Module 5
(Introduction)

(Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA; Wired LAN, Wireless LANs, Connecting LANs and Virtual LANs)

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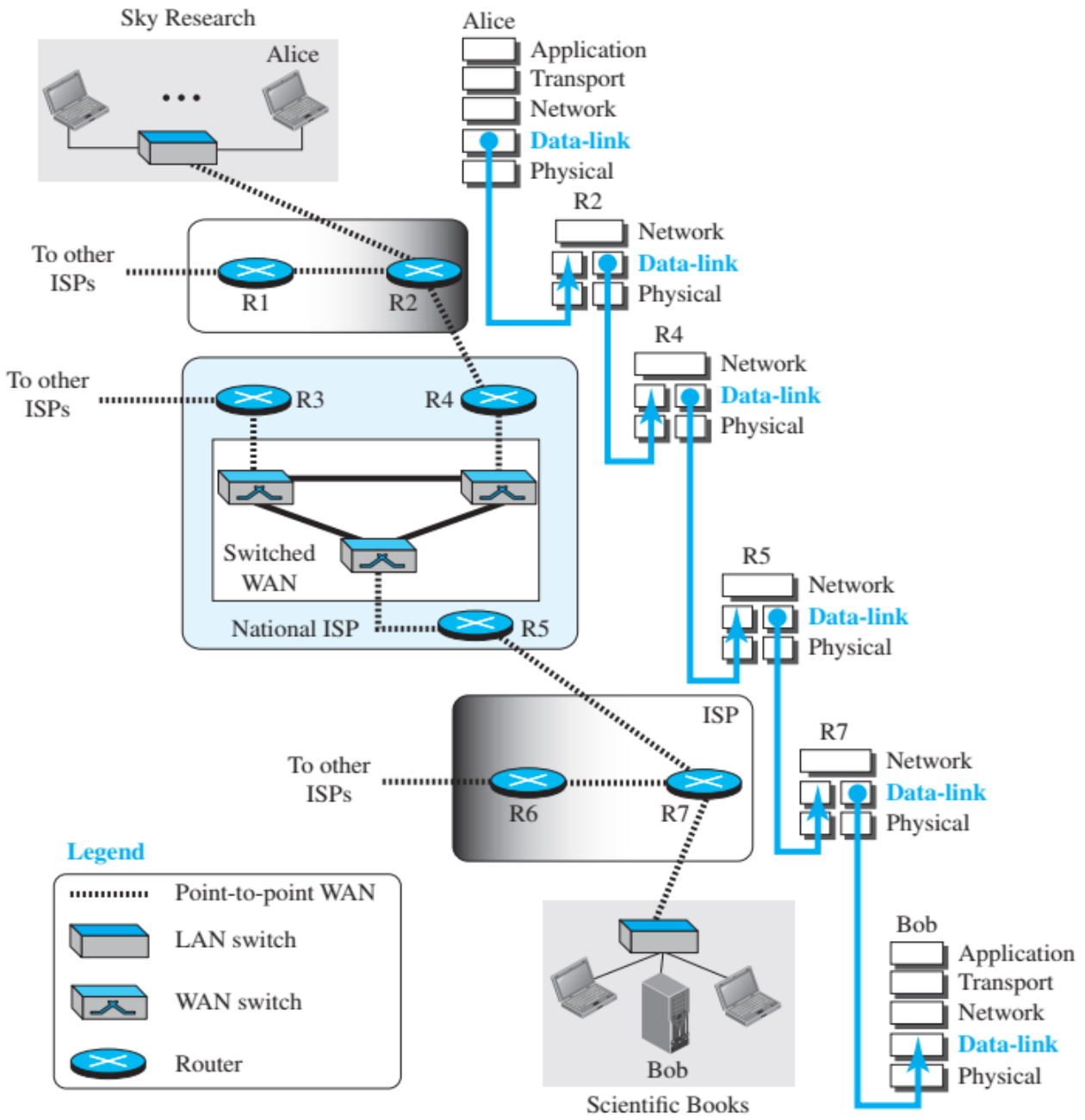
Introduction

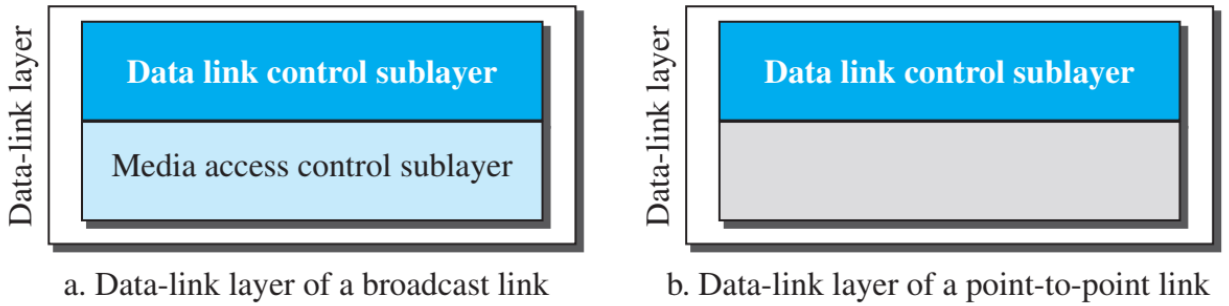
- Internet: combination of networks
  - Attached by connecting devices (routers and switches)
- Nodes: end hosts and routers
- Links: connects the nodes
- Data-link layer: node-to-node communication
- Services
  - Framing
  - Delivery of datagram to the next node in the path
  - Encapsulation and decapsulation
  - Flow & Error Control



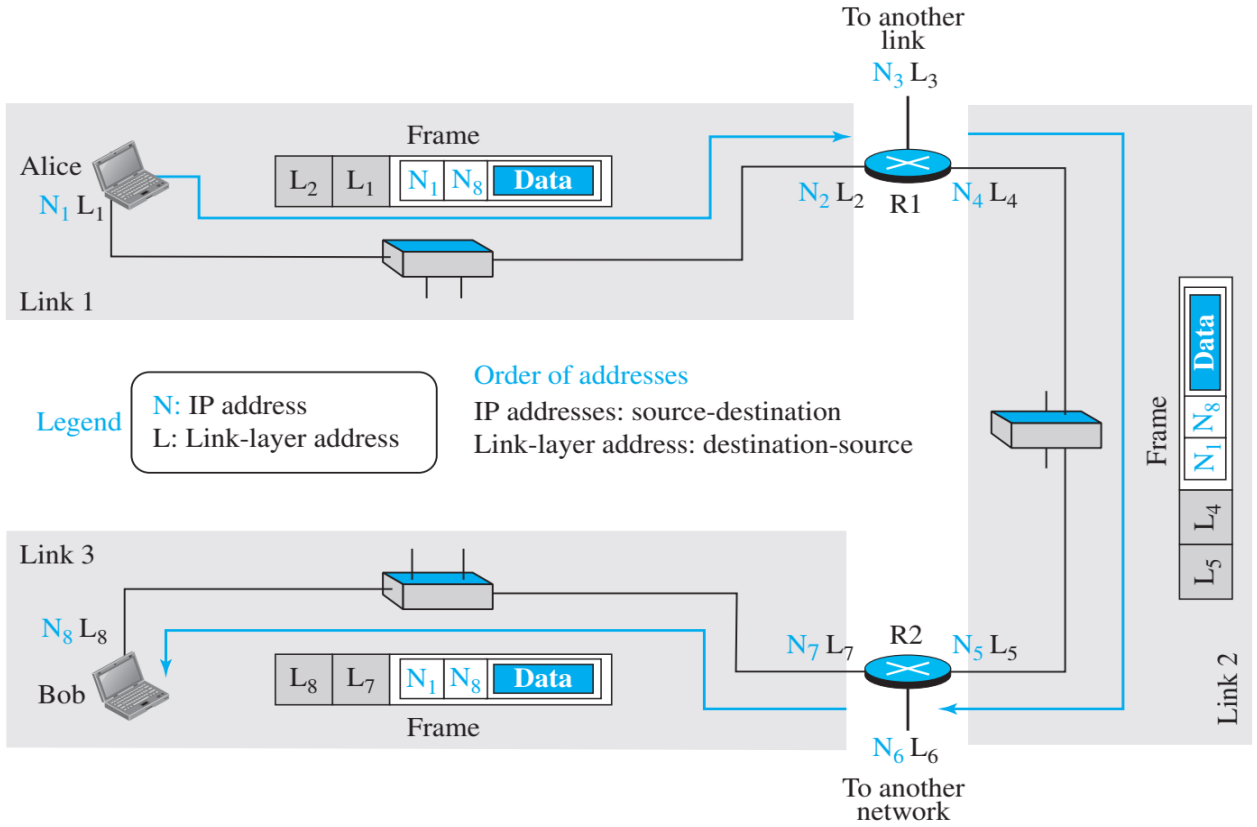
Communication at the Data-Link Layer

Introduction (Contd…)

- Two categories of links
  - Point-to-point
  - Broadcast
- Data-link layer: controls the usage of the transmission medium
- Two sublayers
  - Data-Link Control (DLC): point-to-point and broadcast issues
  - Medium-Access Control (MAC): broadcast issues
- Link layer addresses/Physical address/MAC address
  - Unicast
  - Multicast
  - Broadcast



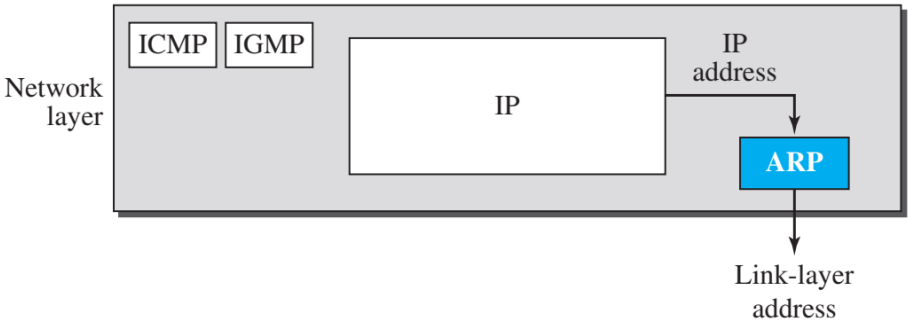
Sublayers of the Data-Link Layer



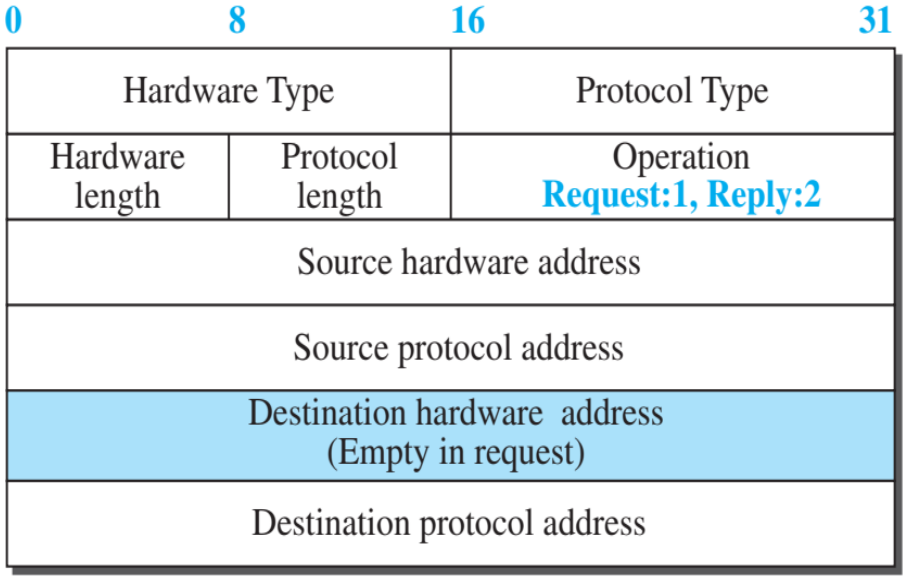
IP & Link Layer Addresses

Introduction (Contd…)

- Address Resolution Protocol (ARP)
  - Auxiliary protocol in the network layer
  - Maps IP address to a logical-link address
- ARP Request: sender's link-layer, IP addresses; receiver's IP address
- ARP Reply: receiver's IP and link-layer address

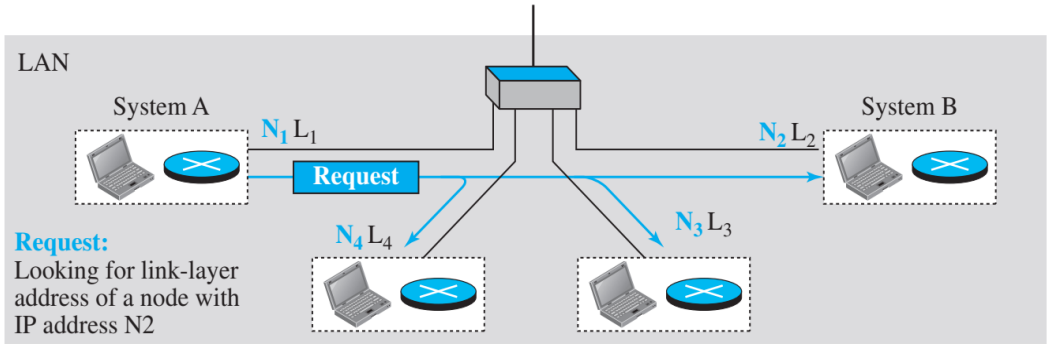


ARP Protocol in TCP/IP Suite

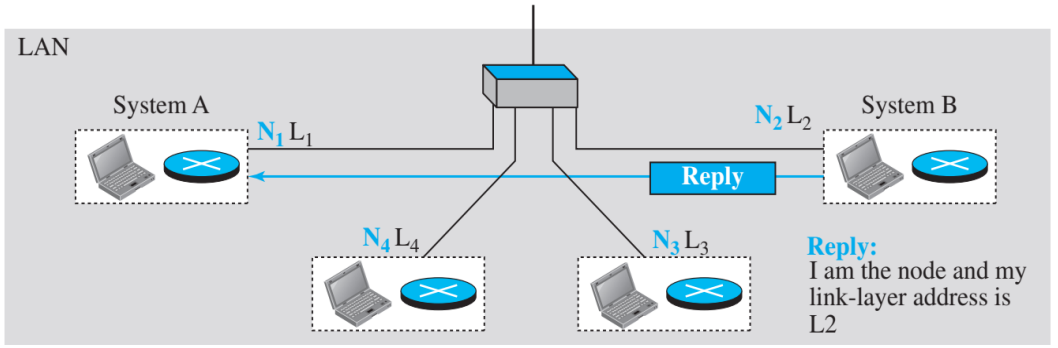


Hardware: LAN or WAN protocol
Protocol: Network-layer protocol

ARP Packet



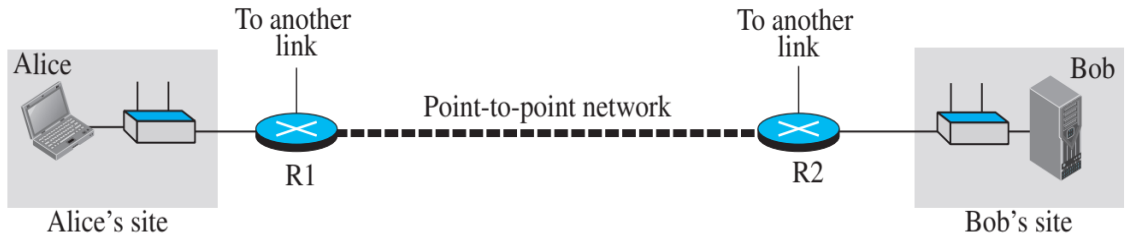
a. ARP request is broadcast



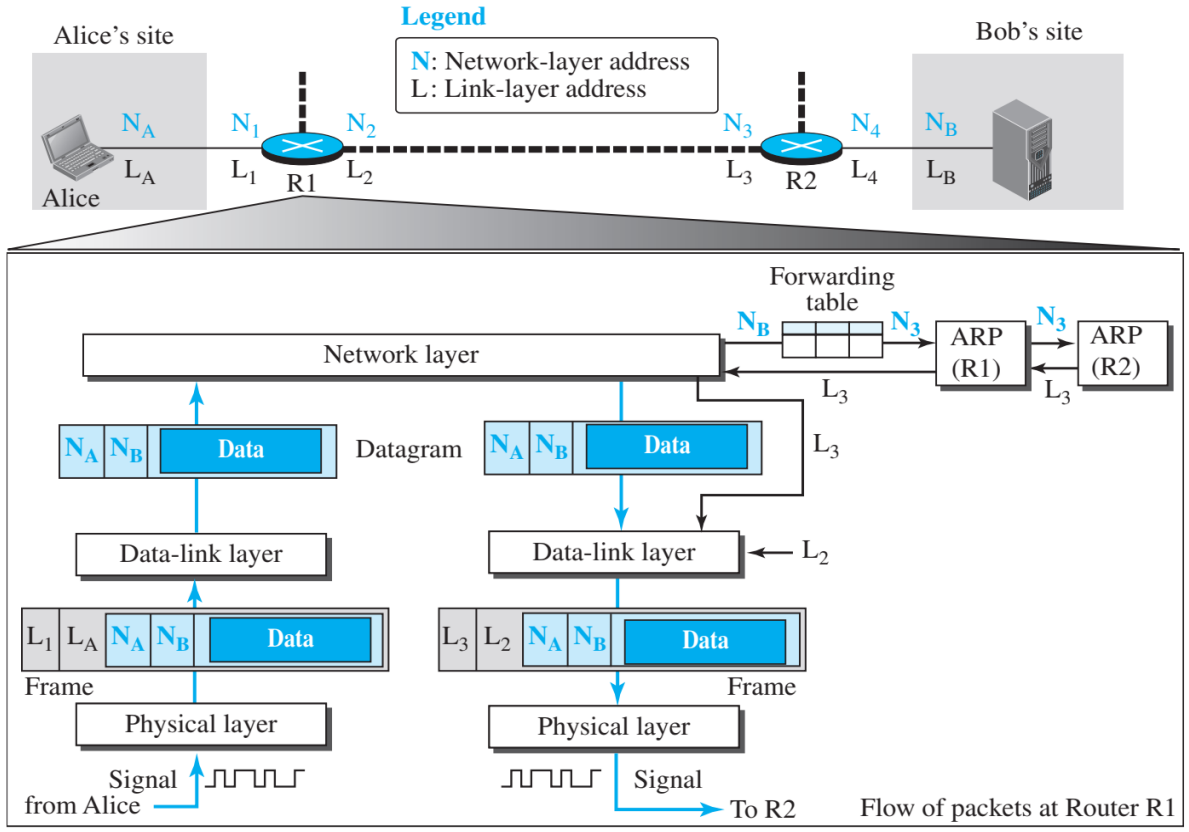
b. ARP reply is unicast

ARP Operations

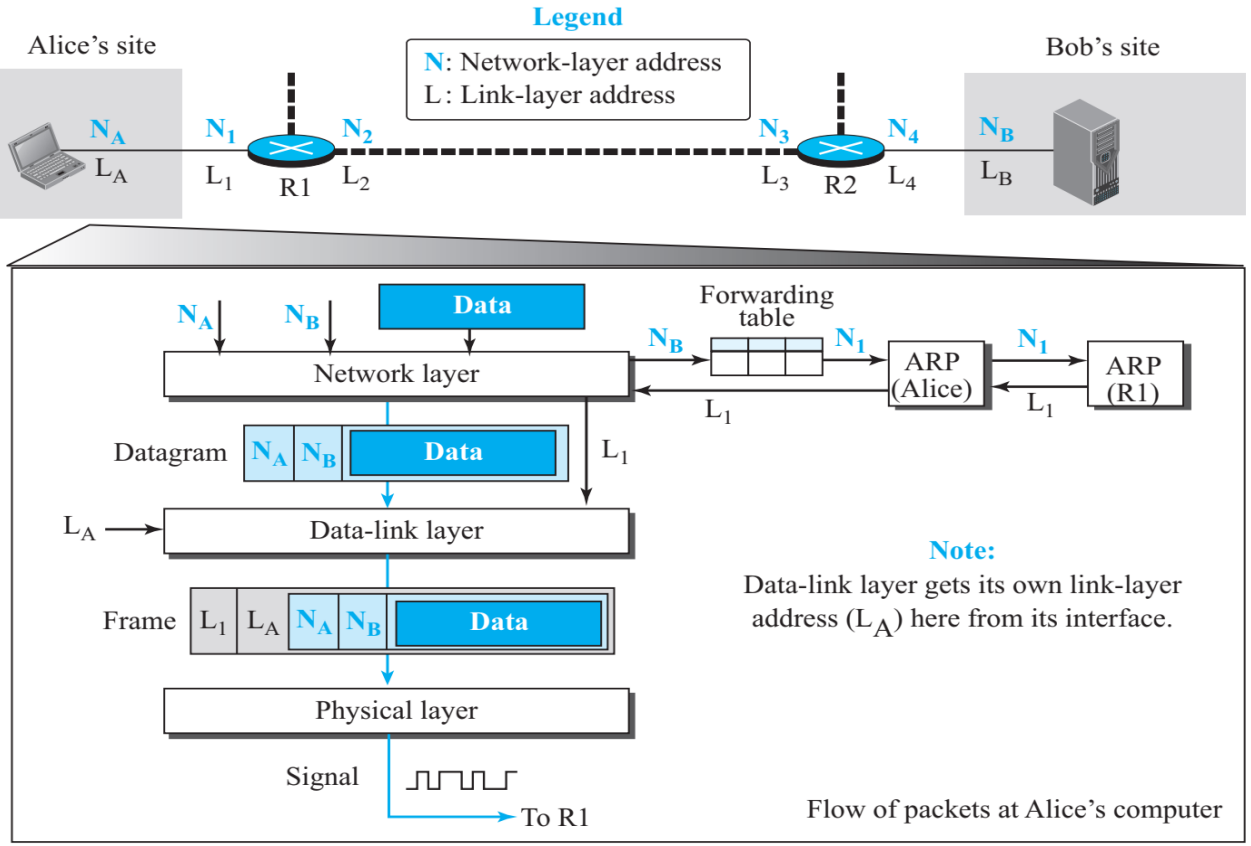
Introduction (Contd…)



A Small internet

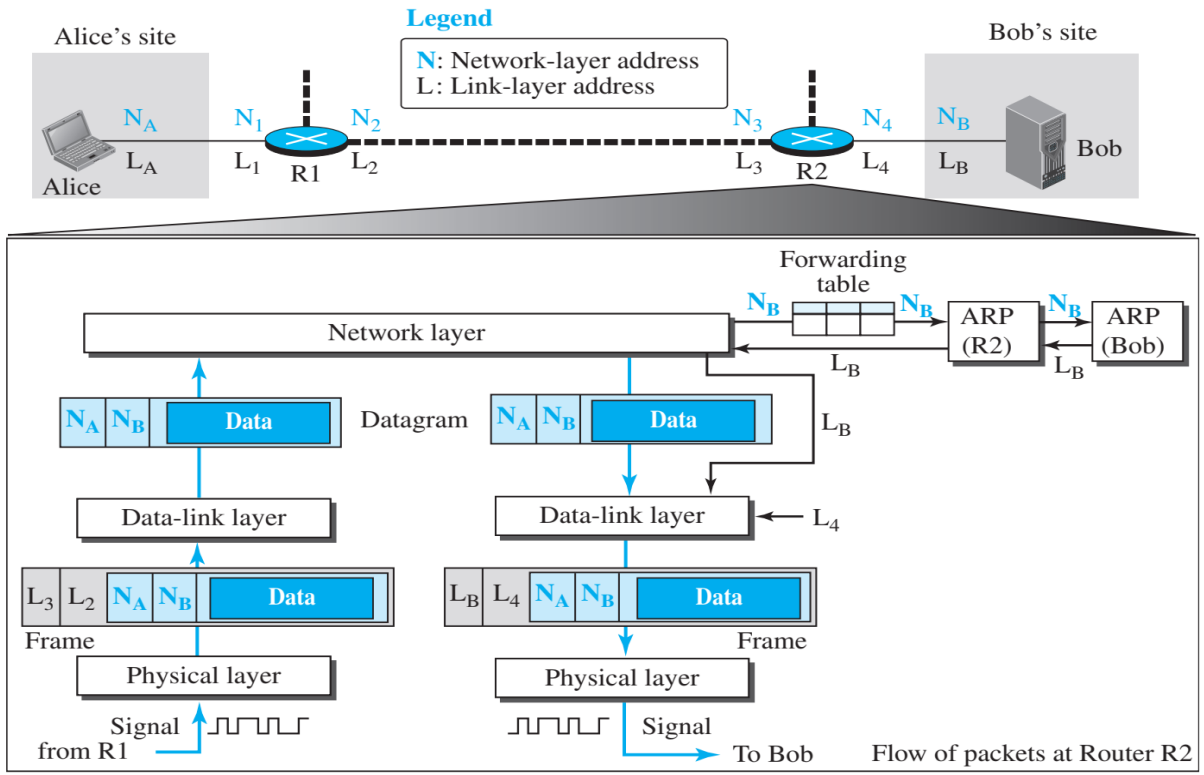


Activities at Router R1

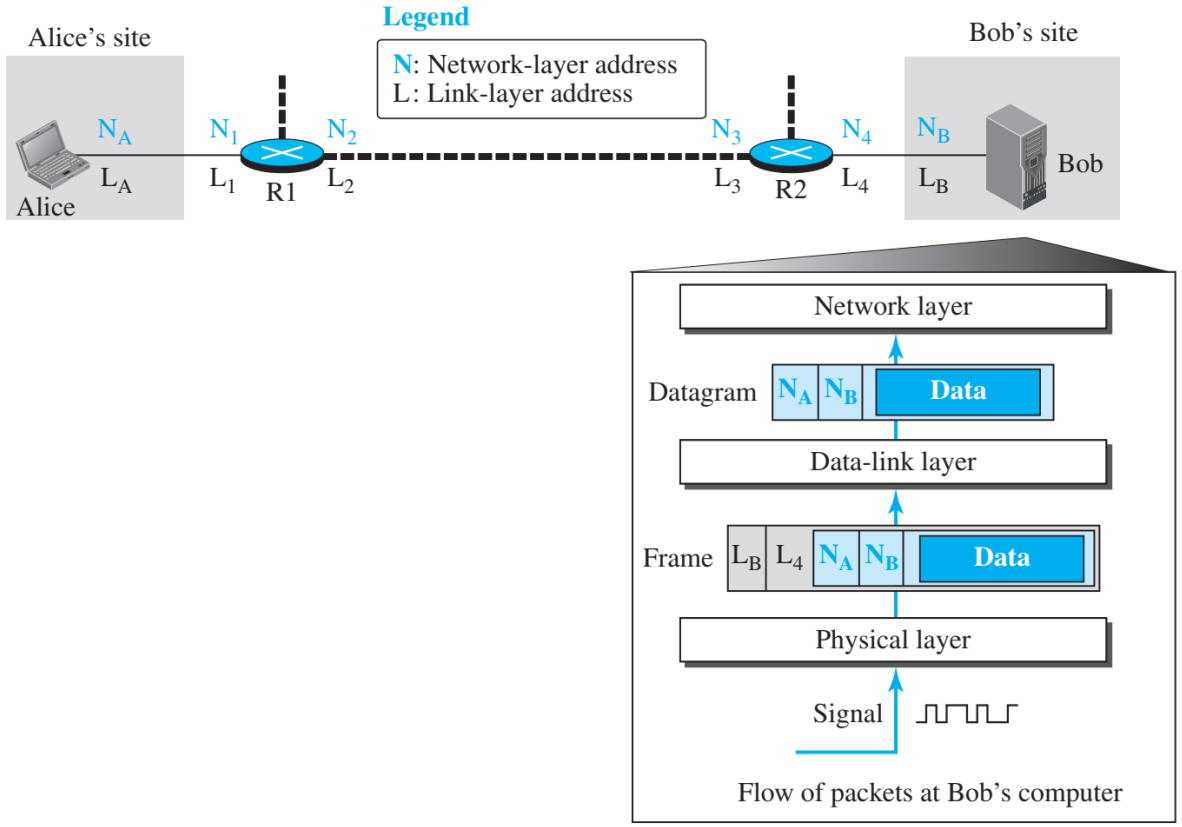


Activities at Alice's (Sender) Site

Introduction (Contd…)



Activities at Router R2



Activities at Bob's (Receiver) Site