

Network Layer – Service Model

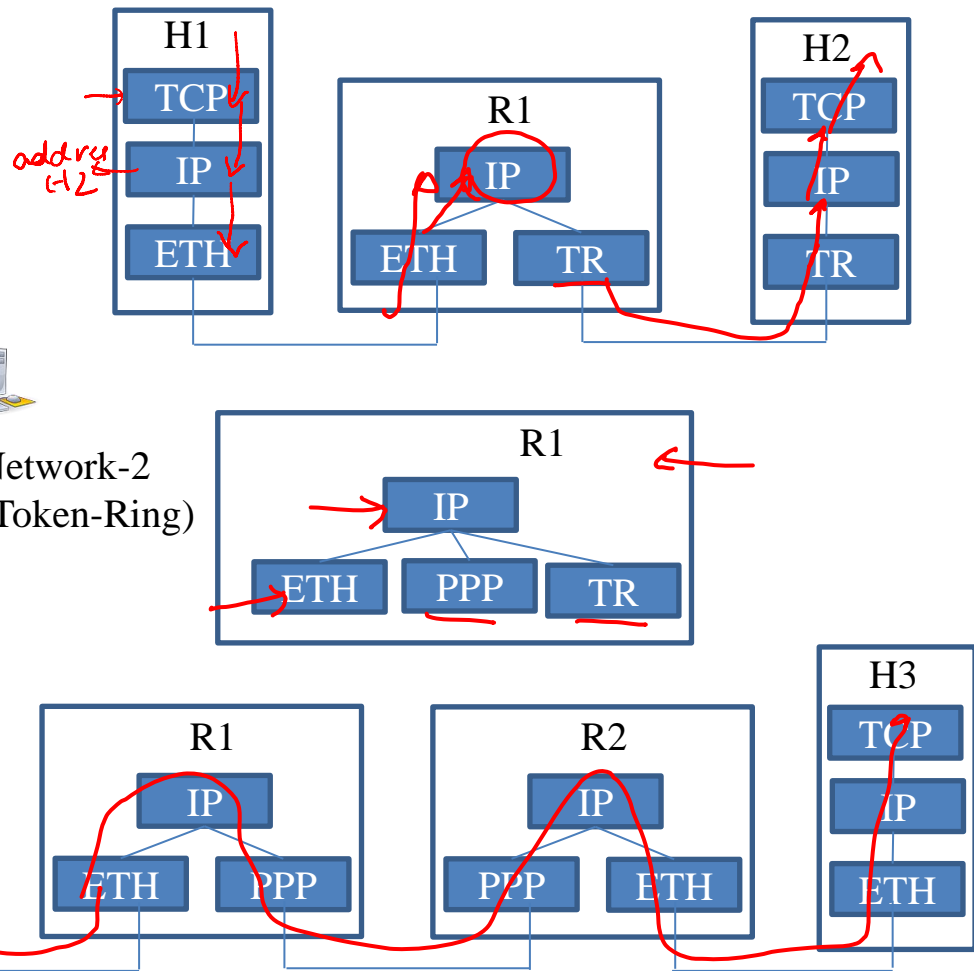
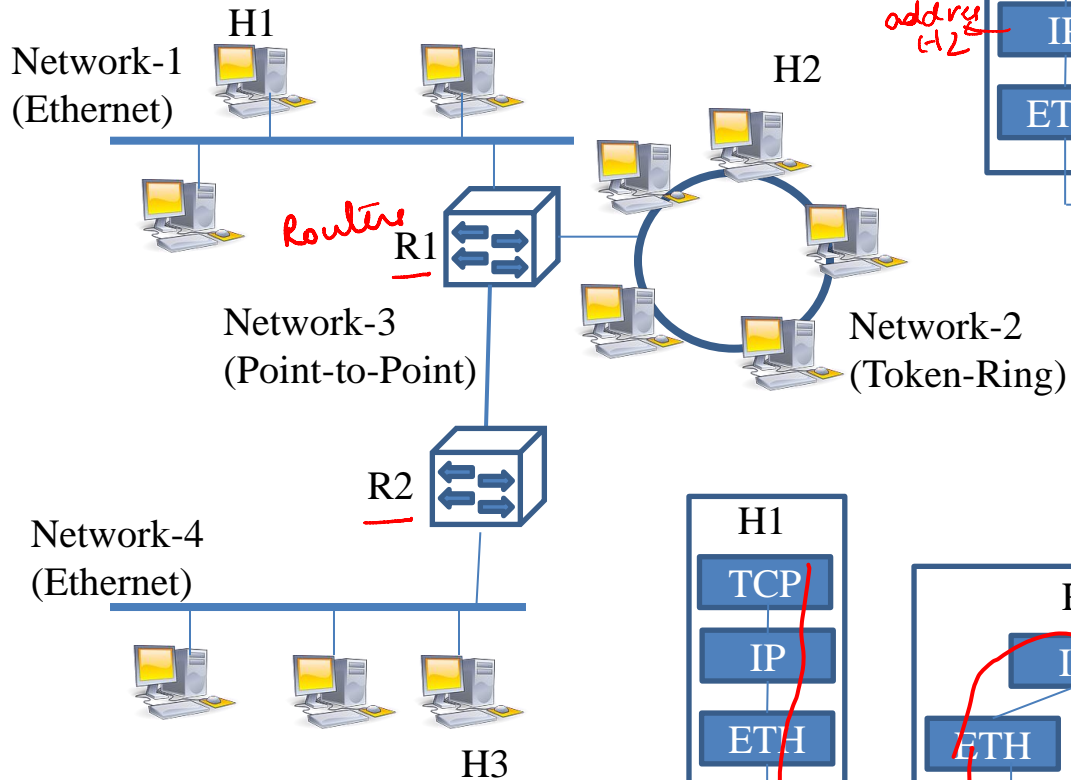
Kameswari Chebrolu

Recap

- Build reasonably sized networks spanning thousands of hosts via Extended LANs
- Drawbacks:
 - Not scalable
 - Can't handle heterogeneity
- Network Layer switching to the rescue

Problem Statement

- Make millions of hosts using different technology communicate
 - Heterogeneity: Addressing conventions, ^{48, 16} bandwidth, latency, loss rates, packet sizes }
- Solution: Internet Protocol (IP)
 - Internet: Interconnect Networks Internet
 - Invented by Robert Kahn and Vint Cerf



Service Model

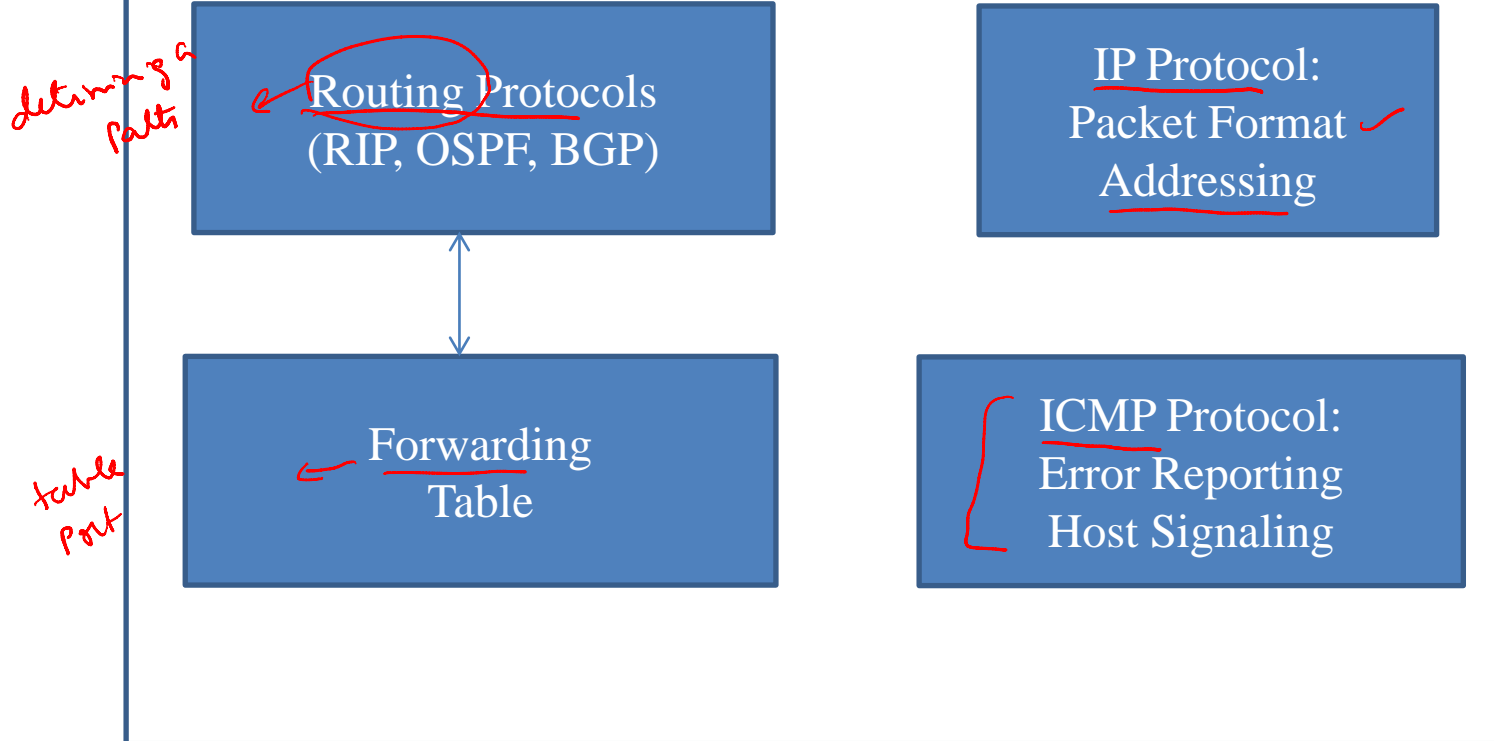
- What service can the network layer offer?
 - Deliver given packets to specified destination
- Delivery options (over packet switching)
 - Guaranteed delivery
 - Bounded delay *x seconds*
 - Guaranteed minimum bandwidth
 - Guaranteed maximum jitter *→ interspace adjacent packets*
 - In-order delivery
 - Duplicate suppression

Datagram Delivery Model

- Datagram: No connection set-up
- Best Effort Service
 - Will make best effort to deliver the packet
 - Packets can get lost, corrupted, reordered, mis-delivered, duplicated, delayed
 - KISS principle in practice (Simplest service)
 - IP protocol's greatest strength
 - Runs over anything

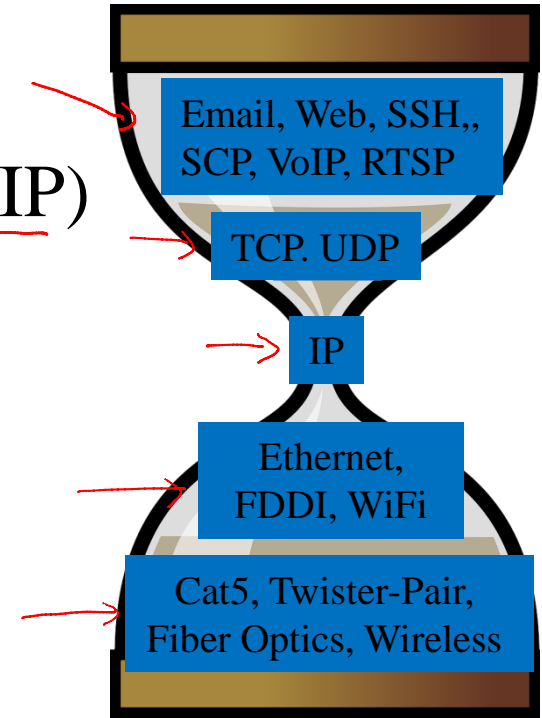
↘ IP
Many different technologies
20ms
↙ bounded delay

Service Model Implementation



Points to Note

- Heterogeneity
 - Move a layer above: Network Layer (IP)
 - Best effort service model
- Scalability
 - Hierarchical addressing
 - Efficient Routing algorithms
- Internet Architecture: Hour Glass



Summary

- Objective: Interconnect heterogeneous networks in a scalable fashion
- Service Model: Best Effort Delivery
- Functionality: IP protocol (packet format, addressing), forwarding, routing
- Ahead: Implementation inside a router