



**General Sir John Kotelawala Defense University**

**IT 3043**

**Advanced Computer Network  
Systems-I**

**Assignment-1**

**BSc in IT/IS Degree Program (Intake 37)**

**Faculty of Computing  
Department of Information Technology**

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## IT 3043 – Advanced Computer Network Systems-I

### ASSIGNMENT 01

#### Instructions

- Answer ALL questions.
- Marks will be awarded for good presentation and thoroughness in your approach.
- NO marks will be awarded for the entire assignment if any part of it is found to be copied directly from printed materials or from another student.
- Complete this cover sheet and attach it to your assignment.

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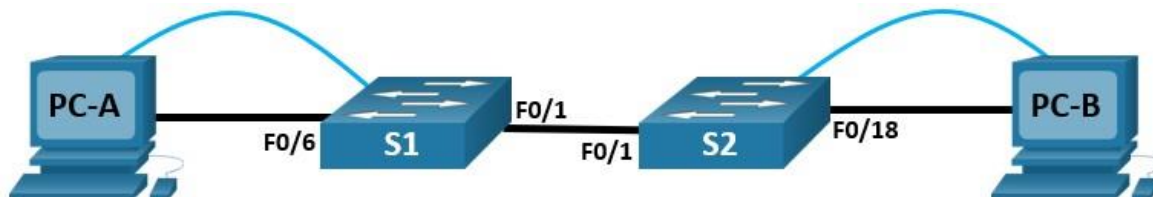
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## Packet Tracer - Configure VLANs and Trunking - Physical Mode

### Topology



### Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
S1	VLAN 1	192.168.1.11	255.255.255.0	N/A
S2	VLAN 1	192.168.1.12	255.255.255.0	N/A
PC-A	NIC	192.168.10.3	255.255.255.0	192.168.10.1
PC-B	NIC	192.168.10.4	255.255.255.0	192.168.10.1

### Objectives

**Part 1: Build the Network and Configure Basic Device Settings**

**Part 2: Create VLANs and Assign Switch Ports**

**Part 3: Maintain VLAN Port Assignments and the VLAN Database Part**

**4: Configure an 802.1Q Trunk Between the Switches**

### 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 controlling which hosts can communicate. In general, VLANs make it easier to design a network to support the goals of an organization.

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.

In this Packet Tracer Physical Mode (PTPM) activity, you will create VLANs on both switches in the topology, assign VLANs to switch access ports, and verify that VLANs are working as expected. You will then create a VLAN trunk between the two switches to allow hosts in the same VLAN to communicate through the trunk, regardless of which switch to which the host is attached.

## 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: Build the network as shown in the topology.

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

Click and drag both switch **S1** and **S2** to the **Rack**.

**Note:** This activity will open with 37% completion because the switch ports are all shutdown. When you install the switches in the rack, the ports will automatically be activated. After about a minute, the score will drop to 1%. Later in the activity, you will shut down unused ports.

- b. Click and drag both **PC-A** and **PC-B** to the **Table** and use the power button to turn them on.
- c. Provide network connectivity by connecting **Copper Straight-through** cables, as shown in the topology.
- d. Connect **Console Cable** from device **PC-A** to **S1** and from device **PC-B** to **S2**.

#### Step 2: Configure basic settings for each switch.

- a. From the **Desktop Tab** on each PC, use the **Terminal** to console into each switch and enable privileged EXEC mode.
- b. Enter configuration mode.
- c. Assign a device name to each switch.
- d. Assign **class** as the privileged EXEC encrypted password.
- e. Assign **cisco** as the console password and enable login.
- f. Assign **cisco** as the vty password and enable login.
- g. Encrypt the plaintext passwords.
- h. Create a banner that warns anyone accessing the device that unauthorized access is prohibited.
- i. Configure the IP address listed in the Addressing Table for VLAN 1 on the switch.
- j. Shut down all interfaces that will not be used.
- k. Set the clock on each switch.

**Note:** The clock setting cannot be graded in Packet Tracer.

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

#### Step 3: Configure PC hosts.

From the **Desktop** tab on each **PC**, click IP Configuration and enter the addressing information as displayed in the Addressing Table.

#### Step 4: Test connectivity.

Test network connectivity by attempting to ping between each of the cabled devices.

Can PC-A ping PC-B?

**Yes**

Can PC-A ping S1?

**No**

Can PC-B ping S2?

**No**

Can S1 ping S2?

**Yes**

if you answered no to any of the above questions, why were the pings unsuccessful?

**When trying to ping between different subnets the ping was unsuccessful.**

### Part 2: Create VLANs and Assign Switch Ports

In Part 2, you will create Management, Operations, Parking\_Lot, and Native VLANs on both switches. You will then assign the VLANs to the appropriate interface. The **show vlan** command is used to verify your configuration settings.

#### Step 1: Create VLANs on the switches.

From the **Desktop Tab** on each **PC**, use Terminal to continue configuring both network switches.

- a. Create the VLANs on **S1**.

```
S1(config)# vlan 10
S1(config-vlan)# name Operations
S1(config-vlan)# vlan 20
S1(config-vlan)# name Parking_Lot
S1(config-vlan)# vlan 99
S1(config-vlan)# name Management
S1(config-vlan)# vlan 1000
S1(config-vlan)# name Native
S1(config-vlan)# end
```

- b. Create the same VLANs on **S2**.

- c. Issue the **show vlan brief** command to view the list of VLANs on **S1**.

```
S1# 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 Gi0/1, Gi0/2

10	Operations	active
20	Parking_Lot	active
99	Management	active
1000	Native	active
1002	fddi-default	active
1003	token-ring-default	active
1004	fddinet-default	active
1005	trnet-default	active

What is the default VLAN?

### VLAN 1

What ports are assigned to the default VLAN?

### Fa0/1 – Fa0 24, Gig0/1-2

#### Step 2: Assign VLANs to the correct switch interfaces.

- a. Assign VLANs to the interfaces on **S1**.

- 1) Assign PC-A to the Operation VLAN.

```
S1(config)# interface f0/6
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 10
```

- 2) From VLAN 1, remove the management IP address and configure it on VLAN 99.

```
S1(config)# interface vlan 1
S1(config-if)# no ip address
S1(config-if)# interface vlan 99
S1(config-if)# ip address 192.168.1.11 255.255.255.0
S1(config-if)# end
```

- b. Issue the **show vlan brief** command and verify that the VLANs are assigned to the correct interfaces. c. Issue the **show ip interface brief** command.

What is the status of VLAN 99? Explain.

### VLAN 99 is up/down

**Display up because VLAN exists but the VLAN not yet assigned to an active port there for also display down**

- d. Assign **PC-B** to the Operations VLAN on **S2**.  
e. From VLAN 1, remove the management IP address and configure it on VLAN 99 according to the Addressing Table.  
f. Use the **show vlan brief** command to verify that the VLANs are assigned to the correct interfaces.

Is S1 able to ping S2? Explain.

**No**

**IP addresses for the switches reside in VLAN 99 and data packets will not be sent over interface Fa0/1.**

Is PC-A able to ping PC-B? Explain.

No

**Interface Fa0/1 is not assigned to VLAN 10, therefore the VLAN 10 data packets will not be sent via it.**

### Part 3: Maintain VLAN Port Assignments and the VLAN Database

In Part 3, you will change port VLAN assignments and remove VLANs from the VLAN database.

#### Step 1: Assign a VLAN to multiple interfaces.

From the **Desktop Tab** on each **PC**, use **Terminal** to continue configuring both network switches.

- On S1, assign interfaces F0/11 – 24 to VLAN99.  

```
S1(config)# interface range f0/11-24
S1(config-if-range)# switchport mode access
S1(config-if-range)# switchport access vlan 99
S1(config-if-range)# end
```
- Issue the **show vlan brief** command to verify VLAN assignments.
- Reassign F0/11 and F0/21 to VLAN 10.
- Verify that VLAN assignments are correct.

#### Step 2: Remove a VLAN assignment from an interface.

- Use the **no switchport access vlan** command to remove the VLAN 99 assignment to F0/24.  

```
S1(config)# interface f0/24
S1(config-if)# no switchport access vlan
S1(config-if)# end
```
- Verify that the VLAN change was made.

Which VLAN is F0/24 now associated with?

**VLAN1 (default VLAN)**

#### Step 3: Remove a VLAN ID from the VLAN database.

- Add VLAN 30 to interface F0/24 without issuing the global VLAN command.

```
S1(config)# interface f0/24
S1(config-if)# switchport access vlan 30
% Access VLAN does not exist. Creating vlan 30
```

**Note:** Current switch technology no longer requires that the **vlan** command be issued to add a VLAN to the database. By assigning an unknown VLAN to a port, the VLAN will be created and added to the VLAN database.

- Verify that the new VLAN is displayed in the VLAN table.

What is the default name of VLAN 30?

**VLAN0030**

- c. Use the **no vlan 30** command to remove VLAN 30 from the VLAN database.

```
S1(config)# no vlan 30
```

```
S1(config)# end
```

- d. Issue the **show vlan brief** command. F0/24 was assigned to VLAN 30.

After deleting VLAN 30 from the VLAN database, why is F0/24 no longer displayed in the output of the **show vlan brief** command? What VLAN is port F0/24 now assigned to? What happens to the traffic destined to the host that is attached to F0/24?

**At the moment we remove the VLAN30, all port that assign to it become inactive but it still assigns with the VLAN 30**

- e. On interface F0/24, issue the **no switchport access vlan** command.  
f. Issue the **show vlan brief** command to determine the VLAN assignment for F0/24.

To which VLAN is F0/24 assigned?

**VLAN1 (default VLAN)**

**Note:** Before removing a VLAN from the database, it is recommended that you reassign all the ports assigned to that VLAN.

Why should you reassign a port to another VLAN before removing the VLAN from the VLAN database?

**When removing the VLAN, ports that assigned to that VLAN become inactive. Also, they are unavailable at the VLAN database until unassign with the removed VLAN**

### Part 4: Configure an 802.1Q Trunk Between the Switches

In Part 4, you will configure interface F0/1 to use the Dynamic Trunking Protocol (DTP) to allow it to negotiate the trunk mode. After this has been accomplished and verified, you will disable DTP on interface F0/1 and manually configure it as a trunk.

#### Step 1: Use DTP to initiate trunking on F0/1.

The default DTP mode of a 2960 switch port is dynamic auto. This allows the interface to convert the link to a trunk if the neighboring interface is set to trunk or dynamic desirable mode.

- a. On **S1**, set F0/1 to negotiate trunk mode.

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

```
S1(config-if)# switchport mode dynamic desirable
```

```
Sep 19 02:51:47.257: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
```

```
Sep 19 02:51:47.291: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to up
```

You should also receive link status messages on S2.



S2#

Sep 19 02:42:19.424: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up

Sep 19 02:42:21.454: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to up

Sep 19 02:42:22.419: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

- b. On **S1** and **S2**, issue the **show vlan brief** command. Interface F0/1 is no longer assigned to VLAN 1. Trunked interfaces are not listed in the VLAN table.
- c. Issue the **show interfaces trunk** command to view trunked interfaces. Notice that the mode on **S1** is set to desirable, and the mode on **S2** is set to auto.

S1# **show interfaces trunk**

S2# **show interfaces trunk**

**Note:** By default, all VLANs are allowed on a trunk. The **switchport trunk** command allows you to control what VLANs have access to the trunk. For this activity, keep the default settings. This allows all VLANs to traverse F0/1.

- d. Verify that VLAN traffic is traveling over trunk interface F0/1.

Can S1 ping S2?

**Yes**

Can PC-A ping PC-B?

**Yes**

Can PC-A ping S1?

**No**

Can PC-B ping S2?

**No**

If you answered no to any of the above questions, explain below

**Switches and PCs are in different VLANs (Switches – VLAN 99, PCs – VLAN 10). Therefore, pining between switches and PCs were become unsuccessful**

### Step 2: Manually configure trunk interface F0/1.

The **switchport mode trunk** command is used to manually configure a port as a trunk. This command should be issued on both ends of the link.

- a. On interface F0/1, change the switchport mode to force trunking. Make sure to do this on both switches.

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

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

- b. Issue the **show interfaces trunk** command to view the trunk mode. Notice that the mode changed from **desirable** to **on**.

S1# **show interfaces trunk**

- c. Modify the trunk configuration on both switches by changing the native VLAN from VLAN 1 to VLAN 1000.

```
S1(config)# interface f0/1
S1(config-if)# switchport trunk native vlan 1000
```

- d. Issue the **show interfaces trunk** command to view the trunk. Notice the Native VLAN information is updated.

```
S2# show interfaces trunk
```

Why might you want to manually configure an interface to trunk mode instead of using DTP?

**All equipment no use DTP. 'Switchport mode trunk' command convert the port to a trunk without considering its type and the connected other end equipment type.**

Why might you want to change the native VLAN on a trunk?

**There is a security risk, if use the Default VLAN (VLAN 1) as the Native VLAN.**

### Reflection Questions

1. What is needed to allow hosts on VLAN 10 to communicate to hosts on VLAN 99?

**For Inter-VLAN communication, a layer 3 device (a router) is needed.**

2. What are some primary benefits that an organization can receive through effective use of VLANs?

- **It a Solution for broadcast problem**
- **It reduces the size of broadcast domains.**
- **It able to add additional layer of security**
- **Make deceive management easy**
- **Higher performance and reduce latency**
- **Removes physical boundaries**
- **Reduce the number of devices**
- **Reduce the cost of the network**