

Management Information System



St. Clements University
MBA Program
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Hong Kong

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1. The role of information systems

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Rise of the Information Economy - 1

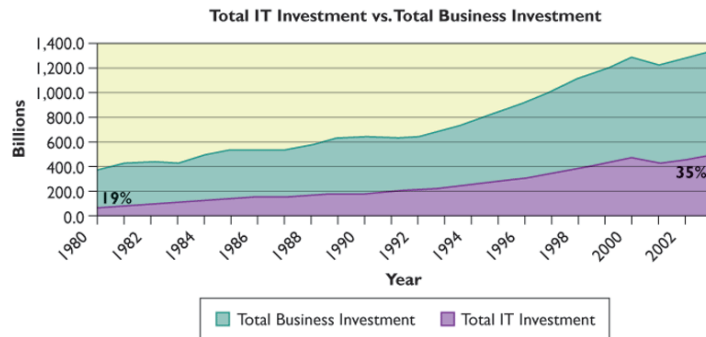
- Rise of the Information Economy have altered the business environment.
 - Knowledge- and information-based economies
 - New products and services
 - Knowledge: a central productive and strategic asset
 - Time-based competition
 - Shorter product life
 - Turbulent environment
 - Limited employee knowledge base

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Rise of the Information Economy - 2

The growth of the information economy

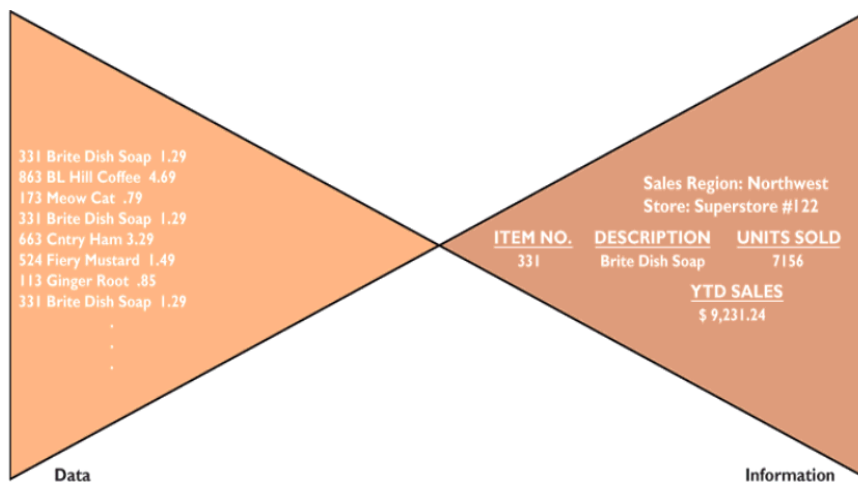


Source: Based on data in U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts, Tables 5.2 and 5.8, 2003.

What Is an Information System?

- A set of interrelated components that **collect** (or retrieve), **process**, **store**, and **distribute information** to **support decision making** and **control** in an organization.
- What is the difference between **information** and **data**?
 - Data:** Streams of raw facts representing events such as business transactions.
 - Information:** Clusters of data that are meaningful and useful to human beings.

Data and Information



What Is an Information System?

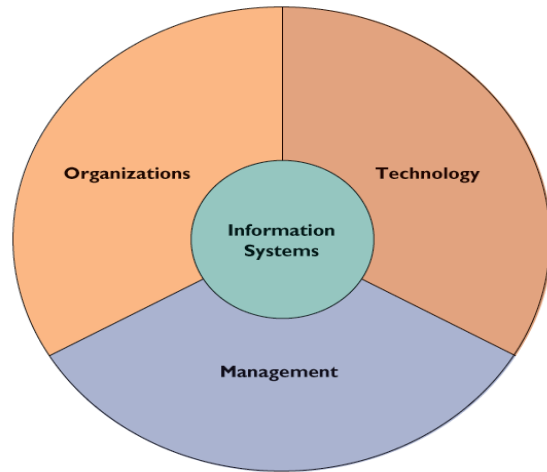
Formal Systems

- Fixed definitions of data and procedures for collecting, storing, processing, disseminating, and using these data

Can be computer-based or manual Computer-based Information Systems

- Use computer hardware and software to process and disseminate information

Information systems are more than computers



A Business Perspective on Information Systems

- **Information systems literacy:** Broad-based understanding of information systems that includes behavioral knowledge about organizations and individuals using information systems and technical knowledge about computers.
- **Computer literacy:** Knowledge about information technology, focusing on understanding how computer-based technologies work.

Information Technology (IT) Infrastructure

- Computer hardware
- Computer software
- Storage technology
- Communications technology

The Challenges of Information Systems: Key Management issues - 1

Positive Impacts of Information Systems

- Faster calculations and paperwork
- Analysis of customer purchase patterns and preferences
- More efficient business services
- Instant global distribution of information

The Challenges of Information Systems: Key Management issues - 2

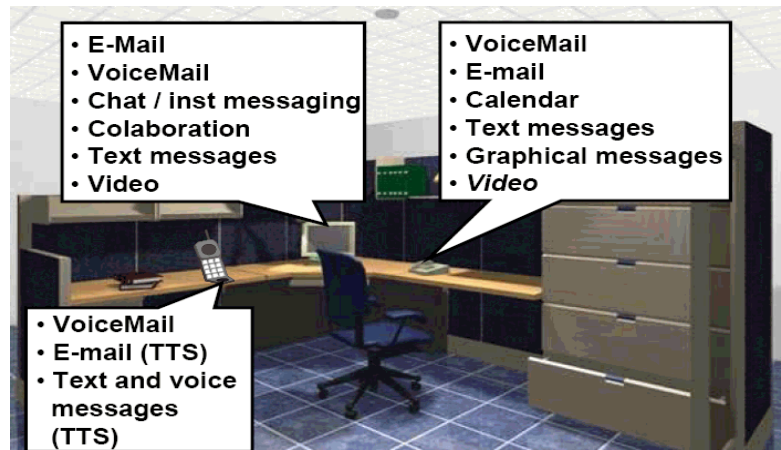
Negative Impacts of Information Systems

- Automation leading to job elimination
- Privacy concerns
- System outages and shutdowns
- Health problems, repetitive stress injury
- Illegal distribution of intellectual property

2. Hardware and Software in the Enterprise

Example of today's work environment - 1

- Three communication devices: PC, desk phone, mobile

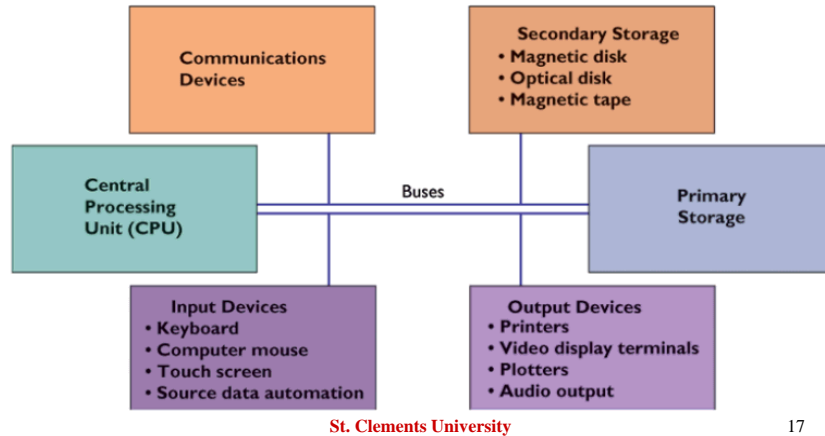


Example of today's work environment - 2



Computer Hardware and Information Technology Infrastructure - 1

- Hardware components of a computer system

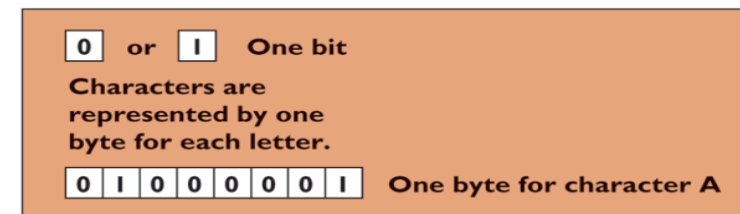


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Computer Hardware and Information Technology Infrastructure - 2

The Computer System

- Bit**
 - Binary digit
 - Represents 0 or 1
- Byte**
 - String of eight bits
 - Stores one number, symbol, character, part of picture

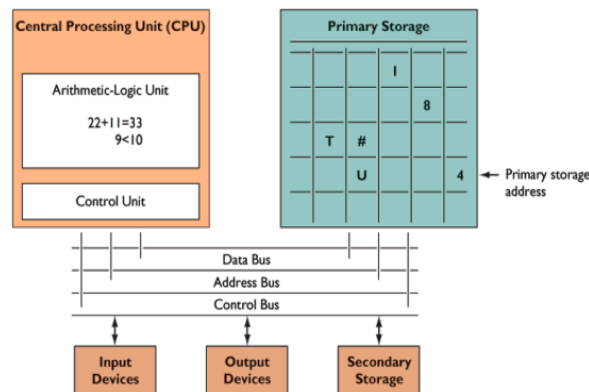


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Computer Hardware and Information Technology Infrastructure - 3

The Computer System

- The Central Processing Unit (CPU)**
 - Controls other parts of computer
- Arithmetic-logic unit**
 - Performs principle logical/mathematical operations
- Control unit**
 - Coordinates other parts, such as reading a stored program



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Computer Hardware and Information Technology Infrastructure - 4

The Computer System

- Primary Storage**
 - Located near CPU
 - Stores all or part of active software program
 - Stores data the program is using
 - Composed of semi-conductors
 - RAM (random access memory): Used for short-term, temporary storage
 - ROM (read-only memory): Semiconductor memory chips with program instructions

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Computer Hardware and Information Technology Infrastructure - 5

The Computer System

• Secondary Storage Technology

- Used for relatively long-term storage of data outside CPU
- Magnetic disk: floppies, hard disks, RAID
- Flash memory
- Optical disk: CD-ROM, CD-RW, DVD
- Magnetic tape
- Storage networking: direct-attached storage; network-attached storage; storage area networks

Computer Hardware and Information Technology Infrastructure - 6

Hierarchy of Memory Capacity

- Kilobyte (KB): approximately one thousand bytes.
- Megabyte (MB): approximately one million bytes (1,048,576 bytes, or $1,024 \times 1,024$).
- Gigabyte (GB): actually 1,073,741,824 bytes ($1,024 \times 1,024 \times 1,024$ bytes).
- Terabyte: One trillion bytes, 10^{12} bytes.
- Petabyte: Approximately 10^{15} bytes.
- Exabyte: Approximately 10^{18} bytes.

Computer Hardware and Information Technology Infrastructure - 7

A storage area network (SAN)



Computer Hardware and Information Technology Infrastructure - 8

The Computer System

• Input Devices

- Keyboard and mouse
- Touch screen
- Optical character recognition
- Magnetic ink character recognition (MICR)
⌚ 1234567890 ⌚ ⌚ 1234567890 ⌚ ⌚ 1234567890 ⌚ ⌚ 1234567890 ⌚
- Pen-based input
- Digital scanner
- Audio input
- Radio-frequency identification (RFID)

Computer Hardware and Information Technology Infrastructure - 9

The Computer System

- **Output Devices**
 - Cathode-ray tube (CRT)
 - LCD Panel
 - Printers
 - Audio output

Classifying Computers

- **Mainframe:** Largest computer, largest multi-user systems, handles massive amounts of data; used for large business, scientific, military applications.



- **Workstation:** More powerful desktop computer used for computation-intensive tasks. A midrange systems multi-user system.
- **Personal computer:** Portable or desktop microcomputer. A single user system.

Types of Software

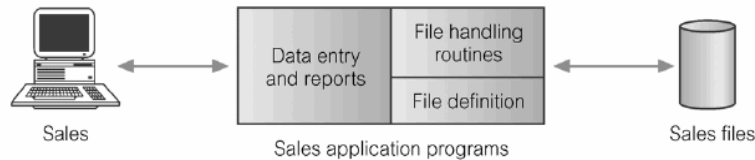
- **Software program:** A series of statements or instructions to the computer
- Two major types of software:
 - **System software**
 - Generalized programs that manage the computer's resources
 - For example, the Windows family of Operating Systems
 - **Application software**
 - Programs written for or by users to perform a specific task.
 - For example, Word, Excel, Powerpoint

3. Database Management Systems

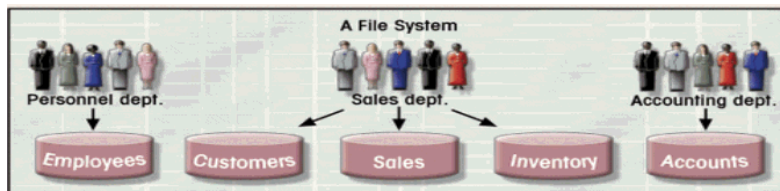
File Systems - 1

Traditional file environment:

- Each application program defines and manages its own data.



- Each program defines and manages its own data.



File Systems - 2

Limitations of File-based Approach:

1. Separation and isolation of data

- Each program maintains its own set of data.
- Users of one program may be unaware of potentially useful data held by other programs.

2. Duplication of data

- Same data is held by different programs.
- Wasted space and potentially different values and/or different formats for the same item.

File Systems - 3

3. Data dependence

- File structure is defined in the program code.

4. Incompatible file formats

- Programs are written in different languages, and so cannot easily access each others files.

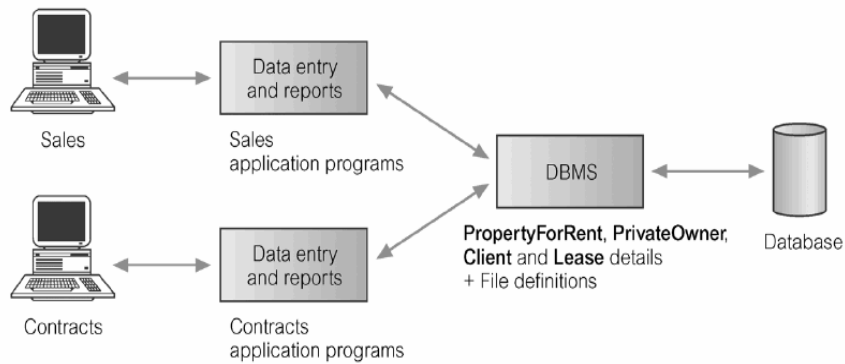
5. Fixed Queries/Proliferation of application programs

- Programs are written to satisfy particular functions.
- Any new requirement needs a new program.

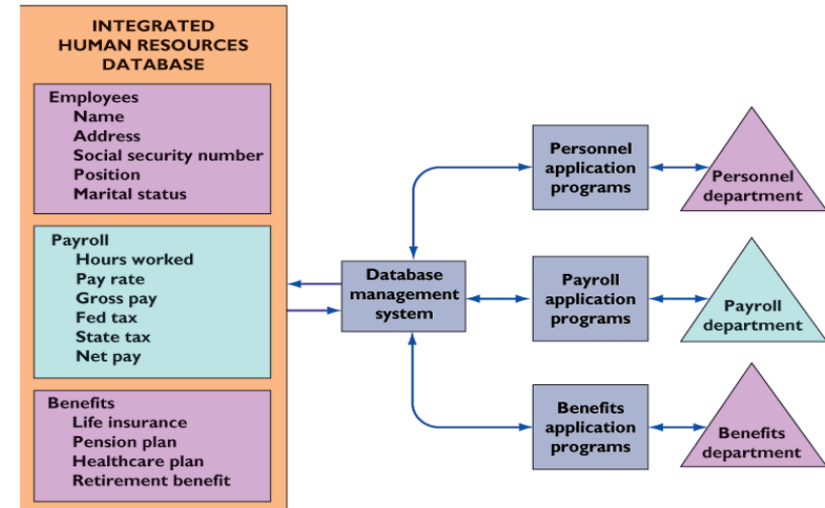
The Database Approach to Data Management - 1

- **Shared collection of logically related data** (and a description of this data), designed to meet the information needs of an organization.
- System catalog (metadata) provides **description of data** to enable program–data independence.
- Logically related data comprises **entities**, **attributes**, and **relationships** of an organization's information.

The Database Approach to Data Management - 2



The Database Approach to Data Management - 3



DBMS Approach

Database Management System (DBMS)

- A software system that enables users to **define**, **create**, and **maintain** the database and which **provides controlled access to this database**.

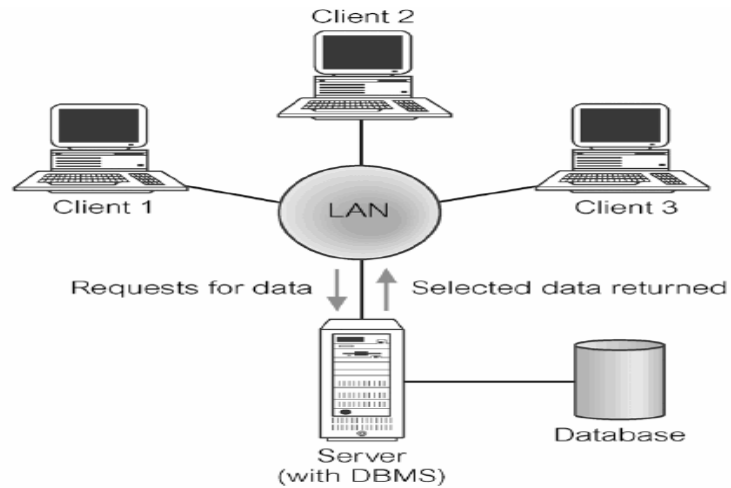
DBMS Components

- Data definition language:** Formal language for specifying the structure of database
- Data manipulation language:** For extracting data from database, e.g. SQL.

How a DBMS Solves Problems of a Traditional File Environment

- Reduces data redundancy
- Eliminates data inconsistency
- Uncouples programs from data
- Increases access and availability of data
- Allows central management of data, data use, and security

Database Client-server Architecture



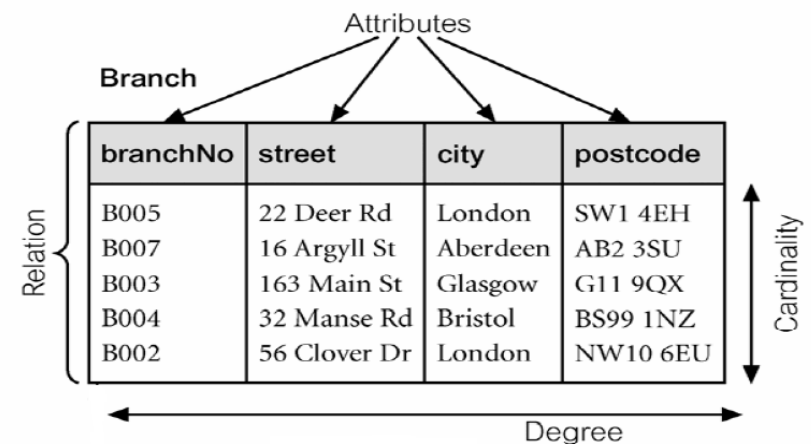
Disadvantages of DBMS

- Complexity
- Size
- Cost of DBMS
- Additional hardware costs
- Cost of conversion
- Performance
- Higher impact of a failure

Relational DBMS - 1

- A **relation** is a table with columns and rows.
 - **Attribute** is a named column of a relation.
 - **Domain** is the set of allowable values for one or more attributes.
 - **Tuple** is a row of a relation.
 - **Degree** is the number of attributes in a relation.
 - **Cardinality** is the number of tuples in a relation.
- Relational Database is a collection of normalized relations with distinct relation names.

Relational DBMS - 2



- Relates data across tables based on **common data element**.

Relational DBMS - 3

Table (Relation)	Columns (Attributes, Fields)				
	Order_ Number	Order_ Date	Delivery_ Date	Part_ Number	Part_ Quantity
ORDER	1634	02/02/04	02/22/04	152	2
	1635	02/12/04	02/28/04	137	3
	1636	02/13/04	03/01/04	145	1
PART	Part_ Number	Part_ Description		Unit_ Price	Supplier_ Number
	137	Door latch		22.50	4058
	145	Door handle		26.25	2038
	150	Door seal		6.00	4058
	152	Compressor		70.00	1125
SUPPLIER	Supplier_ Number	Supplier_ Name	Supplier_ Address		
	4058	CBM Inc.	44 Winslow, Gary, IN 44950		
	2038	Ace Inc.	Rte. 101, Essex, NJ 07763		
	1125	Bryant Corp.	51 Elm, Rochester, NY 11349		

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Relational DBMS - 4

Alternative terminology for relational model terms

Formal terms	Alternative 1	Alternative 2
Relation	Table	File
Tuple	Row	Record
Attribute	Column	Field

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Relational DBMS - 5

Basic Operations in a Relational Database:

- **Select:** Creates **subset of rows** that meet specific criteria

Original table				New table or list			
P_CODE	P_DESCRIPTION	PRICE		P_CODE	P_DESCRIPTION	PRICE	
123456	Flashlight	5.26		123456	Flashlight	5.26	
123457	Lamp	25.15		123457	Lamp	25.15	
123458	Box Fan	10.99		123458	Box Fan	10.99	
213345	9v battery	1.92		213345	9v battery	1.92	
254467	100W bulb	1.47		254467	100W bulb	1.47	
311452	Powerdrill	34.99		311452	Powerdrill	34.99	

SELECT ALL will yield

P_CODE	P_DESCRIPTION	PRICE
213345	9v battery	1.92
254467	100W bulb	1.47

SELECT only PRICE less than 2.00 will yield

P_CODE	P_DESCRIPTION	PRICE
311452	Powerdrill	34.99

SELECT only P_CODE=311452 will yield

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Relational DBMS - 6

- **Project:** Yields all values for selected attributes – **vertical subset** of a table.

Original table			New table or list	
P_CODE	P_DESCRIPTION	PRICE		
123456	Flashlight	5.26	PRICE	5.26
123457	Lamp	25.15		25.15
123458	Box Fan	10.99		10.99
213345	9v battery	1.92		1.92
254467	100W bulb	1.47		1.47
311452	Powerdrill	34.99		34.99

PROJECT PRICE yields

P_DESCRIPTION	PRICE
Flashlight	5.26
Lamp	25.15
Box Fan	10.99
9v battery	1.92
100W bulb	1.47
Powerdrill	34.99

PROJECT P_DESCRIPTION and PRICE yields

P_CODE	PRICE
123456	5.26
123457	25.15
123458	10.99
213345	1.92
254467	1.47
311452	34.99

PROJECT P_CODE and PRICE yields

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Relational DBMS - 7

- **Join:** Enables users to create a new table containing only relevant information from **more than one table**.

Table name: CUSTOMER				Table name: AGENT	
CUS_CODE	CUS_LNAME	CUS_ZIP	AGENT_CODE	AGENT_CODE	AGENT_PHONE
132445	Walker	32145	231	125	6152439887
1217782	Adares	32145	125	167	6153426778
1312243	Rakowski	34129	167	231	6152431124
1321242	Rodriguez	37134	125	333	9041234445
1542311	Smithson	37134	421		
1657399	Vanloo	32145	231		

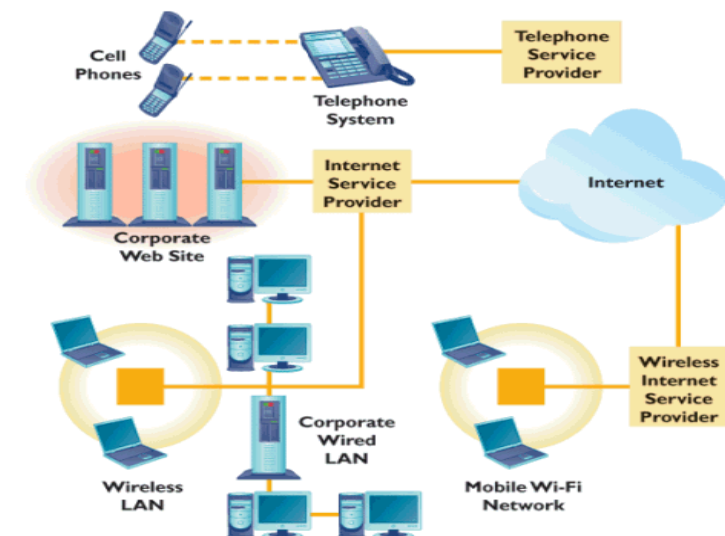
CUS_CODE	CUS_LNAME	CUS_ZIP	AGENT_CODE	AGENT_PHONE
1217782	Adares	32145	125	6152439887
1321242	Rodriguez	37134	125	6152439887
1312243	Rakowski	34129	167	6153426778
1132445	Walker	32145	231	6152431124
1657399	Vanloo	32145	231	6152431124

4. Business Telecommunications System

Telecommunications System

- Facilitation of electronic communication
- Telephone systems
- Broadcast and cable TV
- Radio, satellite, and local area networks
- Internet
- Analog or digital

Corporate Telecommunications System



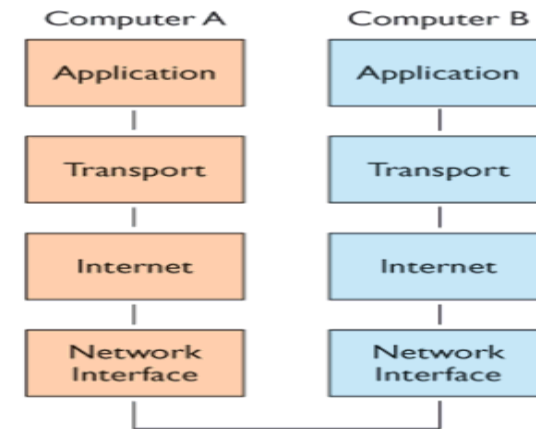
Features of Contemporary Telecommunications Systems - 1

Transmission Control Protocol/Internet Protocol (TCP/IP)

- Open suite of protocols for connectivity developed in 1970s
- Provides standards for **breaking messages into packets**, routing them to destination addresses, and reassembling them at end
- Allows for communication regardless of hardware/software

Features of Contemporary Telecommunications Systems - 2

TCP/IP: Four-Layer Reference Model



Features of Contemporary Telecommunications Systems – 3

TCP/IP: Four-Layer Reference Model

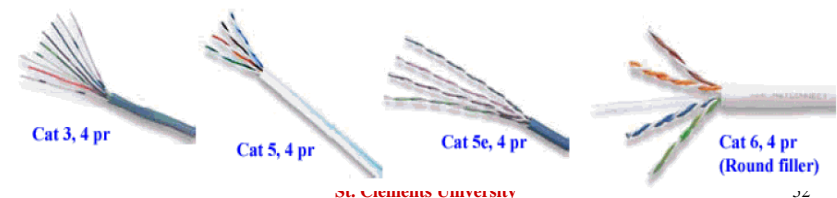
- **Application layer:** Communication between applications and other layers
- **Transport layer:** Acknowledging and sequencing packets to/from application
- **Internet layer:** Addressing, routing, packaging data packets
- **Network interface layer:** Placing packets on and receiving them from network medium

Features of Contemporary Telecommunications Systems – 4

Transmission Media - 1

Twisted wire

- Copper wire twisted in pairs
- Older analog transmission medium
- Can be used for digital signals
- Modems used for translating analog to digital

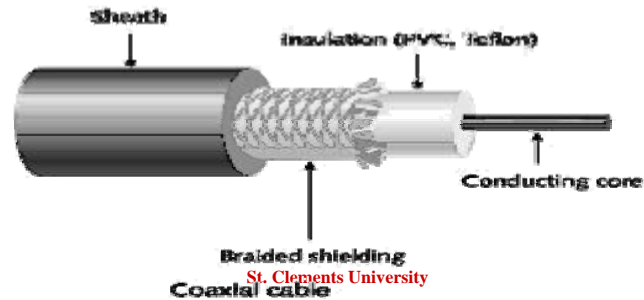


Features of Contemporary Telecommunications Systems – 5

Transmission Media - 2

Coaxial cable:

- Insulated copper wire
- Faster, more interference-free than twisted pair
- Difficult to install



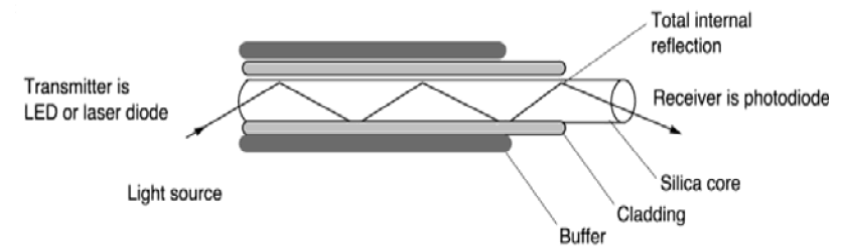
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Features of Contemporary Telecommunications Systems – 6

Transmission Media – 3

• Fiber optics

- Transmission of data as light pulses through optical fiber
- First converting electronic binary signals to light, and then convert the light signals back to electronic signals at the receiving end.
- Faster, lighter, more durable



Features of Contemporary Telecommunications Systems – 7

Transmission Media – 4

- Fiber-optic technology has revolutionized telecommunications due to the **very high speed** of data transmission it can support.
- 0.1kg of optical fiber carries the same information as 30,000kg of copper cable
- At 2.5 Gbps, it is
 - equivalent to more than 3 hrs of TV per second
 - 24,000 simultaneous phone calls

Features of Contemporary Telecommunications Systems – 8

Transmission Media - 5

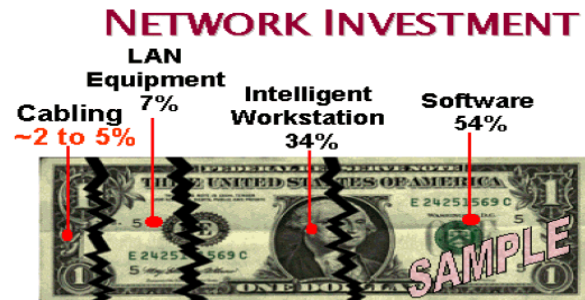
CABLING LIFE CYCLE



Features of Contemporary Telecommunications Systems – 9

Transmission Media – 6

- Although cabling represents only 2 to 5% of the total network investment, the **cabling systems will outlive most network components.**



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Features of Contemporary Telecommunications Systems – 10

Transmission Media – 7

Wireless Transmission

- Use electromagnetic spectrum
- Microwave and infrared use high-frequency radio signals
- Paging systems, cellular telephones, PDAs, mobile data networks
- Wireless communication requires compatible standards
- Security/privacy issues

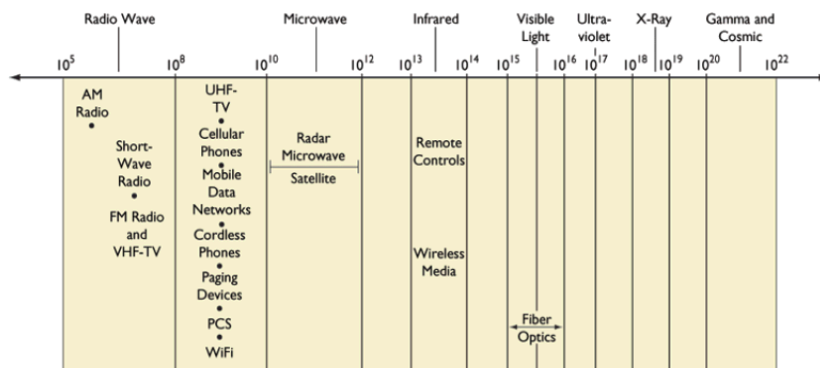
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Features of Contemporary Telecommunications Systems – 11

Transmission Media – 8

Frequency ranges for communication media and devices



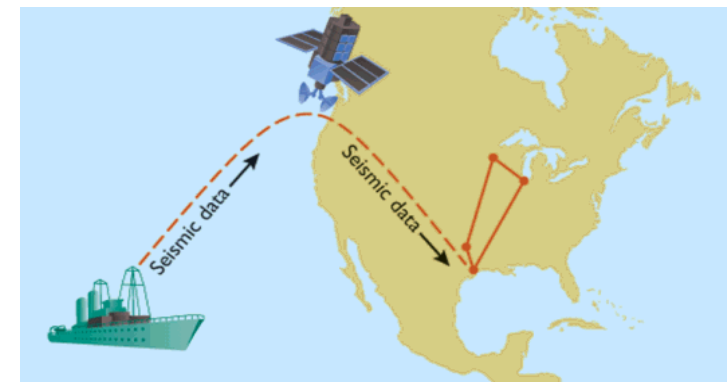
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Features of Contemporary Telecommunications Systems – 12

Transmission Media – 9

- Satellite transmission system



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Features of Contemporary Telecommunications Systems – 13

Transmission Media – 10

• Transmission Speed Comparison

Twisted wire	Up to 1G+ Mbps
Microwave	Up to 200+ Mbps
Satellite	Up to 200+ Mbps
Coaxial cable	Up to 200 Mbps
Fiber-optic cable	Up to 6+ Tbps

5. Communications Networks

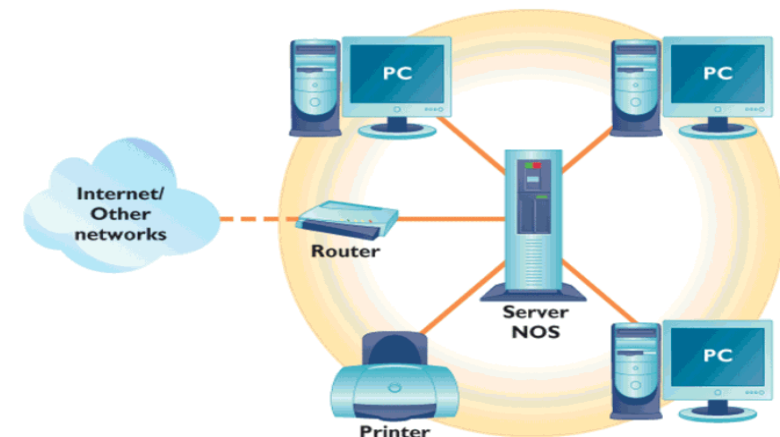
Communications Networks - 1

Local Area Networks (LAN) - 1

- A LAN is a data communication system allowing a number of independent devices to communicate directly with each other,
 - within a moderately sized geographic area,
 - and over a physical communications channel of moderate data rates.
- To implement a LAN, we need to use cabling or wireless technology to link up computers and networking devices, and the required software such as a Network Operating System (NOS).

Communications Networks - 2

Local Area Networks (LAN) - 2



Communications Networks - 3

Local Area Networks (LAN) – 3

- In a client/server arrangement, network services are located on a dedicated computer called a server. The server responds to the requests of clients for, print, application and other services.

Merits:

- The network is scalable.
- Enhanced security, ease of access, and control.

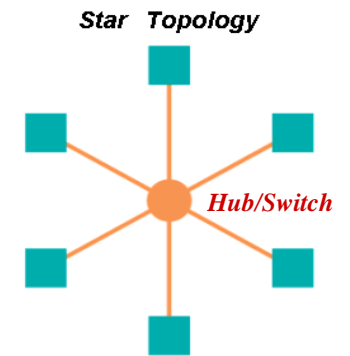
Demerits:

- Introduce a single point of failure in the network.
- More expensive, require specialized hardware and software.
- Require a trained, expert staff member to administer and maintain.

Communications Networks - 4

Local Area Networks (LAN) – 4

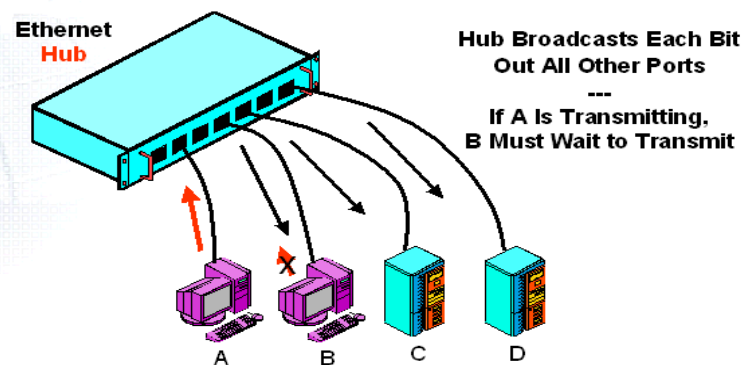
- Ethernet is by far the most common
- Star topology using Ethernet **hubs** and/or **switches**
- Use UTP cabling
- Relatively cheap, easy to install and manage
- Ethernet standards make use of latest developments in network technology



Communications Networks - 5

Local Area Networks (LAN) – 5

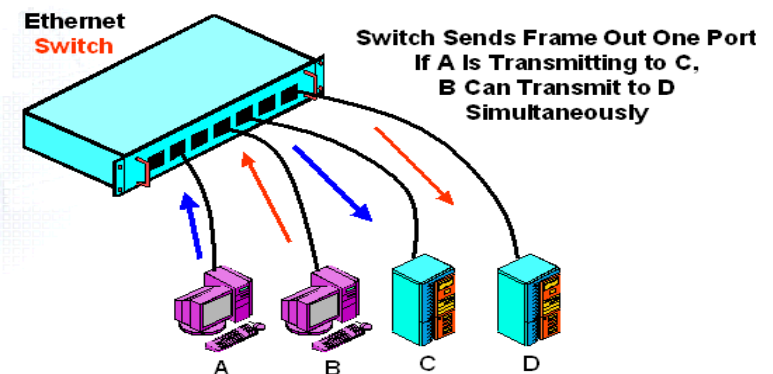
Hub Versus Switch Operation



Communications Networks - 6

Local Area Networks (LAN) – 6

Hub Versus Switch Operation



Communications Networks - 7

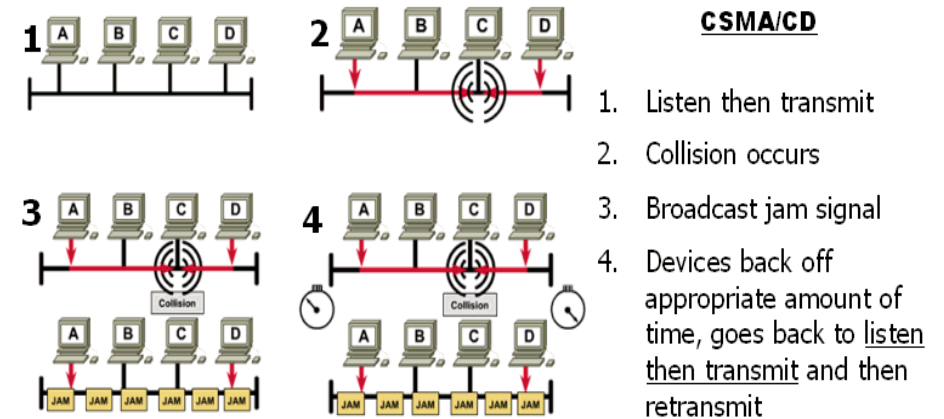
Local Area Networks (LAN) – 7

Hub Versus Switch Operation

- **Hubs Need Media Access Control**
 - This limits when a station may transmit
 - Ethernet hubs use CSMA/CD
- **Carrier Sense Multiple Access (CSMA)**
 - Only transmit if no other station is transmitting
 - Otherwise, wait
- **Collision Detection (CD)**
 - If two NICs transmit at the same time, this is a collision
 - Both will stop, wait a random amount of time, and then go back to CSMA to send again

Communications Networks - 8

Local Area Networks (LAN) – 8



Communications Networks - 9

Local Area Networks (LAN) – 9

UTP dominates the Ethernet access line market

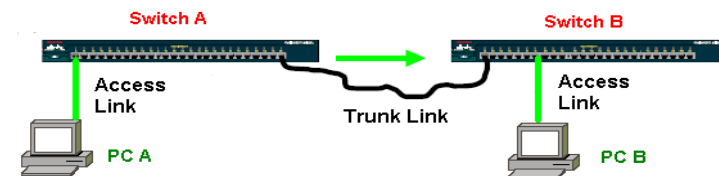
Physical Layer Standard	Speed	Maximum Run Length	Medium Required
10BASE-T	10 Mbps	100 meters	4-pair Category 3 or higher
100BASE-TX	100 Mbps	100 meters	4-pair Category 5 or higher
1000BASE-T (Gigabit Ethernet)	1,000 Mbps	100 meters	4-pair Category 5 or higher

Physical Layer Standard	Speed	Maximum Run Length	Medium
1000BASE-SX	1 Gbps	220 m	850 nm light (inexpensive) Multimode fiber
			62.5 microns
			160 MHz-km

Communications Networks - 10

Local Area Networks (LAN) – 10

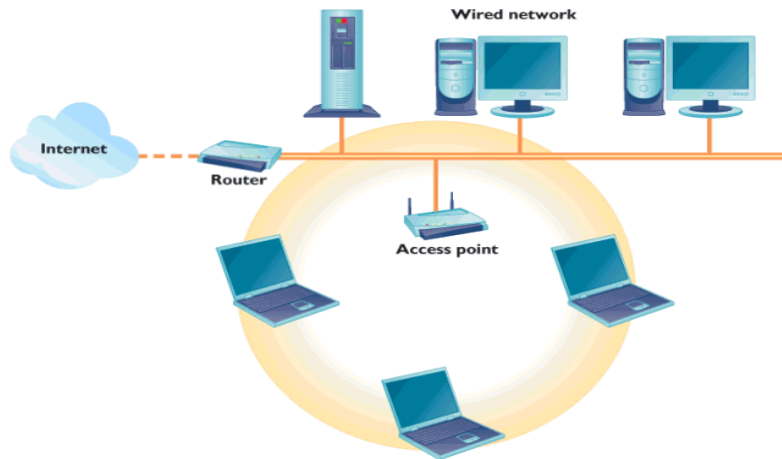
- **Access links** to client stations today are dominated by 100BASE-TX
 - But 1000BASE-T usage is growing
- **Trunk links** today are dominated by 1000BASE-SX
 - Sufficient for most LAN trunk line distances and speeds
 - Short trunk links, however, use UTP
 - Longer and faster trunk links use other fiber standards



Communications Networks - 11

Local Area Networks (LAN) – 11

An 802.11 Wireless LAN



Communications Networks - 12

Local Area Networks (LAN) – 12

Wireless LAN Benefits

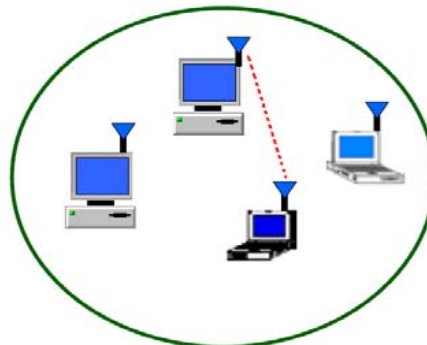
- **Removes wiring challenges**
 - Limited connections to users
 - Perfect for facilities where cost of wiring is prohibitive or impossible
- **Able to redeploy with minimal expense**
 - Low Installation Cost
 - Fast installation, Less Influence
 - Connect permanent or temporary campus buildings quickly and easily
- **Large coverage, High Performance**

Communications Networks - 13

Local Area Networks (LAN) – 13

Wireless LAN

- **Ad-hoc mode:** Peer-to-peer mode; wireless devices communicate with each other directly.
- It involves at least 2 stations
- No backbone infrastructure
- Suitable for small area

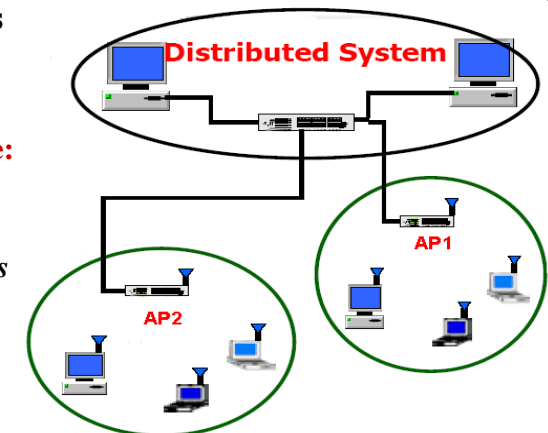


Communications Networks - 14

Local Area Networks (LAN) – 14

Wireless LAN

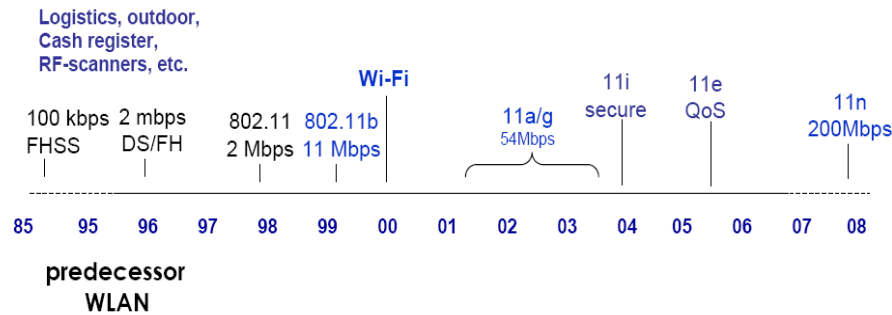
- **Infrastructure mode:**
- Wireless devices communicate with wired LAN via *access points* (APs).



Communications Networks - 15

Local Area Networks (LAN) – 15

• WLAN-standards



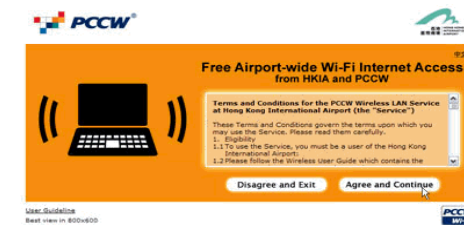
Communications Networks - 16

Local Area Networks (LAN) – 16

• Wireless LAN Standard

Standard	802.11b	802.11a	802.11a
Frequency Band	2.4 GHz	5 GHz	2.4GHz
Data rate	11 Mbps	54 Mbps	54 Mbps

- **Hot spot:** Geographic location in which an access point provides public Wi-Fi network service.
 - Eg. Free PCCW Wi-Fi service in the HK International Airport



Communications Networks - 17

Local Area Networks (LAN) – 17

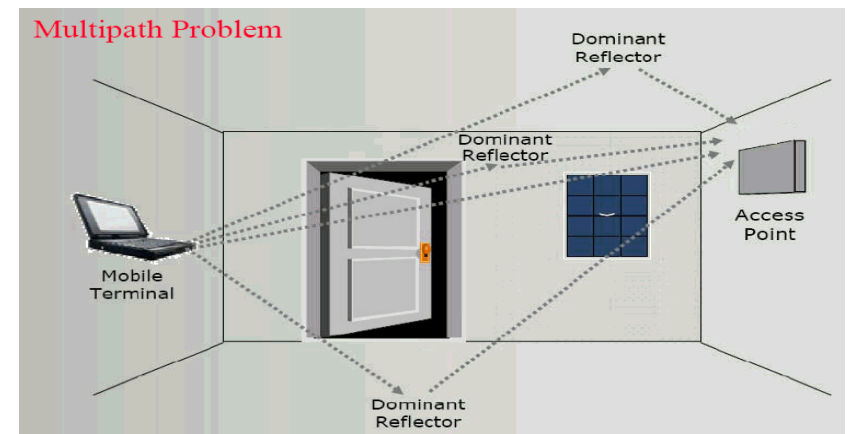
What is 802.11n?

- New IEEE Standard under development
- Uses MIMO radio technology as a basis
- End result will be more “wire-like” performance
- Anywhere from 100Mbps to 600Mbps depending on implementation
- First standard to support both 2.4 GHz and 5 GHz

Communications Networks - 18

Local Area Networks (LAN) – 18

Multi Path Reflections

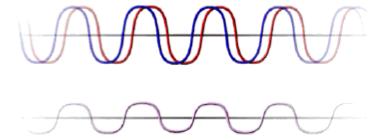


Communications Networks - 19

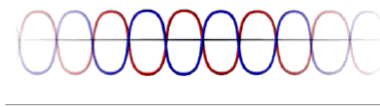
Local Area Networks (LAN) – 19

Multi Path Reflections

Original signal + reflections arrive at the receiver and are “added”, resulting in a distorted reconstructed signal



Null Waves : Original signal and reflected signals are 180 degrees out of phase, cancelling each other out.

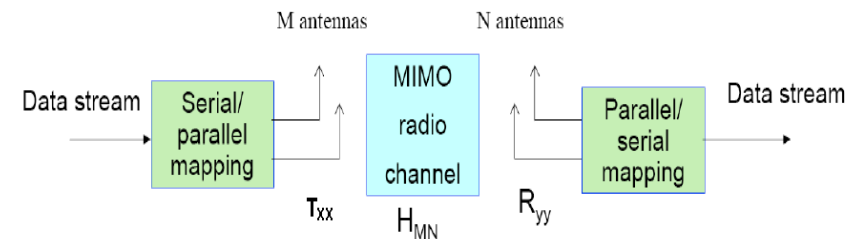


Causing drop outs.

Communications Networks - 20

Local Area Networks (LAN) – 20

- MIMO (Multiple Input / Multiple Output)
- Sending signals on multiple Tx antennas
- Receiving signals on multiple Rx antennas



Communications Networks - 21

Local Area Networks (LAN) – 21

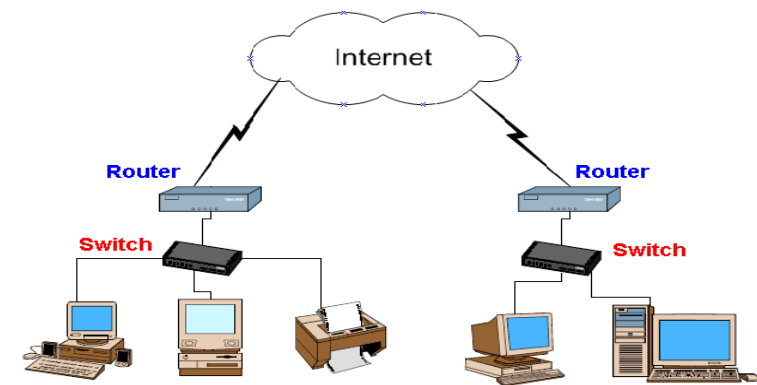
Bluetooth

- Standard for wireless personal area networks that can transmit up to **722 Kbps** within **10-meter area**
- It is a wireless LAN technology designed to connect devices of different functions such as telephones, notebooks, computers (desktop and laptop), cameras, printers and so on.
- A Bluetooth LAN is an ad-hoc network.
- The Bluetooth technology is the implementation of a protocol defined by the IEEE 802.15 standard.
 - The standard defines a wireless personal-area network (PAN) opera ble in an area the size of a room or a hall.

Communications Networks - 22

Local Area Networks (LAN) – 22

- **Routers** provides access to company networks on other sites, and to the Internet.



Communications Networks - 23

Wide Area Networks - 1

- A WAN is a single networks that connect different sites
- WANs and the Telephone
 - WAN technology usually uses the Public Switched Telephone Network transport system for transmission
 - Adds data switching and management
- WAN Purposes
 - Internet access
 - Link sites within the same corporation
 - Provide remote access to individuals who are off site

Communications Networks - 24

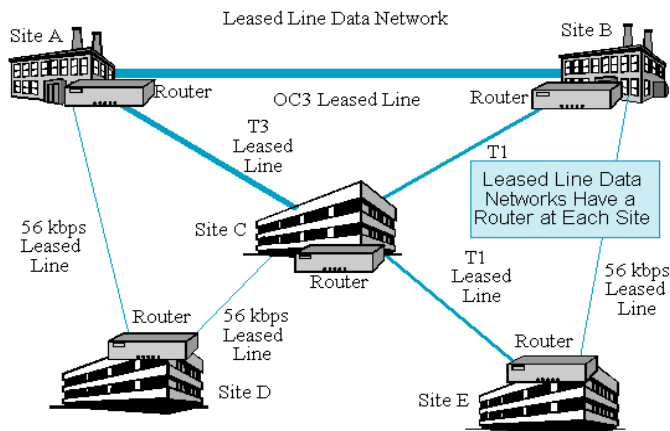
Wide Area Networks – 2

- WANs are characterized by **high cost** and **low speeds**.
- High cost per bit transmitted compared to LANs.
- Consequently, lower speeds (most commonly 128 kbps to a few megabits per second)
- This speed usually is aggregate throughput shared by many users
- Much slower than LAN speeds (100 Mbps to 1 Gbps to the desktop)

Communications Networks - 25

Wide Area Networks – 3

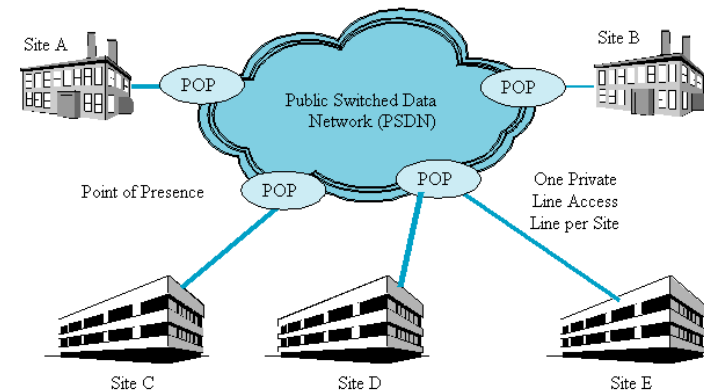
Leased Line Data Networks



Communications Networks - 26

Wide Area Networks – 4

WAN using Public Switched Data Networks



6. The Internet

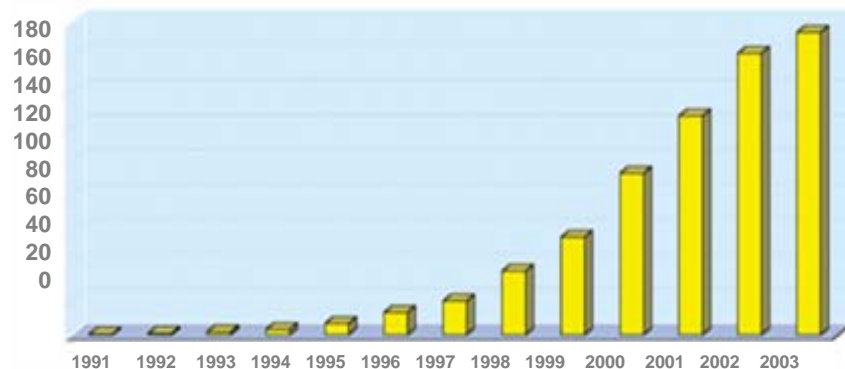
The Internet Revolution

The Internet

- Developed in the early 1960s by the U.S. Department of Defense (DOD) as a need of national security.
- Now grows to an international network of networks
 - Universal technology platform: Any computer can communicate with any other computer
 - Since the introduction of World Wide Web and Web sites, the population in the Internet has grown exponentially.

Growth of the Internet

- ARPANET grew from 4 computers in 1969 to over 300,000 by 1990.



Source: Internet Software Consortium (<http://www.isc.org/>)

Open Architecture Philosophy

Four key points:

- Independent networks should not require any internal changes to be connected to the Internet.
- Packets that do not arrive at their destinations must be **retransmitted** from their source network.
- The router computers **do not retain information** about the packets they handle.
- **No global control** will exist over the network.

Intranet and Extranet

Intranet

- LANs or WANs that use TCP/IP protocol but do not connect to sites outside the firm.

Extranet

- An intranet that allows selected outside parties to connect.

Communicate and collaborate

- Access information
- Participate in discussions
- Supply information
- Exchange business transactions

Commercialization of the Internet

- Businesses quickly recognized profit-making potential offered by a world-wide network of easy-to-use computers.
- **Web page**
 - An HTML document
- **Web site**
 - A collection of linked Web pages with a common theme
- **Web Browser**
 - Software that lets users read HTML documents and move from one HTML document to another through hypertext link tags in each file.

Hypertext and Links - 1

Hypertext Markup Language (HTML)

- A standard language used on the Web
- HTML uses codes (tags) to tell the Web browser software how to display text.

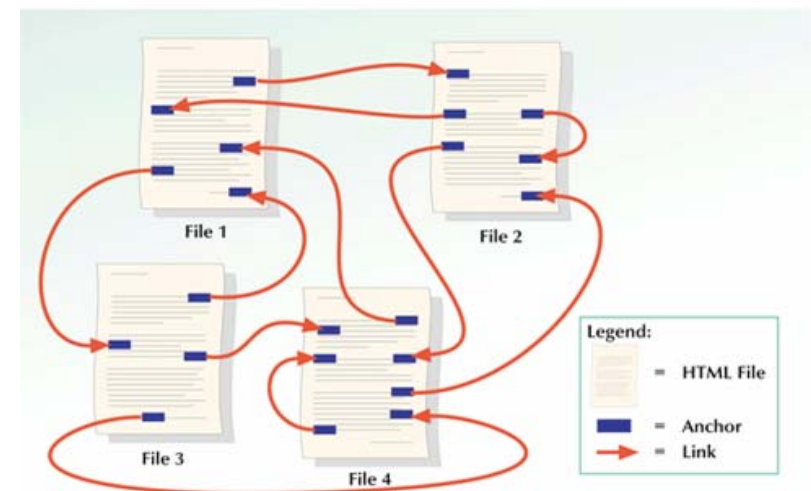
HTML anchor tag

- Enables Web designers to link HTML documents to each other

Hypertext Links

- A link which points to another location in the same or another HTML document

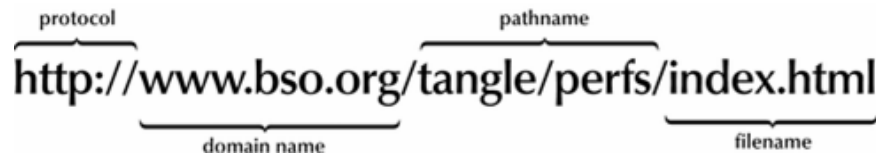
Hypertext and Links - 2



Uniform Resource Locators

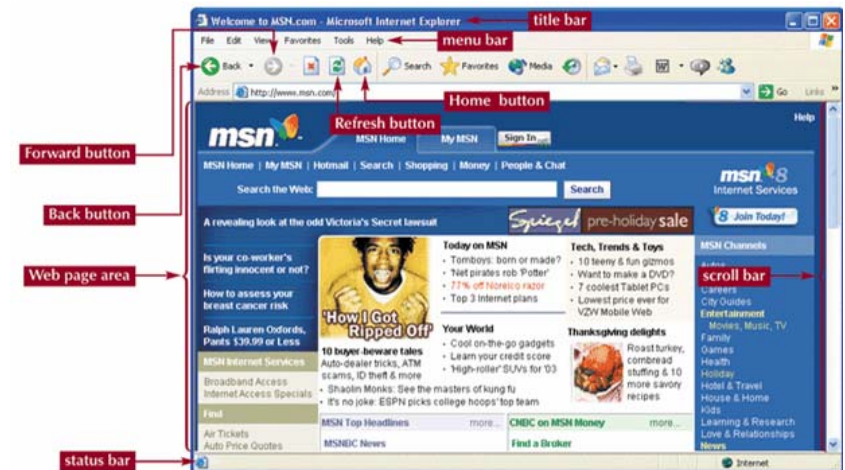
Four-part addressing scheme that tells the Web browser:

- Transfer protocol to use when transporting the file
- Domain name of computer on which file resides
- Pathname of folder or directory on computer on which file resides
- Name of the file



Main Elements of Web Browsers

- **Title Bar, Scroll Bars, Status Bar, Menu Bar, Page Tab, Home Button**



Web Search Engines

- Web pages that conduct searches of the Web to find words or expressions you enter.



7. Networked Applications

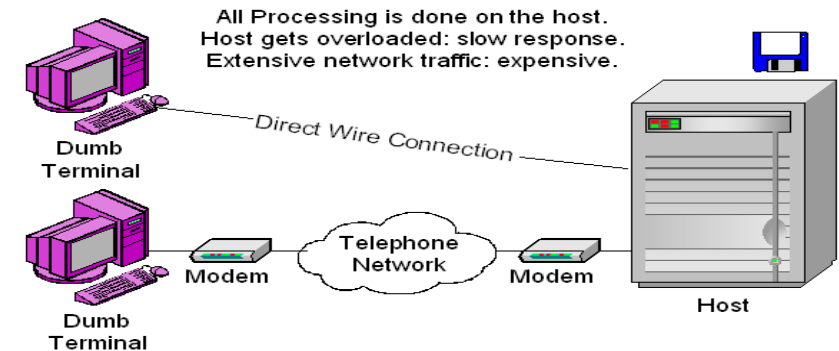
Application Architectures - 1

- An application architecture is the design decision about **which network host or hosts to use** to do the processing work in an application.
- Two type of application architecture:
 - Terminal-Host System
 - Client/Server Computing

Application Architectures - 2

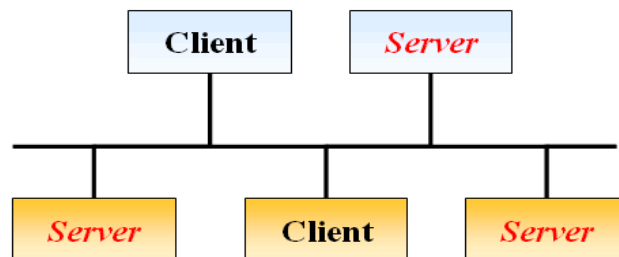
Terminal-Host System

- Applications and databases reside on the same host computer.
- User interacts with the application using a “**dumb terminal**”.



Application Architectures - 3

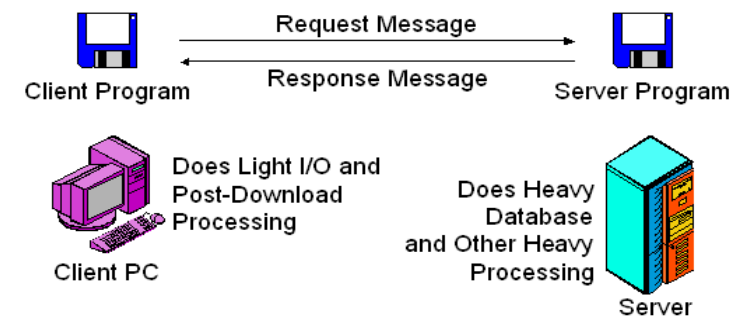
- Applications and databases reside on specialized host computers.
- Servers do most or all of the processing and transmit the results to the client.



Application Architectures - 4

Client/Server Computing

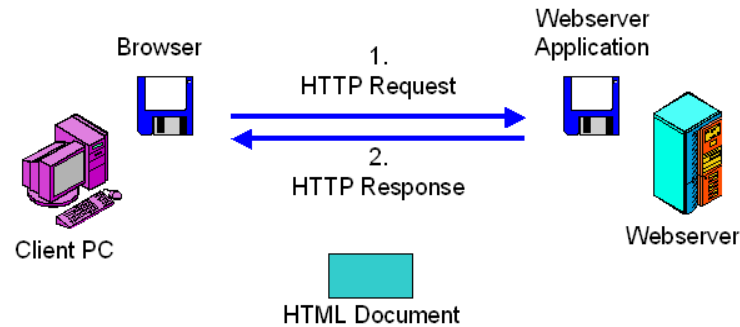
Client/Server Processing with Request-Response Cycle



Highly scalable: Use larger server as number of clients increases

Application Architectures - 5

Web Page Browsing



E-Mail - 1

What is E-Mail?

- E-mail (electronic mail) is the exchange of computer-stored messages by telecommunication.

Mail Server

- A hardware and software system that determines from the recipient's address one of several routes on which to send the message.

Mail Client Software or E-Mail Program

- A software that requests mail delivery from the mail server to your PC.

Email Address

- An address that uniquely identifies an individual or organization that is connected to the Internet.
- **mis.st.clements@gmail.com**

E-Mail - 2

Protocols that make email works

- **SMTP (Simple Mail Transfer Protocol)**
 - It decides which paths an e-mail message takes on the Internet.
- **POP (Post Office Protocol)**
 - It handles incoming messages.
- **IMAP (Internet Message Access Protocol)**
 - A protocol for retrieving mail messages from a server.
- **MIME (Multipurpose Internet Mail Extensions)**
 - A protocol that specifies how to encode non-text data, such as graphics and sound, so it can travel over the Internet.

E-Mail - 3

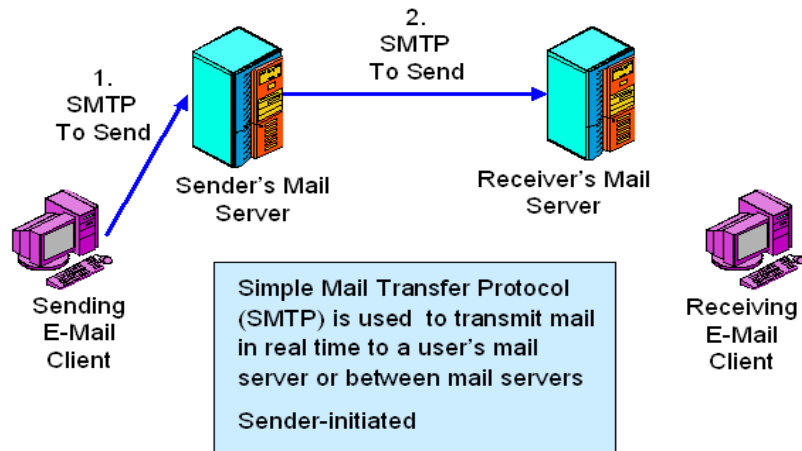
Importance of E-Mail

- Universal service on the Internet
- Attachments make e-mail a general file delivery mechanism!

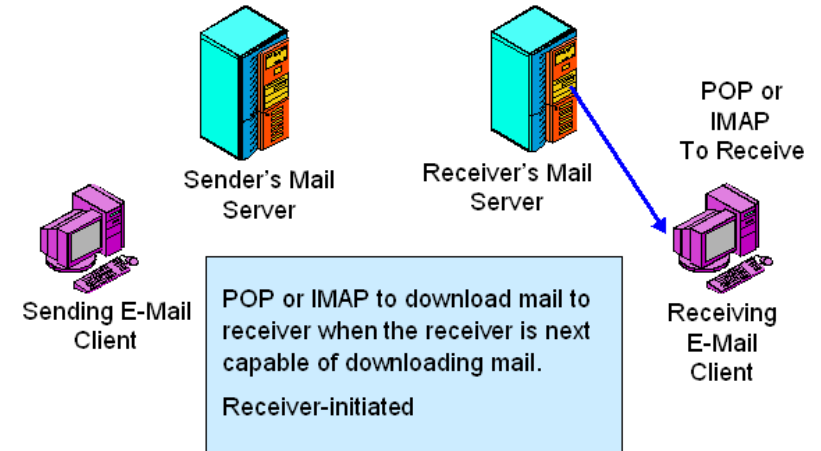
Mail Standards

- Message body standards
- Receiver must understand sender's message
 - RFC 822 and RFC 2822 for all-text bodies
 - HTML bodies with fancy text and graphics
 - UNICODE for non-English language characters

E-Mail - 4



E-Mail - 5



E-Mail – 6

The “evils” come with email:

- Messages with inappropriate content.
 - Racial or sexual harassment
 - Threats
- Spam, adware, spyware, and other abuses.
- Viruses, Worms, and Trojan Horses are often delivered by e-mail attachments!

E-Mail - 7

Viruses, Worms, and Trojan Horses

- Use of antivirus software is a must.
- Where to Do Scanning?
 - On client PCs
 - But users often turn off their software,
 - Fail to download virus definitions regularly
 - Or let their contracts lapse
 - On the corporate mail server or application firewall
 - Users cannot turn off

E-Mail - 8

- **Spam** are unsolicited commercial e-mail
- Why they are harmful?
 - Time consumed by users deleting them
 - Bandwidth and storage consumed
 - Legitimate messages lost because overlooked
- Separating SPAM from legitimate e-mail is difficult
 - Many spam messages get through to users
 - Some legitimate messages are deleted
 - Some firms merely mark messages as probable spam

E-Mail - 9

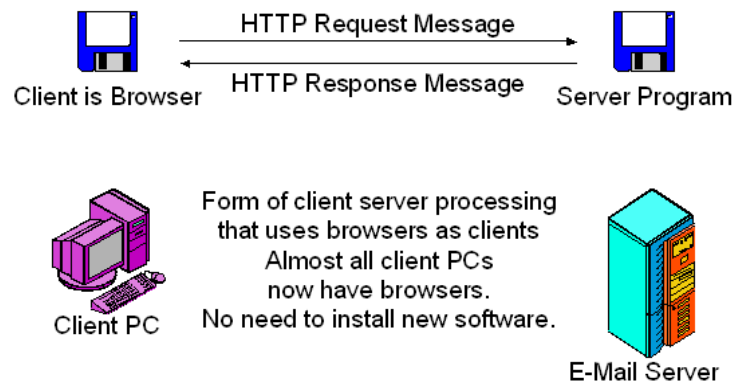
Web-Based E-Mail Services - 1

- Many Internet Web sites provide free e-mail addresses and accounts for **registered users**.
- They may be used with any Web browser.
- Examples: Gmail, Yahoo! Mail, Hotmail etc.



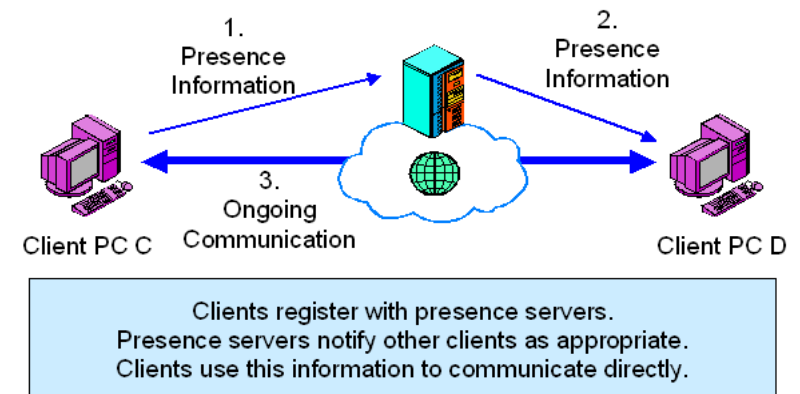
E-Mail - 10

Web-Based E-Mail Services - 2



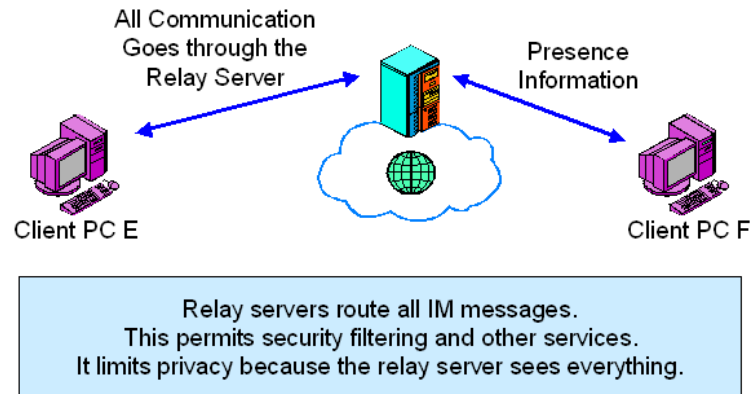
Instant Messaging Servers - 1

Use of a Presence Server



Instant Messaging Servers - 2

Use of a Relay Server



8. Contemporary Mobile Services

Mobile Enterprise

- “Today, penetration within organizations that use mobile applications is strong — on average, 22% of the workforce uses mobile applications.”
 - *Forrester’s March 15, 2006 Topic Overview “Enterprise Mobility”*
- Mobile Enterprise
 - “The **ability for an enterprise to connect** and control suppliers, partners, employees, assets, products, and customers **from any location.**”
 - *Forrester’s March 15, 2006 Topic Overview “Enterprise Mobility”*

What’s Driving Enterprises to Go Mobile?

- Increased competitive pressure as others start adopting mobile technology.
- Overall increased speed of business.
- Executives who have experienced mobility through a wireless email device, such as a *BlackBerry*, are now influencing departments to embrace mobility.

Broadband Wireless Networks...

Versatile Devices...

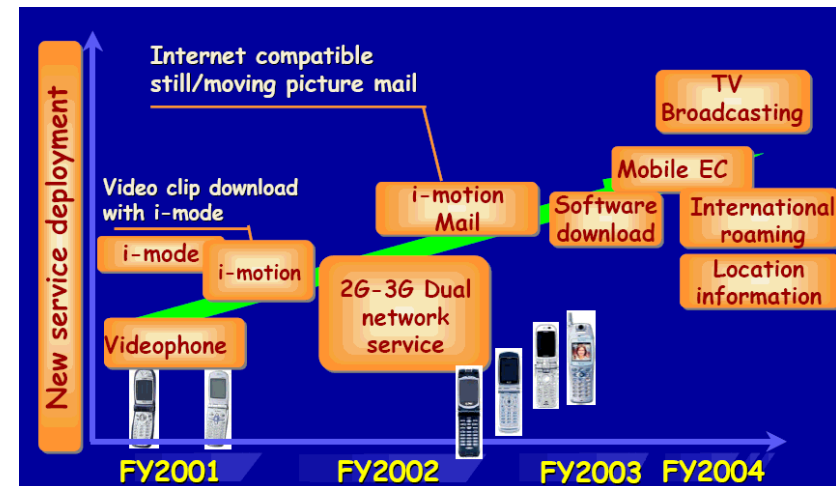
Faster Processors...



Generations of Mobile Networks

- 1G: basic mobile telephony
- 2G: mobile telephony for mass users
 - regional roaming
- 2.5G: mobile internet services
- 3G:
 - global roaming
 - enhanced mobile Internet services

3G Services – To explore the non-voice Applications



HSDPA - 1

- High-Speed Downlink Packet Access (HSDPA) is a 3G mobile telephony communications protocol.
- It support services requiring instantaneous high data rates in the downlink, e.g. Internet browsing, video on demand, office application.
- Peak data rates 3-4 times higher than current 3G.
- Current HSDPA deployments support down-link speeds of 1.8, 3.6, 7.2 and 14.4 Mbit/s.
- New terminals are required to take advantage of HSDPA.

HSDPA - 2

SPEED		Higher bit rates: up to 14 Mbps peak rate
CAPACITY		2 – 3 times improved system capacity
REDUCED DELAY		Quicker response time with interactive services
STANDARDIZED		Integral part of WCDMA (3GPP Rel.5)
Network Coverage		Short time to market with existing sites

Public Wi-Fi Service - 1

- 全民免費試用 PCCW Wi-Fi 寬頻 30 天
- 由即日起，全港市民只需使用備有 Wi-Fi 接駁功能的手提電子產品，如手提電腦、流動電話機、電子手賬電話機或 iPod Touch 等，在遍佈全港的任何一個 PCCW Wi-Fi 熱點進行上網簡單登記，便可以在其後的 30 天內無限量免費試用 PCCW Wi-Fi 寬頻服務，體驗極速、穩定、安全的無線上網樂趣。
- 電訊盈科在提供無線傳輸方面領先同儕，在全港敷設超過4,000個Wi-Fi熱點，致力將香港發展成為「Wi-Fi城市」。

Public Wi-Fi Service - 2

- 每日港幣 18 元使用費，即可全日無限量使用 HSDPA、3G 本地資料傳輸。

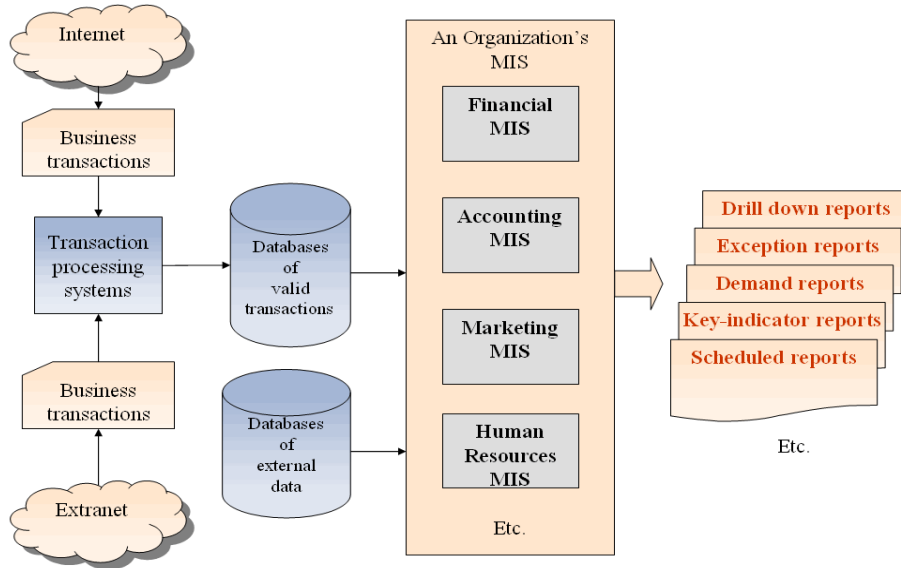


9. MIS Examples

Management information system (MIS) - 1

- An MIS provides managers with **information** and **support** for effective decision making, and provides feedback on daily operations.
- Output, or reports, are usually generated through accumulation of transaction processing data.
- MIS is an **integrated collection of functional information systems**, each supporting particular functional areas.
 - Provides reports based on **routine flow of data**
 - Assists in **general control** of the organization

Management information system (MIS) - 2



Management information system (MIS) - 3

Outputs of an MIS

Scheduled reports

- Produced periodically, or on a schedule (daily, weekly, monthly)

Key-indicator report

- Summarizes the previous day's critical activities
- Typically available at the beginning of each day

Demand report

- Gives certain information at a manager's request

Exception report

- Automatically produced when a situation is unusual or requires management action

Drill Down Reports

- Provide detailed data about a situation. To move from summary data to lower and lower levels of detail.

St. Clements University

130

MIS for Competitive Advantage

- Provides support to managers as they work to achieve corporate goals.
- Enables managers to compare results to established company goals and identify problem areas and opportunities for improvement.
- Data may be made available from management information systems on a company's intranet.
- Employees can use browsers and their PC to gain access to the data.

10. Management of MIS

MIS Management - 1

- Managing the information systems and technologies that support the modern business processes of companies today is a major challenge for both business and IT managers and professionals.
- Failures in IT management can be reduced by the **involvement of business managers** in IT planning and management.

MIS Management - 2

- Managing the joint development and implementation of business/IT strategies.
 - Led by the CEO and CIO
 - Proposals are developed by business managers and IT professionals for **using IT** to **support the strategic business priorities** of the company.
 - This is to ensure alignment of IT with strategic business goals.

MIS Management - 3

- Managing the development and implementation of new business/IT applications and technologies.
 - This is the primary responsibility of the CIO/CTO.
 - This area of IT management involves managing the processes for information systems development and implementation.
 - It also includes the responsibility for research into the strategic business uses of new information technologies.

MIS Management - 4

- Managing the IT organization and the IT infrastructure.
 - The CIO and IT managers share responsibility for managing the work of IT professionals who are typically organized into a variety of project teams and other organizational subunits.
 - They are responsible for managing the IT infrastructure of hardware, software, databases, telecommunications networks, and other IT resources, which must be acquired, operated, monitored, and maintained.

MIS Management - 5

The business/IT planning process has three major components:

- **Strategy Development** – Developing e-business and e-commerce strategies that support a company's e-business vision, use information technology to create innovative e-business systems that focus on customer and business value.
- **Resource Management** – Developing strategic plans for managing or outsourcing a company's IT resources, including IS personnel, hardware, software, data, and network resources.
- **Technology Architecture** – Making strategic IT choices that reflect an information technology architecture designed to support a company's business/IT initiatives.

MIS Management - 6

Managing Hardware and Software

- **Capacity planning:** Process of predicting when a computer hardware system becomes saturated
- **Scalability:** Ability of a computer, product, or system to expand to serve a larger number of users without breaking down

MIS Management - 7

- Total Cost of Ownership (TCO) of Technology Assets
 - Includes both direct and indirect costs
 - Hardware and software acquisitions account for only 20% of TCO
 - TCO for a PC may run to three times original purchase price
 - Be aware of hidden costs!

END