22-1 VLAN and Inter-VLAN Routing Configuration - Answer Key

In this lab you will perform a VLAN configuration for a campus network, including Virtual Trunking Protocol, Access and Trunk ports, and inter-VLAN routing.

VTP, Access and Trunk Ports

1) All routers and switches are in a factory default state. View the VLAN database on SW1 to verify no VLANs have been added.

```
SW1#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                Gig0/1, Gig0/2
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
```

2) View the default switchport status on the link from SW1 to SW2.

```
SW1#show interface gig0/1 switchport
Name: Gig0/1
Switchport: Enabled
Administrative Mode: dynamic auto
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
Appliance trust: none
```

The trunking mode is set to dynamic auto and the interface is currently in the access port operational mode using the default VLAN 1.

3) Configure the links between switches as trunks.

```
SW1(config)#int g0/1
SW1(config-if)#switch mode trunk

SW2(config)#int g0/1
SW2(config-if)#switch trunk encap dot1q
SW2(config-if)#switch mode trunk
SW2(config-if)#int g0/2
SW2(config-if)#switch trunk encap dot1q
SW2(config-if)#switch mode trunk

SW3(config)#int g0/2
SW3(config-if)#switch mode trunk
```

4) Configure SW1 as a VTP Server in the VTP domain Flackbox.

```
SW1(config)#vtp domain Flackbox
Changing VTP domain name from NULL to Flackbox
SW1(config)#vtp mode server
Device mode already VTP SERVER.
```

5) SW2 must not synchronise its VLAN database with SW1.

```
SW2(config)#vtp mode transparent
     Setting device to VTP TRANSPARENT mode.
```

6) SW3 must learn VLAN information from SW1. VLANs should not be edited on SW3.

```
SW3(config)#vtp mode client
Setting device to VTP CLIENT mode.
SW3(config)#vtp domain Flackbox
Changing VTP domain name from NULL to Flackbox
```

7) Add the Eng, Sales and Native VLANs on all switches.

VLANs must be configured on the VTP Server SW1 and on VTP Transparent SW2. VTP Client SW3 will learn the VLANs from SW1.

```
SW1(config)#vlan 10
SW1(config-vlan)#name Eng
SW1(config-vlan)#vlan 20
SW1(config-vlan)#name Sales
SW1(config-vlan)#vlan 199
SW1(config-vlan)#name Native

SW2(config)#vlan 10
SW2(config-vlan)#name Eng
SW2(config-vlan)#vlan 20
SW2(config-vlan)#name Sales
SW2(config-vlan)#vlan 199
SW2(config-vlan)#name Native
```

8) Verify the VLANs are in the database on each switch.

```
SW3#sh vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                Gig0/1
10   Eng                              active
20   Sales                            active
199  Native                           active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
```

9) Configure the trunk links to use VLAN 199 as the native VLAN for better security.

```
SW1(config)#interface gig0/1
SW1(config-if)#switch trunk native vlan 199

SW2(config)#int gig0/1
SW2(config-if)#switch trunk native vlan 199
SW2(config-if)#int gig0/2
SW2(config-if)#switch trunk native vlan 199

SW3(config)#int gig0/2
SW3(config-if)#switch trunk native vlan 199
```

10) Configure the switchports connected to the PCs with the correct VLAN configuration.

Eng PCs should be in VLAN 10, Sales PCs in VLAN 20.

```
SW1(config)#int range f0/1 - 2
SW1(config-if-range)#switch mode access
SW1(config-if-range)#switch access vlan 10
SW1(config-if-range)#int f0/3
SW1(config-if)#switch mode access
SW1(config-if)#switch access vlan 20

SW3(config)#int range f0/1 - 2
SW3(config-if-range)#switch mode access
SW3(config-if-range)#switch access vlan 20
SW3(config-if-range)#int f0/3
SW3(config-if)#switch mode access
SW3(config-if)#switch access vlan 10
```

11) Verify the Eng1 PC has connectivity to Eng3.

```
C:\>ping 10.10.10.12

Pinging 10.10.10.12 with 32 bytes of data:

Reply from 10.10.10.12: bytes=32 time<1ms TTL=128
Reply from 10.10.10.12: bytes=32 time<1ms TTL=128
Reply from 10.10.10.12: bytes=32 time<1ms TTL=128
Reply from 10.10.10.12: bytes=32 time=1ms TTL=128

Ping statistics for 10.10.10.12:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

12) Verify Sales1 has connectivity to Sales3.

```
C:\>ping 10.10.20.12

Pinging 10.10.20.12 with 32 bytes of data:

Reply from 10.10.20.12: bytes=32 time=1ms TTL=128
Reply from 10.10.20.12: bytes=32 time<1ms TTL=128
Reply from 10.10.20.12: bytes=32 time<1ms TTL=128
Reply from 10.10.20.12: bytes=32 time<1ms TTL=128

Ping statistics for 10.10.20.12:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Inter-VLAN Routing – Option 1
Separate Interfaces on Router

13) Configure interface FastEthernet0/0 on R1 as the default gateway for the Eng PCs.

```
R1(config)#interface FastEthernet 0/0
R1(config-if)#ip address 10.10.10.1 255.255.255.0
R1(config-if)#no shutdown
```

14) Configure interface FastEthernet0/1 on R1 as the default gateway for the Sales PCs.

```
R1(config)#interface FastEthernet 0/1
R1(config-if)#ip address 10.10.20.1 255.255.255.0
R1(config-if)#no shutdown
```

15) Configure SW2 to support inter-VLAN routing using R1 as the default gateway.

```
SW2(config)#interface FastEthernet 0/1
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 10
SW2(config-if)#interface FastEthernet 0/2
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 20
```

16) Verify the Eng1 PC has connectivity to the VLAN 20 interface on R1.

```
C:\>ping 10.10.20.1

Pinging 10.10.20.1 with 32 bytes of data:

Reply from 10.10.20.1: bytes=32 time<1ms TTL=255
Reply from 10.10.20.1: bytes=32 time=1ms TTL=255
Reply from 10.10.20.1: bytes=32 time<1ms TTL=255
Reply from 10.10.20.1: bytes=32 time=1ms TTL=255

Ping statistics for 10.10.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

17) Verify the Eng1 PC has connectivity to Sales1.

```
C:\>ping 10.10.20.10

Pinging 10.10.20.10 with 32 bytes of data:

Request timed out.
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127

Ping statistics for 10.10.20.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25%
loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

18) Clean-up: Shut down interface FastEthernet0/1 on R1.

```
R1(config)#int f0/1
R1(config-if)#shutdown
```

Inter-VLAN Routing – Option 2
Router on a Stick

19) Configure sub-interfaces on FastEthernet0/0 on R1 as the default gateway for the Eng and Sales PCs.

```
R1(config)#interface FastEthernet 0/0
R1(config-if)#no ip address
R1(config-if)#no shutdown
R1(config-if)#interface FastEthernet 0/0.10
R1(config-subif)#encapsulation dot1q 10
R1(config-subif)#ip address 10.10.10.1 255.255.255.0
R1(config-subif)#interface FastEthernet 0/0.20
R1(config-subif)#encapsulation dot1q 20
R1(config-subif)#ip address 10.10.20.1 255.255.255.0
```

20) Configure SW2 to support inter-VLAN routing using R1 as the default gateway.

```
SW2(config)#interface FastEthernet 0/1
SW2(config-if)#switch trunk encap dot1q
SW2(config-if)#switchport mode trunk
```

21) Verify the Eng1 PC has connectivity to the VLAN 20 interface on R1.

```
C:\>ping 10.10.20.1

Pinging 10.10.20.1 with 32 bytes of data:

Reply from 10.10.20.1: bytes=32 time<1ms TTL=255
Reply from 10.10.20.1: bytes=32 time=1ms TTL=255
Reply from 10.10.20.1: bytes=32 time<1ms TTL=255
Reply from 10.10.20.1: bytes=32 time=1ms TTL=255

Ping statistics for 10.10.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

22) Verify the Eng1 PC has connectivity to Sales1.

```
C:\>ping 10.10.20.10

Pinging 10.10.20.10 with 32 bytes of data:

Request timed out.
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127

Ping statistics for 10.10.20.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25%
loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

23) Clean-up: Shut down interface FastEthernet0/0 on R1.

```
R1(config)#int f0/0
R1(config-if)#shutdown
```

Inter-VLAN Routing – Option 3
Layer 3 Switch

24) Enable layer 3 routing on SW2.

```
SW2(config)#ip routing
```

25) Configure SVIs on SW2 to support inter-VLAN routing between the Eng and Sales VLANs.

```
SW2(config)#interface vlan 10
SW2(config-if)#ip address 10.10.10.1 255.255.255.0
SW2(config-if)#interface vlan 20
SW2(config-if)#ip address 10.10.20.1 255.255.255.0
```

26) Verify the Eng1 PC has connectivity to the VLAN 20 interface on SW2.

```
C:\>ping 10.10.20.1

Pinging 10.10.20.1 with 32 bytes of data:

Reply from 10.10.20.1: bytes=32 time<1ms TTL=255
Reply from 10.10.20.1: bytes=32 time=1ms TTL=255
Reply from 10.10.20.1: bytes=32 time<1ms TTL=255
Reply from 10.10.20.1: bytes=32 time=1ms TTL=255

Ping statistics for 10.10.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

27) Verify the Eng1 PC has connectivity to Sales1.

```
C:\>ping 10.10.20.10

Pinging 10.10.20.10 with 32 bytes of data:

Request timed out.
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127
Reply from 10.10.20.10: bytes=32 time<1ms TTL=127

Ping statistics for 10.10.20.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25%
loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```