Routing

ROUTING

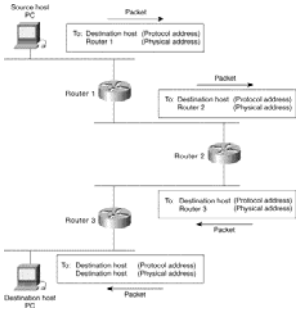
Routing

Router

- A router is a device that determines the next network point to which a packet should be forwarded toward its destination
- Allow different networks to communicate with each other
- A router creates and maintain a table of the available routes and their conditions and uses this information to determine the best route for a given packet.
- A packet will travel through a number of network points with routers before arriving at its destination.
- There can be multiple routes defined. The route with a lower weight/metric will be tried first.

Routing

Routing



Routing

Routing Protocols

- Static Routing
- Dynamic Routing
  - IGP (Interior Gateway Protocol): Route data within an Autonomous System
    - RIP (Routing Information Protocol)
    - RIP-2 (RIP Version 2)
    - OSPF (Open Shortest Path First)
    - IGRP (Interior Gateway Routing Protocol)
    - EIGRP (Enhanced Interior Gateway Routing Protocol)
    - IS-IS
  - EGP (Exterior Gateway Protocol): Route data between Autonomous Systems
    - BGP (Border Gateway Protocol)

Internetworking Devices

Internetworking Devices

Device	Description
Hub	Hubs are used to connect multiple users to a single physical device, which connects to the network. Hubs and concentrators act as repeaters by regenerating the signal as it passes through them.
Bridge	Bridges are used to logically separate network segments within the same network. They operate at the OSI data link layer (Layer 2) and are independent of higher-layer protocols.
Switch	Switches are similar to bridges but usually have more ports. Switches provide a unique network segment on each port, thereby separating collision domains. Today, network designers are replacing hubs in their wiring closets with switches to increase their network performance and bandwidth while protecting their existing wiring investments.
Router	Routers separate broadcast domains and are used to connect different networks. Routers direct network traffic based on the destination network layer address (Layer 3) rather than the workstation data link layer or MAC address.

VLAN

VLAN

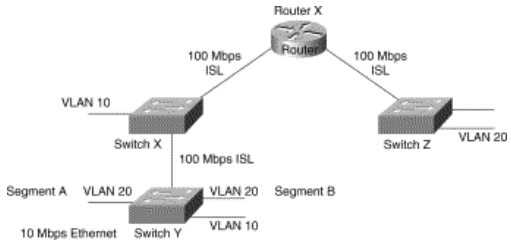
VLAN

VLANs

- **VLANs (Virtual LAN) enable network managers to group users logically (based on functions, project teams or applications) rather than by physical location.**
- **Traffic can only be routed between VLANs.**
- **VLANs provide the segmentation traditionally provided by physical routers in LAN configuration.**

VLAN

VLANs and Inter VLAN Routing



VLAN

Advantages of Using VLANs

- **Broadcast Control**— Just as switches physically isolate collision domains for attached hosts and only forward traffic out a particular port, VLANs provide logical bridging domains that confine broadcast and multicast traffic to the VLANs.
- **Security**— If you do not allow routing in a VLAN, no users outside of that VLAN can communicate with the users in the VLAN and vice versa. This extreme level of security can be highly desirable for certain projects and applications.
- **Performance**— You can assign users that require high-performance or isolated networking to separate VLANs.

TCP / UDP

TCP/UDP

- Transport Layer Protocol
- TCP is connection Oriented (uses checksum and acknowledgment)
- UDP is Connectionless
- Both use the concept of Connection Port Number (16 Bit Source Port Number and Destination Port Number)
- Standard Applications have standard Port Numbers (Email 25, Telnet 23, FTP 20 & 21, SSH 22)