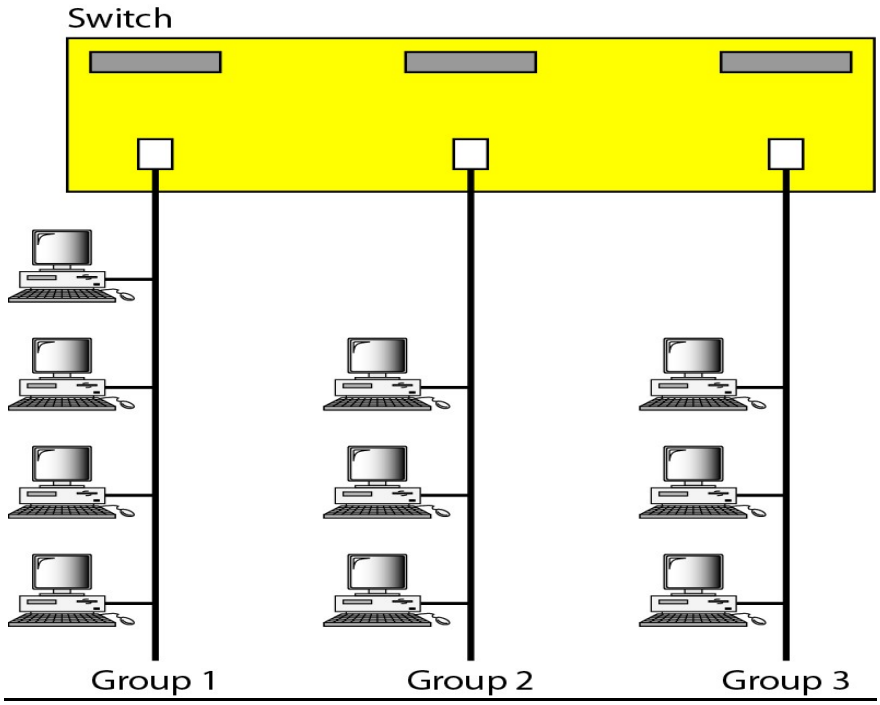
Course Name: A Level (2nd Sem) Subject: DCN

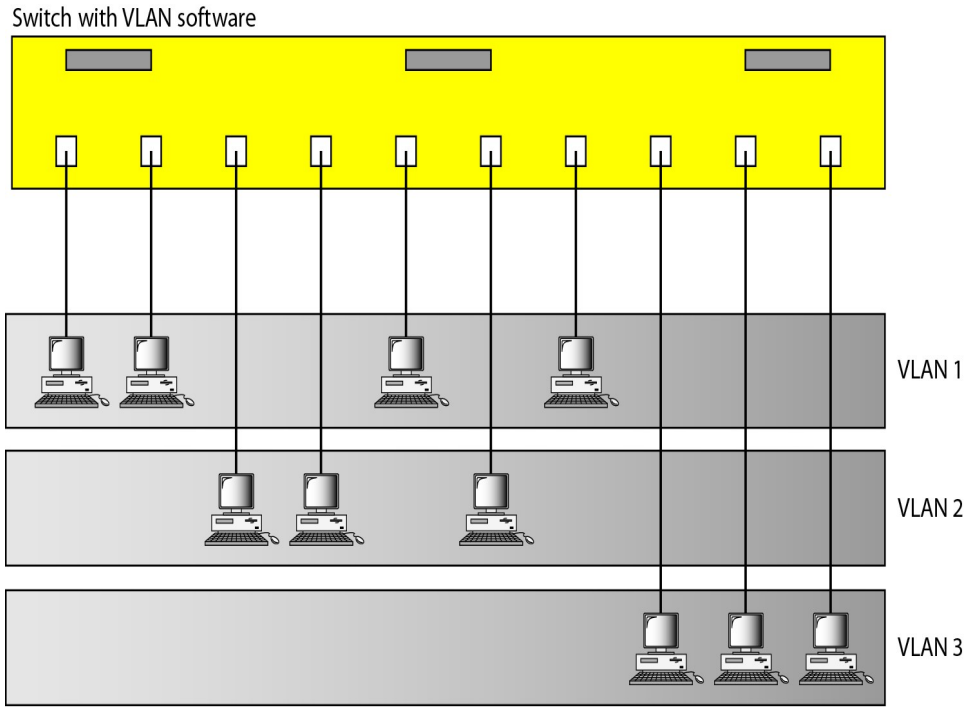
Topic: Virtual LANs Date: 08-06-20

Virtual LANs:

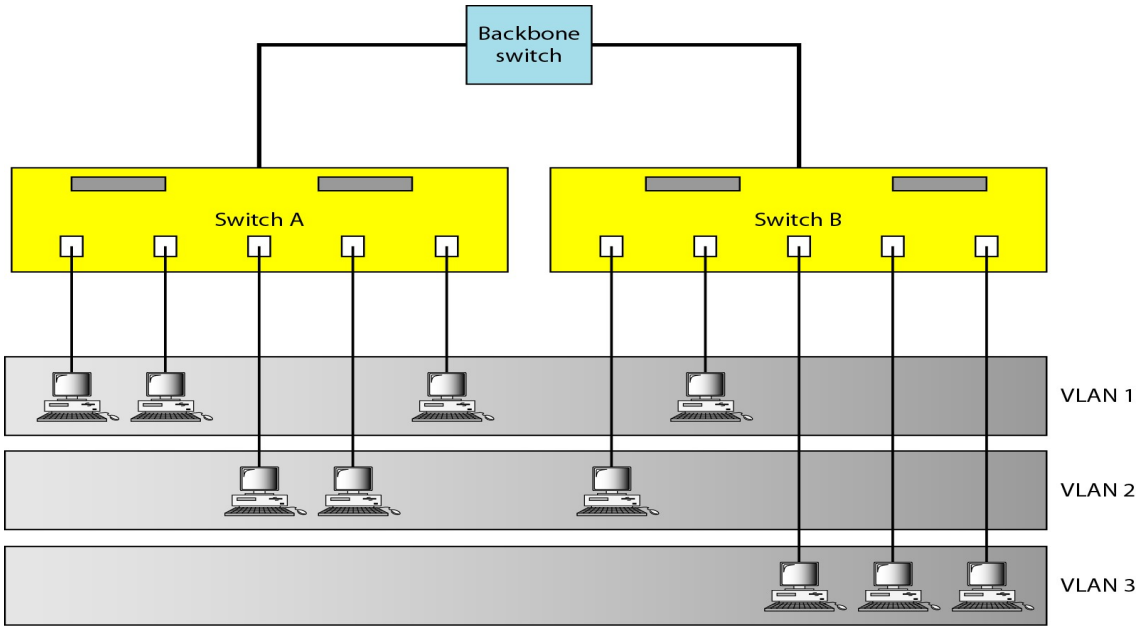
- A station is considered part of a LAN if it physically belongs to that LAN. The criterion of membership is geographic.
- We can define a virtual local area network (VLAN) as a local area network configured by software, not by physical wiring.
- Figure shows a switched LAN in an engineering firm in which 10 stations are grouped into three LANs that are connected by a switch. The first four engineers work together as the first group, the next three engineers work together as the second group, and the last three engineers work together as the third group. The LAN is configured to allow this arrangement.
- But what would happen if the administrators needed to move two engineers from the first group to the third group, to speed up the project being done by the third group?
- The LAN configuration would need to be changed. The network technician must rewire. The problem is repeated if, in another week, the two engineers move back to their previous group. In a switched LAN, changes in the work group mean physical changes in the network configuration.



- Figure shows the same switched LAN divided into VLANs. The whole idea of VLAN technology is to divide a LAN into logical, instead of physical, segments. A LAN can be divided into several logical LANs called VLANs.
- Each VLAN is a work group in the organization. If a person moves from one group to another, there is no need to change the physical configuration. The group membership in VLANs is defined by software, not hardware. Any station can be logically moved to another VLAN. All members belonging to a VLAN can receive broadcast messages sent to that particular VLAN.



- This means if a station moves from VLAN 1 to VLAN 2, it receives broadcast messages sent to VLAN 2, but no longer receives broadcast messages sent to VLAN 1.
- It is obvious that the problem in our previous example can easily be solved by using VLANs. Moving engineers from one group to another through software is easier than changing the configuration of the physical network.
- VLAN technology even allows the grouping of stations connected to different switches in a VLAN. Figure shows a backbone local area network with two switches and three VLANs. Stations from switches A and B belong to each VLAN.



- This is a good configuration for a company with two separate buildings. Each building can have its own switched LAN connected by a backbone. People in the first building and people in the second building can be in the same work group even though they are connected to different physical LANs.

Configuration:

Stations are configured in one of three ways: manual, semiautomatic, and automatic.

a) Manual Configuration:

In a manual configuration, the network administrator uses the VLAN software to manually assign the stations into different VLANs at setup. Later migration from one VLAN to another is also done manually. This is not a physical configuration; it is a logical configuration. The term manually here means that the administrator types the port numbers, the IP addresses, or other characteristics, using the VLAN software.

b) Automatic Configuration

In an automatic configuration, the stations are automatically connected or disconnected from a VLAN using criteria defined by the administrator. For example, the administrator can define the project number as the criterion for being a member of a group. When a user changes the project, he or she automatically migrates to a new VLAN.

c) Semiautomatic Configuration

A semiautomatic configuration is somewhere between a manual configuration and an automatic configuration. Usually, the initializing is done manually, with migrations done automatically.

Advantages:

There are several advantages to using VLANs.

a) Cost and Time Reduction:

VLANs can reduce the migration cost of stations going from one group to another. Physical reconfiguration takes time and is costly. Instead of physically moving one station to another segment or even to another switch, it is much easier and quicker to move it by using software.

b) Creating Virtual Work Groups

VLANs can be used to create virtual work groups. For example, in a campus environment, professors working on the same project can send broadcast messages to one another without the necessity of belonging to the same department. This can reduce traffic if the multicasting capability of IP was previously used.

c) Security

VLANs provide an extra measure of security. People belonging to the same group can send broadcast messages with the guaranteed assurance that users in other groups will not receive these messages.

Exercises:

A. **How does a VLAN save a company time and money?**
B. **How does a VLAN provide extra security for a network?**
C. **How does a VLAN reduce network traffic?**