

Switched Network

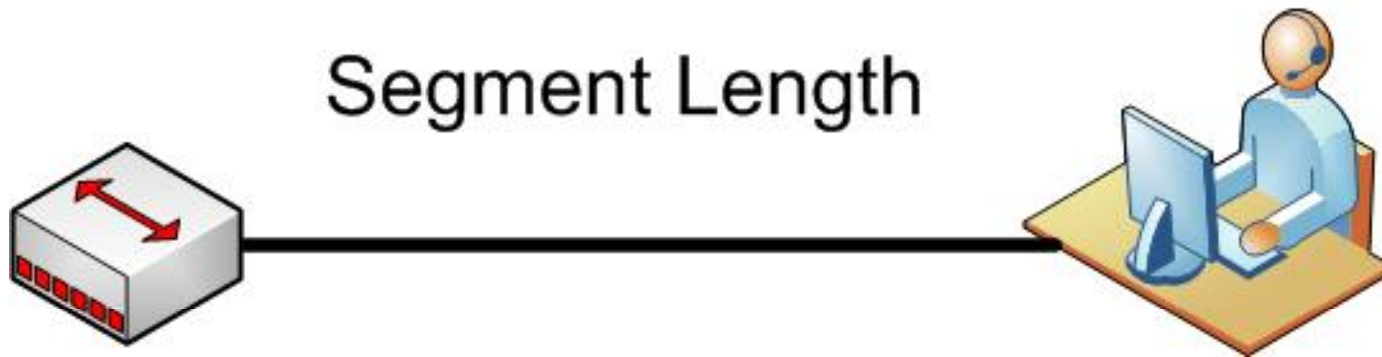
by:

Joseph Ronald Cañedo

Outline

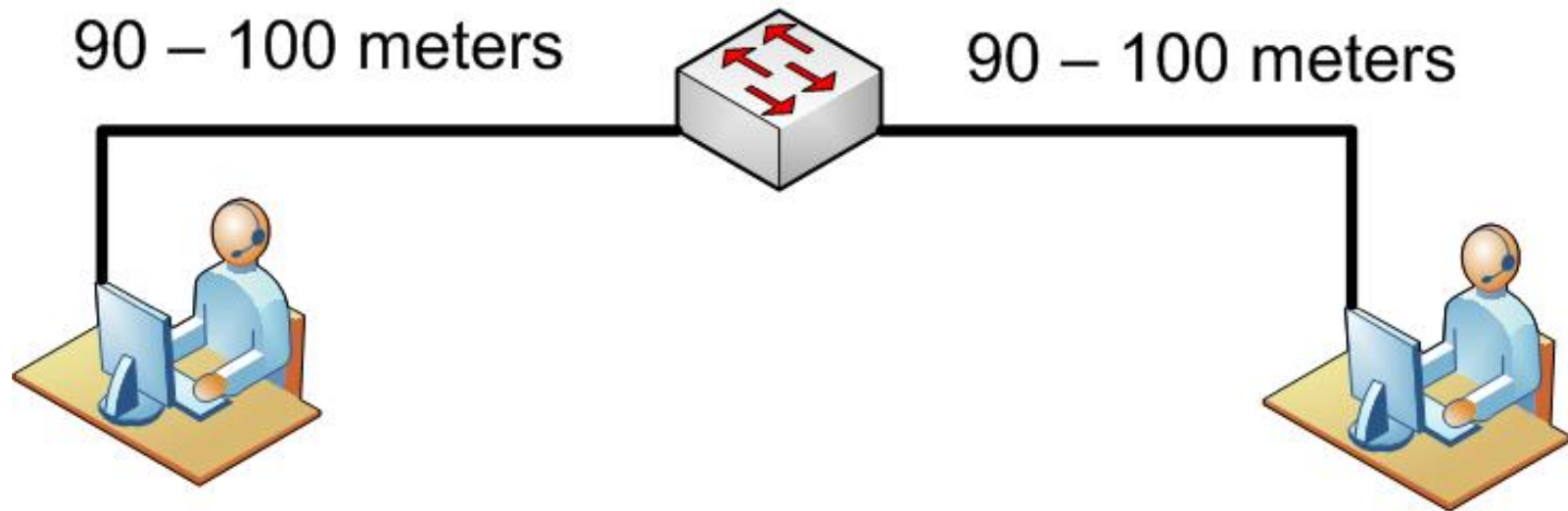
- Overview
- Ethernet LAN Segments
- Extending a LAN Segment
- Collisions
- Collision Domains
- Typical Causes of Network Congestion
- Bridges – Early solution to Network Congestion
- Switches
- Switches vs. Bridges
- How switches segment the Ethernet Network
- Switching in Action
- LANs Using Switched Technology
- Summary

LAN Segment Limitations



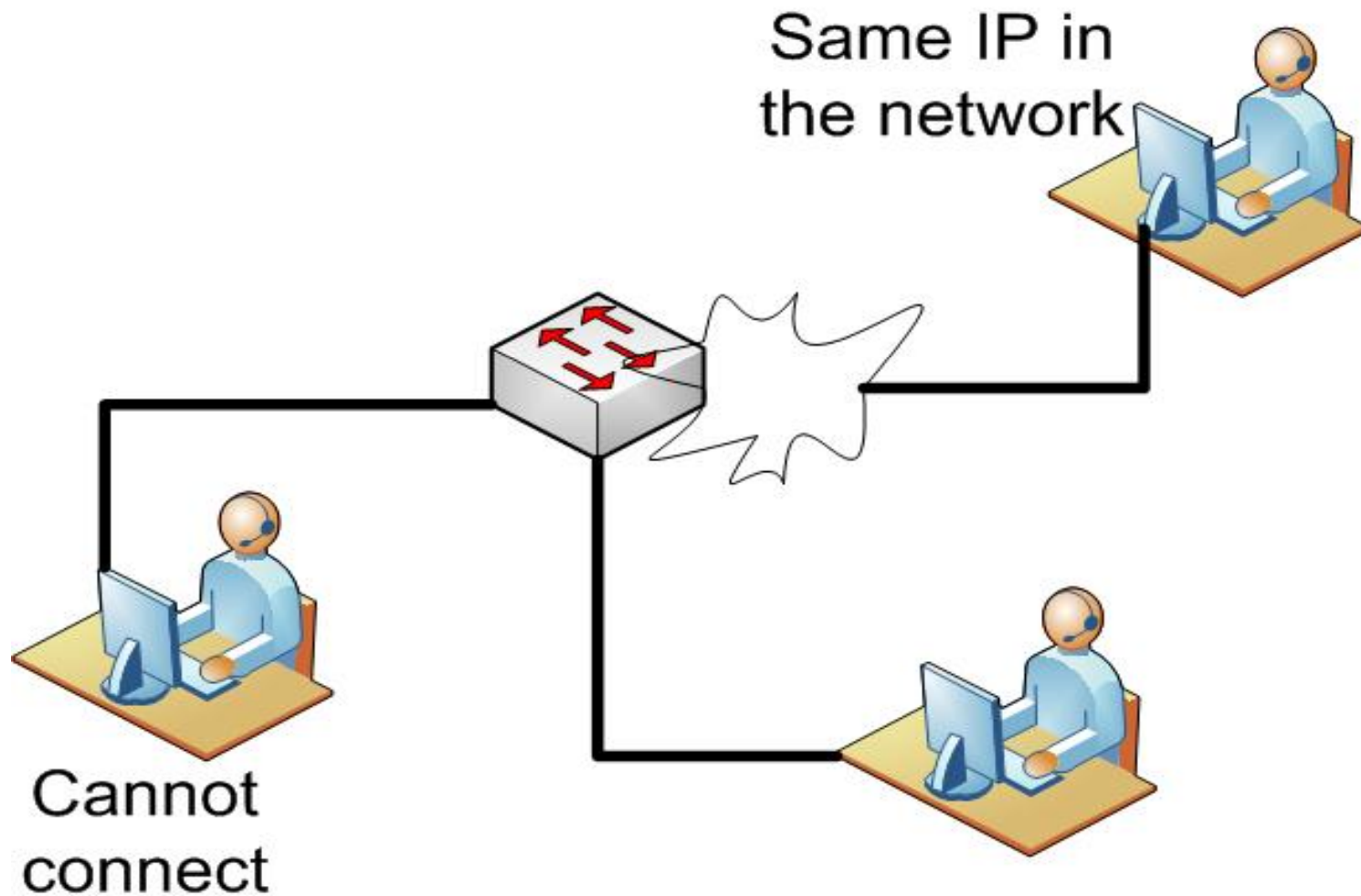
- Signals degrade with transmission distance
- Each Ethernet type has a maximum segment length

Extending LAN Segment



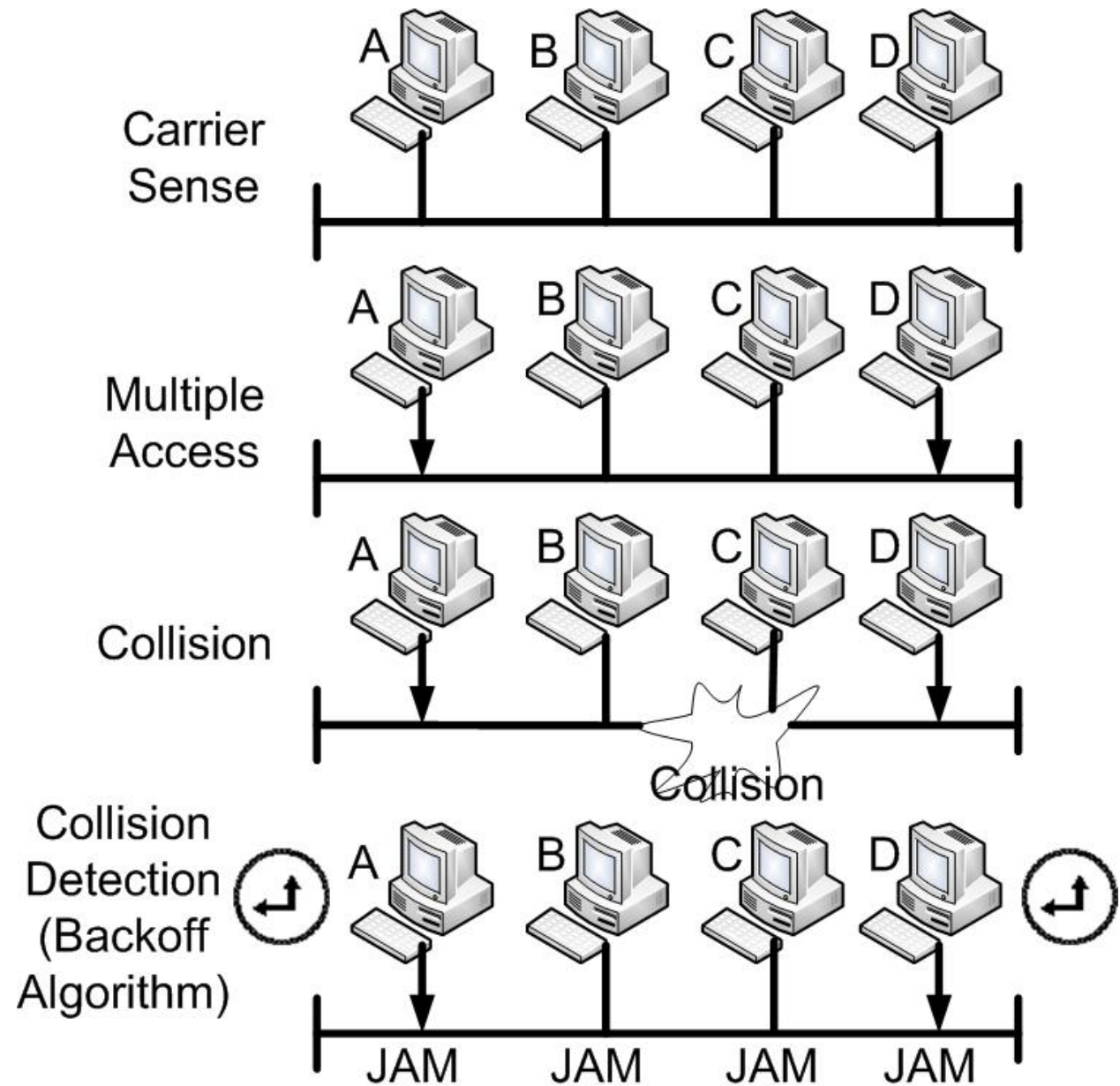
- Extends cable distances
- Regenerates or amplifies signal

Collisions

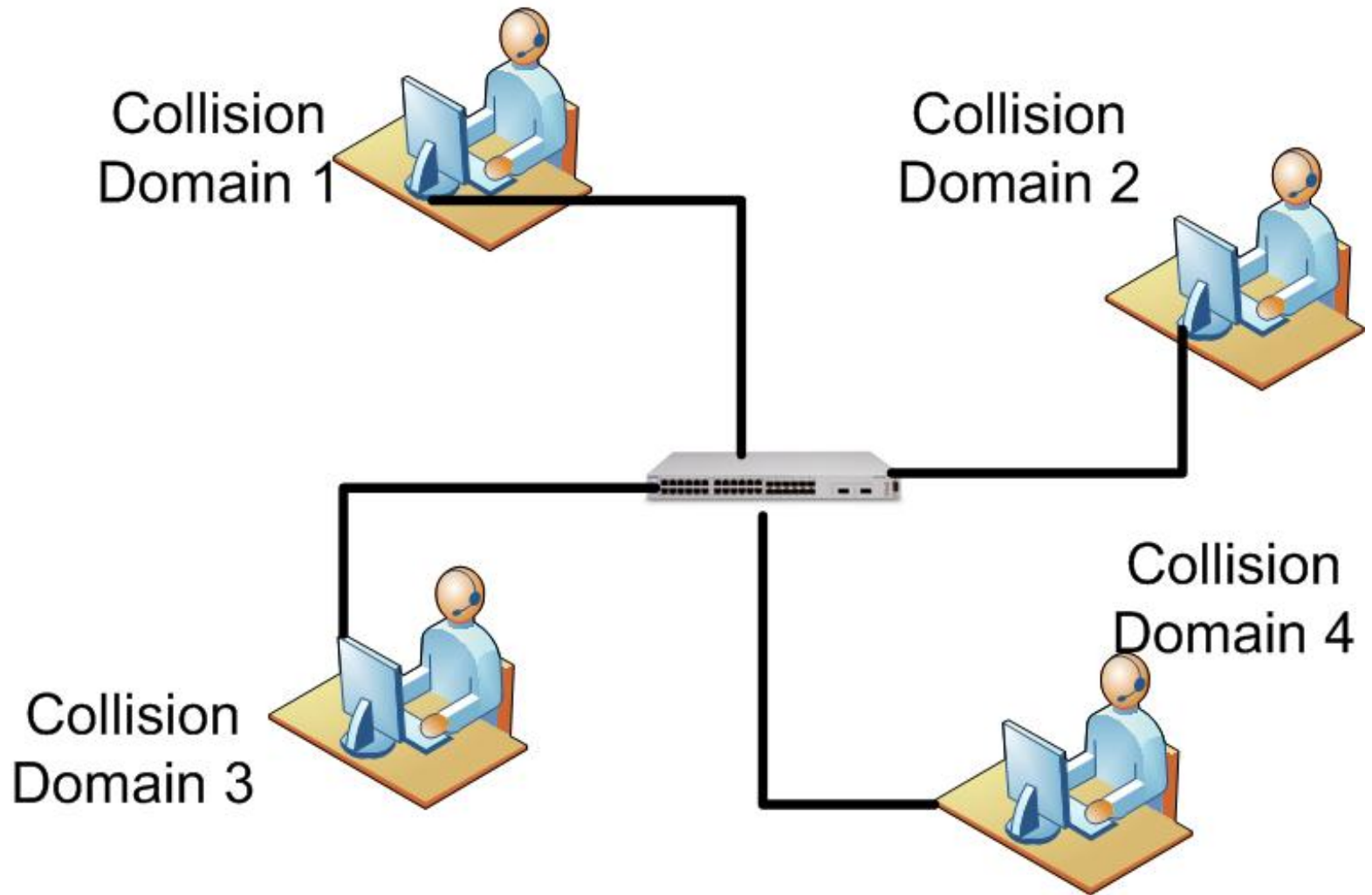


CSMA / CD

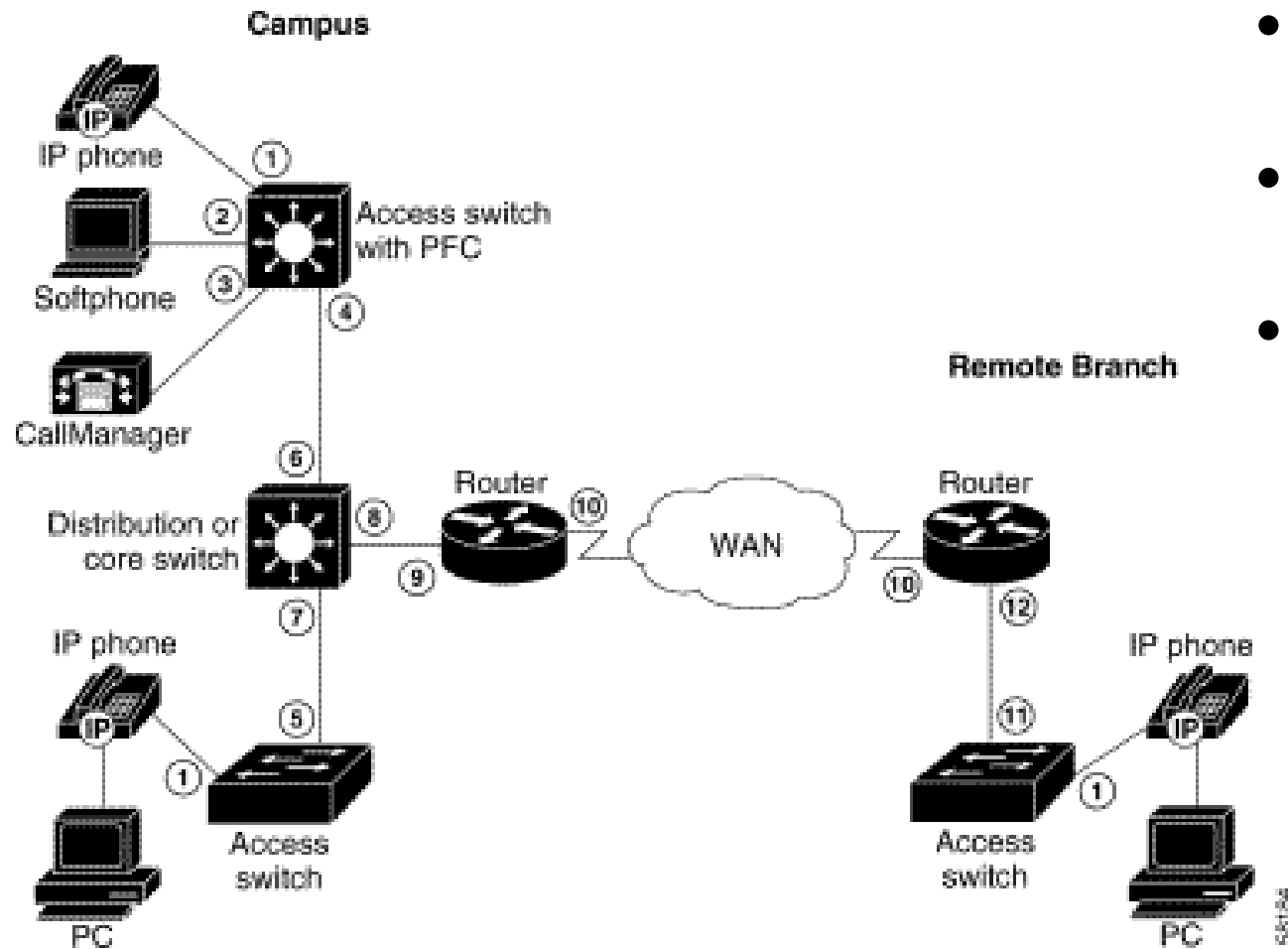
Carrier sense
multiple access
collision detect



Multiple Collision Domains

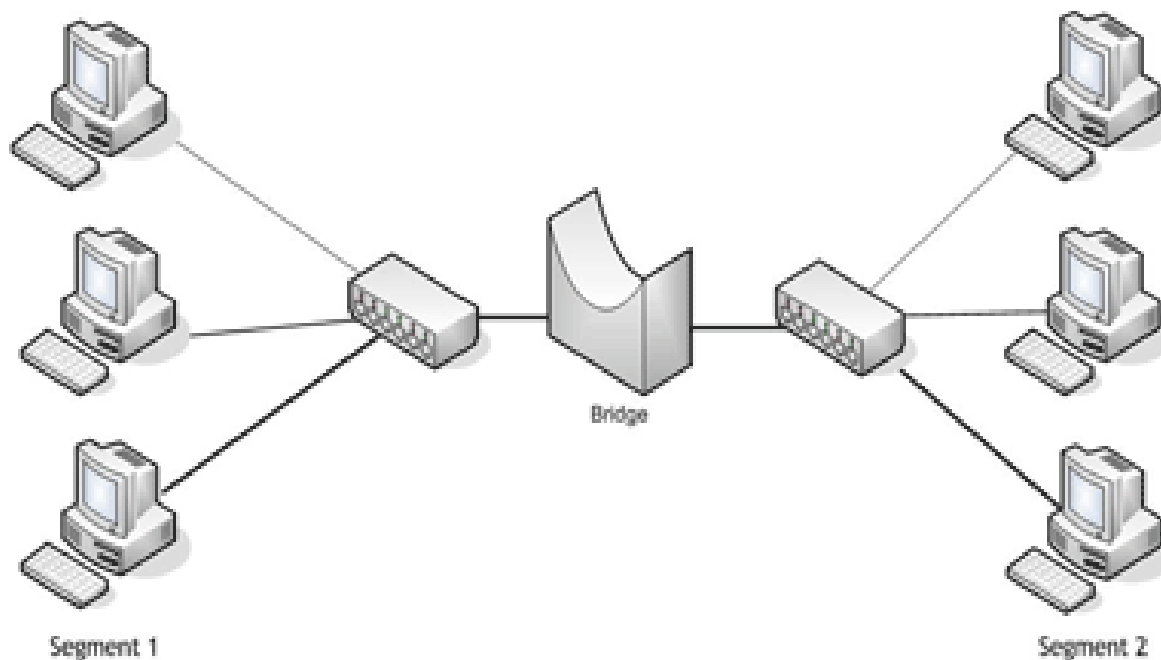


Network Congestion



- Driven by high-performance PCs
- More networked data
- Bandwidth intensive applications

Bridges



- Operate at layer 2 of the OSI model
- Forward, filter, or flood frames
- Few ports
- slow

LAN Switch

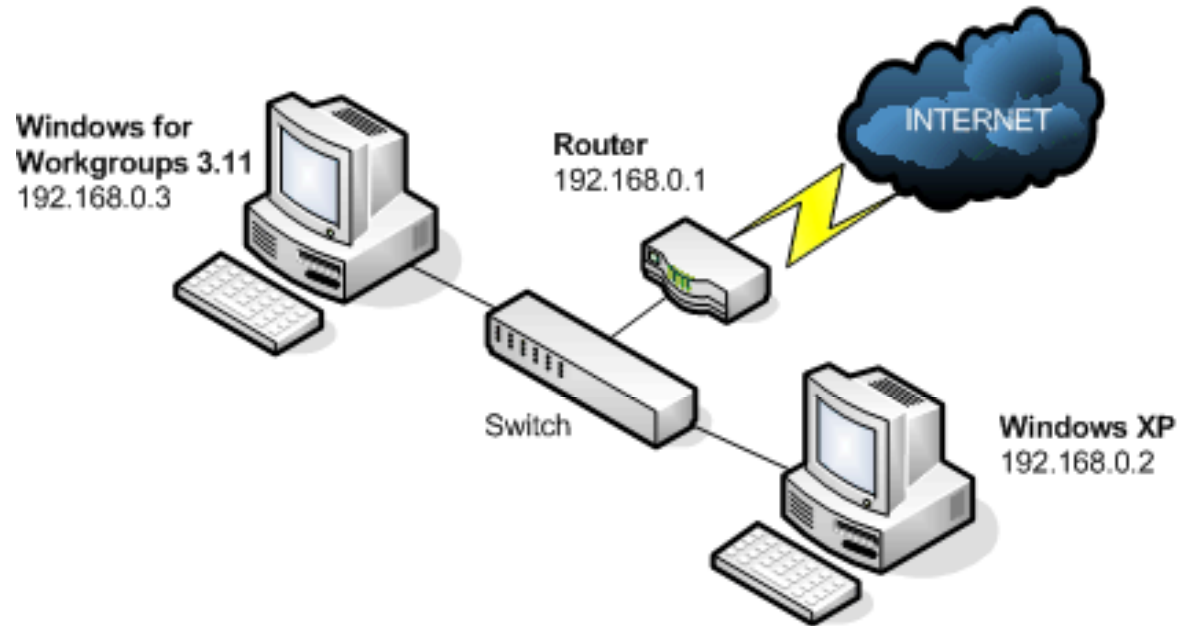
- High port density
- Large frame buffers
- Mixture of port speeds
- Fast internal switching
- Switching modes
 - Cut-through
 - Store-and-forward



LAN Switch Features

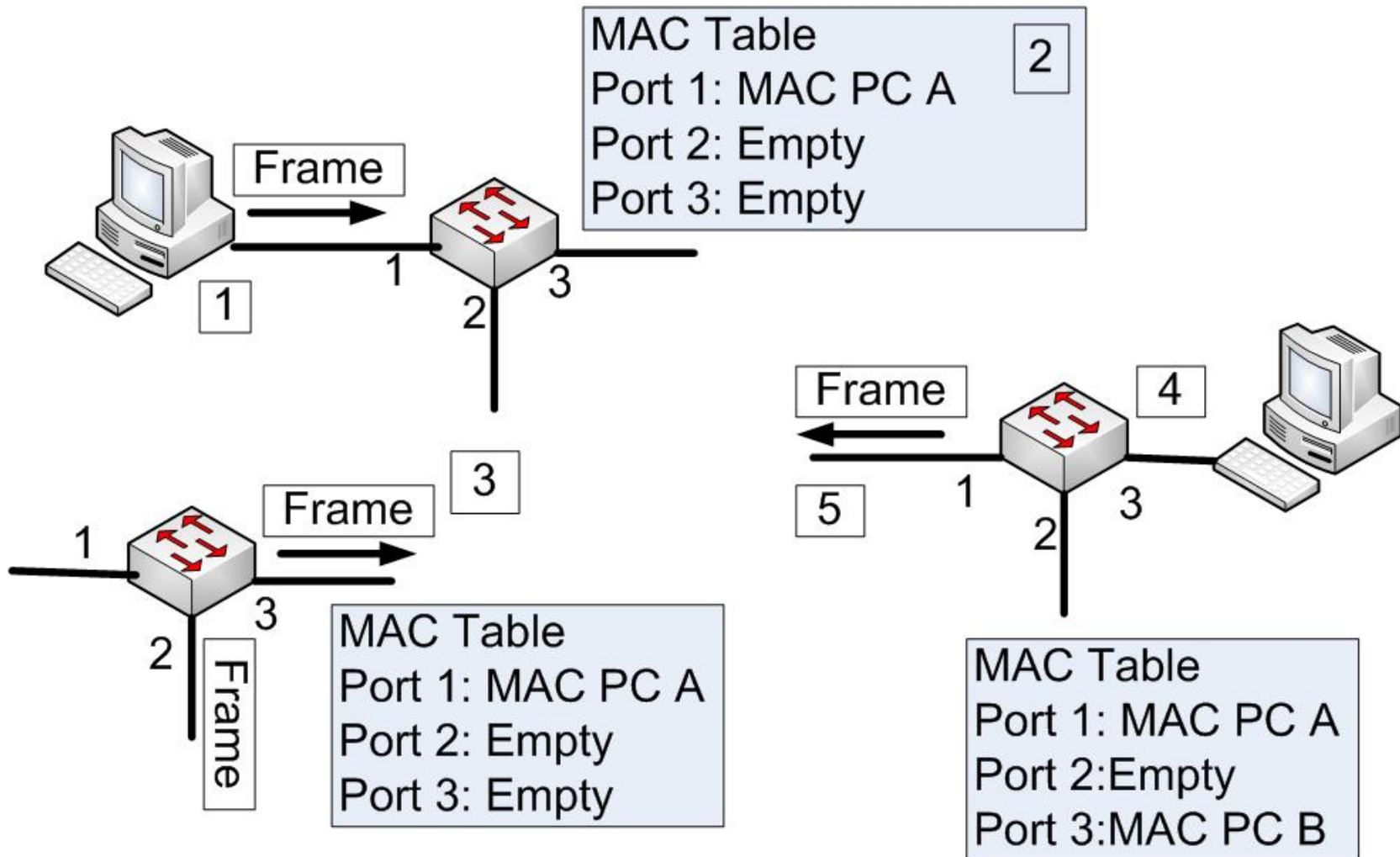
- Dedicated bandwidth on each port
- Channelized sessions
- Full-duplex communication
- Media rate adaption

Switches Supersede Bridges



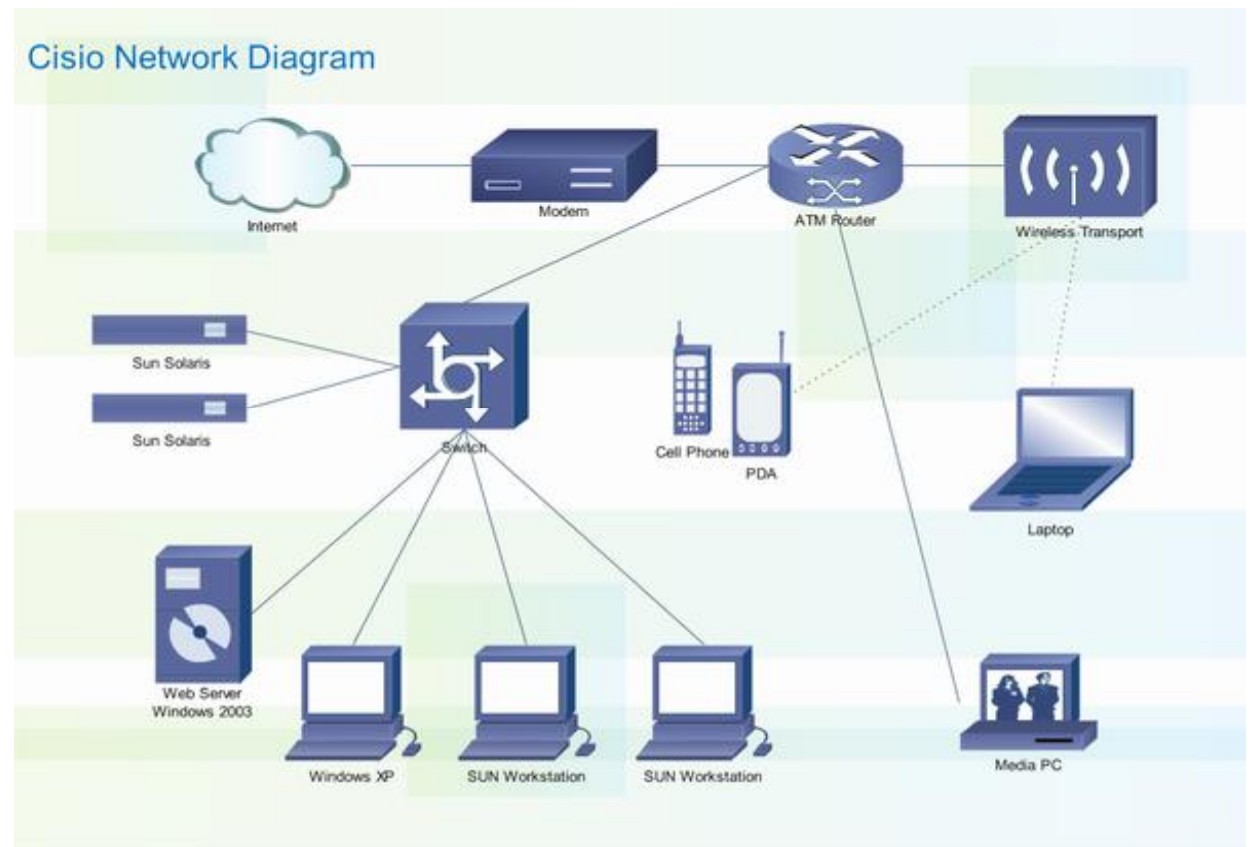
- Operate at layer 2 of the OSI model
- Forward, filter, or flood frames
- Many ports
- Fast

Switching Frames



LANs Today

- Users grouped by physical location
- Many switches
- Switches connected by high-speed links



Summary

- The early version of Ethernet was called thick Ethernet and was large, expensive, difficult to install, limited to 500 meters before a repeater was required, limited in the number and placement of stations, relatively difficult in adding new users, and provided 10 Mbps of bandwidth.
- The later version of Ethernet, thin Ethernet, was smaller, limited to 185 meters before a repeater was required, limited in the number and placement of stations, easier in adding new users, and provided 10 Mbps of bandwidth.

Summary

- A segment is a network connection made by a single unbroken cable. Ethernet cables and segments can only span a limited physical distance after which transmission become degraded.
- A hub extends network segments by receiving incoming bits, amplifying the electrical signal, and transmitting these bits through all of its ports to the other devices on the network.
- If two or more station on a segment transmit at the same, a collision results.

Summary

- The most common causes of network congestion on an Ethernet LAN are increasingly powerful computer and network technologies: increasing volume of network traffic; and high-bandwidth applications, such as desktop publishing, e-learning, and streaming video.
- Switches offer greater benefits for eliminating network congestion than bridges by providing dedicated communication between devices, multiple simultaneous conversation, full-duplex communication, and media-rate adaptation.

