Switches and Bridges

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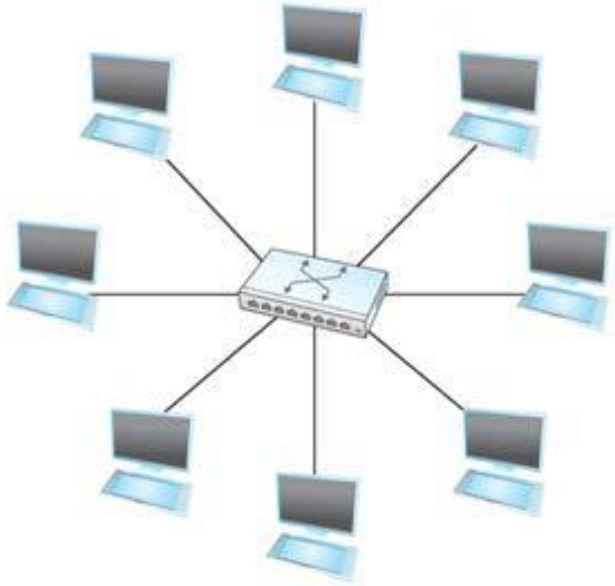
Switches and Bridges

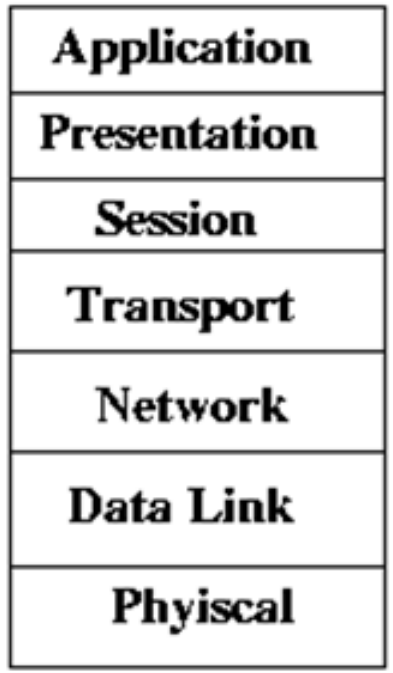
We can use switching technologies to interconnect links to form a large network

- What is a ***hub***?
- What is a ***switch***?
- What is a ***bridge***?
- Collision domains?



Hubs

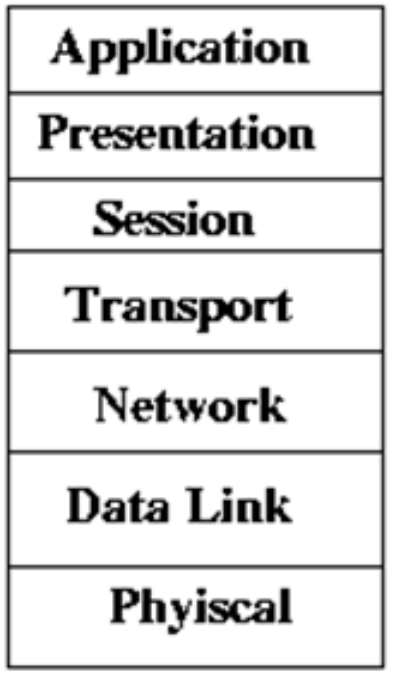
- Hubs operate at the physical layer
- Why?
  - They only repeat signals



OSI Protocol Stack

Switches/Bridges

- Bridges (or switches) operate at the data link layer
- Why?
  - They only make informed switching decisions using link layer addresses (typically MAC addresses)



OSI Protocol Stack

Bridge Advantages

- Isolates collision domains resulting in higher total max throughput
- Limitless number of nodes and geographical coverage
- Can connect different Ethernet types
- Transparent (“plug-and-play”): no configuration necessary

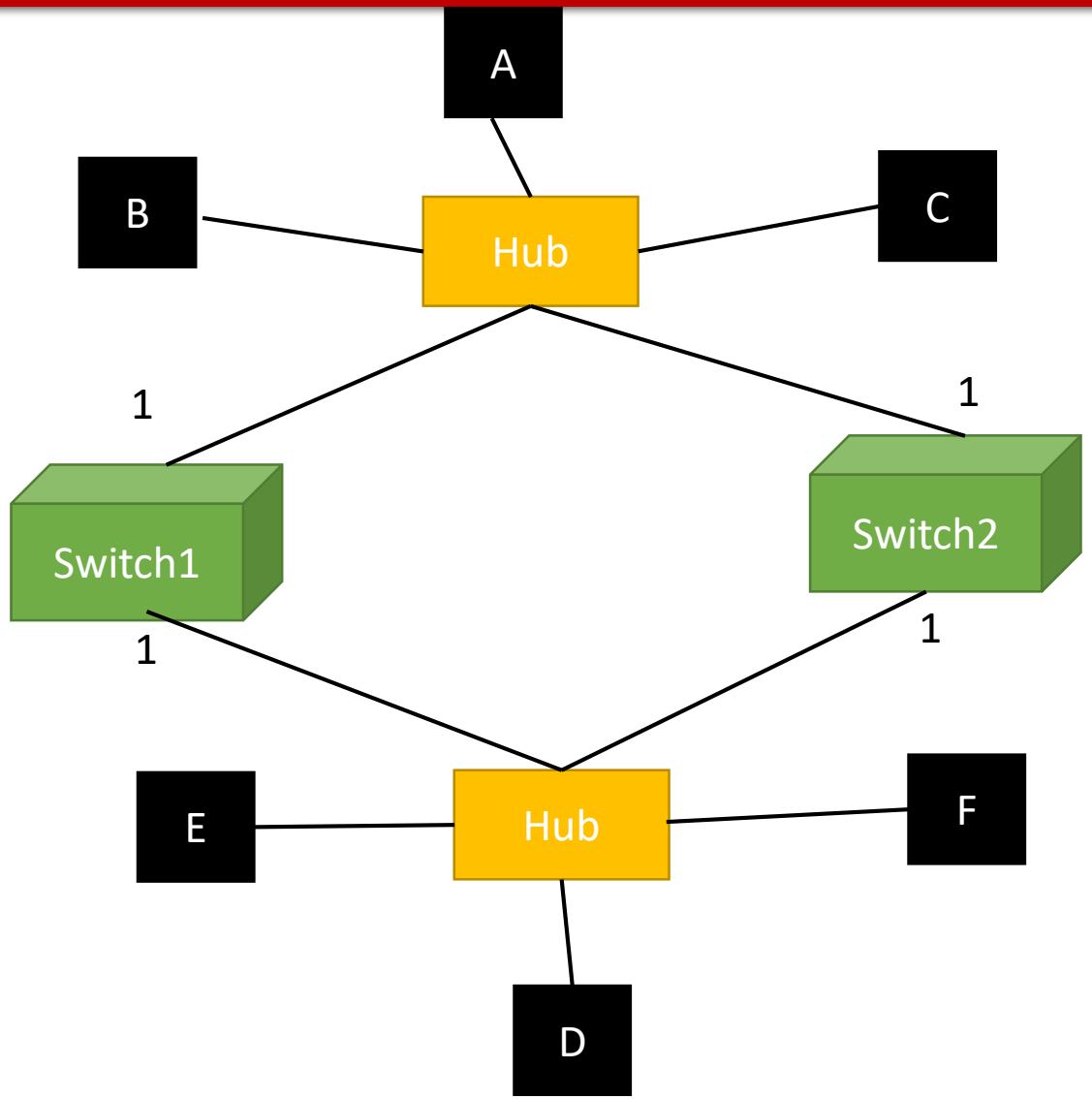
Bridge Self Learning

- A bridge has a ***bridge table***
- Entry in bridge table
  - (Node LAN Address, Bridge Interface, Time Stamp)
  - Stale entries in table dropped (TTL can be 60 min)
- Bridges learn which hosts can be reached through which interfaces
  - When frame received, bridge “learns” location of sender: incoming LAN segment
  - Records sender/location pair in bridge table

Bridge Learning Drawbacks

- Previous strategy works fine until a LAN has a loop in it
- Possible bad failure case – frames could loop forever without getting to final destination!
- How could this happen?
  - In a large network, an administrator could add a bridge that closes a loop without realising it
  - It could also be built in on purpose to provide redundancy

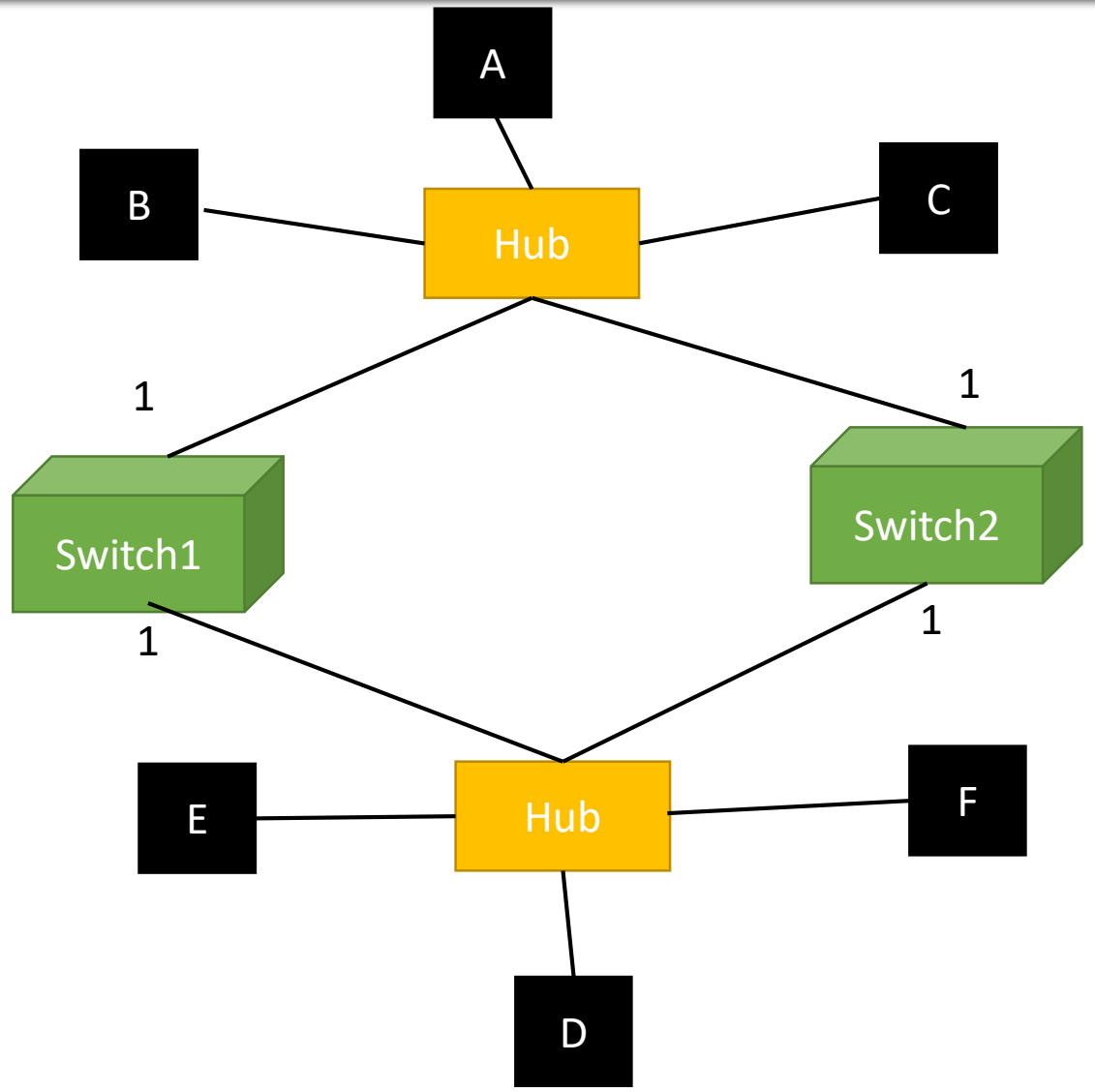
Loop



Loop

Process of finding spanning tree:

- Every switch has built-in ID and broadcast ID
- Choose smallest node as the root of the spanning tree
- Find the shortest path by using Dijkstra algorithm
- Based on the spanning tree block the port



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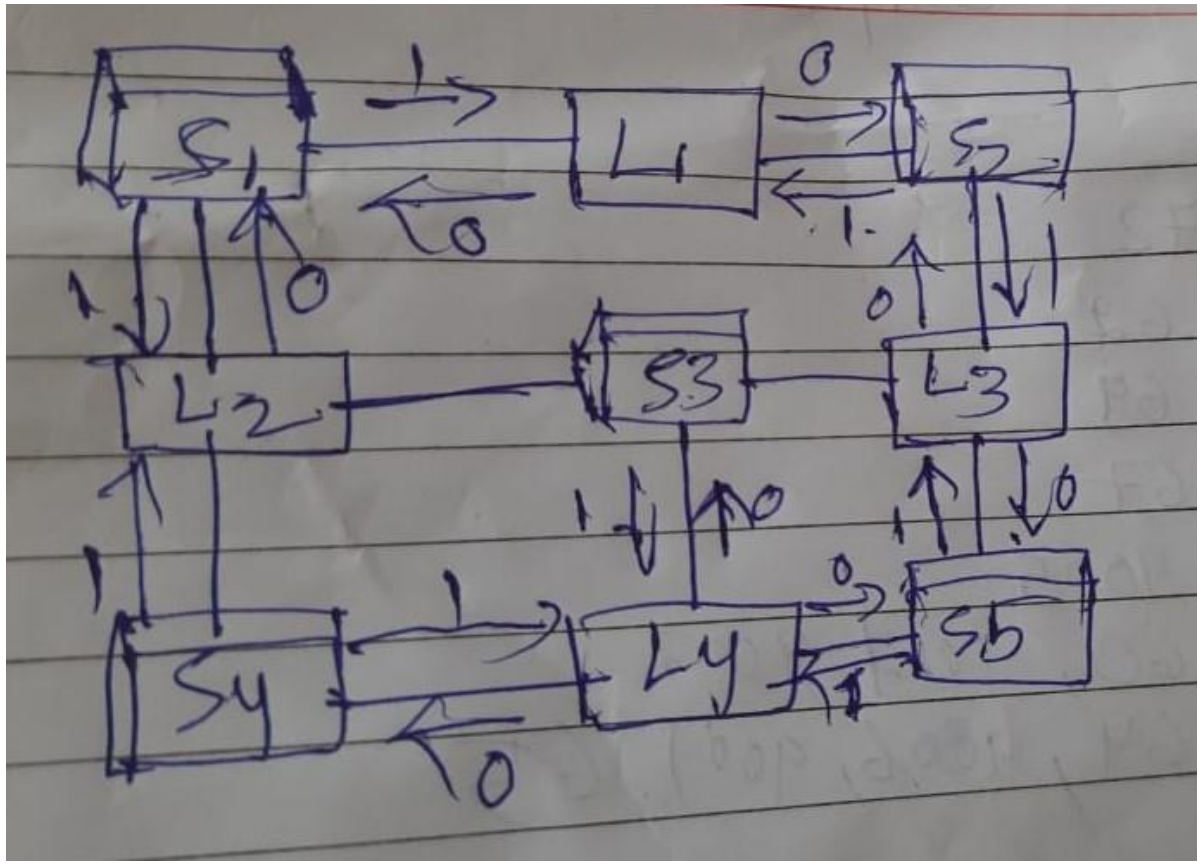

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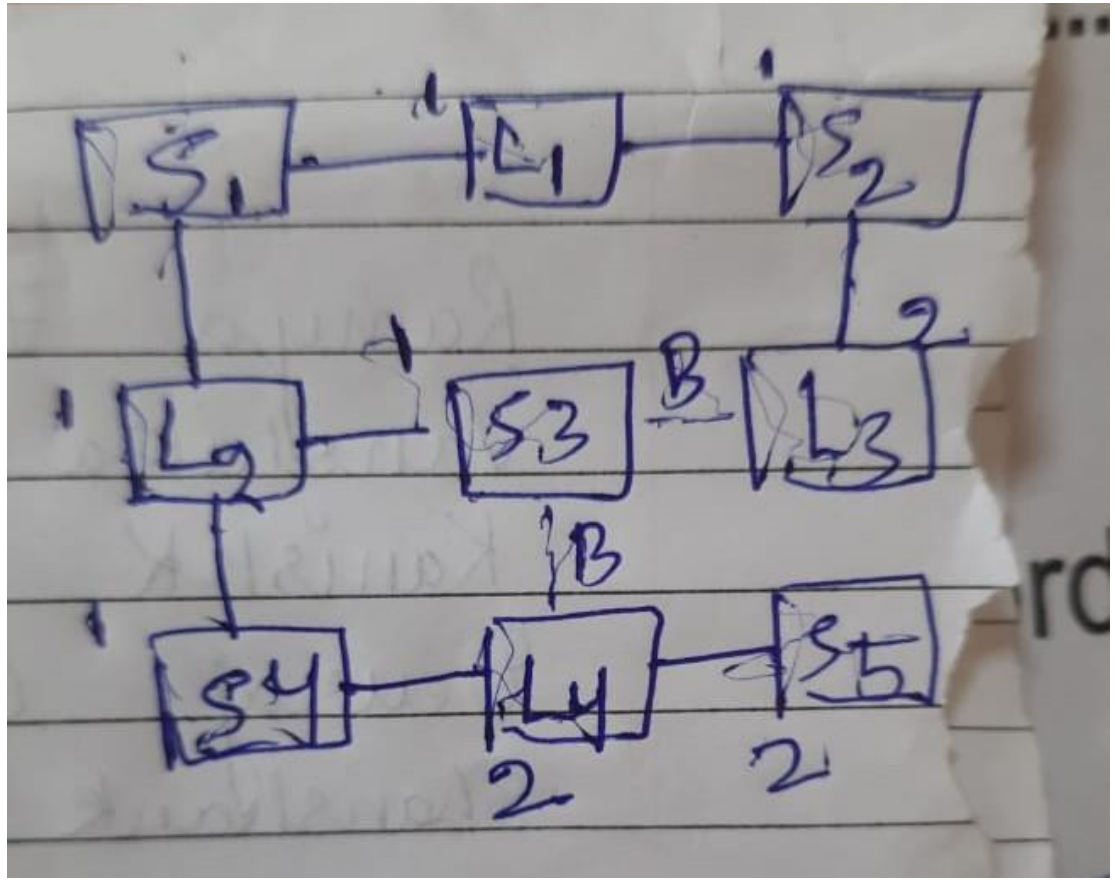

Thank you!