

Network Layer – Service Model

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Recap

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

Problem Statement

- Make millions of hosts using different technology communicate

– Heterogeneity: Addressing conventions, bandwidth, latency, loss rates, packet sizes

48, 16

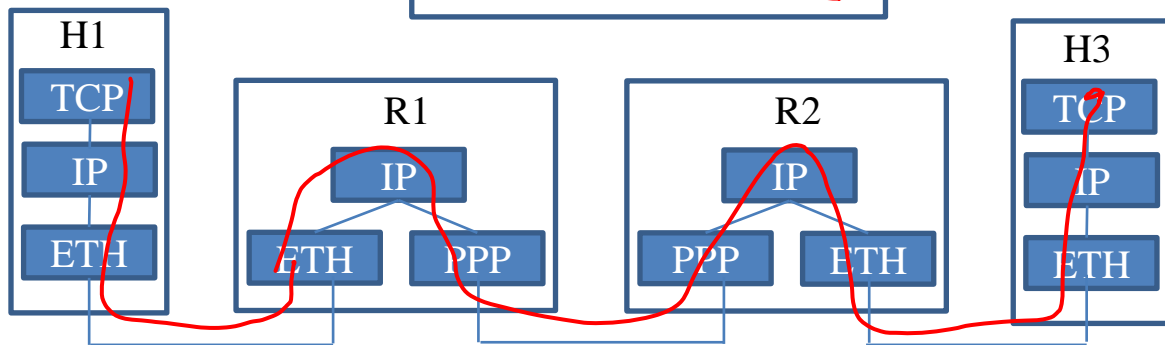
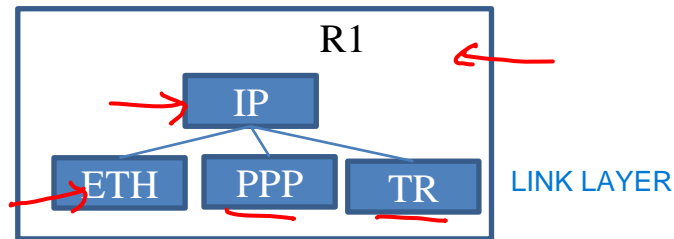
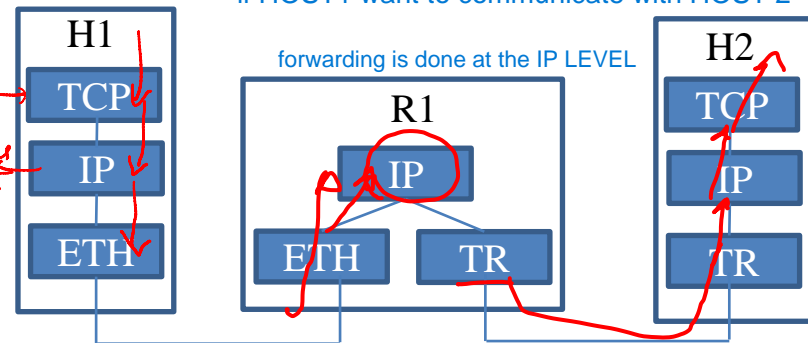
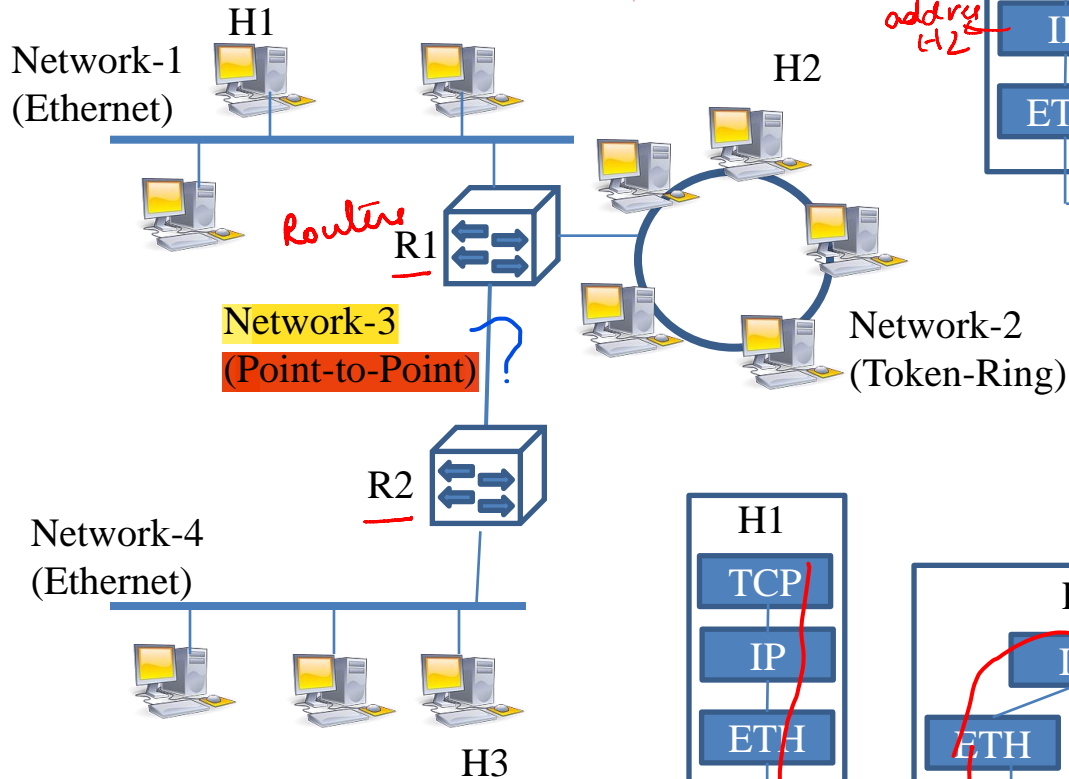
- Solution: Internet Protocol (IP)

– Internet: Interconnect Networks

– Invented by Robert Kahn and Vint Cerf

Internet

interconnect networks...
network of networks



HOST1 ==> HOST3

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*
I will deliver the packet within 'x' seconds
 - Guaranteed minimum bandwidth
 - Guaranteed maximum jitter *→ interspace adjacent packets*
audio video
 - In-order delivery
 - Duplicate suppression

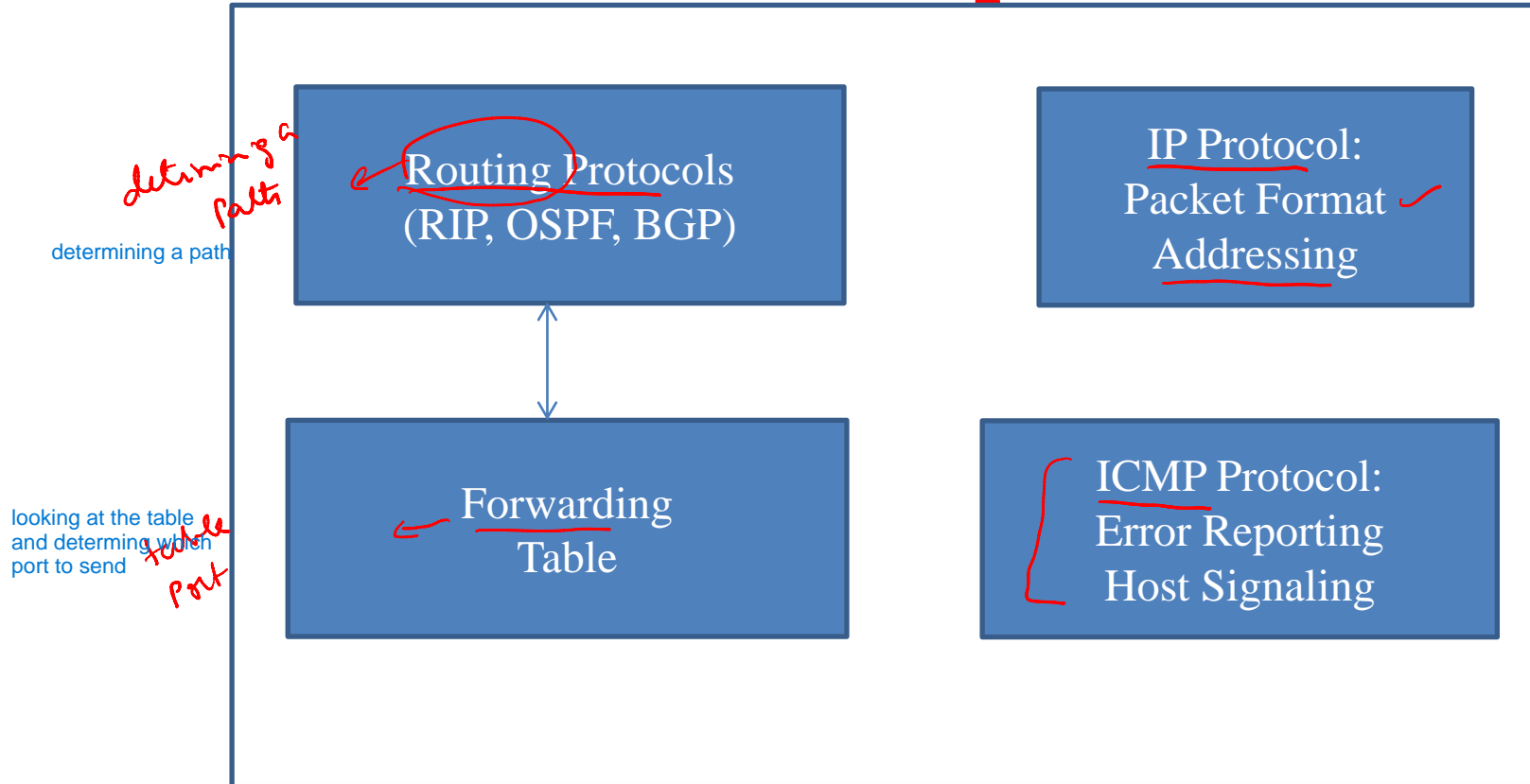
Datagram Delivery Model

IP cannot provide any guarantee bcz the underlying we have many technologies...and they cannot provide guarantee

- 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

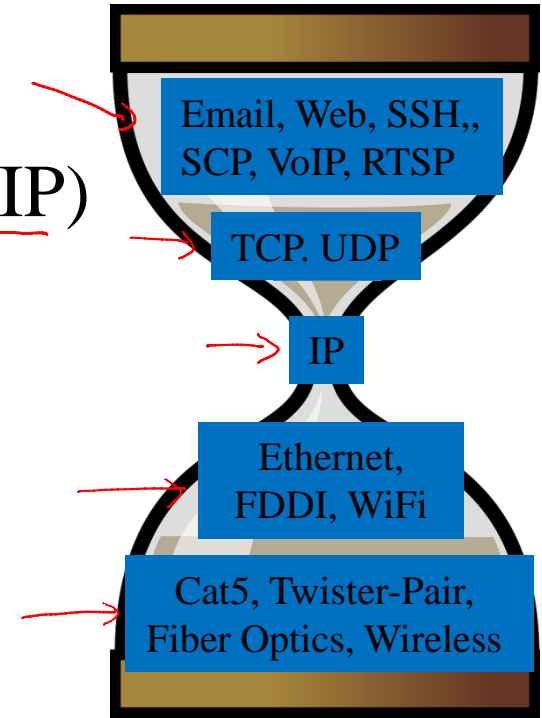
→ IP
Many different technologies
20ms
bounded delay

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