**Telecommunication**

Telecommunication is the assisted transmission of signals over a distance for the purpose of communication. In earlier times, this may have involved the use of smoke signals, drums, semaphore or heliograph. In modern times, telecommunication typically involves the use of electronic transmitters such as the telephone, television, radio or computer. Early inventors in the field of telecommunication include Alexander Graham Bell, Guglielmo Marconi and John Logie Baird. Telecommunication is an important part of the world economy and the telecommunication industry's revenue is placed at just under 3 percent of the gross world product.

The word telecommunication was adapted from the French word telecommunication. It is a compound of the Greek prefix tele, meaning 'far off, and the Latin communicare, meaning 'to share. The French word telecommunication was coined in 1904 by French engineer and novelist Edouard Estaunie.

Basic elements

A telecommunication system consists of three basic elements:

* A transmitter that takes information and converts it to a signal;
* A transmission medium that carries the signal; and,
* A receiver that receives the signal and converts it back into usable information.

In a radio broadcast for example, the broadcast tower is the transmitter, free space is the transmission medium and the radio is the receiver. Often telecommunication systems are two-way, and a single device acts as both a transmitter and receiver or transceiver. For example, a mobile phone is a transceiver. Telecommunication over a phone line is called point- to-point communication because it is between one transmitter and one receiver. Telecommunication through radio broadcasts is called broadcast communication because it is between one powerful transmitter and numerous receivers.

**Analogue or digital**

Signals can be either analogue or digital. In an analogue signal, the signal is varied continuously with respect to the information. In a digital signal, the information is encoded as a set of discrete values (for example ones and zeros). During transmission the information contained in analogue signals will be degraded by noise. Conversely, unless the noise exceeds a certain threshold, the information contained in digital signals will remain intact. This represents a key advantage of digital signals over analogue signals.

**Networks**

A collection of transmitters, receivers or transceivers that communicate with each other is known as a network.

**Channels**

A channel is a division in a transmission medium so that it can be used to send multiple streams of information. For example, a radio station may broadcast at 96.1 MHz while another radio station may broadcast at 94.5 MHz. In this case, the medium has been divided by frequency and each channel has received a separate frequency to broadcast on. Alternatively, one could allocate each channel a recurring segment of time over which to broadcast — this is known as time-division multiplexing and is sometimes used in digital communication.

**Modulation**

The shaping of a signal to convey information is known as modulation. Modulation can be used to represent a digital message as an analogue waveform. This is known as keying and several keying techniques exist (these include phase-shift keying, frequency-shift keying and amplitude-shift keying). Bluetooth, for example, uses phase-shift keying to exchange information between devices.Modulation can also be used to transmit the information of analogue signals at higher frequencies. This is helpful because low-frequency analogue signals cannot be effectively transmitted over free space. Hence the information from a low-frequency analogue signal must be superimposed on a higher-frequency signal (known as a carrier wave) before transmission. There are several different modulation schemes available to achieve this (two of the most basic being amplitude modulation and frequency modulation).

An example of this process is a DJ's voice being superimposed on a 96 MHz carrier wave using frequency modulation (the voice would then be received on a radio as the channel "96 FM").

**Mobile:**

The mobile phone, cellular phone, or simply cell phone is a long -range, portable electronic device used for mobile communication that uses a network of specialized base stations known as cell sites. In addition to the standard voice function of a telephone, current mobile phones can support many additional services such as SMS for text messaging, email, packet switching for access to the Internet, and MMS for sending and receiving photos and video. Mobile phones generally obtain power from batteries which can be recharged from mains power, a USB port or a cigarette lighter socket in a car.

**Applications**

Mobile news services are expanding with many organizations providing "on-demand" news services by SMS. Some also provide "instant" news pushed out by SMS. Mobile telephony also facilitates activism and public journalism being explored by Reuters and Yahoo and small independent news companies such as Jasmine News in Sri Lanka. Companies like Monster are starting to offer mobile services such as job search and career advice.

**Features**

The camera phone now holds 85% of the mobile phone market. Mobile phones often have features beyond sending text messages and making voice calls, including Internet browsing, music (MP3) playback, memo recording, personal organizer functions, e-mail, instant messaging, built-in cameras and camcorders, ringtones, games, radio, Push -to-Talk (PTT), infrared and Bluetooth connectivity, call registers, ability to watch streaming video or download video for later viewing, video calling and serve as a wireless modem for a PC, and soon will also serve as a console of sorts to online games and other high quality’s games.

**Technology**

Mobile phones and the network they operate under vary significantly from provider to provider, and country to country. However, all of them communicate through electromagnetic radio waves with a cell site base station, the antennas of which are usually mounted on a tower, pole or building.

**Cell Broadcast**

It is also known as Short Message Service - Cell Broadcast (SMS-CB). Cell Broadcast is a mobile technology that allows messages (up to 15 pages of up to 93 characters) to be broadcast to all mobile handsets and similar devices within a designated geographical area. The broadcast range can be varied, from a single cell to the entire network. Cordless telephone (portable phone) Cordless phones are standard telephones with radio handsets. Unlike mobile phones, cordless phones use private base stations that are not shared between subscribers. The base station is connected to a land-line.

**Fax:**

Fax (short for facsimile, from Latin fac simile, "make similar", i.e. "make a copy") is a telecommunications technology used to transfer copies (facsimiles) of documents, especially using affordable devices operating over the telephone network. The word telefax, short for telefacsimile means for "make a copy at a distance". The device is also known as a Telecopier in certain industries. When sending documents to people at large distances, faxes have a distinct advantage over postal mail in that the delivery is nearly instantenous.

**Traditional Fax**

It transmits data in the form of pulses via a telephone line to a recipient, usually another fax machine, which then transforms these impulses into images, and prints them on paper. The traditional method requires a phone line, and only one fax can be sent or received at a time.

**Computer-based faxing**

Another alternative to a physical fax machine is to make use of computer software which allows people to send and receive faxes using their own computers.

As modems came into wider use with personal computers, the computer was used to send faxes directly. Instead offirst printing a hard copy to be then sent via fax machine, a document could now be printed directly to the software fax, and then sent via the computer's modem. Receiving faxes was accomplished similarly.

* **Computer** — Phone line — **Fax machine**
* **Fax Machine** — Phone line — **Computer**

A disadvantage of receiving faxes this way is that the computer has to be turned on and running the fax software to receive any faxes. Note: This method is distinct from Internet faxing as the information is sent directly over the telephone network, not over the Internet.

**Internet Fax**

One popular alternative is to subscribe to an internet fax service. Internet fax uses the internet to receive and send faxes. Fax service providers allow users to send and receive faxes from their personal computers using an existing email account. No software, fax server or fax machine is needed. Faxes are received as attached .TIF or .PDF files, or in proprietary formats that require the use of the service provider's software. Faxes can be sent or retrieved from anywhere at any time that a user can get internet access Utilizing a fax service provider requires no paper, toner, fax line, etc.

Advantages of using the internet can include

1. No extra telephone line required for the fax
2. Paperless communication, integrated with email
3. Send and receive multiple faxes simultaneously
4. Reduction in phone costs Internet fax servers/gateways

The Internet has enabled development of several other methods of sending and receiving a fax. The more common method is an extension of computer- based faxing, and involves using a fax server/gateway to the Internet to convert between faxes and emails. It is often referred to as "fax to mail" or "mail to fax". This technology is more and more replacing the traditional fax machine because it offers the advantage of dispensing with the machine as well as the additional telephone line.

• **Fax machine** — Phone line — Fax gateway — email message (over Internet) — **computer email** **account**

A fax is sent via the Public Switched Telephone Network (PSTN) on the fax server, which receives the fax and converts it into PDF or TIFF format, according to the instructions of the user. The fax is then transmitted to the Web server which posts it in the Web interface on the account of the subscriber, who is alerted of the reception by an email containing the fax in an attached file and sometimes by a message on his mobile phone.

**Sending:**

• Computer — Internet — Fax gateway — Phone line — Fax machine

From his/her computer, in the supplier Web site, the user chooses the document s/he wants to send and the fax number of the recipient. When sending, the document is usually converted to PDF format and sent by the Web server to the fax server, which then transmits it to the recipient fax machine via the Standard Telephone Network. Then the user receives a confirmation that the sending was carried out, in his/her web interface and/or by email. An Internet fax service allows one to send faxes from a computer via an Internet connection, thanks to a Web interface usually available on the supplier's Web site. This technology has many advantages:

* **No fax machine** — no maintenance, no paper, toner expenditure, possible repairs, etc.
* **Mobility** — all actions are done on the Web interface; the service is thus available from any computerconnected to Internet, everywhere in the world.
* **Confidentiality —** The faxes are received directly on the account of the user; he is the only one whocan access it. The received faxes are not likely to be lost any more or read by the wrong people.
* **No installation of software or hardware** — All actions are done on the Web interface of the supplier,on the account of the user.
* **No telephone** subscription for an additional line dedicated to the fax.
* **Many faxes** can be sent or received simultaneously, and faxes can be received while the computer isswitched off.

**Fax using Voice over IP**

Making phone calls over the Internet (Voice over Internet Protocol, or VoIP) has become increasingly popular. Compressing fax signals is different from compressing voice signals, so a new standard has been created for this. If the VoIP adapter and gateway are T.38 compliant, most fax machines can simply be plugged into the VoIP adapter instead of a regular phone line.

• **Fax machine** — VoIP adapter — VoIP gateway — Phone line — **Fax machine (or vice versa)**

**Fax using email**

"IFax" was designed for fax machines to directly communicate via email. Faxes are sent as e-mail attachments in a TIFF-F format. A new fax machine (supporting iFax/T.37) is required, as well as a known email address for the sending and receiving machines.

**• IF ax machine** — email message (over Internet) — **computer email account**

**Video Conferencing:**

A videoconference (also known as a video teleconference) is a set of interactive telecommunication technologies which allow two or more locations to interact via two-way video and audio transmissions simultaneously. It has also been called visual collaboration. Video conferencing uses telecommunications of audio and video to bring people at different sites together for a meeting. This can be as simple as a conversation between two people in private offices (point-to-point) or involve several sites (multi-point) with more than one person in large rooms at different sites. Besides the audio and visual transmission of people, video conferencing can be used to share documents, computer-displayed information, and whiteboards. The core technology used in a video teleconference (VTC) system is digital compression of audio and video streams in real time. The hardware or software that performs compression is called a codec (coder/decoder).The screen of the dual plasma on the left is primarily used to show people during the conference or the user interface when setting up the call. The one on the right shows data in this case but can display a 2nd 'far site' in a multipoint call.

The other components required for a VTC system include Video input: video camera or webcam Video output: computer monitor, television or projector Audio input: microphones Audio output: usually loudspeakers associated with the display device or telephone Data transfer: analog or digital telephone network, LAN or Internet Issues Some observers argue that two outstanding issues are preventing videoconferencing from becoming a standard form of communication, despite the ubiquity of videoconferencing-capable systems. These issues are:

**Eye Contact:**

It is known that eye contact plays a large role in conversational turn-taking, perceived attention and intent, and other aspects of group communication.12 While traditional telephone conversations give no eye contact cues, videoconferencing systems are arguably worse in that they provide an incorrect impression that the remote interlocutor is avoiding eye contact. This issue is being addressed through research that generates a synthetic image with eye contact using stereo reconstruction.

**Appearance Consciousness**:

A second problem with videoconferencing is that one is literally on camera, with the video stream possibly even being recorded. The burden of presenting an acceptable on-screen appearance is not present in audio-only communication. Early studies by Alphonse Chapanis found that the addition of video actually impaired communication, possibly because of the consciousness of being on camera. The issue of eye-contact may be solved with advancing technology, and presumably the issue of appearance consciousness will fade as people become accustomed to videoconferencing. Videoconferencing is now being introduced to online news websites, in order to include the element of more liveliness.

**Cable TV:**

Cable television is a system of providing television to consumers via radio frequency signals transmitted to televisions through fixed optical fibers or coaxial cables as opposed to the over-the-air method used in traditional television broadcasting (via radio waves) in which a television antenna is required. Cable TV is a system that uses cables rather than antennas for the transmission of TV programs and commercials. A broadband communications technology in which multiple television channels, as well as audio and data signals, may be transmitted either one way or bidirectional through an often hybrid (fiber and coaxial) distribution system to a single or to multiple specific locations.

It is a TV broadcasting service that delivers signals to households via a fiber optic cable rather than a conventional aerial or a satellite dish. Like satellite, it also requires a set top box. A set top box is a box that connects to your TV and allows you to receive digital television either through cable, satellite, an aerial or through the phone line. It literally translates the digital information and displays it on your television screen. It is a component of your video system that takes an external signal (cable, satellite, etc.) and converts it into a format for your TV to view. And it is typically known as a cable box, satellite box, etc.

Coaxial cables are capable of bi-directional carriage of signals as well as the transmission of large amounts of data. Cable television signals use only a portion of the bandwidth available over coaxial lines. This leaves plenty of space available for other digital services such as broadband internet and cable telephony.

**V-sat:**

A Very Small Aperture Terminal (VSAT), is a two-way satellite ground station with a dish antenna. An innovative feature of VSAT is that the technology has evolved to the point that previously could only be done with large, high -powered transmitting satellite dishes can now be done with a much smaller and vastly lower-powered antenna at the customer's premises. Nearly all VSAT systems are now based on IP, with a very broad spectrum of applications.

VSATs (Very Small Aperture Terminals or Via Satellite Terminals) have emerged as the preferred means of wide area networking for financial institutions, utilities and services sector, as the VSAT has the ability to integrate data, voice, fax and also voice across remote locations. There are different VSAT technologies namely SCPC, DAMA, TDM/TDMA, and FTDMA. Adding a new location takes less than a week, and enhancing services is limited to adding or modifying software at Headquarters (Hub Control Station) only. VSATs offer high network reliability (99.5 %), remote accessibility at lower costs, transmission costs independent of distances, and centralized network control, independent of a public carrier. VSATs offer more flexibility in network expansion and redesign whereas the terrestrial network requires re- engineering, which is process that can take months and involve scores of vendors. Car dealerships, gas stations, lottery systems, banks, insurance companies, drug stores, general stores, supermarkets, healthcare companies, manufacturers, couriers, hotel chains, car rental businesses, food manufacturers, heavy industries, mines, electrical utilities, oil and gas pipelines, energy production and exploration, timber companies, plantations, various government departments and agencies use VSAT systems. VSAT services can be deployed in hours or even minutes (with auto-acquisition antennas).

**E-mail:**

E-mail, short for electronic mail and often abbreviated to e-mail, email or simply mail, is a store and forward method of composing, sending, storing, and receiving messages over electronic communication systems. Messages are exchanged between hosts using the Simple Mail Transfer Protocol with software

programs called mail transport agents. Users can download their messages from servers. When a message cannot be delivered, the recipient MTA must send a bounce message back to the sender, indicating the problem. Despite these disadvantages, and despite the availability of other tools, email-based communication is still the most widely used written medium in businesses.

**Challenges**

**Spamming and computer viruses**

The usefulness of e-mail is being threatened by three phenomena: spamming, phishing and e-mail worms. Spamming is unsolicited commercial e-mail. Because of the very low cost of sending e-mail, spammers can send hundreds of millions of e-mail messages each day over an inexpensive Internet connection. Hundreds of active spammers sending this volume of mail results in information overload for many computer users who receive tens or even hundreds of junk messages each day.E -mail worms use e-mail as a way of replicating themselves into vulnerable computers. The combination of spam and worm programs results in users receiving a constant drizzle of junk e-mail, which reduces the usefulness of e-mail as a practical tool.

**Privacy concerns**

E-mail privacy, without some security precautions, can be compromised because:

* E-mail messages are generally not encrypted;
* e-mail messages have to go through intermediate computers before reaching their destination, meaning it is relatively easy for others to intercept and read messages;
* Many Internet Service Providers (ISP) store copies of your e-mail messages on their mail servers before they are delivered. The backups of these can remain up to several months on their server, even if you delete them in your mailbox;
* The Received: headers and other information in the e-mail can often identify the sender, preventing anonymous communication.

**Video Technology: Digital Camera**

A digital camera is a camera that takes video or still photographs, or both, digitally by recording images on a light-sensitive sensor. Many compact digital still cameras can record sound and moving video as well as still photographs.

Digital cameras can include features that are not found in film cameras, such as displaying an image on the camera's screen immediately after it is recorded, the capacity to take thousands of images on a single small memory device, the ability to record video with sound, the ability to edit images, and deletion of images allowing re- use of the storage they occupied. Digital cameras are incorporated into many devices ranging from PDAs and mobile phones (called camera phones).

**Digital photography**

Digital photography is a form of photography that utilizes digital technology to make digital images of subjects. Until the advent of digital technology, photography used photographic film to create images which could be made visible by photographic processing. Digital images can be displayed, printed, stored, manipulated, transmitted, and archived using digital and computer techniques, without chemical processing.

**Camcorders**

A camcorder is a portable electronic device for recording video images and audio onto an internal storage device. The camcorder contains both a video camera and (traditionally) a videocassette recorder in one unit, hence its portmanteau name. This compares to previous technology where they would be separate.

**Broadcasting:**

Broadcasting is the distribution of audio and/or video signals which transmit programs to an audience. The audience may be the general public or a relatively large sub-audience, such as children or young adults. There are wide varieties of broadcasting systems, all of which have different capabilities. The Largest broadcasting systems are institutional public address systems, which transmit nonverbal messages and music within a school or hospital, and low-powered broadcasting systems which transmit radio stations or television stations to a small area. National radio and television broadcasters have nationwide coverage, using retransmitted towers, satellite systems, and cable distribution. Satellite radio and television broadcasters can cover even wider areas, such as entire continents, and Internet channels can distribute text or streamed music worldwide. Television and radio programs are distributed through radio broadcasting or cable, often both simultaneously. The term "broadcast" was coined by early radio engineers from the Midwestern United States. Broadcasting forms a very large segment of the mass media. Broadcasting to a very narrow range of audience is called narrowcasting. Recorded broadcasts and live broadcasts One can record and live broadcasts. The former allows correcting errors, and removing superfluous or undesired material, rearranging it, applying slow-motion and repetitions, and other techniques to enhance the program. However some live events like sports telecasts can include some of the aspects including slow motion clips of important goals/hits etc in between the live telecast.A disadvantage of recording first is that the public may know the outcome of an event from another source, which may be a spoiler. In addition, prerecording prevents live announcers from deviating from an officially-approved script, as occurred with propaganda broadcasts.An overview of current technology trends in ICE (Information, Communication and Entertainment) and digital convergence and future of media - What Next?

The key factor of change in ICT (Information and Communication technologies) today is digital convergence. Convergence is bringing a fundamental modification not only to the ICT sector but also to the way we use ICT across society and the economy. We are on the verge of a whole new wave of ICT applications and services that will transform the way we live, do business and spend our leisure time. The ICE (Information, Communication and Entertainment) industries are being shaped by the constant drive of convergence and the commoditization of products and services. These drivers are placing tremendous pressure on telecom, media, software and IT companies around the globe. In order to plan a successful path, the various players will need to recognize the need to adopt new business models that reflect emerging ways in which consumers want to access and pay for content.

**Digital convergence** is mainly driven by the TIME industries (Telecommunication, IT/Internet, Mediaand Entertainment) and provides new, innovative solutions to consumers and business users. Based on digital technologies and digitized content it encompasses converged devices (such as smart phones, laptops, internet enabled entertainment devices), converged applications (e.g. music download on PC and handheld) and converged networks (IP networks).

Convergence describes a process change in industry structures (Computer Industry, Information/Content Industry, & Communication Industry) that combines markets through technological and economic dimensions to meet merging consumer needs. This process change takes place, inter and intra industry, in the following structure:

* Computer Industry •S
* Computers •S
* Software •S
* Interfaces

Digital convergence brings together the separate worlds of audio, video, data and voice communication services. Already today we can access the same services and content (e-mail, music television) using different terminals over different types of networks. The borders between fixed-line and wireless mobile networks are disappearing. In the convergent world, consumers will be in control of their entertainment and media content; what they want, when they want it, and where they want it. The process by which all separate media become digital and come to be delivered via the global network is known as Digital Convergence. *Information/Content Industry*

*Databases*

*Information Services*

*Audio-Visuals products*

*Films*

*Music*

*Photos*

*Communication Industry*

*PSTN*

*Cable Networks*

*Broadcasting*

*Mobile networks*

Digital convergence is increasing the importance of content and services in the ICT sector. In many European countries, operators already offer triple-play services, a bundle of voice, internet and video services. Triple Play service is a marketing term for the 3 services: high-speed Internet, Video (TV) and telephone service - all over a single broadband connection. The main current examples of converged services concern Voice and Television over the Internet Protocol. Voice over IP, as we know it, is transforming telephony and will soon be delivered over mobile phones. Already today, there are more radio stations on the Internet than radio stations broadcasting over the airwaves. The combinations of these technologies are unleashing a wealth of opportunities, blurring the boundaries between market sectors, and proving a powerful driver for innovation and change in a global market. In the future, almost every device will be a network device. Some of these devices will be large and immobile, like movie or television screens. Others will be small and portable, like wallets, watches, or cellular phones. All will be hooked up to the global network.

Information, Communications and Entertainment ("ICE") represents the converging industries of communications, media, software and the Internet, electronics and travel, leisure and tourism. (KPMG, 1996) defines that convergence entails the coming together of content, infrastructures, the storage and processing capabilities of computers, and consumer electronics. Convergent technologies, which blend multiple streams of information into a single presentation on a single device, are central to the future growth of IT industry. Digital networks redefine what kinds of infrastructure are possible under the sweeping trend of convergence and highlight the need for privatization and regulatory changes commensurate with such developments. Convergence of technologies takes place at the transmission level, the terminal level and the service level. IT convergence began with the digitization of switching and transmission and the utilization of Intelligent Network (IN) platforms.

The result is a Big Bang of convergence, and it's likely to produce the biggest explosion of innovation since the dawn of the Internet. As these technologies evolve over the next decade, a new digital world will emerge. Analysts predict that these nascent networks will speed up by an average of 50% a year, the historic norm. As networks grow and chips continue to strengthen, companies will work madly to come up with winning products and services. Within the next five years, industry analysts say, practically every machine in the wide realm of communications -- every gadget that sings, talks, beams images, or messages -- will sport a powerful computer and a network connection. And every bit of digital information, whether it's a phone call, a song, a Web page, or a movie, will flow among these machines in the very same river of data.

Think of the force of digitization as the "mother of all forces" the underlying tectonic shift that is creating change everywhere. New media rely on digital technologies, allowing for previously separate media to converge. Media convergence is defined as a phenomenon of new media and this can be explained as a digital media.” The idea of 'new media' captures both the development of unique forms of digital media, and the remaking of more traditional media forms to adopt and adapt to the new media technologies.”