

# NETWORKING AND THE INTERNET

Lecture slides are adapted/modified from slides provided by the textbook, Computer Science: An Overview by J. Glenn Brookshear and Dennis Brylow publisher Pearson



KHOA CÔNG NGHỆ THÔNG TIN  
TRƯỜNG ĐẠI HỌC KHOA HỌC TỰ NHIÊN



# Contents

- ☐ Network Fundamentals
- ☐ The Internet
- ☐ The World Wide Web
- ☐ Internet Protocols
- ☐ Security
- ☐ About Networks and Telecommunications  
Department





# NETWORK FUNDAMENTALS





# Networks

- ☐ Links multiple computer systems and enables them to share data and resources





# Network Classifications

## ☐ Scope

- ☐ Personal area network (PAN)
- ☐ Local area network (LAN)
- ☐ Metropolitan area (MAN)
- ☐ Wide area network (WAN)

## ☐ Ownership

- ☐ Closed versus open

## ☐ Topology (configuration)

- ☐ Bus (Ethernet)
- ☐ Star (Wireless networks with central Access Point)



# Network Fundamentals

- Local Area Network (LAN)
  - ▣ Uses cables, radio waves, or infrared signals
  - ▣ Links computers in a limited geographic area
- Wide Area Network (WAN)
  - ▣ Uses long-distance transmission media
  - ▣ Links computer systems a few miles or thousands of miles
  - ▣ Internet is the largest WAN
- Metropolitan Area Network (MAN)
  - ▣ Designed for a city
  - ▣ Larger than a LAN, smaller than a WAN





# Network Fundamentals

- Campus Area Network (CAN)
  - ▣ Several LANs located in various locations on a college or business campus
  - ▣ Smaller than a WAN
  - ▣ Use devices such as switches, hubs, and routers
- Personal Area Network (PAN)
  - ▣ Network of an individual's own personal devices
  - ▣ Usually within a range of 32 feet
  - ▣ Usually use wireless technology



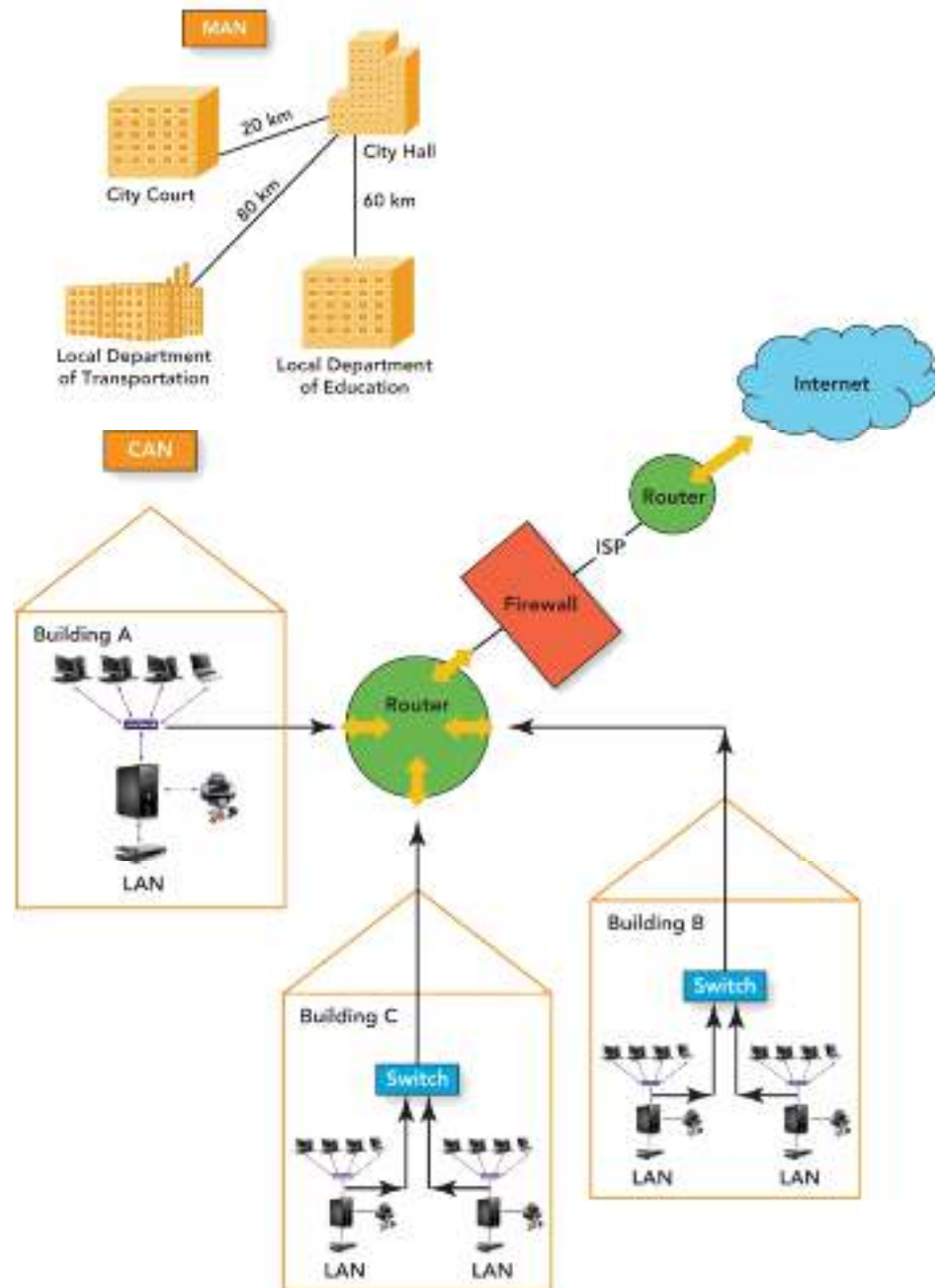


# Network Fundamentals

- ☐ Node
  - ☐ Any device connected to a network
- ☐ Logical address
  - ☐ Unique name assigned to each node on the network
- ☐ Physical address
  - ☐ Unique numeric that identifies each node on the network built into the hardware
- ☐ Network interface card (NIC)
  - ☐ Expansion board or adapter that provides a connection between the computer and the network
  - ☐ Notebook computers have wireless NICs









# Network Fundamentals

- USB wireless network adapter
  - ▣ Plugs into a USB port
  - ▣ Usually provides an intuitive graphical user interface (GUI) for easy configuration
  
- Wireless PC card adapter
  - ▣ About the size of a credit card
  - ▣ Inserted into a slot on the side of most notebooks and netbooks
  - ▣ Has built-in WiFi antenna that provides wireless capability
  - ▣ LED lights that indicate whether the computer is connected





# Network Fundamentals

- USB wireless network adapter
  - ▣ Plugs into a USB port
  - ▣ Usually provides an intuitive graphical user interface (GUI) for easy configuration
- USB dongle
  - ▣ Device inserted into a USB port that adds additional features to the base system
  - ▣ Examples: enabling network connectivity and increasing RAM
- Wireless PC card adapter
  - ▣ About the size of a credit card
  - ▣ Inserted into a slot on the side of most notebooks and netbooks
  - ▣ Has built-in WiFi antenna that provides wireless capability
  - ▣ LED lights that indicate whether the computer is connected





# Connecting Networks

- ☐ Repeater: Extends a network
- ☐ Bridge: Connects two compatible networks
- ☐ Switch: Connects several compatible networks
- ☐ Router: Connects two incompatible networks resulting in a network of networks called an internet





# Network Fundamentals

## ☐ Hub

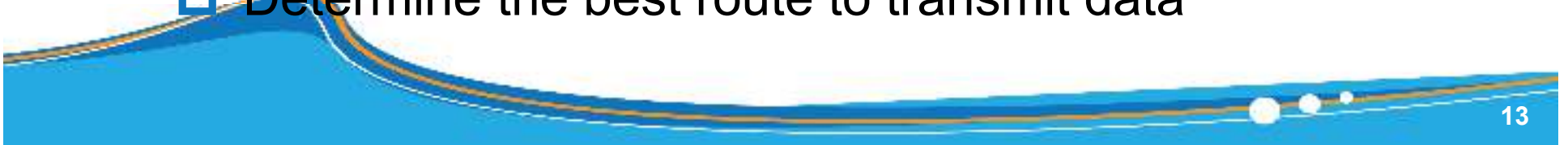
- ☐ Joins multiple computers together in a single network
- ☐ Does not manage traffic between the connections

## ☐ Switches

- ☐ Filter and forward data between nodes
- ☐ Are similar to routers but work within a single network

## ☐ Routers

- ☐ Connect two or more networks
- ☐ Inspect the source and target of a data package
- ☐ Determine the best route to transmit data

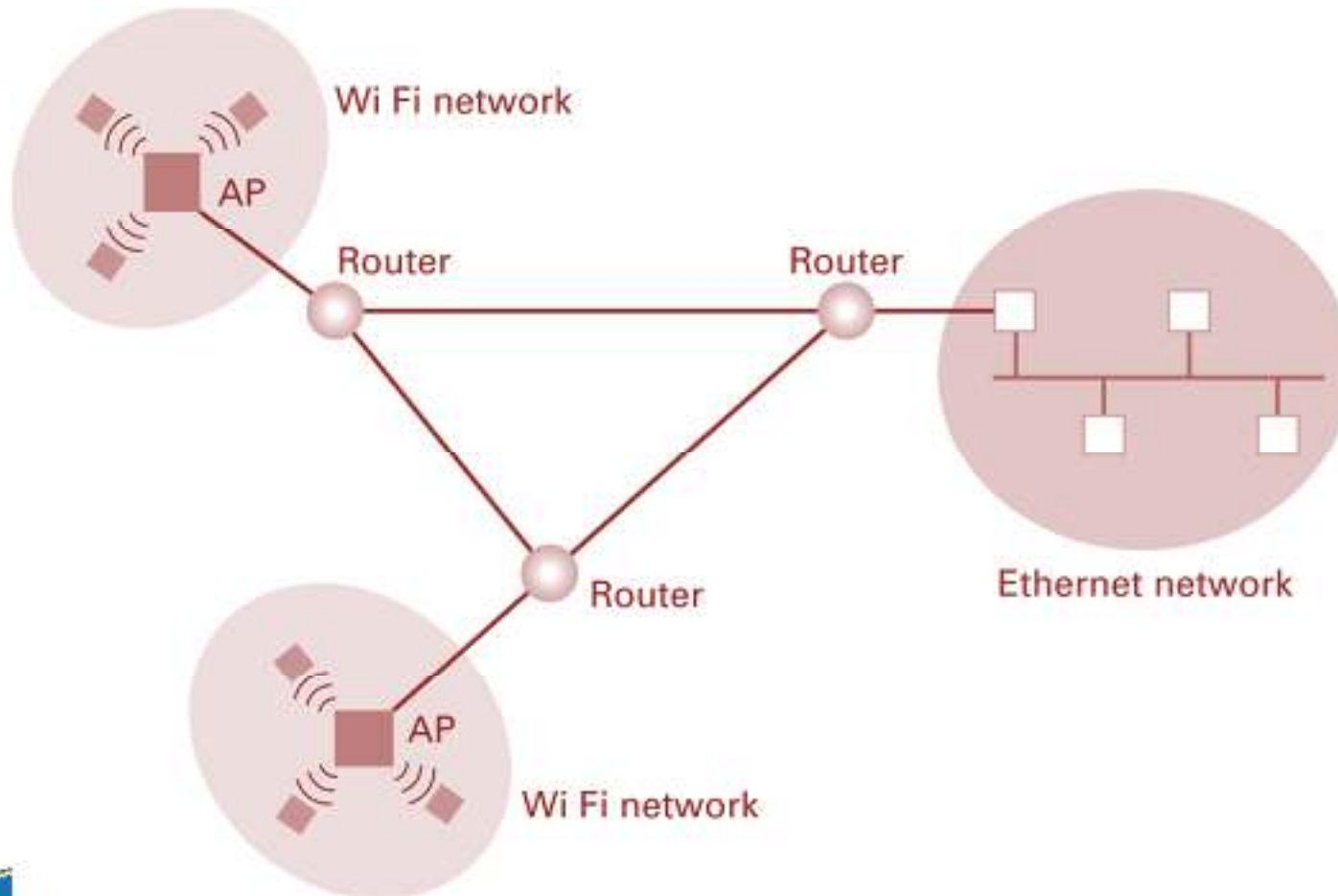






# Network Fundamentals

## Routers





# Network Fundamentals







# Network Fundamentals

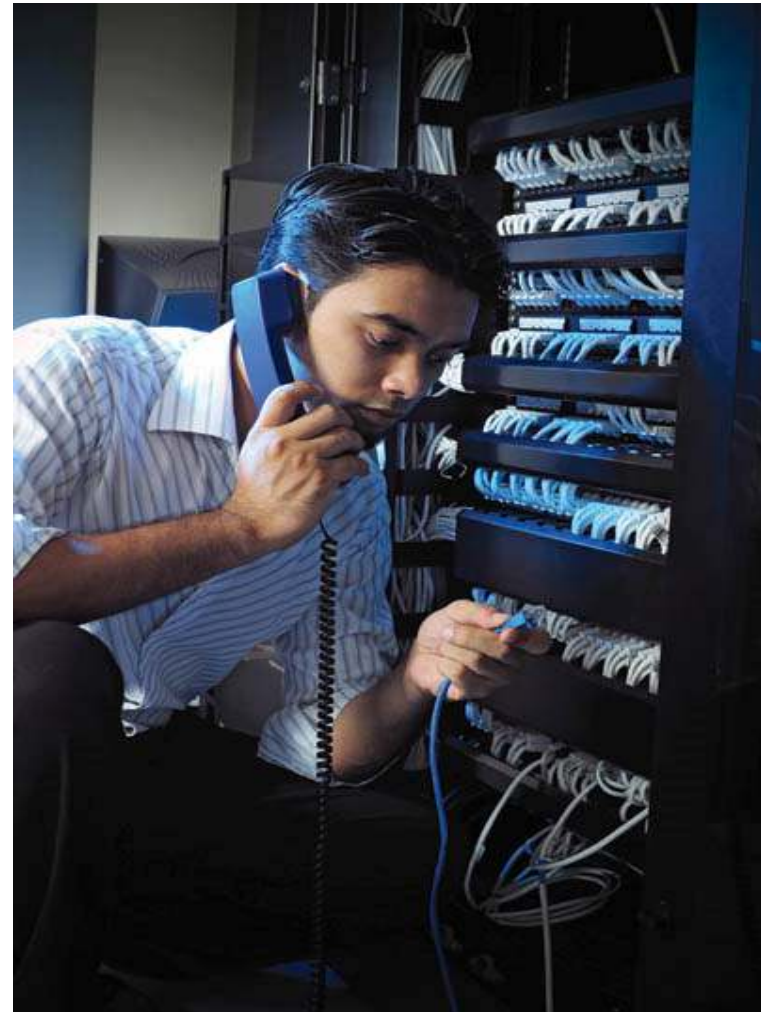
- Server
  - Computer or device with software that manages network resources, such as files, e-mails, printers, databases
- File server
  - Most common type of server
  - High-speed computer that provides program and data files to network users
  - Contains the network operating system (NOS)
    - File directories for file and resource location on the LAN
    - Automated distribution of software updates to desktop computers on the WAN
    - Internet services support
    - Protection of services and data
    - Access to connected hardware by authorized users





# Network Fundamentals

- Network administrator
  - Also called network engineer
  - Installs, maintains, supports computer networks
  - Interact with users
  - Handle security
  - Troubleshoot problems





# Advantages - Disadvantages

## Advantages

- ❑ Reduced hardware costs
- ❑ Application sharing
- ❑ Sharing information resources
- ❑ Data management centralization
- ❑ Connecting people

## disadvantages

- ❑ Loss of autonomy
- ❑ Lack of privacy
- ❑ Security threats
- ❑ Loss of productivity



# Local Area Networks

- Local area network (LAN)
  - Connects hardware devices that are in close proximity
  - The owner of the devices is also the owner of the means of communications
  - Common wired LAN topologies
    - Bus
    - Ring
    - Star





# LOCAL AREA NETWORKS





# Local Area Networks

- ☐ Peer-to-peer networks
- ☐ Wireless LAN
- ☐ Client/server LAN
- ☐ Intranet





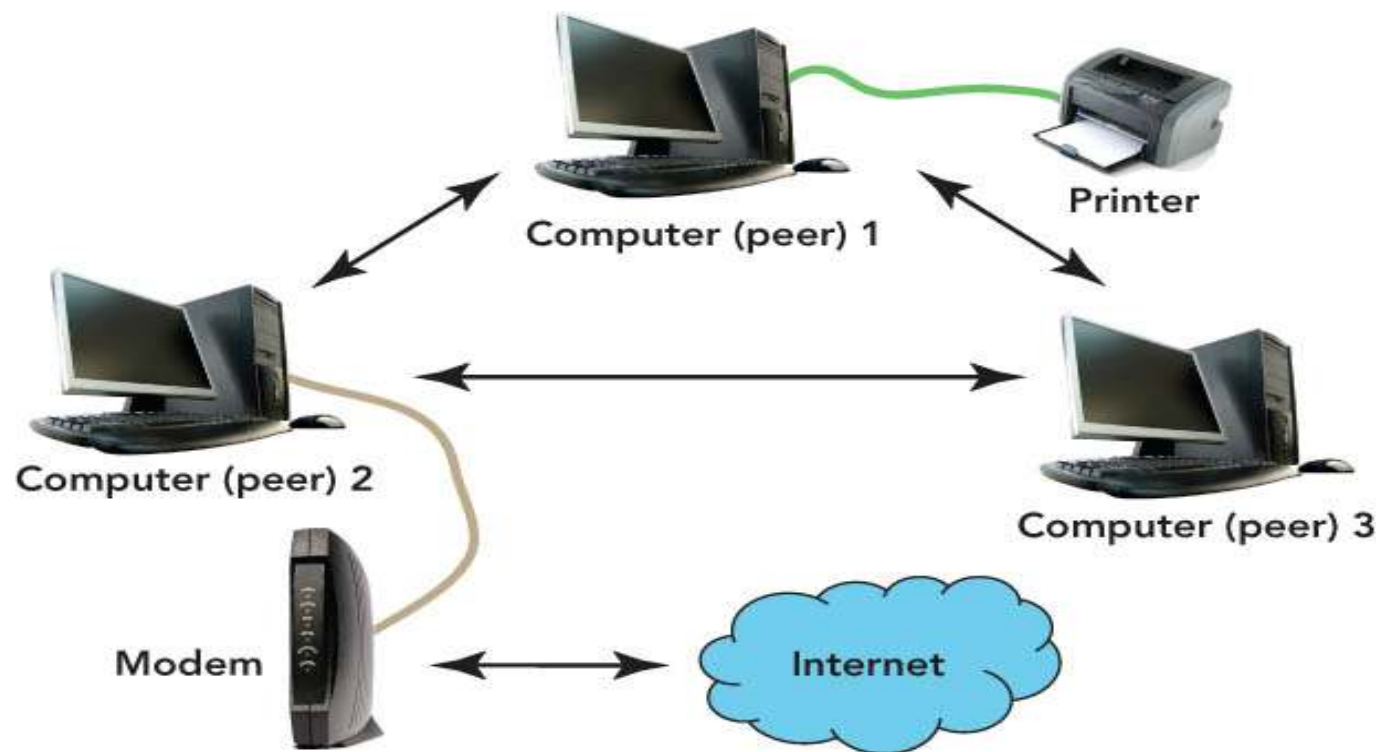
# Peer-to-peer (P2P) networks

- ☐ Share files without a file server
- ☐ Easy to set up
- ☐ Best used for home or small offices with no more than 10 computers
- ☐ Do not require a network operating system
- ☐ Can be slow if there are too many users
- ☐ Security not strong





# Peer-to-peer (P2P) networks







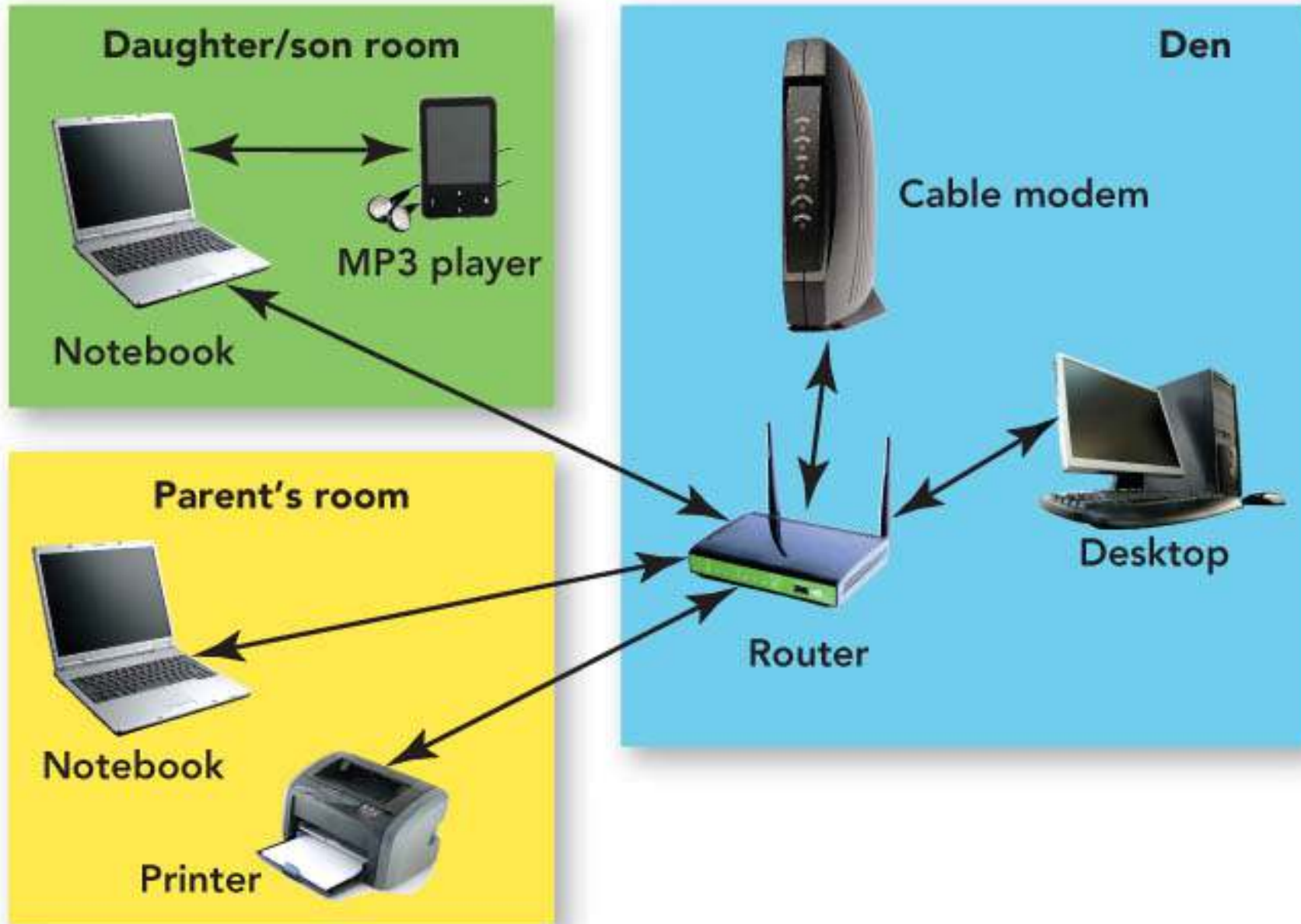
# Wireless LAN

- ☐ Connects users through radio waves instead of wires
- ☐ Use includes networks in:
  - ☐ Homes
  - ☐ Hospitals
  - ☐ Colleges
- ☐ Secured with a radio transmission technique that spreads signals over a seemingly random series of frequencies.
- ☐ Effective inside range of between 125 and 300 feet





# Wireless LAN



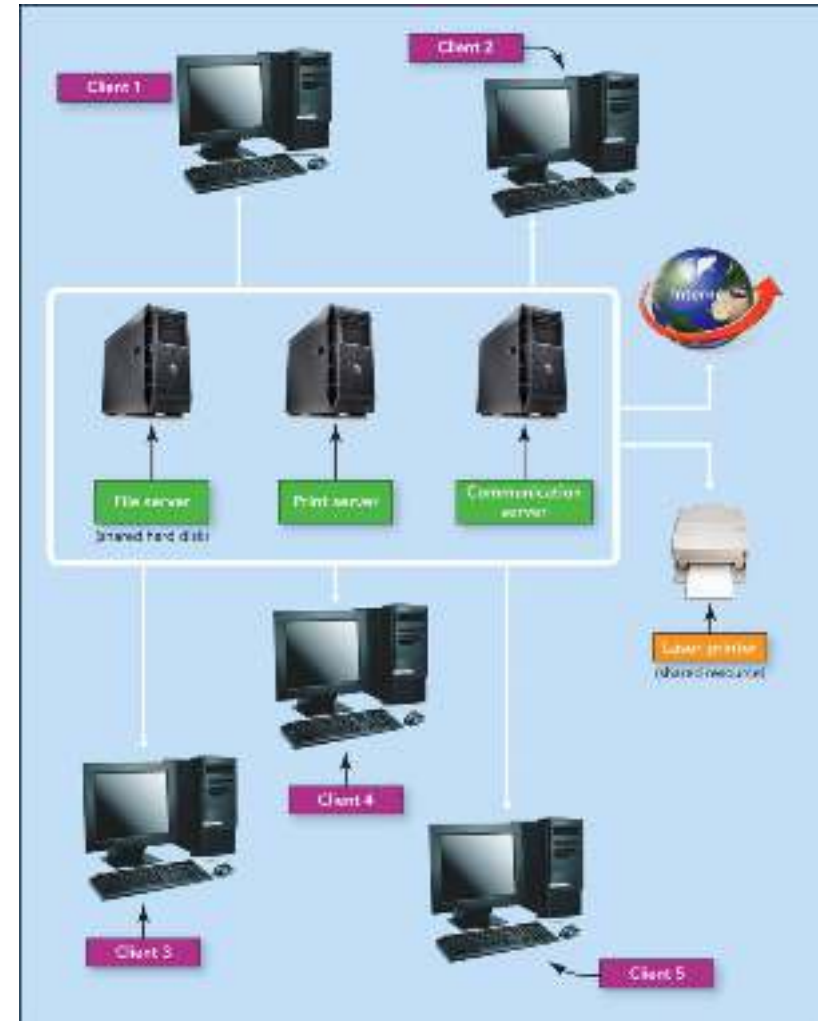


# Client/server networks

- Client/server networks
  - ▣ Made up of one or more file servers and clients (any type of computer)
  - ▣ Client software enables requests to be sent to the server
  - ▣ Wired or wireless connections
  - ▣ Do not slow down with heavy use

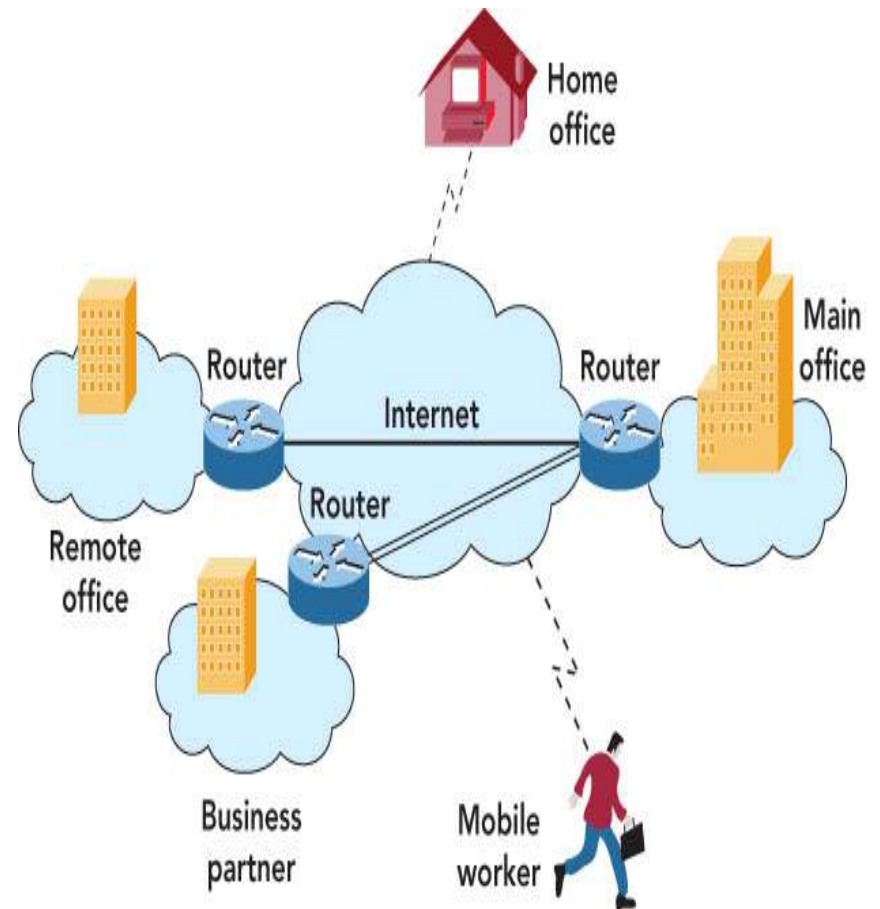


# Client/server networks



# Intranet

- Intranet
  - Password-protected network controlled by the company
  - Accessed only by employees
- Virtual private network
  - Operates over the Internet
  - Accessible by authorized users for quick access to corporate information
  - Uses secure, encrypted connections and special software





# LAN topologies

- Network topology
  - Physical design of a LAN
- Topology resolves contention—conflict that occurs when two or more computers on the network attempt to transmit at the same time
- Contention sometimes results in collisions—corruption of network data caused when two computers transmit at the same time





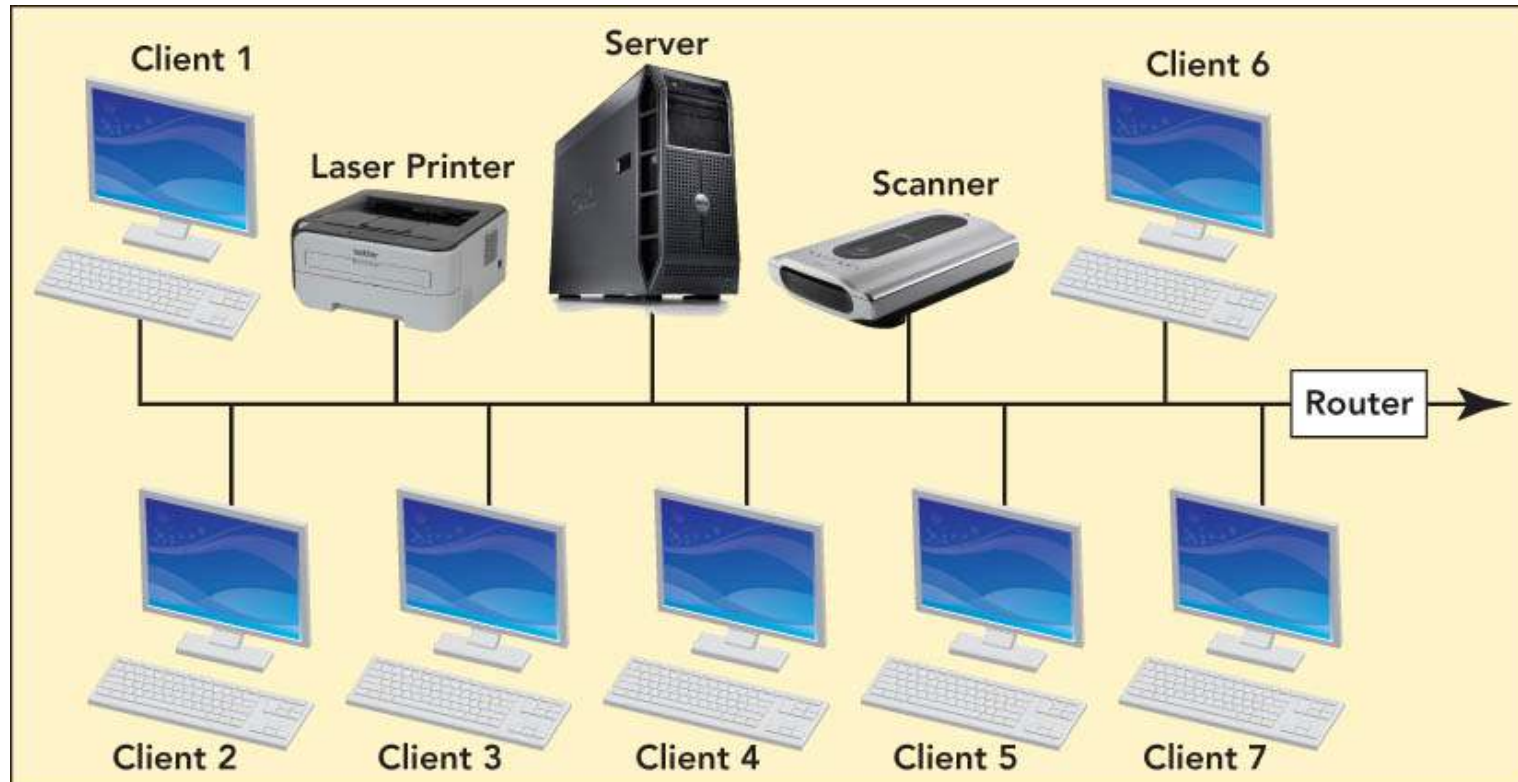
# LAN topologies

- Bus topology
  - Practical for home or small office
  - One node transmits at a time
  - Terminators signify the end of the circuit
  - Uses contention management—technique that specifies what happens when a collision occurs
- Star topology
  - For office buildings, computer labs, and WANs
  - Easy to add users
- Ring topology
  - For a division of a company or one floor
  - Not in common use today
  - Node can transmit only when it has the token—special unit of data that travels around the ring



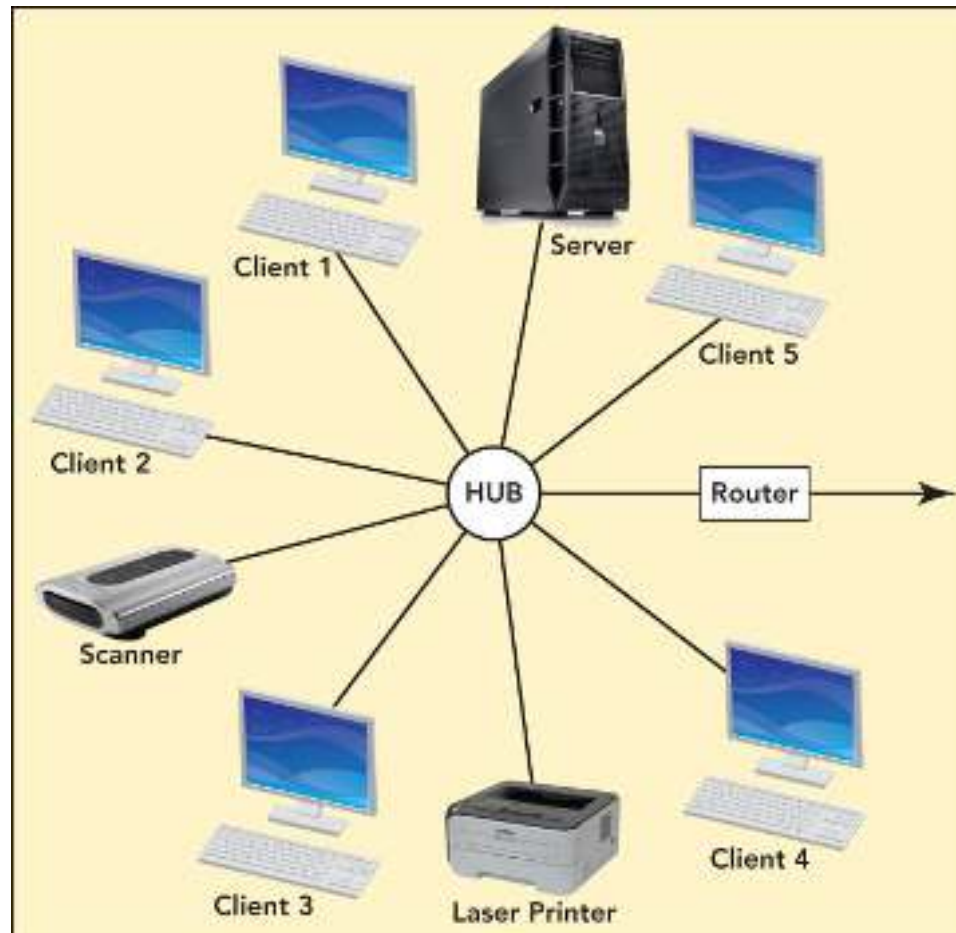


# Local Area Networks

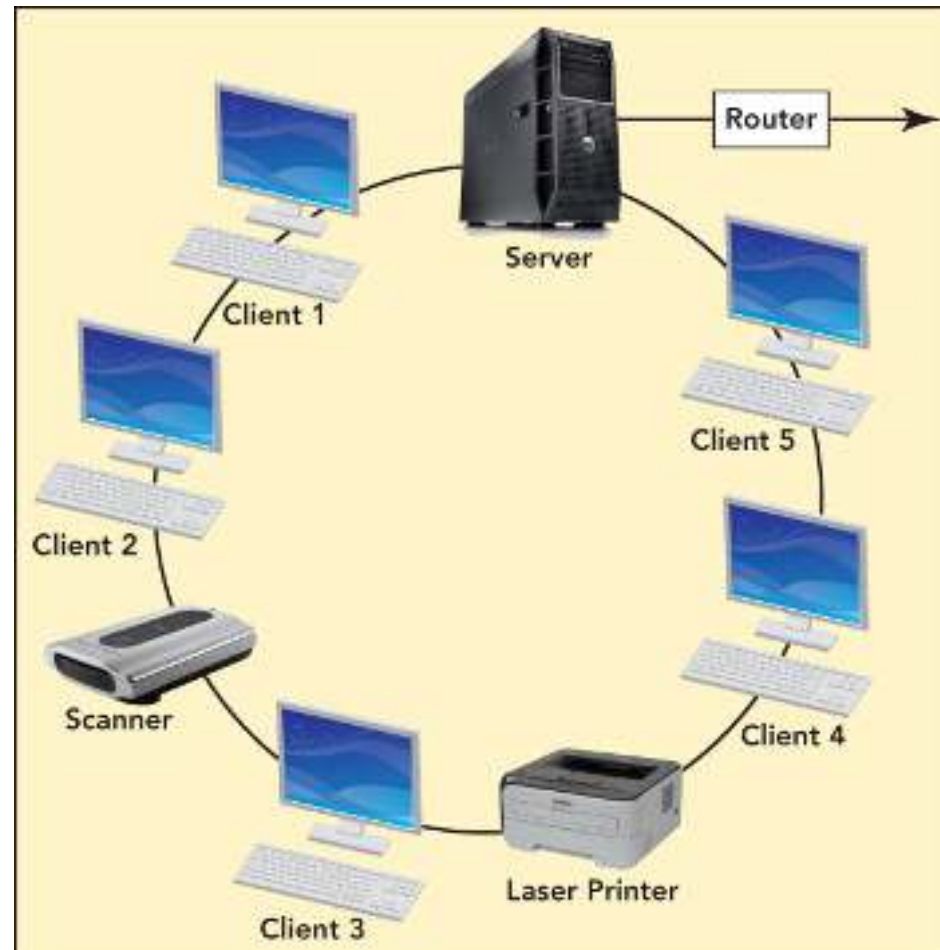




# LAN topologies



# LAN topologies





# LAN technologies

- Ethernet—most-used LAN protocol
  - Ethernet star networks
    - Most popular versions—use twisted-pair wiring and switches
  - Sends data in a fixed-size unit called a packet
  
- WiFi
  - Uses radio waves to provide a wireless LAN standard at Ethernet speeds
  - Needs a central access point—could be a wireless router

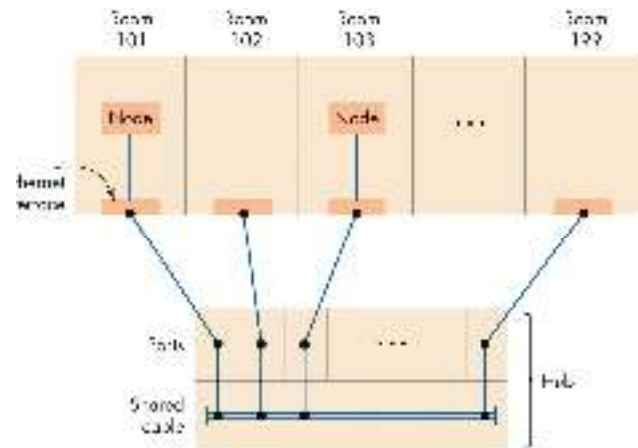


Figure 7.6

An Ethernet LAN Implemented Using a Hub



# Local Area Networks (continued)

- Ethernet
  - ▣ Most widely used LAN technology
  - ▣ Uses the bus topology
  - ▣ Two ways to construct an Ethernet LAN
    - Shared cable
    - Hubs: The most widely used technology

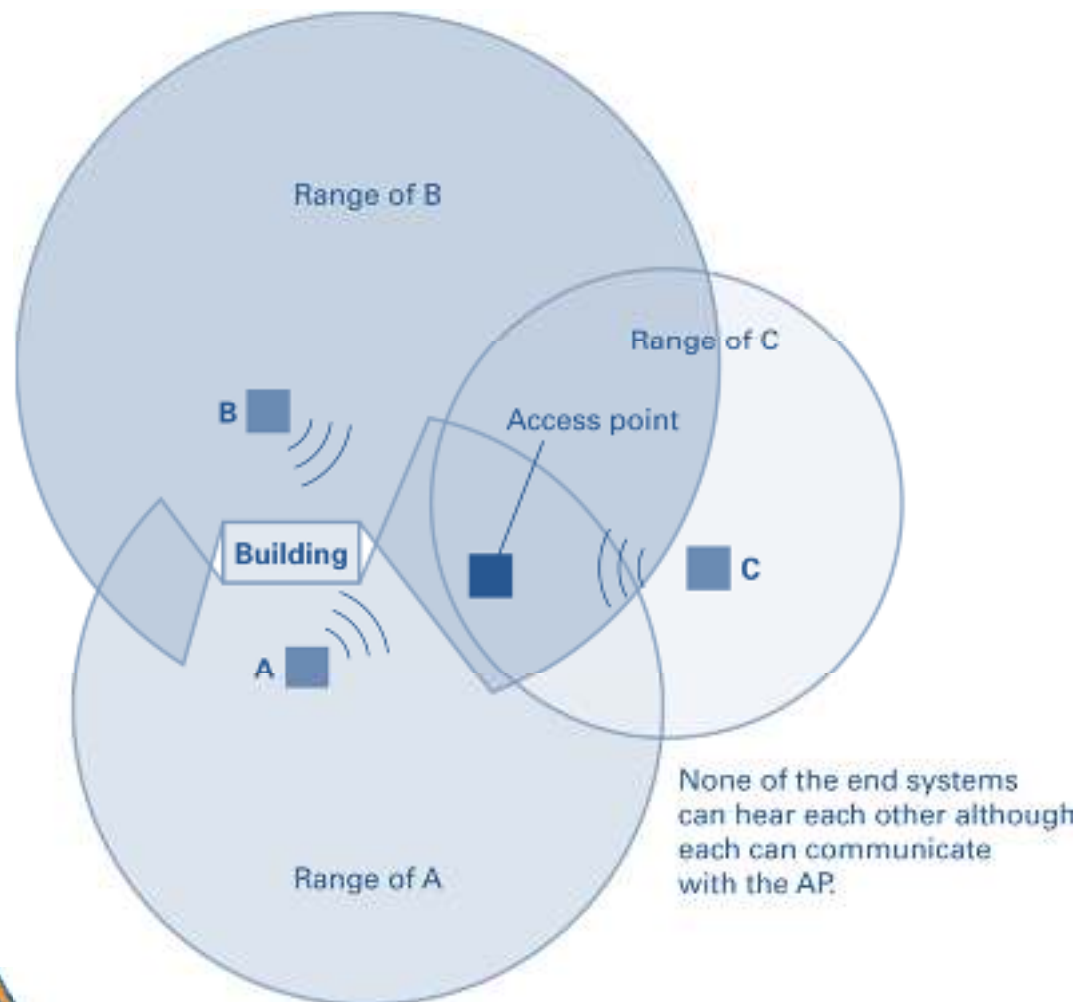


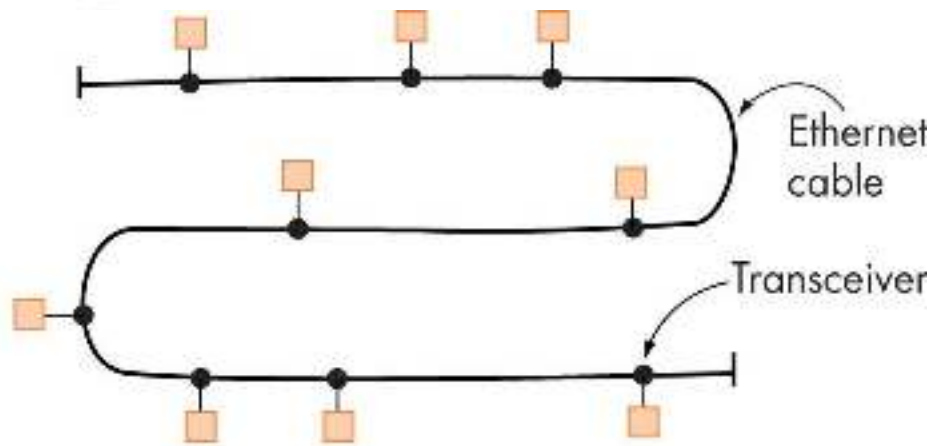


# Protocols

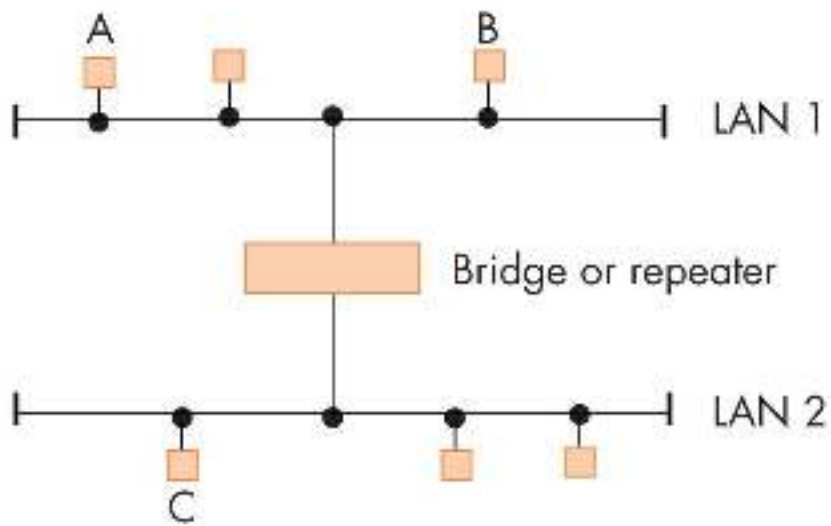
- CSMA/CD (Carrier Sense, Multiple Access with Collision Detection)
  - ▣ Used in Ethernet
  - ▣ Silent bus provides right to introduce new message
  
- CSMA/CA (Carrier Sense, Multiple Access with Collision Avoidance)
  - ▣ Used in WiFi
  - ▣ Hidden terminal problem

# The hidden terminal problem





(a) Single Cable Configuration

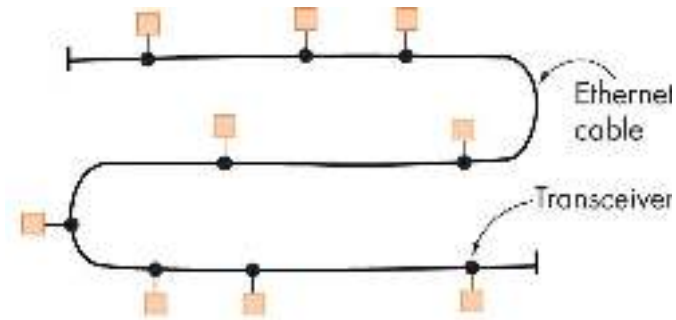


(b) Multiple Cable Configuration

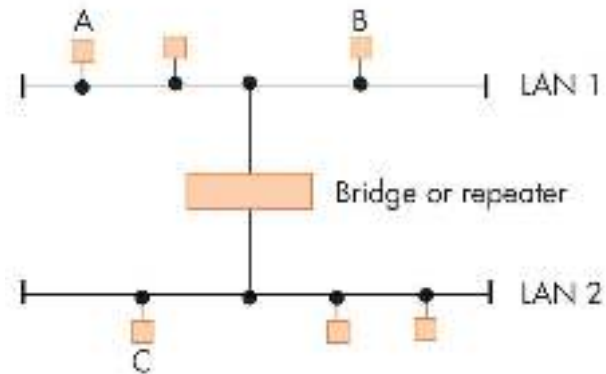
Figure 7.5  
An Ethernet LAN Implemented  
Using Shared Cables







(a) Single Cable Configuration



(b) Multiple Cable Configuration

Figure 7.5  
An Ethernet LAN Implemented  
Using Shared Cables



# WIDE AREA NETWORKS





# Wide Area Networks

- Wide area networks (WANs)
  - Connect devices that are across town, across the country, or across the ocean
  - Users must purchase telecommunications services from an external provider
  - Dedicated point-to-point lines
  - Most use a store-and-forward, packet-switched technology to deliver messages



# Wide Area Networks

1 An outgoing message is divided into data units of a fixed size called packets.



1 Dear Christine,  
Mike and I would like to  
meet with you.

2 We'll be in Boston next week  
on unrelated business.

3 I'll have Jodi B. set up a place  
and time. I'm looking forward  
to a productive meeting.  
  
Sincerely,  
Bill



# Wide Area Networks

**2** Each packet is numbered and addressed to the destination computer.

**1** from: bill@oregon.edu  
to: christine@aol.com

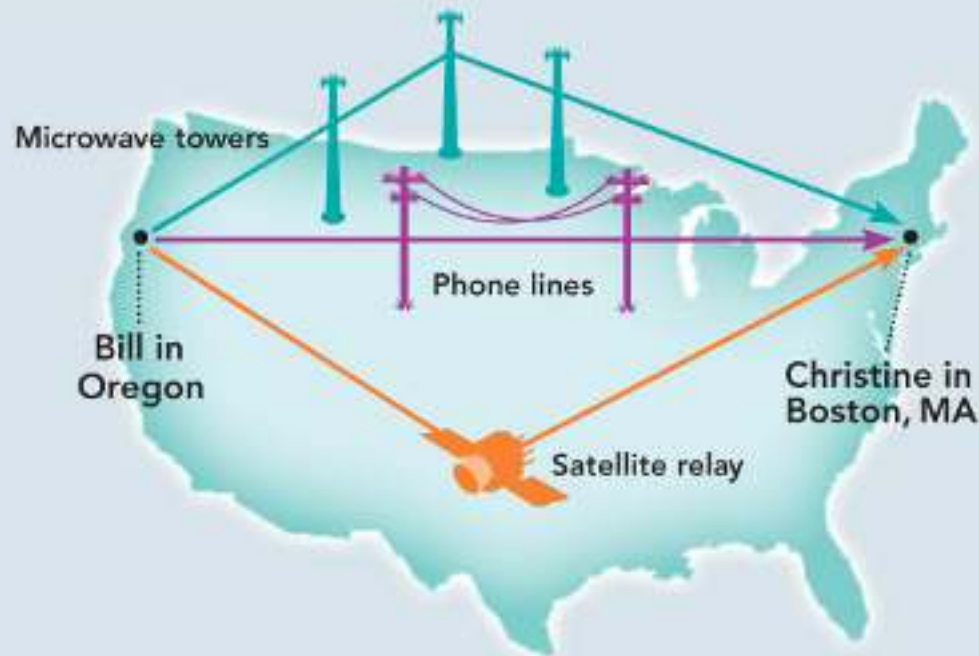
**2** from: bill@oregon.edu  
to: christine@aol.com

**3** from: bill@oregon.edu  
to: christine@aol.com



# Wide Area Networks

- 3** After reading the packet's address, the router consults a table of possible paths to the packet's destination. If more than one path exists, the router sends the packet along the path that is least congested.





# Wide Area Networks

- 4 On the receiving computer, protocols put the packets in the correct order and decode the message they contain.



Dear Christine,  
Mike and I would like to meet with you.  
We'll be in Boston next week on unrelated business.  
I'll have Jodi B. set up a place and time. I'm looking forward to a productive meeting.  
Sincerely,  
Bill







# WAN applications

- ☐ E-mail, conferencing, document exchange, remote database access
- ☐ LAN to LAN connections connect two or more geographically separate locations
- ☐ Transaction acquisition—the instant relay of transaction information from a point-of-purchase sale.





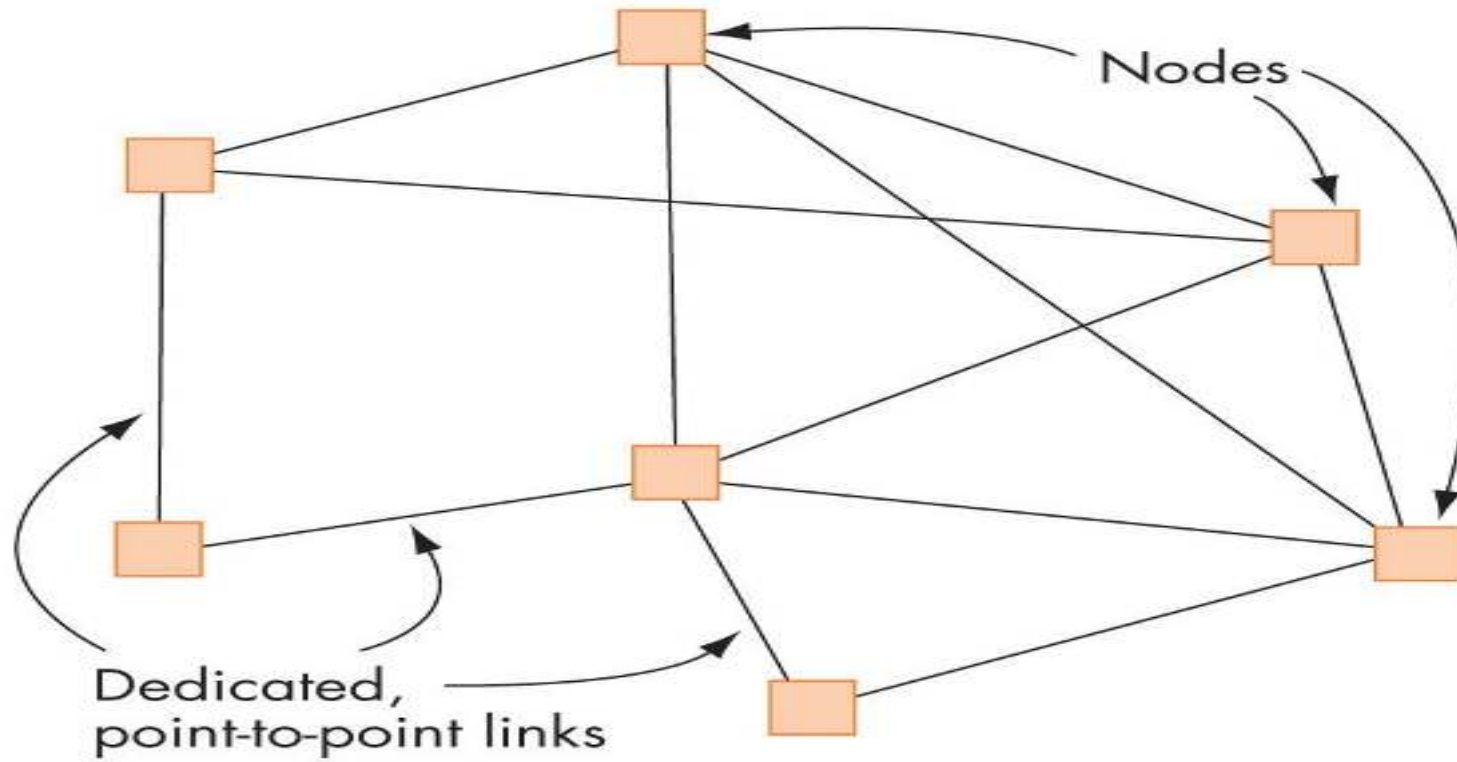


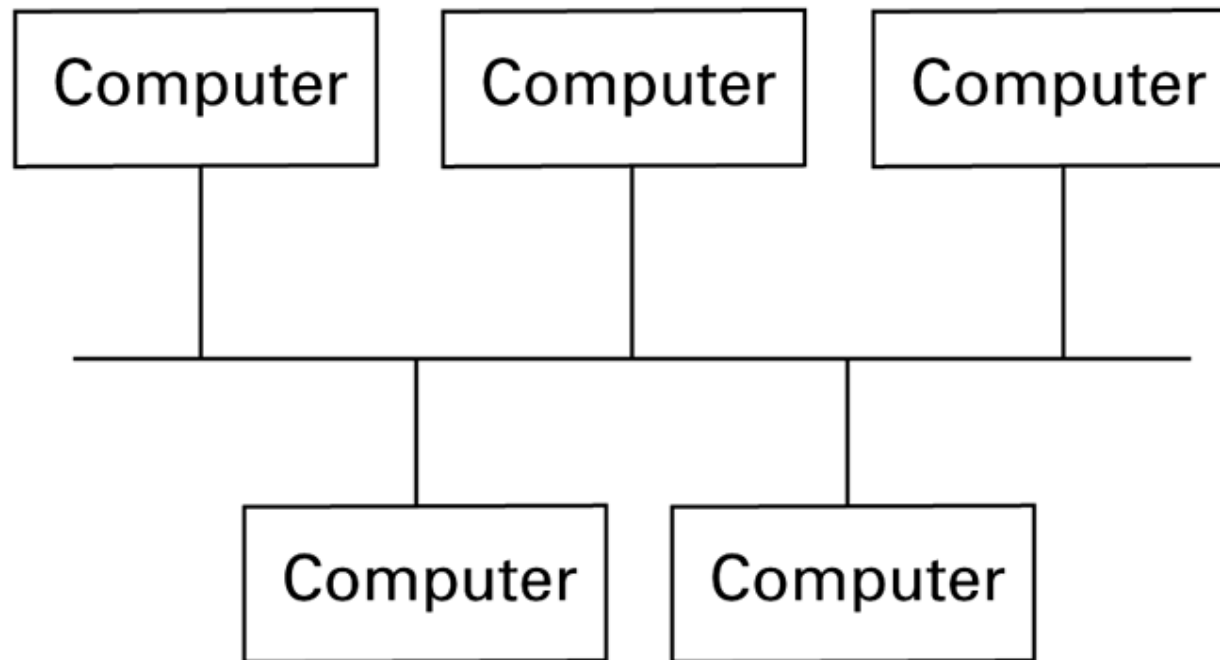
Figure 7.7  
Typical Structure of a Wide Area Network





## Figure 4.1 Network topologies

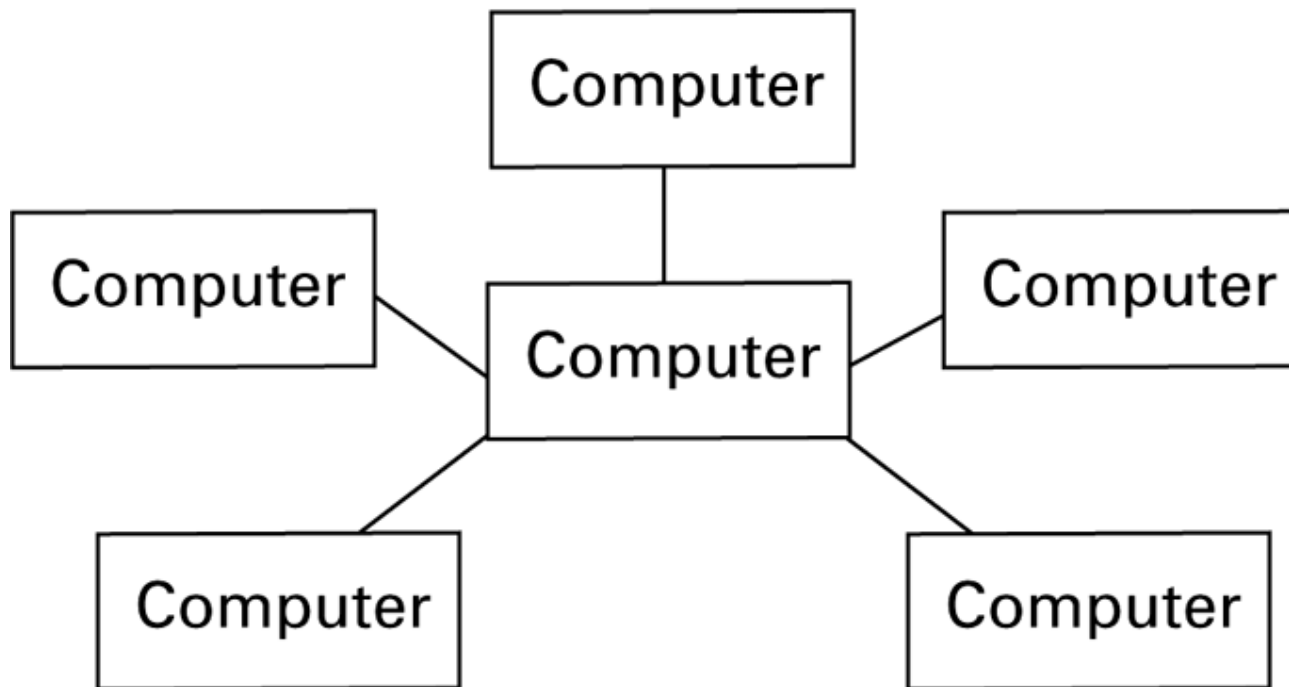
### a. Bus





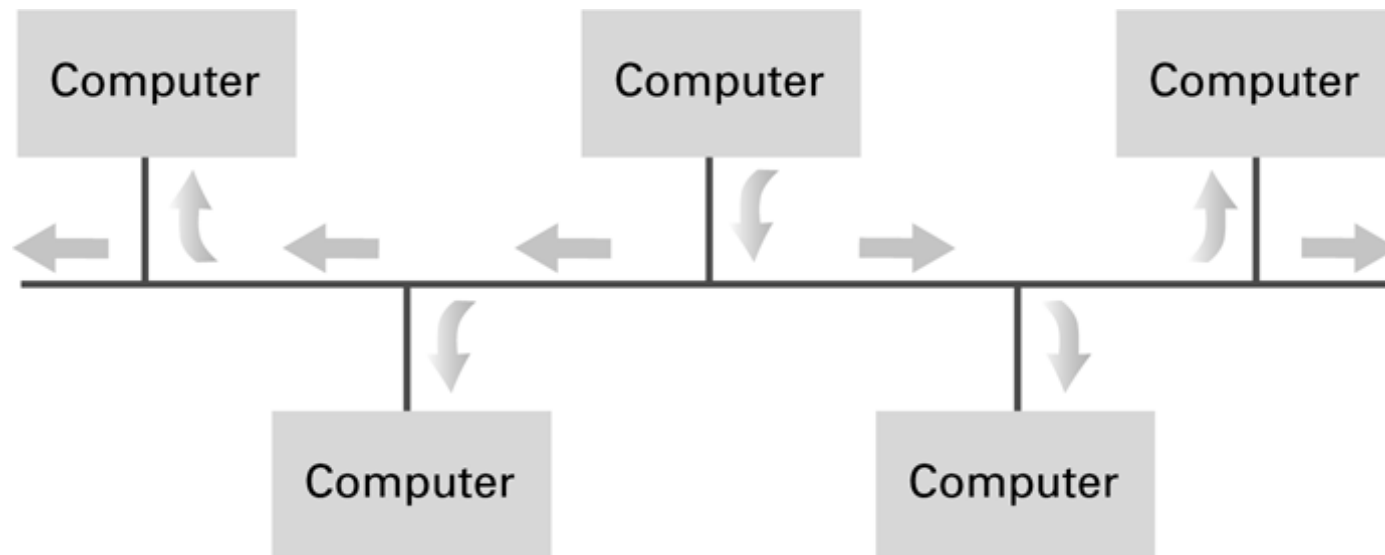
## Figure 4.1 Network topologies (continued)

### b. Star



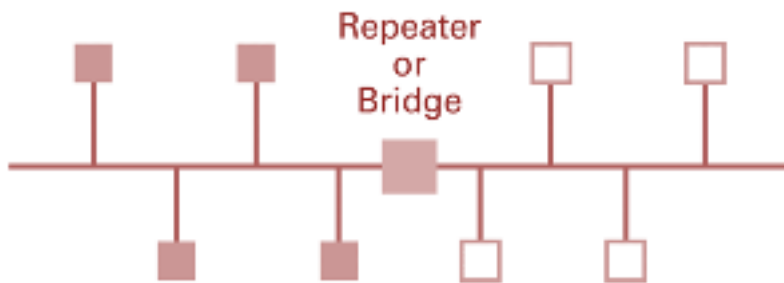


## Figure 4.2 Communication over a bus network

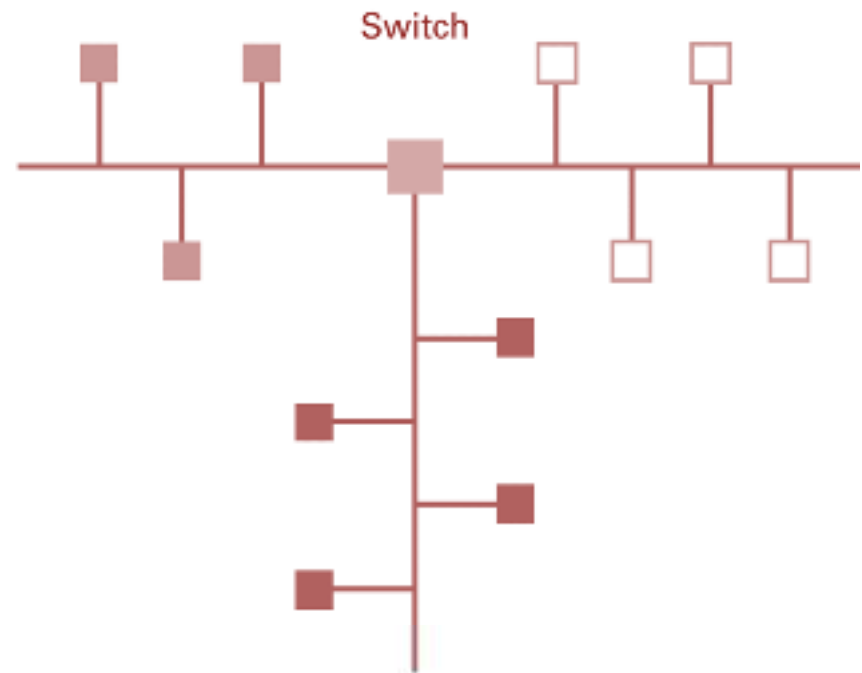




# Building a large bus network from smaller ones



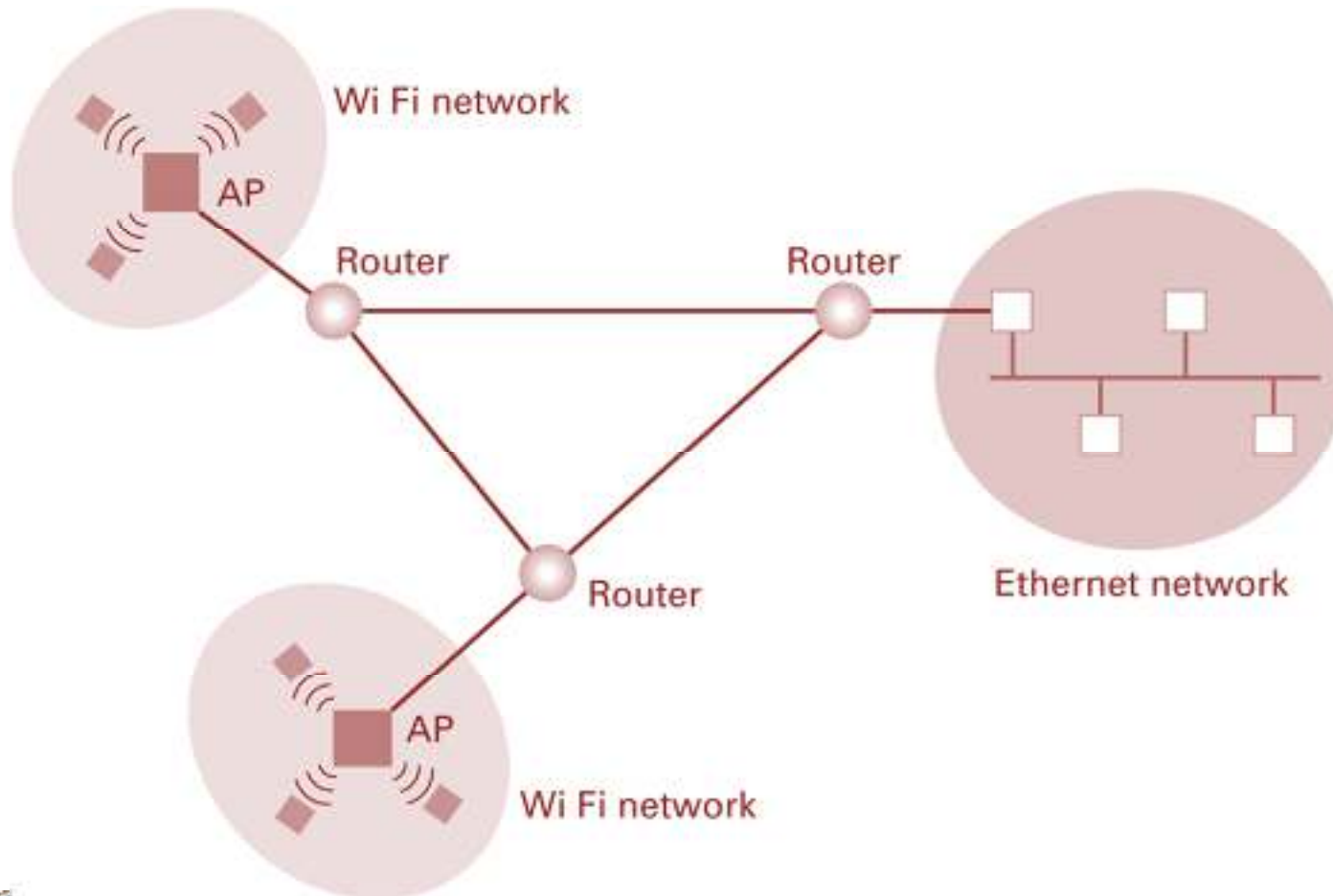
a. A repeater or bridge connecting two buses



b. A switch connecting multiple buses



# Routers





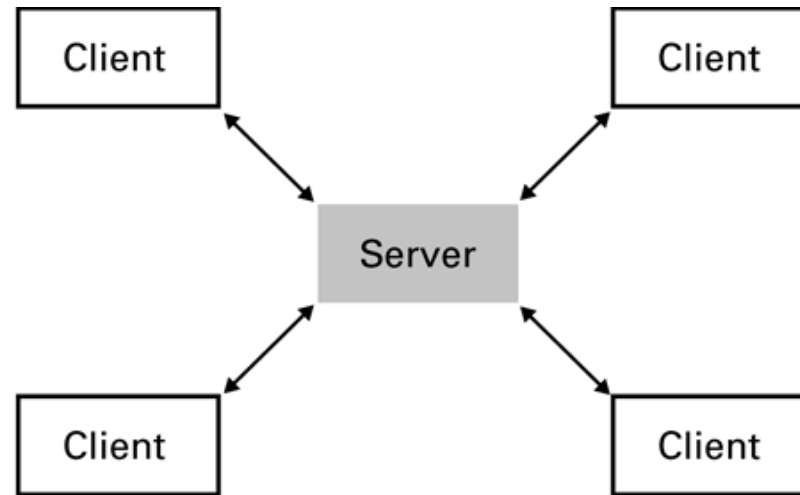
# Inter-process Communication

- Client-server
  - One server, many clients
  - Server must execute continuously
  - Client initiates communication
- Peer-to-peer (P2P)
  - Two processes communicating as equals
  - Peer processes can be short-lived

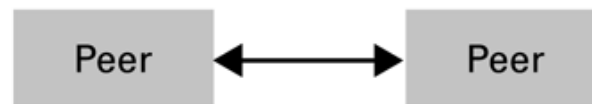




## Figure 4.6 The client/server model compared to the peer-to-peer model



a. Server must be prepared to serve multiple clients at any time.



b. Peers communicate as equals on a one-to-one basis.





# Distributed Systems

- ☐ Systems with parts that run on different computers
  - ☐ Cluster computing
  - ☐ Grid computing
  - ☐ Cloud computing
    - ☐ Amazon's Elastic Compute Cloud
    - ☐ Google Drive





# THE INTERNET





# The Internet

- The Internet: An internet that spans the world
  - Original goal was to develop a means of connecting networks that would not be disrupted by local disasters
  - Today a commercial undertaking that links a worldwide combination of PANs, LANs, MANs, and WANs involving millions of computers



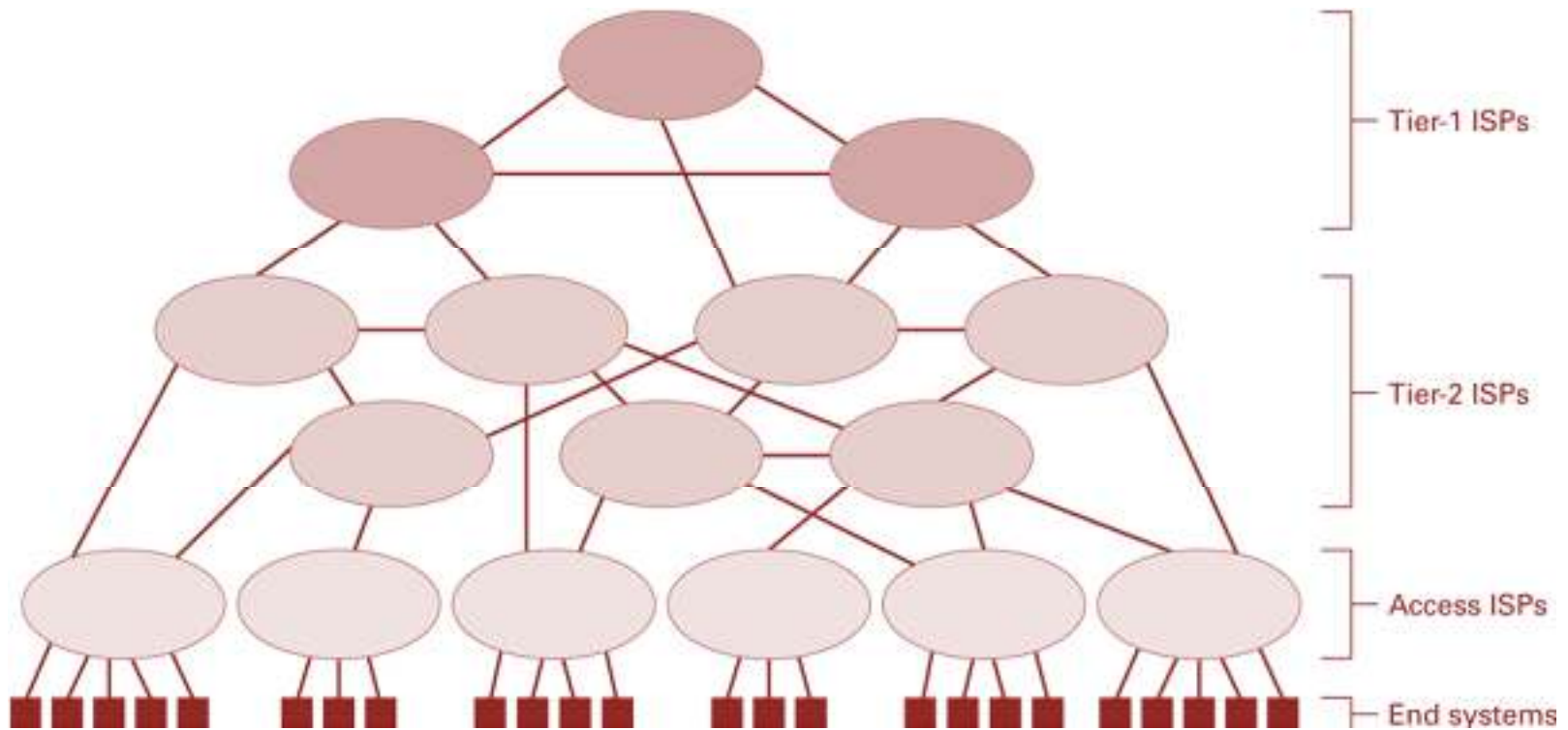


# Internet Architecture

- ☐ Internet Service Provider (ISP)
  - ☐ Tier-1
  - ☐ Tier-2
- ☐ Access or tier-3 ISP: Provides connectivity to the Internet
  - ☐ Hot spot (wireless)
  - ☐ Telephone lines
  - ☐ Cable/Satellite systems DSL
  - ☐ Fiber optics



# Internet Composition





# Internet Addressing

- ☐ IP address: pattern of 32 or 128 bits often represented in dotted decimal notation
- ☐ Mnemonic address:
  - ☐ Domain names
  - ☐ Top-Level Domains
- ☐ Domain name system (DNS)
  - ☐ Name servers
  - ☐ DNS lookup





# ICANN

- ☐ Internet Corporation for Assigned Names & Numbers (ICANN)
- ☐ Allocates IP addresses to ISPs who then assign those addresses within their regions.
- ☐ Oversees the registration of domains and domain names.





# Early Internet Applications

- ☐ Network News Transfer Protocol (NNTP)
- ☐ File Transfer Protocol (FTP)
- ☐ Telnet and SSH (Secured Shell)
- ☐ Hypertext Transfer Protocol (HTTP)
- ☐ Electronic Mail (email)
  - ☐ Domain mail server collects incoming mail and transmits outgoing mail
  - ☐ Mail server delivers collected incoming mail to clients via POP3 (Post Office Protocol version 3) or IMAP (Internet Mail Access Protocol)







# SMTP Simple Mail Transfer Protocol

220 mail.tardis.edu SMTP Sendmail Gallifrey-1.0; Fri, 23 Aug 2413 14:34:10

HELO mail.skaro.gov

250 mail.tardis.edu Hello mail.skaro.gov, pleased to meet you

MAIL From: dalek@skaro.gov

250 2.1.0 dalek@skaro.gov... Sender ok

RCPT To: doctor@tardis.edu

250 2.1.5 doctor@tardis.edu... Recipient ok

DATA

354 Enter mail, end with "." on a line by itself

Subject: Extermination.

EXTERMINATE!

Regards, Dalek

.

250 2.0.0 r7NJYAE1028071 Message accepted for delivery

QUIT

221 2.0.0 mail.tardis.edu closing connection



# More Recent Applications

- ☐ Voice Over IP (VoIP)
- ☐ Internet Multimedia Streaming
  - ☐ N-unicast
  - ☐ Multicast
  - ☐ On-demand streaming
  - ☐ Content delivery networks (CDNs)





# WORLD WIDE WEB





# World Wide Web

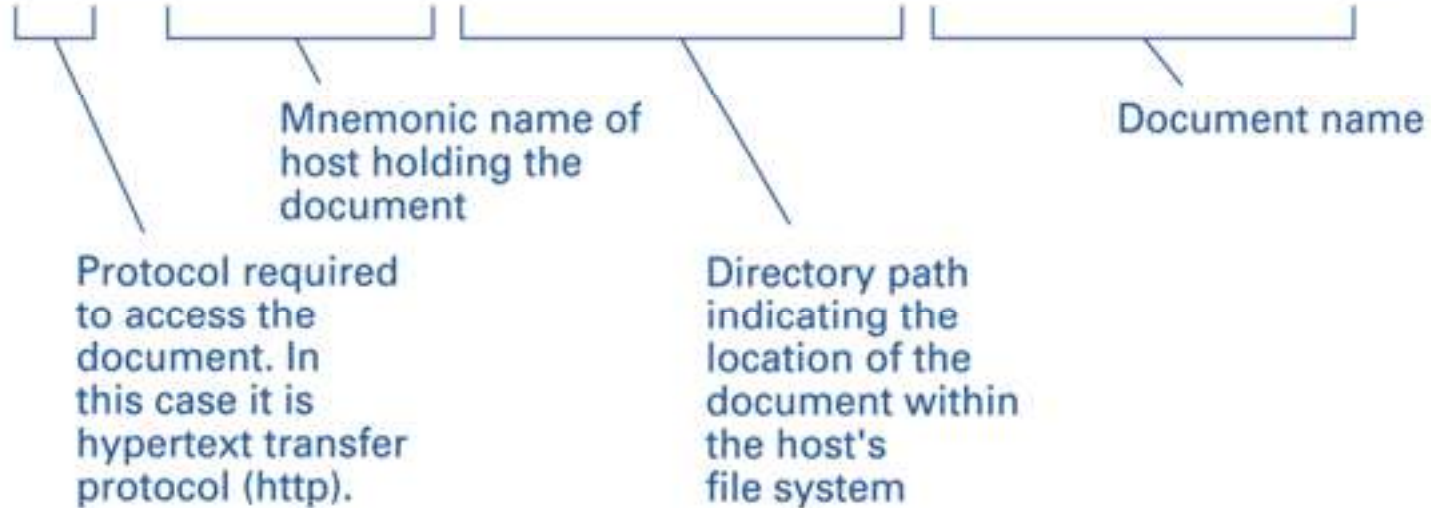
- ☐ Hypertext combines internet technology with concept of linked-documents
  - ☐ Embeds hyperlinks to other documents
- ☐ Browsers present materials to the user
- ☐ Webservers provide access to documents
- ☐ Documents are identified by URLs and transferred using HTTP





# A typical URL

`http://eagle.mu.edu/authors/Shakespeare/Julius_Cesar.html`





# Hypertext Markup Language (HTML)

- ☐ Encoded as text file
- ☐ Contains tags to communicate with browser
  - ☐ Appearance
    - `<h1>` to start a level one heading
    - `<p>` to start a new paragraph
  - ☐ Links to other documents and content
    - `<a href = . . . >`
  - ☐ Insert images
    - `<img src = . . . >`



# A simple webpage

a. The page encoded using HTML.





# A simple webpage

b. The page as it would appear on a computer screen.







# An enhanced simple webpage

a. The page encoded using HTML.

Anchor tag  
containing  
parameter

Closing  
anchor tag

```
<html>
<head>
<title>demonstration page</title>
</head>
<body>
<h1>My Web Page</h1>
<p>Click
    <a href="http://crafty.com/demo.html">
    here
    </a>
    for another page.</p>
</body>
</html>
```



# An enhanced simple Web page

b. The page as it would appear on a computer screen.





# Extensible Markup Language (XML)

- XML: A language for constructing markup languages similar to HTML
  - ▣ A descendant of SGML
  - ▣ Opens door to a World Wide *Semantic* Web





# Using XML

<staff clef = "treble"> <key>C minor</key>

<time> 2/4 </time>

<measure> <rest> egth </rest> <notes>

egth G, egth G, egth G

</notes></measure>

<measure> <notes> hlf E





# Client Side Versus Server Side

## ☐ Client-side activities

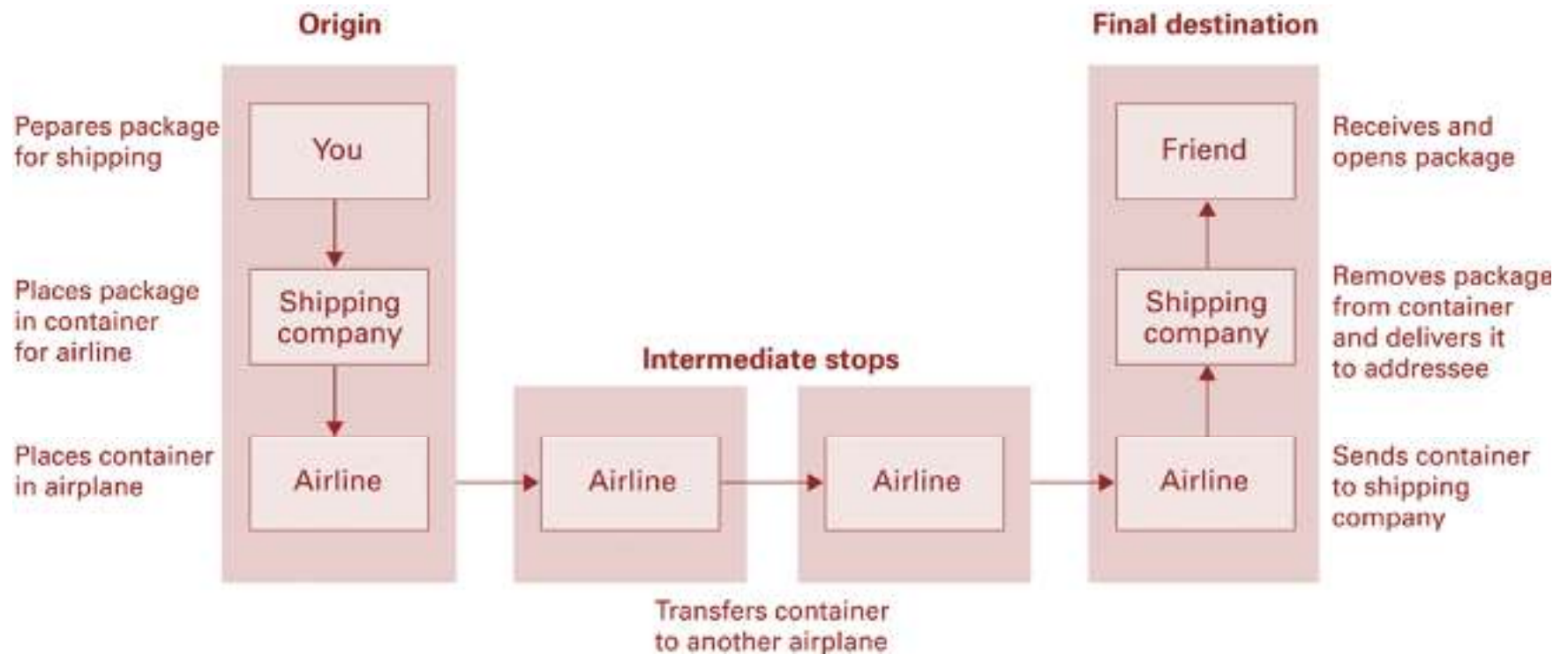
- ☐ Javascript
- ☐ Macromedia Flash

## ☐ Server-side activities

- ☐ Common Gateway Interface (CGI)
- ☐ Servlets
- ☐ JavaServer Pages (JSP) / Active Server Pages (ASP)
- ☐ PHP



# Package-shipping example





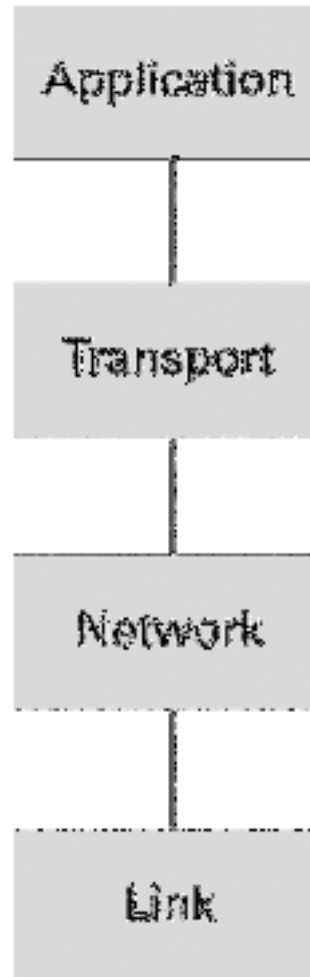
# Internet Software Layers

- **Application:** Constructs message with address
- **Transport:** Chops message into packets
- **Network:** Handles routing through the Internet
- **Link:** Handles actual transmission of packets





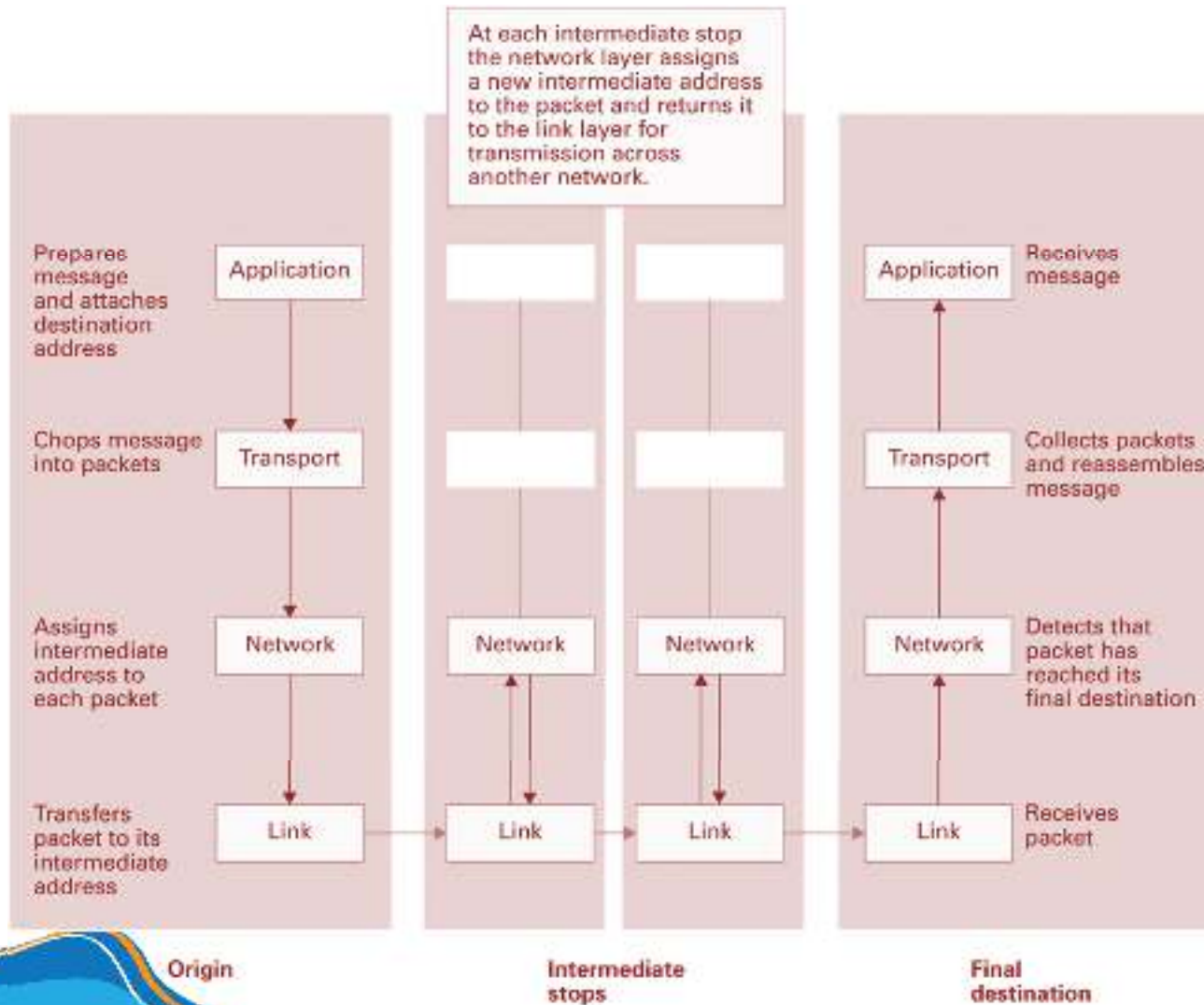
# The Internet software layers







# A message through the Internet





# TCP/IP Protocol Suite

## □ Transport Layer

- Transmission Control Protocol (TCP): break down messages or files into smaller pieces (called packets). When receiving, reassembles the data into a complete file or message. provide error-checking if an error is found TCP retransmits the packet(s).
- User Datagram Protocol (UDP): UDP does not divide each transmission into packets, which allows for a faster transmission. does not provide error checking.

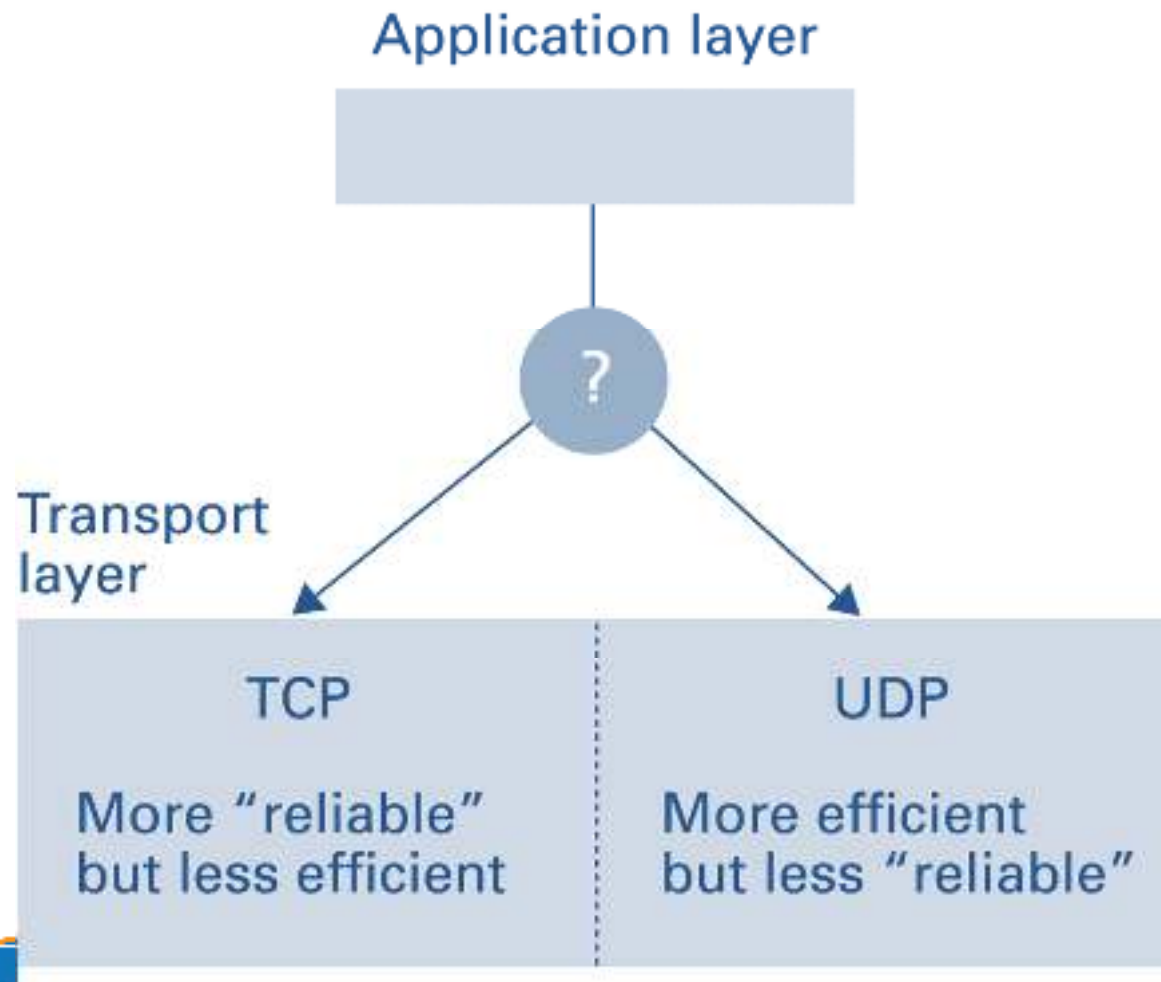
## □ Network Layer

- Internet Protocol (IP)
  - IPv4
  - IPv6





# Choosing between TCP and UDP





# SECURITY





# Security

## ☐ Attacks

- ☐ Malware (viruses, worms, Trojan horses, spyware, phishing software)
- ☐ Denial of service (DoS)
- ☐ Spam

## ☐ Protection

- ☐ Firewalls
- ☐ Spam filters
- ☐ Proxy Servers
- ☐ Antivirus software



# Types of computer crime

- ☐ Identify theft—criminal access to personal information in order to impersonate someone
- ☐ Dumpster diving—disgruntled employees or thieves go through a company's trash to find information they can steal
- ☐ Phishing attacks—legitimate-looking e-mails or Web sites created in an attempt to obtain confidential data about a person
- ☐ Spear phishing (similar to phishing)—uses targeted fake e-mails and social engineering to trick recipients into providing personal information to enable identity theft





# Types of computer crime

□ Malware (short for malicious software)—programs that intentionally harm a computer system or allow individuals to gain access without permission

□ Tips to protect yourself from malware:

- Know who you are dealing with
- Keep your Web browser and operating system up to date
- Back up important files
- Protect children online
- Use security software tools and keep them up to date



# Types of computer crime

- Spyware—software that gathers private information and tracks Web use
  - ▣ Adware—form of spyware that generates annoying pop-up and banner ads
  - ▣ Keyloggers—record keystrokes to provide cybercriminals with confidential data



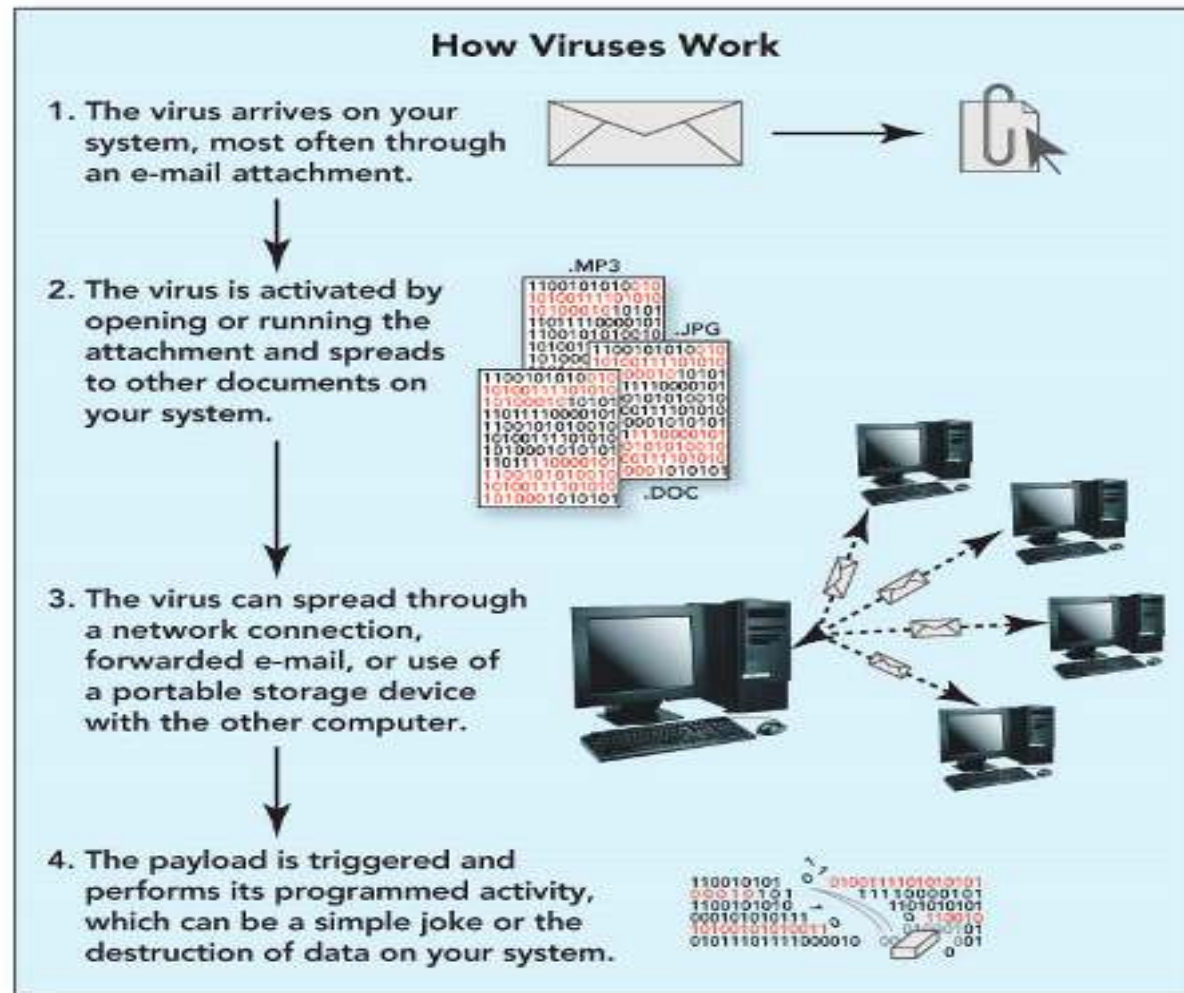




# Types of computer crime

- Computer virus—code concealed inside a program that can harm or destroy files
  - Many spread through e-mail attachments
  - File infectors—attach themselves to files
  - Payload—refers to the dangerous actions a virus performs.
  - Macro viruses—attach to data files and take advantage of application macros
  - Boot sector viruses—execute each time you start the computer
  - SPIM—spam text message sent via a cell phone or instant messaging service

# Computer Crime and Cybercrime





# Types of computer crime

## □ Rogue programs

- Logic bomb—hidden computer code that sits dormant on a system until triggered
- Time bomb—virus program that remains dormant on a computer system until activated
- Worm—similar to a virus but does not need action of a user to execute





# Types of computer crime

- Denial of service (DoS) attack—assaults an Internet server with so many requests it can't function
- Distributed denial of service (DDoS)—attack involves multiple computer systems
  - Commandeered computers form a botnet (robot network)
  - Bot (short for robot)—connects individual computers to the controller, usually a server under the control of the botnet controller
  - The individual computers are called zombies.





# Computer Crime and Cybercrime

## □ More rogue programs (con't.)

□ Syn flooding—form of denial of service attack in which synchronization packets are repeatedly sent to every port on the server

- Uses up all available network connections
- Locks them until they time out

□ Rootkit—malicious program that is disguised as a useful program

- Enables attacker to gain administrator level access
- Allows attacker to have repeated and undetected access

□ Trojan horse—normal looking program that



# Computer Crime and Cybercrime

- ☐ Fraud, theft, and piracy
  - ☐ Memory shaving
  - ☐ Software piracy
- ☐ Cybergaming crime
- ☐ Tricks for obtaining passwords
- ☐ Salami shaving and data diddling
- ☐ Forgery





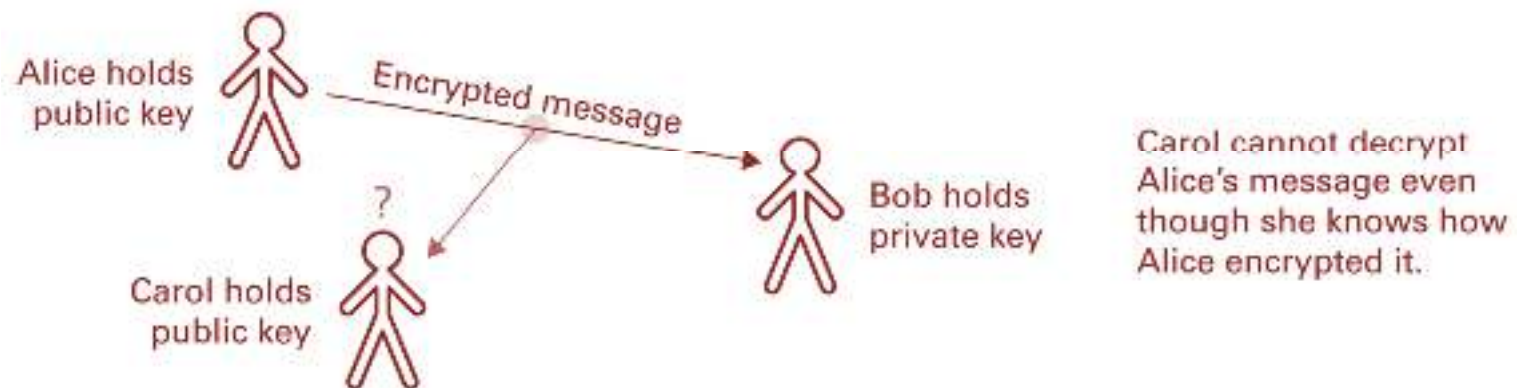
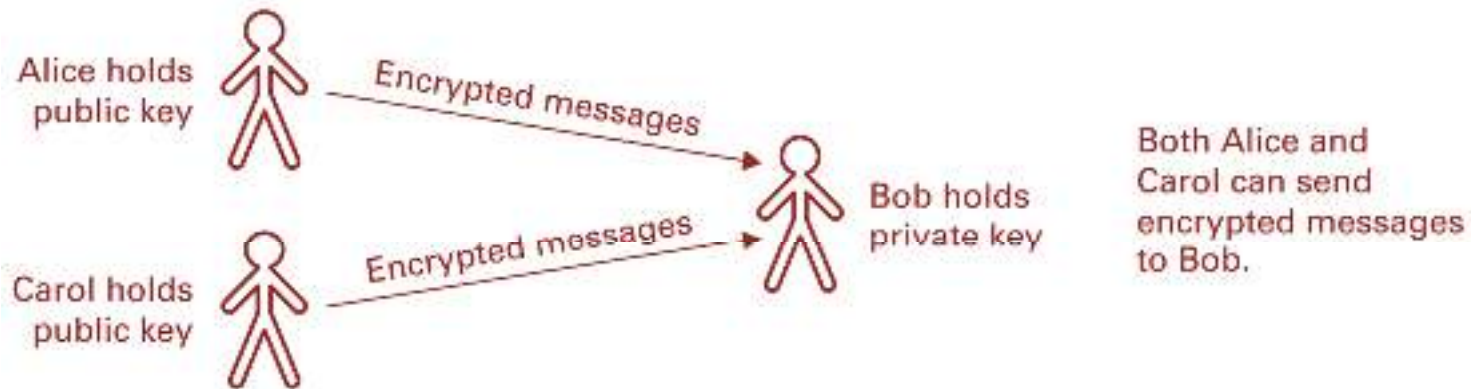
# Encryption

- ☐ HTTPS and SSL
- ☐ Public-key Encryption
  - ☐ Public key: Used to encrypt messages
  - ☐ Private key: Used to decrypt messages
- ☐ Certificates and Digital Signatures
  - ☐ Certificate authorities





# Public-key encryption







# COMPUTER CRIME





# Computer Crime

- ☐ cyber crime, e-crime, electronic crime, or hi-tech crime.
- ☐ Computer crime is an act performed by a knowledgeable computer user, sometimes referred to as a hacker that illegally browses or steals a company's or individual's private information.
- ☐ In some cases, this person or group of individuals may be malicious and destroy or otherwise corrupt the computer or data files.





# Computer crime

- ☐ **Child pornography** - Making or distributing child pornography.
- ☐ **Copyright violation** - Stealing or using another person's copyrighted material without permission.
- ☐ **Cracking** - Breaking or deciphering codes that are being used to protect data.
- ☐ **Cyber terrorism** - Hacking, threats, and blackmailing towards a business or person.
- ☐ **Cyberbully** or **Cyberstalking** - Harassing or stalking others online.
- ☐ **Cybersquatting** - Setting up a domain of another person or company with the sole intentions of selling it to them later at a premium price.
- ☐ **Creating Malware** - Writing, creating, or distributing malware (e.g., viruses and spyware.)
- ☐ **Denial of Service attack** - Overloading a system with so many requests it cannot serve normal requests.
- ☐ **Espionage** - Spying on a person or business.





# Computer crime

- ☐ Fraud - Manipulating data, e.g., changing banking records to transfer money to an account or participating in credit card fraud.
- ☐ Harvesting - Collect account or other account related information on other people.
- ☐ Human trafficking - Participating in the illegal act of buying or selling other humans.
- ☐ Identity theft - Pretending to be someone you are not.
- ☐ Illegal sales - Buying or selling illicit goods online including drugs, guns, and psychotropic substances.
- ☐ Intellectual property theft - Stealing practical or conceptual information developed by another person or company.
- ☐ IPR violation - An intellectual property rights violation is any infringement of another's copyright, patent, or trademark.
- ☐ Phishing - Deceiving individuals to gain private or personal information about that person.





# Computer crime

- ☐ **Salami slicing** - Stealing tiny amounts of money from each transaction.
- ☐ **Scam** - Tricking people into believing something that is not true.
- ☐ **Slander** - Posting libel or slander against another person or company.
- ☐ **Software piracy** - Copying, distributing, or using software that is copyrighted that you did not purchase.
- ☐ **Spamming** - Distributed unsolicited e-mail to dozens or hundreds of different addresses.
- ☐ **Spoofing** - Deceiving a system into thinking you are someone you really are not.
- ☐ **Typosquatting** - Setting up a domain that is a misspelling of another domain.
- ☐ **Unauthorized access** - Gaining access to systems you have no permission to access.
- ☐ **Wiretapping** - Connecting a device to a phone line to listen to conversations.





# Cyberbully

- Alternatively referred to as a cyberstalker, a cyberbully is someone who posts inappropriate or unwanted things about another person, or otherwise harasses them in e-mails, IMs, or SMS.





# Spyware

- Spyware or **snoopware**
  - a software program that is intentionally installed on a computer by to monitor what other users of the same computer are doing.
  - a program designed to gather information about a user's activity secretly. Spyware programs are often used to track users' habits to target them with advertisements better.





# Computer fraud

## □ Computer fraud

- ▣ any act using computers, the Internet, Internet devices, and Internet services to defraud people, companies, or government agencies of money, revenue, or Internet access.
- ▣ Illegal computer activities include **phishing**, **social engineering**, viruses, and DDoS attacks are some examples used to disrupt service or gain access to another's funds.





# Identity theft

- Identity theft is the act of a person obtaining information illegally about someone else.
- Thieves try to find such information as full name, maiden name, address, date of birth, social security number, passwords, phone number, e-mail, and credit card numbers.
- The thief can then use this information to gain access to bank accounts, e-mail, cell phones, identify themselves as you, or sells your information.





# Phishing

- describe a malicious individual or group of individuals who scam users.
- They do so by sending e-mails or creating web pages that are designed to collect an individual's online bank, credit card, or other login information. Because these e-mails and web pages look like legitimate companies users trust them and enter their personal information.





# DEPARTMENT OF NETWORKS AND TELECOMMUNICATIONS





# Overview

- ☐ Since 1998
- ☐ Room: I.74
- ☐ Tel: (028) 38.324.467 (ext: 711)
- ☐ Head: Prof. Tran Trung Dung
- ☐ Vice Head: Msc. Huynh Thuy Bao Tran

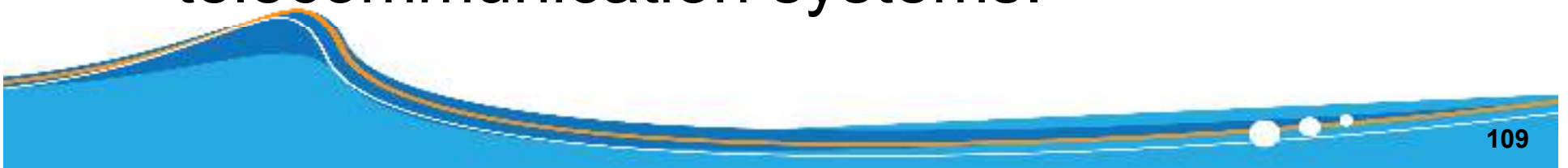




# GOALs

## Bachelor in Computer Networks and Telecommunications (CN&T)

- ❑ Provide a strong background in computer networking
- ❑ This program focuses on providing knowledge and skill regarding to design, implementation, installation, operation and maintenance computer network & telecommunication systems.





# GOALS

- ❑ Research methodology in CN&T field
- ❑ Be able to self learning new technologies as well as applying them in real life problems.
- ❑ After graduated, students are able to work in worldwide environment.





## Career orientation- Future career

- ❑ Computer Systems & Networking administration, Design and consulting of Computer networks & telecommunications systems
- ❑ Computer networking programming
- ❑ Computer & computer networks securities
- ❑ Internet of Things





# Required courses

Students accumulate at least 5 courses

STT	MÃ SỐ	TÊN HỌC PHẦN	TC	LT	TH
1	CTT601	Hệ điều hành nâng cao	4	45	30
2	CTT602	Hệ thống viễn thông	4	45	30
3	CTT603	Lập trình mạng	4	45	30
4	CTT604	Mạng máy tính nâng cao	4	45	30
5	CTT605	Thực tập mạng máy tính	4	45	30







# Optional courses

Students accumulate at least 5 courses, which contain at least 2 courses (8 credits) of CN&T department

STT	MÃ SỐ	TÊN HỌC PHẦN	TC	LT	TH
11	CTT124	Kiến tập nghề nghiệp	2	15	30
12	CTT125	Khởi nghiệp	3	30	30
13	CTT621	An ninh mạng	4	45	30
14	CTT622	An ninh mạng nâng cao	4	45	30
15	CTT623	Chuyên đề Hệ điều hành Linux	4	45	30
16	CTT624	Kiến trúc máy tính nâng cao	4	45	30
17	CTT625	Mạng cảm ứng không dây	4	45	30
18	CTT626	Mô hình hóa và mô phỏng mạng	4	45	30
19	CTT627	Seminar mạng máy tính	4	45	30
20	CTT628	Thiết kế mạng	4	45	30



# Optional courses

STT	MÃ SỐ	TÊN HỌC PHẦN	TC	LT	TH
21	CTT629	Thực tập hệ điều hành mạng	4	45	30
22	CTT630	Thực tập hệ thống viễn thông	4	45	30
23	CTT631	Truyền thông không dây	4	45	30
24	CTT631	Truyền thông kỹ thuật quang	4	45	30
25	CTT633	Truyền thông kỹ thuật số	4	45	30
26	CTT634	Xử lý và tính toán song song	4	45	30





# Courses & Career orientation

Mã MH	Tên môn học	Môn học trước	QTM	TK M	Tư vấn	PM M	NC & GD
CTT601	Hệ điều hành nâng cao	HĐH		*	*		*
CTT602	Hệ thống viễn thông	MMT	*	*	**	*	**
CTT603	Lập trình mạng	HĐH	*	*	*	**	**
CTT604	Mạng máy tính nâng cao	HĐH	**	*	**	**	**
CTT605	Thực tập mạng máy tính	MMT nâng cao	**	*	**	*	**
CTT621	An ninh mạng	MMT nâng cao	**	*	*		*
CTT622	An ninh mạng nâng cao	An ninh mạng	**	*	*		*
CTT623	CĐỀ Hệ điều hành Linux	HĐH, MMT	**		*	*	*
CTT624	Kiến trúc MT nâng cao	KTMT và h.ngữ			**		*
CTT625	Mạng cảm ứng không dây	MMT		*	*		*



# Courses & Career orientation

Mã MH	Tên môn học	Môn học trước	QTM	TK M	Tư vấn	PM M	NC & GD
CTT625	Mạng cảm ứng không dây	MMT		*	*		*
CTT626	Mô hình hóa và mô phỏng mạng	XS thống kê B, MMT NC		*	*		**
CTT627	Seminar mạng máy tính	MMT nâng cao	*	*	*	*	*
CTT628	Thiết kế mạng	MMT nâng cao	*	**	*		*
CTT629	Thực tập HĐH mạng	HĐH	**	*	*	*	*
CTT630	Thực tập HT viễn thông	HĐH, HT VT	**				*
CTT631	Truyền thông không dây	MMT	**	*	*	*	*
CTT632	Tr. thông kỹ thuật quang	MMT	*		**		*
CTT633	Truyền thông kỹ thuật số	MMT	*	*	**		*
CTT634	Xử lý và tính toán s.song	MMT			*	**	*



# Career & job position

**a. Quản trị mạng:**

CV quản trị hệ thống mạng, CV triển khai dịch vụ mạng

**b. Thiết kế:**

CV thiết kế mạng

**c. Tư vấn:**

CV tư vấn HT mạng, CV tư vấn an ninh mạng, CV tư vấn DV/UD mạng

**d. Xây dựng dịch vụ mạng:**

CV thiết kế web, CV thiết kế ứng dụng mạng

**e. Nghiên cứu & giảng dạy:**

Trợ giảng, giảng viên, nghiên cứu viên





# Company & Career orientation

Doanh nghiệp – Cơ quan	Nghề nghiệp
Các Cty xây dựng phần mềm	d
Các Cty kiểm chứng phần mềm	d
Các Cty thiết kế lắp đặt mạng và triển khai HT mạng	b, c
Các Cty cung cấp giải pháp, thiết bị, dịch vụ mạng	c, b
Các ISP, trung tâm dữ liệu (data center)	a, c, b
Các Cty, cơ quan có sử dụng CNTT	a, d
Các trường, viện, TT đào tạo và nghiên cứu	e



# QUIZ





# Quiz

- ☐ Which of the following best describes the Internet?
- A. A network of interlinked computers
  - B. A communications network
  - C. An information network
  - D. All of the above







# Quiz

- ☐ When was the first Internet network started?
- A. 1969
  - B. 1983
  - C. 1987
  - D. 1996





# Quiz

- ☐ The Internet was originally developed by whom?
- A. computer hackers
  - B. corporation
  - C. the U.S. Department of Defense
  - D. the University of Michigan





# Quiz

- ☐ Where do files live on the Internet?
- A. On your computer
- B. On one massive computer - the www
- C. On individual computers, often known as servers
- D. On a network of routers





# Quiz

- ☐ Who writes the rules for the Internet?
- A. No-one
  - B. The government of the country in which the Internet is being used
  - C. The Internet Society
  - D. Your parents





## Quiz

- ☐ Which of the following is a TRUE statement?
- A. You are free to copy information you find on the Web and include it in your research report.
  - B. You do not have to cite the Web sources you use in your research report.
  - C. You should never consult Web sources when you are doing a research report.
  - D. Just like print sources, Web sources must be cited in your research report. You are



# Quiz

- ☐ What is the World Wide Web?
- A. computer game
- B. software program
- C. the part of the Internet that enables information-sharing via interconnected pages
- D. another name for the Internet





# Quiz

- ☐ What does URL stand for?
- A. Unique Records List
  - B. Uniform Resource Locator
  - C. Undefined Restricted Learner
  - D. Universal Robot Location





# Quiz

- ☐ Which of the following is used to translate between IP addresses and mnemonic addresses?
- A. File server
  - B. Mail server
  - C. Name server
  - D. FTP server







# Quiz

☐ Which of the following is not a means of connecting networks?

- A. Switch
- B. Server
- C. Router
- D. Bridge





# Quiz

☐ Which of the following is not an email related protocol?

- A. HTTP
- B. POP3
- C. IMAP
- D. SMTP

