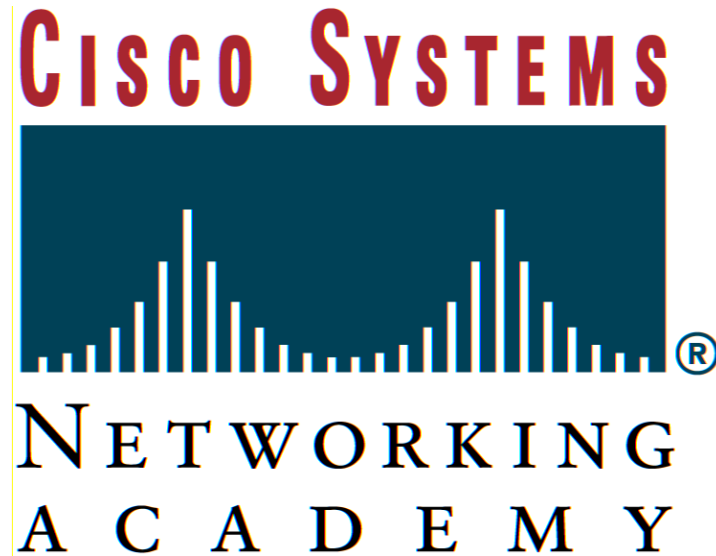


CHABOT COLLEGE



ELEC 99.05

Collision & Broadcast Domains

MAC Address

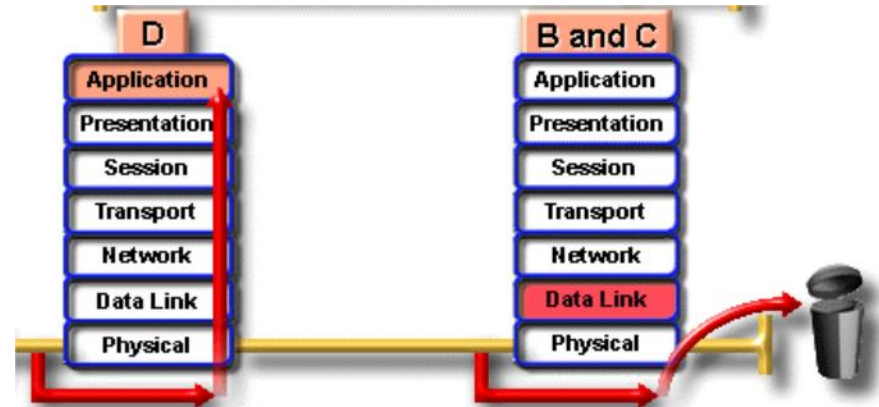
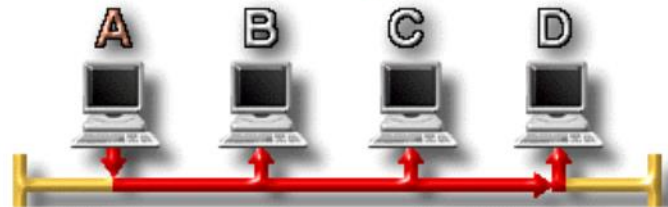
- Contains 48-bit destination address field.
- Who is this frame for?
 - 00-C0-F0-56-BD-97
- “Hey Joe”



MAC Address

- How will all other NICs handle the frame?
- Drop it (in the “bit bucket”)

Ethernet Operation



Systems, Inc. 1999

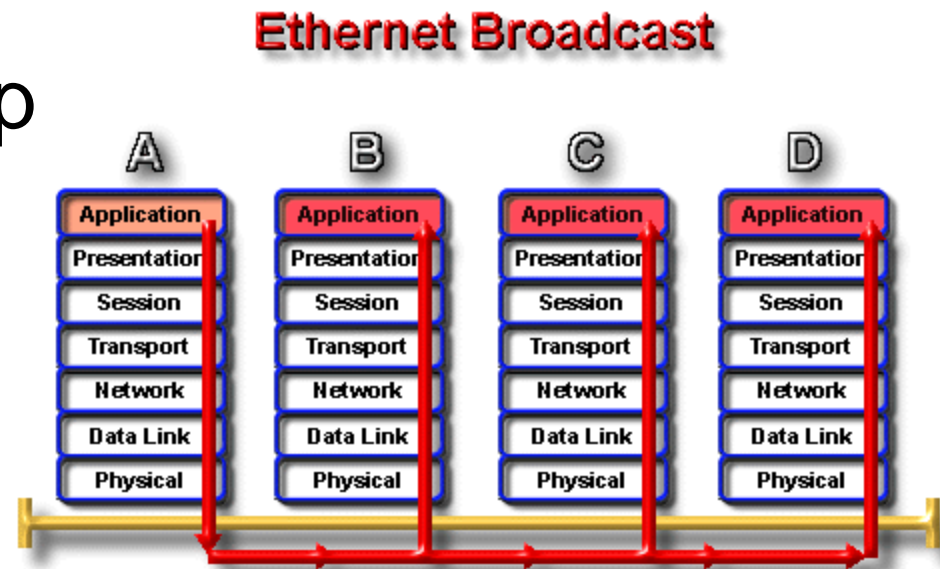
Special MAC Address

- Who is this frame for?
 - FF-FF-FF-FF-FF-FF
- “Hey everybody”



Broadcast MAC Address

- FF-FF-FF-FF-FF-FF
- 48 bits, all 1s
- All NICs copy the frame & send it up the stack



Broadcast Frames

- Necessary for network function
- Used for
 - finding services: “Hey, is there a server out there?”
 - Advertising services: “Hey, I’m a printer you can use.”

Broadcast Frames

- Some Layer 3 (Network Layer) protocols use broadcasts frequently:
 - Appletalk
 - IPX (older Novell protocol)
- Networks that use these protocols must be limited in size, or they will become saturated with broadcast frames.

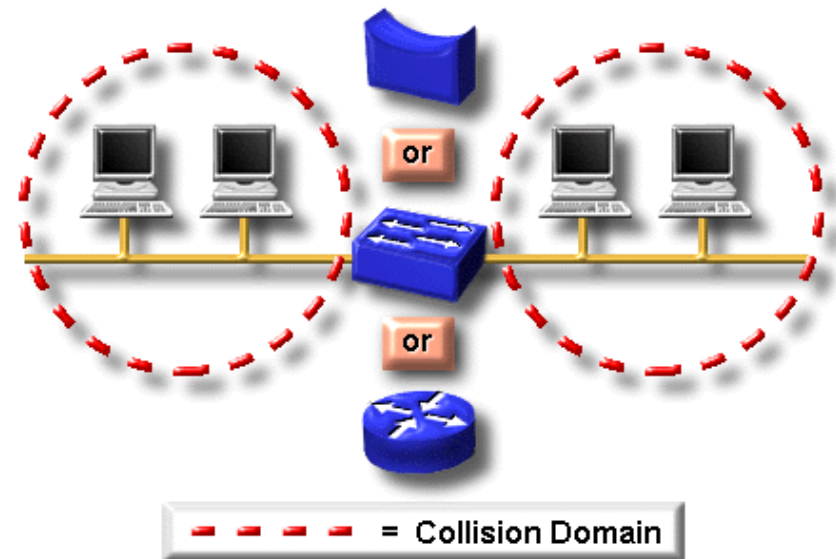
Broadcast Frames

- **TCP/IP** (a Layer 3 protocol) uses broadcasts sparingly.
- Therefore, networks that use TCP/IP can be made quite large without broadcast problems. (They “scale” well.)

Collision Domain

- Network region in which collisions are propagated.
- Repeaters and hubs propagate collisions.
- Bridges, switches and routers do not.

Separating Collision Domains



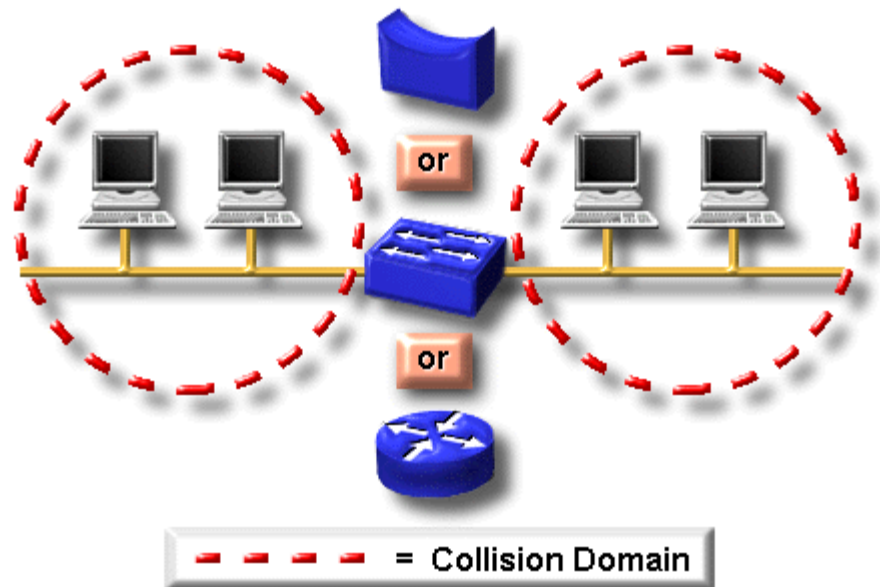
© Cisco Systems, Inc. 1999

Reducing Collisions

Collision frequency can be kept low by breaking the network into segments bounded by:

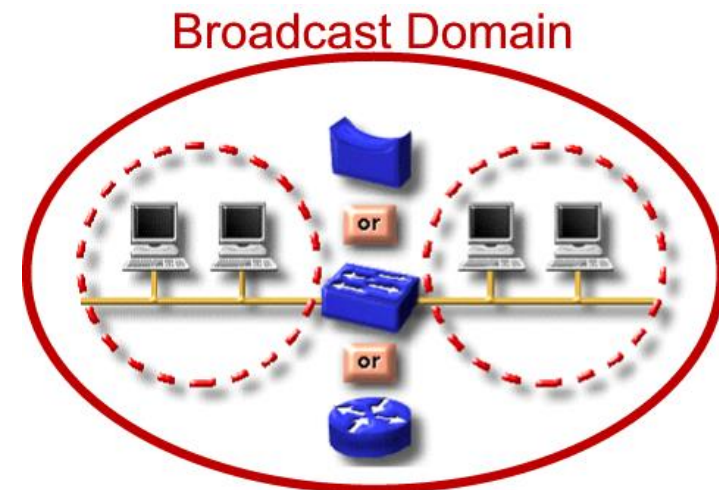
- bridges
- switches
- routers

Separating Collision Domains



Broadcast Domain

- Network region in which broadcast frames are propagated.
- Repeaters, hubs, bridges, & switches propagate broadcasts.
- Routers either do or don't, depending on their configuration.



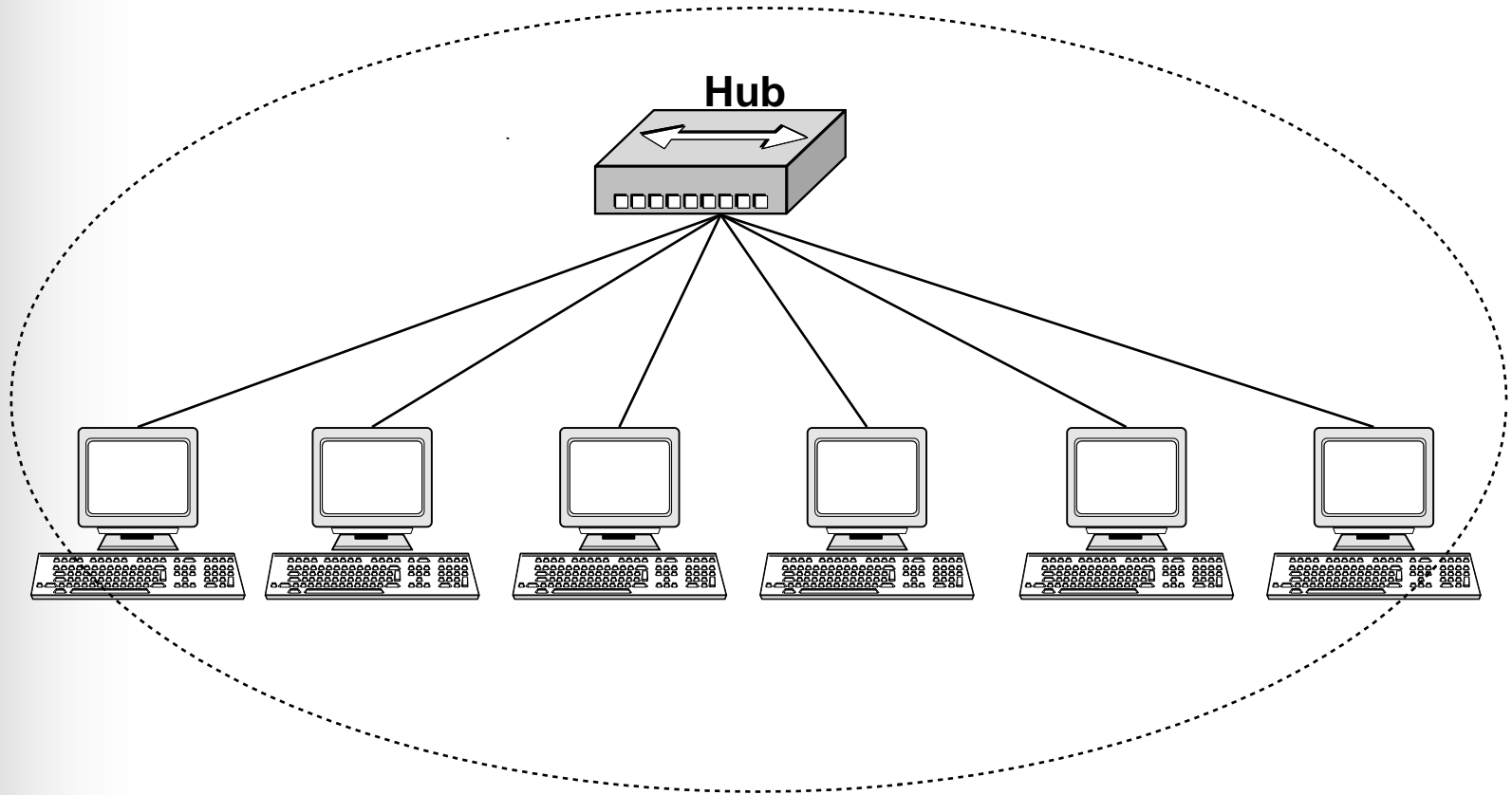
Reducing Broadcasts

- Broadcasts are necessary for network function.
- Some devices and protocols produce lots of broadcasts; avoid them.
- Broadcast frequency can be kept manageable by limiting the LAN size.
- LANs can then be cross-connected by routers to make a larger internetwork.

Shared Ethernet

- A single segment that is shared among all connected NICs.
- A single collision domain.
- A logical “bus” (may be a physical star).
- The segment includes repeaters and hubs.
- Sometimes called a “single flat Ethernet”.

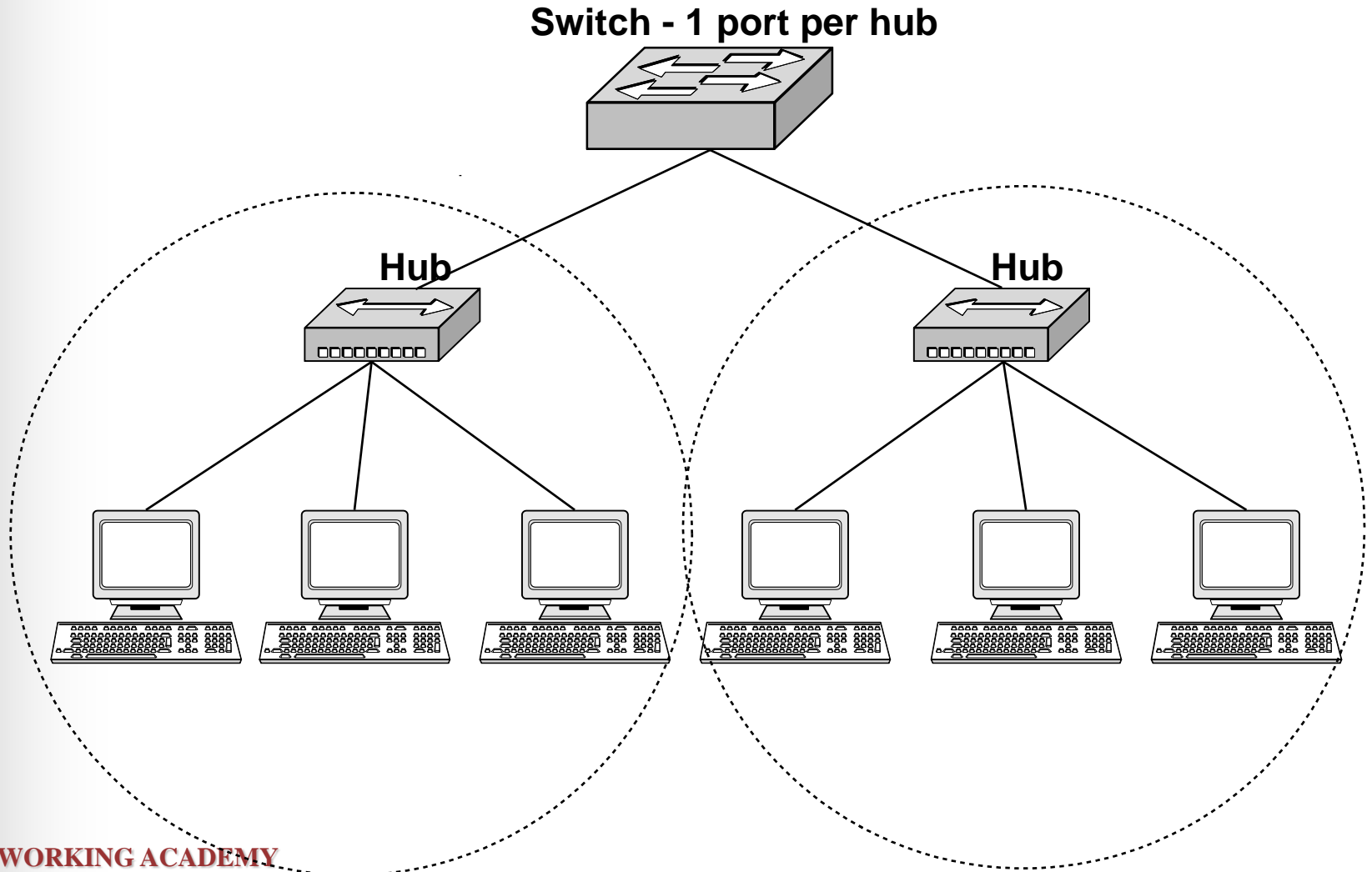
Shared Ethernet



Switched Ethernet

- Consists of a several segments, each of which is shared by NICs attached to it.
- The network is segmented into several collision domains.
- Bridges, switches, and routers create the segment and collision domain boundaries.
- Segments may contain hubs and repeaters.

Switched Ethernet

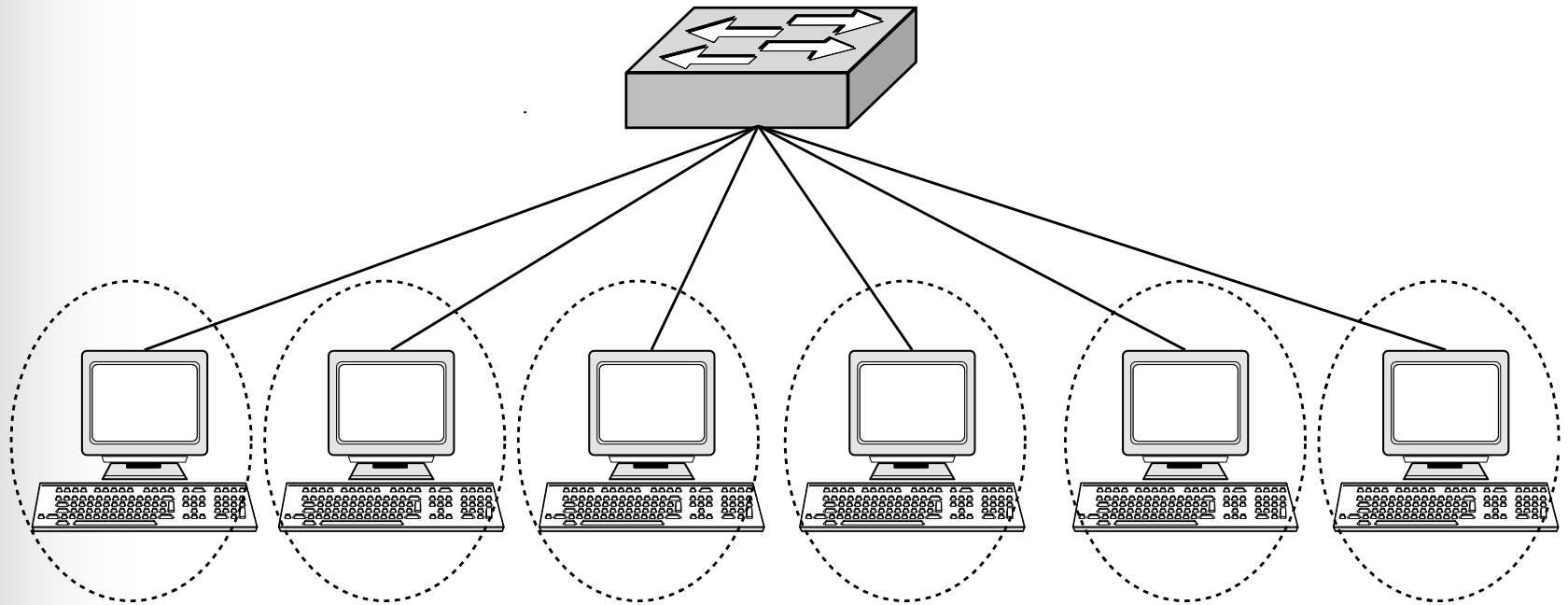


Microsegmented Switched Ethernet

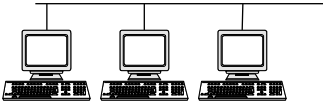
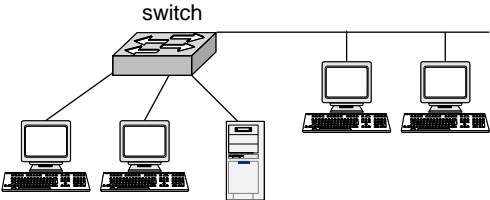
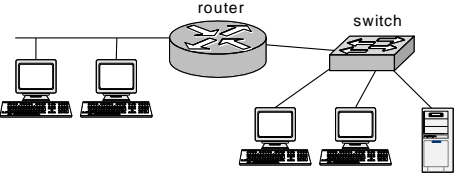
- Each user NIC is connected directly to a switch port.
- Provides one switched segment to each connected NIC.
- No sharing.
- No collisions.

Microsegmented Switched Ethernet

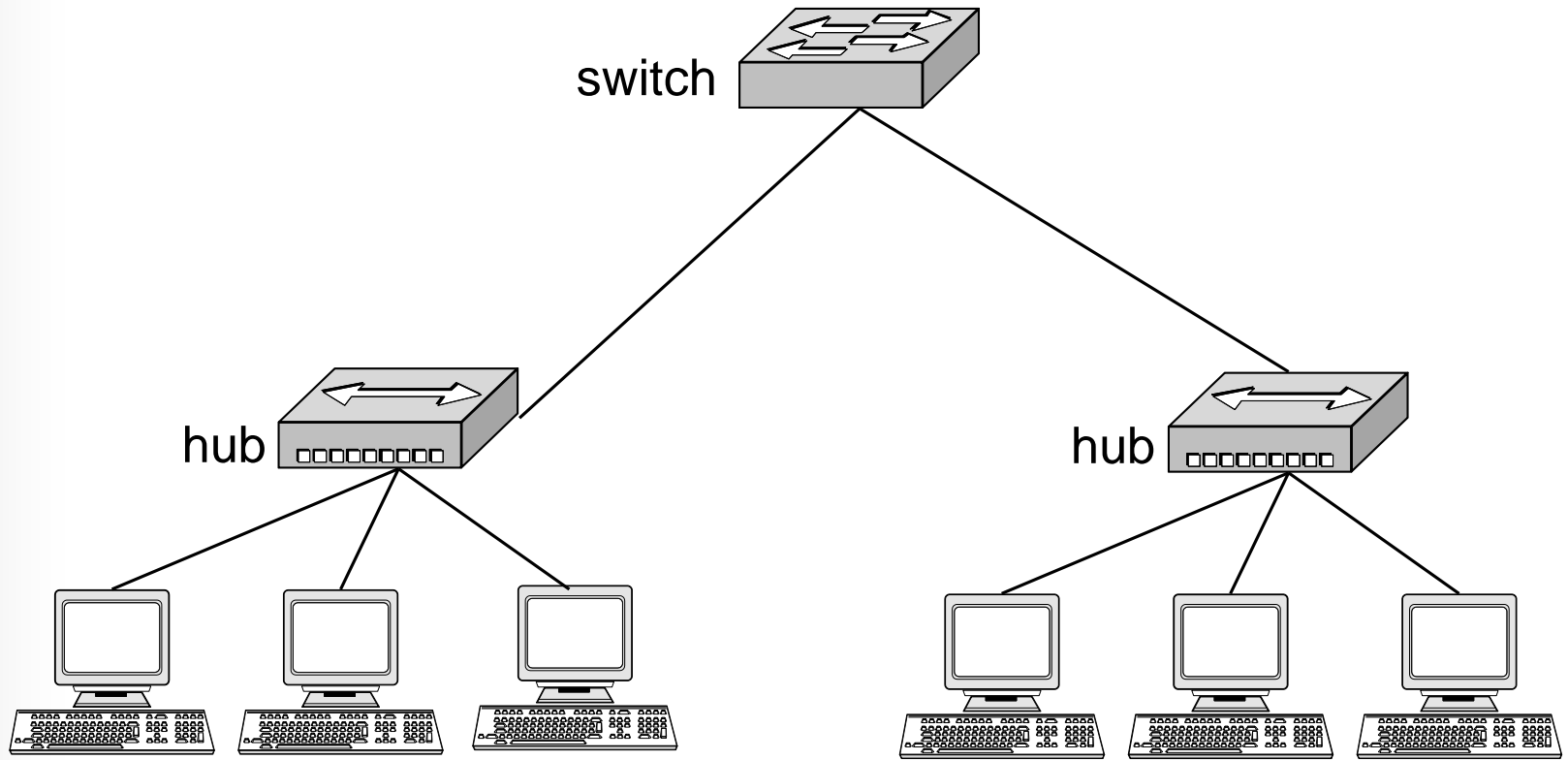
Switch - 1 port per PC



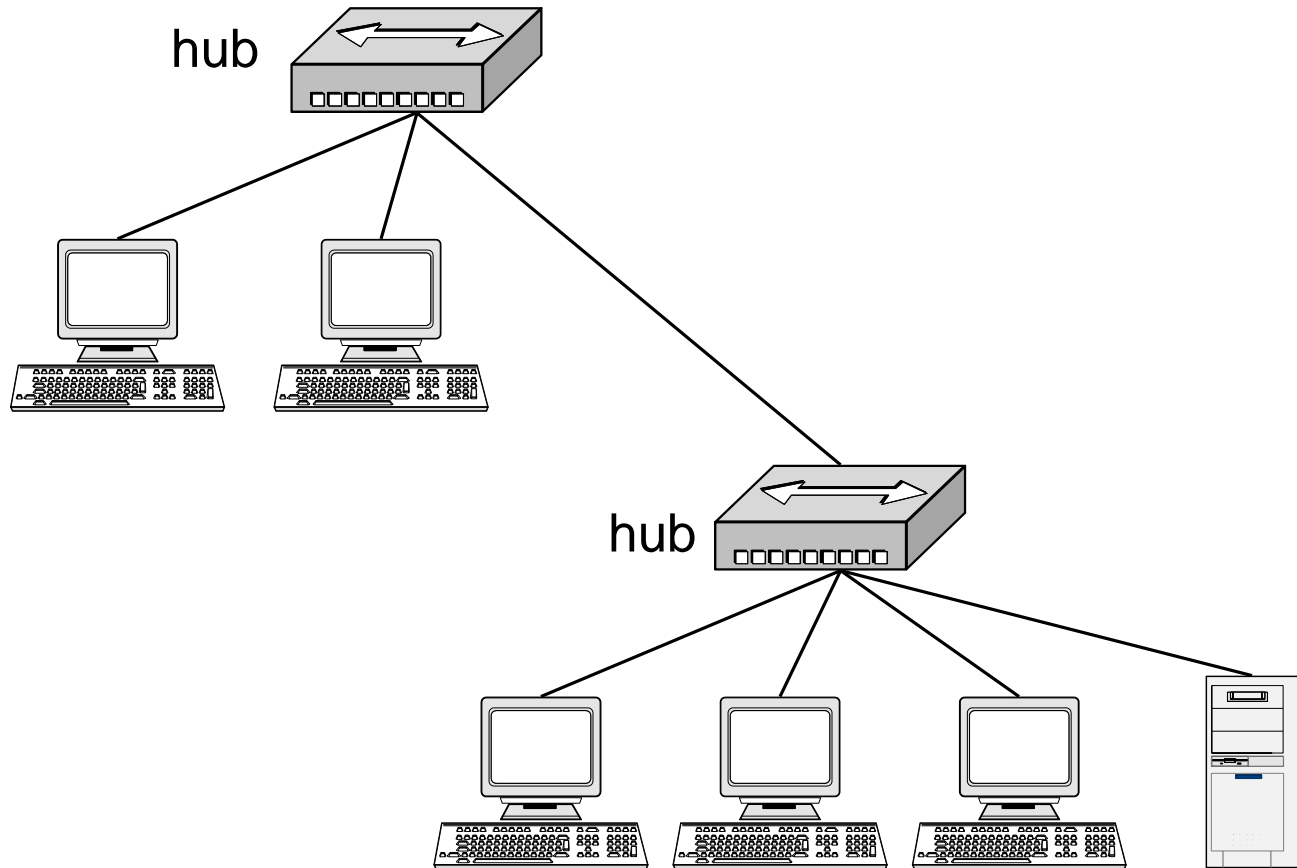
Summary

Term	Includes	Boundary	Example
LAN Segment (Collision domain)	Cable Repeaters Hubs	Bridges Switches (Routers)	
Entire LAN (Broadcast domain)	Everything except Routers	Edge of LAN Routers	
Internetwork (Group of LANs cross-connected by Routers)	LANs & Routers	Edge of Internetwork	

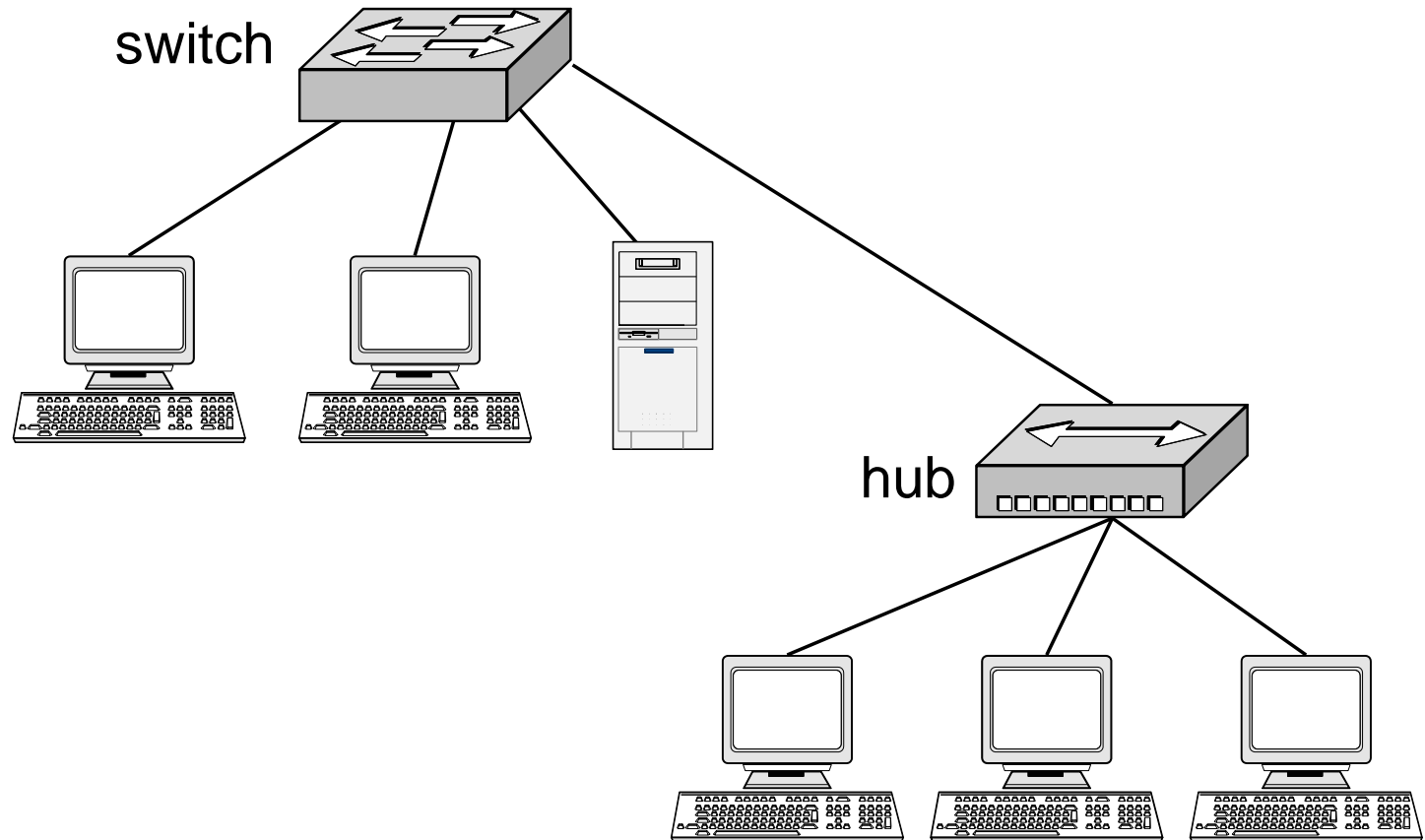
Identify the collision domains & broadcast domains:



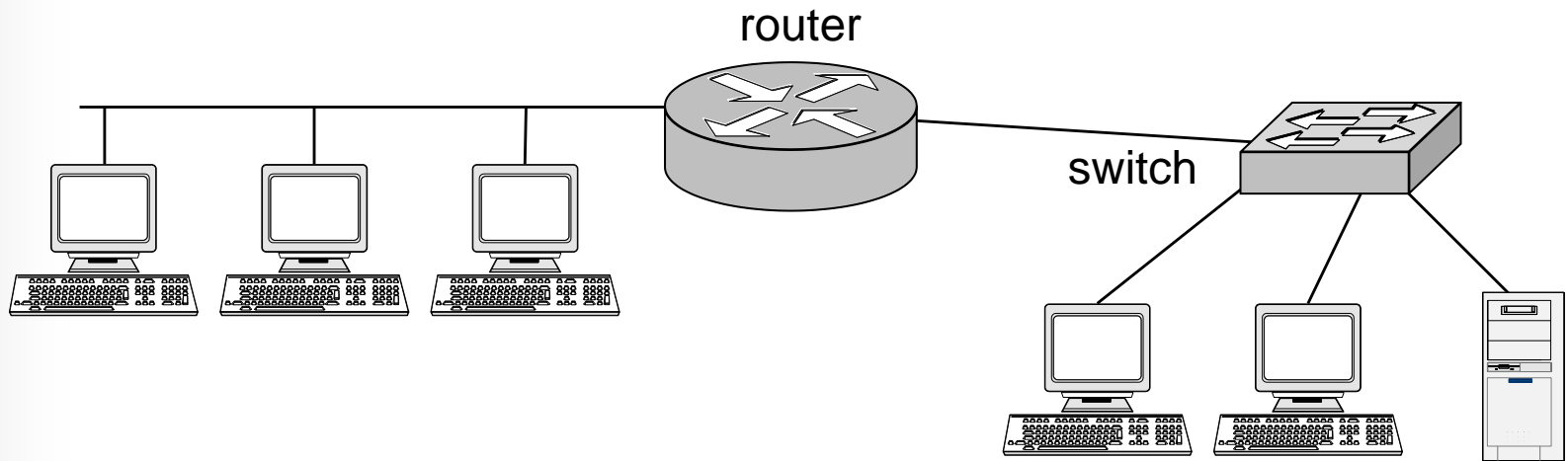
Identify the collision domains & broadcast domains:



Identify the collision domains & broadcast domains:



Identify the collision domains & broadcast domains:



Router connects separate networks.

One broadcast domain per router interface.

Application

- First, complete Lab 7A
- Then, on a printed copy of the “Teaching Topology” (curriculum p7.5.5)
 - Circle each collision domain - use a solid line.
 - Circle each broadcast domain - use a dashed line.

Reminder

- Collisions
 - spread throughout a LAN segment
 - spread across hubs & repeaters
 - are stopped by **switches & bridges**
- Broadcasts
 - spread throughout an entire LAN
 - spread across hubs, switches, bridges
 - are stopped only by **routers**