Lab - Troubleshooting VLAN Configurations (Solution)

Topology

1. Addressing Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Device | Interface | IP Address | Subnet Mask | Default Gateway |
| S1 | VLAN 1 | 192.168.1.2 | 255.255.255.0 | N/A |
| S2 | VLAN 1  | 192.168.1.3 | 255.255.255.0 | N/A |
| PC-A | NIC | 192.168.10.2 | 255.255.255.0 | 192.168.10.1 |
| PC-B | NIC | 192.168.10.3 | 255.255.255.0 | 192.168.10.1 |
| PC-C | NIC | 192.168.20.3 | 255.255.255.0 | 192.168.20.1 |

Switch Port Assignment Specifications

|  |  |  |
| --- | --- | --- |
| Ports | Assignment | Network |
| F0/1 | 802.1Q Trunk | N/A |
| F0/6-12 | VLAN 10 – Students | 192.168.10.0/24 |
| F0/13-18 | VLAN 20 – Faculty | 192.168.20.0/24 |
| F0/19-24 | VLAN 30 – Guest | 192.168.30.0/24 |

Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Troubleshoot VLAN 10

Part 3: Troubleshoot VLAN 20

1. Background / Scenario

VLANs provide logical segmentation within an internetwork and improve network performance by separating large broadcast domains into smaller ones. By separating hosts into different networks, VLANs can be used to control which hosts can communicate. In this lab, a school has decided to implement VLANs in order to separate traffic from different end users. The school is using 802.1Q trunking to facilitate VLAN communication between switches.

The S1 and S2 switches have been configured with VLAN and trunking information. Several errors in the configuration have resulted in connectivity issues. You have been asked to troubleshoot and correct the configuration errors and document your work.

**Note**: The switches used with this lab are Cisco Catalyst 2960s with Cisco IOS Release 15.0(2) (lanbasek9 image). Other switches and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and output produced might vary from what is shown in the labs.

**Note**: Make sure that the switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

1. Required Resources
* 2 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
* 3 PCs (Windows 7, Vista, or XP with 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
1. Build the Network and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure the switches with some basic settings, such as passwords and IP addresses. Preset VLAN-related configurations, which contain errors, are provided for you for the initial switch configurations. You will also configure the IP settings for the PCs in the topology.

* 1. Cable the network as shown in the topology.
	2. Configure PC hosts.
	3. Initialize and reload the switches as necessary.
	4. Configure basic settings for each switch.
		1. Disable DNS lookup.
		2. Configure the IP address according to the Addressing Table.
		3. Assign **cisco** as the console and vty passwords and enable login for console and vty lines.
		4. Assign **class** as the privileged EXEC password.
		5. Configure **logging synchronous** to prevent console messages from interrupting command entry.
	5. Load switch configurations.

The configurations for the switches S1 and S2 are provided for you. There are errors within these configurations, and it is your job to determine the incorrect configurations and correct them.

Switch S1 Configuration:

hostname S1

vlan 10

 name Students

vlan 2

!vlan 20

name Faculty

vlan 30

 name Guest

interface range f0/1-24

 switchport mode access

 shutdown

!interface f0/1

! switchport mode trunk

! no shutdown

interface range f0/7-12

!interface range f0/6-12

 switchport access vlan 10

interface range f0/13-18

 switchport access vlan 2

! switchport access vlan 20

interface range f0/19-24

 switchport access vlan 30

end

Switch S2 Configuration:

hostname S2

vlan 10

 name Students

vlan 20

 name Faculty

vlan 30

 name Guest

interface f0/1

 switchport mode trunk

 switchport trunk allowed vlan 1,10,2,30

! switchport trunk allowed vlan 1,10,20,30

interface range f0/2-24

 switchport mode access

 shutdown

!interface range f0/6-12

! switchport access vlan 10

interface range f0/13-18

 switchport access vlan 20

interface range f0/19-24

 switchport access vlan 30

 shutdown

end

* 1. Copy the running configuration to the startup configuration.
1. Troubleshoot VLAN 10

In Part 2, you must examine VLAN 10 on S1 and S2 to determine if it is configured correctly. You will troubleshoot the scenario until connectivity is established.

* 1. Troubleshoot VLAN 10 on S1.
		1. Can PC-A ping PC-B? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ No
		2. After verifying that PC-A was configured correctly, examine the S1 switch to find possible configuration errors by viewing a summary of the VLAN information. Enter the **show vlan brief** command.

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/1, Fa0/2, Fa0/3, Fa0/4

 Fa0/5, Fa0/6, Gi0/1, Gi0/2

2 Faculty active Fa0/13, Fa0/14, Fa0/15, Fa0/16

 Fa0/17, Fa0/18

10 Students active Fa0/7, Fa0/8, Fa0/9, Fa0/10

 Fa0/11, Fa0/12

30 Guest active Fa0/19, Fa0/20, Fa0/21, Fa0/22

 Fa0/23, Fa0/24

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

* + 1. Are there any problems with the VLAN configuration?

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Yes. The port for PC-A is not assigned to the correct VLAN. The port for F0/1 is assigned to VLAN 1; therefore, it is not acting as a trunk port.

* + 1. Examine the switch for trunk configurations using the **show interfaces trunk** and the **show interfaces f0/1 switchport** commands.

S1# **show interfaces trunk**

S1# **show interfaces f0/1 switchport**

Name: Fa0/1

Switchport: Enabled

Administrative Mode: static access

Operational Mode: down

Administrative Trunking Encapsulation: dot1q

Negotiation of Trunking: Off

Access Mode VLAN: 1 (default)

Trunking Native Mode VLAN: 1 (default)

Administrative Native VLAN tagging: enabled

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 Native VLAN tagging: enabled

Administrative private-vlan trunk encapsulation: dot1q

Administrative private-vlan trunk normal VLANs: none

Administrative private-vlan trunk associations: none

Administrative private-vlan trunk mappings: none

Operational private-vlan: none

Trunking VLANs Enabled: ALL

Pruning VLANs Enabled: 2-1001

Capture Mode Disabled

Capture VLANs Allowed: ALL

Protected: false

Unknown unicast blocked: disabled

Unknown multicast blocked: disabled

Appliance trust: none

* + 1. Are there any problems with the trunking configuration?

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Yes. No trunk ports exist and F0/1 is configured as an access port instead of a trunk port.

* + 1. Examine the running configuration of the switch to find possible configuration errors.

Are there any problems with the current configuration?

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Yes. F0/1-5 are all configured as access ports and all ports on the switch are shutdown.

* + 1. Correct the errors found regarding F0/1 and VLAN 10 on S1. Record the commands used in the space below.

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S1(config)# **interface f0/1**

S1(config-if)# **no shutdown**

S1(config-if)# **switchport mode trunk**

S1(config-if)# **interface f0/6**

S1(config-if)# **no shutdown**

S1(config-if)# **switchport access vlan 10**

* + 1. Verify the commands had the desired effects by issuing the appropriate **show** commands.

S1# **show interfaces trunk**

Port Mode Encapsulation Status Native vlan

Fa0/1 on 802.1q trunking 1

Port Vlans allowed on trunk

Fa0/1 1-4094

Port Vlans allowed and active in management domain

Fa0/1 1-2,10,30

Port Vlans in spanning tree forwarding state and not pruned

Fa0/1 1-2,10,30

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/2, Fa0/3, Fa0/4, Fa0/5

 Gi0/1, Gi0/2

2 Faculty active Fa0/13, Fa0/14, Fa0/15, Fa0/16

 Fa0/17, Fa0/18

10 Students active Fa0/6, Fa0/7, Fa0/8, Fa0/9

 Fa0/10, Fa0/11, Fa0/12

30 Guest active Fa0/19, Fa0/20, Fa0/21, Fa0/22

 Fa0/23, Fa0/24

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

* + 1. Can PC-A ping PC-B? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ No
	1. Troubleshoot VLAN 10 on S2.
		1. Using the previous commands, examine the S2 switch to find possible configuration errors.

Are there any problems with the current configuration?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Yes. No ports were assigned access to VLAN 10 and ports F0/1 and F0/11 are shutdown.

S2# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/2, Fa0/3, Fa0/4, Fa0/5

 Fa0/6, Fa0/7, Fa0/8, Fa0/9

 Fa0/10, Fa0/11, Fa0/12, Gi0/1

 Gi0/2

10 Students active

20 Faculty active Fa0/13, Fa0/14, Fa0/15, Fa0/16

 Fa0/17, Fa0/18

30 Guest active Fa0/19, Fa0/20, Fa0/21, Fa0/22

 Fa0/23, Fa0/24

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

* + 1. Correct the errors found regarding interfaces and VLAN 10 on S2. Record the commands below.

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S2(config)# **interface range f0/6-12**

S2(config-if-range)# **switchport access vlan 10**

S2(config-if-range)# **interface f0/11**

S2(config-if)# **no shutdown**

* + 1. Can PC-A ping PC-B? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Yes
1. Troubleshoot VLAN 20

In Part 3, you must examine VLAN 20 on S1 and S2 to determine if it is configured correctly. To verify functionality, you will reassign PC-A into VLAN 20, and then troubleshoot the scenario until connectivity is established.

* 1. Assign PC-A to VLAN 20.
		1. On PC-A, change the IP address to 192.168.20.2/24 with a default gateway of 192.168.20.1.
		2. On S1, assign the port for PC-A to VLAN 20. Write the commands needed to complete the configuration.

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S1(config)# **interface f0/6**

S1(config-if)# **switchport access vlan 20**

* + 1. Verify that the port for PC-A has been assigned to VLAN 20.

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/2, Fa0/3, Fa0/4, Fa0/5

 Gi0/1, Gi0/2

2 Faculty active Fa0/13, Fa0/14, Fa0/15, Fa0/16

 Fa0/17, Fa0/18

10 Students active Fa0/7, Fa0/8, Fa0/9, Fa0/10

 Fa0/11, Fa0/12

20 VLAN0020 active Fa0/6

30 Guest active Fa0/19, Fa0/20, Fa0/21, Fa0/22

 Fa0/23, Fa0/24

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

* + 1. Can PC-A ping PC-C? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ No
	1. Troubleshoot VLAN 20 on S1.
		1. Using the previous commands, examine the S1 switch to find possible configuration errors.

Are there any problems with the current configuration?

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Yes. VLAN 2 was created instead of VLAN 20 and ports have been assigned to VLAN 2 instead of VLAN 20.

* + 1. Correct the errors found regarding VLAN 20.

S1(config)# **interface range f0/13-18**

S1(config-if-range)# **switchport access vlan 20**

S1(config-if-range)# **exit**

S1(config)# **no vlan 2**

S1(config)# **vlan 20**

S1(config-vlan)# **name Faculty**

* + 1. Can PC-A ping PC-C? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ No
	1. Troubleshoot VLAN 20 on S2.
		1. Using the previous commands, examine the S2 switch to find possible configuration errors.

Are there any problems with the current configuration?

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Yes. The trunked interface has been misconfigured to allow communication for VLAN 2 instead of VLAN 20 and port f0/18 is shutdown.

S2# **show interfaces trunk**

Port Mode Encapsulation Status Native vlan

Fa0/1 on 802.1q trunking 1

Port Vlans allowed on trunk

Fa0/1 1-2,10,30

Port Vlans allowed and active in management domain

Fa0/1 1,10,30

Port Vlans in spanning tree forwarding state and not pruned

Fa0/1 1,10,30

S2# **show run interface f0/18**

Building configuration...

Current configuration : 95 bytes

!

interface FastEthernet0/18

 switchport access vlan 20

 switchport mode access

 shutdown

end

* + 1. Correct the errors found regarding VLAN 20. Record the commands used below.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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S2(config)# **interface f0/18**

S2(config-if)# **no shutdown**

S2(config)# **interface f0/1**

S2(config-if)# **switchport trunk allowed vlan remove 2**

S2(config-if)# **switchport trunk allowed vlan add 20**

* + 1. Can PC-A ping PC-C? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Yes

**Note**: It may be necessary to disable the PC firewall to ping between PCs.

1. Reflection
	1. Why is a correctly configured trunk port critical in a multi-VLAN environment?

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An 802.1Q trunk port allows for transmission of multiple VLANs across one link. An incorrectly configured trunk port can prevent VLANs from communicating across switches.

* 1. Why would a network administrator limit traffic for specific VLANs on a trunk port?

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To prevent unwanted VLAN traffic from traveling through that trunk port.

1. Device Configs

**Note**: The VLANs configured do not display in the running configuration but are stored in the vlan.dat file.

1. Switch S1

S1# show vlan brief

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/2, Fa0/3, Fa0/4, Fa0/5

 Gi0/1, Gi0/2

10 Students active Fa0/7, Fa0/8, Fa0/9, Fa0/10

 Fa0/11, Fa0/12

20 Faculty active Fa0/6, Fa0/13, Fa0/14, Fa0/15

 Fa0/16, Fa0/17, Fa0/18

30 Guest active Fa0/19, Fa0/20, Fa0/21, Fa0/22

 Fa0/23, Fa0/24

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

S1#show run

Building configuration...

Current configuration : 3966 bytes

!

version 15.0

no service pad

service timestamps debug uptime

service timestamps log uptime

no service password-encryption

!

hostname S1

!

boot-start-marker

boot-end-marker

!

enable secret 5 $1$Hf8a$8iwF0hp1dYGtxw1UsJuE5/

!

no aaa new-model

system mtu routing 1500

!

!

no ip domain-lookup

!

!

!

spanning-tree mode pvst

spanning-tree extend system-id

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface FastEthernet0/1

 switchport mode trunk

!

interface FastEthernet0/2

 switchport mode access

 shutdown

!

interface FastEthernet0/3

 switchport mode access

 shutdown

!

interface FastEthernet0/4

 switchport mode access

 shutdown

!

interface FastEthernet0/5

 switchport mode access

 shutdown

!

interface FastEthernet0/6

 switchport access vlan 20

 switchport mode access

!

interface FastEthernet0/7

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/8

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/9

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/10

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/11

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/12

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/13

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/14

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/15

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/16

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/17

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/18

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/19

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/20

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/21

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/22

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/23

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/24

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface GigabitEthernet0/1

!

interface GigabitEthernet0/2

!

interface Vlan1

 ip address 192.168.1.2 255.255.255.0

 no ip route-cache

!

ip http server

ip http secure-server

logging esm config

!

line con 0

 password cisco

 logging synchronous

 login

line vty 0 4

 password cisco

 login

line vty 5 15

 password cisco

 login

!

end

1. Switch S2

S2# show vlan brief

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/2, Fa0/3, Fa0/4, Fa0/5

 Gi0/1, Gi0/2

10 Students active Fa0/6, Fa0/7, Fa0/8, Fa0/9

 Fa0/10, Fa0/11, Fa0/12

20 Faculty active Fa0/13, Fa0/14, Fa0/15, Fa0/16

 Fa0/17, Fa0/18

30 Guest active Fa0/19, Fa0/20, Fa0/21, Fa0/22

 Fa0/23, Fa0/24

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

S2# show run

Building configuration...

Current configuration : 3966 bytes

!

! Last configuration change at 00:07:17 UTC Mon Mar 1 1993

!

version 15.0

no service pad

service timestamps debug uptime

service timestamps log uptime

no service password-encryption

!

hostname S2

!

boot-start-marker

boot-end-marker

!

enable secret 5 $1$T7f6$AYijjsmnLmWzgIAET.DDj/

!

no aaa new-model

system mtu routing 1500

!

!

no ip domain-lookup

!

!

!

spanning-tree mode pvst

spanning-tree extend system-id

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface FastEthernet0/1

 switchport trunk allowed vlan 1,10,20,30

 switchport mode trunk

!

interface FastEthernet0/2

 switchport mode access

 shutdown

!

interface FastEthernet0/3

 switchport mode access

 shutdown

!

interface FastEthernet0/4

 switchport mode access

 shutdown

!

interface FastEthernet0/5

 switchport mode access

 shutdown

!

interface FastEthernet0/6

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/7

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/8

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/9

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/10

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/11

 switchport access vlan 10

 switchport mode access

!

interface FastEthernet0/12

 switchport access vlan 10

 switchport mode access

 shutdown

!

interface FastEthernet0/13

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/14

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/15

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/16

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/17

 switchport access vlan 20

 switchport mode access

 shutdown

!

interface FastEthernet0/18

 switchport access vlan 20

 switchport mode access

!

interface FastEthernet0/19

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/20

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/21

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/22

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/23

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface FastEthernet0/24

 switchport access vlan 30

 switchport mode access

 shutdown

!

interface GigabitEthernet0/1

!

interface GigabitEthernet0/2

!

interface Vlan1

 ip address 192.168.1.3 255.255.255.0

 no ip route-cache

!

ip http server

ip http secure-server

logging esm config

!

line con 0

 password cisco

 logging synchronous

 login

line vty 0 4

 password cisco

 login

line vty 5 15

 password cisco

 login

!

end