Set 5a Review

- **Layer 1** - Repeaters
- **Layer 2** - Bridges
- **Layer 3** - Routers
  - Brouters
Gateways
Gateways

Gateways links two systems that do not use the same:

- communication protocols
- data formatting structures
- languages
- architecture
How Gateways Work

- Gateways are task-specific. They are dedicated to a particular type of transfer.
- The gateway takes the data from one environment, strips off its old protocol stack, and repackages it in the protocol stack of the destination network.
- Some gateways use all 7 layers, but gateways typically perform protocol conversion at the Application layer.
Mainframe Gateways

One common use for gateways is to translate between PCs and mainframe environments.
Gateway Considerations

- Gateways are typically dedicated servers on a network and use a significant percentage of a server’s capacity.
  - Adequate processing power and memory capacity is required to perform resource-intensive tasks such as protocol conversion.

- Some limitations of gateways are:
  - they are task-specific
  - they can be slow
  - they are expensive
Internet Gateways

- Devices that are used to bridge a local network with the Internet without exposing devices in the local network

- Reasons for using **Internet Gateways**
  - Limited Routable IP Address Space (next lesson)
  - Increased security requirements
  - Limited external bandwidth

- Most common type of Internet Gateways – **HTTP Proxies (L7)** and **NAT Routers (L4)**
Back to Hubs and Switches
Device Progression

- **Repeater**
  - Physical Layer
  - No Address review
  - Broadcast Device

- **Hub**
  - Multi-port Repeater
  - Physical Layer
  - Broadcast Device
  - Star Configuration

- **Bridge**
  - Connect different LAN
  - Data Link Layer
  - Point to Point

- **Switch**
  - Multi-port Bridge
  - Star Configuration
  - Data Link Layer
  - Point to Point
Hubs

- Multiport repeater containing multiple ports to interconnect multiple devices
Figure 6-18: Hubs in a network design
Modular Hubs and Intelligent Hubs

- Modular hubs
  - Provide a number of interface options within one chassis

- Intelligent hubs
  - Also called managed hubs
  - Network administrators can store the information generated by intelligent hubs in a MIB (management information base)
Hubs and Switches

- **Shared medium hubs**

- **Switched LAN hubs**
Advantages of Switched Hubs (Switches)

- No modifications needed to workstations when replacing shared-medium hub
- Each device has a dedicated capacity equivalent to entire LAN
- Easy to attach additional devices to the network
Types of Switched Hubs

- **Store and forward switch**
  - Accepts a frame on input line
  - Buffers it briefly
  - Routes it to appropriate output line

- **Cut-through switch**
  - Begins repeating the frame as soon as it recognizes the destination MAC address
  - Higher throughput, increased chance of error
Other Considerations

- **Backplane Bandwidth**
  - Determines the amount of traffic a switch can have at any given time
  - Limits the effective throughput of a switch

- **Maximum Supported MAC Addresses**
  - Determines the maximum number of hosts in a switched domain
Switch Fabric Examples
Basic Switches
Banyan Switch Fabric
Parallel Banyan
Parallel Banyan
What is this switch fabric called?
Interconnected Parallel Banyan Network (IPBN)

- Also known as the Tagle-Sharma Switch 😊

SY2004-2005 CS 154 - Networks I 25
Network Design Examples
Network Design Example 1

10 Mbps Shared Links

File Server

10 Mbps Hub

10 Mbps Shared Links

10 Mbps Hub

8 PC’s

10 Mbps Shared Links

10 Mbps Hub

8 PC’s
Network Design Example 3

20 PC's

100 Mbps Shared Links

100 Mbps Hub

100 Mbps Shared Links

10 Mbps Switch

20 PC's

10 Mbps Switch

10 Mbps Links

20 PC’s
Network Design Example 4

100 Mbps Switch

100 Mbps Links

File Server

20 PC’s

100 Mbps Links

10 Mbps Switch

10 Mbps Links

20 PC’s

10 Mbps Switch
End