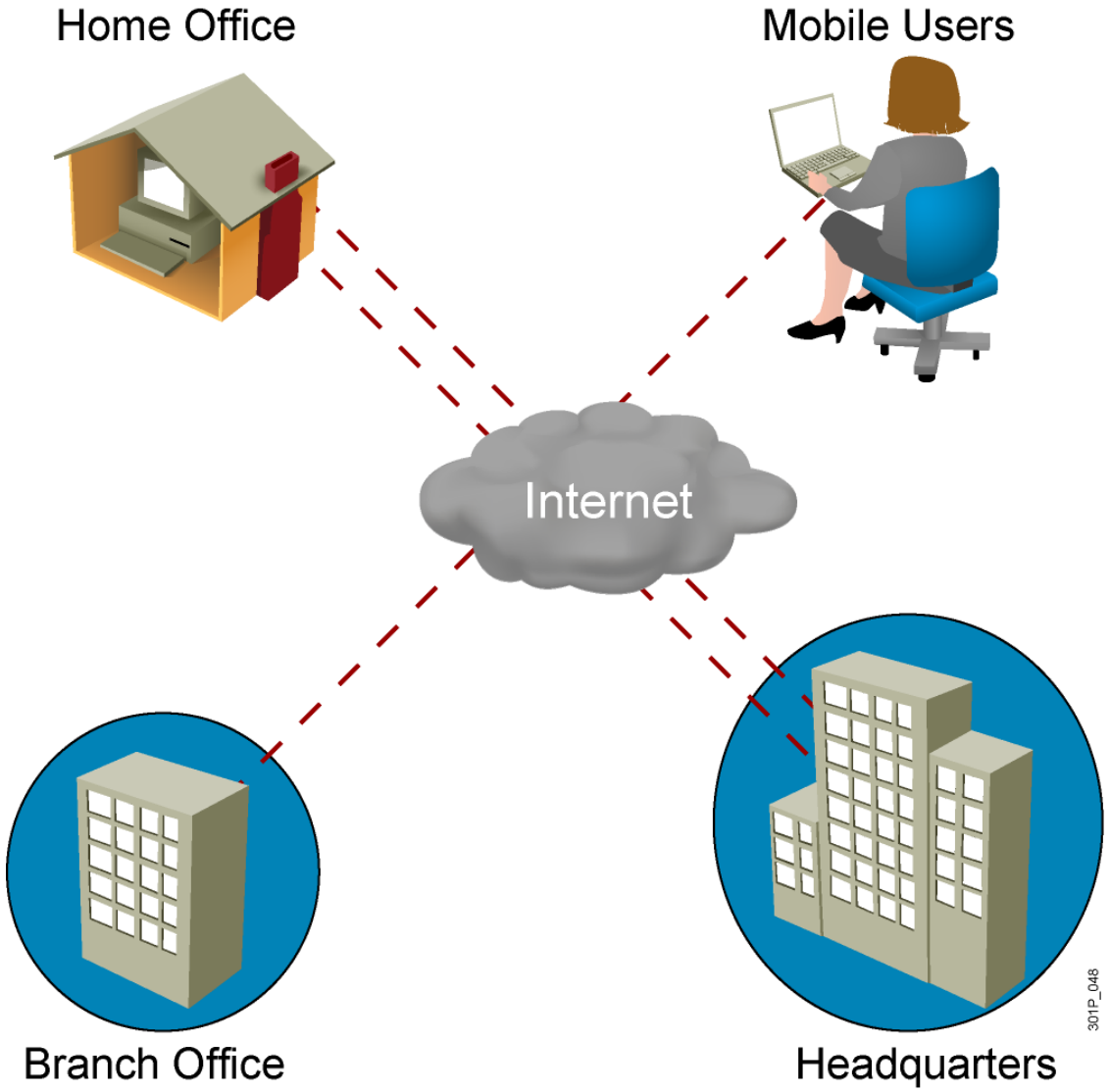
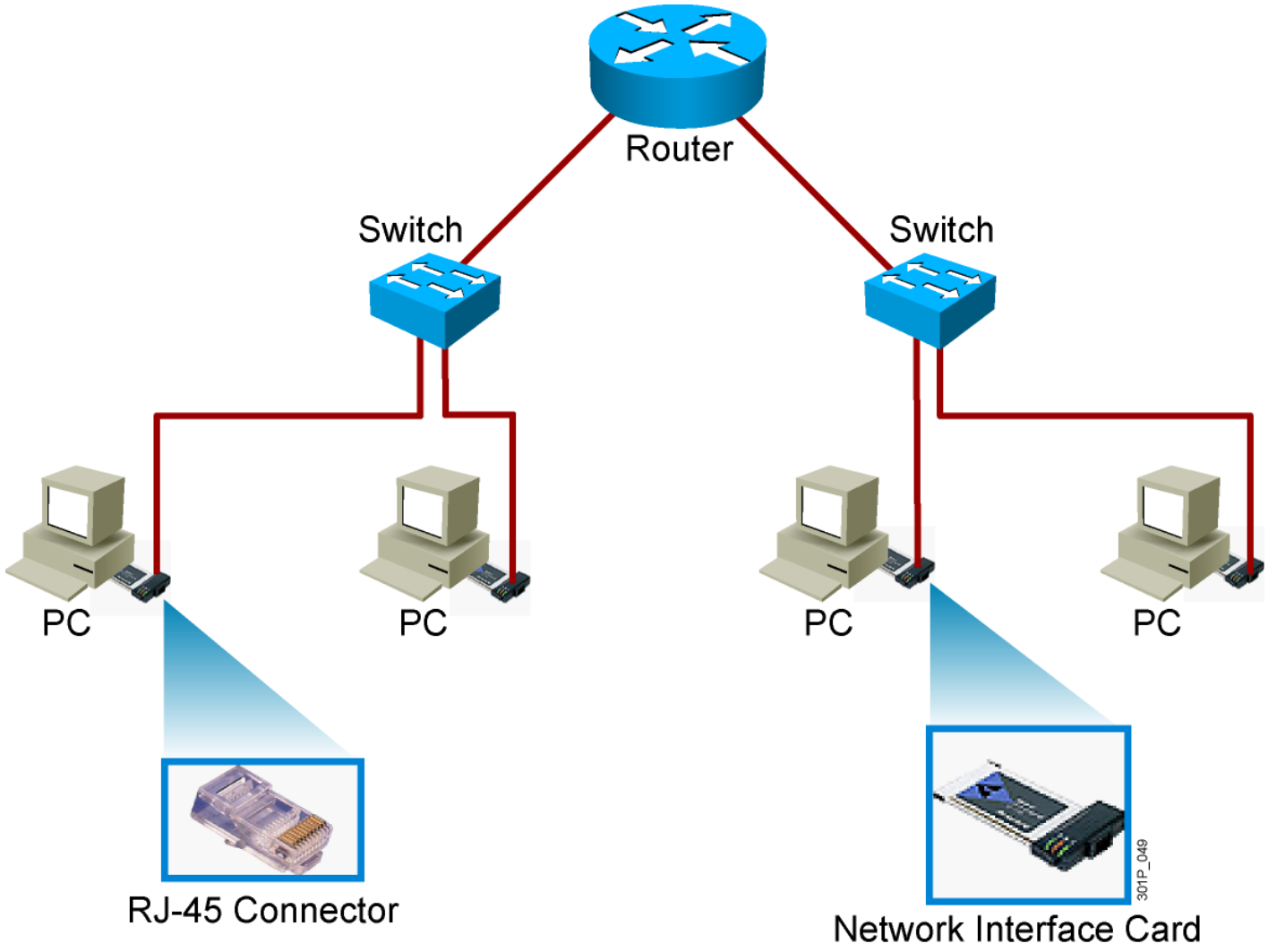
Network Basic

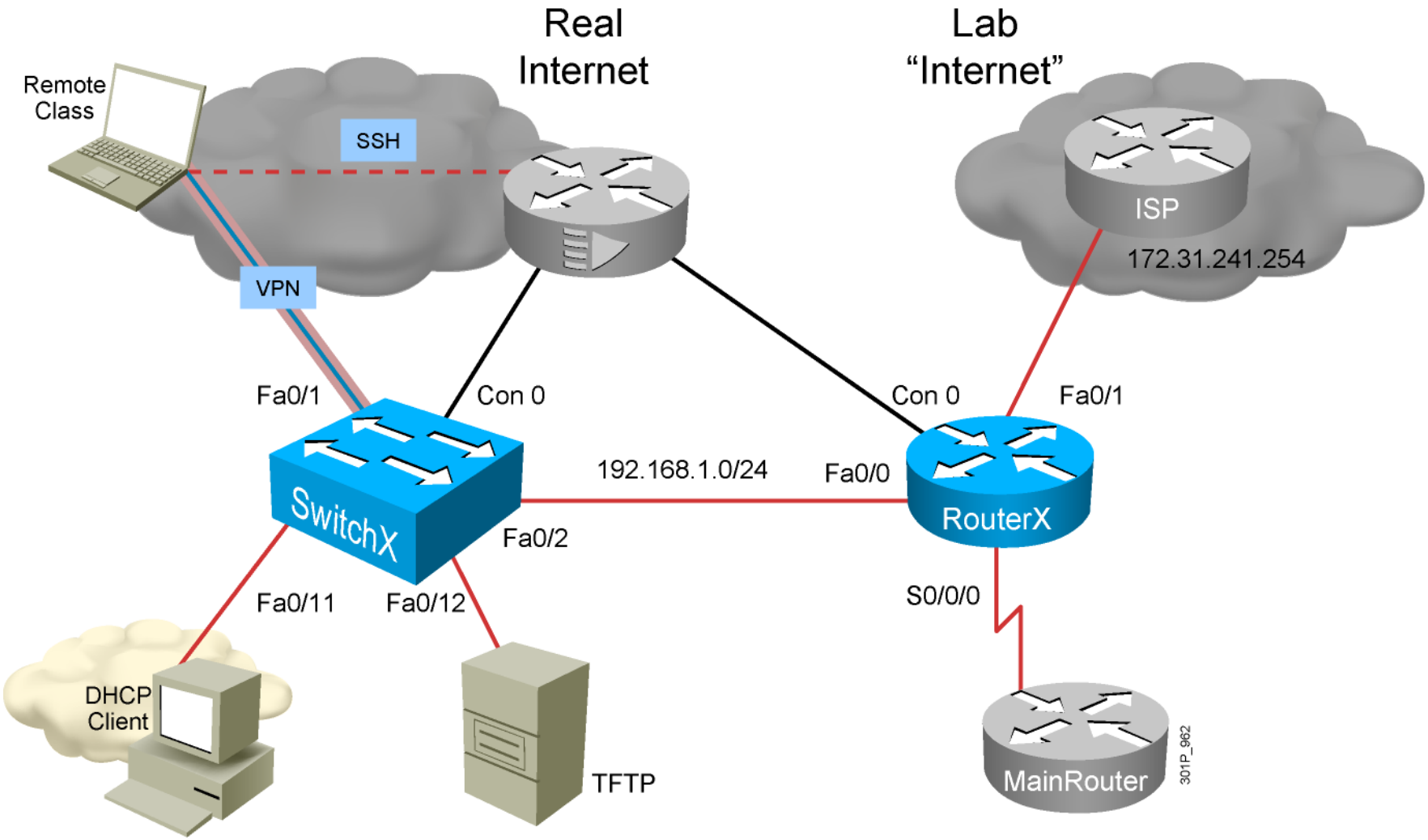
What Is a Network?



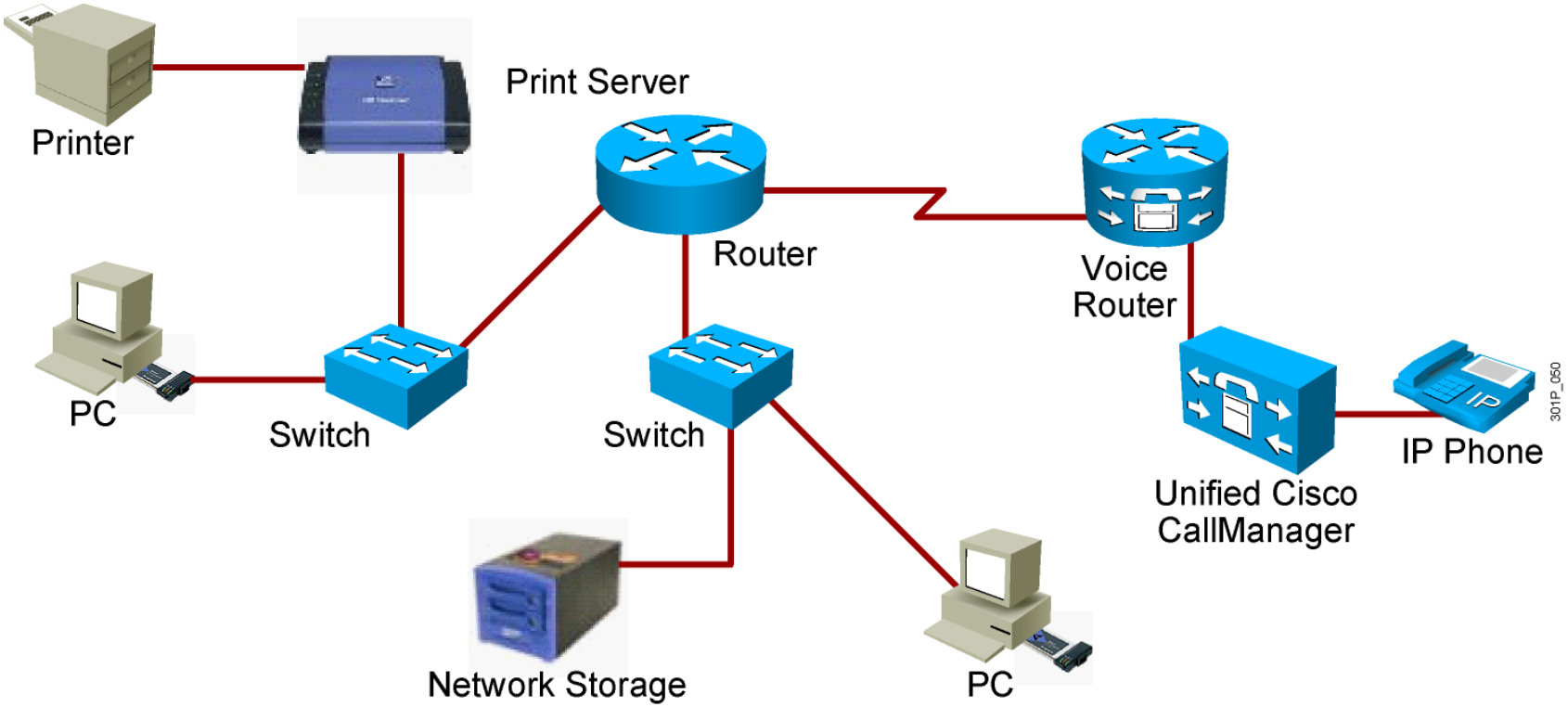
Common Physical Components of a Network



Interpreting a Network Diagram



Resource-Sharing Functions and Benefits



- **Data and applications**
- **Resources**
- **Network storage**
- **Backup devices**

Network User Applications

- **E-mail (Outlook, POP3, Yahoo, and so on)**
- **Web browser (IE, Firefox, and so on)**
- **Instant messaging (Yahoo IM, Microsoft Messenger, and so on)**
- **Collaboration (Whiteboard, Netmeeting, WebEx, and so on)**
- **Databases (file servers)**

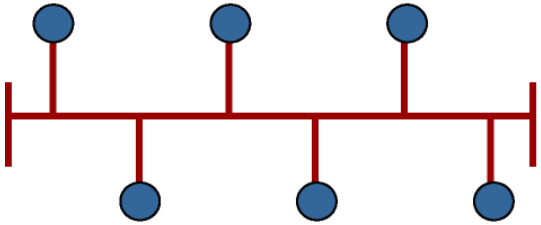
Impact of User Applications on the Network

- **Batch applications**
  - **FTP, TFTP, inventory updates**
  - **No direct human interaction**
  - **Bandwidth important, but not critical**
- **Interactive applications**
  - **Inventory inquiries, database updates.**
  - **Human-to-machine interaction.**
  - **Because a human is waiting for a response, response time is important but not critical, unless the wait becomes excessive.**
- **Real-time applications**
  - **VoIP, video**
  - **Human-to-human interaction**
  - **End-to-end latency critical**

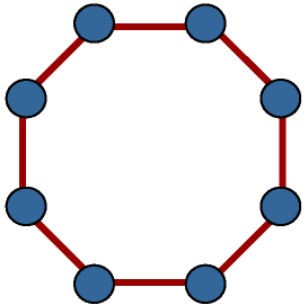
Characteristics of a Network

- **Speed**
- **Cost**
- **Security**
- **Availability**
- **Scalability**
- **Reliability**
- **Topology**

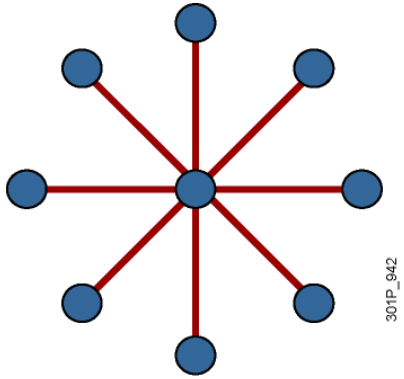
Physical Topology Categories



Bus Topology

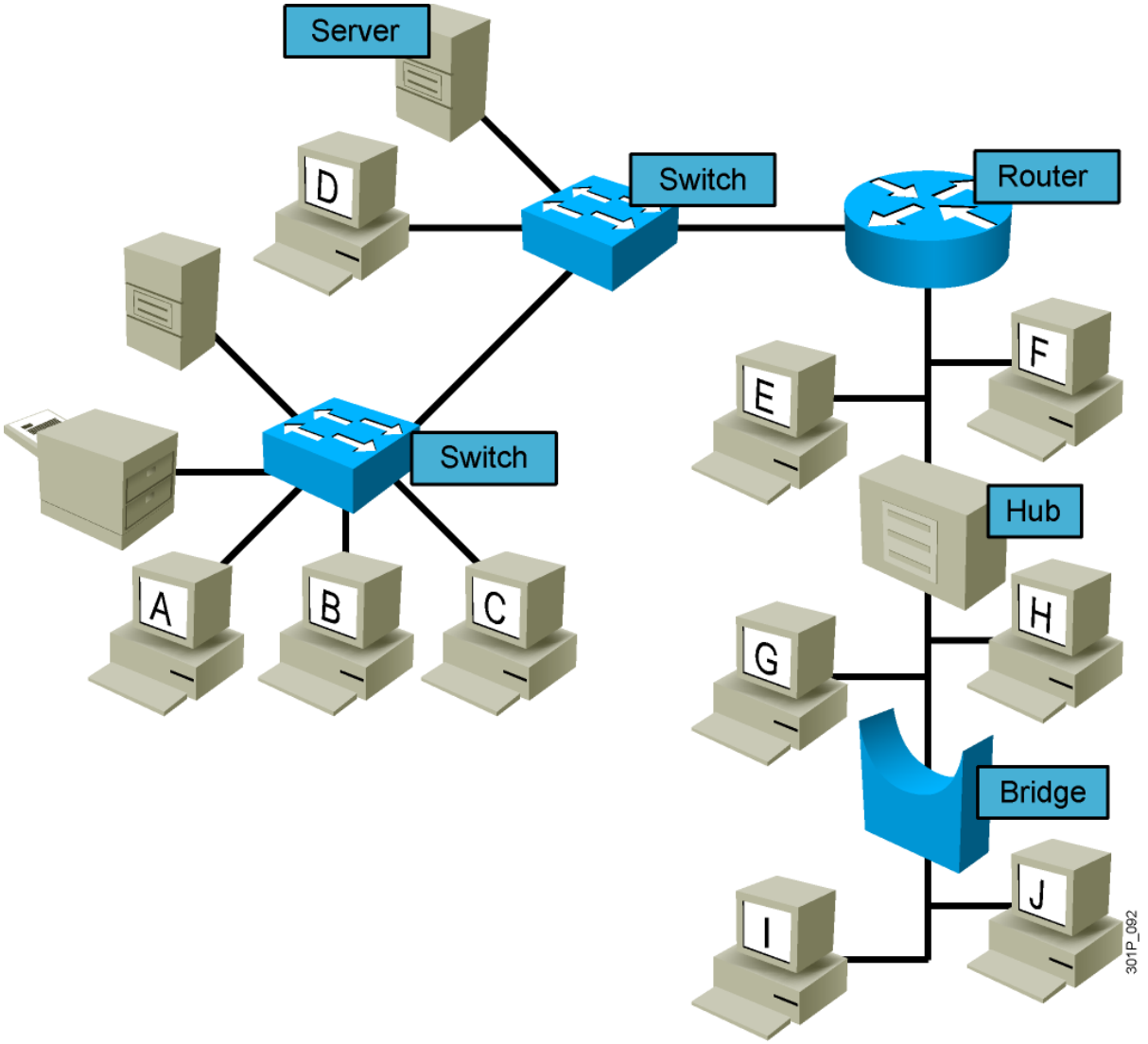


Ring Topology

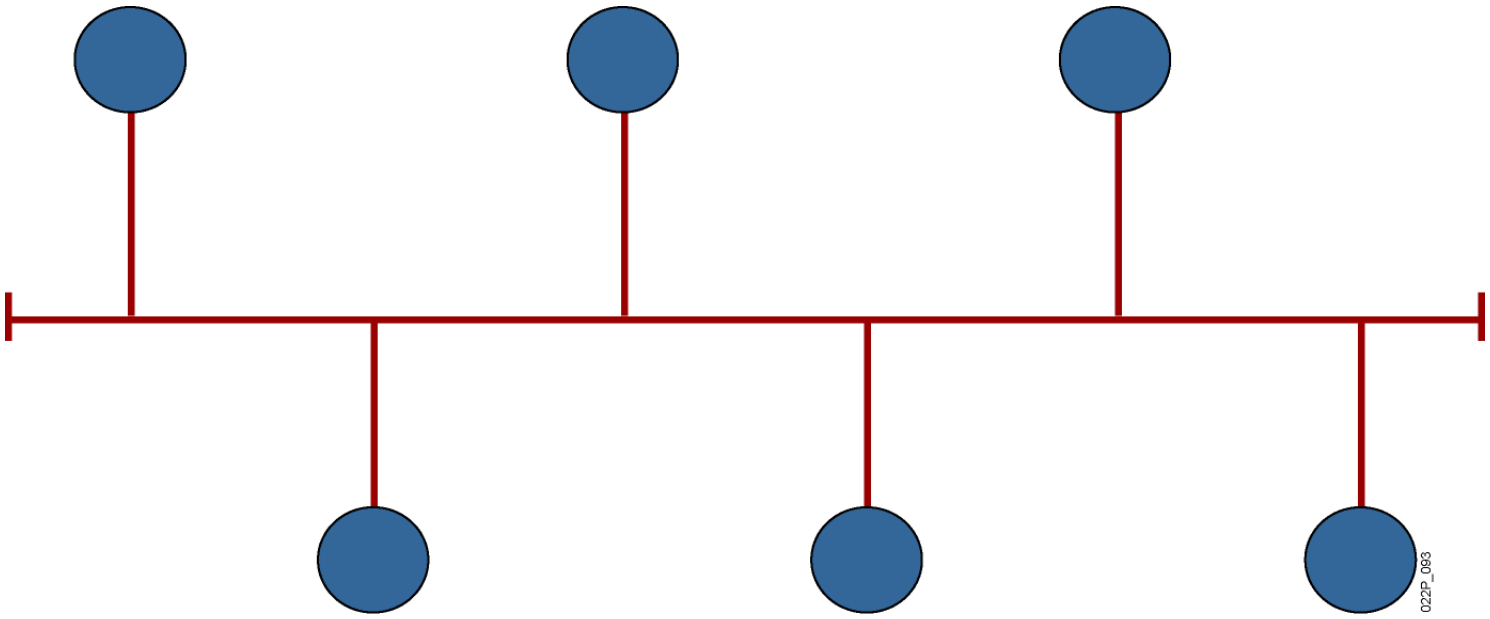


Star Topology

Logical Topologies

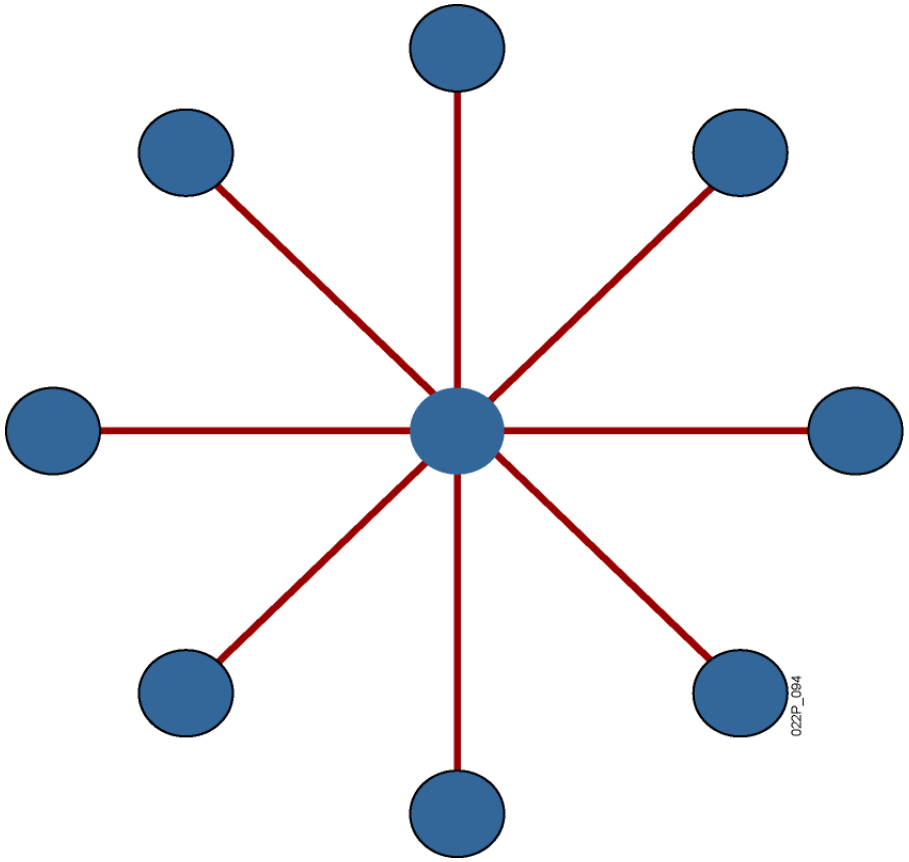


Bus Topology



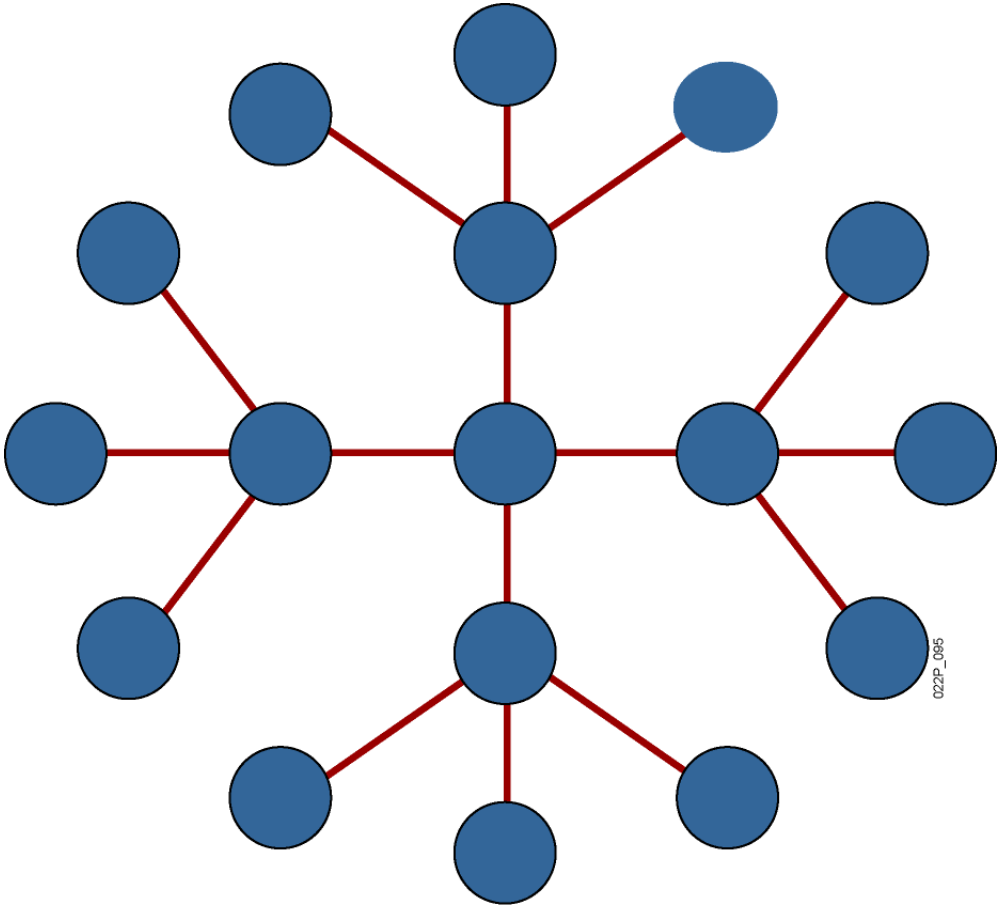
- **All devices receive the signal.**

Star Topology



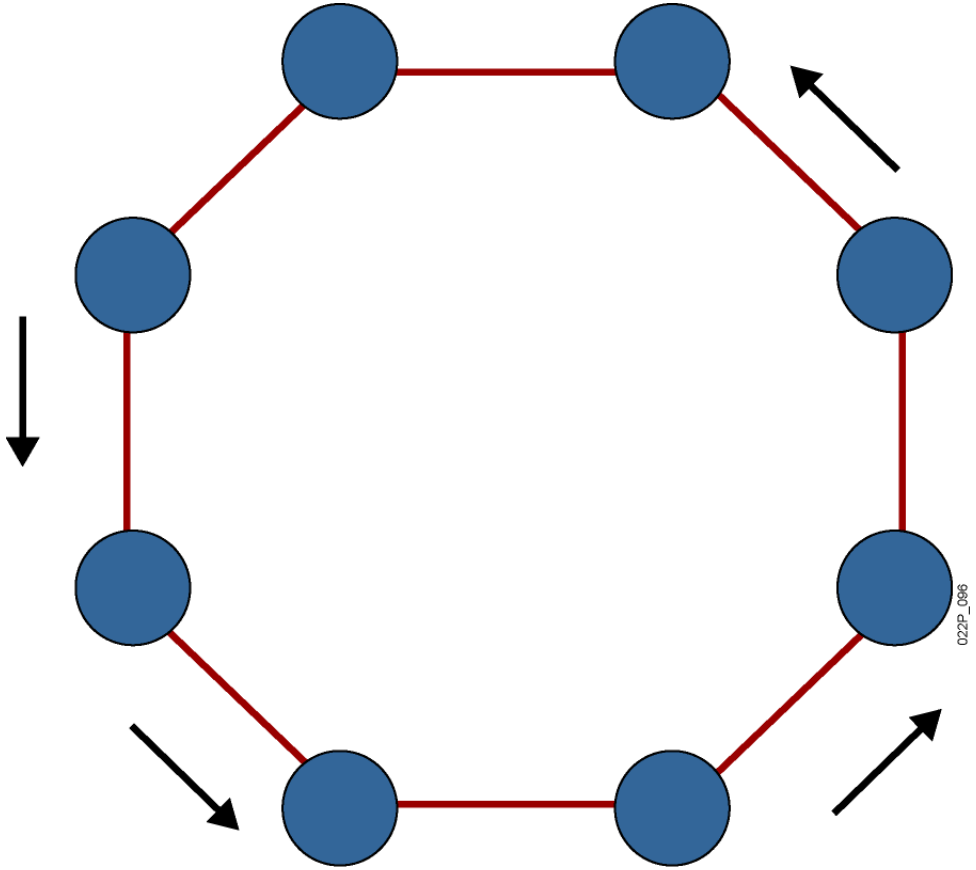
- **Transmission through a central point.**
- **Single point of failure.**

Extended-Star Topology



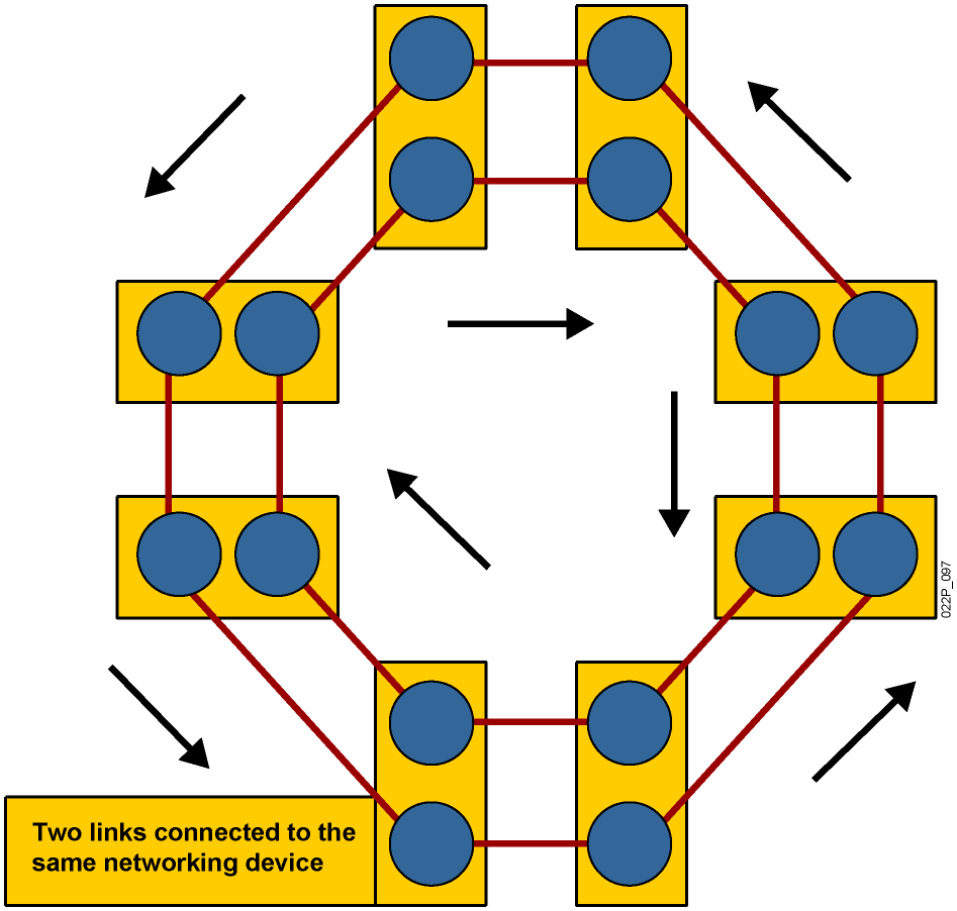
- **More resilient than star topology.**

Ring Topology



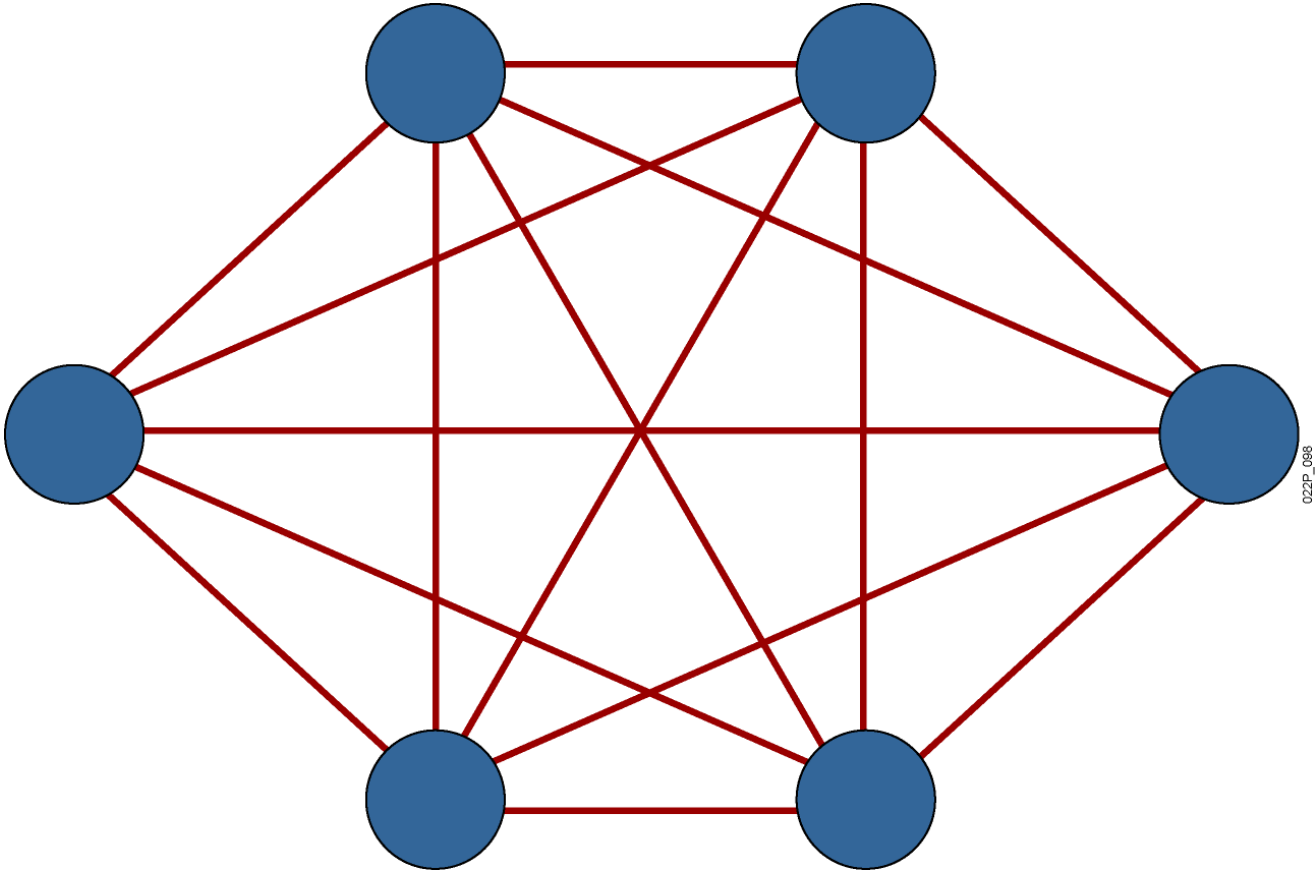
- **Signals travel around ring.**
- **Single point of failure.**

Dual-Ring Topology



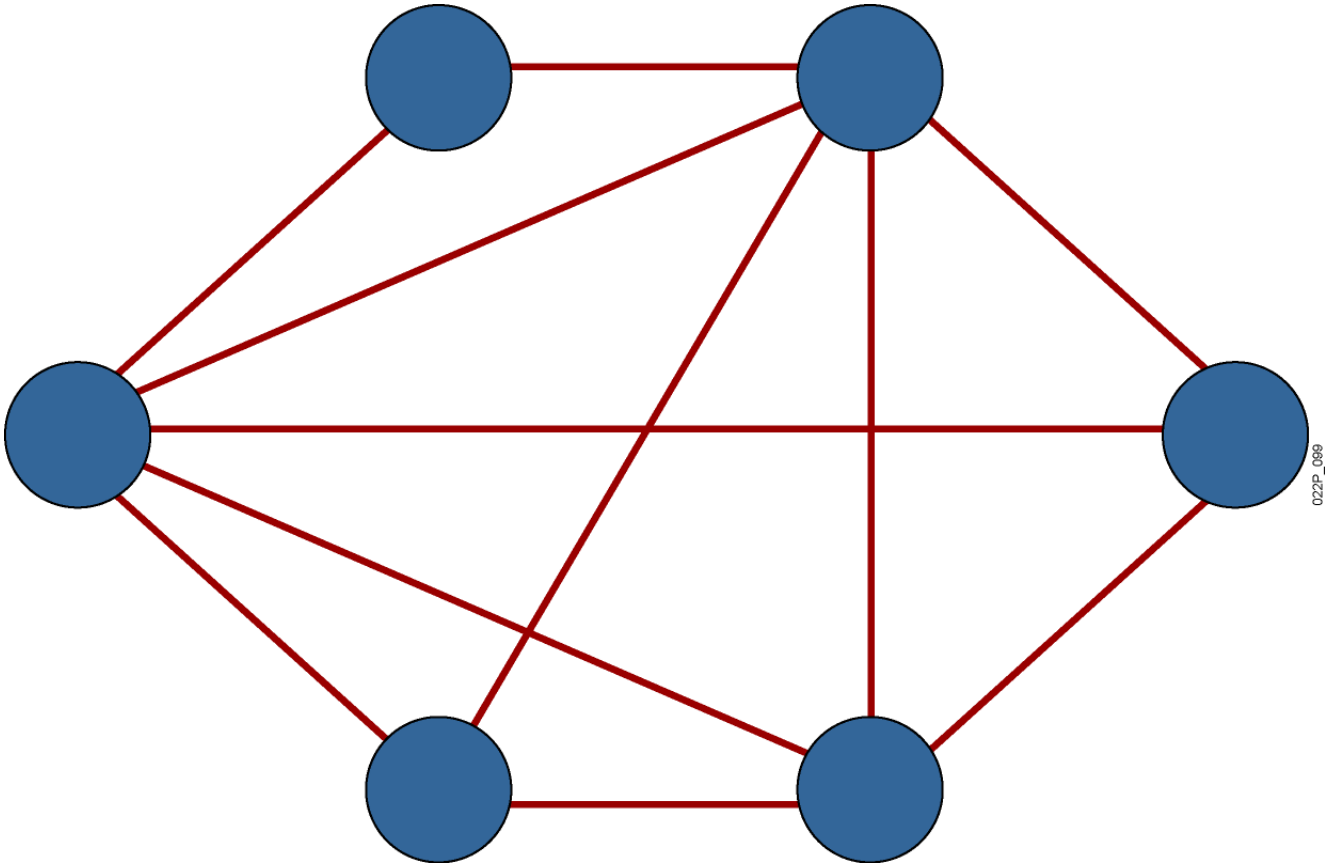
- **Signals travel in opposite directions.**
- **More resilient than single ring.**

Full-Mesh Topology



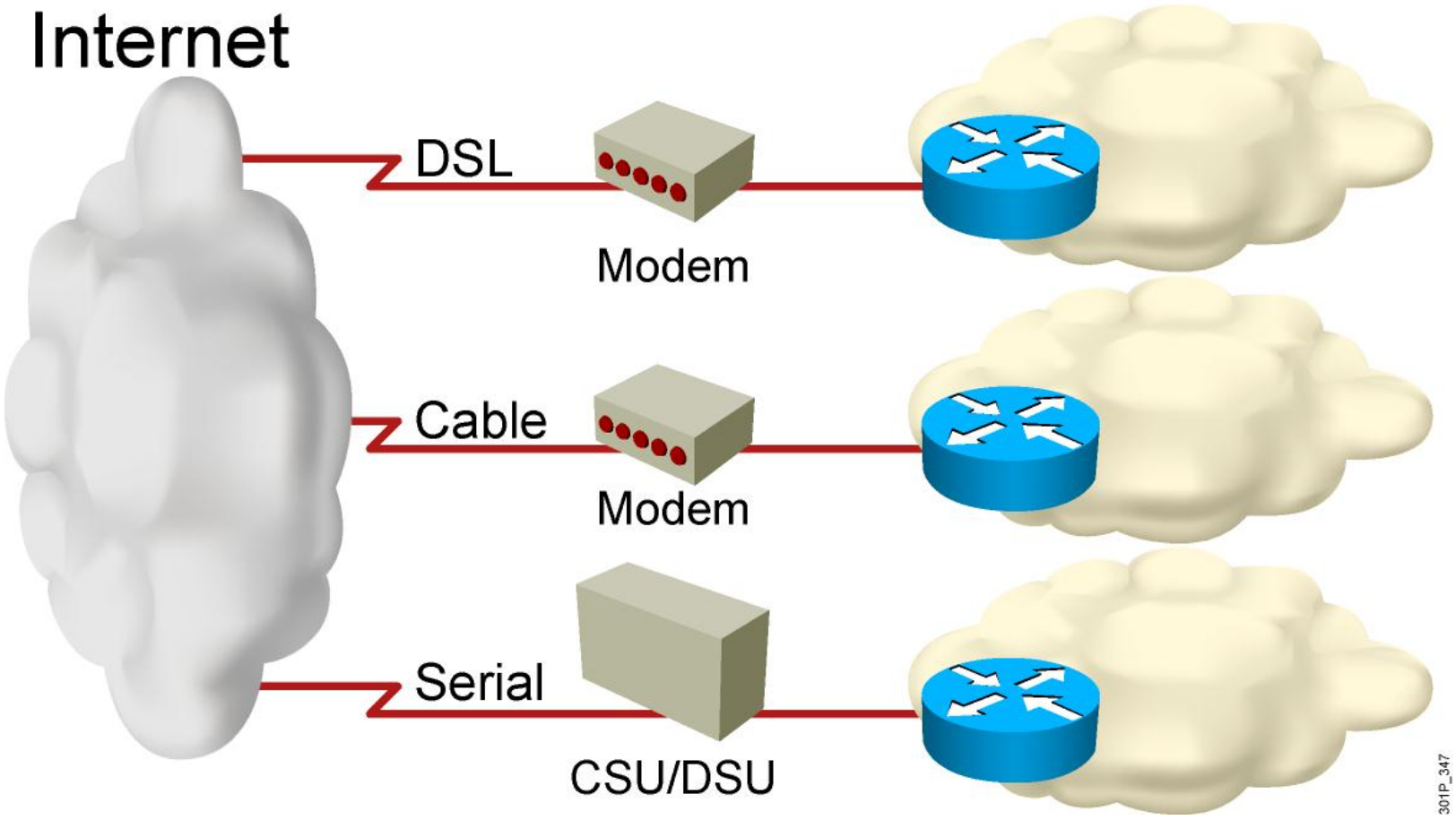
- **Highly fault-tolerant**
- **Expensive to implement**

Partial-Mesh Topology



- **Trade-off between fault tolerance and cost**

Connection to the Internet

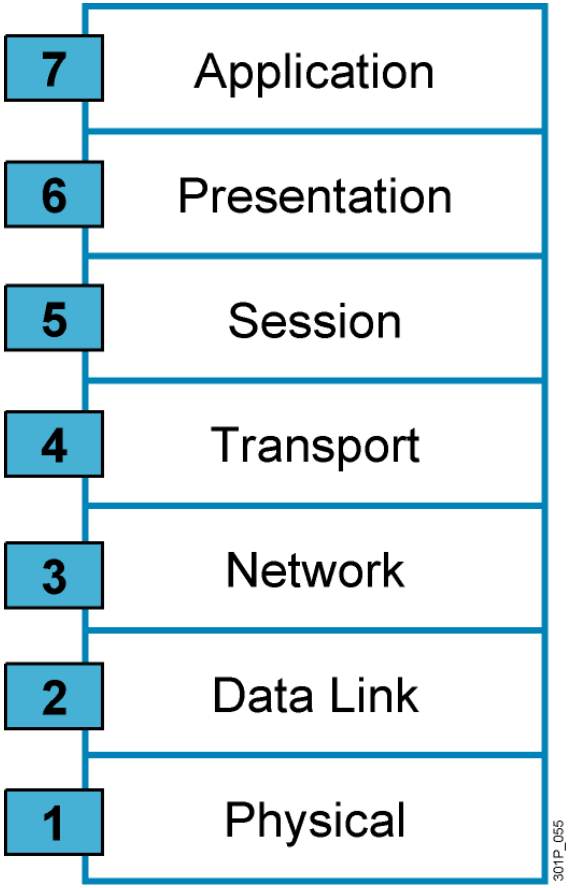


OSI Model
TCP/IP

Understanding Host-to-Host Communications

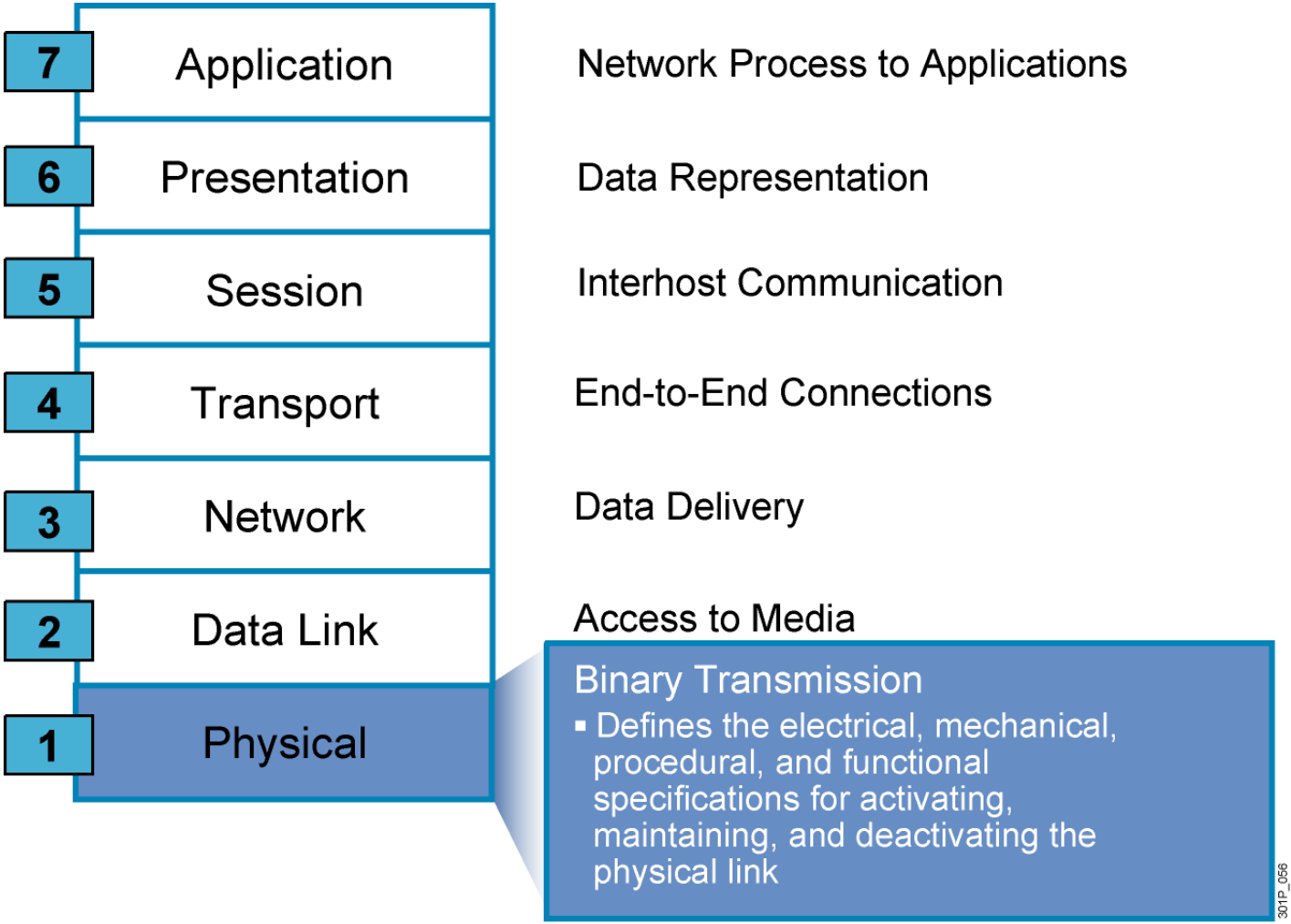
- **Older model**
  - **Proprietary**
  - **Application and combinations software controlled by one vendor**
- **Standards-based model**
  - **Multivendor software**
  - **Layered approach**

Why a Layered Network Model?

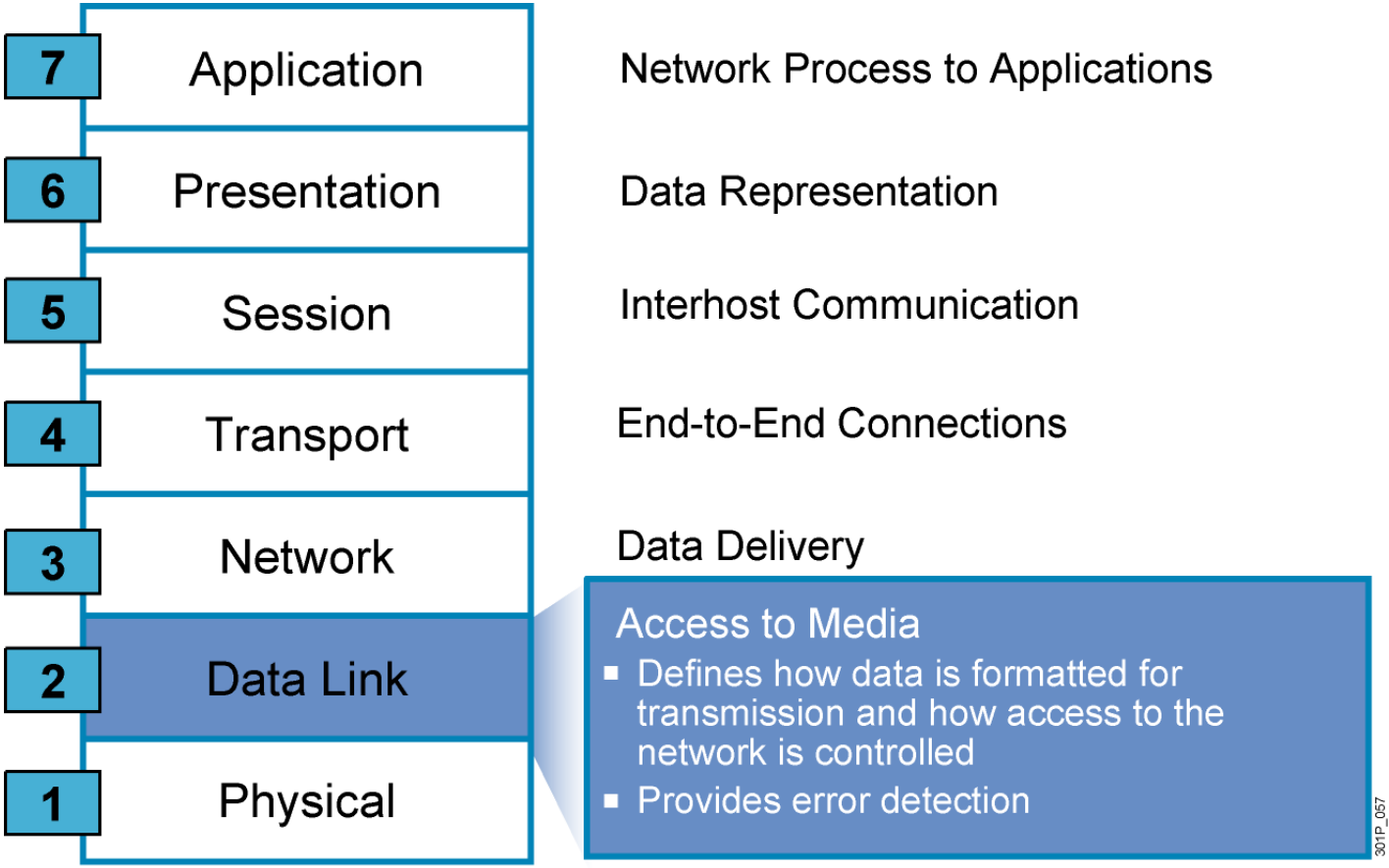


- Reduces complexity
- Standardizes interfaces
- Facilitates modular engineering
- Ensures interoperable technology
- Accelerates evolution
- Simplifies teaching and learning

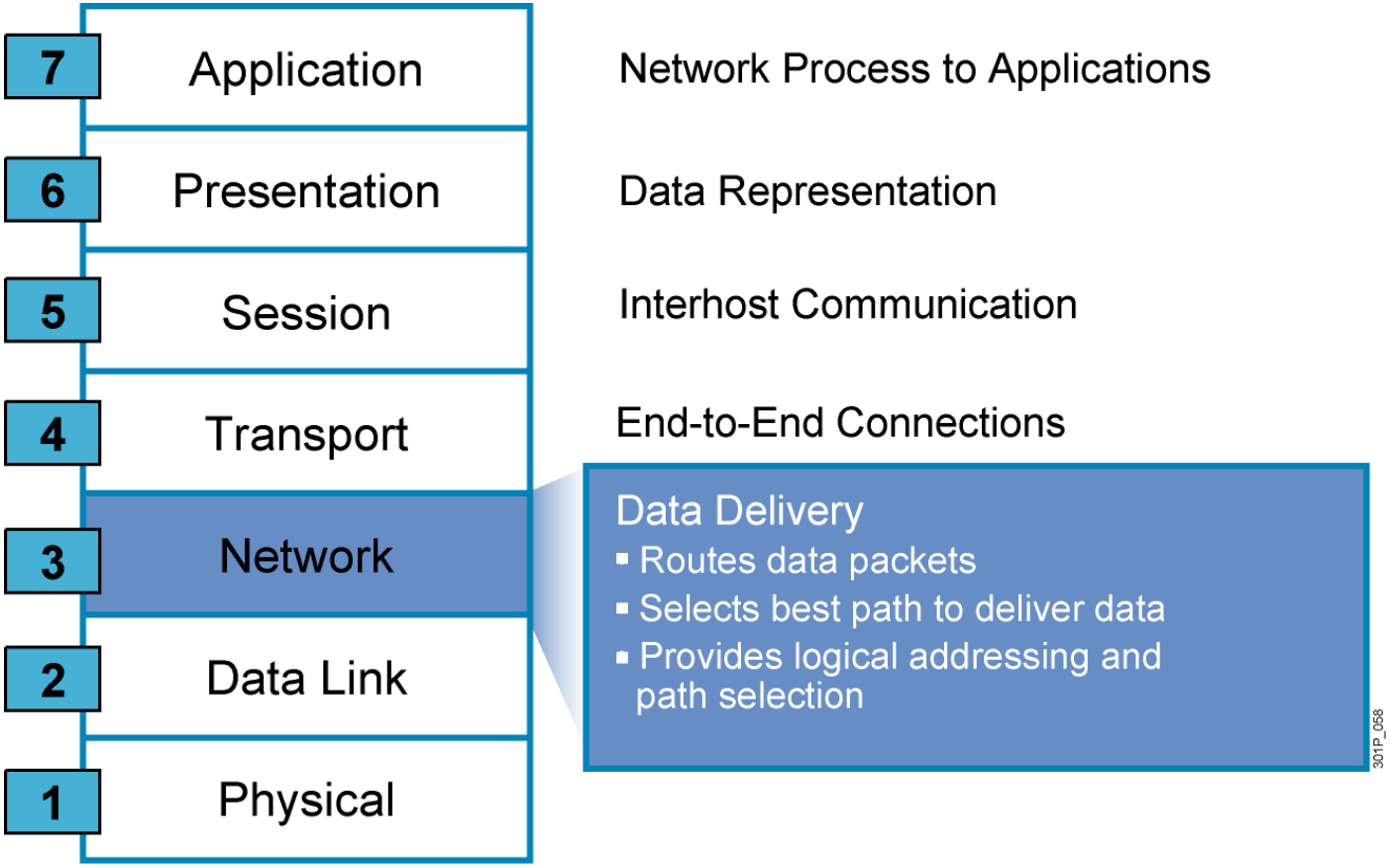
The Seven Layers of the OSI Model



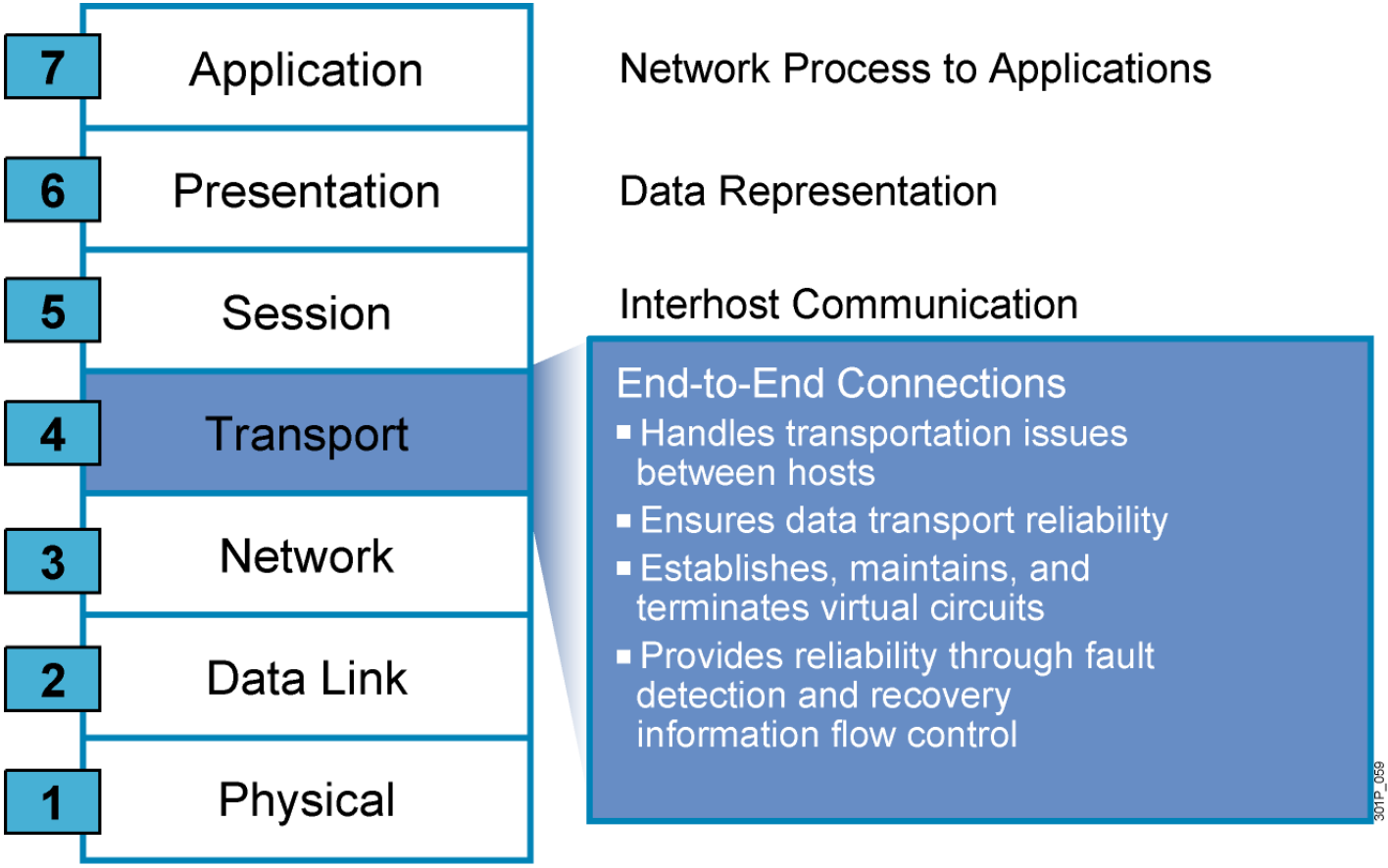
The Seven Layers of the OSI Model (Cont.)



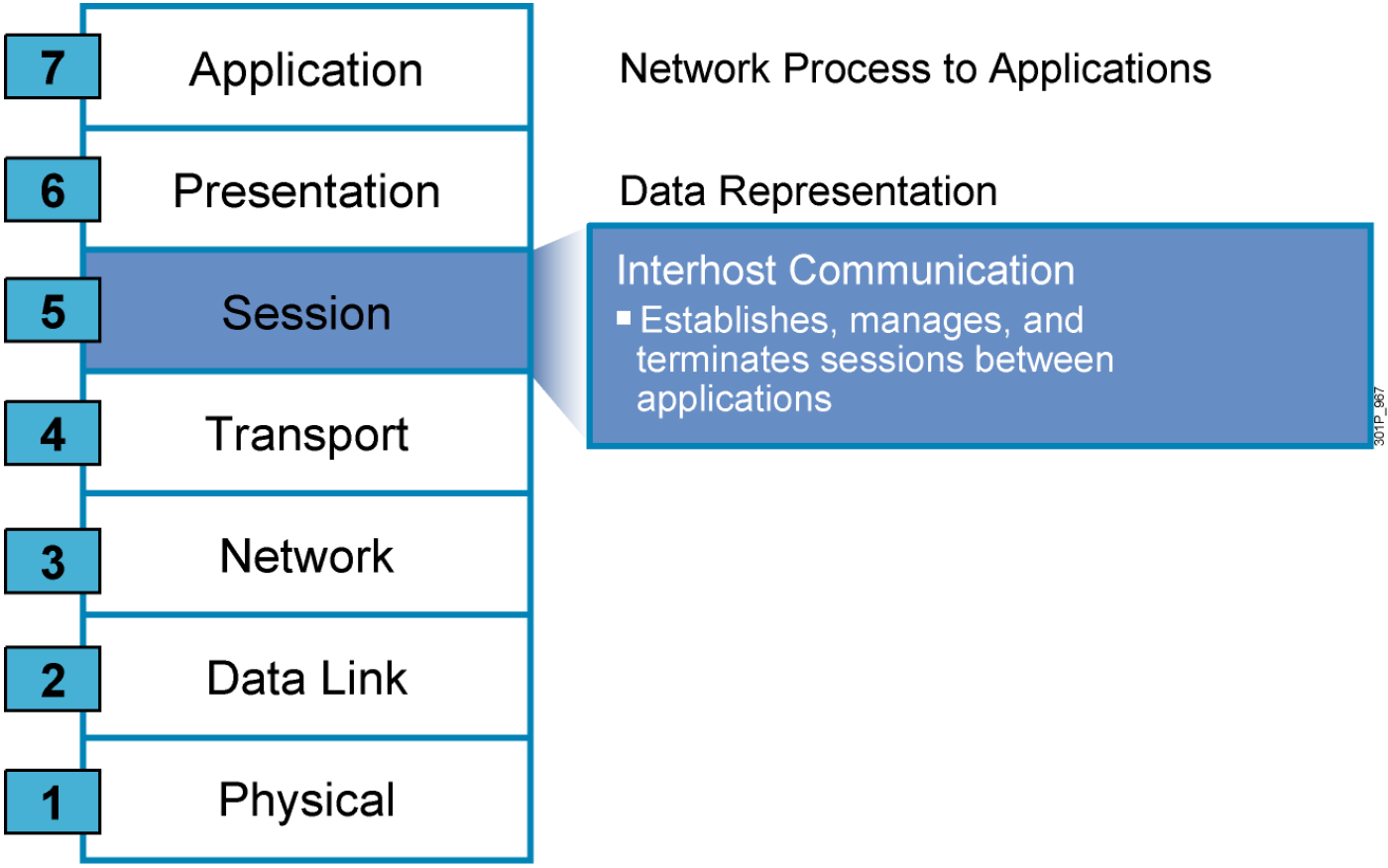
The Seven Layers of the OSI Model (Cont.)



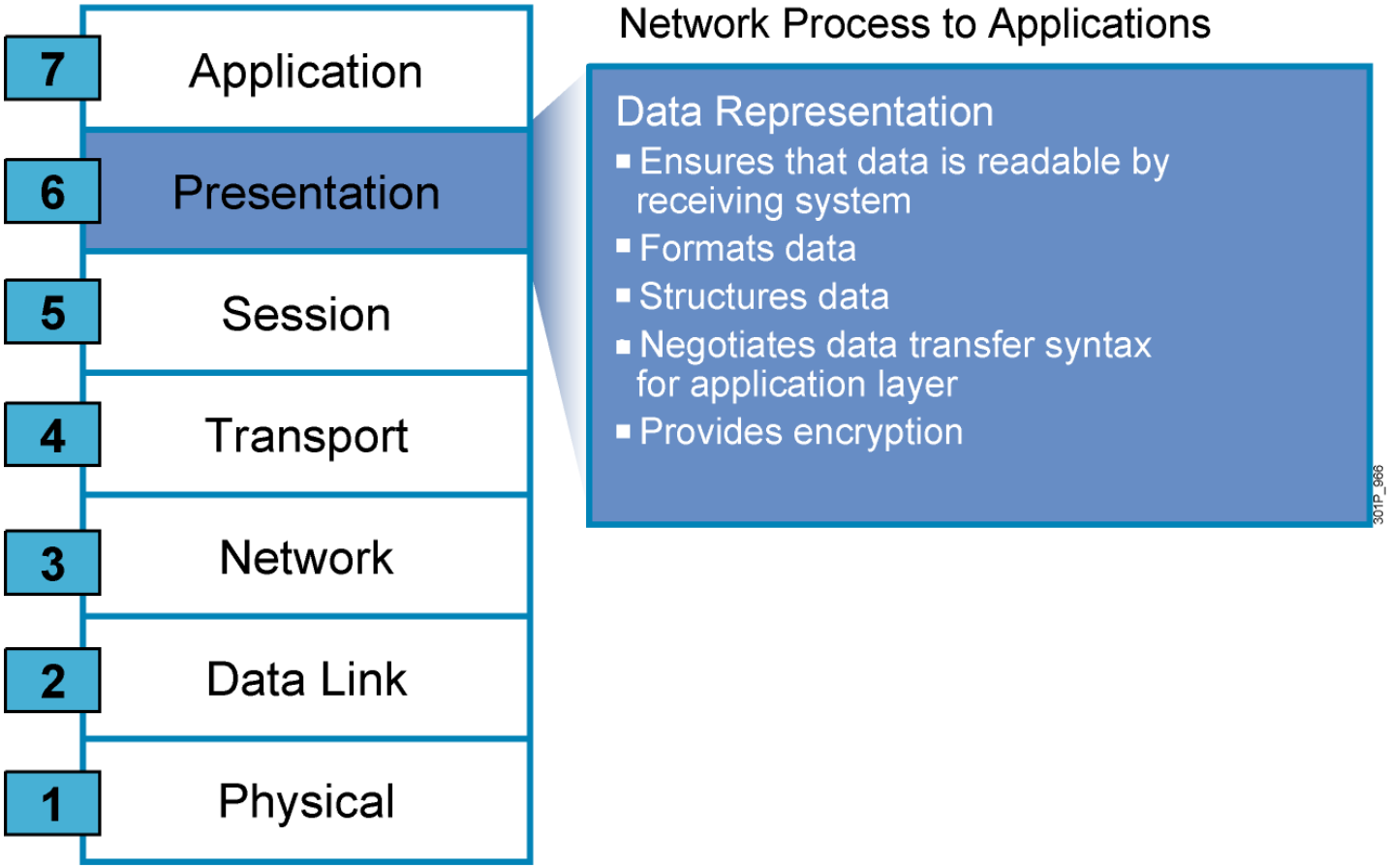
The Seven Layers of the OSI Model (Cont.)



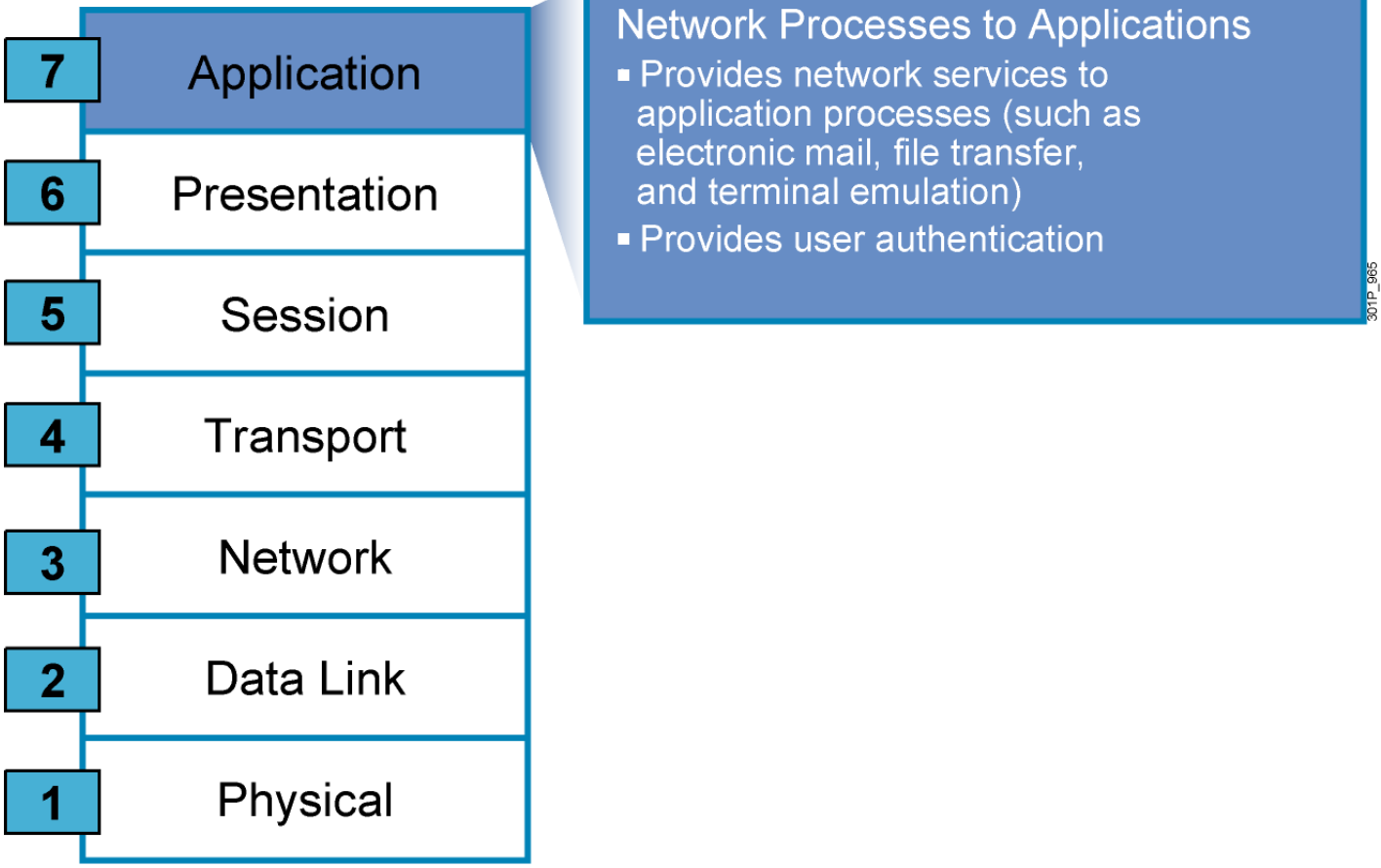
The Seven Layers of the OSI Model (Cont.)



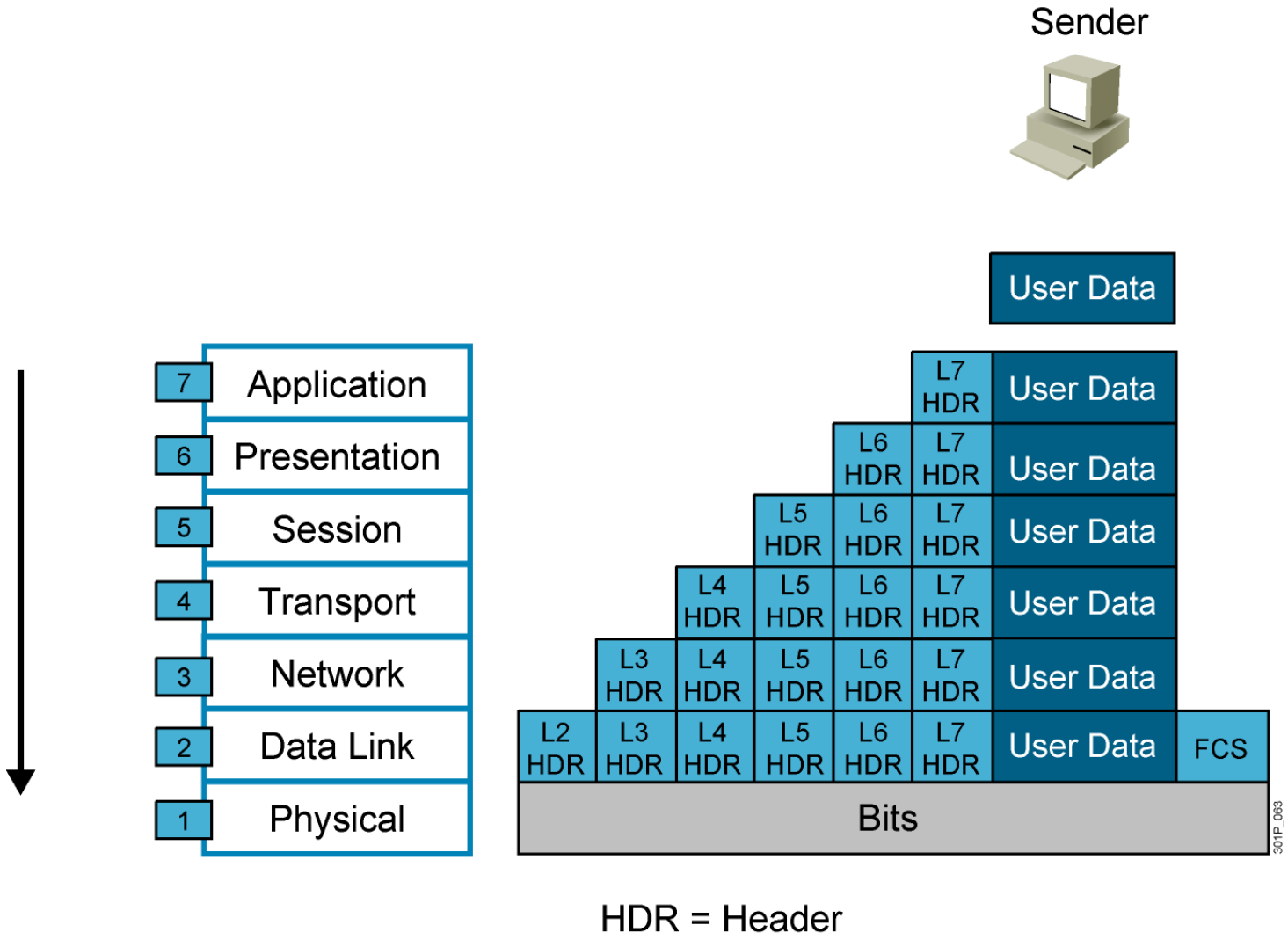
The Seven Layers of the OSI Model (Cont.)



The Seven Layers of the OSI Model (Cont.)

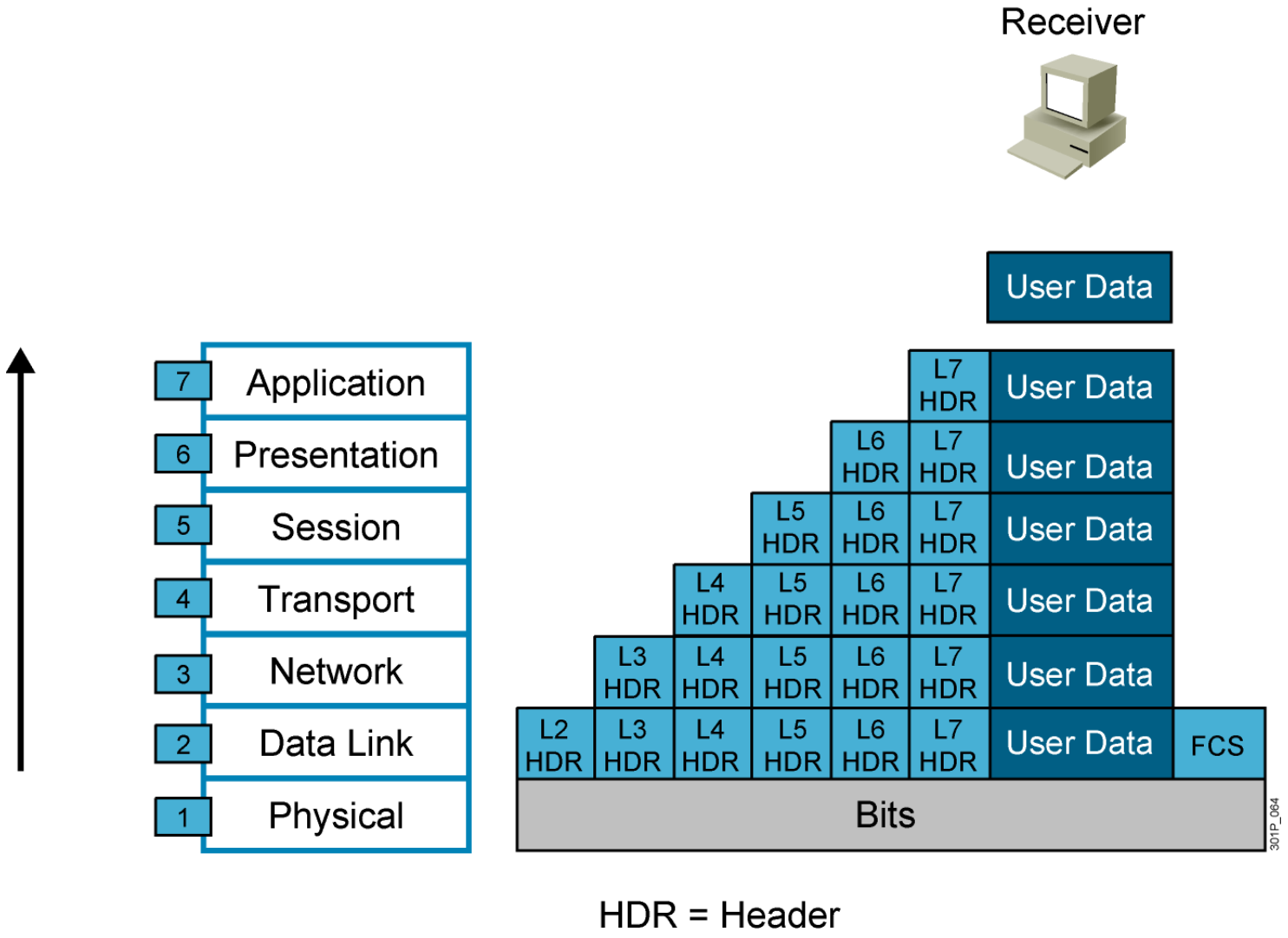


Data Encapsulation



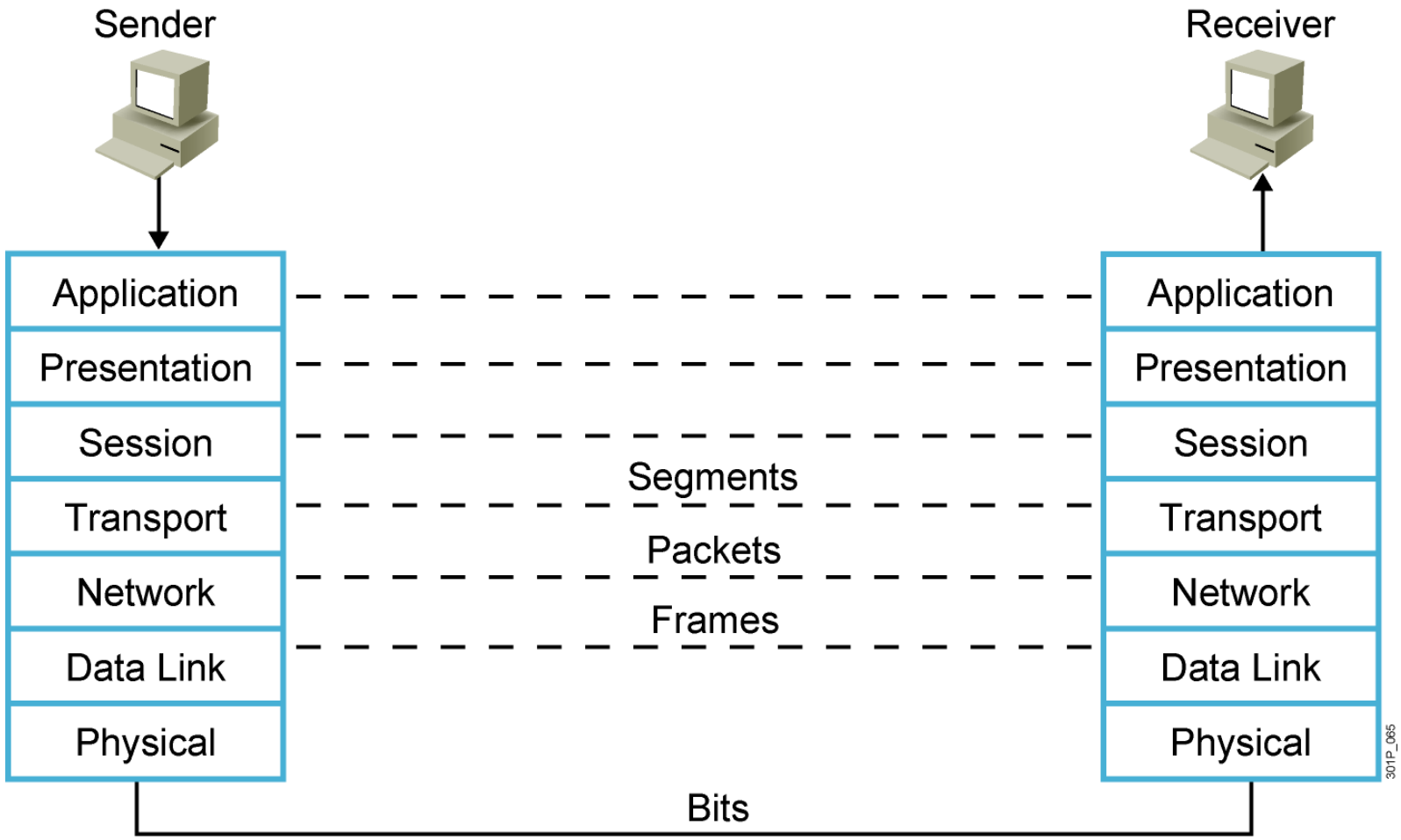
HDR = Header

Data De-Encapsulation

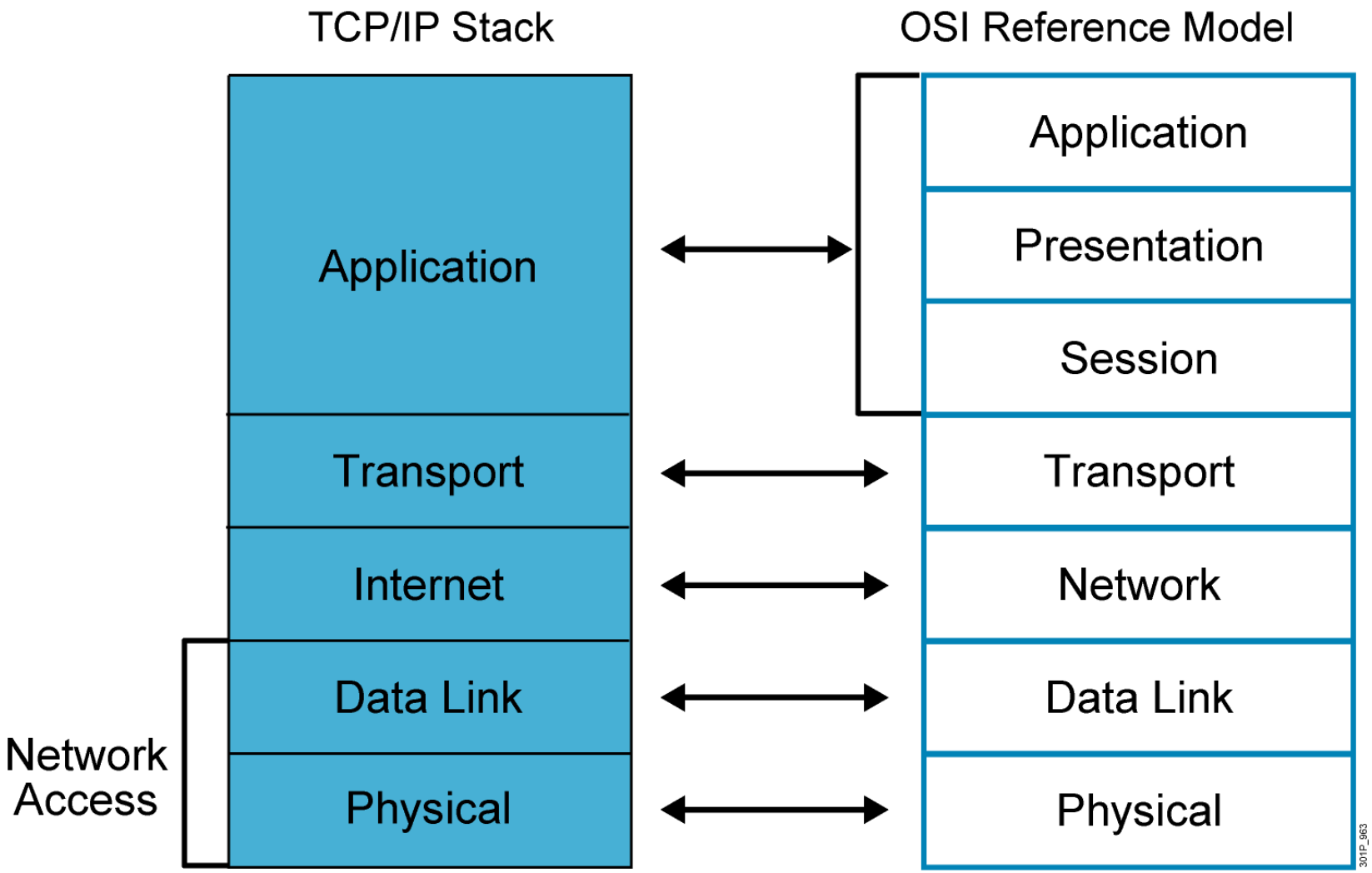


HDR = Header

Peer-to-Peer Communication

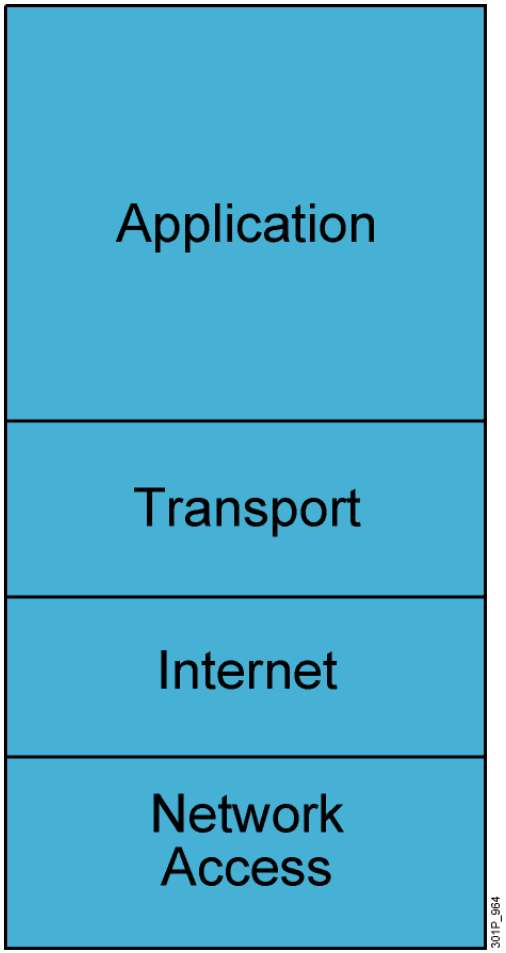


TCP/IP Stack vs. the OSI Model

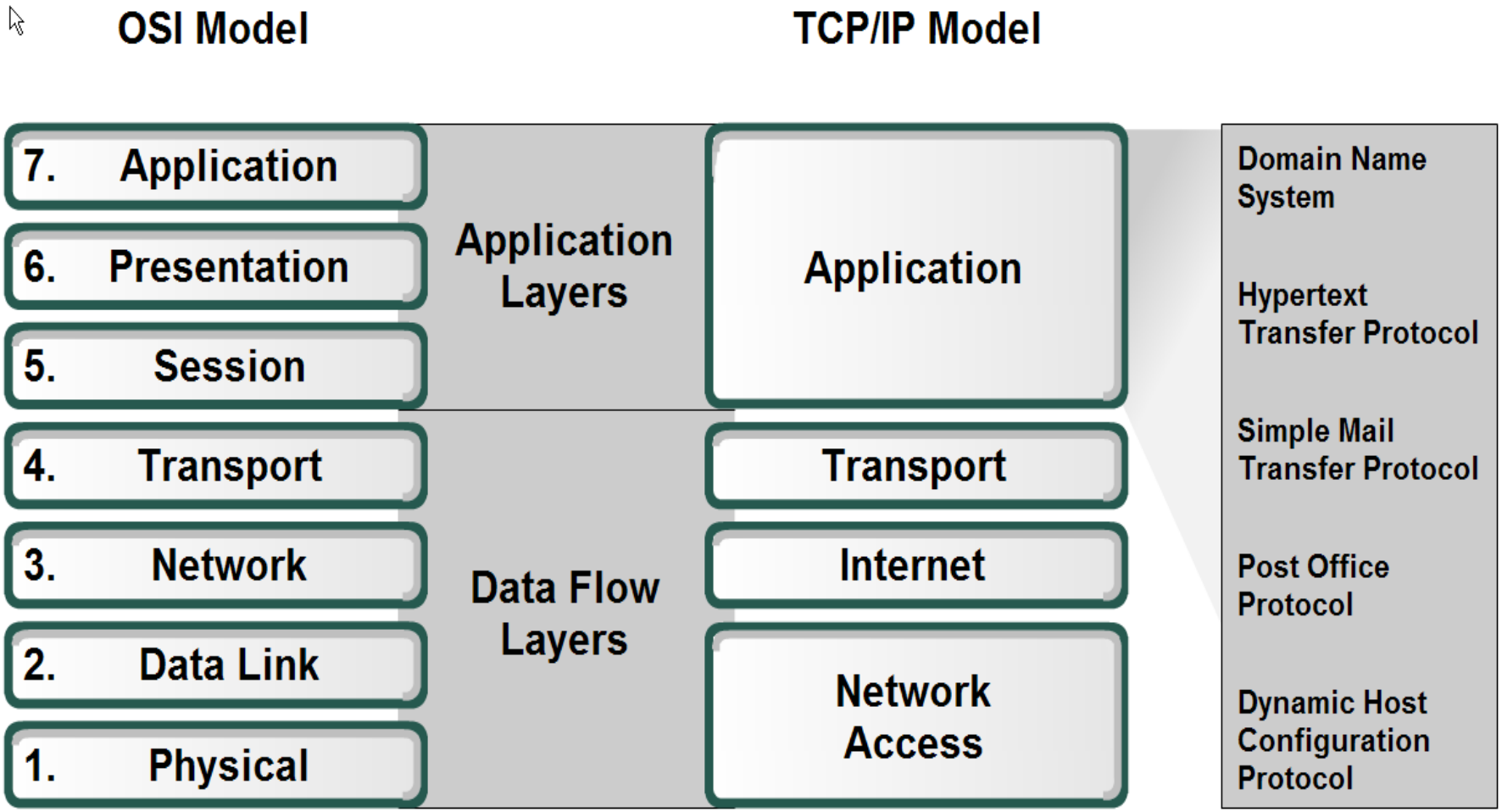


TCP/IP Stack

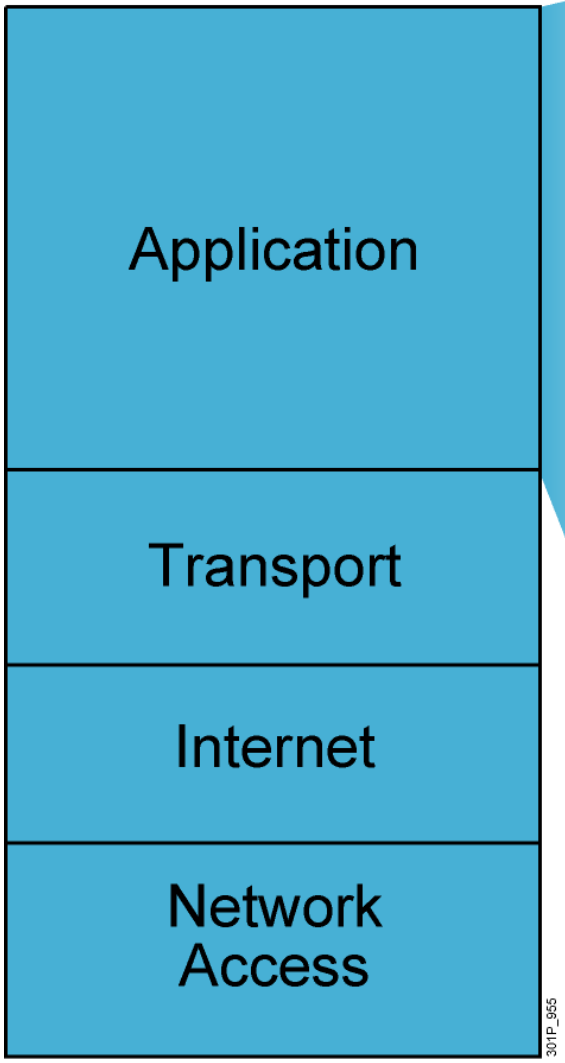
- **Defines four layers**
- **Uses different names for Layers 1 through 3**
- **Combines Layers 5 through 7 into single application layer**



Applications

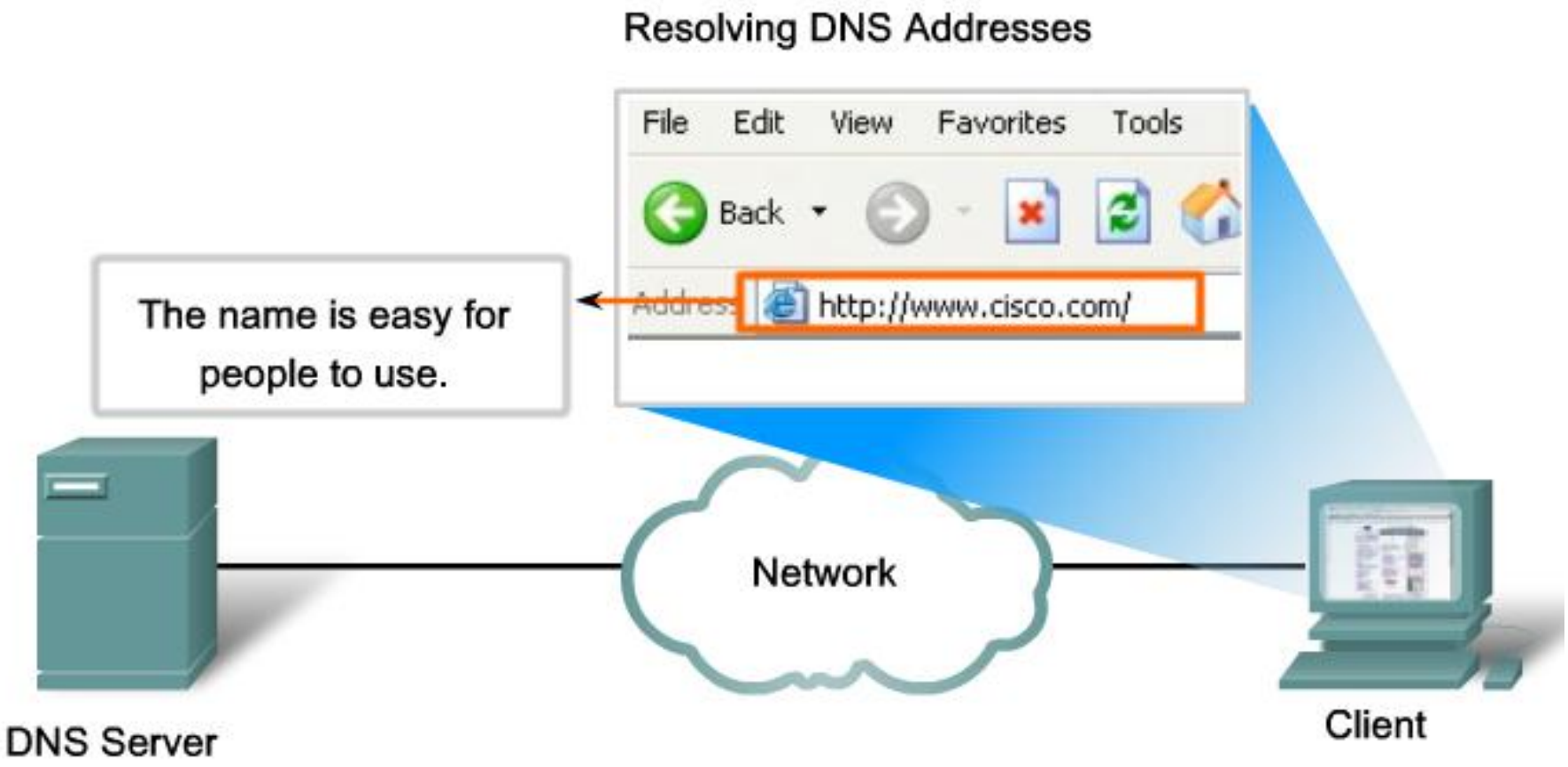


TCP/IP Application Layer Overview

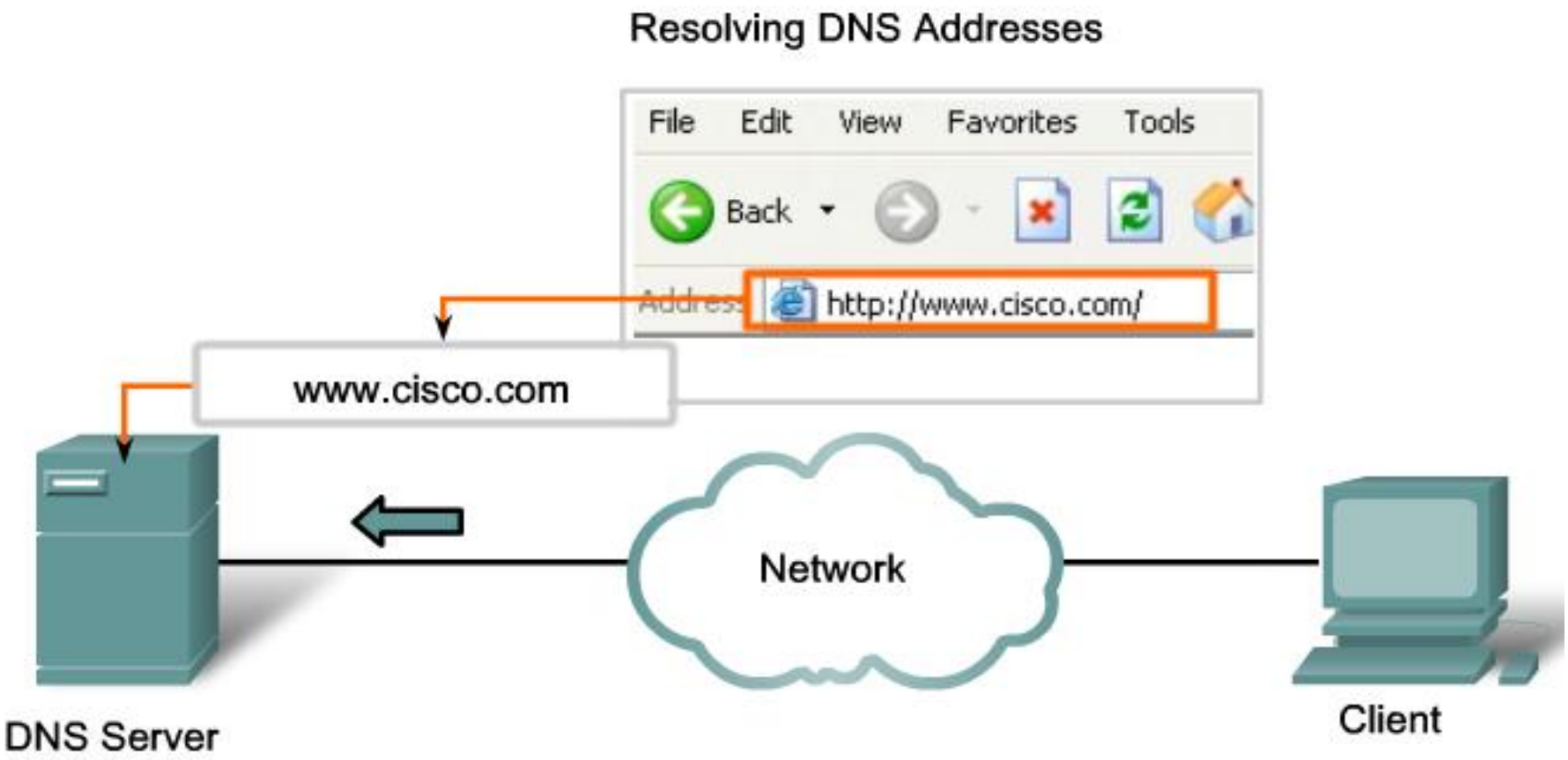


- File transfer
  - FTP
  - TFTP
  - Network File System
- E-mail
  - Simple Mail Transfer Protocol
- Remote login
  - Telnet
  - rlogin
- Network management
  - Simple Network Management Protocol
- Name management
  - Domain Name System

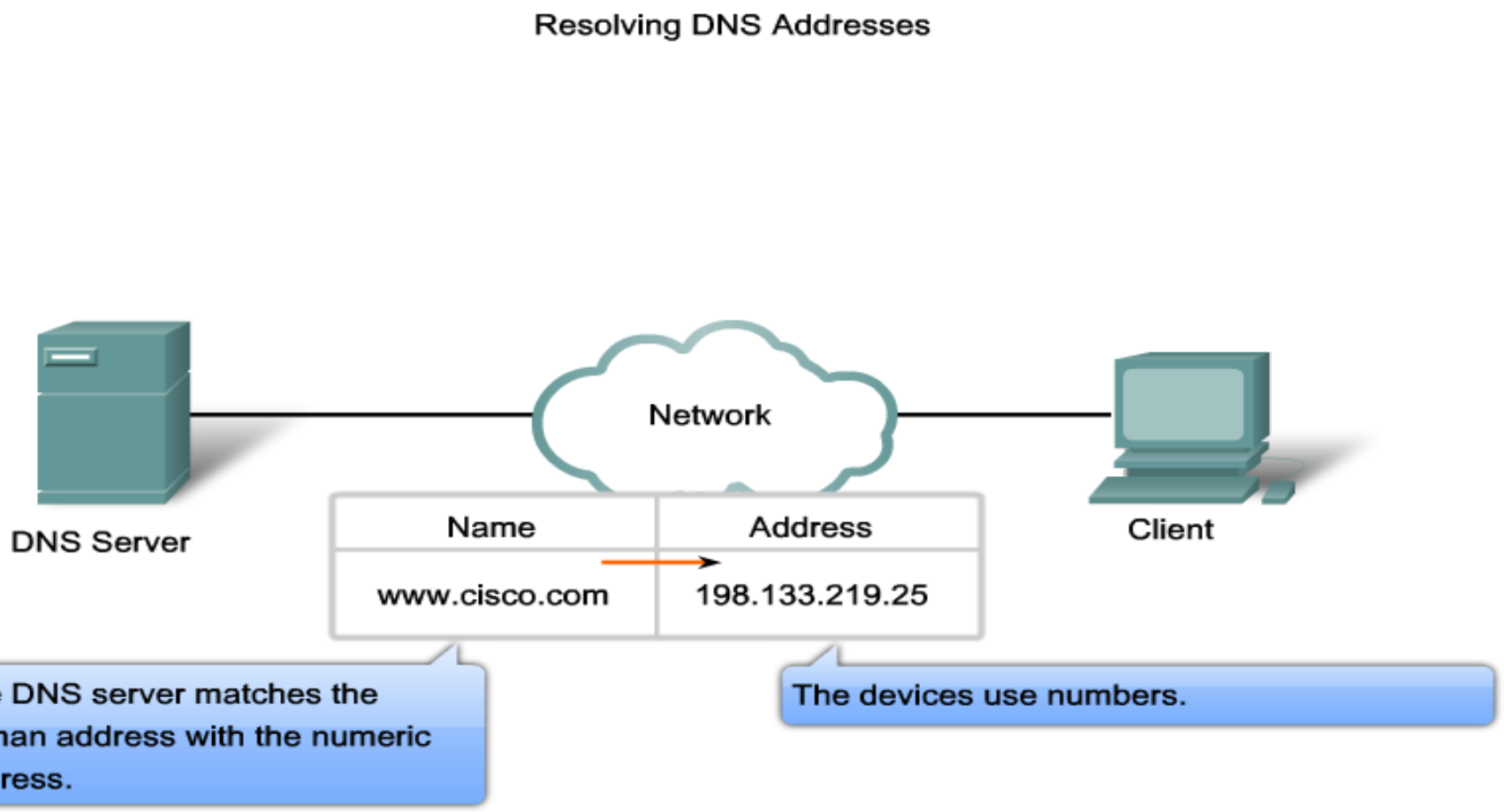
Domain Name Server DNS



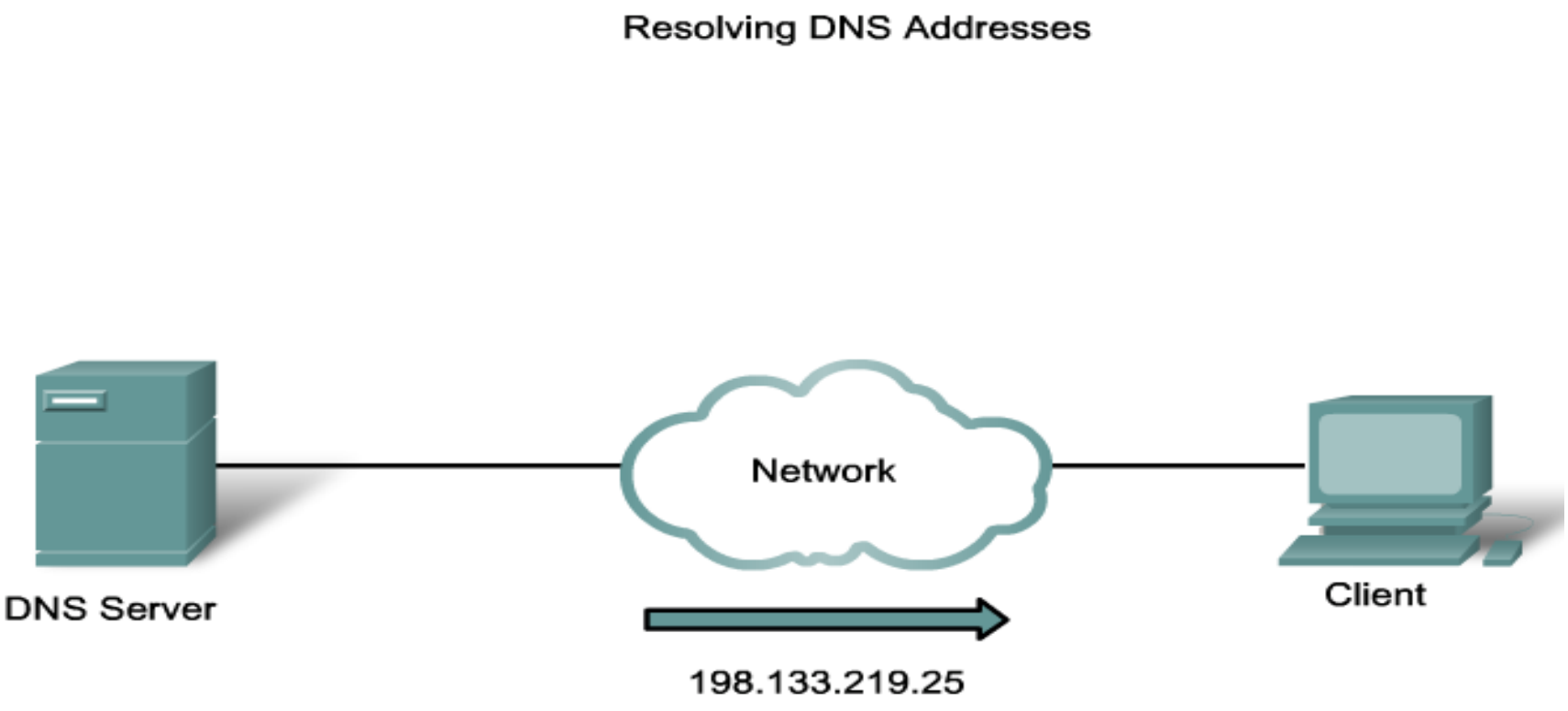
Domain Name Server DNS



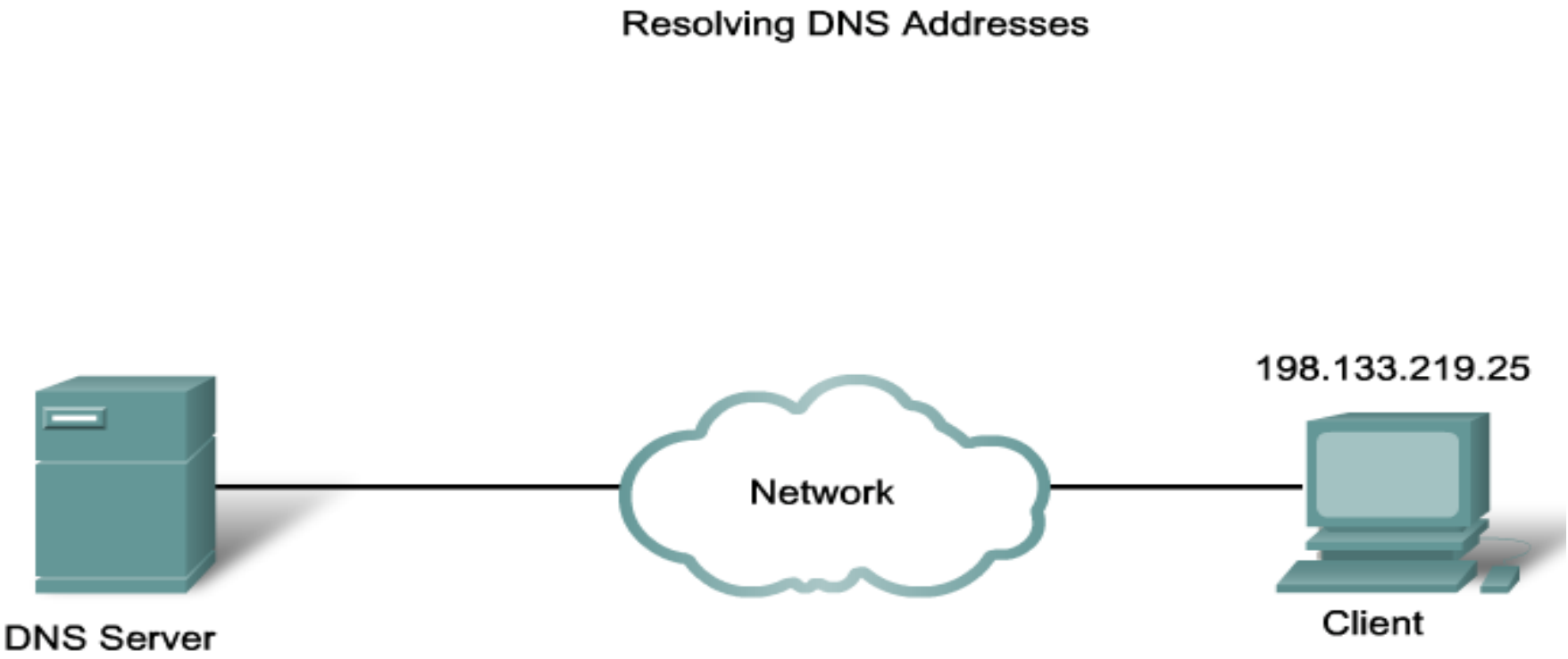
Domain Name Server DNS



Domain Name Server DNS



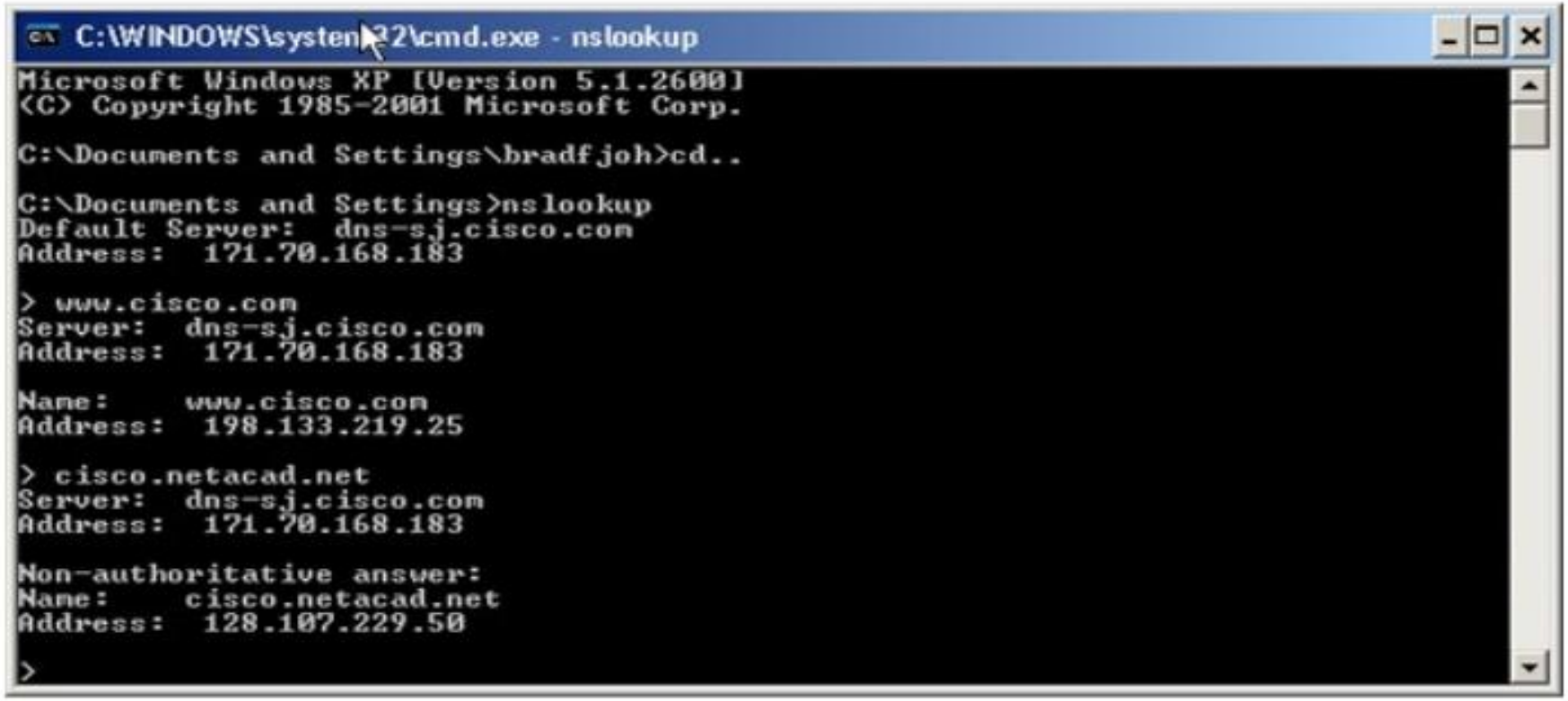
Domain Name Server DNS



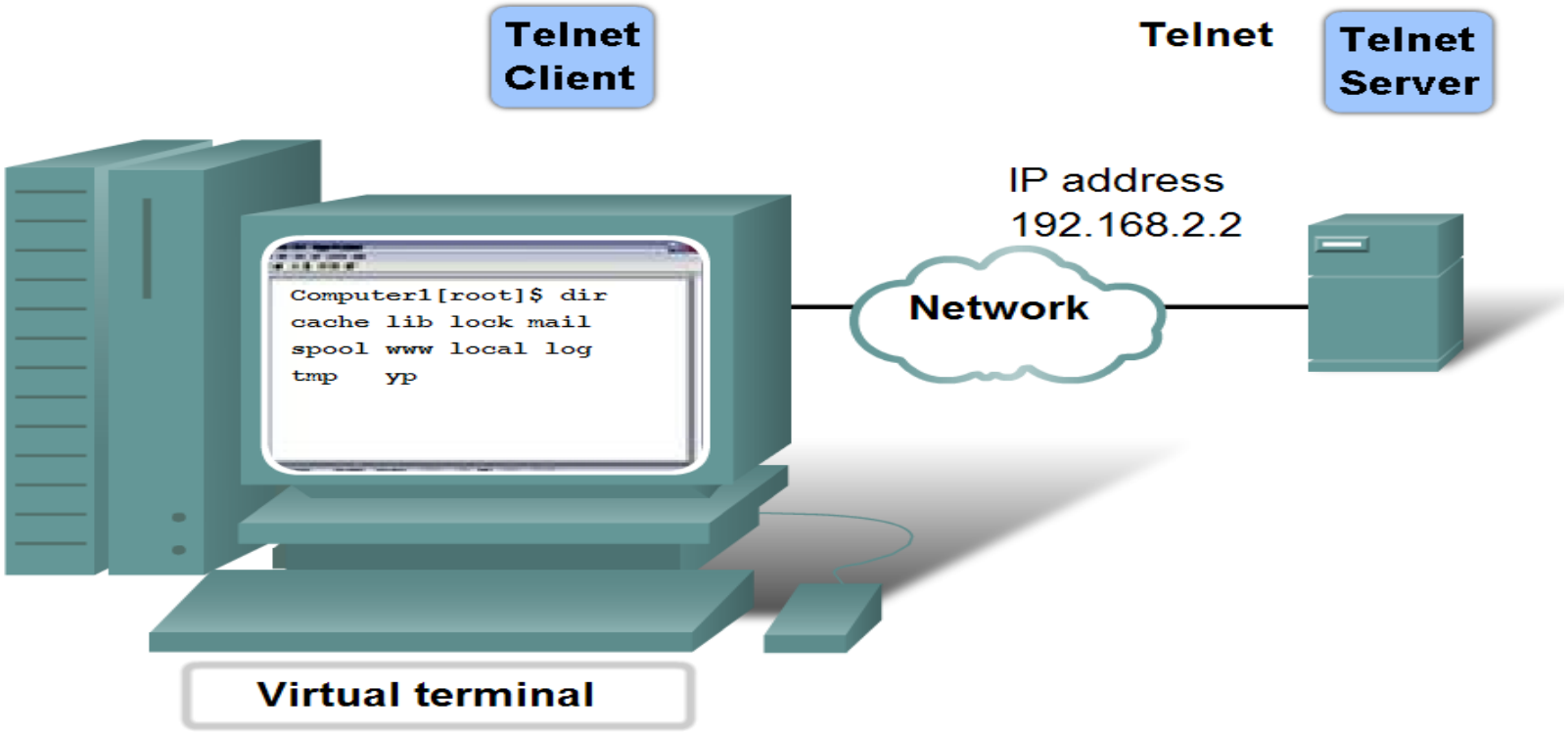
A human legible name is resolved to its numeric network device address by the DNS protocol.

Domain Name Server DNS

Using nslookup

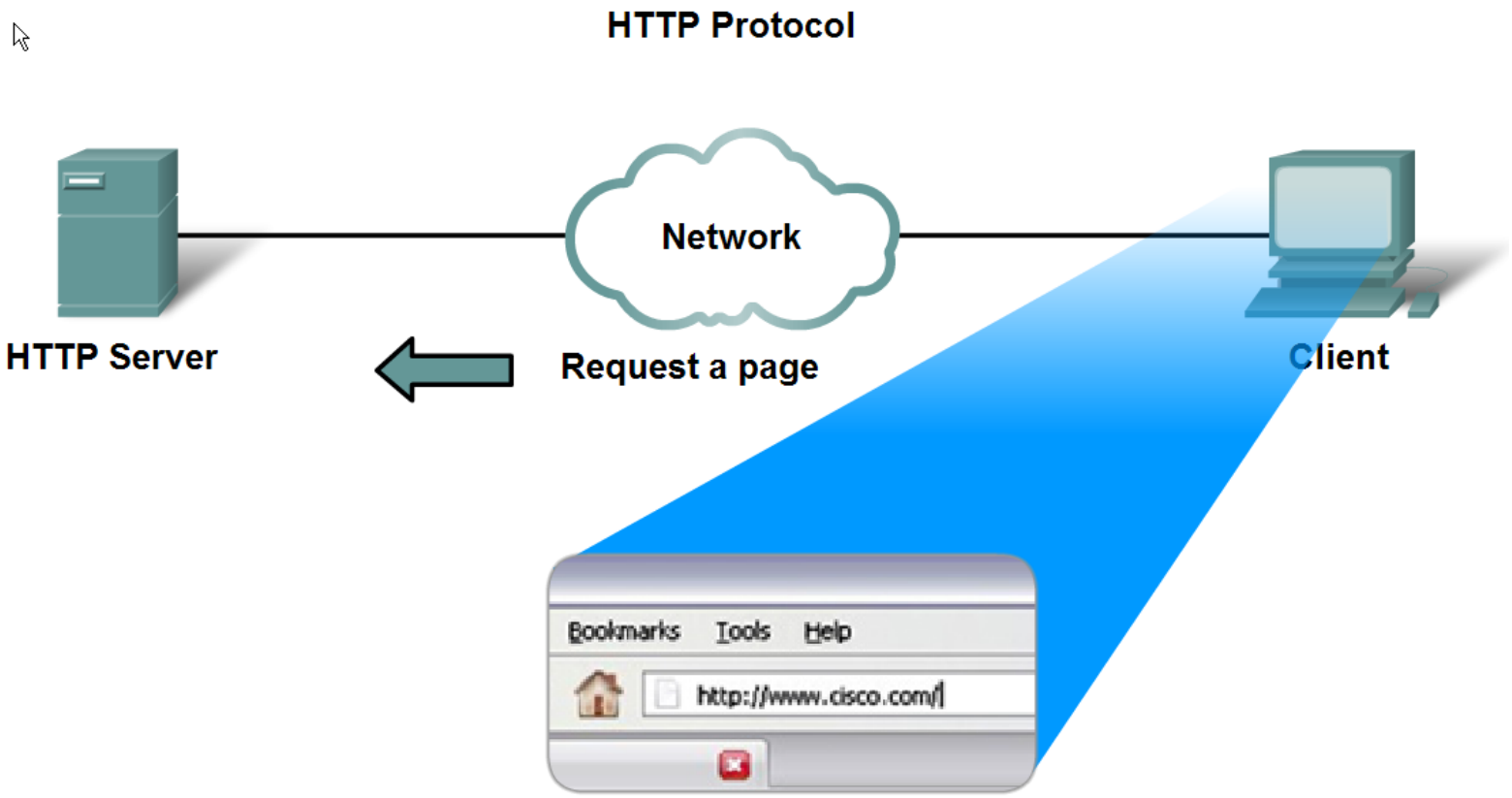


Telecommunication Network Telnet

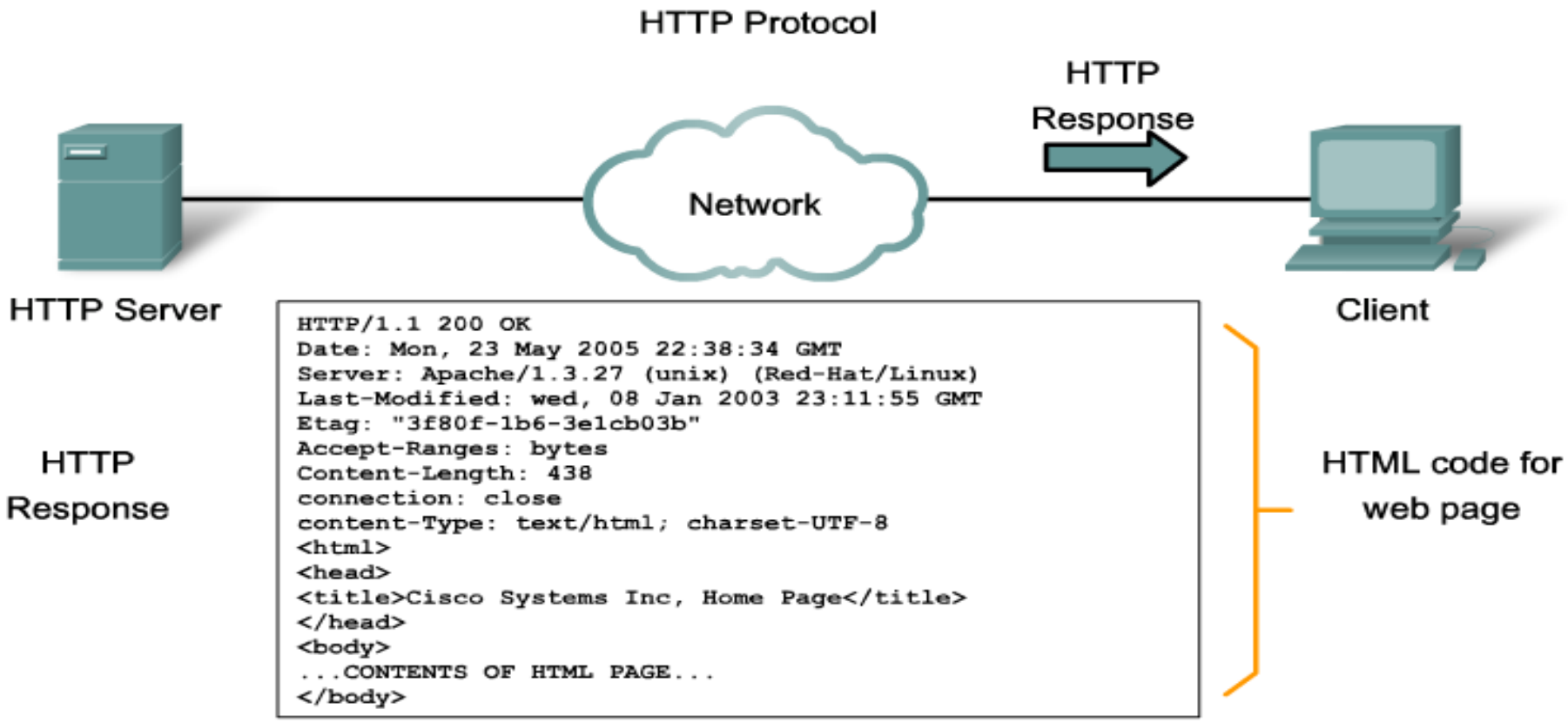


Telnet provides a way to use a computer, connected via the network, to access a network device as if the keyboard and monitor were directly connected to the device.

HyperText Transfere Protocol HTTP

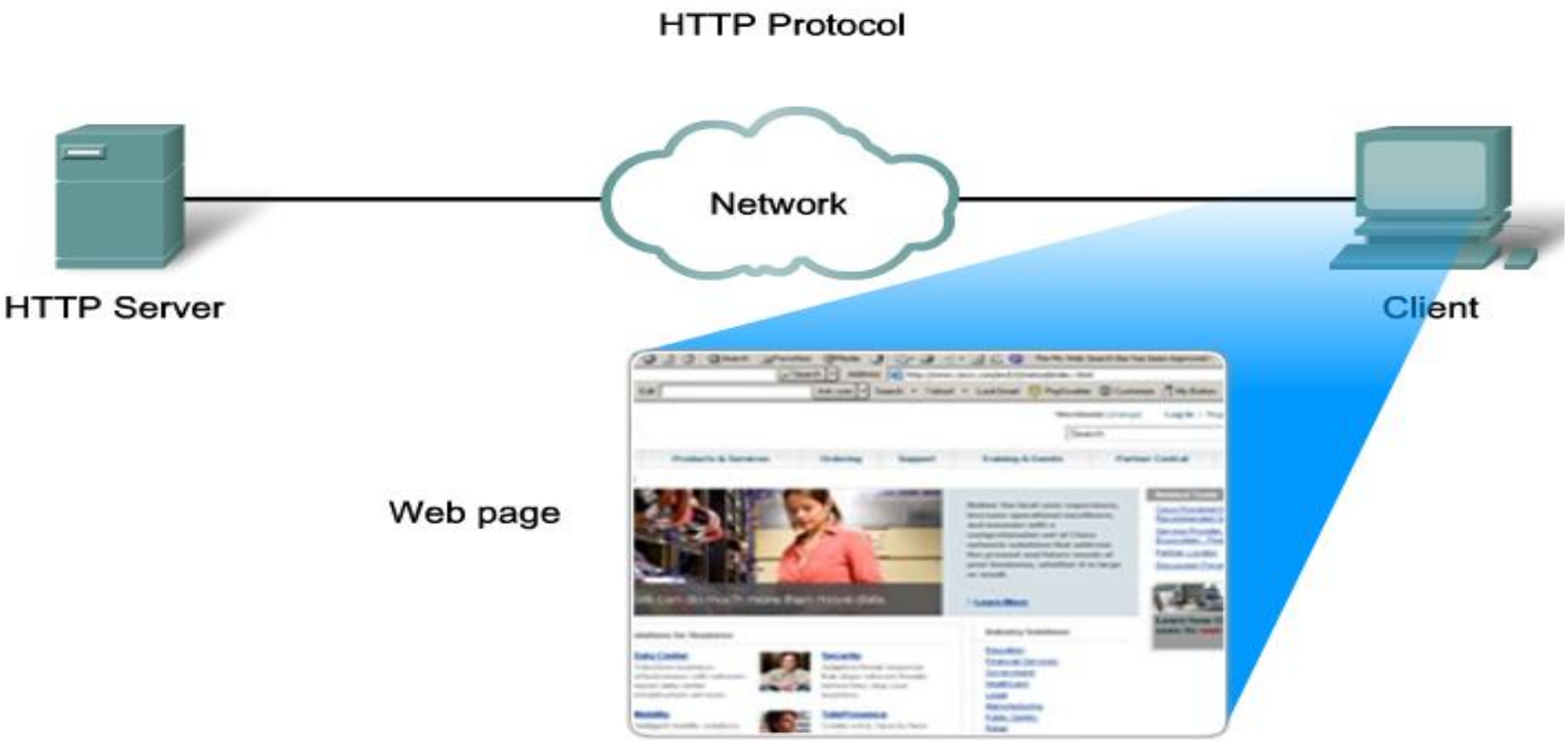


HyperText Transfere Protocol HTTP



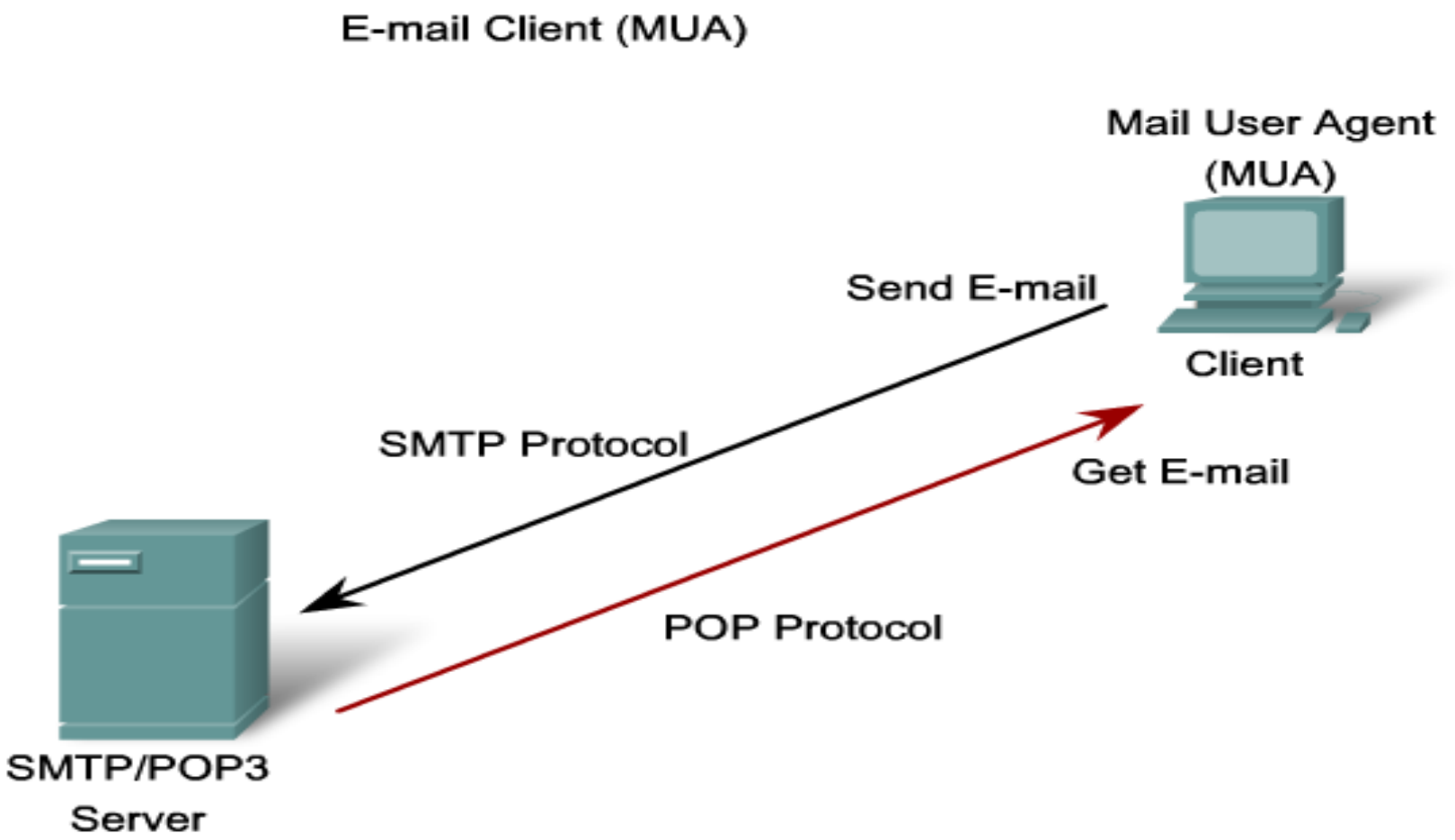
In response to the request, the HTTP server returns code for a web page.

HyperText Transfere Protocol HTTP

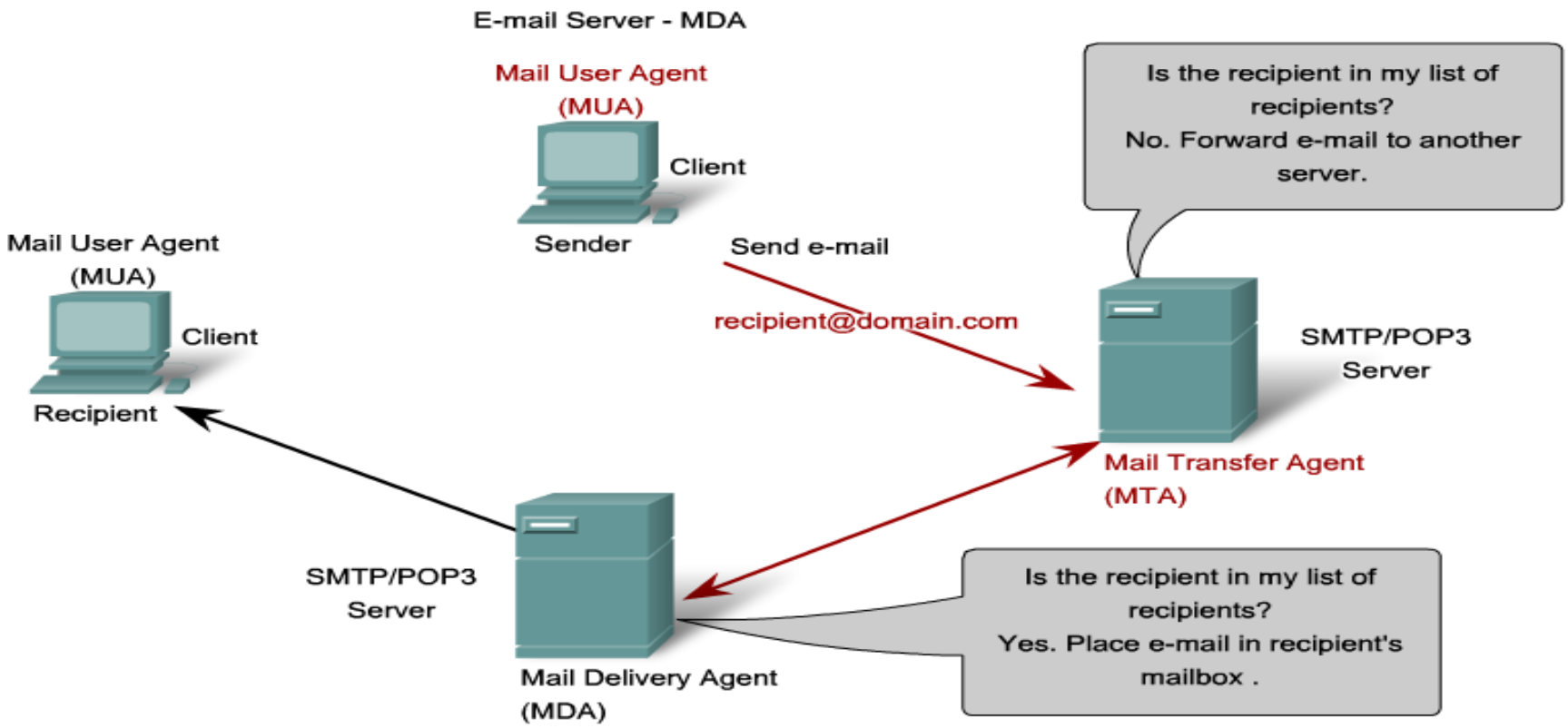


The browser interprets the HTML code and displays a web page.

Post Office Protocol POP / Simple Mail Transfer Protocol SMTP

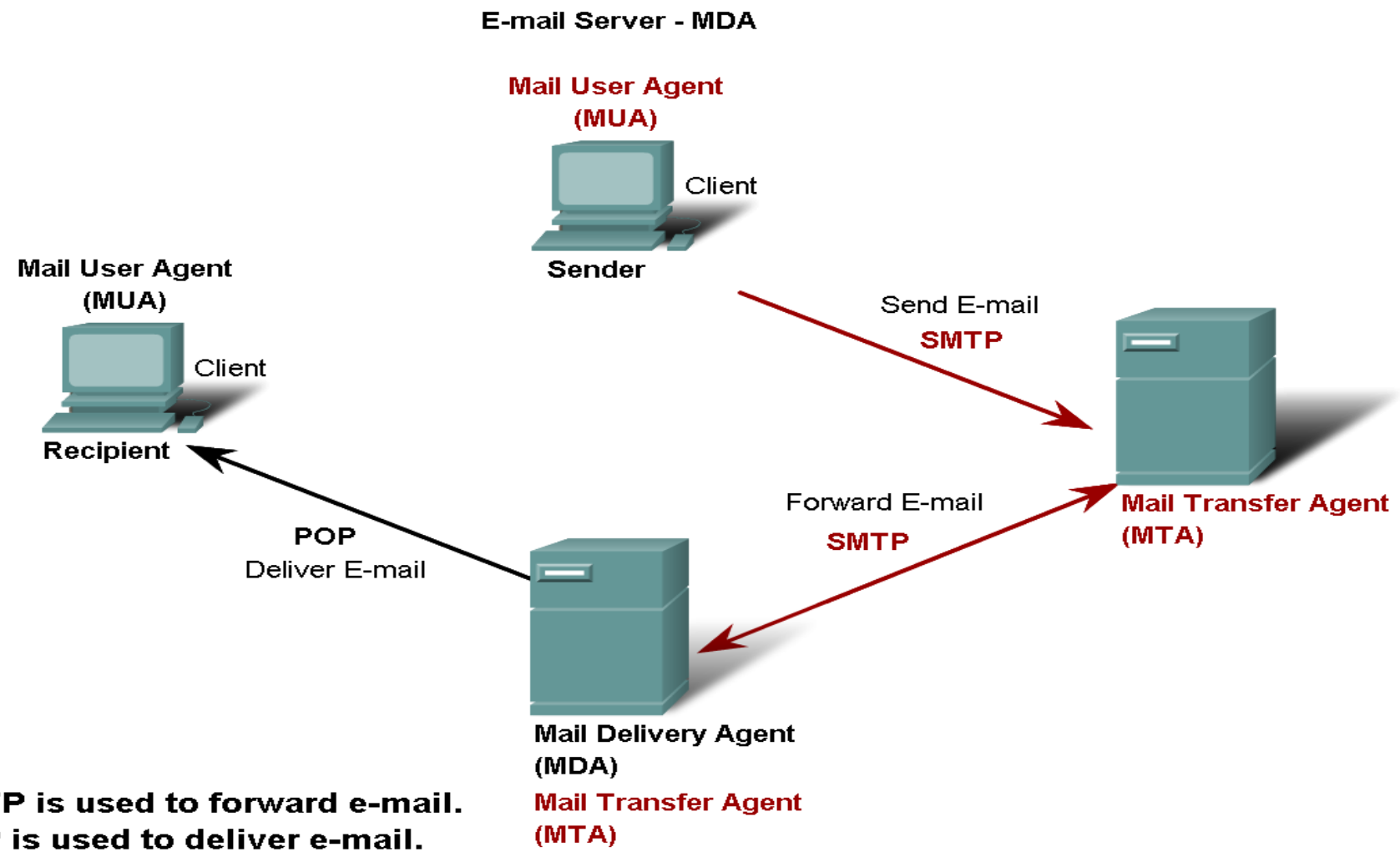


Post Office Protocol POP / Simple Mail Transfer Protocol SMTP



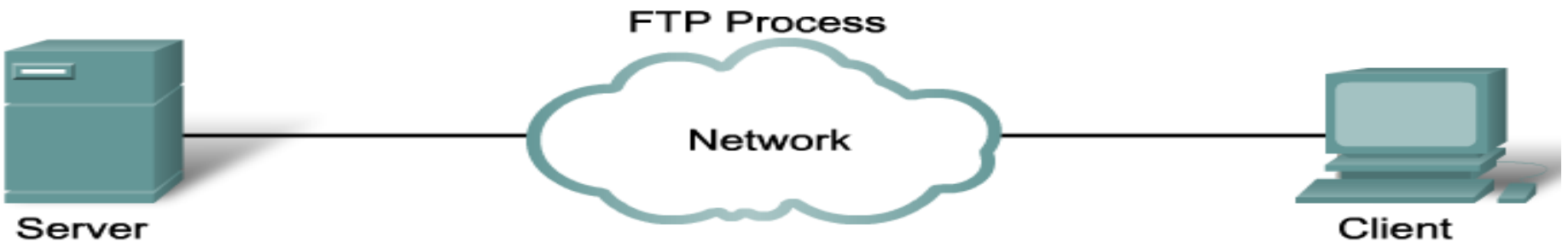
The Mail Delivery Agent process governs delivery of e-mail between servers and clients.

Post Office Protocol POP / Simple Mail Transfer Protocol SMTP



SMTP is used to forward e-mail.
POP is used to deliver e-mail.

File Transfer Protocol FTP



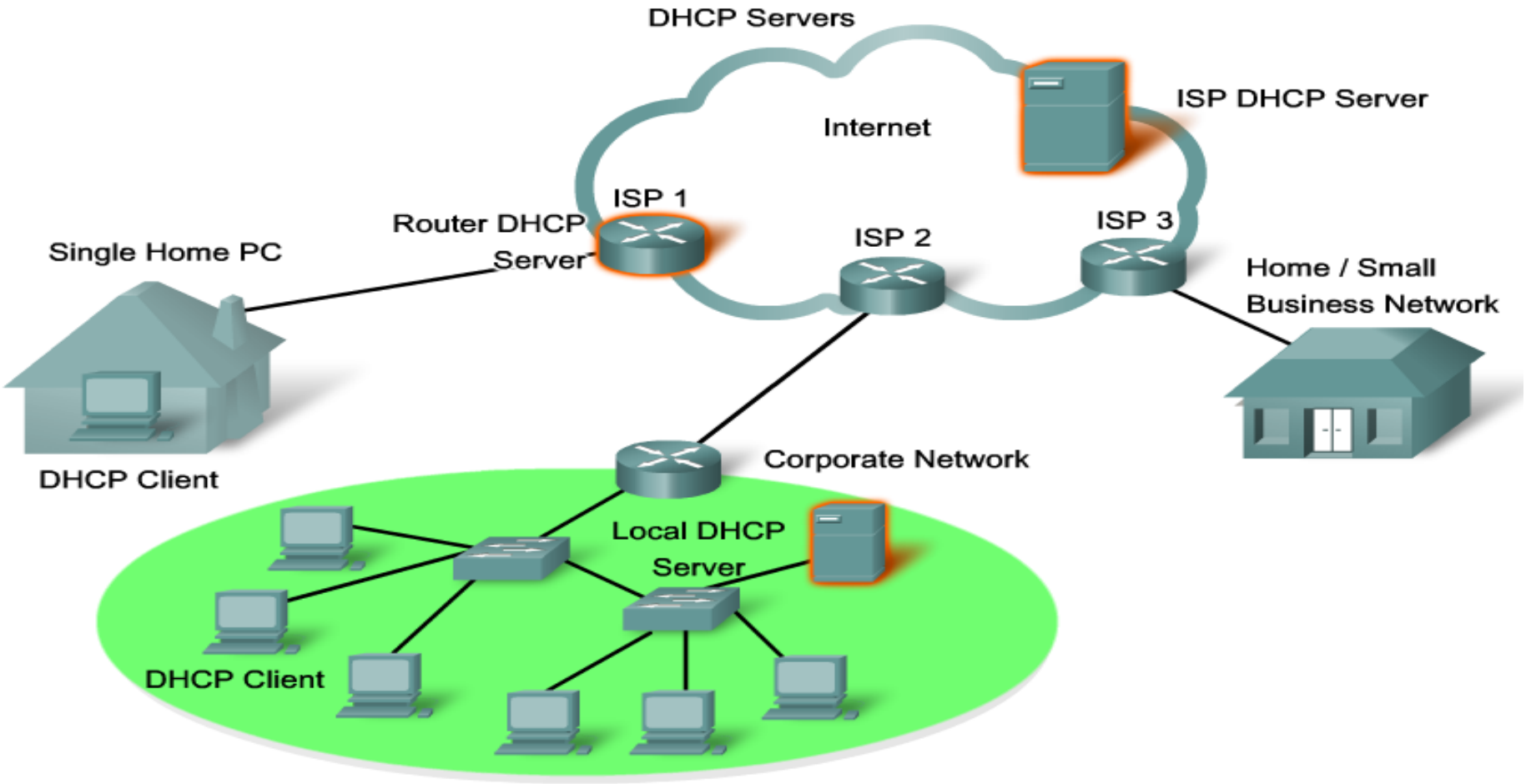
Control Connection:
Client opens first connection to the server for control traffic.

Data Connection:
Client opens second connection for data traffic.

Get Data

Based on command sent across control connection, data can be downloaded from server or uploaded from client.

Dynamic Host Configuration Protocol DHCP




CISCO