CST 235 Network and System Administration

Practice Your Knowledge on VLAN

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1. Description

Switching has become the standard for most company internal network infrastructure as each port maintains its own collision domain, and with the advent of VLANs further allow the engineer to segment the network into multiple, smaller broadcast domains. As a Cisco engineer, as well as in the Cisco CCNA exam, you will need to know how to configure VLANs on Cisco switches as well as verify the option.

2. Lab Procedures

2.1 Topology

Step 1: Creating the topology as following figure, where six PCs connected to the same switch
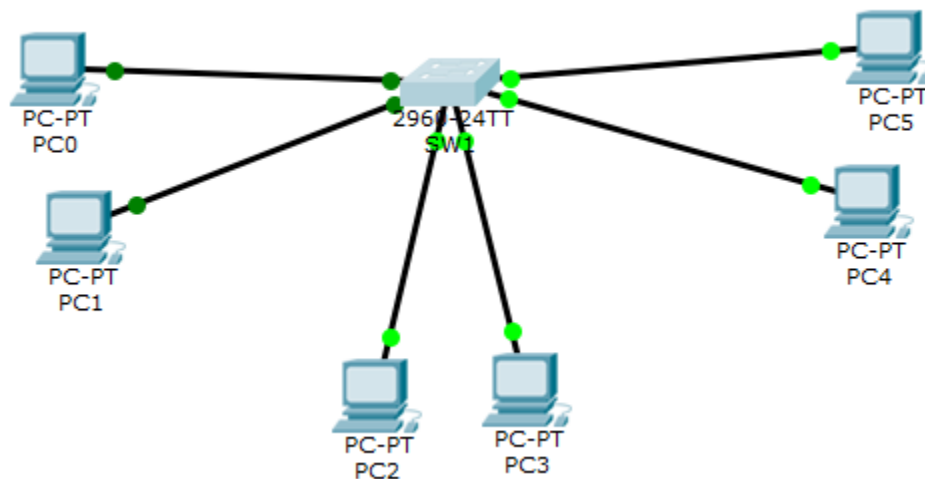
- PC0 interface FastEthernet 0 connect to swtich interface Fa0/1,
- PC1 interface FastEthernet 0 connect to swtich interface Fa0/2
- PC2 interface FastEthernet 0 connect to swtich interface Fa0/3
- PC3 interface FastEthernet 0 connect to swtich interface Fa0/4
- PC4 interface FastEthernet 0 connect to swtich interface Fa0/5,
- PC5 interface FastEthernet 0 connect to swtich interface Fa0/6

2.2 General Settings

Step 2: Configure the hostname and display name on Switch0 to be SW1.

```
Switch#
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW1
```

Show your topology with screenshot.
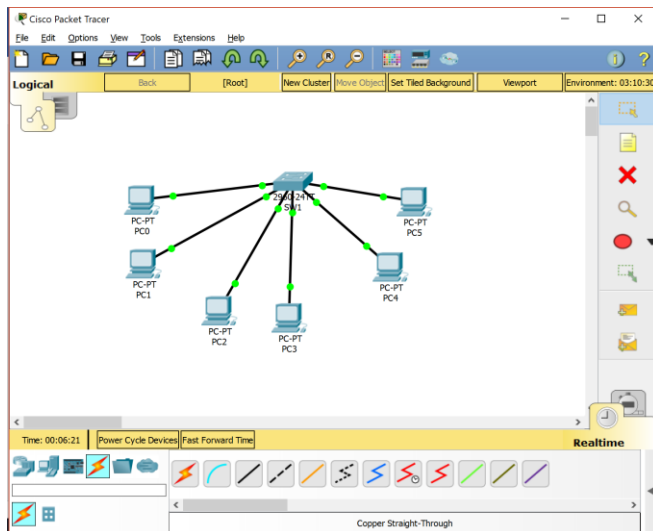
Step 3: Configure no ip domain-lookup on SW1

Under the configure terminal mode, enter "no ip domain-lookup" command

What is the purpose for no ip domain-lookup command on switch?

Keeping this on may slow down the user as commands or erroneous URLs will still just to be justified to an address, this will cause a hang. If not using a DNS server, this setting should be turned off.

Step 4: Configure the enable secret password as cisco on SW1

```
SW1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
SW1(config)#enable secret cisco
```

Step 5: Configure the console and vty password as westchester on SW1

```
SW1(config)#line con 0
SW1(config-line)#password westchester
SW1(config-line)#login
SW1(config-line)#line vty 0 4
SW1(config-line)#password westchester
SW1(config-line)#login
```

What is the meaning for line vty 0 4?

VTY or Virtual Teletype is essentially used for allowing connections from users via Telnet or SSH. So this command opens connection slots 0 through 4, allowing for 5 connections at any given time.

Step 6: Configure the exec-timeout command to the console and virtual terminal lines

```
SW1(config-line)#line con 0
SW1(config-line)#exec-timeout 0 0
SW1(config-line)#line vty 0 4
SW1(config-line)#exec-timeout 0 0
```

What is the purpose for command exec-timeout 0 0?

Exec-timeout controls the amount of time the EXEC command interpreter waits for user input before timeout. The arguments it takes are minutes then seconds, 0 0 sets no timeout because it is 0 min 0 seconds.

2.3 Creating VLANs and assign add interfaces to each VLAN

<u>Step 7</u>: Create the VLANs as shown in figure 1

```
SW1(config)#vlan 10
SW1(config-vlan)#name ADMIN
```

Configure vlan 20 (name SALES) and vlan 30 (name ENGINEERING) by using similar command.

What is VLAN? Why we need VLAN?

VLAN is a Virtual Local Area Network. It allows computers to be connected through a form of tunnel and appear as if they are all next to each other on the network. This can also be done to segregate computers within a LAN or group computers within a business that is spread across multiple cities through WAN. Only computers connected to the VLAN can see the other machines connected to the VLAN.

Step 8: verity vlan configuration by "do sh vlan" command

```
SW1(config-vlan)#do sh vlan

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
10   ADMIN                          active
20   SALES                          active
30   ENGINEERING                    active
```

Step 9: Now, add interfaces to each of these VLANs with the switchport command as follows:

- interface Fa0/1, Fa0/2 belongs to VLAN 10, ADMIN
- interface Fa0/3, Fa0/4 belongs to VLAN 20, SALES
- interface Fa0/5, Fa0/6 belongs to VLAN 30, ENGINEERING

There are two ways to add interfaces: (1) add individual interfaces one by one, (2) add a range of interfaces. Let us start from the first method.

Step 9.1 add Fa0/1 and Fa0/2 to VLAN 10 individually

```
SW1(config-vlan)#interface Fa0/1
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 10
SW1(config-if)#exit
SW1(config)#interface Fa0/2
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 10
SW1(config-if)#exit
```

Step 9.2 add ports Fa0/3 – Fa0/4 to VLAN 20 as a group

```
SW1(config)#interface range Fa0/3-4
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#switchport access vlan 20
```

Configure interface fa0/5 and interface fa0/6 by using similar command.

Step 10: Verify your VLAN configuration using relevant show commands in Cisco IOS.

Show vlan configuration by using command "do sh vlan" under enable mode.

Show your VLAN configuration screenshot.
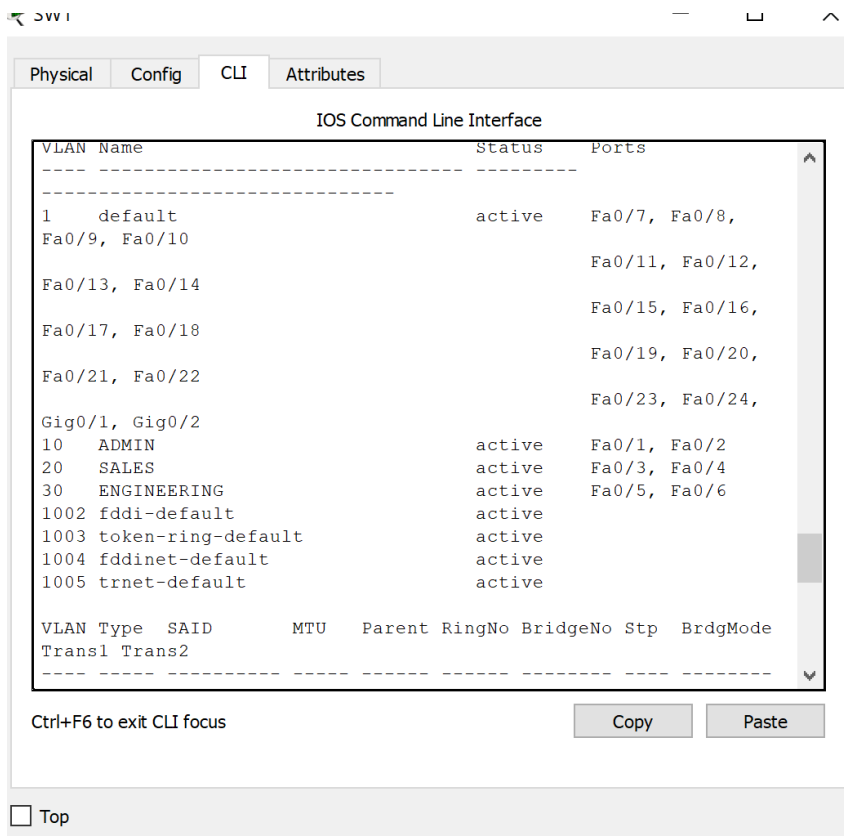
2.4 Verify VLANs

Step 11: assign IP address to hosts

You can click the PC, then select Desktop tab, choose IP configuration and enter the IP address

- PC0: 192.168.1.100 255.255.255.0
- PC1: 192.168.1.101 255.255.255.0
- PC2: 192.168.2.100 255.255.255.0
- PC3: 192.168.2.101 255.255.255.0
- PC4: 192.168.3.100 255.255.255.0
- PC5: 192.168.3.101 255.255.255.0

Step 12: ping within VLAN

For example, you can click PC0, select Desktop tab, choose command prompt, then ping PC1 by typing command "ping 192.168.1.101" (PC0 and PC1 are in the same VLAN). You can also ping PC3 from PC2 (vice versa), and ping PC5 from PC4 (vice versa) by using proper IP address.

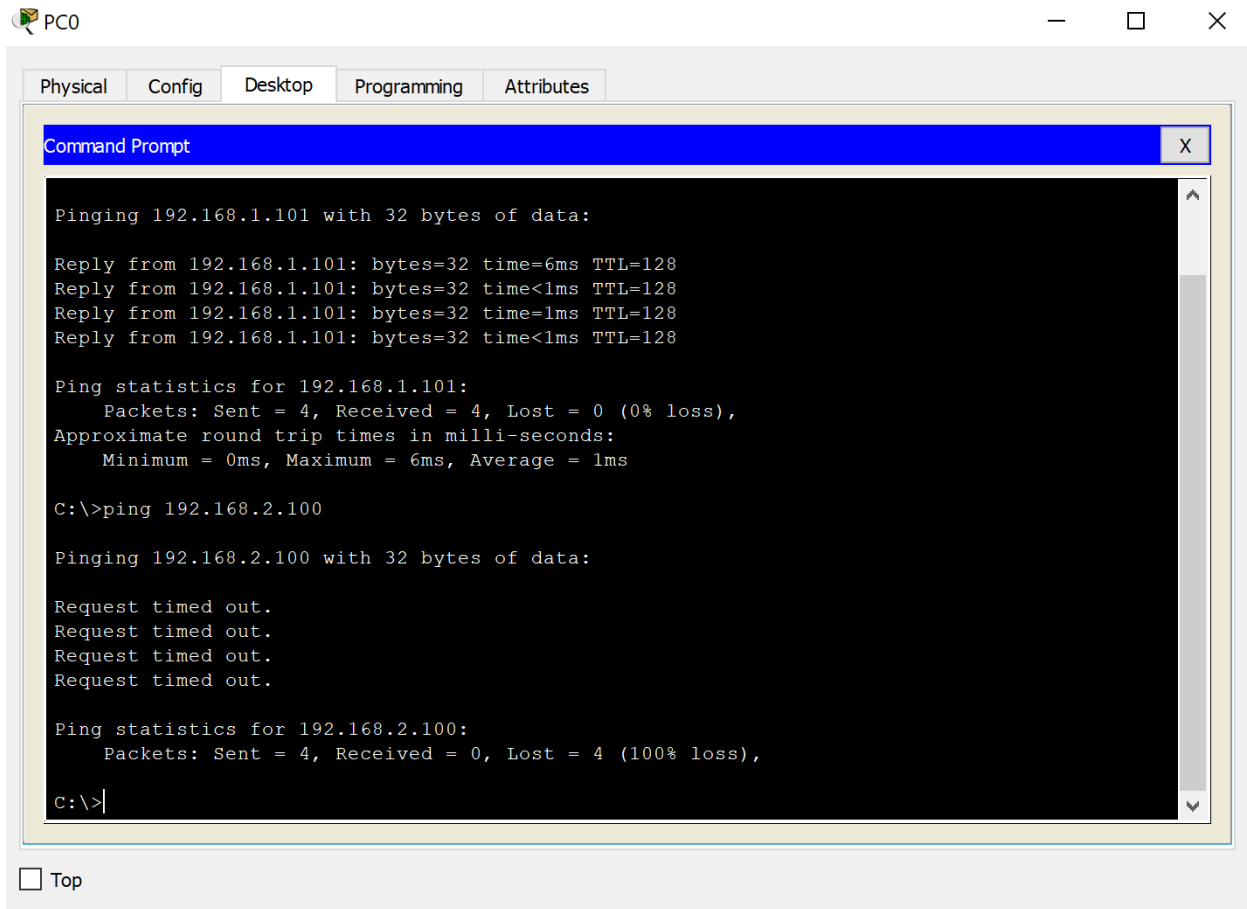**Can you successfully ping devices in the same VLAN? Show the screenshot from ping, and explain WHY.**
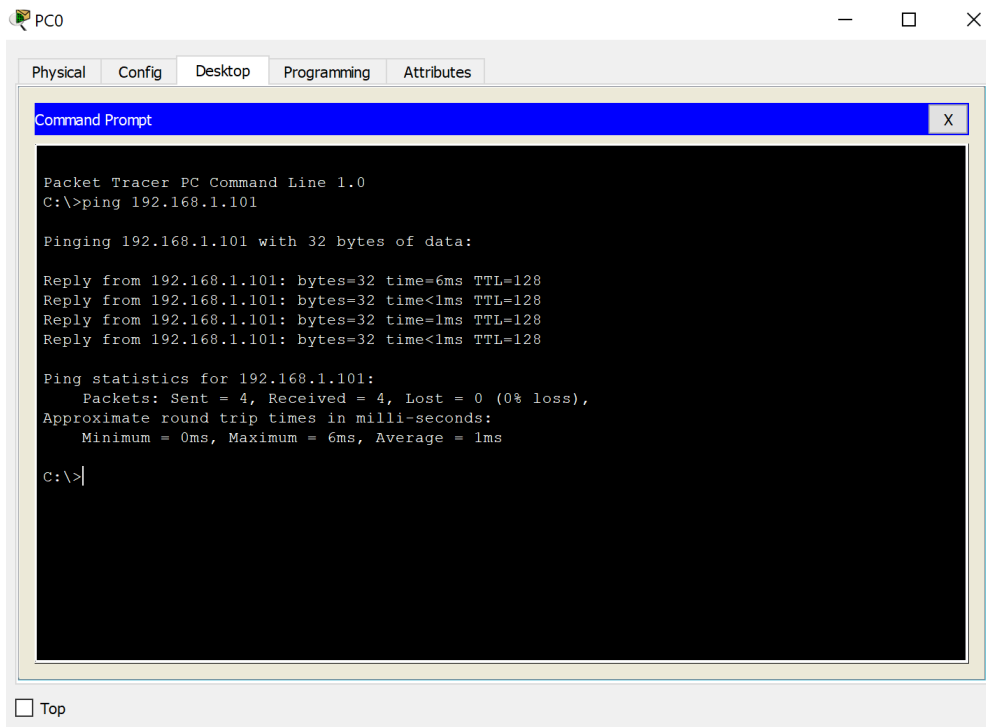
Yes, since the computers are stuck into the same VLAN they can see each other. With PC0 and PC1 both being on the same VLAN, they have no issue communicating. But since PC2 is on a separate VLAN from PC0 they cannot communicate or see each other on the network. The VLAN is a virtual connection that is currently only servicing two ports each, so only two machines will be able to see each other.

Step 13: ping devices in other VLAN

For example, you can click PC0, select Desktop tab, choose command prompt, then ping PC2, PC3, PC4, or PC5, such as "ping 192.168.1.105"

Can you successfully ping devices in other VLANs? Show the screenshot from ping, and explain WHY.

PC0   — □ ✕

| Physical | Config | Desktop | Programming | Attributes |

Command Prompt   X

```
Pinging 192.168.1.101 with 32 bytes of data:

Reply from 192.168.1.101: bytes=32 time=6ms TTL=128
Reply from 192.168.1.101: bytes=32 time<1ms TTL=128
Reply from 192.168.1.101: bytes=32 time=1ms TTL=128
Reply from 192.168.1.101: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.101:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms

C:\>ping 192.168.2.100

Pinging 192.168.2.100 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.2.100:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

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No, because the connections are segregated with a VLAN, even though there is a physical connection that we can trace, the other machine is on its own virtual network, and completely hidden from other machines not on that VLAN.

2.5 OPTIONAL: Configure Inter VLAN Routing (10 points towards final grade)

Configure inter VLAN routing through Layer 3 switch. Show all the configuration steps as I did previously. Eventually, show that PC0 can successfully ping PC5.

```
SW1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
SW1(config)#ip routing
```

```
SW1(config)#interface Vlan10
SW1(config-if)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed
state to up

SW1(config-if)#ip address 192.168.100.1 255.255.255.0
SW1(config-if)#no shutdown

SW1(config-if)#interface Vlan20
SW1(config-if)#
%LINK-5-CHANGED: Interface Vlan20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan20, changed
state to up

SW1(config-if)#ip address 192.168.100.1 255.255.255.0
% 192.168.100.0 overlaps with Vlan10
SW1(config-if)#no shutdown
SW1(config-if)#interface Vlan30
SW1(config-if)#
%LINK-5-CHANGED: Interface Vlan30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan30, changed
state to up

SW1(config-if)#ip address 192.168.100.1 255.255.255.0
% 192.168.100.0 overlaps with Vlan10
SW1(config-if)#no shutdown

SW1(config)#interface Vlan20
SW1(config-if)#ip address 192.168.101.1 255.255.255.0
SW1(config-if)#interface Vlan30
SW1(config-if)#ip address 192.168.102.1 255.255.255.0
```

```
SW1(config)#ip route 0.0.0.0 0.0.0.0 10.1.1.2
SW1(config)#interface GigabitEthernet 0/0
%Invalid interface type and number
SW1(config)#interface GigabitEthernet 0/1
SW1(config-if)#no switchport
SW1(config-if)#ip address 10.1.1.2 255.255.255.0
SW1(config-if)#no shutdown
SW1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to
up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to up
```

Router0

Physical | Config | **CLI** | Attributes

IOS Command Line Interface

```
The following configuration command script was created:

!
hostname R1
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
enable password westchester
line vty 0 4
password westchester
!
interface Vlan1
 shutdown
 no ip address
!
interface GigabitEthernet0/0
 no shutdown
 ip address 192.168.100.100 255.255.255.0
!
interface GigabitEthernet0/1
 shutdown
 no ip address
!
end

[0] Go to the IOS command prompt without saving this config
```

Ctrl+F6 to exit CLI focus

Copy   Paste

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