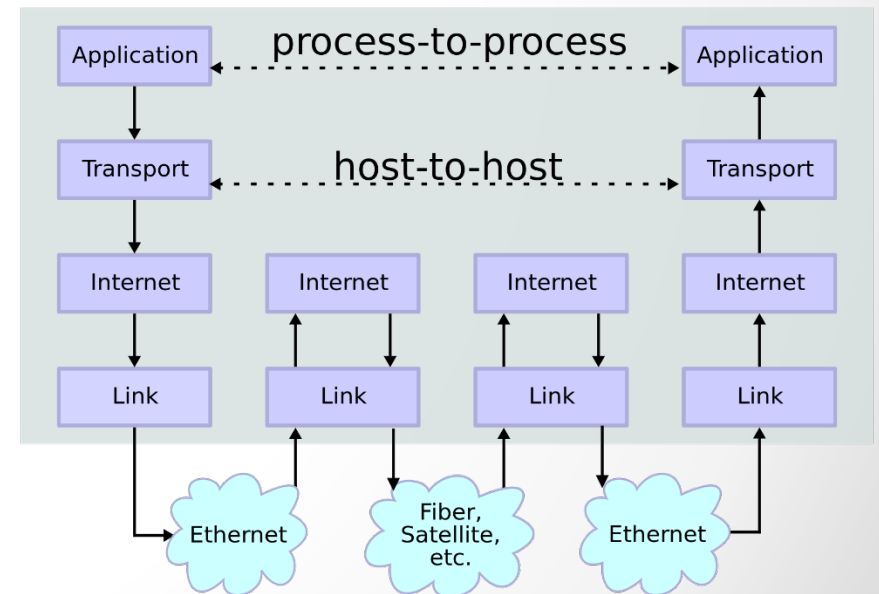# TCP/IP Protocol Suite

- Application, transport and network layers
- Supported by the data link and physical layers
- Application layer has HTTP, FTP, SMTP, POP3 or IMAP plus others
- Transport layer has TCP (connection-oriented)
- Network layer has IP (connectionless)
- Data link layer can have Ethernet

Network Topology

| Host A | → | Router | → | Router | → | Host B |

Data Flow

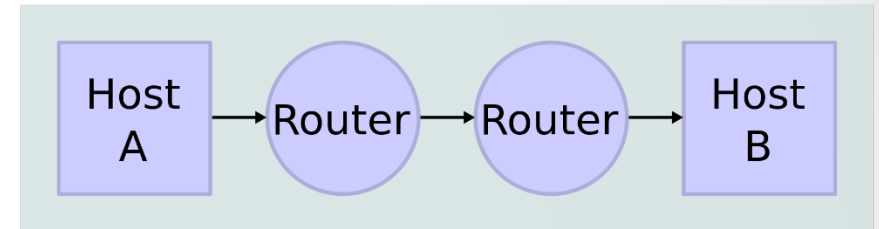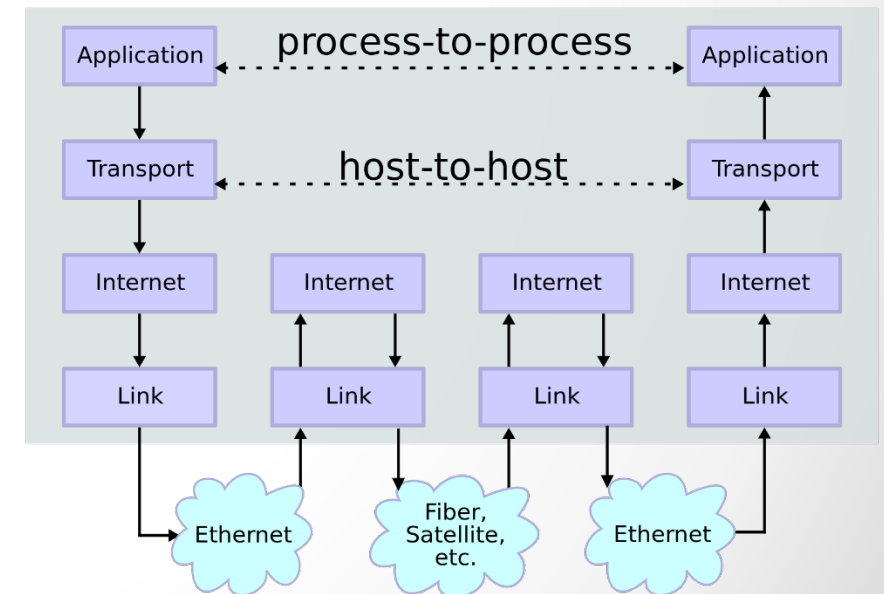| Application | ⇠ process-to-process ⇢ | Application |
Transport	⇠ host-to-host ⇢	Transport
Internet	Internet	Internet	Internet
Link	Link	Link	Link

Ethernet | Fiber, Satellite, etc. | Ethernet
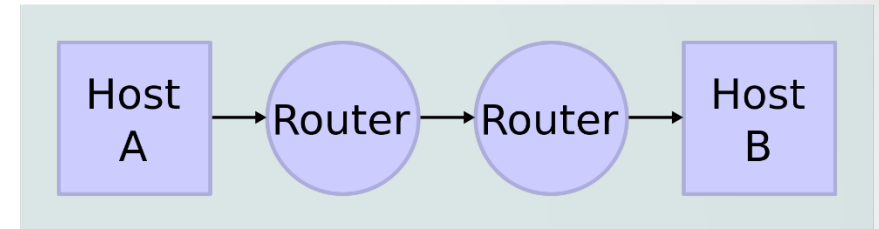
TCP/IP

- Transmission Control Protocol (TCP)
- Internet Protocol (IP)
- Use of Router at Data link Layer

Network Topology

| Host A | → Router → | Router → | Host B |

Data Flow

Application	← ← ← process-to-process → → →	Application
Transport	← - - - host-to-host - - - →	Transport
Internet	Internet	Internet	Internet
Link	Link	Link	Link

Ethernet   Fiber, Satellite, etc.   Ethernet

TCP/IP Protocol | Application Layer

- Application Layer
  - Programs:
    - Web browsers
    - Server software
  - Associated Protocols
    - Hypertext transfer protocol (HTTP)
    - File transfer protocol (FTP)
      - Anonymous ftp
      - ftp commands
      - ftp server
    - Simple mail transfer protocol (SMTP)
      Multipurpose Inter mail extension (MIME)
    - Post office protocol (POP3/4)
      Internet message access protocol (IMAP)

TCP/IP Protocol | Transport Layer

- Transport Layer
  - Transmission Control Protocol (TCP)

TCP/IP Protocol | Network Layer

- Network/Internet/data-link layer
  - Internet Protocol (IP)