LINK:

PHY: bit transmission
    bit transmission - modulation, error correcting codes

MAC: nbr-to-nbr frame transmission
    frame transmission - framing, MAC addressing 48-bits
    multiple access - random access, taking-turns,
    frequency division, code-division

broadcast
ethernet: hubs, switches, bridges, and routers
    spanning tree
NETWORK: endhost - to - endhost packet delivery

hierarchical addressing - common addressing across heterogeneous network technologies
IPv4 - Inter-net Protocol
  best-effort service (ordering, latency, speed, reliability)

routi**ng** - prefix routing, default route
  proactive protocols:
  ospf - link state routing protocol
  rip - distance vector routing
reactive protocols:
  ad hoc networks
hierarchical routing:
  BGP - border gateway protocol
    policy routing
mobile IP - (relatively efficient)
VPN - tunneling (practical but inefficient)

NAT - network address translation
   end-to-end reachability broken
   some security benefit
IPv4 32-bit addresses, total 4 billion

IPv6 128-bit addresses
   IPv6 - IPv6 tunneling over IPv4
   IPv4/v6 bridging
Transport layer: process-to-process delivery
   TCP
      ordering
      reliability
      flow-control
      congestion control
   UDP

Application layer: user-to-user delivery
   WWW
   DNS
   email
   peer-to-peer applications (bittorrent)

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