Ethernet Switching

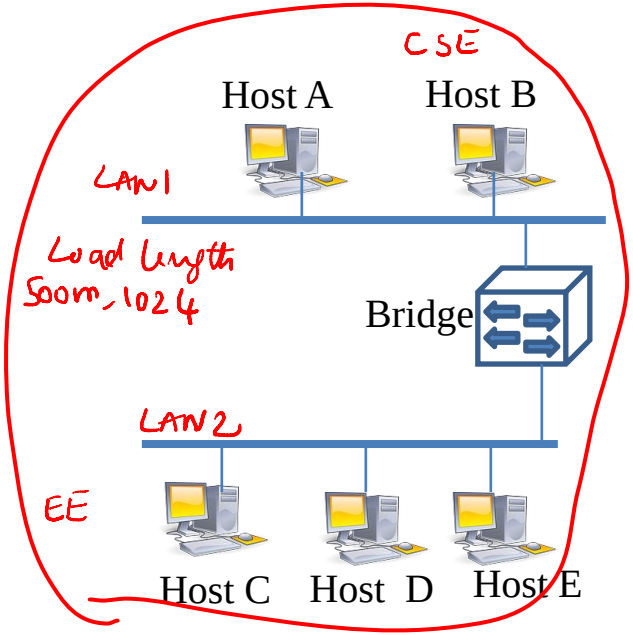
Kameswari Chebrolu

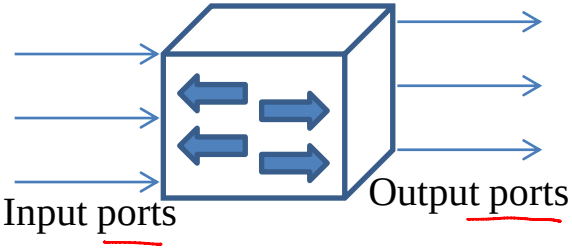
Recap

- Switching scales networks
- Packet switching helps utilize resources more efficiently
  - Predominant use: Datagram switching
- Apply packet switching to interconnect Ethernet segments

LAN Switches

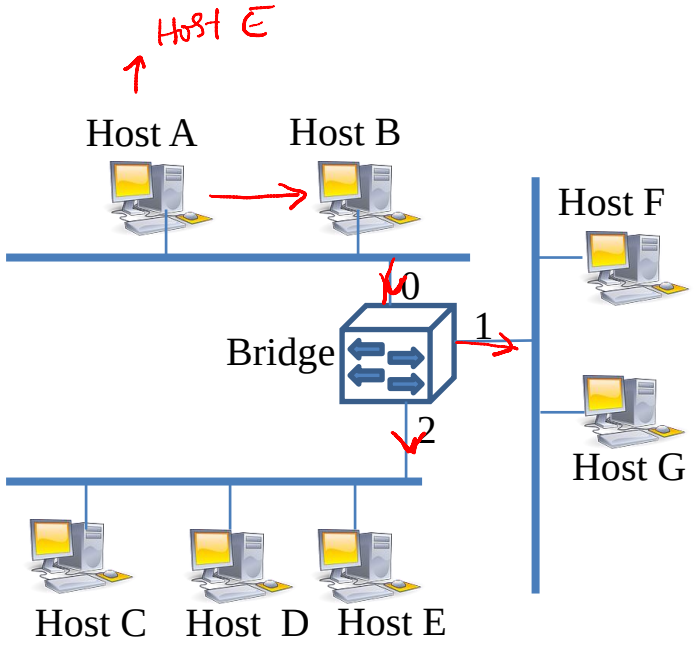
- Also called layer-2 switches or bridges
- Overall network: Extended LAN
- Multi-input Multi-output device with buffers
- Why used?
  - Different administrators
  - Load or Length restrictions
  - Isolate Networks (helps in security)

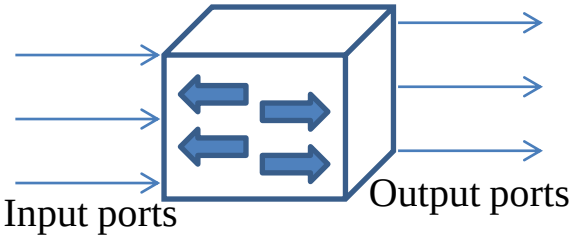




Forwarding

- How to forward?
  - Host A sending packet to Host B
  - Host A sending packet to Host E
- Manual configuration: Tedious
- Automatic simple strategy: Forward on all interfaces except the one on which received

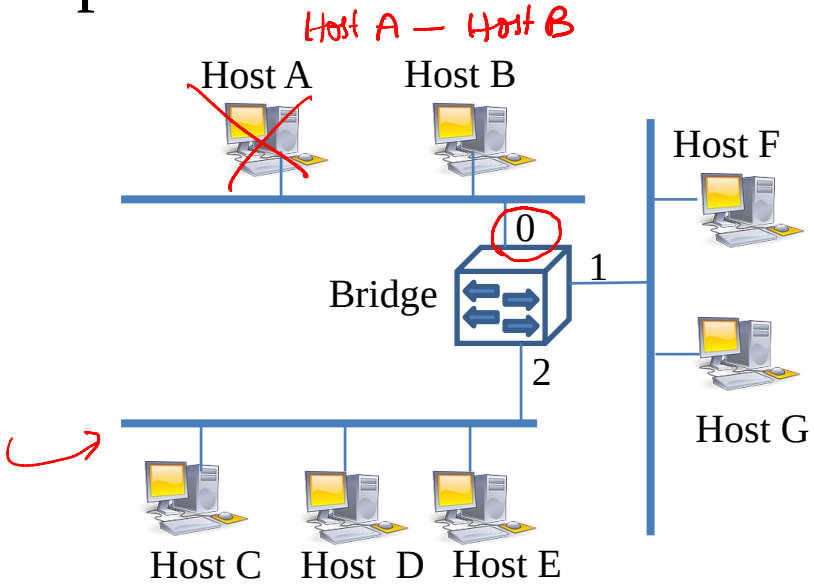




Learning Bridges

- Idea: Inspect source address and map it to port on which the frame was received
  - Each entry purged after some period unless refreshed

Host	Port
A	0
B	0
C	2
D	2
E	2
F	1
G	1

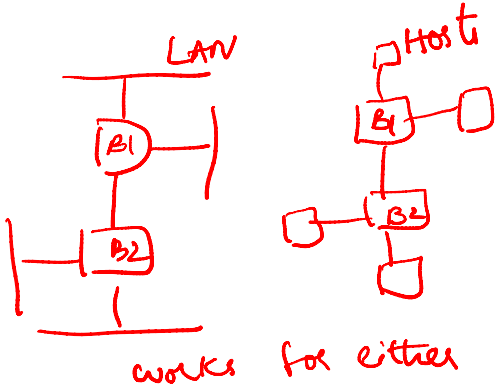


Algorithm

- If a frame received at bridge for destination D on port p
  - No entry for D in the table, forward on all ports except port p
  - If entry for D in forwarding table corresponds to p, drop frame
  - If entry for D in forwarding table corresponds to i != p, then forward on i

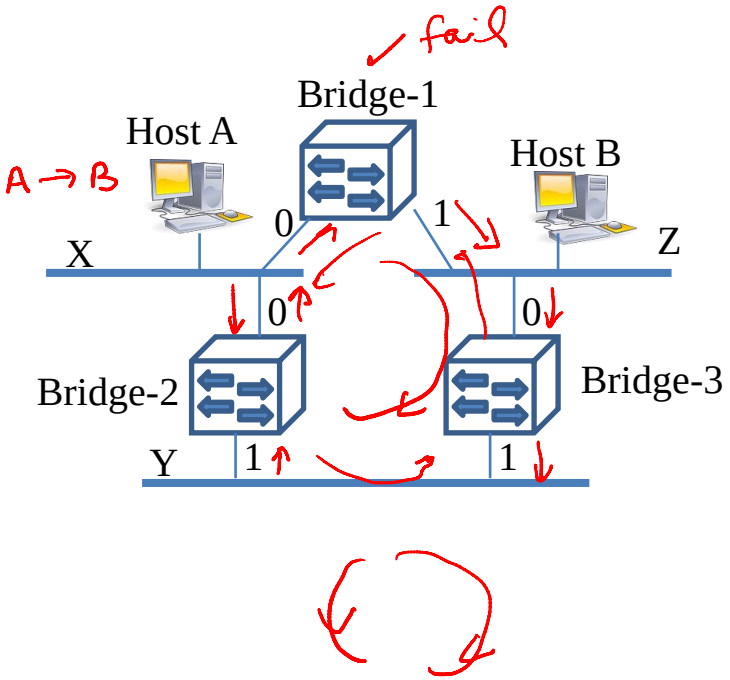
Points to Note

- Plug and play operation (very desirable)
  - No change of hardware/software in hosts
  - No manual configuration in switches
- Learning process is an optimization, not required for correctness



Problem: Loops

- Why loops?
  - Mis-configuration, redundancy
- Host A sends a packet to Host B
  - Assume empty tables
  - Frames can loop indefinitely



Summary

- Ethernet switching extends LANs to form ‘Extended LANs’
  - Can interconnect few thousands of hosts
- Plug-n-play mode of operation
- Learning feature improves efficiency
- Switching fails in presence of loops
- Ahead: Solution in the form of Spanning Tree Algorithm