Erbil Polytechnic University
Erbil Technical Engineering College (ETEC)
Information System Engineering Dep

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Module Name: Network Design & Implementing
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Net Lab 4 – Practical Lecture

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Lab -4-

VLAN (Virtual Local Area Network)

Objectives

- VLAN types
- Create VLAN
- Access mode config.
- Trunk mode config.

What is VLAN ?

VLAN (Virtual Local Network) is a logically separate IP subnetwork which allow multiple IP networks and subnets to exist on the same-switched network.

VLAN is a logical broadcast domain that can span multiple physical LAN segments. It is a modern way administrators configure switches into virtual local-area networks (VLANs) to improve network performance by separating large Layer 2 broadcast domains into smaller ones.

When to use VLANs ?

In medium-to-large size organizations, we usually have different departments physically separated on rooms or floors. A set of end-devices (PCs, servers, printers, phones, etc) are connected to a series of switches connecting to a router or a layer 3 switch.

Benefits of using VLAN

Improved security:

the different groups of users don't need to know of each other and shouldn't see each other's data unless explicitly configured.

Higher performance:

Dividing the network into different virtual sub-networks reduces unnecessary traffic and improves performance.

Cost reduction:

the routers are usually considerably more expensive compared to switches (with the exception of layer 3 switches which we'll discuss later).

Simplified network management:

logically dividing the network into virtual sub-networks improves maintenance and manageability.

broadcast domains:

Dividing a network into VLANs reduces the number of devices in the broadcast domain.

Type of VLAN

Default VLAN: When the switch initially starts up, all switch ports become a member of the default VLAN (generally all switches have default VLAN named as VLAN 1), which makes them all part of the same broadcast domain.

Data VLAN: This VLAN also known as a user VLAN, the data VLAN is used only for user-generated data. This VLAN carrying data only.

Voice VLAN: Voice VLAN is configured to carry voice traffic. Voice VLANs are mostly given high transmission priority over other types of network traffic. voice over IP (VoIP).

Management VLAN: A management VLAN is configured to access the management capabilities of a switch (traffic like system logging, monitoring).

Native VLAN: This VLAN identifies traffic coming from each end of a trunk link. A native VLAN is allocated only to an 802.1Q trunk port (traffic that does not come from any VLAN)

Type of Connection

Access ports:

- Belong to one VLAN.
- Commonly used to connect computer ports.

Trunk ports:

- Allow multiple VLANs through.
- Receive and send multiple VLAN packets.
- Typically used for connection between switches.

Hybrid ports:

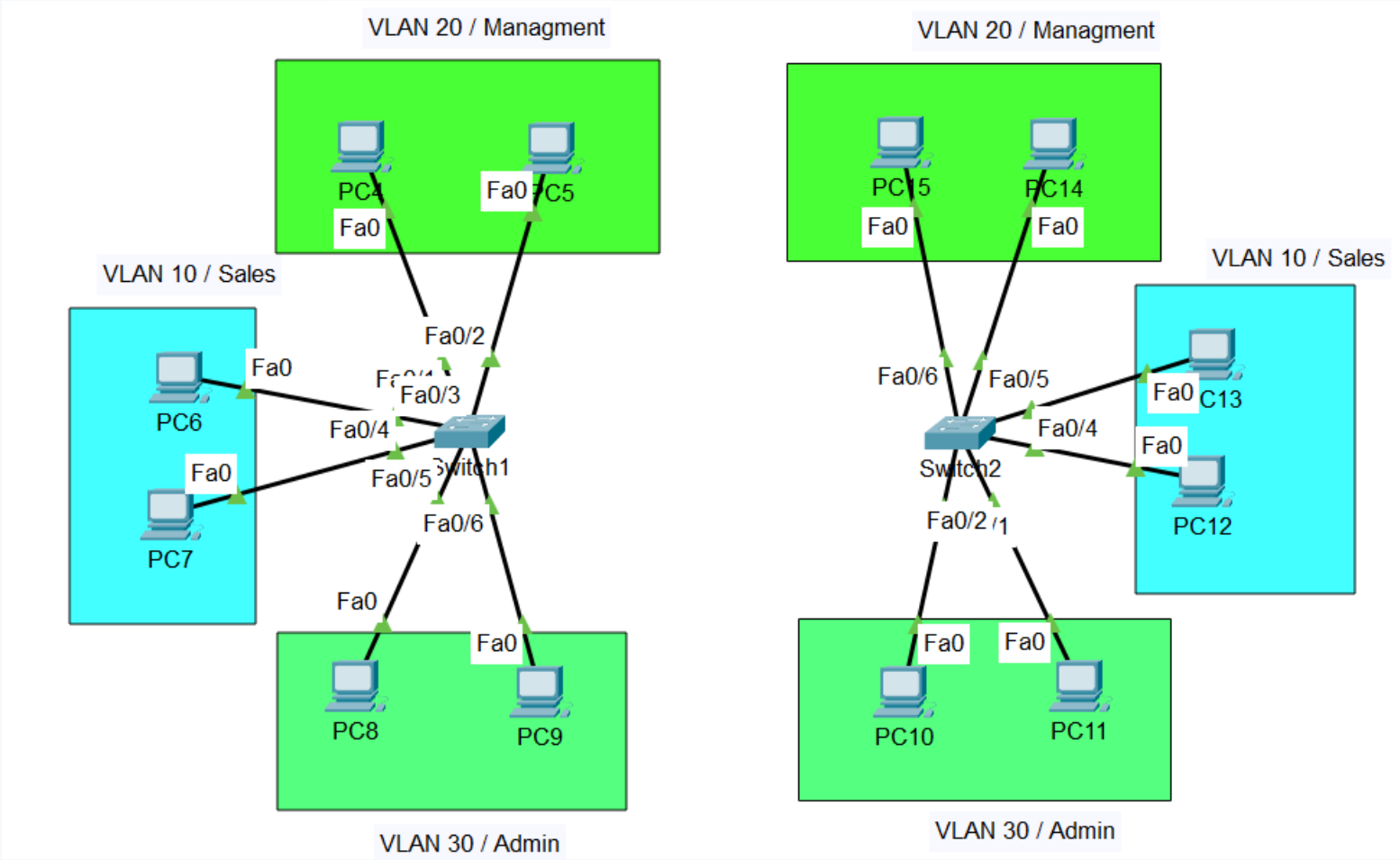
- Allow multiple VLANs through.
- Receive and send multiple VLAN packets.
- Used for connection between switches, or switch and computer.

Example of Vlan

Vlan 10, 192.168.10.0/24

Vlan 20, 192.168.20.0/24

Vlan 30, 192.168.30.0/24



Show Vlan

```
Switch>
Switch>enable
Switch#show 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
1002 fddi-default                        active
1003 token-ring-default                  active
1004 fddinet-default                     active
1005 trnet-default                       active
```

Creating Vlan's

before configuration VLAN , we must Configuring basic config for each switch

```
Switch>
Switch>enable
Switch#conf terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name Sales
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name Managment
Switch(config-vlan)#ex
Switch(config)#vlan 30
Switch(config-vlan)#name Admin
Switch(config-vlan)#exit
Switch(config)#
```

Show Vlan's

```
Switch(config)#
Switch(config)#do show 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   Sales                               active
20   Managment                           active
30   Admin                               active
1002 fddi-default                        active
1003 token-ring-default                  active
1004 fddinet-default                     active
1005 trnet-default                       active
```

Assign interface to Vlan's

```
Switch(config)#
Switch(config)#int
Switch(config)#interface fas
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#SW
Switch(config-if)#switchport mode access
Switch(config-if)#SWitchport access vlan 10
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/9
Switch(config-if)#SWitchport access vlan 20
Switch(config-if)#switchport mode access
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fastEthernet 0/17
Switch(config-if)#SWitchport access vlan 30
Switch(config-if)#switchport mode access
Switch(config)#
```

Show Vlan's with Interfaces

```
Switch(config)#
Switch(config)#do show vlan

VLAN Name                                Status    Ports
---- ----------------------------------- --------- -------------------------------
1    default                             active    Fa0/2, Fa0/3, Fa0/4, Fa0/5
                                                   Fa0/6, Fa0/7, Fa0/8, Fa0/10
                                                   Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                   Fa0/15, Fa0/16, Fa0/18, Fa0/19
                                                   Fa0/20, Fa0/21, Fa0/22, Fa0/23
                                                   Fa0/24, Gig0/1, Gig0/2
10   Sales                               active    Fa0/1
20   Managment                           active    Fa0/9
30   Admin                               active    Fa0/17
1002 fddi-default                        active
1003 token-ring-default                  active
1004 fddinet-default                     active
1005 trnet-default                       active
```

Assign Range Interface to Vlan's

```
Switch(config)#
Switch(config)#
Switch(config)#interface range fastEthernet 0/1-10
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config)#
Switch(config)#
Switch(config)#interface range fastEthernet 0/11-15
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config)#
Switch(config)#
Switch(config)#interface range fastEthernet 0/16-20
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
```

Show Vlan's with Range Interfaces

```
Switch(config-if-range)#do show vlan

VLAN Name                                Status    Ports
---- ----------------------------------- --------- -------------------------------
1    default                             active    Fa0/2, Fa0/3, Fa0/4, Fa0/5
                                                   Fa0/6, Fa0/7, Fa0/8, Gig0/1
                                                   Gig0/2
10   Sales                               active    Fa0/1
20   Managment                           active    Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                   Fa0/13, Fa0/14, Fa0/15, Fa0/16
30   Admin                               active    Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                   Fa0/21, Fa0/22, Fa0/23, Fa0/24
1002 fddi-default                        active
1003 token-ring-default                  active
1004 fddinet-default                     active
1005 trnet-default                       active
```

Config IP Address to VLAN

```
Switch(config)#
Switch(config)#interface vlan 10
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

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

Switch(config-if)#ip address 192.168.10.2 255.255.255.0
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#
Switch(config)#
Switch(config)#interface vlan 20
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan20, changed state to up

Switch(config-if)#ip address 192.168.20.2 255.255.255.0
Switch(config-if)#ex
Switch(config)#
Switch(config)#
Switch(config)#interface vlan 30
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan30, changed state to up

Switch(config-if)#ip address 192.168.30.2 255.255.255.0
Switch(config-if)#
```

Config Ports btween Switchs to trunk

```
Switch(config)#
Switch(config)#interface g
Switch(config)#interface gigabitEthernet 0/1
Switch(config-if)#sw
Switch(config-if)#switchport mode trunk
Switch(config-if)#
Switch(config-if)#ex
Switch(config)#
```

Troubleshooting

- Floor1#sh vlan
- Floor1#sh in vlan 10
- Floor1#sh ip interface vlan 10

Thanks

?

Questions