Today’s lecture

- Ethernet bridging
  - The learning bridge
  - Spanning tree algorithm for bridges

Why use Ethernet bridges?

- Larger networks
- More concurrent communication
- Extend Ethernet without changing computers

Collision!!!
Basic transparent bridge

Bridge

From A   To C
A

From A   To C
B

From A   To C
C

From A   To C
D

CS 640

Basic transparent bridge

Bridge

From A   To B
A

From A   To B
B

From A   To B
C

From A   To B
D

CS 640

Learning bridge

Bridge

I known A is to the left

From A   To C
A

From A   To C
B

From A   To C
C

From A   To C
D

CS 640
Learning bridge

Bridge
I known A is to the left
I known B is to the left

From B => To A

A

From B => To A

B

C

D

Learning bridges

• Initially forward frames onto all ports
• Learn where hosts are based on source address
• For known addresses only forward to right port
• Multicast/broadcast go to all ports
• Terminology
  – For twisted pair based Ethernet
    • Repeaters are called hubs
    • Bridges are called switches
  – A segment or collision domain has wires and hubs
    • LAN vs. extended LAN

What happens with cycles
Solution: eliminate cycles

- On power up Ethernet bridges run a distributed spanning tree algorithm
  - Node with lowest ID is root
  - Spanning tree is the tree of shortest paths to root
  - Break ties based on bridge IDs
- Ports that are not part of the spanning tree are turned off to data traffic
  - All cycles eliminated

Spanning tree algorithm details

- Message format: (root, distance, bridgeID)
- Each bridge stores best message for each port
- Each bridge picks port closest to root
- Best message is flooded with distance incremented
- Each segment "elects" a designated bridge
- The root repeats message
- Messages are timed out

Ethernet today

- Limits to growth of bridged LANs
  - Traffic due to broadcast/multicast frames still goes to all segments
  - Throughput at root switch becomes bottleneck
    - Can have faster switches towards the middle
- Bonus for switched Ethernet: better security
  - Hosts cannot snoop on others’ traffic
  - Today switches have advanced features (VLANs)