

# Network Layer – Service Model

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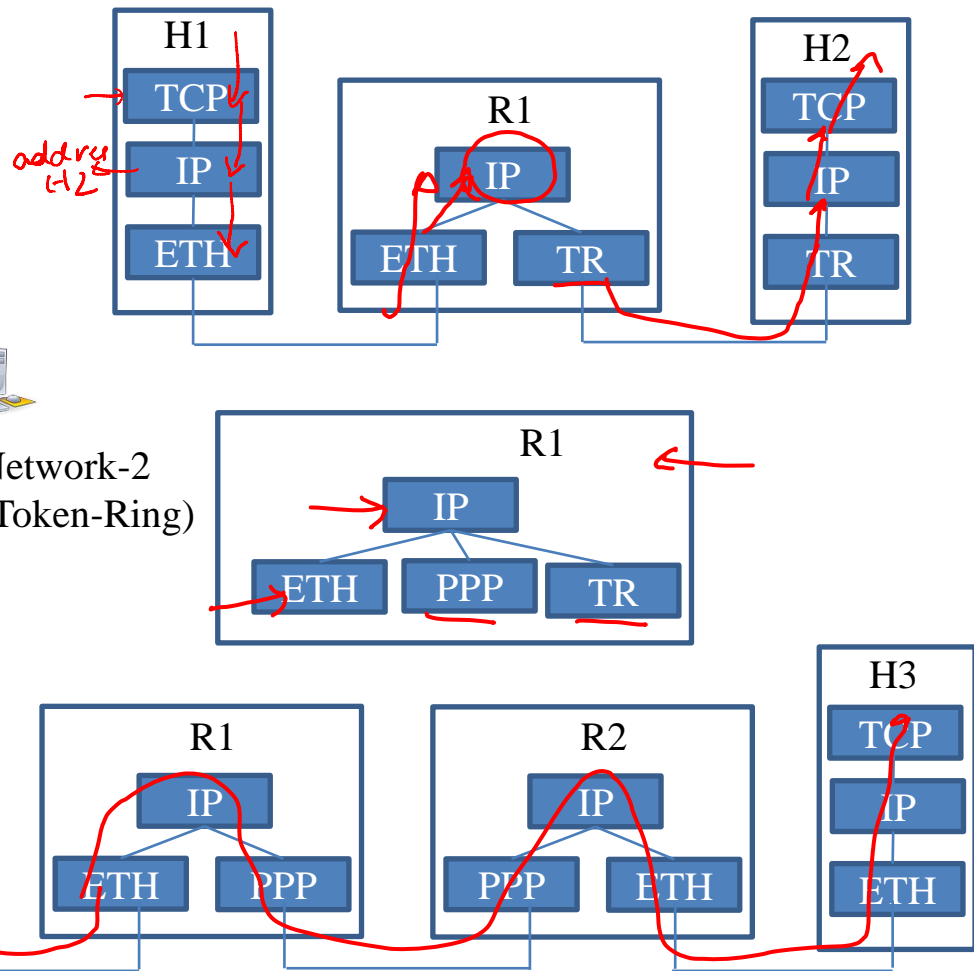
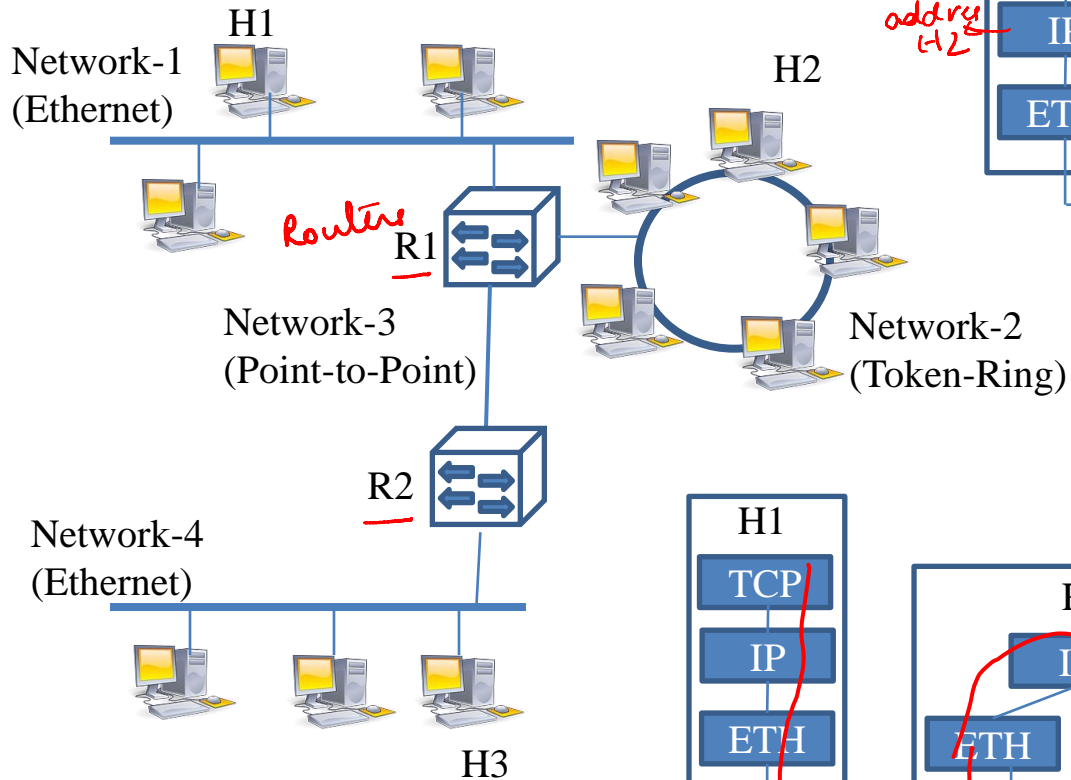
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# Recap

- 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, <sup>48, 16</sup> bandwidth, latency, loss rates, packet sizes }
- Solution: Internet Protocol (IP)
  - Internet: Interconnect Networks Internet
  - Invented by Robert Kahn and Vint Cerf



# Service Model

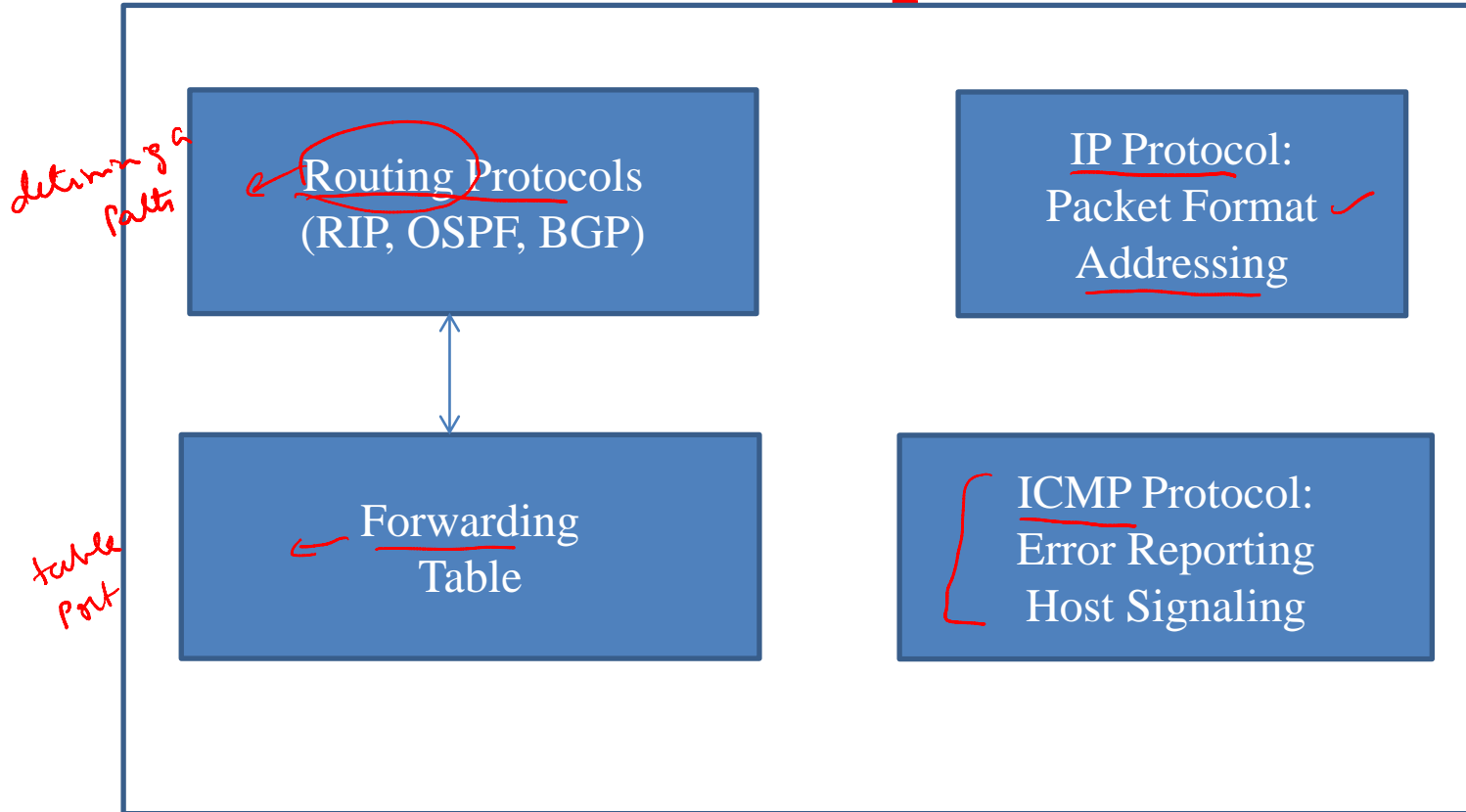
- What service can the network layer offer?
  - Deliver given packets to specified destination
- Delivery options (over packet switching)
  - Guaranteed delivery
  - Bounded delay *x seconds*
  - Guaranteed minimum bandwidth
  - Guaranteed maximum jitter *→ interspace adjacent packets*
  - In-order delivery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

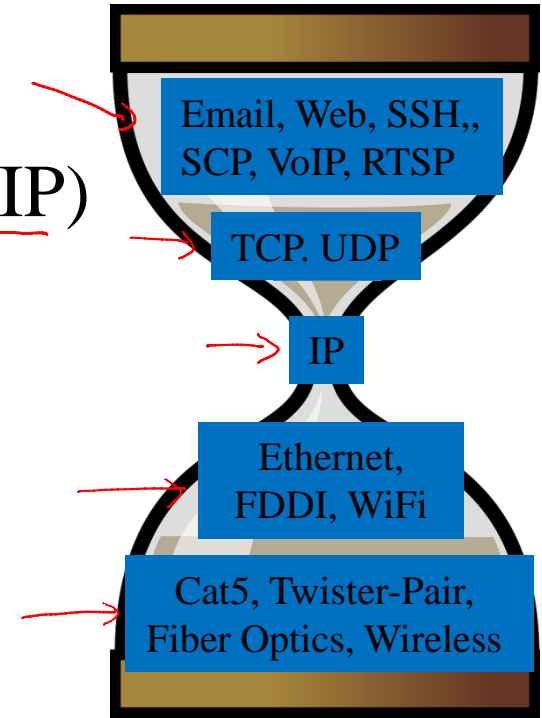
↘ IP  
Many different technologies  
20ms  
↙ bounded delay

# 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