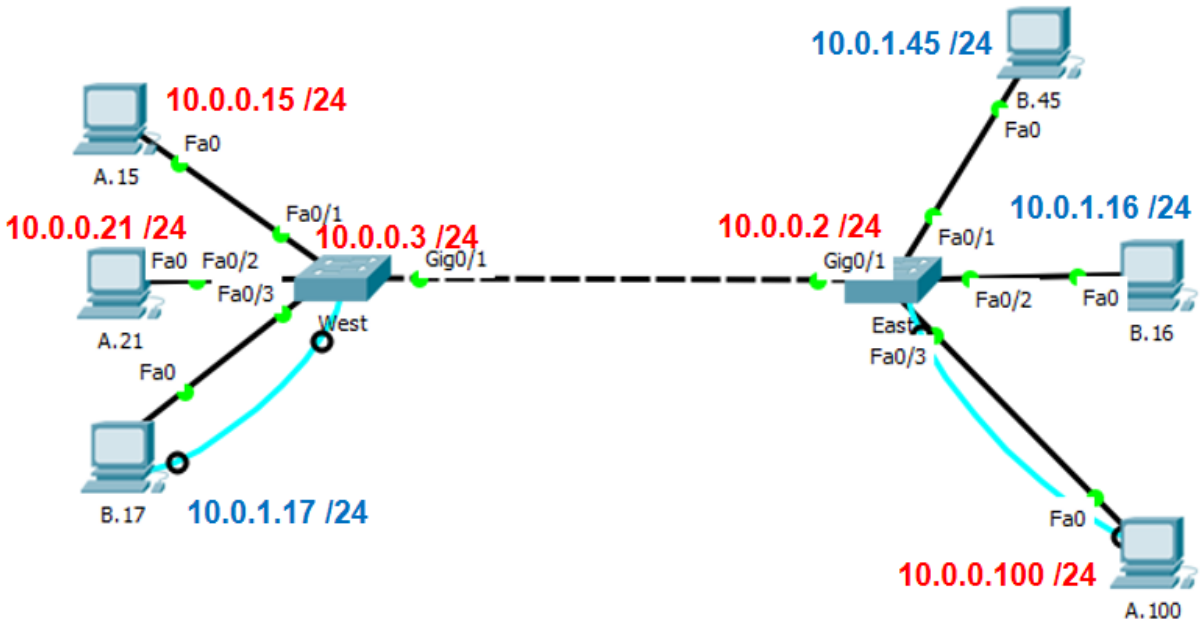
Assignment 4-2: Working with VLANs

Name: _____

Objective

In this lab, we demonstrate working with VLANs within our network. This will allow us to run two different subnets or networks on the same LAN with a higher level of security and less congestion because each VLAN will see only its own broadcasts. The starting topology is shown below. It is your final save from the last exercise, or you can download Class4-2-1.pkt. I added the labels to review what we have assigned so far. The colors indicate what will be our VLANs.

Lab Topology



Task 1 – Getting Started

This topology assumes that you completed and saved the last exercise as ***yourname*4-1-3** as a starting point. If for any reason you do not have that you can download **Class4-2-1** from the assignment page.

Immediately save your open file as ***yourname*4-2-1**.

Task 2 – Updating our devices and topology

Select the host labeled **A.16** and using the **Config** tab, change the **Display Name** to **B.16**.

Use the **Desktop | IP Configuration** tool on each host to confirm or make the following entries.

Label	IP Address	Subnet Mask	Default Gateway	DNS Server
A.15	10.0.0.15	255.255.255.0	10.0.0.1	10.0.0.1
A.21	10.0.0.21	255.255.255.0	10.0.0.1	10.0.0.1
A.100	10.0.0.100	255.255.255.0	10.0.0.1	10.0.0.1
B.17	10.0.1.17	255.255.255.0	10.0.1.1	10.0.1.1
B.16	10.0.1.16	255.255.255.0	10.0.1.1	10.0.1.1
B.45	10.0.1.45	255.255.255.0	10.0.1.1	10.0.1.1

We will use the Default Gateway later in the exercise.

Confirm that the A network hosts can ping each other and the switches but not the B network hosts. The B network hosts can ping each other but nothing else.

Save your Packet Tracer file as ***yourname*4-2-2**.

Task 3 – Creating VLANs

VLANs require a two-step process. First, we define or create the VLANs and then we assign interfaces to the VLAN. VLAN 1 is created by default, and all interfaces are assigned to it by default – that is what allows a switch to work right out of the box.

There is one required command to create a VLAN and a couple options. The process is started in Global Configuration mode (config t). The syntax for the two commands we plan to use is:

Device(config)#**vlan *n*** – where *n* is any whole number from 2 to 1001 and 1006 to 4094
Device(config-vlan)#**name *label*** – (Optional) where *label* is text like Sales to describe the vlan

We will create three new VLANs even though we won't use them all in this exercise.

Console or Telnet to the **East** switch from **A.100** using the same passwords as before.

Type the following:

```
East#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
East(config)#vlan 100
East(config-vlan)#Name Sales
East(config-vlan)#vlan 200
East(config-vlan)#Name Engineering
East(config-vlan)#vlan 300
East(config-vlan)#Name Guest
East(config-vlan)#[Ctrl]+Z
East#
```

To see your results in a compact report, use the **show vlan brief** command in privilege mode.

```
East#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
                                                Gig0/1, Gig0/2
100  Sales                            active
200  Engineering                      active
300  Guest                            active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
East#
```

Note that all interfaces are assigned to VLAN 1, the default VLAN, until we assign them. VLANs 1002-1005 are residuals of the old days and old technologies. They can be used, but their name can't be changed and they can't be deleted.

We could use the **no vlan *n*** command to delete a VLAN. Example: **no vlan 101**.

Switch Interfaces

Switch ports or interfaces are up by default and don't need to be configured to use them. But we can configure them to add a description (label) and to assign them to VLANs other than the default VLAN (VLAN 1). The process begins in global configuration mode.

- Single interface**:** Use the interface *intID* command.
  Example: interface fastethern0/8 or int fa 0/10.
- Consecutive interfaces: Use the interface range *intIDrange* command.
  Example: interface range fastethernet 0/8-20 or int ran fa 0/6-12.

Once in interface configuration mode, we can do the following:

- Add a description (optional) – shows up in configuration. Example description IT Dept
- Put it/them in a VLAN – syntax switchport access vlan *vlanID*. Example switchport access vlan 100. The VLAN must already be defined.
- Define interface mode – access or trunk. Access is for regular data links. Syntax: switchport mode access

Task 4 – Add interfaces to VLANs

We know from our topology map that Fa0/3 is in the A network (VLAN 1, the IT Dept) and Fa0/1-2 are in the B network (VLAN 100, Sales).

Make the following entries.

```
East#conf t
Enter configuration commands, one per line. End with CNTL/Z.
East(config)#int fa 0/3
East(config-if)#desc IT Dept
East(config-if)#int range fa 0/1-2
East(config-if-range)#des Sales Dept
East(config-if-range)#switchport access vlan 100
East(config-if-range)#switchport mode access
East(config-if-range)#int range fa 0/10-16
East(config-if-range)#des Engineering Dept
East(config-if-range)#switchport access vlan 200
East(config-if-range)#switchport mode access
East(config-if-range)#int range fa 0/17-24
East(config-if-range)#des Guest Network
East(config-if-range)#switchport access vlan 300
East(config-if-range)#switchport mode access
East(config-if-range)#[Ctrl]+Z
East#
```

To see your results, try the following commands.

show vlan brief – to see the interfaces are now in VLANs.

show interfaces status – to see VLANs and port status (connected?).

show run – to see the current configuration.

Confirm that **A.100** can ping A.15, A.21, and both switches. Same as before.

Confirm that **B.45** and **B.16** can ping each other but can no longer ping **B.17**. Why? We will fix this when we return.

Task 5 – Save your work

Do a **copy run start** on East just in case.

Close your session with East and save your Packet Tracer file as yourname4-2-3.

Task 6 – Configure the West switch

Use the topology diagram and the above skills to configures West.

- Note from the topology diagram that Fa0/1-2 are in the A network and Fa0/3 is in the B network. How does that effect how you assign your VLANS?
- Assign interfaces 10-24 the same as East.
- Confirm that **A.15** and **A.21** can ping all A network devices and both switches.
- Confirm that **B.17** can't ping anything. Why? We will fix this when we return.
- Do a **copy run start** on West just in case.
- Close your session with West and save your Packet Tracer file as yourname4-2-4.

Why can the B network host ping across the switch link?

Simply we put the B network hosts in VLAN 100 (Sales). The link between the switches is still on VLAN 1 (the default) and now won't carry traffic from other VLANs. So, the two on East can still ping each other, but they can't reach B.17. Why not just put the link between the two switches in VLAN 100?

The answer is to make the link between the switches a trunk link, and then it will carry all VLANs by default.

Task 7 – Configure the Trunk link on the East switch

There are just two commands required to create the trunk. They are configured on the interface. They are:

switchport mode trunk
switchport nonegotiate
description Trunk to East switch

The first tells it to form a trunk; the second tells it not to negotiate with the other end – just make the trunk. The third is just an optional description like we used on the other interfaces,

There are other optional commands, a common one **switchport trunk allowed** would let you list which VLANs could use the trunk. Example: **switchport trunk allowed vlan 100, 200**

Enter the following commands on the East switch.

```
East#conf t
Enter configuration commands, one per line. End with CNTL/Z.
East(config)#interface Gig 0/1
East(config-if)#switchport mode trunk
East(config-if)#switchport nonegotiate
East(config-if)#description Trunk to West switch
East(config-if)#
```

To see your results, run these two show commands and look over the results.

show interfaces trunk
show interfaces gig0/1 switchport

```
East#show interfaces trunk
Port Mode Encapsulation Status Native vlan
Gig0/1 on 802.1q trunking 1

Port Vlans allowed on trunk
Gig0/1 1-1005

Port Vlans allowed and active in management domain
Gig0/1 1,100,200,300

Port Vlans in spanning tree forwarding state and not pruned
Gig0/1 1,100,200,300

East#
East#show interfaces gig0/1 switchport
Name: Gig0/1
Switchport: Enabled
Administrative Mode: trunk
Operational Mode: trunk
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: Off
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
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 encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
Appliance trust: none

East#
```

Task 8 – Configure the Trunk link on West switch and save our work

Repeat Task 7 on the West switch – be sure to adjust the description.

Confirm that host **B.17** can ping B.16 and B.45.

You still can't ping the A network devices or the switches, but that is a problem that can't be solved by a Layer 2 switch. For that we will need a router – see the next assignment.

Do a **copy run start** on both switches.

Save your Packet Tracer file as yourname4-2-5

Bob's East Configuration

```
East#show run
Building configuration...

Current configuration: 2887 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname East
!
no logging console
enable secret 5 $1$mERr$gzv89F7IwFptX3urMu3zV/
enable password 7 082B594002
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
description Sales Dept
switchport access vlan 100
switchport mode access
!
interface FastEthernet0/2
description Sales Dept
switchport access vlan 100
switchport mode access
!
interface FastEthernet0/3
description IT Dept
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
description Engineering Dept
switchport access vlan 200
switchport mode access
!
interface FastEthernet0/11
```

```
description Engineering Dept
switchport access vlan 200
switchport mode access
!
interface FastEthernet0/12
description Engineering Dept
switchport access vlan 200
switchport mode access
!
interface FastEthernet0/13
description Engineering Dept
switchport access vlan 200
switchport mode access
!
interface FastEthernet0/14
description Engineering Dept
switchport access vlan 200
switchport mode access
!
interface FastEthernet0/15
description Engineering Dept
switchport access vlan 200
switchport mode access
!
interface FastEthernet0/16
description Engineering Dept
switchport access vlan 200
switchport mode access
!
interface FastEthernet0/17
description Guest Network
switchport access vlan 300
switchport mode access
!
interface FastEthernet0/18
description Guest Network
switchport access vlan 300
switchport mode access
!
interface FastEthernet0/19
description Guest Network
switchport access vlan 300
switchport mode access
!
interface FastEthernet0/20
description Guest Network
switchport access vlan 300
switchport mode access
!
interface FastEthernet0/21
description Guest Network
switchport access vlan 300
switchport mode access
!
interface FastEthernet0/22
description Guest Network
switchport access vlan 300
```

```
switchport mode access
!
interface FastEthernet0/23
description Guest Network
switchport access vlan 300
switchport mode access
!
interface FastEthernet0/24
description Guest Network
switchport access vlan 300
switchport mode access
!
interface GigabitEthernet0/1
description Trunk to West switch
switchport mode trunk
switchport nonegotiate
!
interface GigabitEthernet0/2
!
interface Vlan1
ip address 10.0.0.2 255.255.255.0
!
banner motd ^C

This is an example of a Message of the Day! ^C
!
!
!
line con 0
password 7 08285F4D01160A1B
login
history size 20
exec-timeout 30 0
!
line vty 0 4
exec-timeout 30 0
password 7 08285F4D01160A1B
login
line vty 5 15
exec-timeout 30 0
password 7 08285F4D01160A1B
login
!
!
!
end


East#
East#
```