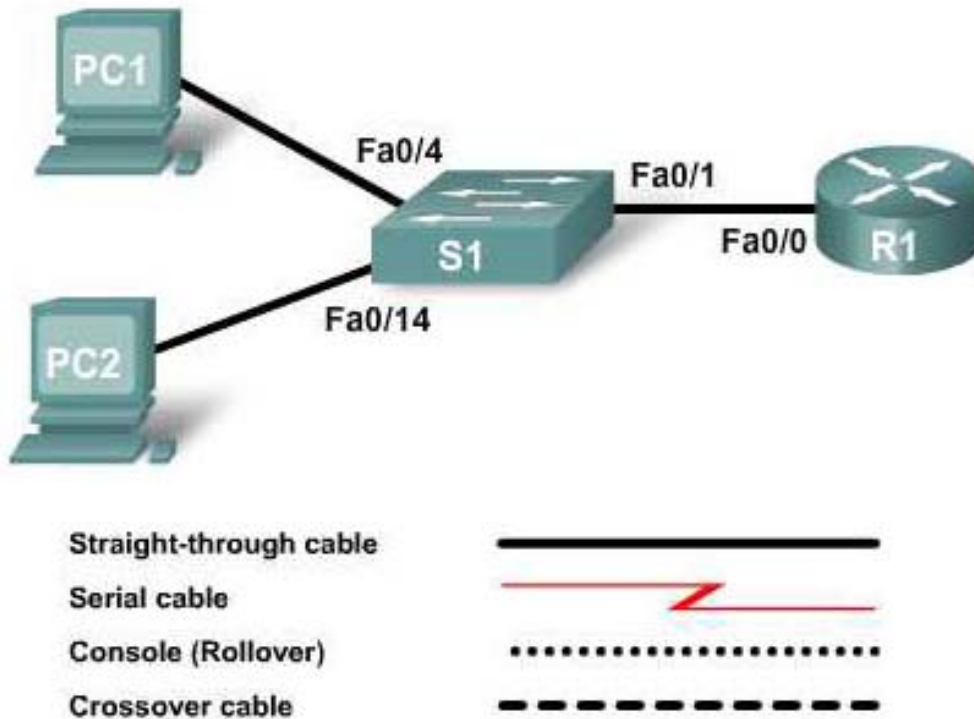Cisco | Networking Academy®
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Lab 7.1.6 Analyzing a Test Plan and Performing a Test

Objectives

- Analyze a sample test plan to determine:
    - The subject of the test
    - The methods and tools for testing
    - The potential results
- Perform the test using the lab equipment.

640-802 CCNA Exam Objectives

This lab contains skills that relate to the following CCNA exam objectives:

- Perform and verify initial switch configuration tasks, including remote access management.
- Verify network status and switch operation using basic utilities (including: ping, traceroute, Telnet, SSH, arp, ipconfig), and **show** and **debug** commands.
- Describe how VLANs create logically separate networks and the need for routing between them.
- Configure, verify, and troubleshoot VLANs.

Expected Results and Success Criteria

Before starting this lab, read through the tasks that you are expected to perform. What do you expect the result of performing these tasks will be?

_____

_____

_____

How is an understanding of the ability to analyze a test plan important in network prototyping?

_____

_____

_____

How will a network administrator know if the test was successful?

_____

_____

_____

Background / Preparation

This lab demonstrates the analysis of a standardized test plan to determine the nature of the test to be performed, the methods and tools to be used, and the potential results. After analyzing and answering questions regarding the test plan, you will document the results of the specified tests.

The configuration output used in this lab matches that of a 2960 switch and 1841 series router. The same commands can be used with other Cisco switches and routers but may produce slightly different output.

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Example Test Plan

Table of Contents

Introduction

> **INSTRUCTIONS: Explain briefly what the purpose of the test is and what should be observed. Include a brief description of testing goals. List all tests that you intend to run.**

The purpose of this prototype is to demonstrate how the individual Access Layer VLANs can be configured to separate traffic from the end devices, IP telephones, and video cameras. The intent is to demonstrate that computers on VLAN 10 cannot access devices on the voice VLAN unless inter-vlan routing is configured.

- Test 1: Basic VLAN Connectivity Test

  - Verify physical and IP connectivity between devices on the prototype network.

  - Demonstrate IP connectivity between devices on the same VLANs.

  - Demonstrate lack of IP connectivity between devices on different VLANs.

- Test 2: VLAN Routing Test

 - Demonstrate routing of traffic between separate VLANs, unrestricted.

Equipment

> **INSTRUCTIONS: List all of the equipment needed to perform the tests. Be sure to include cables, optional connectors or components, and software.**

Qty. Rqd	Model	Additional options or software required	Substitute	IOS Software Rev.
1	2960 Layer 2 switch	none	Any 2950 or 2960 model switch	12.2 or above
1	37xx multilayer switch	none	Any multilayer switch or router with minimum 1 FastEthernet port.	12.2 or above
2	Personal Computer end devices	FastEthernet NIC	At least one PC and any other IP end-device (camera, printer, etc.)	Windows, MAC, or Linux operating system
3	Cat 5 or above straight-through patch cables	none	none	n/a

Design and Topology Diagram

INSTRUCTIONS: Place a copy of the prototype network topology in this section. This is the network as it should be built to be able to perform the required tests. If this topology duplicates a section of the actual network, include a reference topology showing the location within the existing or planned network. Initial configurations for each device must be included in the Appendix.

Add a description about this design here that is essential to provide a better understanding of the testing or to emphasize any aspect of the test network to the reader.
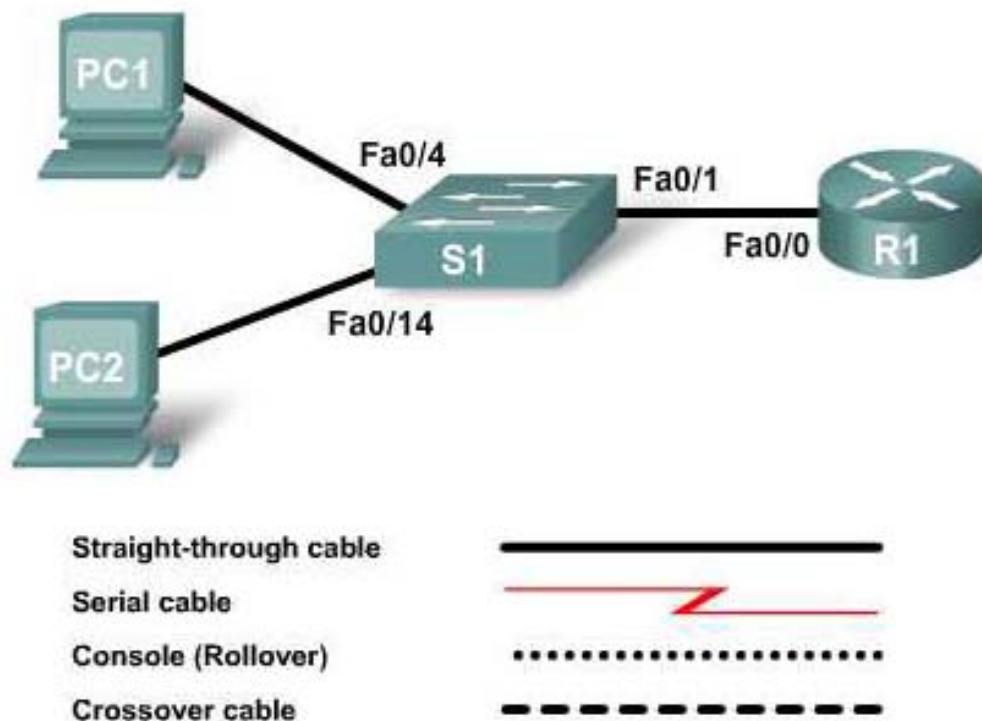
IP Address Plan

Device Designation	Device Name	Fast Ethernet Address	Subnet Mask	Default Gateway
R1	FC-CPE-1	Fa0/0.1 – 10.0.1.1 Fa0/0.10 – 10.0.10.1 Fa0/0.20 – 10.0.20.1	255.255.255.0	
S1	FC-ASW-1	VLAN1 10.0.1.2	255.255.255.0	10.0.1.1
PC1	Host1	10.0.10.2	255.255.255.0	10.0.10.1
PC2	Host2	10.0.20.2	255.255.255.0	10.0.20.1

VLAN Plan

Switch	VLAN Names and IDs	IP Address Range	Group	Switch Ports
S1	VLAN1 management	10.0.1.2	Network Management	Fa0/1
S1	VLAN10 main-net	10.0.10.0 / 24	Network Users	Fa0/2 -12
S1	VLAN20 voice	10.0.20.0 / 24	IP Phones	Fa0/13 - 24

In Test 1, each of the two PCs is to be attached to a different VLAN on the switch. In Test 2, the switch is connected to the router with a trunk link and the router will be configured with subinterfaces to route between the two PCs.

Test 1. Description: Basic VLAN Connectivity Test

INSTRUCTIONS: For each test to be performed state the goals of the test, the data to record during the test, and the estimated time required to perform the test.

Goals of Test:

The goal of the basic connectivity test is to verify that the proper physical connections are made, that the topology is up, and that devices are correctly configured.

Data to Record:

Switch and PC Configurations

Ping Test results

Estimated Time:

60 minutes

Test 1. Procedures

INSTRUCTIONS: Itemize the procedures to follow to perform the test.

1. Console into the switch and start a log file. Get the `show running-config` and `show vlans` from the switch.
2. Verify that VLANs are correctly configured. Record any anomalies.
3. Verify the IP configurations of the PCs.
4. Test IP connectivity between host devices on the same VLAN.
5. Test IP connectivity between host devices on different VLANs.

Test 1. Expected Results and Success Criteria

INSTRUCTIONS: List all of the expected results. Specific criteria that must be met for the test to be considered a success should be listed. An example of specific criteria is: "A requirement that ping response times cannot exceed 100 ms."

1. Hosts on a VLAN can ping successfully to other hosts on the same VLAN.
2. Hosts on different VLANs are unable to ping successfully.

Test 1. Results and Conclusions

INSTRUCTIONS: Record the results of the tests and the conclusions that can be drawn from the results.

When Hosts 1 and 2 are in the same VLAN and with compatible IP addresses, they can communicate. When they are in different VLANs they cannot.

Test 2. Description: VLAN Routing Test

Goals of Test:

The goal of the VLAN routing test is to verify that the host on one VLAN and subnetwork can communicate with a host on another VLAN and subnetwork, using the router.

Data to Record:

Configurations

Routing Tables

Ping Test results

Estimated Time:

60 minutes

Test 2. Procedures

1. Console into the switch and ping all router subinterfaces and other devices in the topology. Record any anomalies.
2. Ping the switch and the router default gateway from each PC. Record any anomalies.
3. Telnet from each PC to the switch and the router.
4. Start a log file and get the `show running-config` and `show vlans` from the switch and router. Get the `show ip route` from the router.
5. Test IP connectivity between host devices on the same VLAN.
6. Test IP connectivity between host devices on different VLANs.

Test 2. Expected Results and Success Criteria:

1. All networking devices are connected and accessible through ping and Telnet.
2. Hosts on a VLAN can ping successfully to other hosts on the same VLAN.
3. Hosts on different VLANs are able to ping successfully using the router.

Test 2. Results and Conclusions

When hosts are in different VLANs, they can communicate via the router.

*** END OF TEST PLAN ***

Task 1: Analyze the Test Plan

Analyze the test plan shown above and answer the following questions:

a. What are the four main sections of the test plan?

_____

_____

_____

_____

b. How many tests are defined within the test plan in this lab? _____

c. In which testing subsection would you find the types of commands or analysis tools used to determine if the test was successful? _____

d. In which main test plan section would you find a description the devices and cabling used to build the prototype for the test plan? _____

e. In which main testing section would an overall description of the tests to be performed and the reasons why they are being specified in the test plan? _____

Task 2: Configure the PCs and switch VLANs and perform Test 1

Step 1: Connect devices and configure PC IP addresses

NOTE: If the PC used in this lab is also connected to your Academy LAN or to the Internet, ensure that you record the cable connections and TCP/IP settings so that these can be restored at the conclusion of the lab.

a. Connect the switch to the router as shown in the Test Plan topology diagram.

b. Connect the PC1 and PC2 hosts to the switch using the ports indicated in the Test Plan topology table.

c. Using the IP address information from the Test Plan table, configure PC1 and PC2.

Step 2: Prepare the switch for configuration

a. Connect a PC with a console cable to the switch to perform configurations using a terminal emulation program.

b. Confirm that the switch is ready for lab configuration by ensuring that all existing VLAN and general configurations are removed.

Remove the switch startup configuration file from NVRAM.

```
Switch#erase startup-config
Erasing the nvram filesystem will remove all files! Continue? [confirm]
```

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

c. If the switch has previously been configured with VLANs, it will necessary to delete the VLAN database information file. From the privileged EXEC mode, issue the following commands:

```
Switch#delete vlan.dat
Delete filename [vlan.dat]?[Enter]
Delete flash:/vlan.dat? [confirm] [Enter]
```

If there was no VLAN file, this message is displayed.

```
%Error deleting flash:/vlan.dat (No such file or directory)
```

It is recommended that the **delete** command not be issued as: **delete flash:vlan.dat**. Accidentally omitting **vlan.dat** from this command could lead to the complete IOS being deleted from flash memory.

Issuing the **reload** command to restart the switch may not always clear the previous VLAN configuration; for that reason, the power cycle (hardware restart) step is recommended.

Step 3: Configure VLANs on switch S1

a. Configure switch S1 with a hostname and passwords.

```
Switch(config)#hostname FC-ASW-1
FC-ASW-1(config)#enable password cisco
FC-ASW-1(config)#enable secret class
FC-ASW-1(config)#line console 0
FC-ASW-1(config-line)#password cisco
FC-ASW-1(config-line)#login
FC-ASW-1(config-line)#line vty 0 15
FC-ASW-1(config-line)#password cisco
FC-ASW-1(config-line)#login
FC-ASW-1(config-line)#exit
FC-ASW-1(config)#
```

b. Configure switch S1 with the VLAN 1 IP address of 10.0.1.2/24.

```
FC-ASW-1(config)#interface vlan1
FC-ASW-1(config-if)#ip address 10.0.1.2 255.255.255.0
FC-ASW-1(config-if)#no shutdown
FC-ASW-1(config-if)#exit
FC-ASW-1(config)#
```

c. Configure switch S1 with the default gateway address of 10.0.1.1.

```
FC-ASW-1(config)#ip default-gateway 10.0.1.1
FC-ASW-1(config)#
```

d. Create VLAN 10 named **main-net** and VLAN 20 named **voice**.

```
FC-ASW-1(config)#vlan 10
FC-ASW-1(config-vlan)#name main-net
FC-ASW-1(config-vlan)#exit
FC-ASW-1(config-vlan)#vlan 20
FC-ASW-1(config-vlan)#name voice
FC-ASW-1(config-vlan)#exit
FC-ASW-1(config)#
```

e. Assign interface range Fa0/2 through Fa0/12 to VLAN 10.

```
FC-ASW-1(config)#interface range fa0/2 - 12
FC-ASW-1(config-if-range)#switchport mode access
FC-ASW-1(config-if-range)#switchport access vlan 10
FC-ASW-1(config-if-range)#exit
FC-ASW-1(config)#
```

f. Assign interface range Fa0/13 through Fa0/24 to VLAN 20.

```
FC-ASW-1(config)#interface range fa0/13 - 24
FC-ASW-1(config-if-range)#switchport mode access
FC-ASW-1(config-if-range)#switchport access vlan 20
FC-ASW-1(config-if-range)#end
FC-ASW-1#
```

Step 4: Perform Test 1 to determine if the hosts can communicate between VLANs

   a. Issue the **show running-config** commands from the switch and verify all basic configuration settings.

   b. Issue the **show vlan brief** command on the switch to verify what ports are in which VLANs.

   Which switch ports are in VLAN 1? _____

   Which switch ports are in VLAN 10? _____

   Which switch ports are in VLAN 20? _____

   c. With PC1 connected to switch port 4 and PC2 attached to port 14, attempt to ping from PC1 to PC2.

   Would you expect the ping to be successful? _____

   Why or why not? _____

   d. Change the IP address of PC2 to 10.0.10.5 so that the two PCs are on the same network and ping again.

   Would you expect the ping to be successful? _____

   Why or why not? _____

   e. Move the cable for PC2 to a port that is in the VLAN 10 range (Fa0/2 to Fa0/12) and ping again.

   Would you expect the ping to be successful? _____

   Why or why not? _____

   f. Change the IP address for PC2 back to 10.0.20.2 and move the cable back to Fa0/14 in VLAN 20.

This test demonstrated that the PCs from the main-net cannot communicate with the PCs on the voice net without assistance from a Layer 3 device.

Task 3: Configure the switch and router for VLAN routing and perform Test 2

Step 1: Configure VLAN trunking on switch S1

   NOTE: If using he 2900XL switch be sure to configure the DOT1Q encapsulation to ensure trunking works.

   Configure trunking between switch S1 and the router with 802.1 encapsulation on both devices.

```
FC-ASW-1#int fa0/1
FC-ASW-1(config-if)#switchport mode trunk
FC-ASW-1(config-if)#end
```

Step 2: Perform basic configuration of the router.

   a. Connect a PC to the console port of the router to perform configurations using a terminal emulation program.

   b. Configure router R1 with a hostname and console, Telnet, and privileged passwords according to the table diagram.

```
Router(config)#hostname FC-CPE-1
FC-CPE-1(config)#line con 0
FC-CPE-1(config-line)#password cisco
FC-CPE-1(config-line)#login
FC-CPE-1(config-line)#line vty 0 4
FC-CPE-1(config-line)#password cisco
FC-CPE-1(config-line)#login
FC-CPE-1(config-line)#exit
FC-CPE-1(config)#enable password cisco
```

```
FC-CPE-1(config)#enable secret class
FC-CPE-1(config)#no ip domain lookup
```

Step 3: Configure VLAN Trunking on the Router

a. Configure router R1 Fa0/0 interface to trunk for VLAN 1, VLAN 10, and VLAN 20 with 802.1Q encapsulation.

```
FC-CPE-1(config)#interface fa0/0
FC-CPE-1(config-if)#no shutdown
FC-CPE-1(config-if)#interface fa0/0.1
FC-CPE-1(config-subif)#encapsulation dot1Q 1
FC-CPE-1(config-subif)#ip address 10.0.1.1 255.255.255.0
FC-CPE-1(config-subif)#exit
FC-CPE-1(config)#interface fa0/0.10
FC-CPE-1(config-subif)#encapsulation dot1Q 10
FC-CPE-1(config-subif)#ip address 10.0.10.1 255.255.255.0
FC-CPE-1(config-subif)#exit
FC-CPE-1(config)#interface fa0/0.20
FC-CPE-1(config-subif)#encapsulation dot1Q 20
FC-CPE-1(config-subif)#ip address 10.0.20.1 255.255.255.0
FC-CPE-1(config-subif)#end
FC-CPE-1#
```

b. On the router, issue the command `show vlans`.

What information is displayed?

_____

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_____

_____

_____

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_____

c. From switch S1, issue the command `show interfaces trunk`.

What interface on switch S1 is in trunking mode? _____

Which VLANs are allowed and active in the management domain? _____

Step 4: Perform Test 2 to determine if the hosts can communicate between VLANs through the use of inter-vlan routing provide by a router

a. Issue the `show running-config` commands from the switch and verify all basic configuration settings.

b. Ping from the switch to the router default gateway for VLAN 1.

Was the ping successful? _____

c. Telnet from the switch to the router.

Where you successful? _____

d. With PC1 connected to switch port 4 and PC2 attached to port 14, attempt to ping from PC1 to PC2.

Would you expect the ping to be successful? _____

Why or why not? _____

e. Telnet from PC1 to the switch and the router.

Would you expect the Telnet to be successful? _____

Why or why not? _____

Issue the **show ip route** command on the router to display the routing
table. How many subnet routes are there? _____

Task 4: Reflection

Why is it important to develop a test plan and prototype network behavior?

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