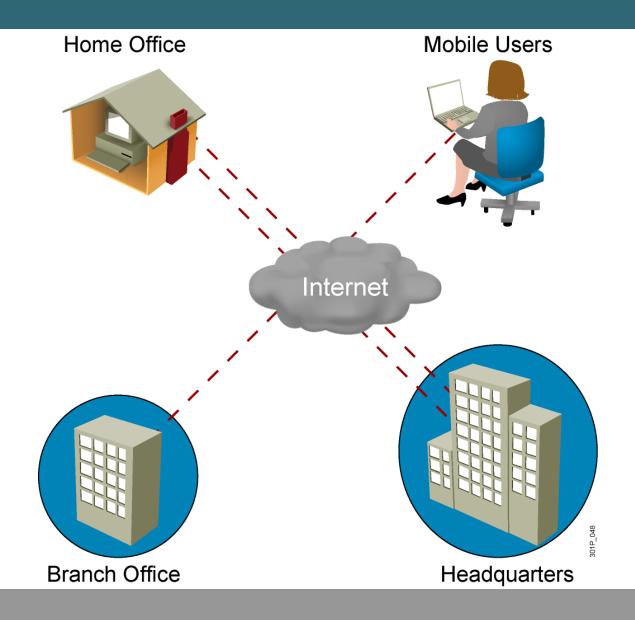
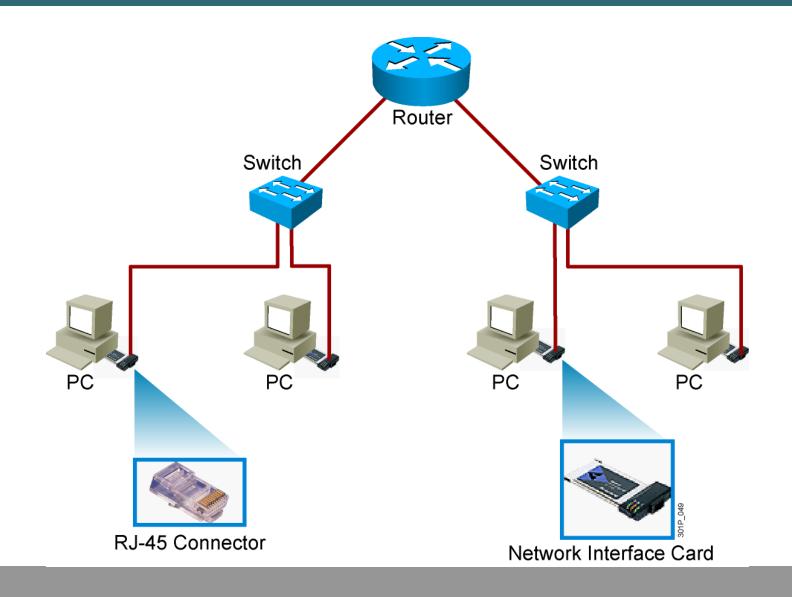


Network Basic

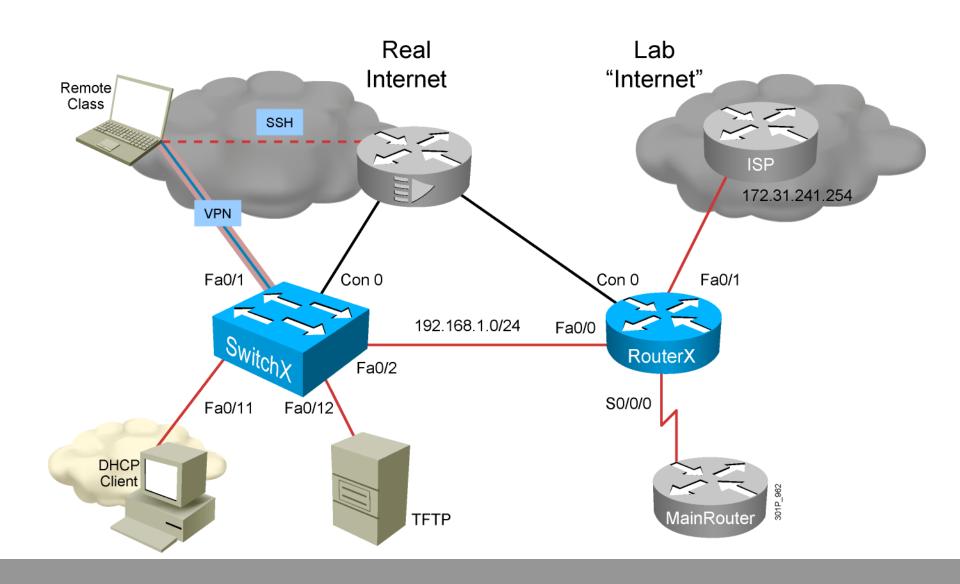
What Is a Network?



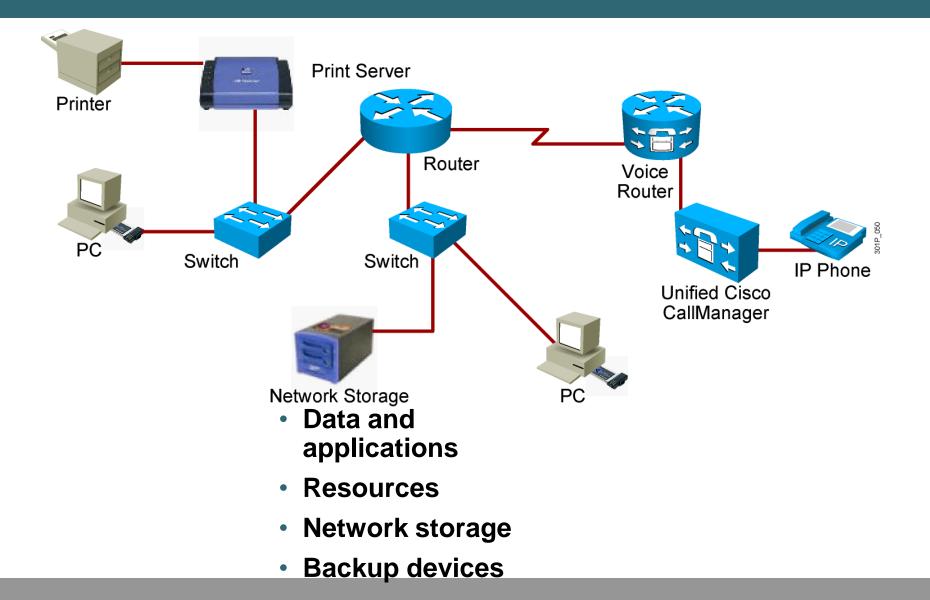
Common Physical Components of a Network



Interpreting a Network Diagram



Resource-Sharing Functions and Benefits



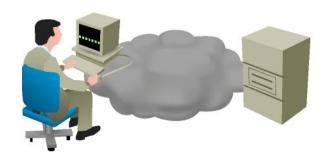
Network User Applications

- 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



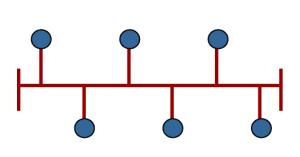




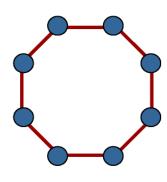
Characteristics of a Network

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

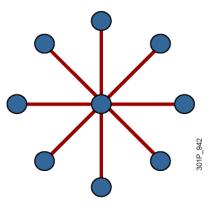
Physical Topology Categories



Bus Topology

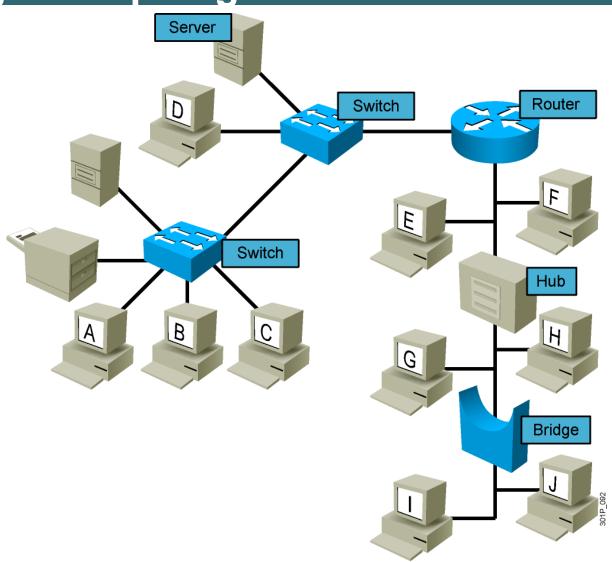


Ring Topology

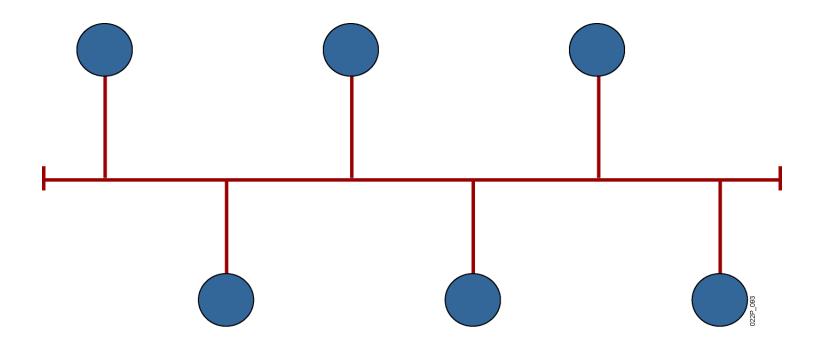


Star Topology

Logical Topologies

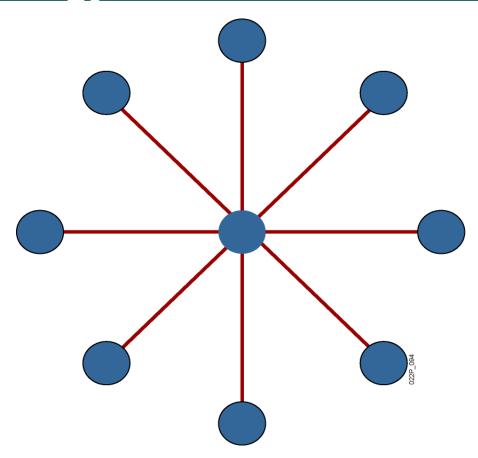


Bus Topology



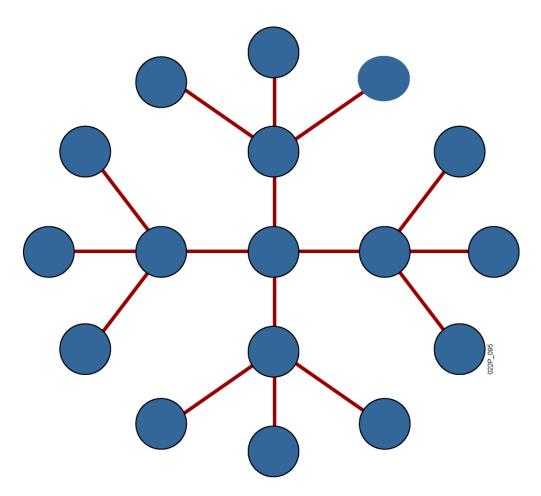
All devices receive the signal.

Star Topology



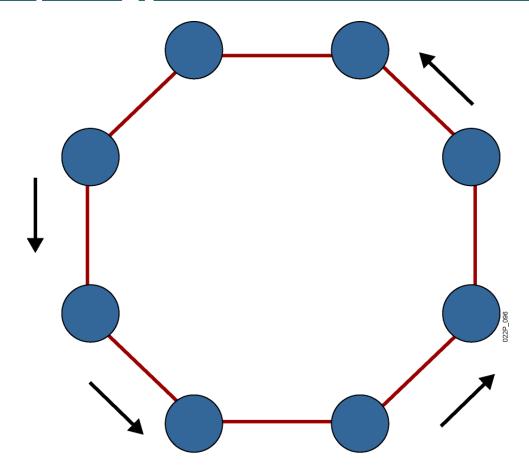
- Transmission through a central point.
- Single point of failure.

Extended-Star Topology



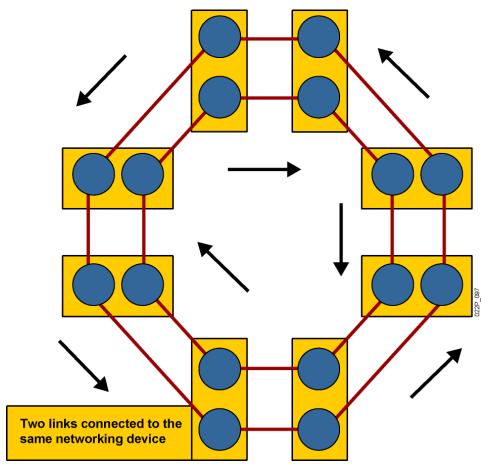
More resilient than star topology.

Ring Topology



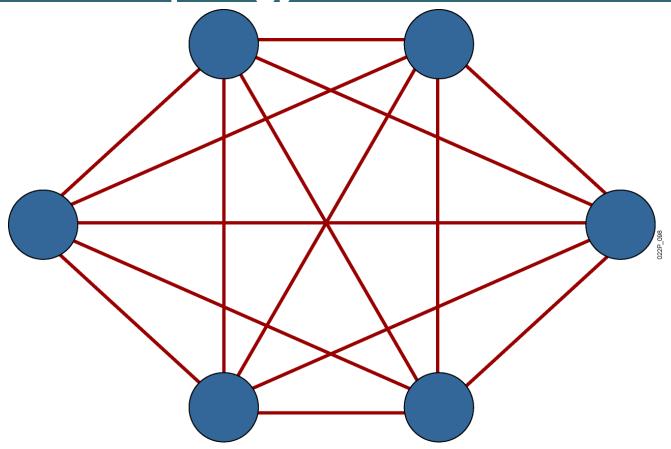
- Signals travel around ring.
- Single point of failure.

Dual-Ring Topology



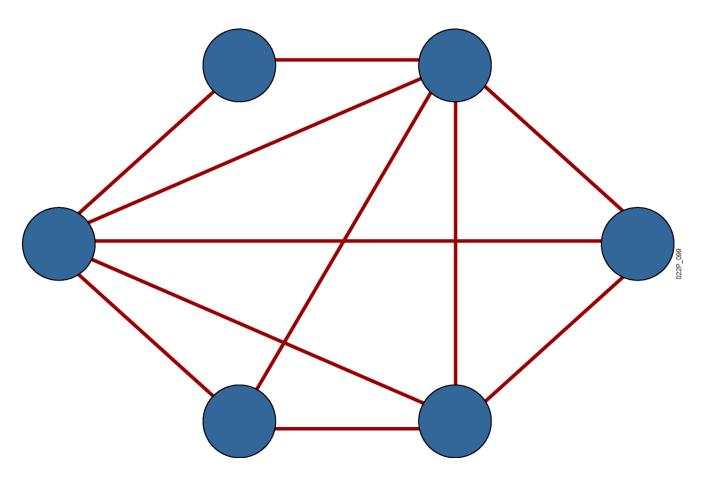
- Signals travel in opposite directions.
- More resilient than single ring.

Full-Mesh Topology



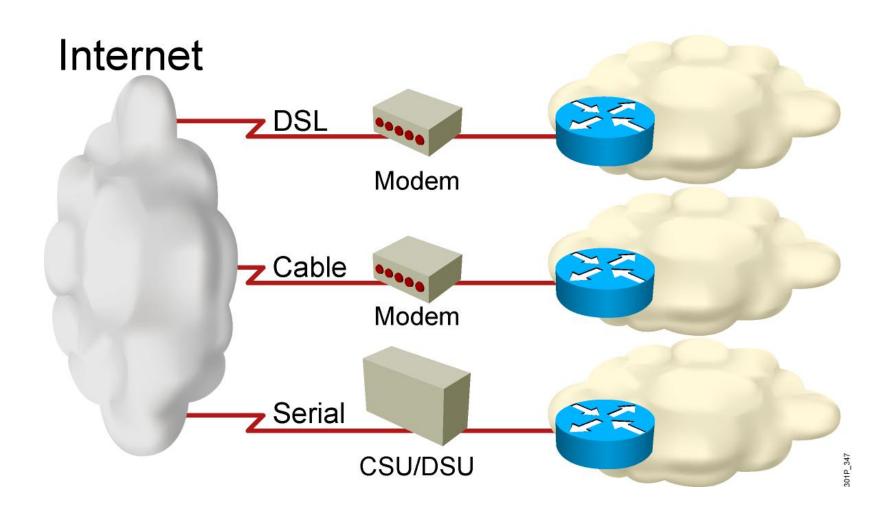
- Highly fault-tolerant
- Expensive to implement

Partial-Mesh Topology



Trade-off between fault tolerance and cost

Connection to the Internet





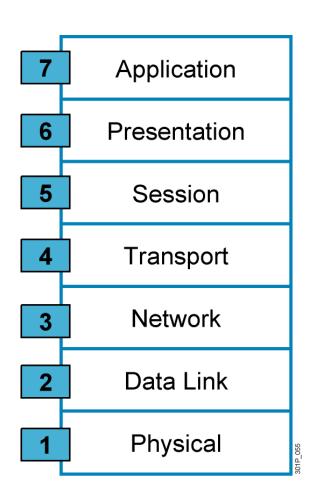
OSI Model TCP/IP

Understanding Host-to-Host Communications



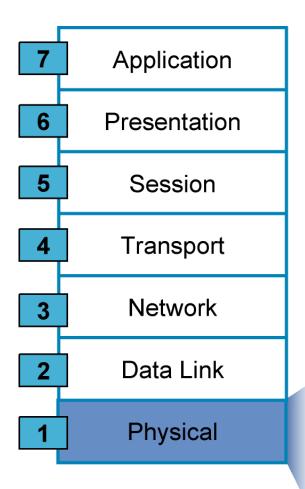
- Older model
 - Proprietary
 - Application and combinations software controlled by one vendor
- Standards-based model
 - Multivendor software
 - Layered approach

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



Network Process to Applications

Data Representation

Interhost Communication

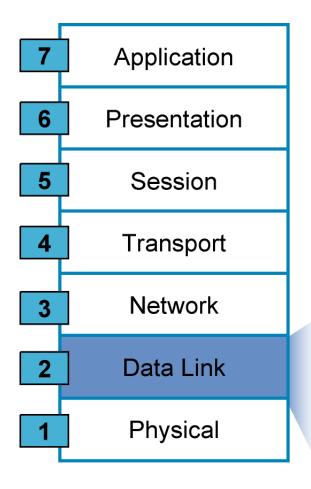
End-to-End Connections

Data Delivery

Access to Media

Binary Transmission

 Defines the electrical, mechanical, procedural, and functional specifications for activating, maintaining, and deactivating the physical link



Network Process to Applications

Data Representation

Interhost Communication

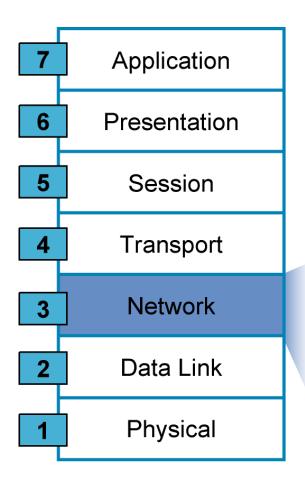
End-to-End Connections

Data Delivery

Access to Media

- Defines how data is formatted for transmission and how access to the network is controlled
- Provides error detection

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Network Process to Applications

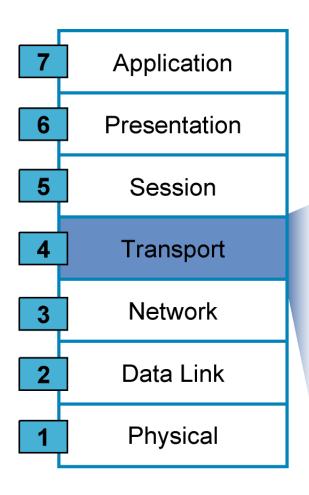
Data Representation

Interhost Communication

End-to-End Connections

Data Delivery

- Routes data packets
- Selects best path to deliver data
- Provides logical addressing and path selection



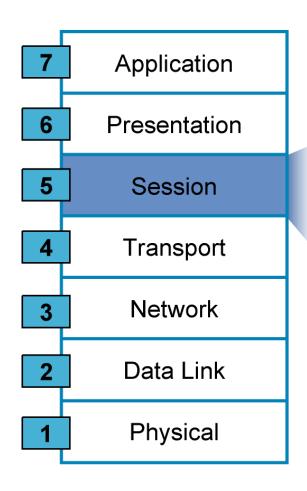
Network Process to Applications

Data Representation

Interhost Communication

End-to-End Connections

- Handles transportation issues between hosts
- Ensures data transport reliability
- Establishes, maintains, and terminates virtual circuits
- Provides reliability through fault detection and recovery information flow control

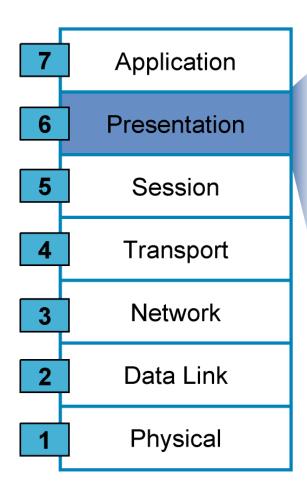


Network Process to Applications

Data Representation

Interhost Communication

 Establishes, manages, and terminates sessions between applications

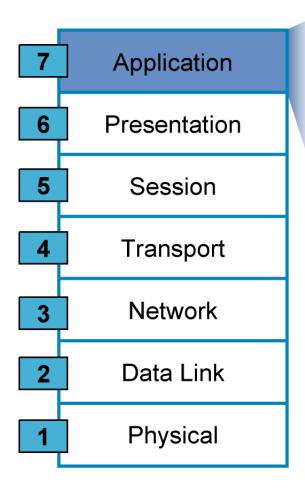


Network Process to Applications

Data Representation

- Ensures that data is readable by receiving system
- Formats data
- Structures data
- Negotiates data transfer syntax for application layer
- Provides encryption

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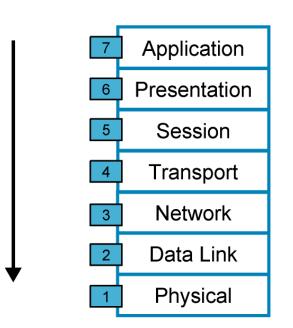
Network Processes to Applications

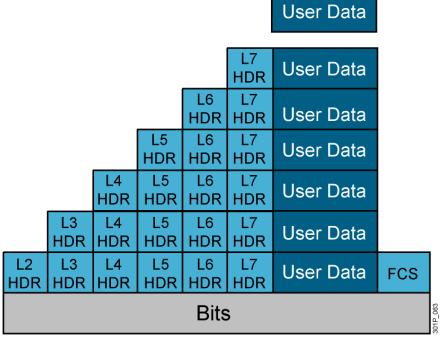
- Provides network services to application processes (such as electronic mail, file transfer, and terminal emulation)
- Provides user authentication

O D

Data Encapsulation





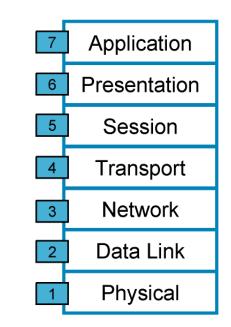


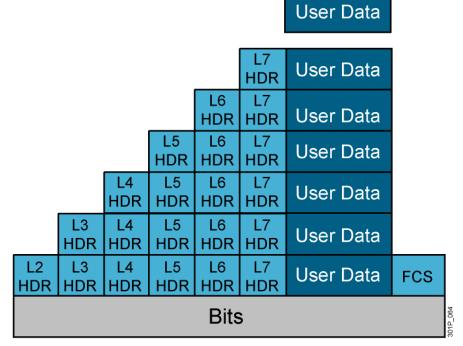
HDR = Header

Data De-Encapsulation

Receiver

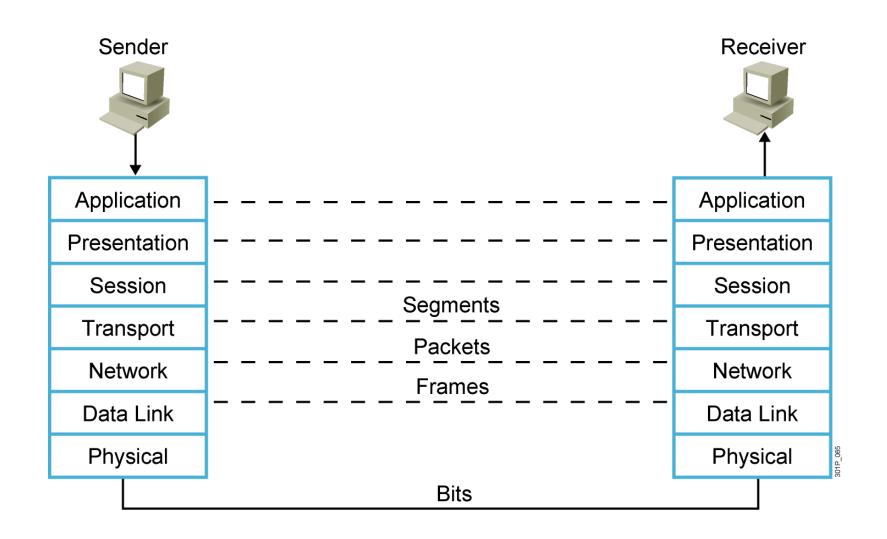




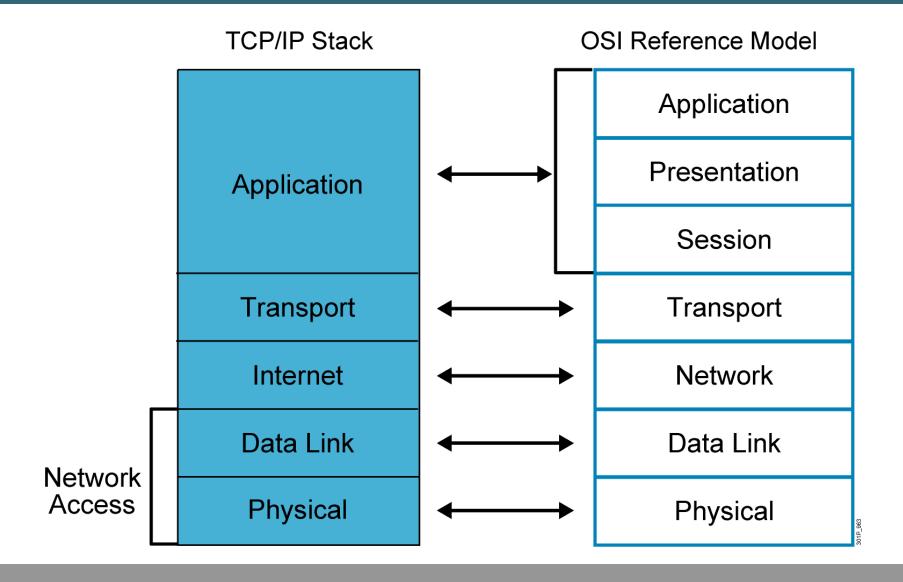


HDR = Header

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

Application

Transport

Internet

Network Access

904

Applications

Nodel TCP/IP Model

Domain Name Application System **Application** Presentation **Application** Layers **Hypertext Transfer Protocol** 5. Session Simple Mail 4. **Transport Transport Transfer Protocol** 3. **Network** Internet Post Office **Data Flow Protocol** Layers **Data Link** Network **Dynamic Host** Configuration Access **Physical Protocol**

TCP/IP Application Layer Overview

Application

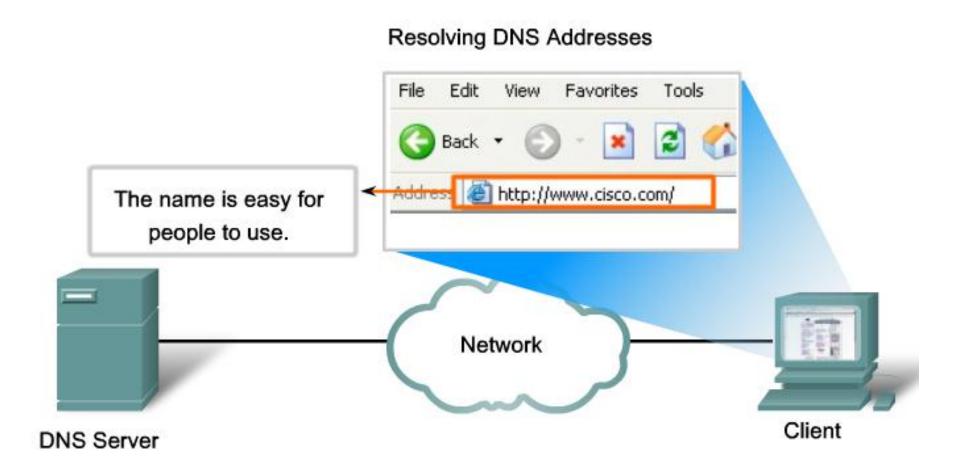
Transport

Internet

Network Access

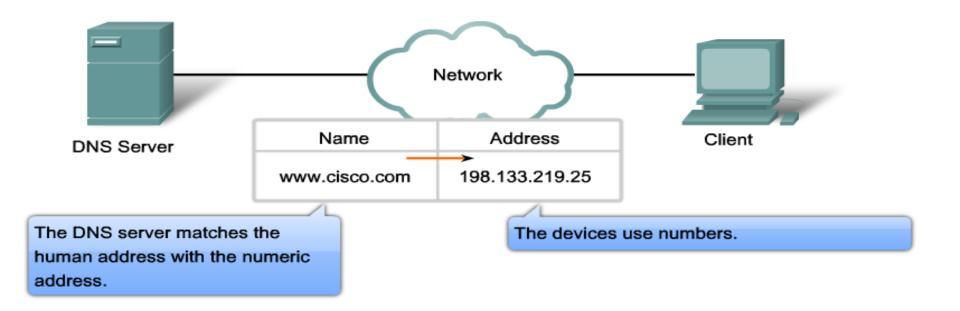
- File transfer
 - FTP
 - TFTP
 - Network File System
- E-mail
 - Simple Mail Transfer Protocol
- Remote login
 - Telnet
 - rlogin
- Network management
 - Simple Network Management Protocol
- Name management
 - Domain Name System

Domain Name Server DNS

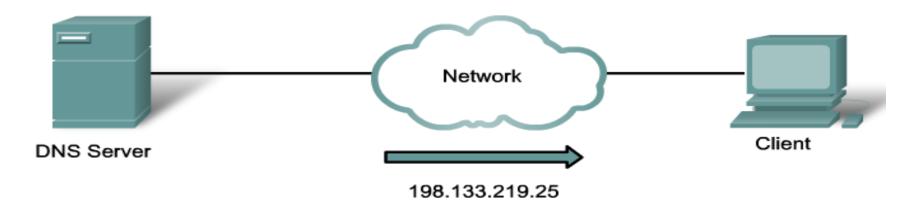


Resolving DNS Addresses Edit View Favorites Tools Address 🎒 http://www.cisco.com/ www.cisco.com Network Client **DNS Server**

Resolving DNS Addresses

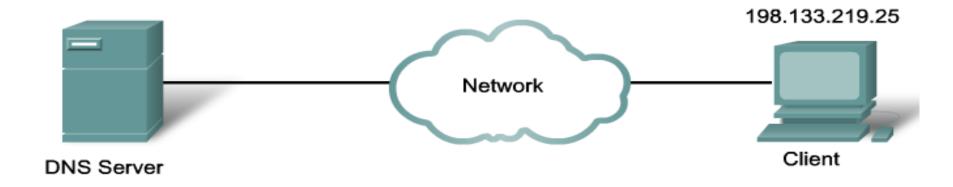


Resolving DNS Addresses



The number is returned back to the client for use in making requests of the server.

Resolving DNS Addresses

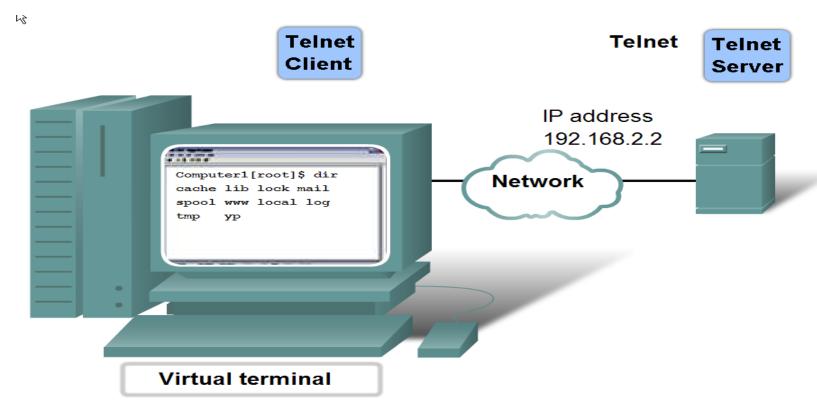


A human legible name is resolved to its numeric network device address by the DNS protocol.

Using nslookup

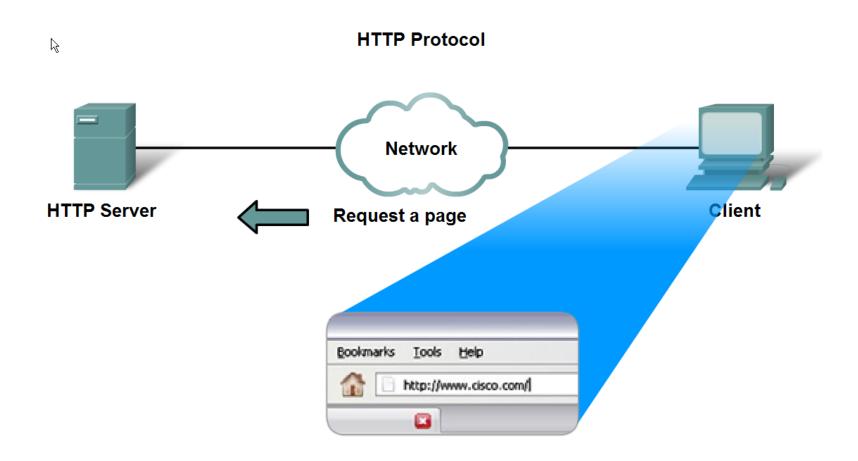
```
C:\WINDOWS\systen 22\cmd.exe - nslookup
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
C:\Documents and Settings\bradfjoh>cd..
C:\Documents and Settings>nslookup
Default Server: dns-sj.cisco.com
Address: 171.70.168.183
> www.cisco.com
Server: dns-sj.cisco.com
Address: 171.70.168.183
Name: www.cisco.com
Address: 198.133.219.25
> cisco.netacad.net
Server: dns-sj.cisco.com
Address: 171.70.168.183
Non-authoritative answer:
        cisco.netacad.net
Name:
Address: 128,107,229,50
```

Telecommunication Network Telnet

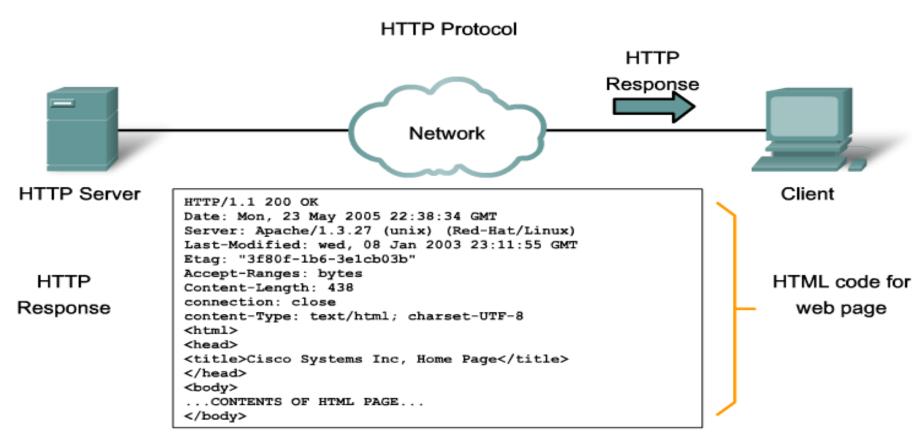


Telnet provides a way to use a computer, connected via the network, to access a network device as if the keyboard and monitor were directly connected to the device.

HyperText Transfere Protocol HTTP

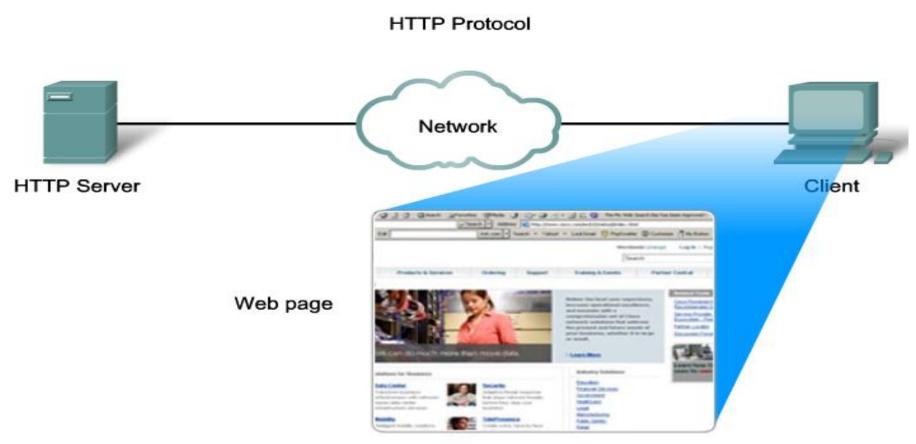


HyperText Transfere Protocol HTTP



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

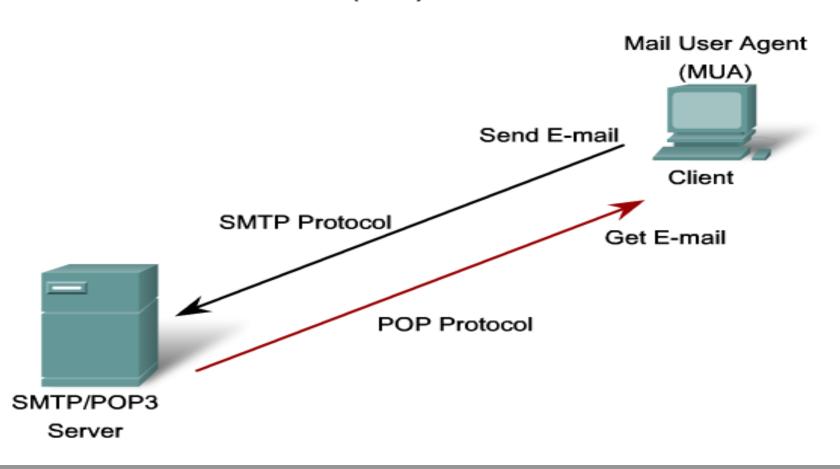
HyperText Transfere Protocol HTTP



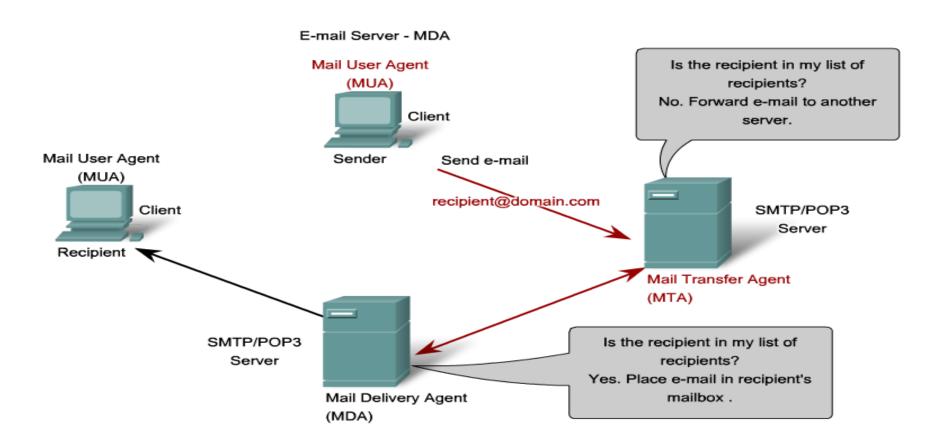
The browser interprets the HTML code and displays a web page.

Post Office Protocol POP / Simple Mail Transfer Protocol SMTP

E-mail Client (MUA)

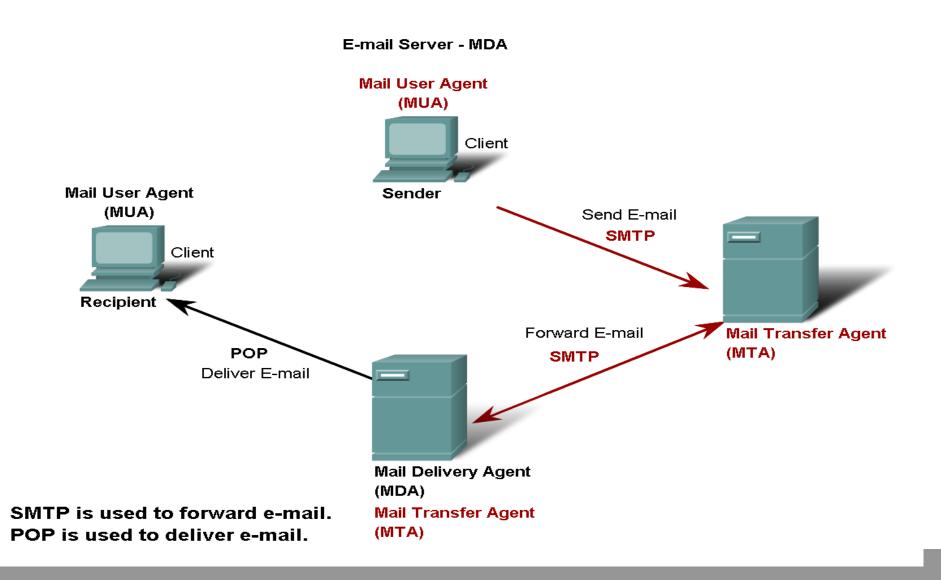


Post Office Protocol POP / Simple Mail Transfer Protocol SMTP

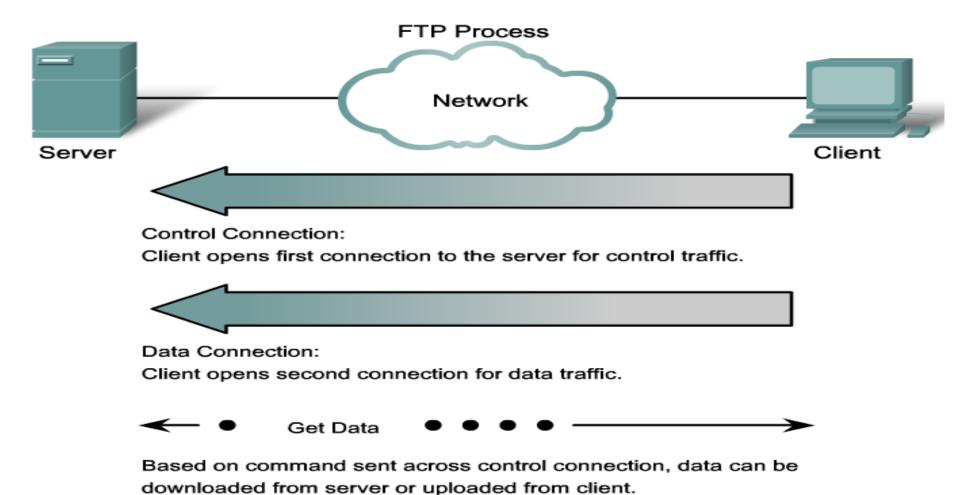


The Mail Delivery Agent process governs delivery of e-mail between servers and clients.

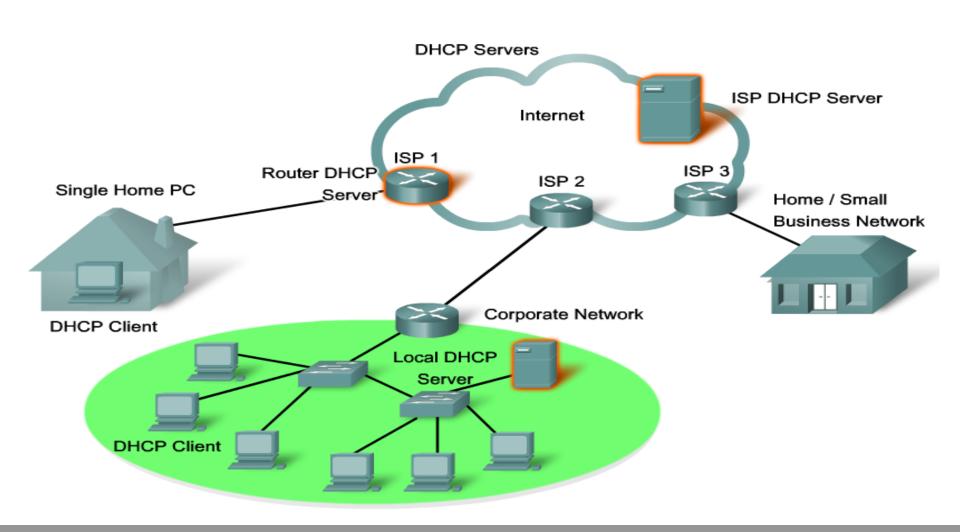
Post Office Protocol POP / Simple Mail Transfer Protocol SMTP



File Transfer Protocol FTP



Dynamic Host Configuration Protocol DHCP



#