



CHAPTER **4**

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# Telecommunications and Networking

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1. What Is a Computer Network?
  2. Network Fundamentals
  3. The Internet and the World Wide Web
  4. Network Applications
-



1. Compare and contrast the major types of networks.
2. Describe the wireline communications media and transmission technologies.
3. Describe the most common methods for accessing the Internet.
4. Explain the impact that networks have had on business and everyday life for each of the six major categories of network applications.

# OPENING



## • **Get Rid of E-Mail? Seriously?**



1. Is it feasible for your university to eliminate e-mail? Why or why not? Would you support such a policy at your school? Why or why not?
2. Describe the advantages and disadvantages of eliminating e-mail from an organization. Provide specific examples to support your answers.

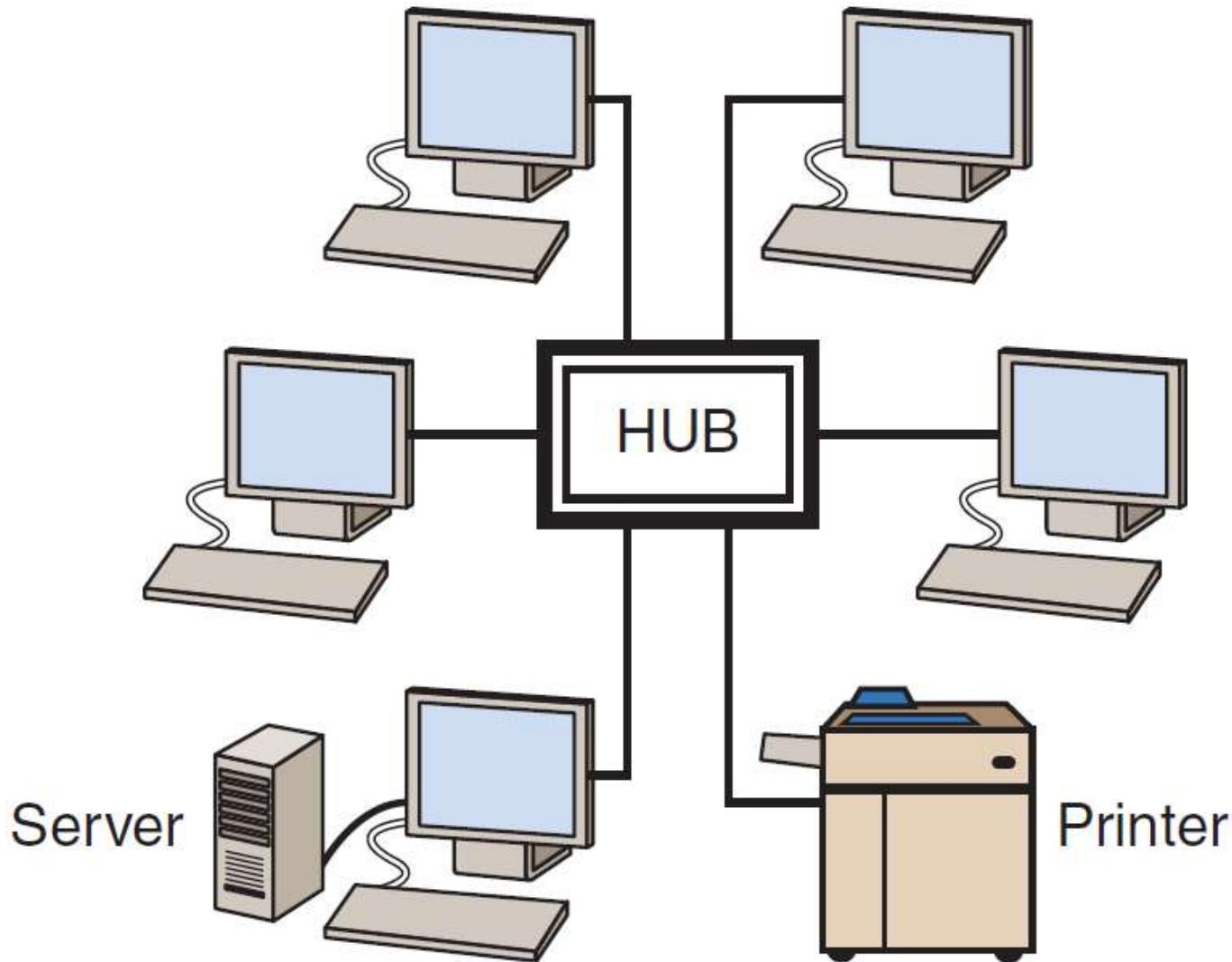
# 4.1 What Is a Computer Network?

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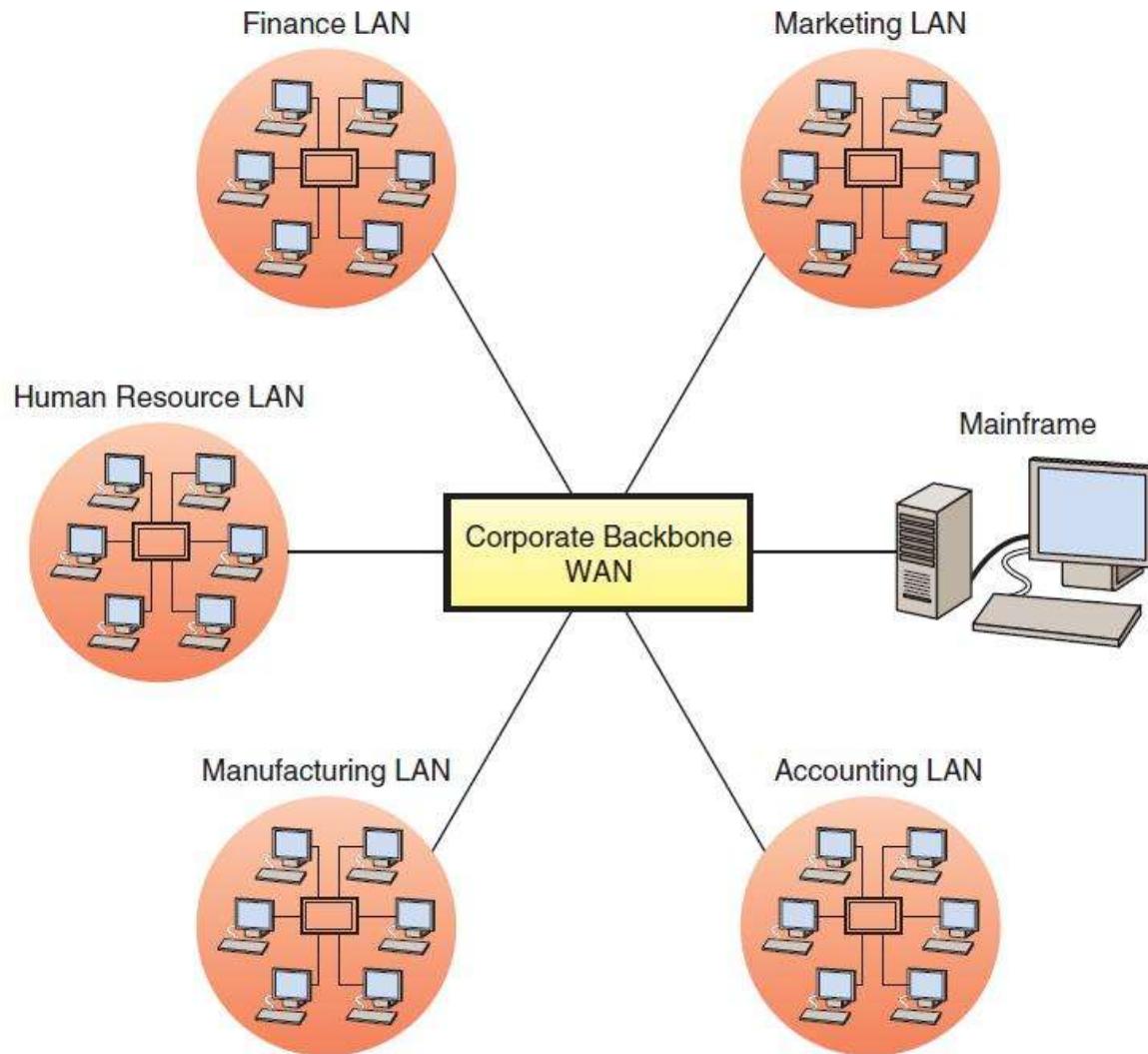
- Computer Network
- Bandwidth
- Broadband
- Local Area Networks
- Wide Area Networks
- Enterprise Networks

# Figure 4.1: Ethernet Local Area Network (LAN)

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# Figure 4.1: Ethernet Local Area Network (LAN)



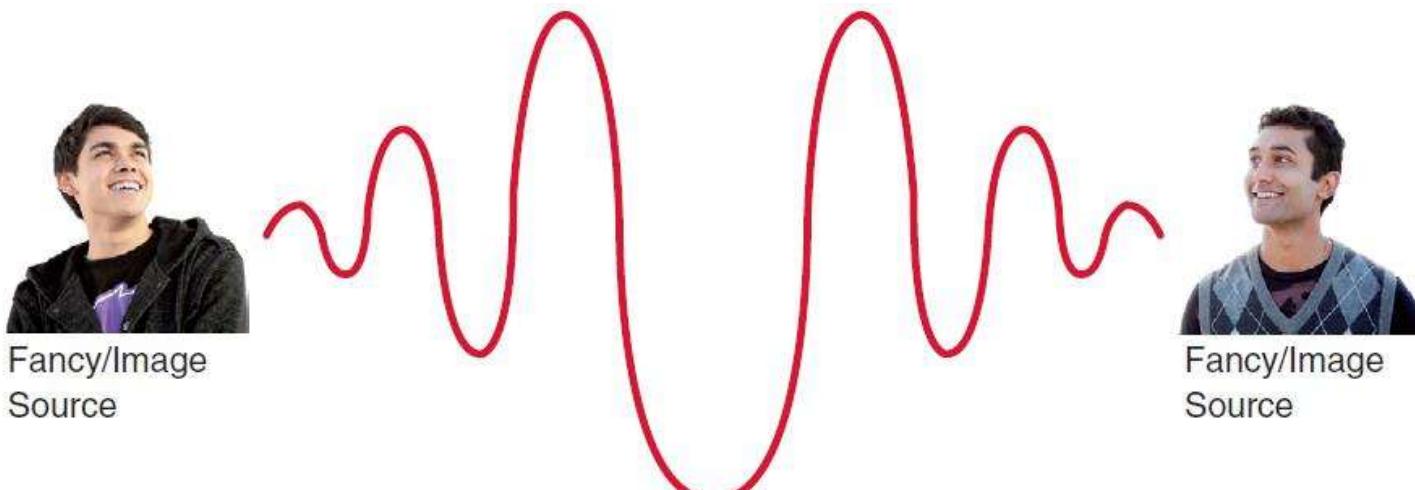
## 4.2 Network Fundamentals

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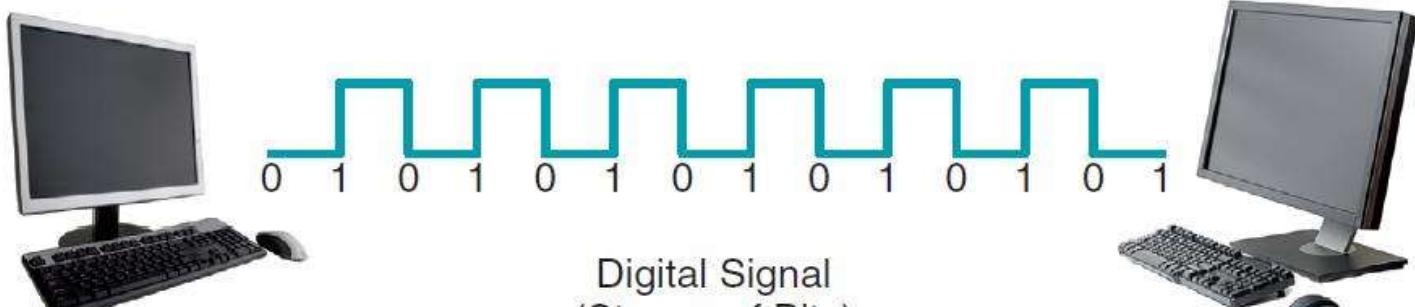
- Analog and Digital Signals
- Modem
- Communications Media and Channels
- Network Protocols
- Types of Network Processing

# Figure 4.3: Analog and Digital Signals

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Analog Signal  
(Wave Signals)



Digital Signal  
(Stream of Bits)

Media Bakery

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Fotostock

# Communications Media and Channels

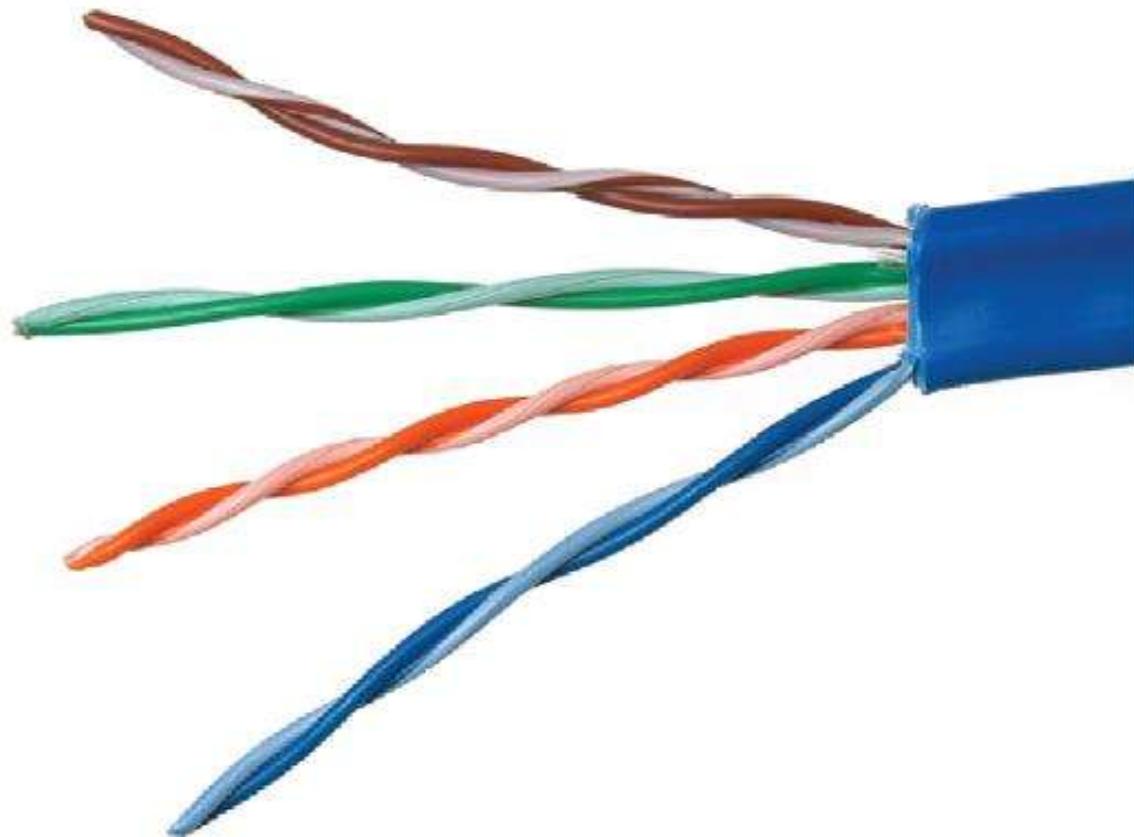
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- Twisted-Pair Wire
- Coaxial Cable
- Fiber Optics



# Communications Media: Twisted-Pair Wire

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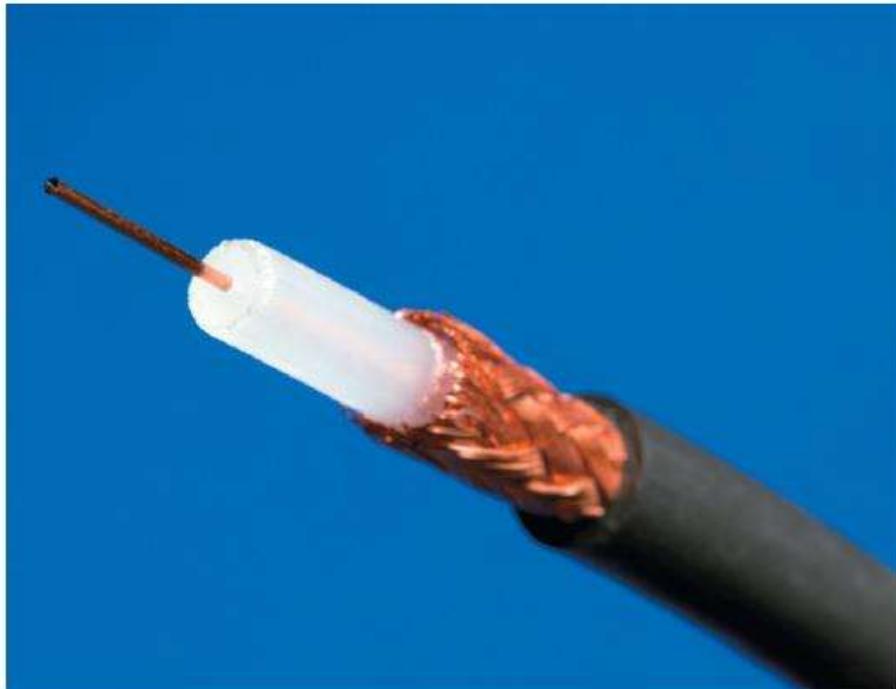


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# Communications Media: Coaxial Cable

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GIPhotoStock/Science Source

Cross-section view

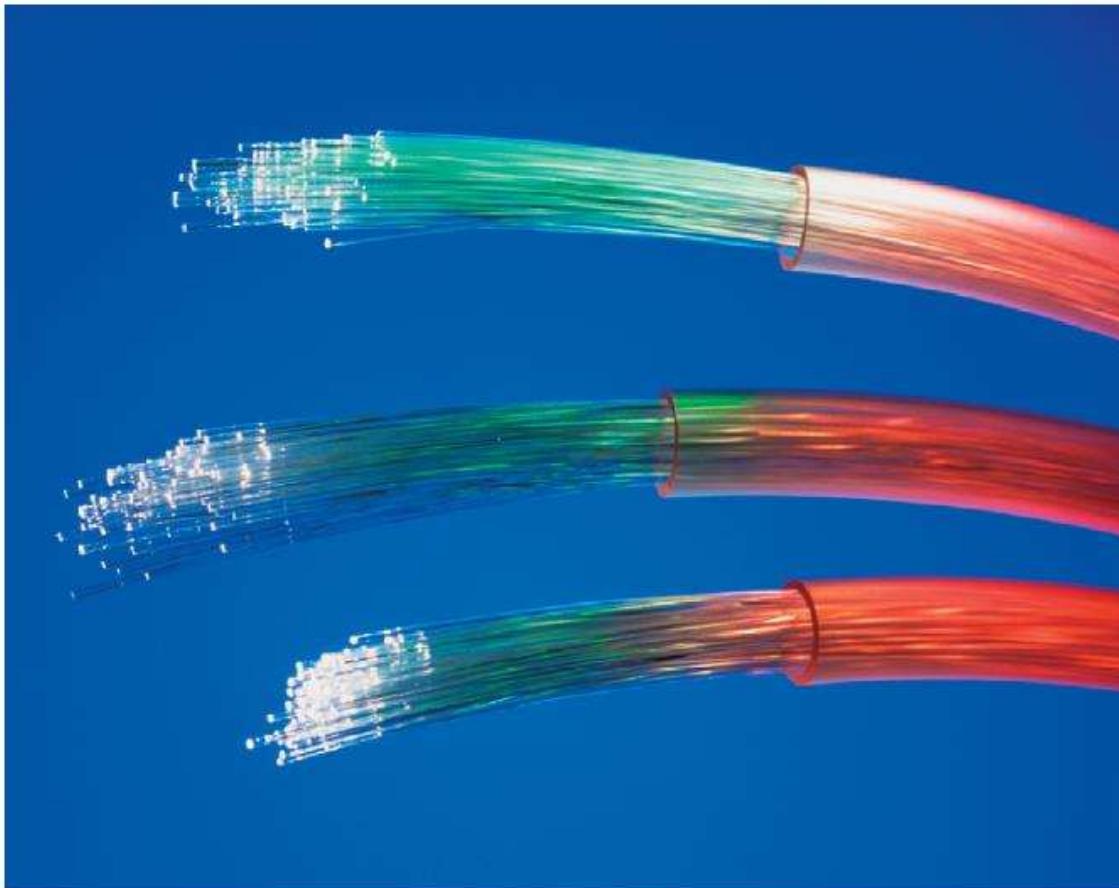


© piotr\_malczyk/iStockphoto

How coaxial cable looks to us

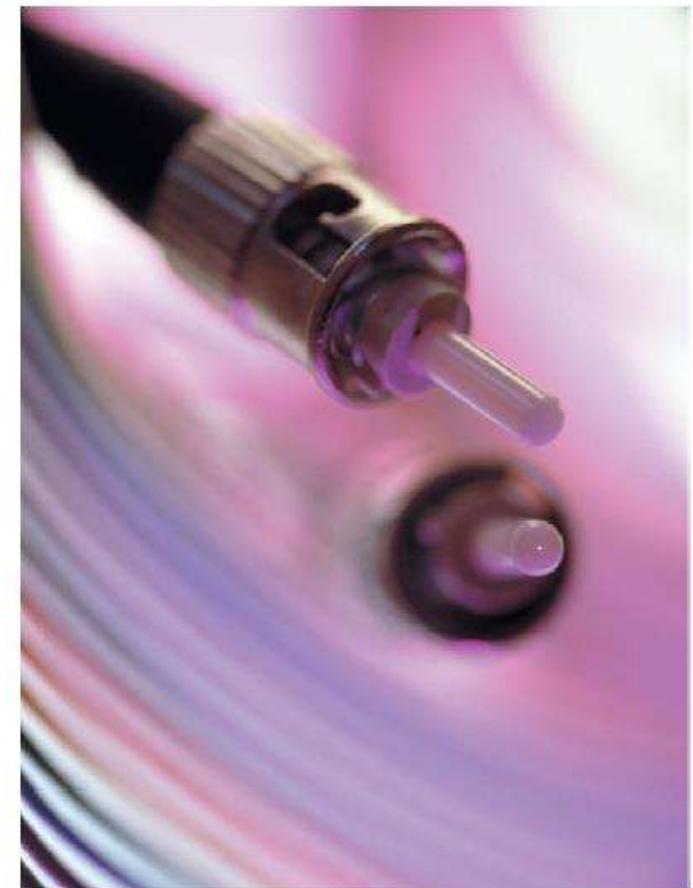
# Communications Media: Fiber Optics

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Philip Hatson/Science Source

Cross-section view



Chris Knapton/Science Source

How fiber-optic cable looks to us

# Table 4.1: Advantages and Disadvantages of Wireline Communications Channels

| Channel           | Advantages                                       | Disadvantages                                |
|-------------------|--|--|
| Twisted-pair wire | Inexpensive                                      | Slow (low bandwidth)                         |
|                   | Widely available                                 | Subject to interference                      |
|                   | Easy to work with                                | Easily tapped (low security)                 |
| Coaxial cable     | Higher bandwidth than twisted-pair               | Relatively expensive and inflexible          |
|                   |  | Easily tapped (low to medium security)       |
| Fiber-optic cable | Less susceptible to electromagnetic interference | Somewhat difficult to work with              |
|                   | Very high bandwidth                              | Difficult to work with (difficult to splice) |
|                   | Relatively inexpensive                           |  |
|                   | Difficult to tap (good security)                 |  |

# Network Protocols

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- Ethernet
- Transmission Control Protocol / Internet Protocol (TCP/IP)



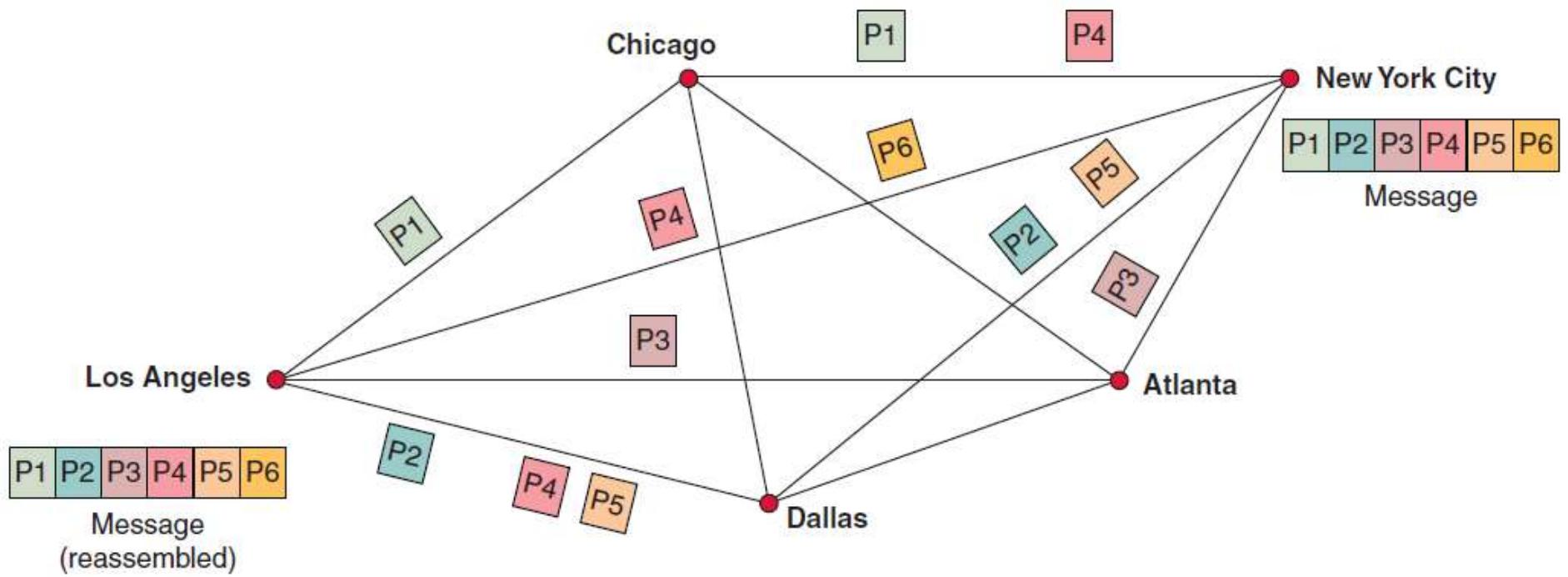
# Transmission Control Protocol / Internet Protocol

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- Three Basic Functions of TCP
- Packets & Packet Switching
- Four Layers of the TCP/IP Reference Model

# Figure 4.8: Packet Switching

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# Three Basic Functions of the TCP

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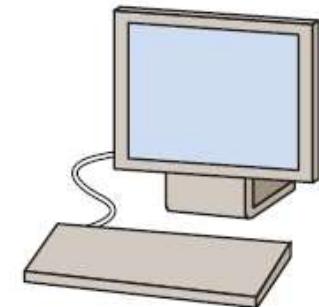
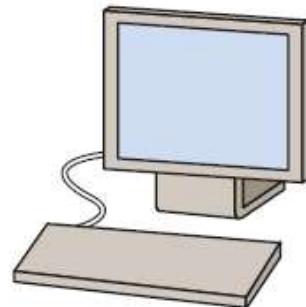
1. Manages the movement of data packets between computers by establishing a connection between the computers
2. Sequences the transfer of packets
3. Acknowledges the packets that have been transmitted

# Four Layers of the TCP/IP Reference Model

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1. Application Layer
2. Transport Layer
3. Internet Layer
4. Network Interface Layer

# Figure 4.7: The Four Layers of TCP/IP Reference Model



|  |                   |   |
|--|-------------------|---|
| Email: Sending a Message via SMPT (Simple Mail Transfer Protocol)  | Application       | Email: Message received                                       |
| Break Message into packets and determine order                     | Transport         | Packets reordered and replaced (if lost)                      |
| Assign sending and receiving IP addresses and apply to each packet | Internet          | Packets routed through internal network to desired IP address |
| Determine path across network/ Internet to intended destination    | Network Interface | Receipt of packets  |



# Types of Network Processing

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- Distributed Processing
- Client/Server Computing
- Peer-to-Peer Processing



# IT'S ABOUT BUSINESS 4.1

- **Internet Access in Cuba**

1. Describe the advantages and disadvantages of the global Internet to Cuban citizens.
2. Describe the advantages and disadvantages of the global Internet to the Cuban government.



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## 4.3 The Internet and the World Wide Web

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- Internet versus WWW
- Accessing the Internet
- The Future of the Internet
- The World Wide Web

# Accessing the Internet

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- Connecting via an Online Service
- Connecting via Other Means
  - Internet kiosks
  - Smart phones and iPads
  - Cybercafes
- Addresses on the Internet

# Figure 4.9: Internet (backbone in white)

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# Table 4.2: Internet Connection Methods

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| Service                  | Description   |
|--------------------------|---|
| Dial-up                  | Still used in the United States where broadband is not available  |
| DSL                      | Broadband access via telephone companies  |
| Cable modem              | Access over your cable TV coaxial cable. Can have degraded performance if many of your neighbors are accessing the Internet at once |
| Satellite                | Access where cable and DSL are not available  |
| Wireless                 | Very convenient, and WiMAX will increase the use of broadband wireless  |
| Fiber-to-the-home (FTTH) | Expensive and usually placed only in new housing developments   |

# Future of the Internet

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Experts are concerned that Internet users will experience brownouts from 3 factors:

1. increasing number of people working online
2. Popularity of Web sites such as YouTube requiring large amounts of bandwidth
3. Demand for high-definition television delivered over the Internet

# The World Wide Web (www)

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- World Wide Web
- Internet
- Intranet
- Extranet



## 4.4 Network Applications

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- Discovery
- Communication
- E-learning and Distance Education
- Virtual Universities
- Telecommuniting



# Network Applications: Discovery

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- Search Engines and Metasearch Engines
- Publication of Material in Foreign Languages
- Portals



# Publication of Materials in Foreign Languages

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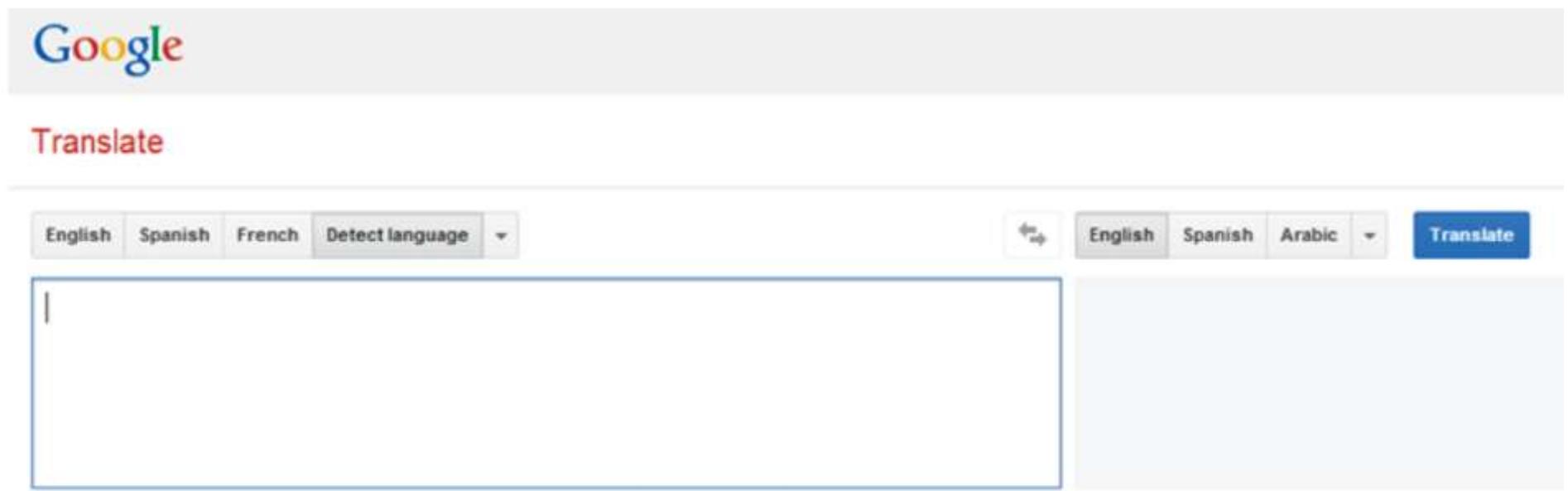


Figure 4.10 Google Translate. (Google and the Google logo are registered trademarks of Google Inc., used with permission)

# IT'S ABOUT BUSINESS 4.2

- **Just Exactly What Is Quora?**
  1. Is Quora a search engine, a knowledge-management system, or both? Provide specific examples to support your answer.
  2. Is there an inherent problem with Quora itself selecting experts to whom the site sends questions? Support your answer.

# Network Applications: Portals

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- Commercial portal
- Affinity portal
- Corporate portal
- Industrywide portal

# Affinity Portals

The screenshot shows the University of West Georgia's myUWG portal. At the top left is a photo of two students. To the right is the "myUWG" logo with a red "my" and blue "UWG". Below the logo is a banner with three horizontal bars: yellow, red, and blue. On the left side, there's a "Welcome to myUWG" section with text and a "Pay Fees By Credit Card" link. In the center is a photo of three students. On the right is a "Secure Access Login" form with fields for User Name and Password, and buttons for Login and Cancel. Below the form are links for password change rules, browser support, lost password, and username lookup.

Welcome to myUWG

Welcome to the University of West Georgia's myUWG website.  
Please login to the right.

Pay Fees By Credit Card  
[Click here to pay fees by credit card.](#)

What's Inside?

**E-mail:** Send and receive e-mail, and create your own personal address book.

**Calendar:** Access and manage your personal, course and school calendars.

**Groups:** Create, manage and join group homepages for clubs, affiliations and interests.

and much more...

Secure Access Login

User Name:

Password:

Having problems logging in?  
[Click here for new Password Change Rules and supported browsers.](#)

[Lost your password?](#)  
[Lookup your Username](#)

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Figure 4.11 University of West Georgia affinity portal. (Courtesy of the University of West Georgia)

# Network Applications: Communication

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- Electronic Mail
  - Web-Based Call Centers
  - Electronic Chat Rooms
  - Voice Communication
    - Voice Over Internet Protocol (VoIP)
  - Unified Communications
  - Collaboration
  - Electronic Teleconferencing
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# Telecommunication: Teleconferencing/Telepresence

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HO Marketwire Photos/Newscom

Figure 4.12 Telepresence system.

# Network Applications: Collaboration

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- Workgroup
- Workflow
- Virtual Team
- Virtual Collaboration
- Crowdsourcing
- Synchronous versus Asynchronous
- Collaboration Tools



# Collaboration Tools

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- Microsoft Sharepoint
- Google Drive
- IBM Lotus Quikr
- Jive

# Network Applications: E-Learning versus Distance Education

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- E-Learning
- Distance Education



# Virtual Universities

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- University of Phoenix
- California Virtual Campus
- University of Maryland

# Network Applications: Telecommuting

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- Knowledge workers
- Digital Nomads

# IT'S ABOUT BUSINESS 4.3

## • **Yahoo! CEO Marissa Mayer Bans Telecommuting**

1. Do you feel that Yahoo! is making the correct decision of banning telecommuting? a. Present the pro side of this issue (i.e., Mayer's side). b. Present the con side of this issue.
2. This IT's About Business was written in March 2014. Take a look at [www.yahoo.com](http://www.yahoo.com) to see how the company is doing. Also, check on news articles about the ongoing fallout from Mayer's decision.
3. Discuss Mayer's internal memo quoted above. Do you agree or disagree with it? Support your answer.



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