Application Layer Functionality and Protocols

Network Fundamentals – Chapter 3

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Objectives

- Define the application layer as the source and destination of data for communication across networks.

- Explain the role of protocols in supporting communication between server and client processes.

- Describe the features, operation, and use of well-known TCP/IP application layer services (HTTP, DNS, SMTP).
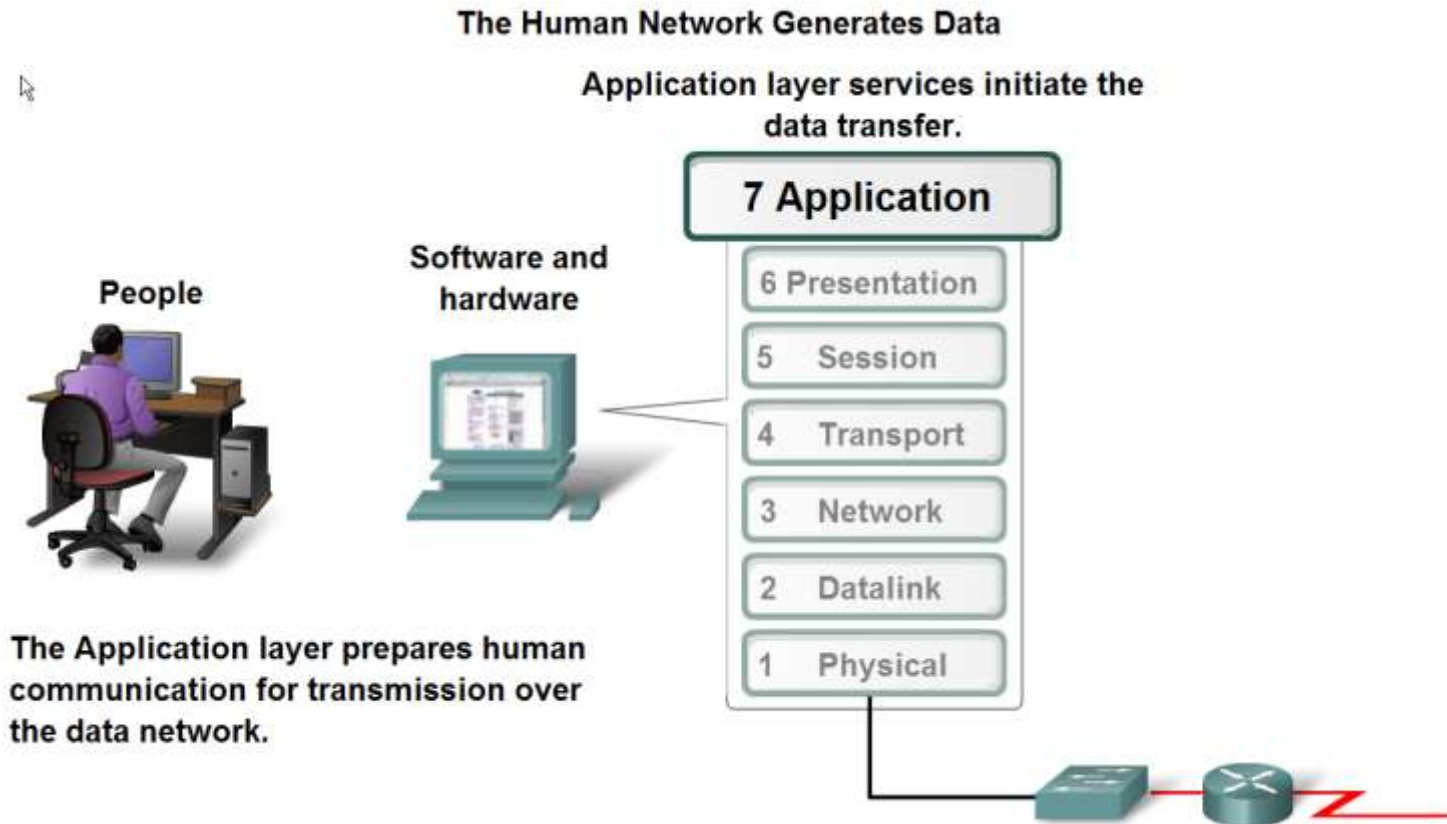
Applications – The Interface Between Human and Data Networks

- Explain that applications provide the means for generating and receiving data that can be transported on the network

Interfacing Human and Data Networks

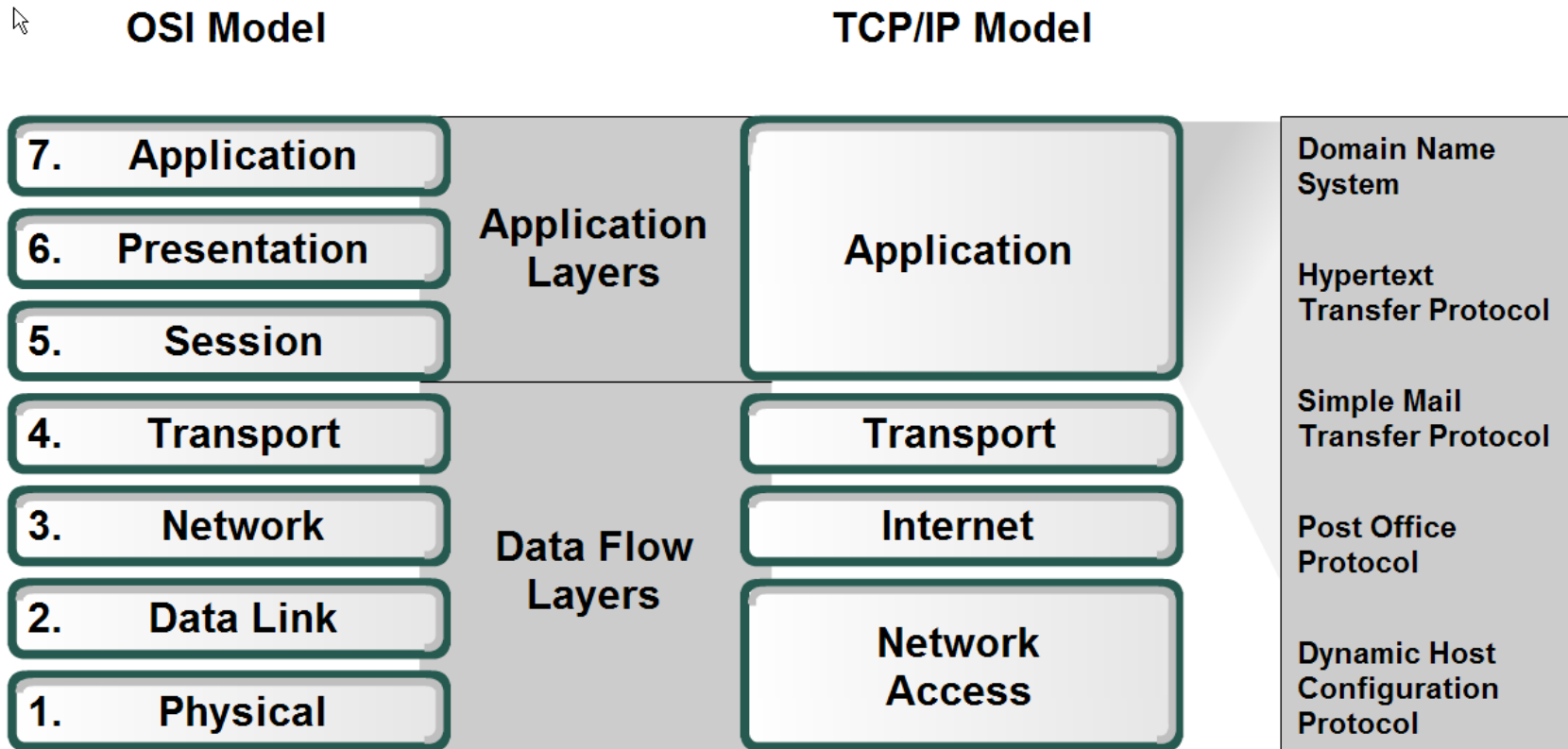The Application layer provides the interface to the network.
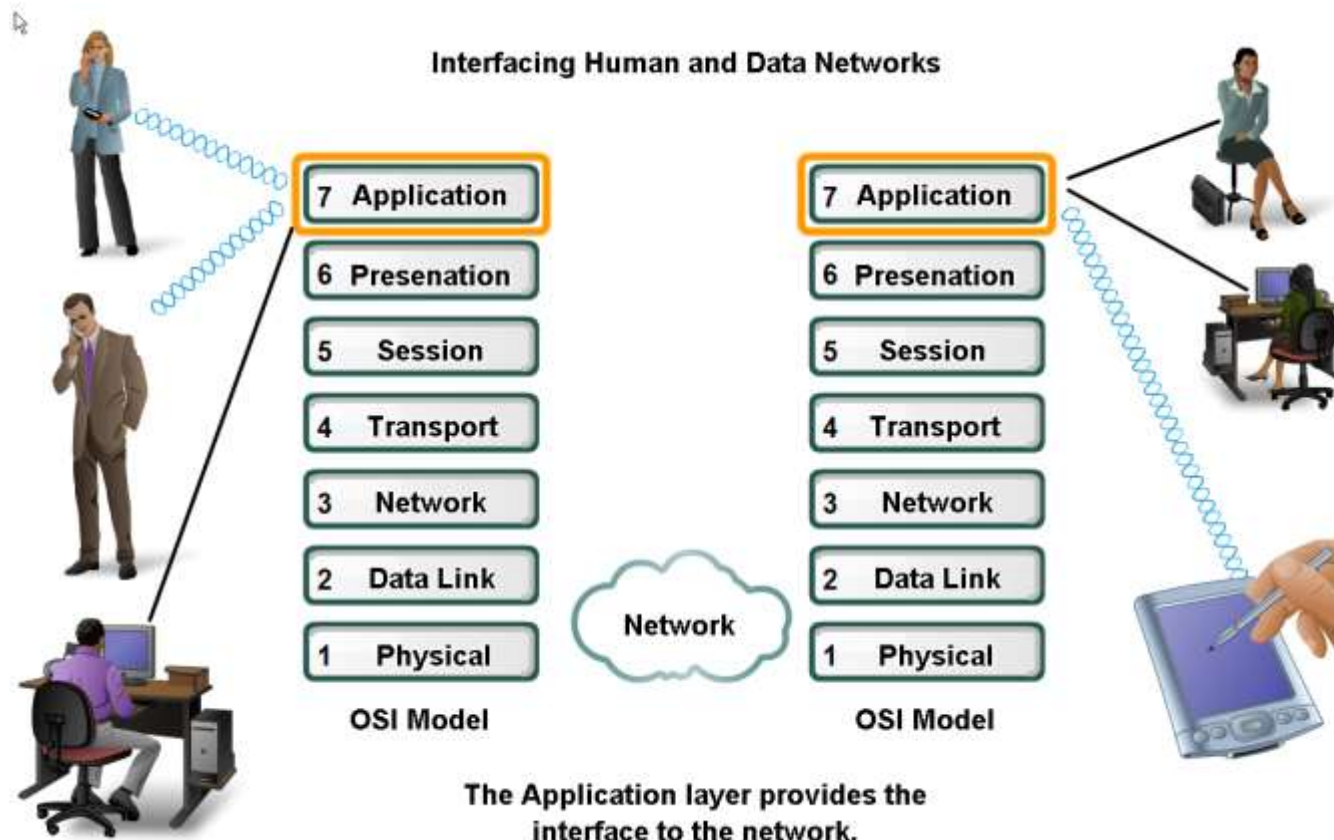
Applications – The Interface Between Human and Data Networks

- Explain the role of applications, services and protocols in converting communication to data that can be transferred across the data network

The Human Network Generates Data

Application layer services initiate the data transfer.

People

Software and hardware

The Application layer prepares human communication for transmission over the data network.

7 Application

6 Presentation

5 Session

4 Transport
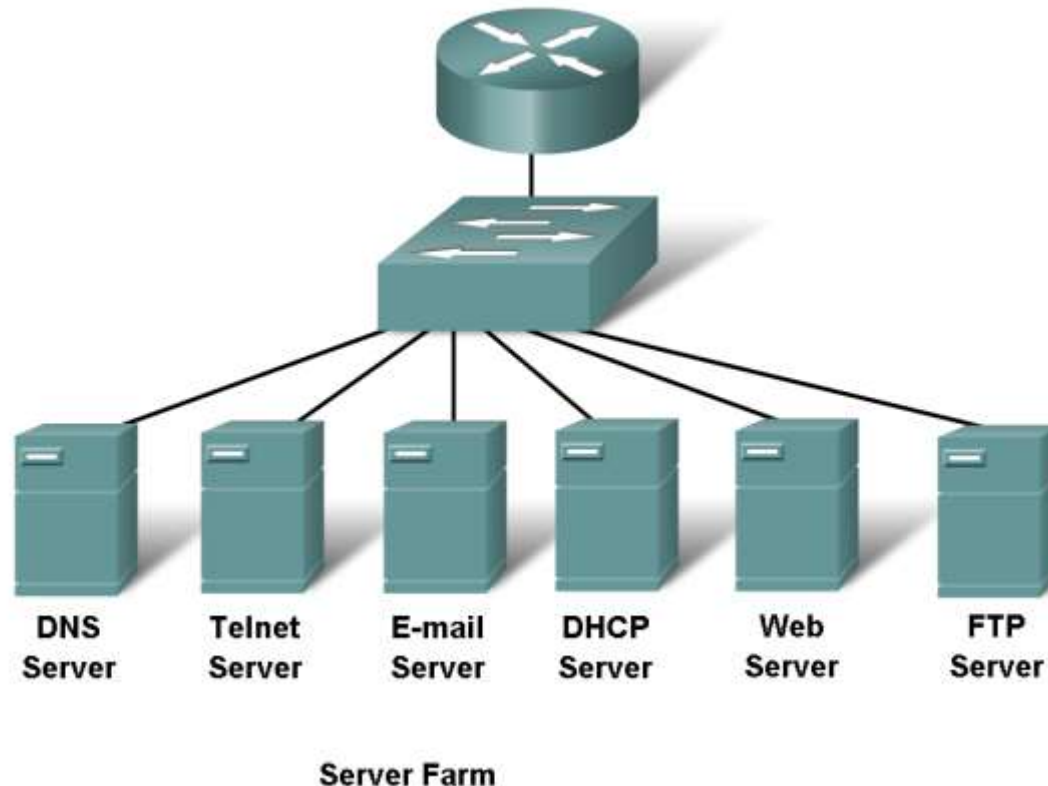
3 Network

2 Datalink

1 Physical

Applications – The Interface Between Human and Data Networks

- Define the separate roles applications, services and protocols play in transporting data through networks

OSI Model

7.	Application
6.	Presentation
5.	Session
4.	Transport
3.	Network
2.	Data Link
1.	Physical

Application Layers

Data Flow Layers

TCP/IP Model

| Application |
| Transport |
| Internet |
| Network Access |

Domain Name System

Hypertext Transfer Protocol

Simple Mail Transfer Protocol

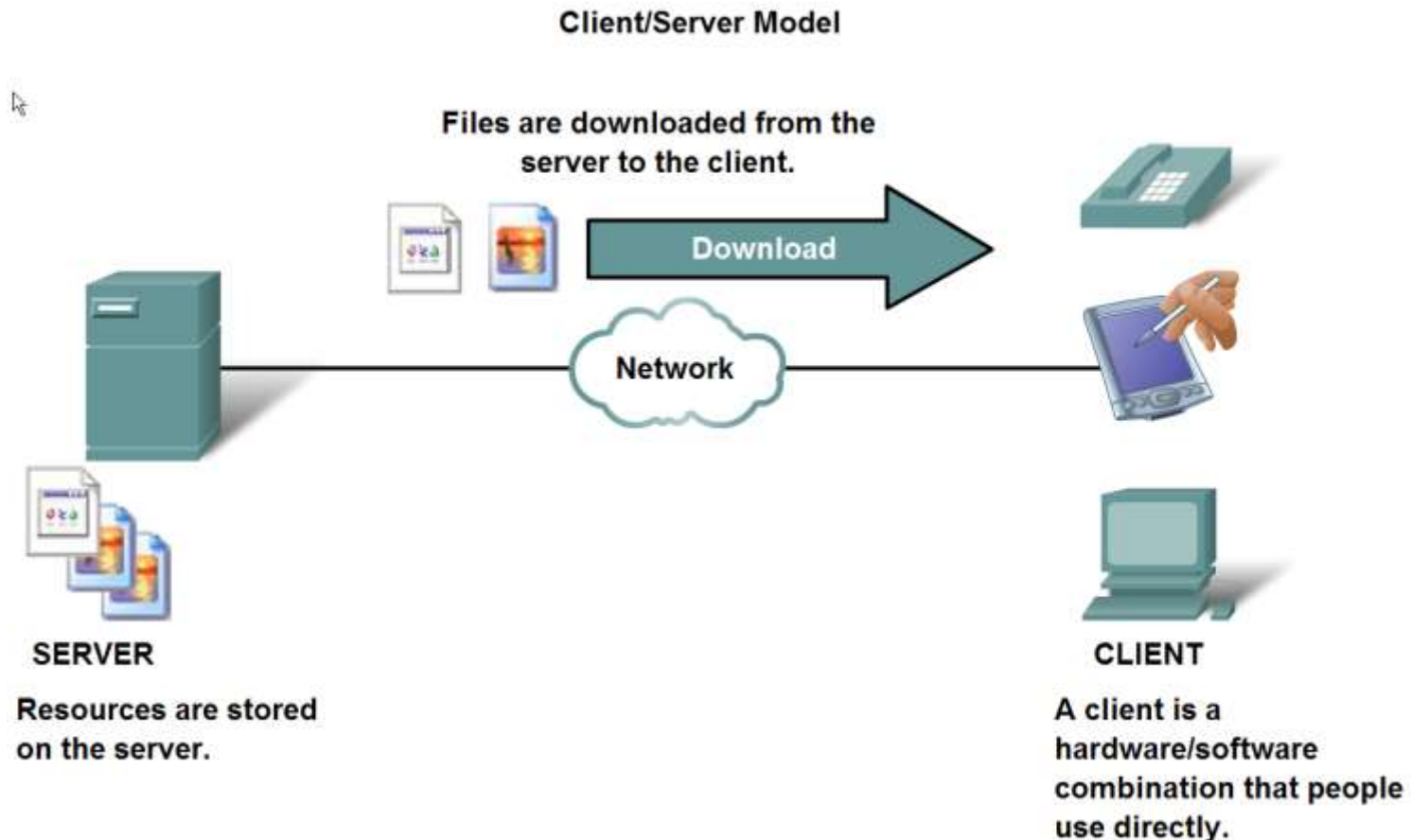Post Office Protocol

Dynamic Host Configuration Protocol

Applications – The Interface Between Human and Data Networks

- Describe the role protocols play in networking and be able to identify several message properties that can be defined by a protocol

Server Farm
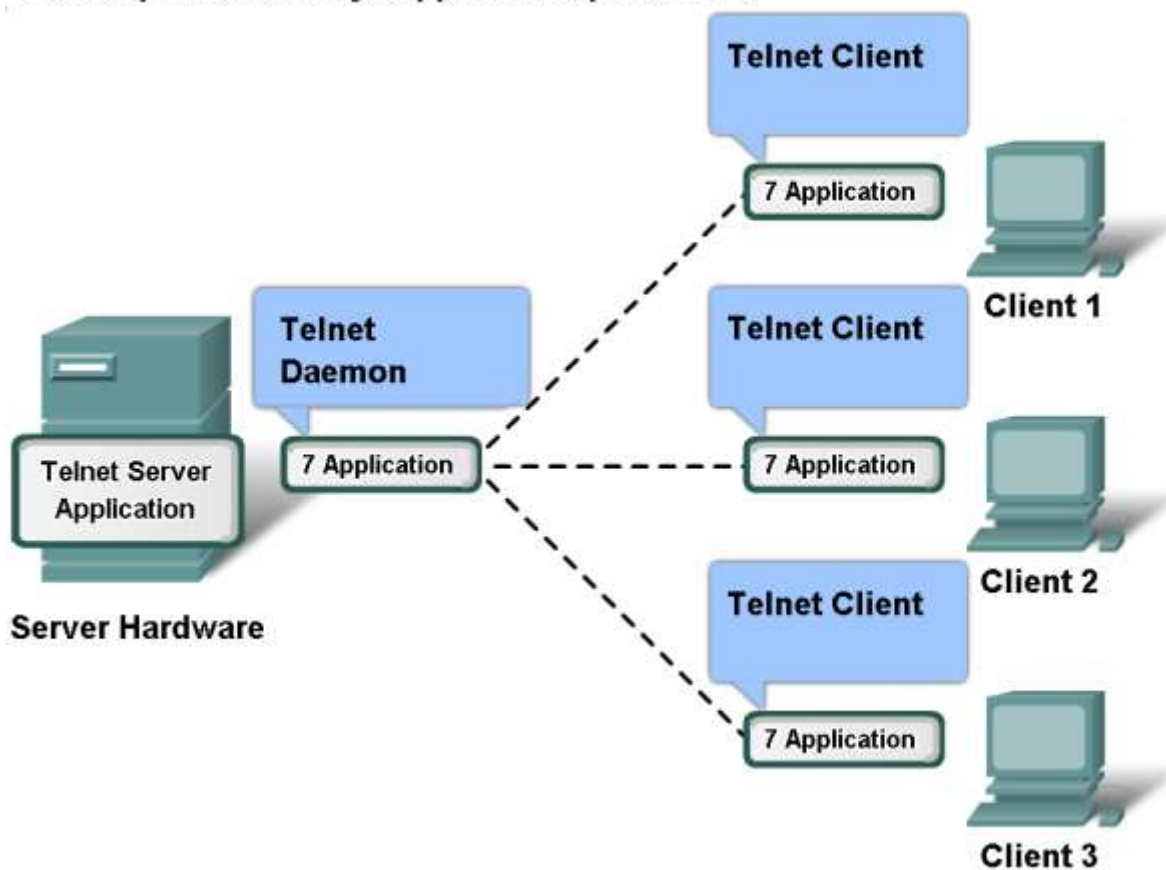
The Role of Protocols in Supporting Communication

- Describe the roles of client and server processes in data networks

Client/Server Model

Files are downloaded from the server to the client.

Download

Network

SERVER
Resources are stored on the server.

CLIENT
A client is a hardware/software combination that people use directly.

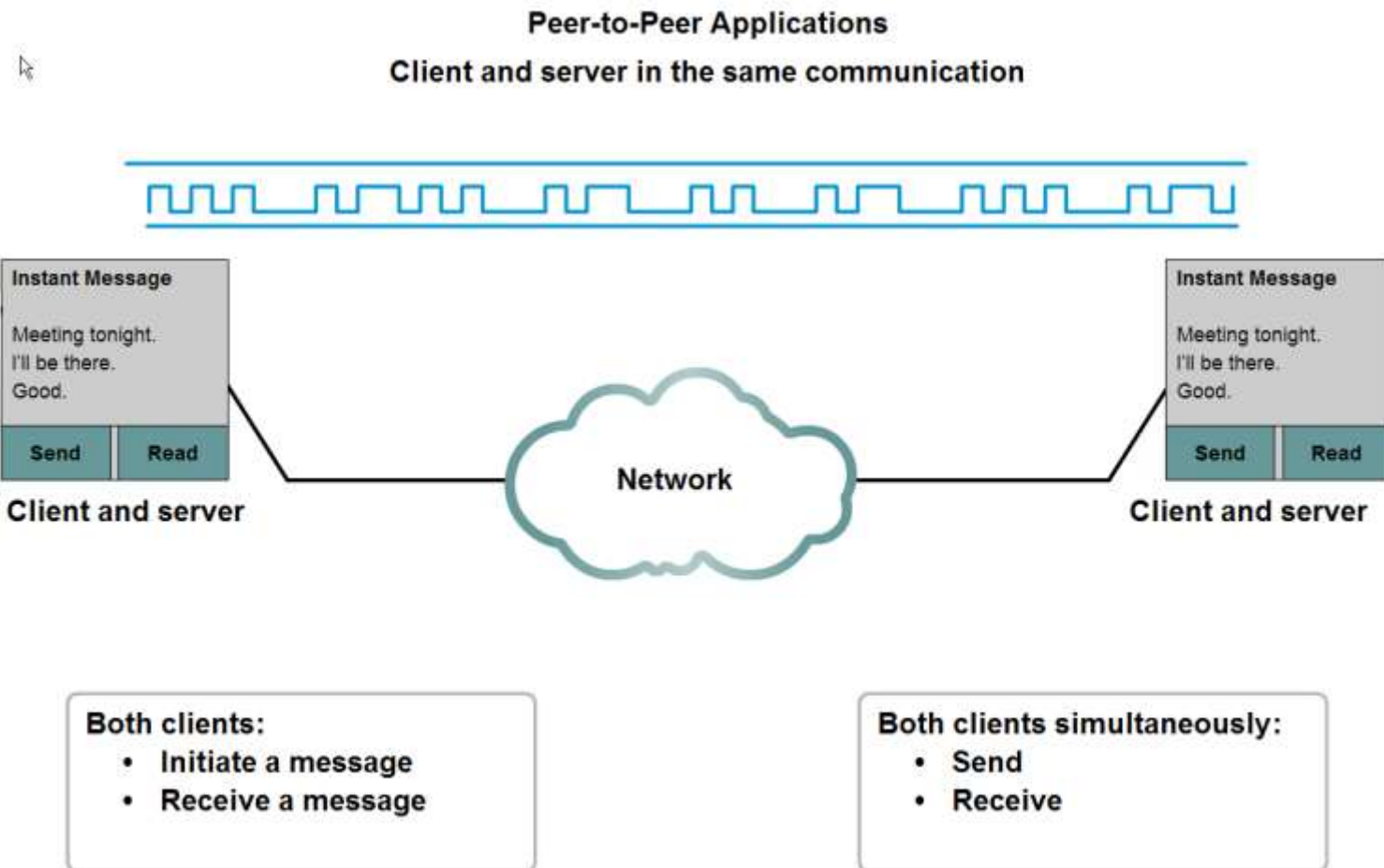# The Role of Protocols in Supporting Communication

- List common Application Layers services and protocols

Server processes may support multiple clients.
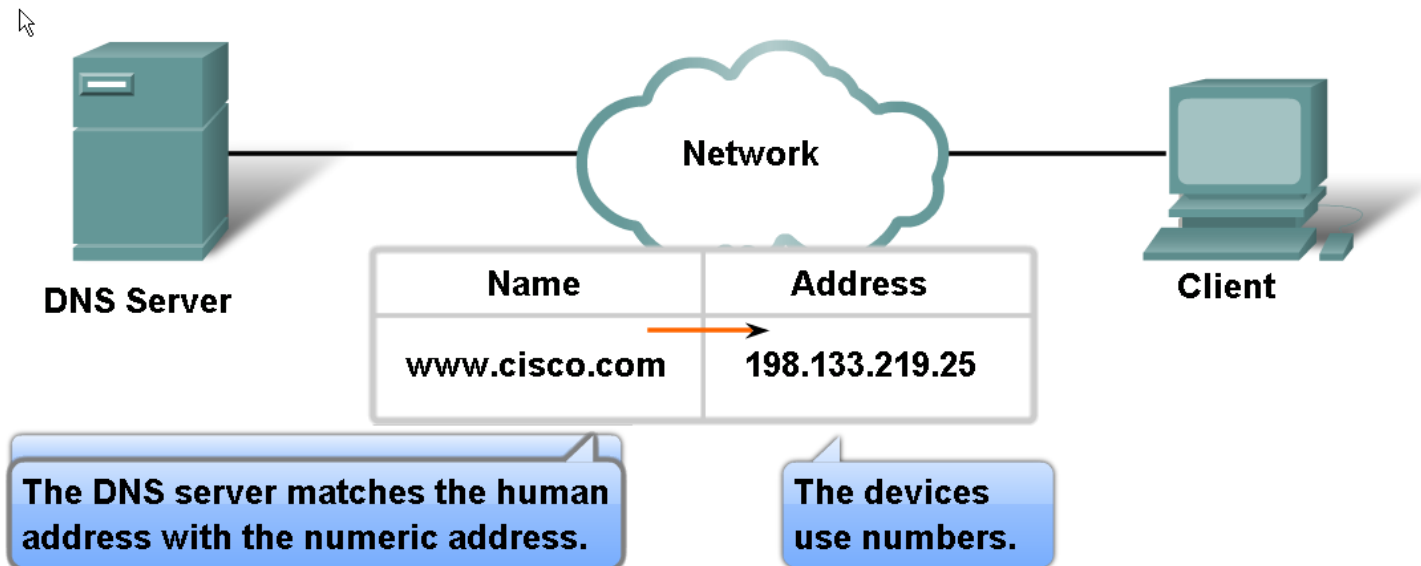
The Role of Protocols in Supporting Communication

- Compare and contrast client server networking with peer-to-peer networking and peer-to-peer applications

Peer-to-Peer Applications

Client and server in the same communication

Instant Message
Meeting tonight.
I'll be there.
Good.
Send | Read
Client and server

Network

Instant Message
Meeting tonight.
I'll be there.
Good.
Send | Read
Client and server

Both clients:
- Initiate a message
- Receive a message

Both clients simultaneously:
- Send
- Receive

Features, Operation, and Use of TCP/IP Application Layer Services

- Describe the features of the DNS protocol and how this protocol supports DNS services

Resolving DNS Addresses

Name	Address
www.cisco.com	198.133.219.25

DNS Server

Client

The DNS server matches the human address with the numeric address.
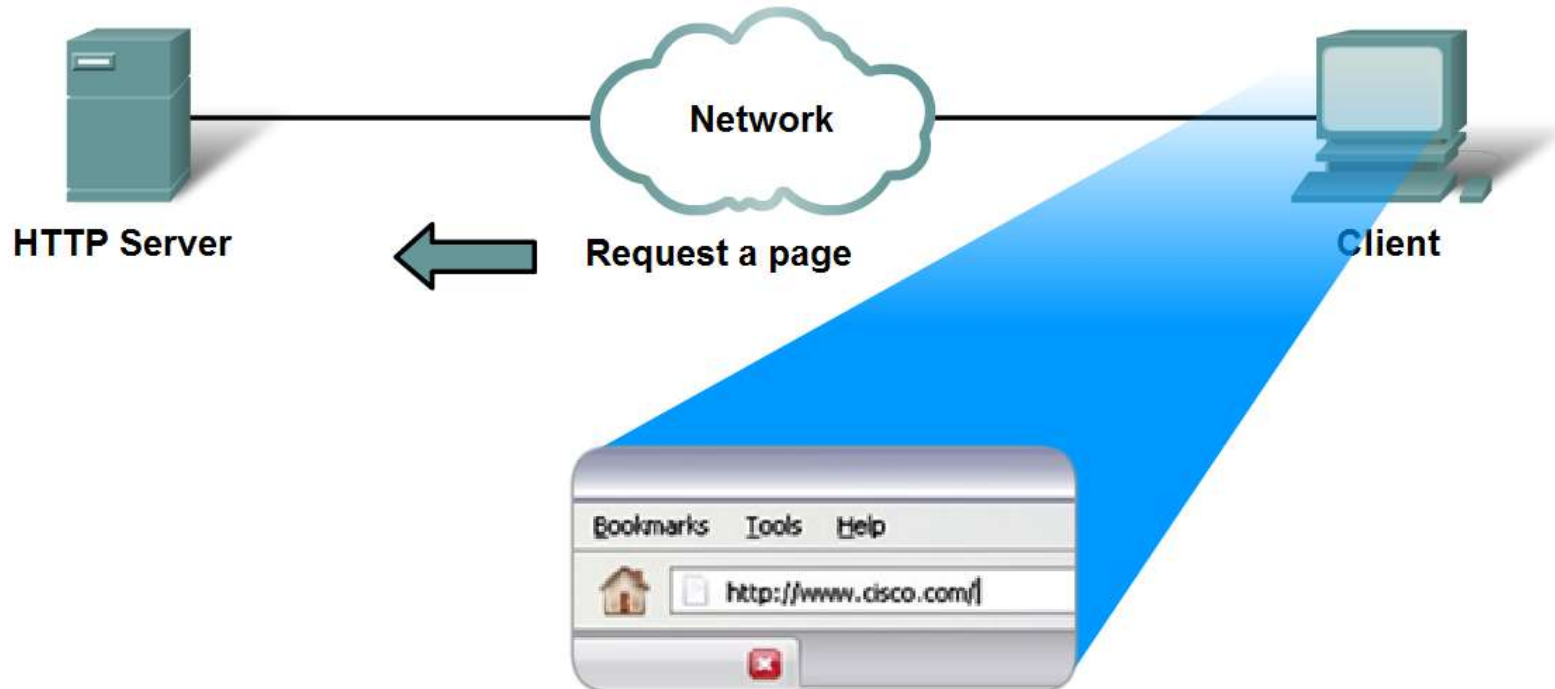
The devices use numbers.

Features, Operation, and Use of TCP/IP Application Layer Services

- Describe the features of the HTTP protocol and how this protocol supports the delivery of web pages to the client
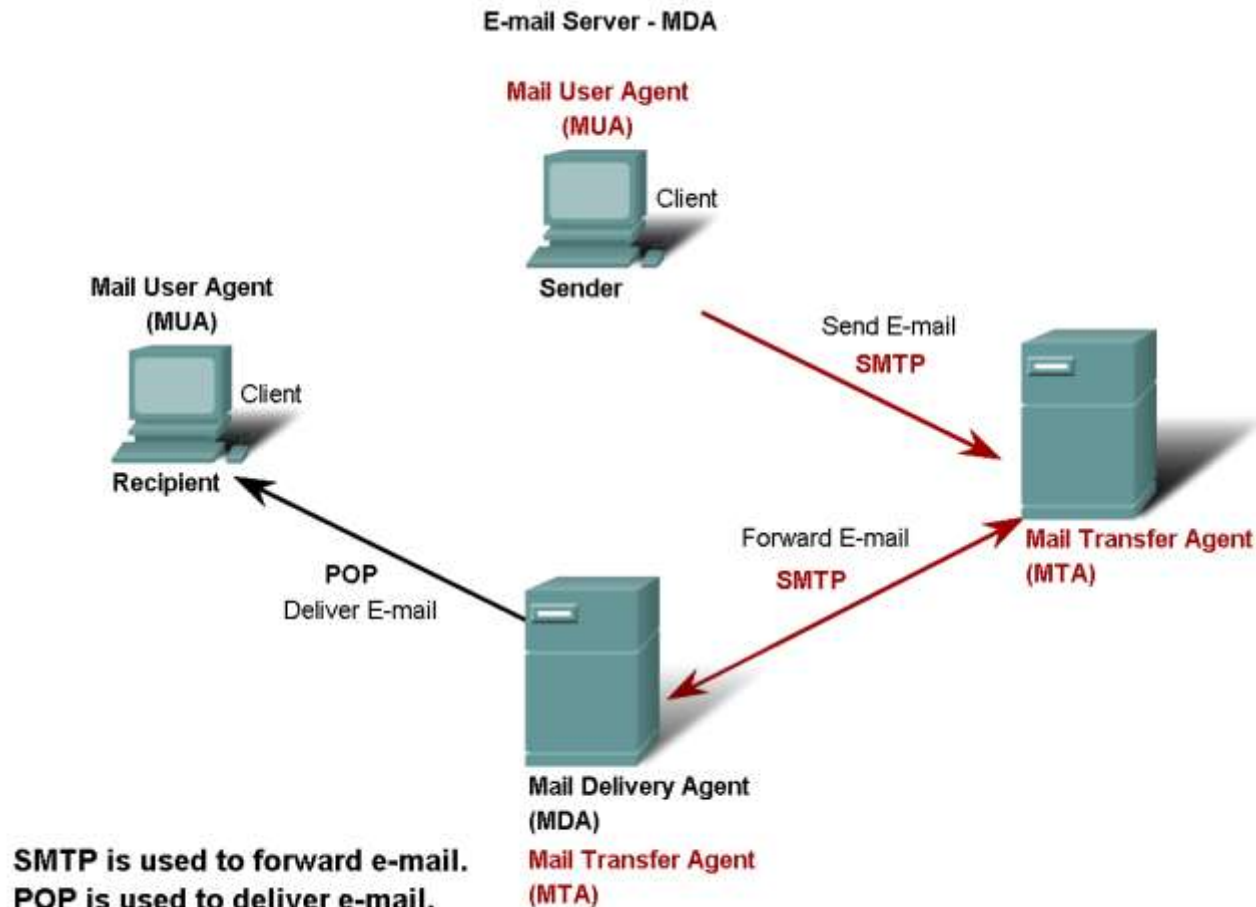
HTTP Protocol

HTTP Server — Network — Request a page — Client
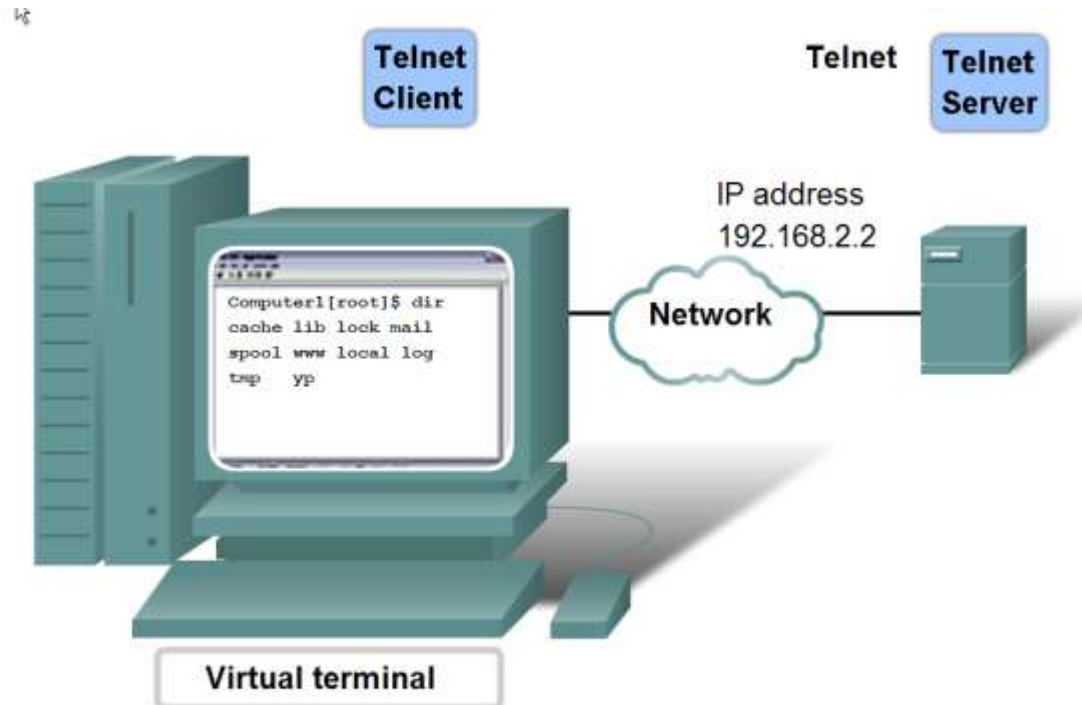
http://www.cisco.com/

Features, Operation, and Use of TCP/IP Application Layer Services

- Describe the features of the POP and SMTP protocols, and how these protocols support e-mail services

E-mail Server - MDA

Mail User Agent (MUA)
Client
Sender

Mail User Agent (MUA)
Client
Recipient

Send E-mail
SMTP

Forward E-mail
SMTP

Mail Transfer Agent (MTA)

POP
Deliver E-mail

Mail Delivery Agent (MDA)
Mail Transfer Agent (MTA)

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

Features, Operation, and Use of TCP/IP Application Layer Services

- Describe the features of the Telnet protocol and identify several of its uses in examining and managing networks


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.

Features, Operation, and Use of TCP/IP Application Layer Services

- Describe the features of the SMB protocol and the role it plays in supporting file sharing in Microsoft-based networks
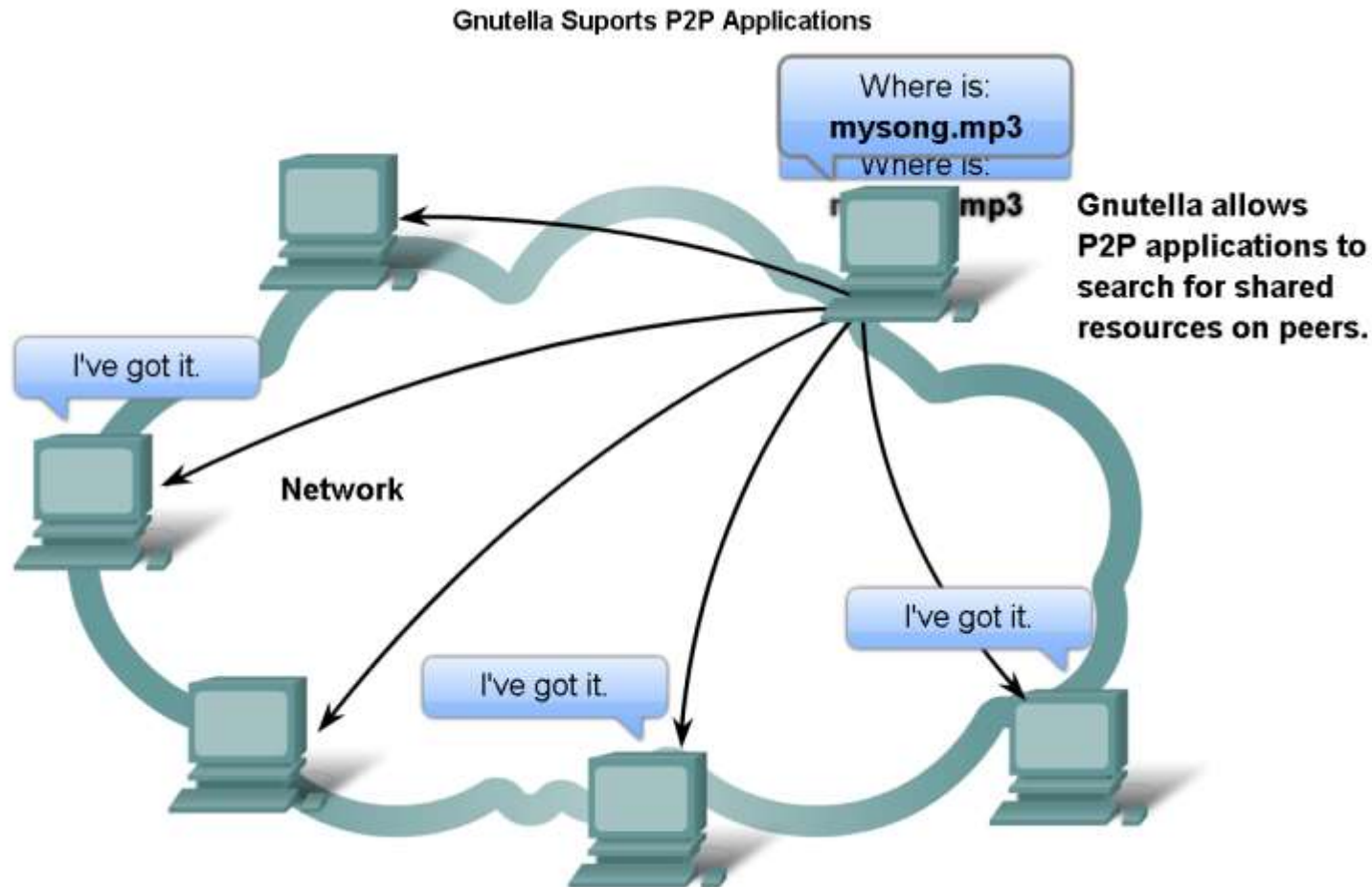
File Sharing Using the SMB Protocol

Shared Resources
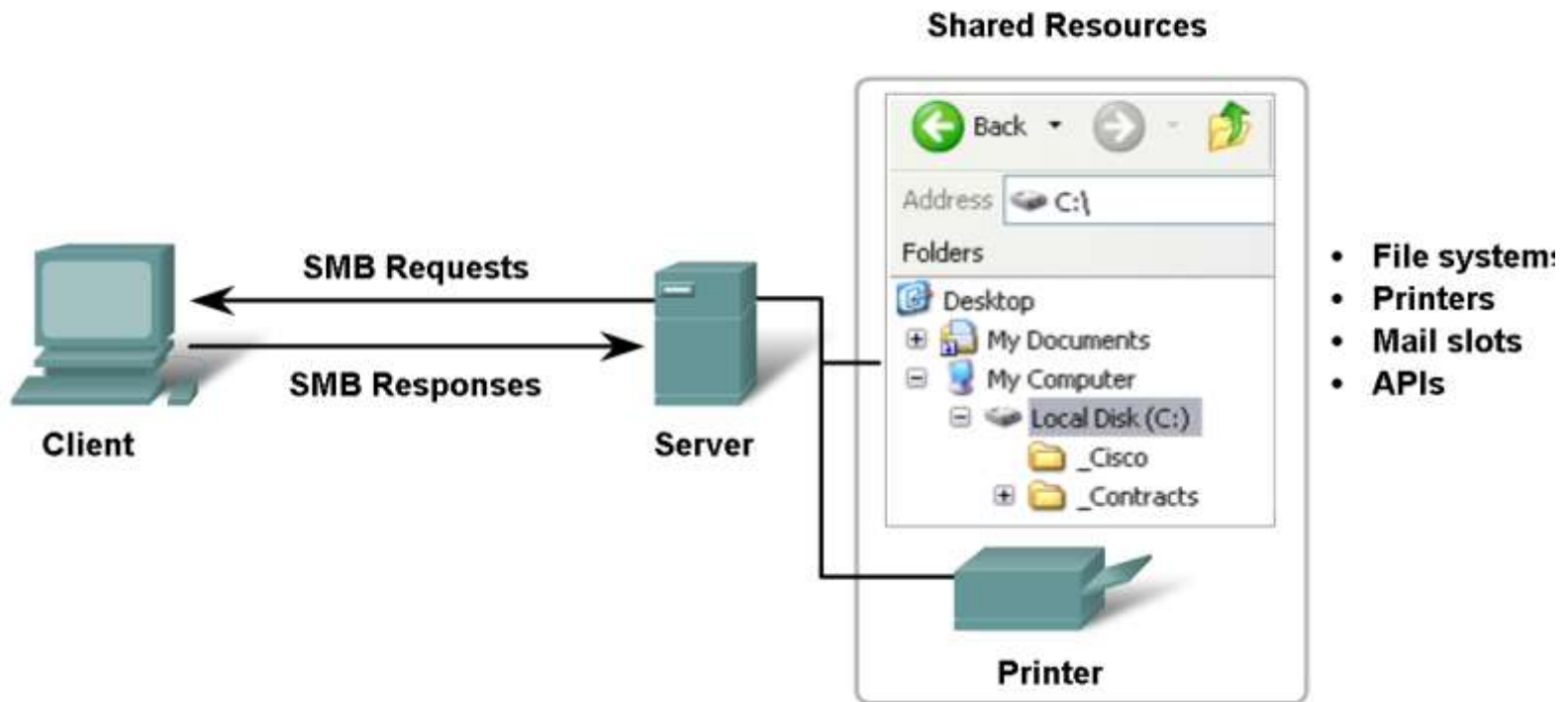
SMB is a client-server, request-response protocol. Servers can make their resources available to clients on the network.

Features, Operation, and Use of TCP/IP Application Layer Services

- Describe the features of the Gnutella protocol and the role it plays in supporting P2P services

Gnutella Suports P2P Applications

Where is: **mysong.mp3**

Gnutella allows P2P applications to search for shared resources on peers.

I've got it.

Network

I've got it.

I've got it.

Summary

In this chapter, you learned to:

- Describe how the functions of the three upper OSI model layers provide network services to end user applications.
- Describe how the TCP/IP Application layer protocols provide the services specified by the upper layers of the OSI model.
- Define how people use the Application layer to communicate across the information network.
- Describe the function of well-known TCP/IP applications, such as the World Wide Web and email, and their related services (HTTP, DNS, SMB, DHCP, STMP/POP, and Telnet).
- Describe file-sharing processes that use peer-to-peer applications and the Gnutella protocol.
- Explain how protocols ensure services running on one kind of device can send to and receive data from many different network devices.
- Use network analysis tools to examine and explain how common user applications work.

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