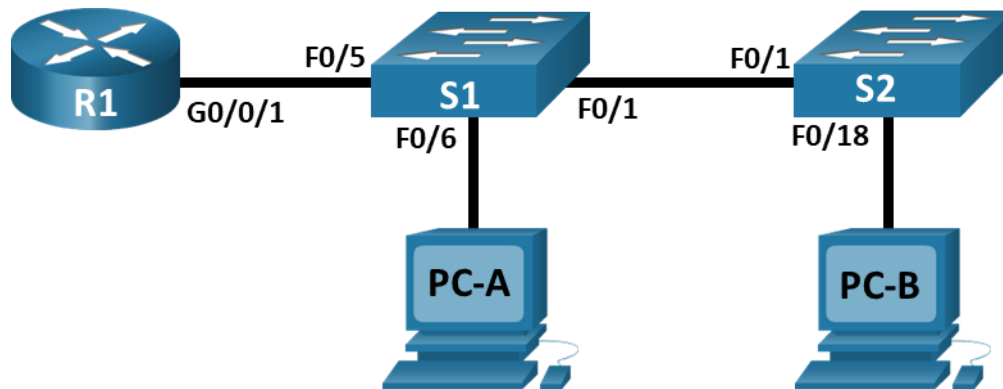


Lab - Implement Inter-VLAN Routing

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0/1.10	192.168.10.1	255.255.255.0	N/A
	G0/0/1.20	192.168.20.1	255.255.255.0	
	G0/0/1.30	192.168.30.1	255.255.255.0	
	G0/0/1.1000	N/A	N/A	
S1	VLAN 10	192.168.10.11	255.255.255.0	192.168.10.1
S2	VLAN 10	192.168.10.12	255.255.255.0	192.168.10.1
PC-A	NIC	192.168.20.3	255.255.255.0	192.168.20.1
PC-B	NIC	192.168.30.3	255.255.255.0	192.168.30.1

VLAN Table

VLAN	Name	Interface Assigned
10	Management	S1: VLAN 10 S2: VLAN 10
20	Sales	S1: F0/6
30	Operations	S2: F0/18
999	Parking_Lot	S1: F0/2-4, F0/7-24, G0/1-2 S2: F0/2-17, F0/19-24, G0/1-2
1000	Native	N/A

Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Create VLANs and Assign Switch Ports

Part 3: Configure an 802.1Q Trunk between the Switches

Part 4: Configure Inter-VLAN Routing on the Router

Part 5: Verify Inter-VLAN Routing is working

Background / Scenario

Modern switches use virtual local-area networks (VLANs) to improve network performance by separating large Layer 2 broadcast domains into smaller ones. VLANs can also be used as a security measure by separating sensitive data traffic from the rest of the network. In general, VLANs make it easier to design a network to support the goals of an organization. Communication between VLANs requires a device operating at Layer 3 of the OSI model. Adding an inter-VLAN router allows the organization to segregate and separate broadcast domains while simultaneously allowing them to communicate with each other.

VLAN trunks are used to span VLANs across multiple devices. Trunks allow the traffic from multiple VLANs to travel over a single link, while keeping the VLAN identification and segmentation intact. A particular kind of inter-VLAN routing, called "Router-on-a-Stick", uses a trunk from the router to the switch to enable all VLANs to pass to the router.

In this lab, you will create VLANs on both switches in the topology, assign VLANs to switch access ports, verify that VLANs are working as expected, create VLAN trunks between the two switches and between S1 and R1, and configure Inter-VLAN routing on R1 to allow hosts in different VLANs to communicate, regardless of which subnet the host resides.

Note: The routers used with CCNA hands-on labs are Cisco 4221 with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

Note: Ensure that the routers and switches have been erased and have no startup configurations. If you are unsure contact your instructor.

Required Resources

- 1 Router (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 2 Switches (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
- 2 PCs (Windows with a terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

Instructions

Part 1: Build the Network and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure basic settings on the PC hosts and switches.

Step 1: Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

Step 2: Configure basic settings for the router.

- a. Console into the router and enable privileged EXEC mode.

```
router> enable
```

- b. Enter configuration mode.

```
router# config terminal
```

- c. Assign a device name to the router.

```
router(config)# hostname R1
```

- d. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.

```
R1(config)# no ip domain lookup
```

- e. Assign **class** as the privileged EXEC encrypted password.

```
R1(config)# enable secret class
```

- f. Assign **cisco** as the console password and enable login.

```
R1(config)# line console 0
```

```
R1(config-line)# password cisco
```

```
R1(config-line)# login
```

- g. Assign **cisco** as the vty password and enable login.

```
R1(config)# line vty 0 4
```

```
R1(config-line)# password cisco
```

```
R1(config-line)# login
```

- h. Encrypt the plaintext passwords.

```
R1(config)# service password-encryption
```

- i. Create a banner that warns anyone accessing the device that unauthorized access is prohibited.

```
R1(config)# banner motd $ Authorized Users Only! $
```

- j. Save the running configuration to the startup configuration file.

```
R1(config)# exit
```

```
R1# copy running-config startup-config
```

- k. Set the clock on the router.

```
R1# clock set 15:30:00 27 Aug 2019
```

Close configuration window

Step 3: Configure basic settings for each switch.

- a. Assign a device name to the switch.

```
switch(config)# hostname S1
```

```
switch(config)# hostname S2
```

- b. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.

```
S1(config)# no ip domain-lookup
```

```
S2(config)# no ip domain-lookup
```

- c. Assign **class** as the privileged EXEC encrypted password.

```
S1(config)# enable secret class
```

```
S2(config)# enable secret class
```

- d. Assign **cisco** as the console password and enable login.

```
S1(config)# line console 0
```

```
S1(config-line)# password cisco
```

```
S1(config-line)# login
```

```
S2(config)# line console 0
```

```
S2(config-line)# password cisco
```

```
S2(config-line)# login
```

- e. Assign **cisco** as the vty password and enable login.

```
S1(config)# line vty 0 4
```

```
S1(config-line)# password cisco
```

```
S1(config-line)# login
```

```
S2(config)# line vty 0 4
```

```
S2(config-line)# password cisco
```

```
S2(config-line)# login
```

- f. Encrypt the plaintext passwords.

```
S1(config)# service password-encryption
```

```
S2(config)# service password-encryption
```

- g. Create a banner that warns anyone accessing the device that unauthorized access is prohibited.

```
S1(config)# banner motd $ Authorized Users Only! $
```

```
S2(config)# exit
```

```
S2(config)# banner motd $ Authorized Users Only! $
```

```
S2(config)# exit
```

- h. Set the clock on the switch.

```
S1# clock set 15:30:00 27 Aug 2019
```

```
S2# clock set 15:30:00 27 Aug 2019
```

- i. Save the running configuration to the startup configuration.

```
S1# copy running-config startup-config
```

```
S2# copy running-config startup-config
```

Step 4: Configure PC hosts.

Refer to the Addressing Table for PC host address information.

Part 2: Create VLANs and Assign Switch Ports

In Part 2, you will create VLANs as specified in the table above on both switches. You will then assign the VLANs to the appropriate interface and verify your configuration settings. Complete the following tasks on each switch.

Step 1: Create VLANs on both switches.

- a. Create and name the required VLANs on each switch from the table above.

```
S1(config)# vlan 10
S1(config-vlan)# name Management
S1(config-vlan)# vlan 20
S1(config-vlan)# name Sales
S1(config-vlan)# vlan 30
S1(config-vlan)# name Operations
S1(config-vlan)# vlan 999
S1(config-vlan)# name Parking_Lot
S1(config-vlan)# vlan 1000
S1(config-vlan)# name Native
S1(config-vlan)# exit
```

```
S2(config)# vlan 10
S2(config-vlan)# name Management
S2(config-vlan)# vlan 20
S2(config-vlan)# name Sales
S2(config-vlan)# vlan 30
S2(config-vlan)# name Operations
S2(config-vlan)# vlan 999
S2(config-vlan)# name Parking_Lot
S2(config-vlan)# vlan 1000
S2(config-vlan)# name Native
S2(config-vlan)# exit
```

- b. Configure the management interface and default gateway on each switch using the IP address information in the Addressing Table.

```
S1(config)# interface vlan 10
S1(config-if)# ip address 192.168.10.11 255.255.255.0
S1(config-if)# no shutdown
S1(config-if)# exit
S1(config)# ip default-gateway 192.168.10.1
```

```
S2(config)# interface vlan 10
S2(config-if)# ip address 192.168.10.12 255.255.255.0
S2(config-if)# no shutdown
S2(config-if)# exit
S2(config)# ip default-gateway 192.168.10.1
```

- c. Assign all unused ports on the switch to the Parking_Lot VLAN, configure them for static access mode, and administratively deactivate them.

Note: The interface range command is helpful to accomplish this task with as few commands as necessary.

```
S1(config)# interface range f0/2 - 4 , f0/7 - 24 , g0/1 - 2
S1(config-if-range)# switchport mode access
S1(config-if-range)# switchport access vlan 999
S1(config-if-range)# shutdown
```

```
S2(config)# interface range f0/2 - 17 , f0/19 - 24 , g0/1 - 2
S2(config-if-range)# switchport mode access
S2(config-if-range)# switchport access vlan 999
S2(config-if-range)# shutdown
```

Step 2: Assign VLANs to the correct switch interfaces.

- a. Assign used ports to the appropriate VLAN (specified in the VLAN table above) and configure them for static access mode.

```
S1(config)# interface f0/6
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 20
```

```
S2(config)# interface f0/18
S2(config-if)# switchport mode access
S2(config-if)# switchport access vlan 30
```

- b. Verify that the VLANs are assigned to the correct interfaces.

```
S1# show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/5
10	Management	active	
20	Sales	active	Fa0/6
30	Operations	active	
999	Parking_Lot	active	Fa0/2, Fa0/3, Fa0/4, 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, Gi0/1, Gi0/2
1000	Native	active	
1002	fddi-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	

```
S2# show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1
10	Management	active	
20	Sales	active	
30	Operations	active	Fa0/18
999	Parking_Lot	active	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 Fa0/19, Fa0/20, Fa0/21, Fa0/22 Fa0/23, Fa0/24, Gi0/1, Gi0/2
1000	Native	active	
1002	fddi-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	

Part 3: Configure an 802.1Q Trunk Between the Switches

In Part 3, you will manually configure interface F0/1 as a trunk.

Step 1: Manually configure trunk interface F0/1 on switch S1 and S2.

- Configure static trunking on interface F0/1 for both switches.

```
S1(config)# interface f0/1
S1(config-if)# switchport mode trunk
```

```
S2(config)# interface f0/1
S2(config-if)# switchport mode trunk
```

- Set the native VLAN to 1000 on both switches.

```
S1(config-if)# switchport trunk native vlan 1000
```

```
S2(config-if)# switchport trunk native vlan 1000
```

- Specify that VLANs 10, 20, 30, and 1000 are allowed to cross the trunk.

```
S1(config-if)# switchport trunk allowed vlan 10,20,30,1000
```

```
S2(config-if)# switchport trunk allowed vlan 10,20,30,1000
```

- Verify trunking ports, the Native VLAN and allowed VLANs across the trunk.

```
S1# show interfaces trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Fa0/1	on	802.1q	trunking	1000

Port	Vlans allowed on trunk
Fa0/1	10,20,30,1000

```
Port      Vlans allowed and active in management domain
Fa0/1     10,20,30,1000
```

```
Port      Vlans in spanning tree forwarding state and not pruned
Fa0/1     10,20,30,1000
```

```
S2# show interfaces trunk
```

```
Port      Mode          Encapsulation  Status        Native vlan
Fa0/1     on            802.1q         trunking      1000
```

```
Port      Vlans allowed on trunk
Fa0/1     10,20,30,1000
```

```
Port      Vlans allowed and active in management domain
Fa0/1     10,20,30,1000
```

```
Port      Vlans in spanning tree forwarding state and not pruned
Fa0/1     10,20,30,1000
```

Step 2: Manually configure S1's trunk interface F0/5

- Configure S1's interface F0/5 with the same trunk parameters as F0/1. This is the trunk to the router.
- Save the running configuration to the startup configuration file.

```
S1# copy running-config startup-config
```

```
S2# copy running-config startup-config
```

- Verify trunking.

What happens if G0/0/1 on R1 is down?

S1 F0/5 will not be displayed if the GigabitEthernet 0/0/1 interface status on the router is down.

Part 4: Configure Inter-VLAN Routing on the Router

Step 1: Configure the router.

- Activate interface G0/0/1 as necessary on the router.

```
R1(config)# interface g0/0/1
R1(config-if)# no shutdown
R1(config-if)# exit
```

- Configure sub-interfaces for each VLAN as specified in the IP addressing table. All sub-interfaces use 802.1Q encapsulation. Ensure the sub-interface for the native VLAN does not have an IP address assigned. Include a description for each sub-interface.

```
R1(config)# interface g0/0/1.10
R1(config-subif)# description Management Network
```



```
R1(config-subif)# encapsulation dot1q 10
R1(config-subif)# ip address 192.168.10.1 255.255.255.0
R1(config-subif)# interface g0/0/1.20
R1(config-subif)# encapsulation dot1q 20
R1(config-subif)# description Sales Network
R1(config-subif)# ip address 192.168.20.1 255.255.255.0
R1(config-subif)# interface g0/0/1.30
R1(config-subif)# encapsulation dot1q 30
R1(config-subif)# description Operations Network
R1(config-subif)# ip address 192.168.30.1 255.255.255.0
R1(config-subif)# interface g0/0/1.1000
R1(config-subif)# encapsulation dot1q 1000 native
R1(config-subif)# description Native VLAN
```

- c. Verify the sub-interfaces are operational

```
R1# show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	unassigned	YES	NVRAM	down	down
GigabitEthernet0/0/1	unassigned	YES	NVRAM	up	up
Gi0/0/1.10	192.168.10.1	YES	manual	up	up
Gi0/0/1.20	192.168.20.1	YES	manual	up	up
Gi0/0/1.30	192.168.30.1	YES	manual	up	up
Gi0/0/1.1000	unassigned	YES	unset	up	up
GigabitEthernet0	unassigned	YES	NVRAM	down	down

Part 5: Verify Inter-VLAN Routing is Working

Step 1: Complete the following tests from PC-A. All should be successful.

Note: You may have to disable the PC firewall for pings to work

- Ping from PC-A to its default gateway.
- Ping from PC-A to PC-B
- Ping from PC-A to S2

Step 2: Complete the following test from PC-B

From the Command Prompt window on PC-B, issue the **tracert** command to the address of PC-A.

What intermediate IP addresses are shown in the results?

The tracert output should show two entries in the results. The first hop is R1's G0/0/1.30 interface address, which is the Gateway address for PC-B. The second hop is PC-A's address.

Router Interface Summary Table

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
4221	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
4300	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.

Device Configs - Final

Switch S1

```
S1# show run
Building configuration...

Current configuration : 3232 bytes
!
version 15.2
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname S1
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$i9s4$16r08XteeFVjmCcZIgmeV0
!
no aaa new-model
```

Lab - Implement Inter-VLAN Routing

```
system mtu routing 1500
!
!
no ip domain-lookup
!
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
!
interface FastEthernet0/1
 switchport trunk allowed vlan 10,20,30,1000
 switchport trunk native vlan 1000
 switchport mode trunk
!
interface FastEthernet0/2
 switchport access vlan 999
 switchport mode access
 shutdown
!
interface FastEthernet0/3
 switchport access vlan 999
 switchport mode access
 shutdown
!
interface FastEthernet0/4
 switchport access vlan 999
 switchport mode access
 shutdown
!
interface FastEthernet0/5
 switchport trunk allowed vlan 10,20,30,1000
 switchport trunk native vlan 1000
 switchport mode trunk
!
interface FastEthernet0/6
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/7
 switchport access vlan 999
 switchport mode access
 shutdown
!
interface FastEthernet0/8
 switchport access vlan 999
 switchport mode access
 shutdown
```

```
!  
interface FastEthernet0/9  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/10  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/11  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/12  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/13  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/14  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/15  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/16  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/17  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/18  
  switchport access vlan 999  
  switchport mode access  
  shutdown
```

```
!  
interface FastEthernet0/19  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/20  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/21  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/22  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/23  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/24  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface GigabitEthernet0/1  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface GigabitEthernet0/2  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface Vlan1  
  no ip address  
  shutdown  
!  
interface Vlan10  
  ip address 192.168.10.11 255.255.255.0  
!  
ip http server  
ip http secure-server
```

```
!  
banner motd ^C Authorized Users Only! ^C  
!  
line con 0  
  password 7 110A1016141D  
  login  
line vty 0 4  
  password 7 110A1016141D  
  login  
line vty 5 15  
  login  
!  
end
```

Switch S2

```
S2# show run  
Building configuration...  
  
Current configuration : 3181 bytes  
!  
version 15.2  
no service pad  
service timestamps debug datetime msec  
service timestamps log datetime msec  
service password-encryption  
!  
hostname S2  
!  
boot-start-marker  
boot-end-marker  
!  
enable secret 5 $1$Egw6$KhQsKEMbfcGBIoVHJ2Q8F.  
!  
no aaa new-model  
system mtu routing 1500  
!  
!  
no ip domain-lookup  
!  
!  
spanning-tree mode rapid-pvst  
spanning-tree extend system-id  
!  
vlan internal allocation policy ascending  
!  
!  
interface FastEthernet0/1  
  switchport trunk allowed vlan 10,20,30,1000  
  switchport trunk native vlan 1000
```

```
switchport mode trunk
!
interface FastEthernet0/2
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/3
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/4
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/5
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/6
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/7
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/8
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/9
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/10
switchport access vlan 999
switchport mode access
shutdown
!
interface FastEthernet0/11
switchport access vlan 999
switchport mode access
```

```
shutdown
!
interface FastEthernet0/12
  switchport access vlan 999
  switchport mode access
  shutdown
!
interface FastEthernet0/13
  switchport access vlan 999
  switchport mode access
  shutdown
!
interface FastEthernet0/14
  switchport access vlan 999
  switchport mode access
  shutdown
!
interface FastEthernet0/15
  switchport access vlan 999
  switchport mode access
  shutdown
!
interface FastEthernet0/16
  switchport access vlan 999
  switchport mode access
  shutdown
!
interface FastEthernet0/17
  switchport access vlan 999
  switchport mode access
  shutdown
!
interface FastEthernet0/18
  switchport access vlan 30
  switchport mode access
!
interface FastEthernet0/19
  switchport access vlan 999
  switchport mode access
  shutdown
!
interface FastEthernet0/20
  switchport access vlan 999
  switchport mode access
  shutdown
!
interface FastEthernet0/21
  switchport access vlan 999
  switchport mode access
  shutdown
```


Lab - Implement Inter-VLAN Routing

```
!  
interface FastEthernet0/22  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/23  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface FastEthernet0/24  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface GigabitEthernet0/1  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface GigabitEthernet0/2  
  switchport access vlan 999  
  switchport mode access  
  shutdown  
!  
interface Vlan1  
  no ip address  
!  
interface Vlan10  
  ip address 192.168.10.12 255.255.255.0  
!  
ip http server  
ip http secure-server  
!  
banner motd ^C Authorized Users Only! ^C  
!  
line con 0  
  password 7 00071A150754  
  login  
line vty 0 4  
  password 7 00071A150754  
  login  
line vty 5 15  
  login  
!  
end
```

Router R1

```
R1# show run
Building configuration...

Current configuration : 4347 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
vrf definition Mgmt-intf
!
  address-family ipv4
    exit-address-family
  !
  address-family ipv6
    exit-address-family
  !
enable secret 5 $1$1A12$hVlCY2CB18CBDtaHd48hq/
!
no aaa new-model
!
no ip domain lookup
!
ip dhcp pool webuidhcp
!
login on-success log
!
subscriber templating
!
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
redundancy
  mode none
!
interface GigabitEthernet0/0/0
  no ip address
  negotiation auto
```

Lab - Implement Inter-VLAN Routing

```
!  
interface GigabitEthernet0/0/1  
  no ip address  
  negotiation auto  
!  
interface GigabitEthernet0/0/1.10  
  description Management Network  
  encapsulation dot1Q 10  
  ip address 192.168.10.1 255.255.255.0  
!  
interface GigabitEthernet0/0/1.20  
  description Sales network  
  encapsulation dot1Q 20  
  ip address 192.168.20.1 255.255.255.0  
!  
interface GigabitEthernet0/0/1.30  
  description Operations Network  
  encapsulation dot1Q 30  
  ip address 192.168.30.1 255.255.255.0  
!  
interface GigabitEthernet0/0/1.1000  
  description Native VLAN  
  encapsulation dot1Q 1000 native  
!  
interface Serial0/1/0  
  no ip address  
  shutdown  
!  
interface Serial0/1/1  
  no ip address  
  shutdown  
!  
interface GigabitEthernet0  
  vrf forwarding Mgmt-intf  
  no ip address  
  negotiation auto  
!  
ip forward-protocol nd  
no ip http server  
ip http secure-server  
ip tftp source-interface GigabitEthernet0  
!  
control-plane  
!  
banner motd ^C Authorized Users Only! ^C  
!  
line con 0  
password 7 070C285F4D06  
login  
transport input none
```

Lab - Implement Inter-VLAN Routing

```
stopbits 1
line aux 0
stopbits 1
line vty 0 4
password 7 104D000A0618
login
!
end
```