



Telecommunication and Mobile Computing

Pertemuan 8

Kompetensi Khusus:

Mahasiswa mampu membedakan berbagai media transmisi nirkabel, dan jenis-jenis aplikasi mobile untuk kepentingan bisnis (C2)

Materi:

1. What Is a Computer Network
2. Network Fundamentals
3. The Internet and WWW
4. Wireless Technologies
5. Mobile Computing and Mobile Commerce
6. The Internet of Things



1. What Is a Computer Network?

1.1 What is a Network?

- A network consists of two or more computers that are linked in order to share resources (such as printers and CDs), exchange files, or allow electronic communications. The computers on a network may be linked through cables, telephone lines, radio waves, satellites, or infrared light beams.

1.2 Computer Network

- A computer network is a system that connects computers and other devices (e.g., printers) via communications media so that data and information can be transmitted among them. Voice and data communication networks are continually becoming faster—that is, their bandwidth is increasing—and cheaper.

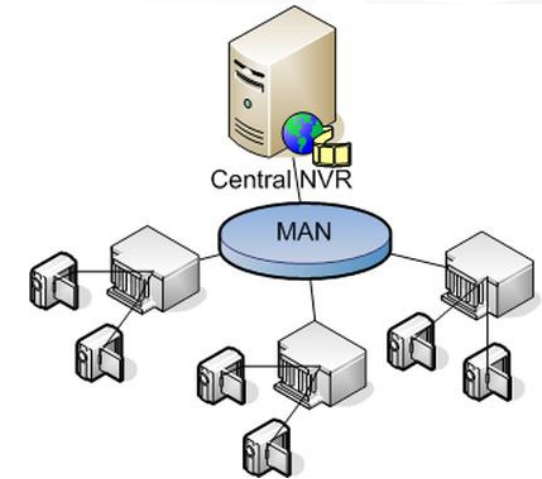
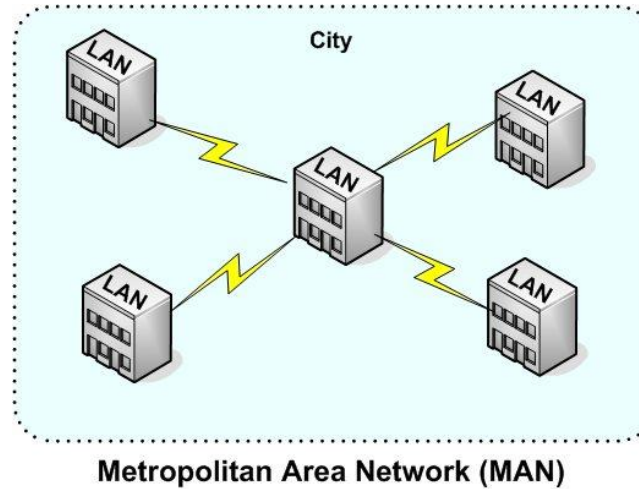
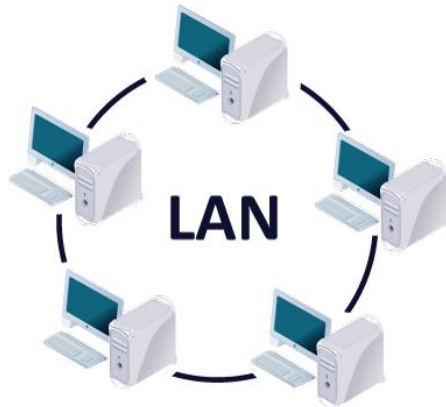
1.2 Computer Network (Lanj)

- **Bandwidth** refers to the transmission capacity of a network; it is stated in bits per second. Bandwidth ranges from narrowband (relatively low transmission capacity) to broadband (relatively high network capacity).

1.3 Types Of Computer Networks

- The various types of computer networks range from small to worldwide. They include (from smallest to largest) personal area networks (PANs), local area networks (LANs), metropolitan area networks (MANs), wide area networks (WANs), and the ultimate WAN, the Internet.

1.3 Types of Computer Network





2. Network Fundamentals

2.1 How Network Work?

- computer networks communicate via **digital signals**, which are discrete pulses that are either on or off, representing a series of *bits* (0's and 1's).
- This quality allows digital signals to convey information in a binary form that can be interpreted by computers.

2.2 Communications Media and Channels

- A **communications channel** is such a pathway. It is comprised of two types of media: cable (twisted pair wire, coaxial cable, or fiber-optic cable) and broadcast (microwave, satellite, radio, or infrared).
- **Wire line media** or **cable media** use physical wires or cables to transmit data and information. Twisted-pair wire and coaxial cables are made of copper, and fiber-optic cable is made of glass.
- The alternative is communication over **broadcast media** or **wireless media**.

2.3 Type of Network Processing

- Distributed processing divides processing work among two or more computers. This process enables computers in different locations to communicate with one another via telecommunications links.
- Two types of network processing
 1. Client/ Server Computing
 2. Peer-to-Peer (P2P) Processing



3. The Internet and WWW

3.1 The Internet

- The Internet (“the Net”) is a global WAN that connects approximately 1 million organizational computer networks in more than 200 countries on all continents, including Antarctica
- It has become so widespread that it features in the daily routine of some 3 billion people.
- Participating computer systems include smartphones, PCs, LANs, database, and mainframes.

3.1 The Internet (Lanj)

- They are connected to one another by data communications lines of different speeds.
- The primary network connections and telecommunications lines that link the nodes are referred to as the **Internet backbone**.
- For the Internet, the backbone is a fiber-optic network that is operated primarily by large telecommunications companies.

3.2 WWW (World Wide Web)

- Many people equate the Internet with the World Wide Web
- The Internet functions as a transport mechanism, whereas the World Wide Web is an application that uses those transport functions. Other applications, such as e-mail, also run on the Internet.
- The **World Wide Web (The Web, WWW, or W3)** is a system of universally accepted standards for storing, retrieving, formatting, and displaying information via a client/server architecture.

3.3 Hypertext

- **Hypertext** is the underlying concept defining the structure of the World Wide Web
- Hypertext is the text displayed on a computer display or other electronic device with references, called hyperlinks, to other text that the reader can immediately access, or where text can be revealed progressively at additional levels of details



4. Wireless Technologies

4.1 Wireless Technologies

- Wireless technologies include both wireless devices, such as smartphones, and wireless transmission media, such as microwave, satellite, and radio.
- Wireless Devices provide three major advantages to users:
 1. They are small enough to easily carry or wear
 2. They have sufficient computing power to perform productive tasks.
 3. They can communicate wirelessly with the internet and other devices

4.2 Wireless Transmission Media

- Wireless media, or broadcast media, transmit signals without wires. The major types of wireless media are microwave, satellite, and radio.

4.3 Advantages and Disadvantages

Channel	Advantages	Disadvantages
Microwave	High bandwidth Relatively inexpensive	Must have unobstructed line of sight Susceptible to environmental interference
Satellite	High bandwidth Large coverage area	Expensive Must have unobstructed line of sight Signals experience propagation delay Must use encryption for security
Radio	High bandwidth Signals pass through walls Inexpensive and easy to install	Creates electrical interference problems Susceptible to snooping unless encrypted



5. Mobile Computing & Mobile Commerce

5.1 Mobile Computing

- Mobile computing was designed for workers who travel outside the boundaries of their organizations as well as for anyone traveling outside his or her home.
- Mobile computing refers to a real-time connection between a mobile device and other computing environments
- This innovation is revolutionizing how people use computers.
- It is spreading at work and at home; in education, healthcare, and entertainment; and in many other areas.

5.2 Two Major Mobile Computing

- Mobile computing has two major characteristics that differentiate it from other forms of computing: ***mobility*** and ***broad reach***.
- **Mobility** means that users carry a device with them and can initiate a real-time contact with other systems from wherever they happen to be.
- **Broad reach** refers to the fact that when users carry an open mobile device, they can be reached instantly, even across great distances.

5.2 Two Major Mobile Computing

- Mobility and broad reach create five value-added attributes that break the barriers of geography and time: ubiquity, convenience, instant connectivity, personalization, and localization of products and services.

5.3 Mobile Commerce

- Mobile commerce (or m-commerce) refers to electronic commerce (EC) transactions that are conducted in a wireless environment, especially via the Internet.
- Like regular EC applications, m-commerce can be transacted via the Internet, private communication lines, smart cards, and other infrastructures.
- M-commerce creates opportunities for businesses to deliver new services to existing customers and to attract new customers.

5.4 Mobile Commerce Applications

- Mobile commerce applications are many and varied.
- The most popular applications include location-based applications, financial services, intra business applications, accessing information, and telemetry

5.5 Location-Based Applications and Services

- M-commerce B2C applications include location-based services and location-based applications.
- Location-based mobile commerce is called location-based commerce (or L-commerce).
- Location-based services provide information that is specific to a given location.

5.5 Location-Based Applications and Services (Lanj)

A mobile user can :

- (1) Request the nearest business or service, such as an ATM or a restaurant;
- (2) Receive alerts, such as a warning of a traffic jam or an accident; and
- (3) Find a friend.

5.6 Financial Services

- Mobile financial applications include banking, wireless payments and micropayments, money transfers, wireless wallets, and bill payment services.
- The bottom line for mobile financial applications is to make it more convenient for customers to transact business regardless of where they are or what time it is.
- In many countries, banks increasingly offer mobile access to financial and account information. For example, Citibank (www.citibank.com) alerts customers on their digital cell phones about changes to their account information.

5.7 Intra business Applications

- Although business-to-consumer (B2C) m-commerce receives considerable publicity, most of today's m-commerce applications actually are used within organizations. In this section, you will see how companies use mobile computing to support their employees.

5.8 Accessing Information

- Two types of technologies—mobile portals and voice portals—are designed to aggregate and deliver content in a form that will work within the limited space available on mobile devices.
- **A mobile portal** is a lean, or stripped down, version of a Web site that is optimized for viewing on a mobile device. Mobile portals try to match the functionality of a Web site while keeping data transfers to a minimum.
- **A voice portal** is the voice equivalent of a Web portal, providing access to information through spoken commands and voice responses. For example, most airlines utilize voice portals to provide real-time information on flight status.

5.9 Telemetry Application

- Telemetry is the wireless transmission and receipt of data gathered from remote sensors. Telemetry has numerous mobile computing applications.
- For example, technicians can use telemetry to identify maintenance problems in equipment. As another example, doctors can monitor patients and control medical equipment from a distance.



6. The Internet of Things

6.1 IoT

- The Internet of Things (IoT), also called the Internet of Everything, the Internet of Anything, the Industrial Internet, and machine-to-machine (M2M) communication, is a system in which any object, natural or manmade, has a unique identity (i.e., its own IP address) and is able to send and receive information over a network (i.e., the Internet) without human interaction.

6.1 IoT Technology

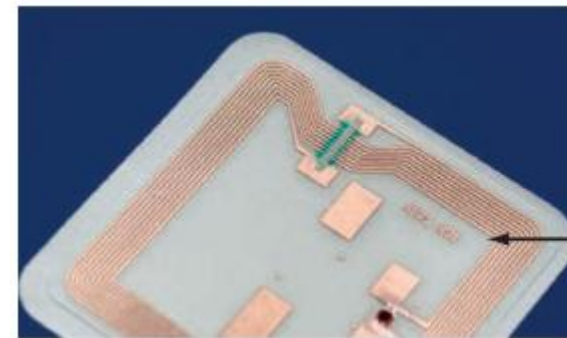
- Wireless sensors are an underlying technology of the Internet of Things.
- A wireless sensor is an autonomous device that monitors its own condition, as well as physical and environmental conditions around it, such as temperature, sound, pressure, vibration, and movement.
- Wireless sensors collect data from many points over an extended space. A sensor contains processing, storage, and radio-frequency antennas for sending and receiving messages.

6.2 Radio-Frequency Identification

- Radio-frequency identification technology allows manufacturers to attach tags with antennas and computer chips on goods and then track their movement via radio signals.
- RFID was developed to replace bar codes



QR code



RFID tag

6.3 Examples of IoT

- **The Smart Home:**

In a smart home, your home computer, television, lighting and heating controls, home security system (including smart window and door locks), thermostat, and appliances have embedded sensors and can communicate with one another via a home network. You control these networked objects through various devices, including your pager, smartphone, television, home computer, and even your automobile.

- **Healthcare:**

Patients with non-life-threatening conditions can wear sensors, or have them implanted—for example, to monitor blood pressure or glucose levels—that are monitored by medical staff. In many cases, the patients can be shown how to interpret the sensor data themselves. Also, consumer-oriented sensors such as the Fit bit can encourage people to adopt healthier lifestyles.

6.3 Example IoT

- **Supply Chain Management:**

The IoT can make a company's supply chain much more transparent. A company can now track, in real time, the movement of raw materials and parts through the manufacturing process to finished products delivered to the customer. Sensors in fleet vehicles (e.g., trucks) can monitor the condition of sensitive consignments (e.g., the temperature of perishable food). In addition, they can trigger automatic security alerts if a container is opened unexpectedly.

- **Agriculture:**

Sensors monitor, in real time, air temperature, humidity, soil temperature, soil moisture, leaf wetness, atmospheric pressure, solar radiation, trunk/stem/fruit diameter, wind speed and direction, and rainfall. The data from these sensors are used in precision agriculture. (Precision agriculture is a farming technique based on observing, measuring, and responding to inter- and intra field variability in crops.)

Summary

- The two major types of networks are local area networks (LANs) and wide area networks (WANs). LANs encompass a limited geographical area and are usually composed of one communications medium. In contrast, WANs encompass a broad geographical area and are usually composed of multiple communications media.
- Common methods for connecting to the Internet include dial-up, DSL, cable modem, satellite, wireless, and fiber to the home.
- Microwave transmission systems are used for high-volume, long distance, line-of-sight communication. One advantage is the high volume. A disadvantage is that microwave transmissions are susceptible to environmental interference during severe weather such as heavy rain and snowstorms.

Summary (Lanj)

- *Satellite transmission* systems make use of communication satellites, and they receive and transmit data via line-of-sight. One advantage is that the enormous footprint—the area of Earth's surface reached by a satellite's transmission—overcomes the limitations of microwave data relay stations. Like microwaves, satellite transmissions are susceptible to environmental interference during severe weather
- *Radio transmission* systems use radio-wave frequencies to send data directly between transmitters and receivers. An advantage is that radio waves travel easily through normal office walls. A disadvantage is that radio transmissions are susceptible to snooping by anyone who has similar equipment that operates on the same frequency

Summary (Lanj)

- The Internet of Things (IoT) is a system where any object, natural or manmade, has a unique identity (using IPv6) and the ability to send and receive information over a network (i.e., the Internet) without human interaction.



Terimakasih

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