Multimedia Technology (IT-204-F)

Section A
Introduction to multimedia

Lecture 4

Multimedia Networks

- **Multimedia Networks:**
- Five basic types that provide multimedia communication services:

    -- Telephone networks;

    -- Data networks;

    -- Broadcast TV networks;

    -- Integrated services digital networks

    -- Broadband multiservice networks.

Telephone networks

Telephony
(fixed and mobile)   Voice-mail   Facsimile
(fax)   Access to the
Internet   Video
telephony   Speech and
videoconferencing   Entertainment
(video-on-demand,
interactive TV)

The Internet

Email and
file transfers   Multimedia
mail   Speech and video
telephony   Videoconferencing   Information retrieval
and electronic
commerce

Cable networks

Analog/digital
audio and
television   CD and video/movie
on demand   Interactive TV   Access to the
PSTN   Access to the
Internet

Satellite and terrestrial broadcast networks

Analog/digital audio
and television broadcast   Near video/movie-
on-demand   Interactive
television

Narrowband ISDN

Digital telephony
and fax   Video telephony
and conferencing   LAN
interconnection   Access to the
Internet

Broadband ISDN

ATM LANs   ATM MANs   ATM backbone networks

All interpersonal and
interactive applications   High-speed network
interconnection

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- **Telephone networks:**

Plain old phone service;

Private branch Exchange;

Mobile switching center;

International gateway exchange;

- **Data networks**

LAN, WAN

Internet-works (Internet is the most popular internetwork).

- **Broadcast TV networks**

Cable Networks; Satellite/ terrestrial broadcast networks.

- **Integrates services digital networks: ISDN**
- **Broadband multiservice networks**

B-ISDN, ATM

- **Multimedia Applications**
- Three categories:
  -- Interpersonal Communications;
  -- Interactive application over the Internet;
  -- Entertainment applications.
- **Interpersonal Communications**
- Speech only
- Image only
- Text only
- Speech and Video

Interactive application over the Internet

- WWW
- Hypertext
- XML

INTERNET

- For some it is a medium of exchanging information.
- A network of networks, joining many government, university and private computers together and providing an infrastructure for the use of E-mail, bulletin boards, file archives, hypertext documents, databases and other computational resources
- The vast collection of computer networks which form and act as a single huge network for transport of data and messages across distances which can be anywhere from the same office to anywhere in the world.

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers).

It was conceived by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1969 and was first known as the ARPANET.

- The **Internet** is a global system of interconnected computer networks that use the standardized Internet Protocol Suite (TCP/IP). It is a *network of networks* that consists of millions of private and public, academic, business, and government networks of local to global scope that are linked by copper wires, fiber-optic cables, and other technologies.

- The Internet carries a vast array of information resources and services, most notably the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail, in addition to popular services such as online chat, file transfer and file sharing, online gaming, and Voice over Internet Protocol (VoIP) person-to-person communication via voice and video.

- **The largest network of networks in the world.**
- **Uses TCP/IP protocols and packet switching .**
- **Runs on any communications substrate.**

- Multimedia transfer in Internet:
- Internet does not support continuous media

Because:

-packet transport is not reliable

-capacity is not enough for multimedia

-no guarantee on transfer speed

- Real-time transport protocols aim at more reliable multimedia transfer (e.g., RTP)
- Media streams can be sent to groups (Multicast)
- Capacity can be reserved (e.g., RSVP)

ADVANTAGES OF INTERNET

E-mail

The concept of sending electronic text messages between parties in a way analogous to mailing letters or memos predates the creation of the Internet. Pictures, documents and other files can be sent as e-mail attachments

The World Wide Web

Many people use the terms *Internet* and *World Wide Web* (or just the *Web*) interchangeably, but, the two terms are not synonymous

The World Wide Web is a huge set of interlinked documents, images and other resources, linked by hyperlinks and URLs. These hyperlinks and URLs allow the web servers and other machines that store originals, and cached copies of, these resources to deliver them as required using HTTP (Hypertext Transfer Protocol). HTTP is only one of the communication protocols used on the Internet. Web documents may contain almost any combination of computer data including graphics, sounds, text, video, multimedia and interactive content including games, office applications and scientific demonstrations.

Remote access

The Internet allows computer users to connect to other computers and information stores easily, wherever they may be across the world. They may do this with or without the use of security, authentication and encryption technologies, depending on the requirements.

- The creation of the Internet solved the following challenges:
  - Basically inventing digital networking as we know it
  - Survivability of an infrastructure to send / receive high-speed electronic messages
  - Reliability of computer messaging

Collaboration

The low cost and nearly instantaneous sharing of ideas, knowledge, and skills has made collaborative work dramatically easier. Not only can a group cheaply communicate and share ideas, but the wide reach of the Internet allows such groups to easily form in the first place. An example of this is the free software movement, which has produced, among other programs, Linux, Mozilla Firefox and OpenOffice.org

File sharing

A computer file can be e-mailed to customers, colleagues and friends as an attachment. It can be uploaded to a website or FTP server for easy download by others. It can be put into a "shared location" or onto a file server for instant use by colleagues. These simple features of the Internet, over a worldwide basis, are changing the production, sale, and distribution of anything that can be reduced to a computer file for transmission. This includes all manner of print publications, software products, news, music, film, video, photography, graphics and the other arts. This in turn has caused seismic shifts in each of the existing industries that previously controlled the production and distribution of these products.

Streaming media

- Webcams can be seen as an even lower-budget extension of this phenomenon. While some webcams can give full-frame-rate video, the picture is usually either small or updates slowly. Internet users can watch animals around an African waterhole, ships in the Panama Canal, traffic at a local roundabout or monitor their own premises, live and in real time. Video chat rooms and video conferencing are also popular with many uses being found for personal webcams, with and without two-way sound.

- YouTube was founded on 15 February 2005 and is now the leading website for free streaming video with a vast number of users. It uses a flash-based web player to stream and show video files. Registered users may upload an unlimited amount of video and build their own personal profile. YouTube claims that its users watch hundreds of millions, and upload hundreds of thousands, of videos daily

Internet Telephony (VoIP)

VoIP stands for Voice-over-Internet Protocol, referring to the protocol that underlies all Internet communication. The idea began in the early 1990s with walkie-talkie-like voice applications for personal computers. In recent years many VoIP systems have become as easy to use and as convenient as a normal telephone. The benefit is that, as the Internet carries the voice traffic, VoIP can be free or cost much less than a traditional telephone call, especially over long distances and especially for those with always-on Internet connections such as cable or ADSL.

WAYS OF ACCESSING INTERNET

1) DIAL UP CONNECTIONS
2) BROAD BAND CONNECTIONS
3) SATELLITE CONNECTIONS
4) WI-FI

DIAL UP CONNECTIONS

- With a dial-up connection, the Internet user can connect to the Internet via his or telephone line and an Internet service provider. This method of connecting to the Internet is generally considered the cheapest, but it is also provides the user with the slowest overall connection speeds. However, it may suit the purposes of the occasional Internet user without a need for a fast or consistent connection.

BROADBAND CONNECTIONS

- Broadband connections offer another way to connect to the Internet. In this category are cable and DSL connections. With a cable connection, the user must subscribe to a cable-television/Internet service. These connections are typically very fast, offering speeds upwards of 70 times faster than dial-up connections. They also allow the user to stay connected to the Internet at all times; the user need only open a browser window to access the Internet, as there is no log-on process to complete.

- Like cable Internet service, DSL offers much faster speeds than those available with dial-up modems. However, there is a wide range of speeds available form different providers, generally going up to 3 Mbps (3000 Kbps). With DSL, normal telephone wires are used to combine usually separate voice and data lines, allowing users to connect to the Internet and talk on the phone via the same telephone line.

SATELLITE

- Satellite Internet service is another form of high-speed Internet connection. It employs telecommunications satellites to allow users to connect to the Internet. Typically, such connections are most popular in areas in which cable and DSL connections are either unavailable or unreliable. However, satellite connections are usually slower than cable and DSL connections. Also, they often experience high network latency because of delays in data transmission, and this can lead to a rather lethargic performance, especially when it comes to gaming and downloading.

Wi-fi

- web users are now able to connect to the Internet wirelessly, accessing the web without wires or cables of any type. Wireless technology allows users to have mobile connections, accessing the web (with some limitations) where and when they need to. This can be accomplished via public Wi-Fi networks, cellular services, and Wimax — a somewhat newer type of wireless service. These technologies vary in terms of connectivity, reliability, and cost, but they all allow users to connect whether they are at home, school, work, or on the road.

HYPERTEXT & HYPERMEDIA

a. Hypertext is text which is not constrained to be linear. Hypertext is text which   contains links to other texts. The term was coined by Ted Nelson around 1965.

b.   Hypertext systems are particularly useful for organizing and browsing through large databases that consist of disparate types of information. There are several Hypertext systems available for Apple Macintosh computers and PCs that enable you to develop your own databases. Such systems are often called *authoring systems .* *HyperCard software from Apple Computer is the most famous.*

- Text which does not form a single sequence and which may be read in various orders; specially text and graphics ... which are interconnected in such a way that a reader of the material (as displayed at a computer terminal, etc.) can discontinue reading one document at certain points in order to consult other related matter.

- Theodore `Ted' Nelson, who first coined the terms hypertext and hypermedia, wrote in *Literary Machines* that `As popularly conceived, [hypertext] is a series of text chunks connected by links which offer the reader different pathways.' Neither hypertext nor hypermedia require the use of link.

- HYPERMEDIA is an extension to hypertext that supports linking graphics, sound, and video elements in addition to text elements. The World Wide Web is a partial hypermedia system since is supports graphical hyperlinks and links to sound and video files. New hypermedia systems under development will allow objects in computer videos to be hyperlinked.

CABLE MODEM VS DSL

Dial-up modems are limited to a [bitrate](#) of less than 56 kbit/s ([kilobits](#) per second) and require the full use of a telephone line—whereas broadband technologies supply more than double this rate and generally without disrupting telephone use.

 Broadband is often called "**high-speed**" Internet, because it usually has a high rate of data transmission. In general, any connection to the customer of 256 kbit/s (0.256 Mbit/s) or greater is more concisely considered **broadband Internet**.

The first difference between DSL and cable is that DSL is delivered over a standard telephone line, while cable requires cable television service. In both cases, the lines can handle other transmissions in addition to Internet service. For example, you can use your telephone to make and receive calls while online with DSL, because DSL utilizes separate frequencies from telephone communications. Similarly, you can watch television while online with cable Internet service.

A DSL subscriber will have to be within a certain distance from a telephone hub to get good DSL service. Therefore, DSL is not available in all areas, though this is becoming less of a problem. Any DSL provider that services your area can tell by your telephone number whether you are eligible for DSL service.

   An advantage of DSL service is that your speed remains the same, no matter how many people are using the service. With cable Internet service, the number of users in your local area can affect [bandwidth](#) availability and result in slow service. Your personal experience is dependent upon the number of active users at any given time.

APPLICATIONS

- Image Processing
- Image Enhancement
- Medical Imaging

Scope of Research

- VOIP
- ADSL