



**T e l e c o m m u n i c a t i o n s , t h e  
i n t e r n e t , a n d W i r e l e s s  
t e c h n o l o g y**

Chapter 7

# WELCOME

Group 7

## group members:

1. Dewi Setyani 16808144017
2. Ricko Ilham S 16808144020
3. Zulaikha Azmali Sururi 16808144019
4. Moh Barqi Tobroni 16808144041



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What are the principal  
components  
of telecommunications  
networks and  
key networking  
technologies?



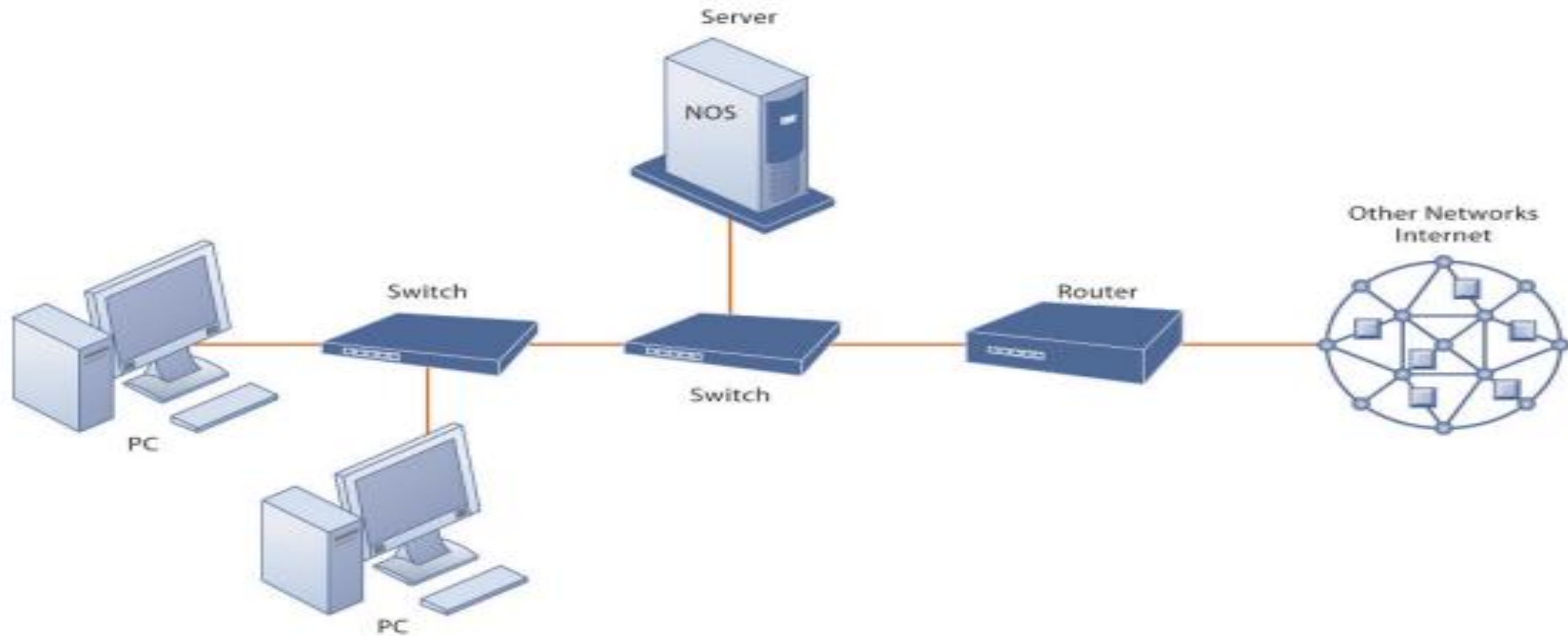
# What are the principal components of telecommunications networks and key networking technologies?

If you run or work in a business, you can't do without networks. You need to communicate rapidly with your customers, suppliers, and employees. Until about 1990, businesses used the postal system or telephone system with voice or fax for communication. Today, however, you and your employees use computers, email, text messaging, the Internet, mobile phones, and mobile computers connected to wireless networks for this purpose. Networking and the Internet are now nearly synonymous with doing business.

# Networking and Communication trends

Firms in the past used two fundamentally different types of networks: telephone networks and computer networks. Telephone networks historically handled voice communication, and computer networks handled data traffic. Telephone companies built telephone networks throughout the twentieth century by using voice transmission technologies (hardware and software), and these companies almost always operated as regulated monopolies throughout the world. Computer companies originally built computer networks to transmit data between computers in different locations.

# Networking and Communication trends



**Figure 7.1**

**Components of a Simple Computer Network**

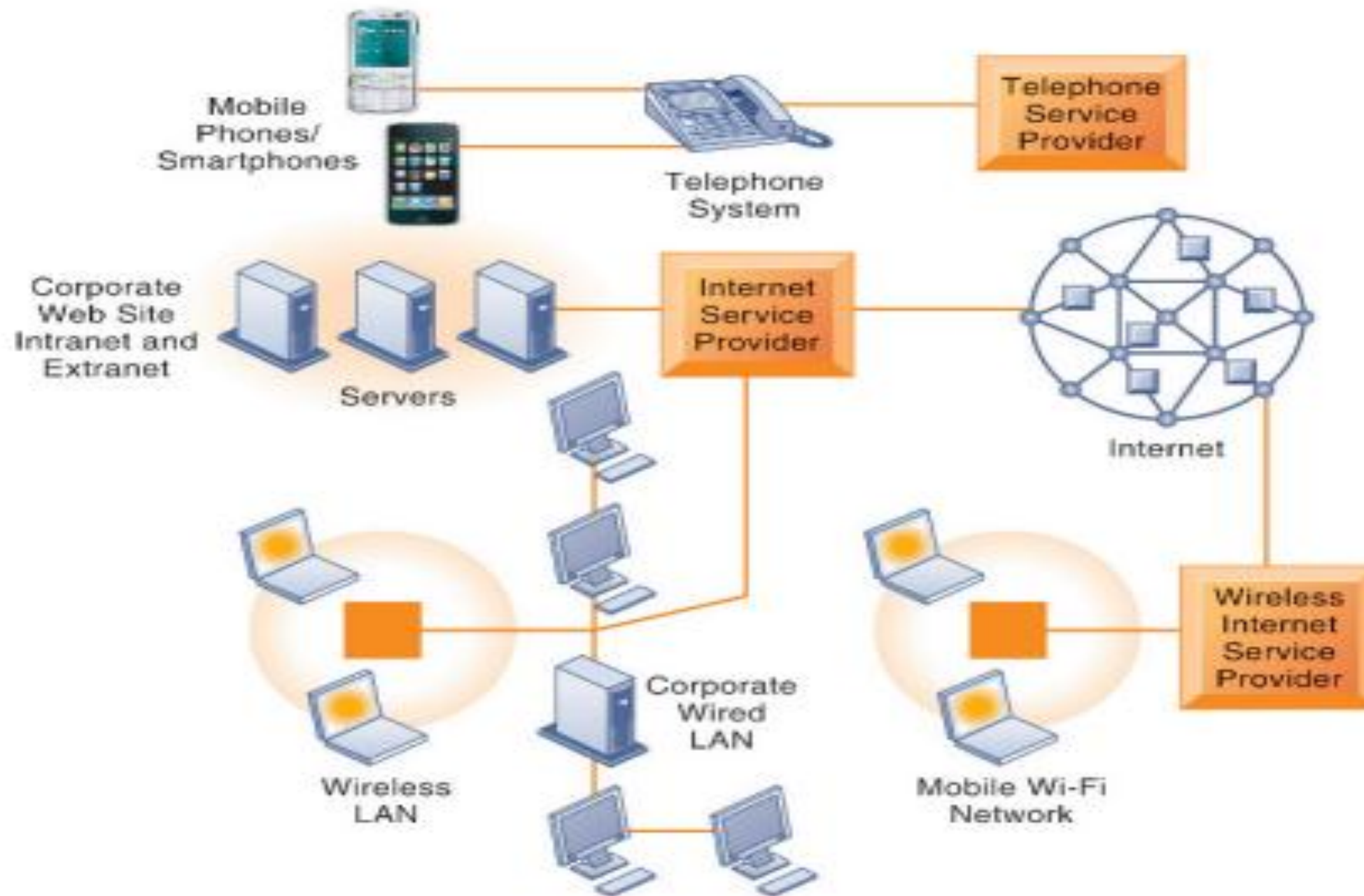
*Illustrated here is a simple computer network consisting of computers, a network operating system (NOS) residing on a dedicated server computer, cable (wiring) connecting the devices, switches, and a router.*

# Key digital Networking technologies

**Figure 7.2**

## Corporate Network Infrastructure

Today's corporate network infrastructure is a collection of many networks from the public switched telephone network, to the Internet, to corporate local area networks linking workgroups, departments, or office floors.





**Client/server Computing**


**packet switching**

**tCp/ip and Connectivity**

**Client/server** computing is a distributed computing model in which some of the processing power is located within small, inexpensive client computers and resides literally on desktops or laptops or in handheld devices. These powerful clients are linked to one another through a network that is controlled by network server computer. The server sets the rules of communication for the network and provides every client with an address so others can find it on the network.

**Packet switching** is a method of slicing digital messages into parcels called packets, sending the packets along different communication paths as they become available and then reassembling the packets once they arrive at their destinations

**Tcp/ip and Connectivity** In the past, diverse proprietary and incompatible protocols often forced businessfirms to purchase computing and communications equipment from a single vendor. However, today, corporate networks are increasingly using a single, common, worldwidedstandard called **Transmission Control Protocol/Internet Protocol (TCP/IP)**. TCP/IP was developed during the early 1970s to support U.S. Department of Defense Advanced Research Projects Agency (DARPA) efforts to help scientists transmit data among different types of computers over long distances.



What are the  
different types of  
networks?

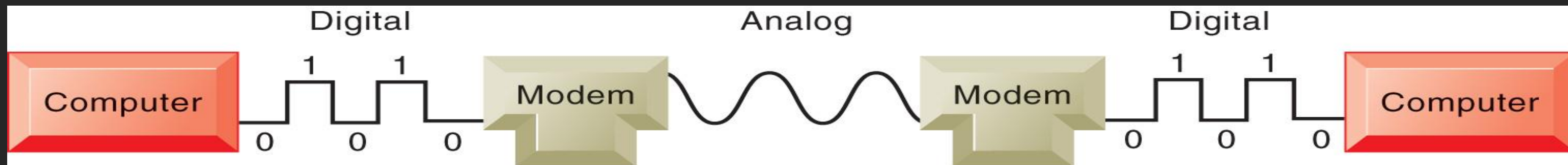
# Signals: digital vs. analog

- Analog
  - Continuous waveform
  - voice
- Digital
  - Digital, binary waveform
  - String of two discrete states: zero bits & one bits
  - Computer



## Figure 7.5

Functions of the Modem : *A modem is a device that translates digital signals into analog form (and vice versa) so that computers can transmit data over analog networks such as telephone and cable networks.*



## Types of networks

- Classify by geographic scope
  - Local Area network, LAN
    - Connect PCs and other digital devices within 500 meters
      - » Small office
      - » In one building
  - Campus area network
  - Metropolitan area network
  - Wide area network

## LAN

- Peer-to-peer architecture
  - Treat all processors equally
  - Do not need server to
    - Exchange data
    - Share peripheral

Type	area
Local area network (LAN)	Up to 500 meters (half a mile); an office or floor of a building
Campus area network (CAN)	Up to 1,000 meters (a mile); a college campus or corporate facility
Metropolitan area network (MAN)	A city or metropolitan area
Wide area network (WAN)	A regional, transcontinental, or global area



# Metropolitan and Wide area Networks

**Wide area networks (WANs)** span broad geographical distances—entire regions, states, continents, or the entire globe. The most universal and powerful WAN is the Internet. Computers connect to a WAN through public networks, such as the telephone system or private cable systems, or through leased lines or satellites. A **metropolitan area network (MAN)** is a network that spans a metropolitan area, usually a city and its major suburbs. Its geographic scope falls between a WAN and a LAN.

# TrANsmissioN media aNd traNsmissioN speed

Networks use different kinds of physical transmission media, including twisted pair wire, coaxial cable, fiber-optic cable, and media for wireless transmission. Each has advantages and limitations. A wide range of speeds is possible for any given medium, depending on the software and hardware configuration.

## **Bandwidth: transmission speed**

The number of cycles per second that can be sent through that medium is measured in **hertz**—one hertz is equal to one cycle of the medium.

The range of frequencies that can be accommodated on a particular telecommunications channel is called its **bandwidth**.

**How** do the internet  
and internet technology  
work and how do they  
support communication  
and e-business?



# WHAT IS THE INTERNET?

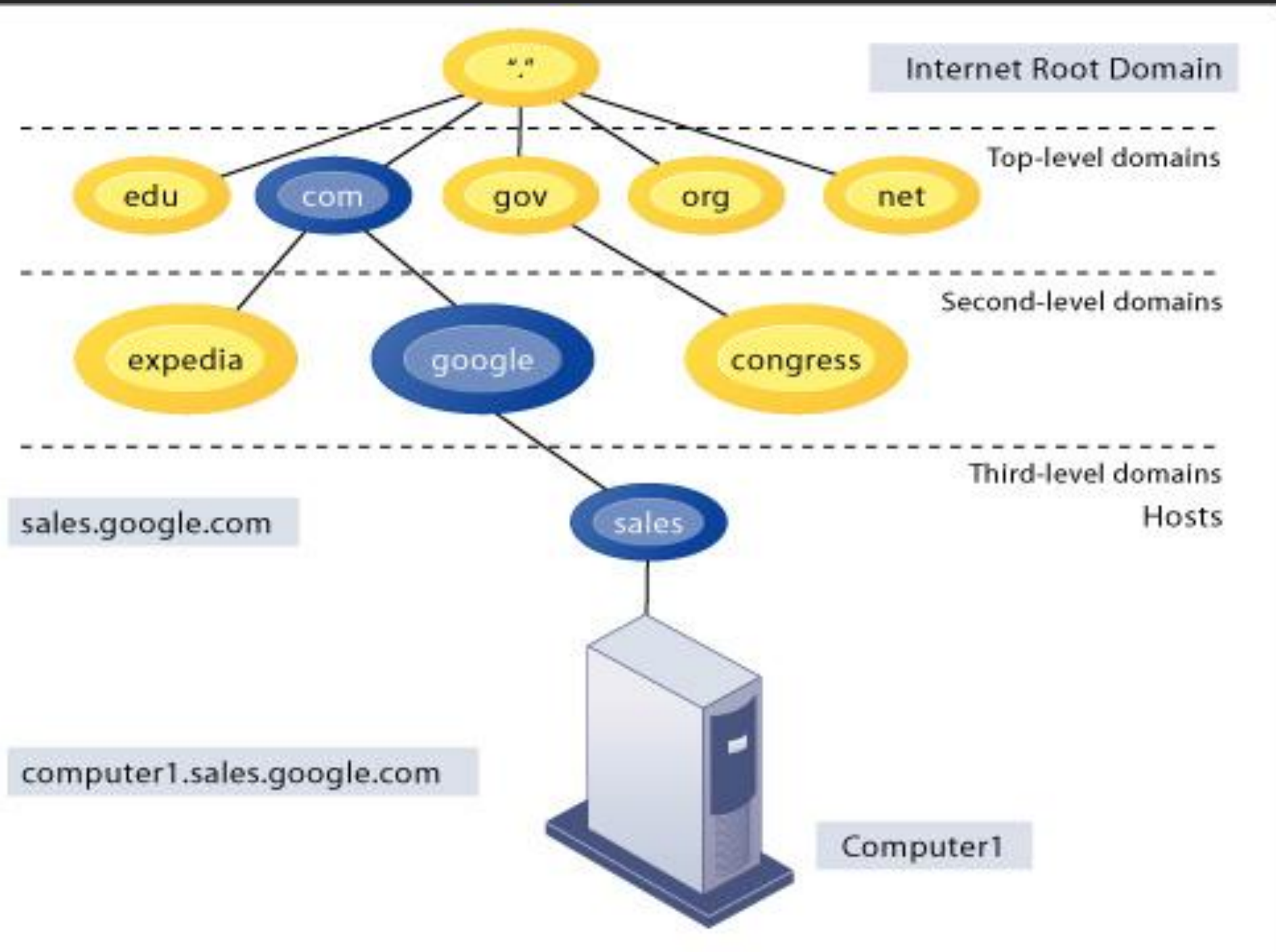
The Internet in the present era is the world's most public communications system. This global network began in the early 1970s as a network of the US Department of Defense to connect university scientists and university professors around the world. Internet service providers (ISPs) are commercial organizations with a connection to the internet that sells temporary connections for customers.

These Internet service providers in traditional times with cable and modem with speed 56.6 kilobits per second (Kbps). but broadband connection most have replaced it. Digital subscriber line, cable, satellite internet connection, and line t provides this broadband service.

# INTERNET ADDRESSING AND ARCHITECTURE

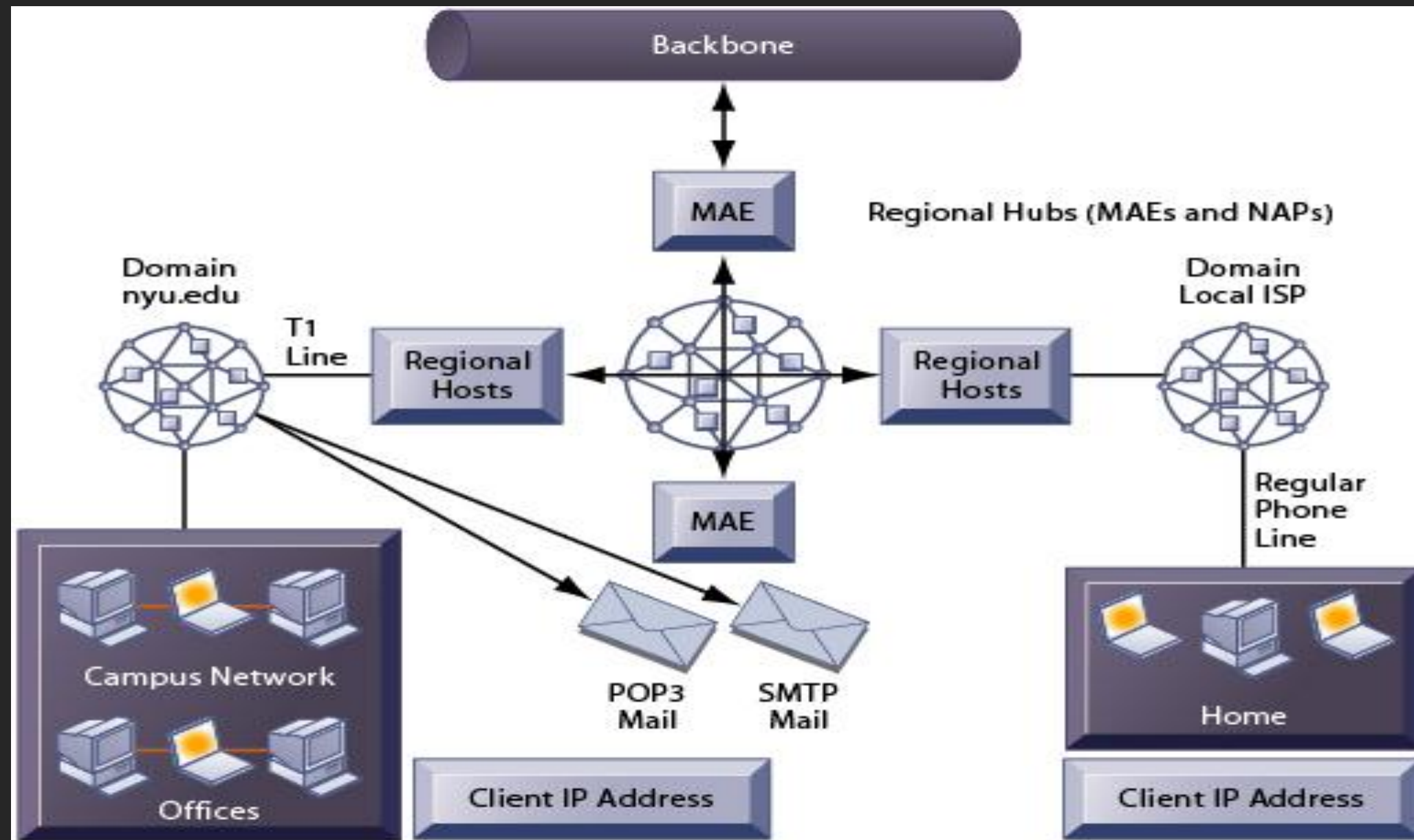
The Internet is based on the TCP / IP network protocol. Every computer on the Internet is given a unique Internet Protocol (IP), which is currently a 32-bit number represented by four numbered strings ranging from 0 to 255 separated by period. For example, IP address [www.microsoft.com](http://www.microsoft.com) is 207.46.250.119.

# THE DOMAIN NAME SYSTEM



Domain Name System (DNS) changes the domain name to IP Address Domain name is an English corresponding name that corresponds to a unique 32-bit numeric IP address for every computer connected to the Internet.

# INTERNET NETWORK ARCHITECTURE



*The Internet backbone connects to regional networks, which in turn provide access to Internet service providers, large firms, and government institutions. Network access points (NAPs) and metropolitan area exchanges (MAEs) are hubs where the backbone intersects regional and local networks and where backbone owners connect with one another.*

# the Future internet: ipv6 and internet2

The Internet was not originally designed to handle large amounts of transmission data and billions of users. IPv6 is compatible with most modems and routers currently sold.

universities, private companies, and government agencies working with 66,000 institutions across the United States and international network partners over 100 countries. Because of this the Internet began to grow with a high capacity such as 100 Gbps network. which serves as a test bed for the cutting edge technology possible eventually migrating to the public internet, including large-scale network performance measuring and management tools, identity identification tools and secure access, and capabilities such as high bandwidth scheduling, high performance circuit.

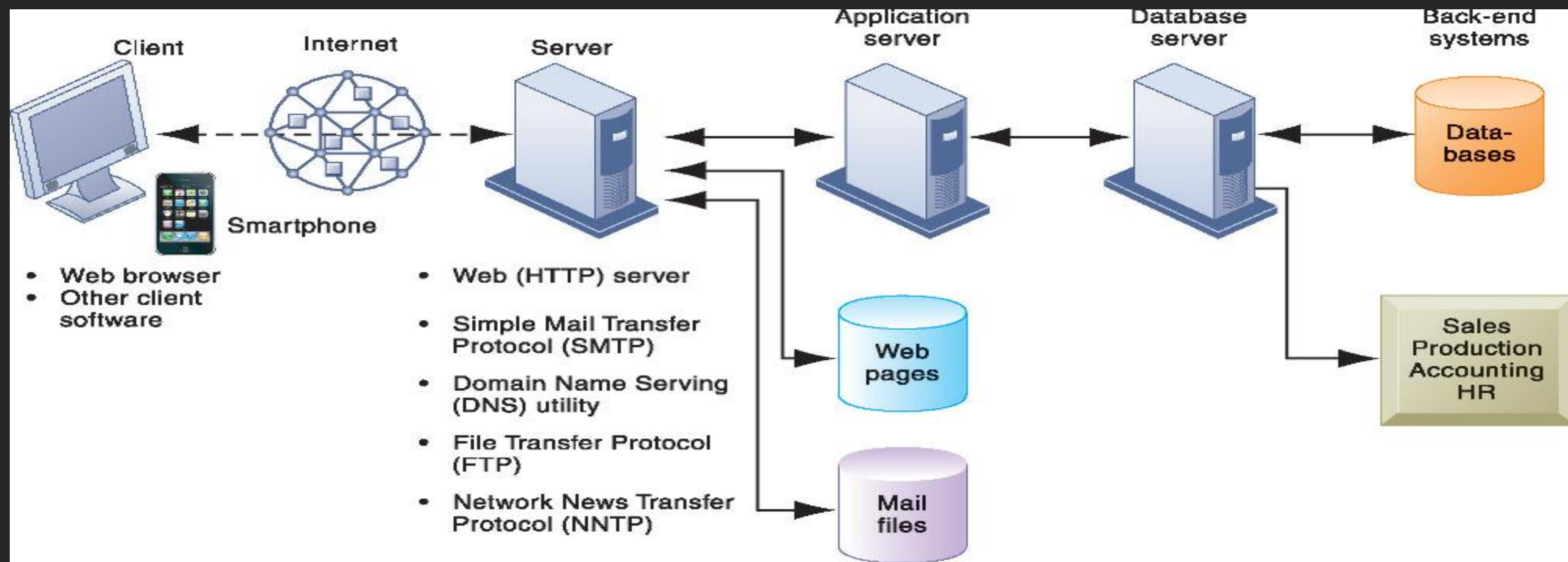


# INTERNET SERVICES AND COMMUNICATION TOOLS

It is a client / server technology. Individuals use what Internet controls they do through client applications on their computers, such as web browser software

## INTERNET SERVICES:

<b>Capability</b>	<b>Functions supported</b>
Email	Person-to-person messaging; document sharing
Chatting and instant messaging	Interactive conversations
Newsgroups	Discussion groups on electronic bulletin boards
Telnet	Logging on to one computer system and doing work on another
File Transfer Protocol (FTP)	Transferring files from computer to computer
World Wide Web	Retrieving, formatting, and displaying information (including text, audio, graphics, and video) by using hypertext links



***Voice over IP***, is a platform for voice and corporate Internet-based networks.

***unified Communications***, combines different modes of communication into one universally accessible service using integrated communications technology

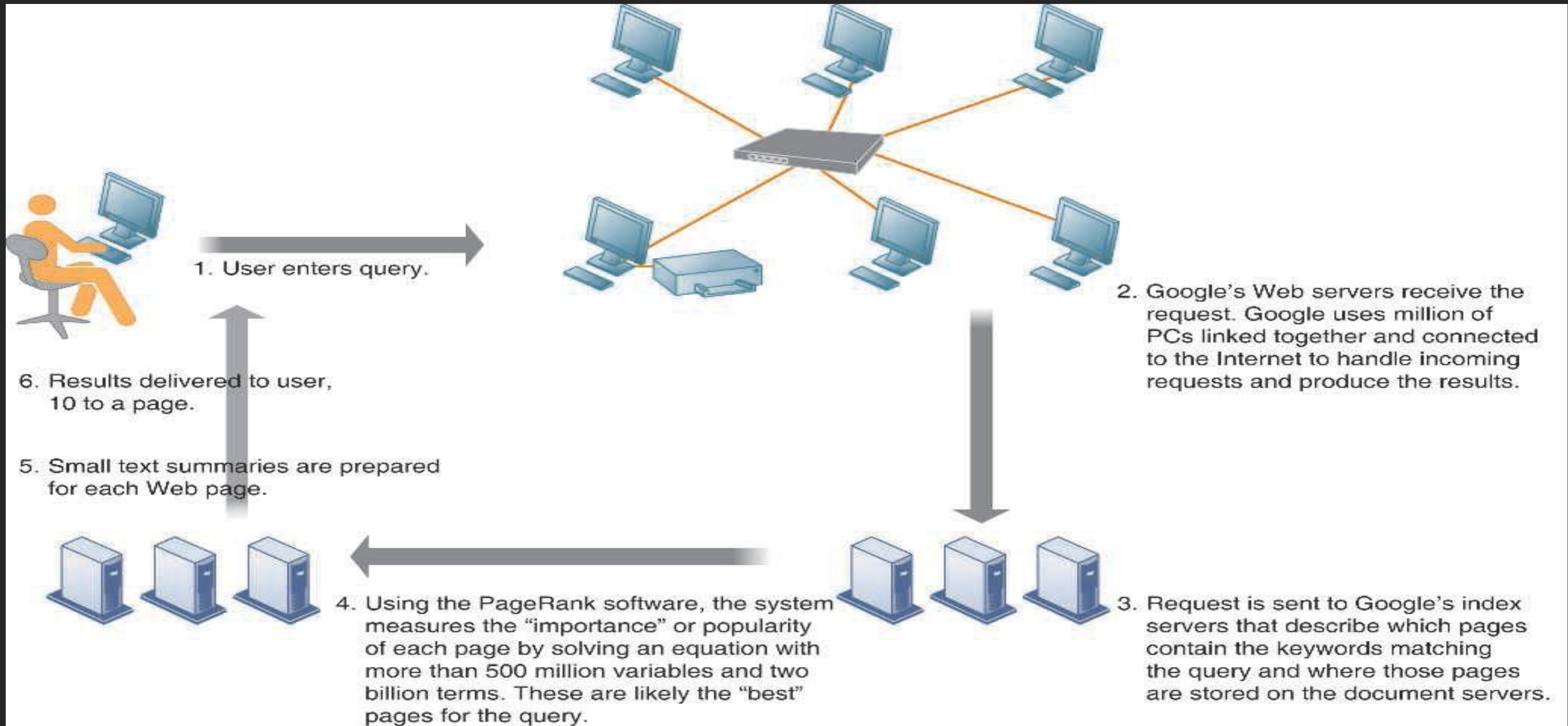
***Virtual private networks***, is a secure and encrypted private network that has been configured in a public network to capitalize on economies of scale and large network management facilities and also provides an infrastructure network to combine voice and data networks.

# THE WEB

***Hipertext***, Web pages are based on standard Hypertext Markup Language (HTML), which formats documents and incorporates dynamic links to documents and other images.

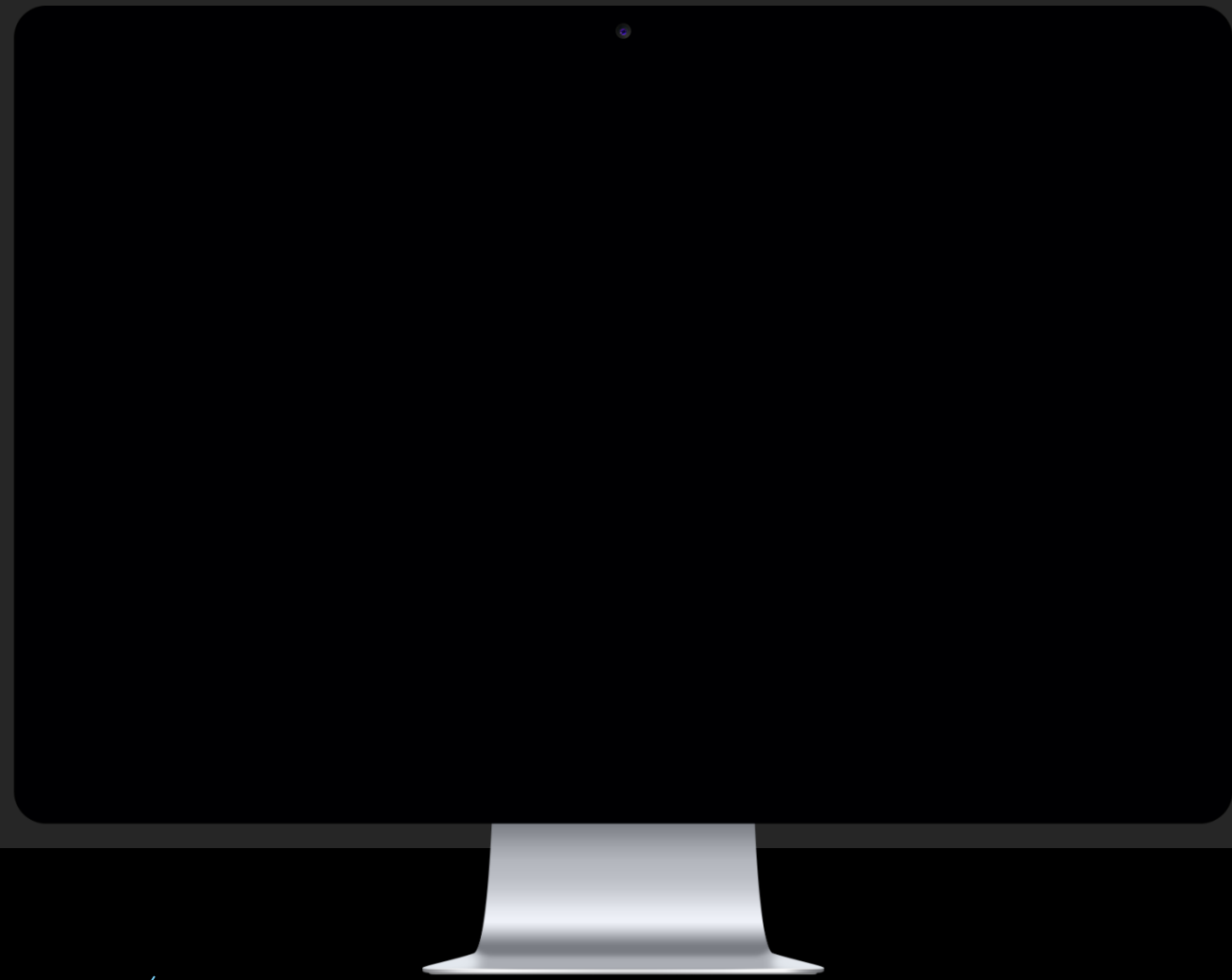
***Web Server***, is software to find and manage stored web pages.

***Searching for information on the Web***, is a system that can help in finding various content that is available among many other similar content. (google, youtube, etc). Many types of search systems are semantic Search one.



**Web 2.0**, this site not only contains content but also allows people to collaborate, share information, and create new services and content online. Like uploading a video on youtube or uploading an image in Pinterest

**Web 3.0 and the future web**, with its main feature is more tools for individuals to understand than 600 billion pages on Internet, or millions of apps available for smartphone and 3D Web visuals (3D). Even more than that the web is controlling everything from city traffic lights and water usage, to the lights in your living room, to the rear view mirror of your car



/// **What are the principal technologies and standards for wireless networking, communication, and internet access?**

# WIRELESS REVOLUTION

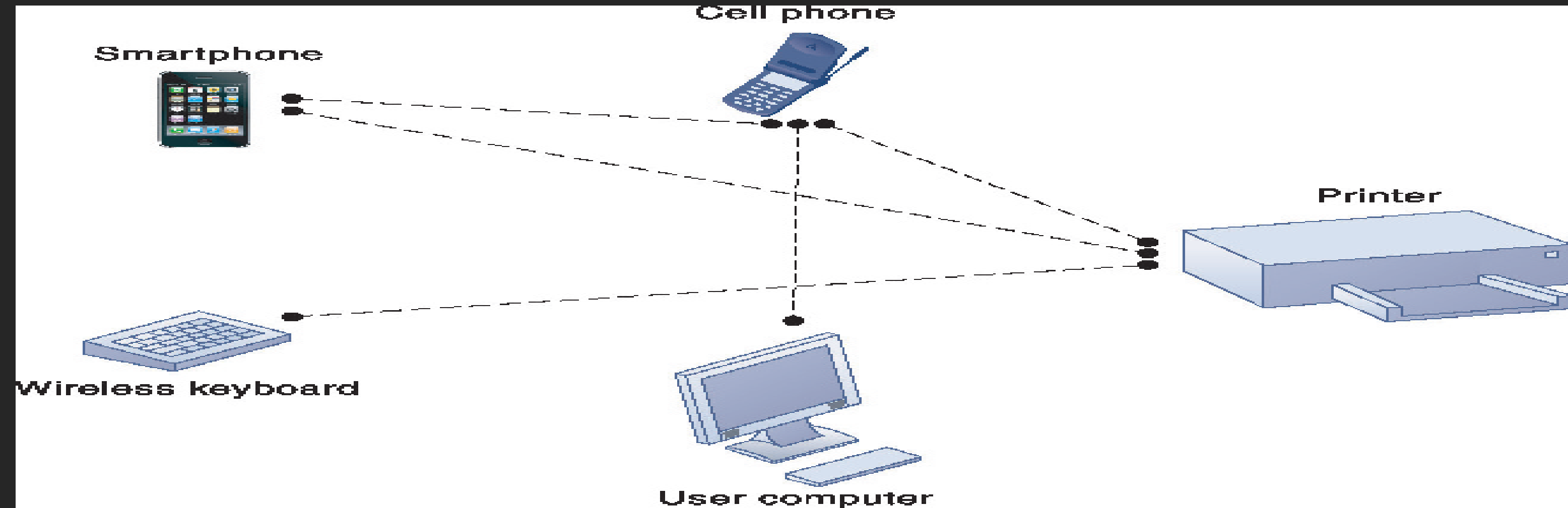
## 1. Celular System

Earlier generations of cellular systems were designed primarily for voice and limited data transmission in the form of short text messages. Today wireless carriers offer 3G and 4G networks. **3G networks**, with transmission speeds ranging from 144 Kbps for mobile users. **4G networks (LTE)** have much higher speeds: 100 megabits/second download and 50 megabits upload speed.



## 2. Wireless Computer Networks and internet access

Bluetooth, useful for creating small **personal area networks (PANs)**. It links up to eight devices within a 10-meter area using low-power, radio-based communication and can transmit up to 722 Kbps in the 2.4-GHz band.



Wireless phones, pagers, computers, printers, and computing devices using Bluetooth communicate with each other and even operate each other without direct user intervention

# Wi-Fi and Wireless internet access

In most Wi-Fi communication, wireless devices communicate with a wired LAN using access points. An access point is a box consisting of a radio receiver/transmitter and antennas that links to a wired network, router, or hub.

**Hotspots** are locations with one or more access points providing wireless Internet access and are often in public places.

Businesses of all sizes are using Wi-Fi networks to provide low-cost wireless LANs and Internet access. Wi-Fi hotspots can be found in hotels, airport lounges, libraries, cafes, etc

Wi-Fi technology poses several challenges, however. One is Wi-Fi's security features, which make these wireless networks vulnerable to intruders.

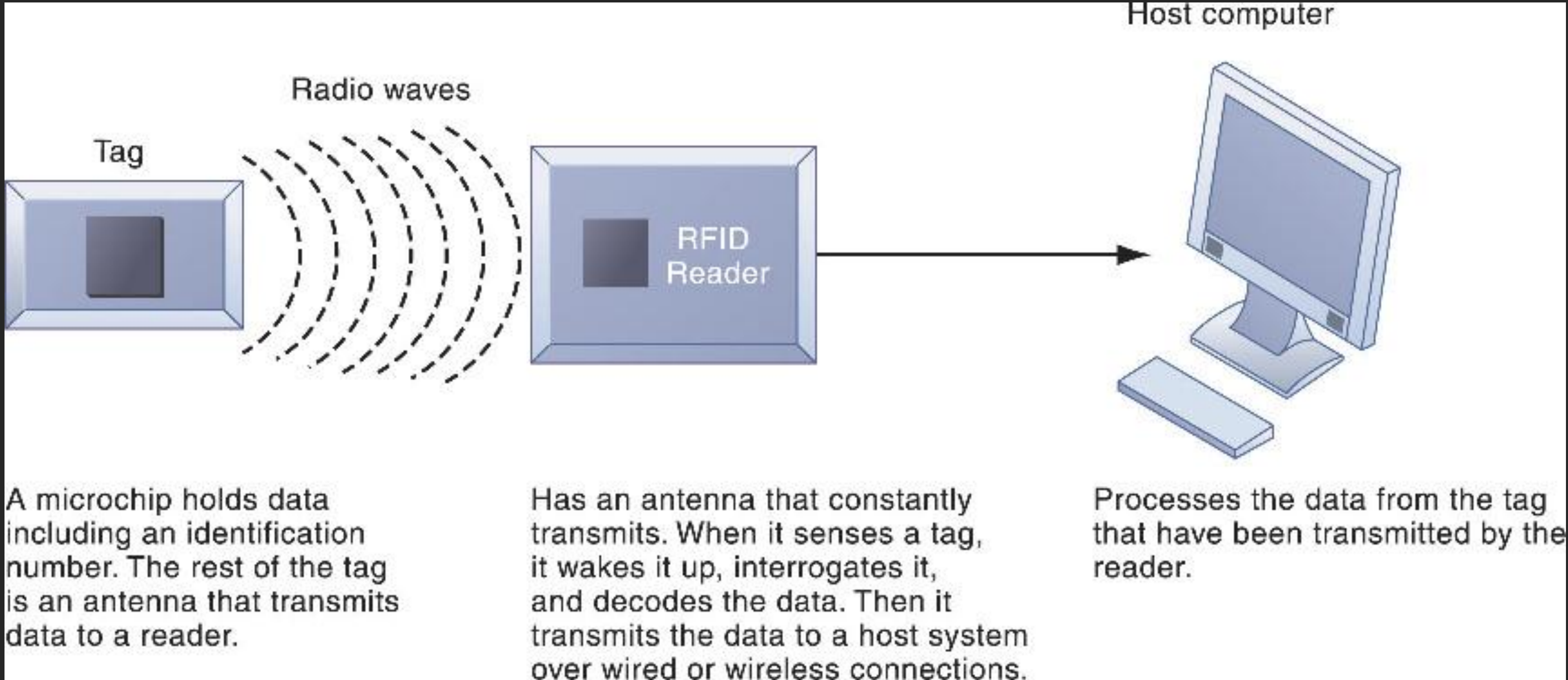
## **Wimax** (Worldwide Interoperability for Microwave Access)

It has a wireless access range of up to 31 miles and transmission speed of up to 75 Mbps. WiMax antennas are powerful enough to beam high-speed Internet connections to rooftop antennas of homes and businesses that are miles away. Mobile WiMax is one of the 4G network technologies

### **3. RFID and Wireless sensor Networks**

**Radio frequency identification (RFID)** use tiny tags with embedded microchips containing data about an item and its location to transmit radio signals over a short distance to RFID readers. The RFID readers then pass the data over a network to a computer for processing. Unlike bar codes, RFID tags do not need line-of-sight contact to be read.

# Figure show how RFID works



## Wireless sensor Networks

**Wireless sensor networks (WSNs)** are networks of interconnected wireless devices that are embedded in the physical environment to provide measurements of many points over large spaces. These devices have built-in processing, storage, and radio frequency sensors and antennas. They are linked into an interconnected network that routes the data they capture to a computer for analysis.

RFID systems and wireless sensor networks are major sources of big data that organizations are starting to analyze to improve their operations and decision making. Output from these systems is called the *Industrial Internet*,



THANK YOU!

Any Questions?

MEMORIES

