

Chapter 11

Trends and Issues in ICT

ICT

Information and Communications Technology is the study or business of developing and using technology to process information and aid communications.

Intellectual Property Rights

Intellectual Property Rights are legal rights, which result from intellectual activity in industrial, scientific, literary & artistic fields. These rights Safeguard creators and other producers of intellectual goods & services by granting them certain time-limited rights to control their use.

Mobile Computing

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without connected to a fixed physical link.

Mobile communication

Mobile communication is talking, sending data or image files over a wireless network. An example of mobile communication is sending an SMS using a mobile phone. Mobile communication networks does not depend on any physical connection for communication.

Generations in mobile communication

Mobile phone was introduced in the year 1946. It's initial growth was very slow. Availability of limited spectrum was the major problem. Government has allotted spectrum for mobile communications with the development of communication satellites. The development of mobile communication is divided into different generations.

First generation networks

1G refers to the first generation of mobile communication. It was based on analog system and provided only basic voice facility.

Second Generation networks

Second generation(2G) networks used digital system for communication. Picture messages and Multimedia Messaging Service(MMS) were introduced. GSM(Global Systems for Mobile) and CDMA(Code Division Multiple Access) were introduced.

1)GSM(Global Systems for Mobile)

GSM (Global System for Mobile Communications) is a second-generation digital mobile telephone standard. It is a digital(circuit switched) network. Its frequency band lies between 900 to 1800 MHz. It follows an international standard. The network is identified by SIM(Subscriber Identity Module).

Different technologies used to enhance data communication features to GSM

2G network was expanded to include communication features like GPRS(General Packet Radio Services) and EDGE(Enhanced Data Rate for GSM).

GPRS(General Packet Radio Services)

GPRS is a packet oriented data service on GSM. It has shorter access time and higher data rate. It is data only technology. It improves GSM's voice quality.

EDGE(Enhanced Data Rate for GSM)

EDGE is a digital mobile technology. It provides better data transmission rate for GSM. It can function on any network with GPRS. It is three times faster than GPRS. It is a technology that gives GSM the capacity to handle services for the third generation mobile network.

2)CDMA(Code Division Multiple Access)

CDMA is a technology which allows multiple signals to be transmitted over simultaneously over a single communication channel. It has wider coverage and voice quality than GSM. It has better security than GSM.

Third Generation networks

The third generation(3G) network provides high data transfer rate. It is also referred to as wireless broadband.

Fourth Generation networks

Fourth generation (4G) system is also called Long Term Evolution(LTE).It provides ultra broad band internet access.It supports applications such as video streaming and calling.

Fifth generation networks

5G Technology stands for 5th Generation Mobile technology.5G is the coming fifth-generation wireless broadband technology. 5G is a packet switched wireless system with wide area coverage and high throughput.5G will provide better speeds and coverage than the current 4G.

Mobile communication services

A communication which does not depend on the physical connection between devices is called mobile communication.It includes SMS,MMS,GPS etc.

1)SMS(Short Message Service)

Short Message Service(SMS) is a text messaging service.It is a data application used by mobile phone users.SMS uses 'store and forward' mechanism. When an SMS is sent it reaches the SMSC (Short Message Service Center),from there it is send to the recipients.

SMS messages are send using the SS7(Signalling System No.7).

2)MMS(Multimedia Messaging Service)

MMS is a standard way to send and receive message consisting of multimedia content using mobile phones.It extends SMS capability to send text messages.There is no limitation in the size of MMS messages.

3)GPS(Global Positioning System)

GPS is a satellite based navigation system.It is used to locate geographical position.It is designed and operated by U.S department of defence. GPS works in any weather conditions, anywhere in the world. There are no subscription fees or setup charges to use GPS.

4)Smart Cards

A smart card is a plastic card embedded with a computer chip and memory. It is secure, intelligent and convenient. Smart card technology is used in SIM for GSM mobile phones. It is inserted or integrated into mobile phones. The card stores information and helps to identify subscribers. ATM cards, fuel cards etc are different forms of smart cards.

Mobile Operating System

A mobile operating system is an operating system used in mobile devices. It is similar to operating systems used in desktop or laptop computers. Some of the popular mobile operating systems are Android, iOS, Black Berry, Windows Phone etc.

Android operating system

Android is a Linux based operating system designed for smart phones and tablet PC. It was originally developed by Android Inc, which was later acquired by Google. Android OS consists of Linux kernel. The Android code is released under Apache License. The wide acceptance of Android is due to its open source nature. Android's user interface is mainly based on direct manipulation, such as swiping, pinching, tapping etc. Programs for Android, also called "apps", come from the Google Play store.

ICT in Business

ICT has become a vital part of business. The use of ICT helps to improve the quality of product and services. Internet has changed the shopping habits of people. The use of ICT has made a shift from traditional shop to online retailer. The online retailers can track customers, change marketing strategies.

Social networks and big data analytics

Social media analytics is the practice of gathering data from blogs and social media websites and analyzing that data to make business decisions. The most common use of social media analytics is to mine customer sentiment in order to support marketing and customer service activities. The first step in a social media analytics initiative is to determine which business goals the data that is gathered and analyzed will benefit. Typical objectives include increasing revenues, reducing customer service costs, getting feedback on products and services and improving public opinion of a particular product or business division.

Big data analytics is the process of examining large data sets containing a variety of data types – i.e., big data – to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful business information. Big data is a broad term for data sets so large or complex that traditional data processing applications are inadequate. The analytical findings can lead to more effective marketing, new revenue opportunities, better customer service, improved operational efficiency, competitive advantages over rival organizations and other business benefits. The primary goal of big data analytics is to help companies make more informed business decisions.

Business Logistics

Business logistics is the management of flow of goods(resources) in a business between point of origin and point of consumption to meet customer requirements. The resources may include products, food etc. The objective of business logistics is to ensure availability of right products in right quantity and condition at right place and time. It includes

- a) Purchase of materials from suppliers.
- b) Transportation of materials.
- c) Movement of finished goods to customers.

The complexity of logistics can be reduced by using hardware and software. RFID (Radio Frequency Identification) technology is used to identify and track objects in logistics. It consists of a RFID tag and reader. The tag contains a microchip for storing data and for sending and receiving data. Tag can be either active (battery powered) or passive (powered by reader). RFID tags are used in supermarkets, payments in toll booths, animal census etc. The use of RFID in business helps to track the movement of products. This helps to maximise on time delivery, improve customer service etc.

Information Security

The security of information passed over the internet is important. There are many methods to ensure security of information, it includes trademark, patents, copyright etc. Some of the methods used for security of information are

Intellectual Property Right

Intellectual Property Rights are legal rights, which result from intellectual activity in industrial, scientific, literary & artistic fields. Intellectual property rights are

the rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time. Intellectual property is divided into two types industrial property and copyright.

Industrial property

Industrial property right is applied to industry, commerce and agricultural products. It includes patents, trademark, industrial design and geographical indications. In India industrial property right can be registered with Controller General of Patents Designs and Trademarks.

Patent

A patent is an exclusive right granted for an invention. It provides protection for the invention to the owner of the patent. The protection is granted for a limited period. Patent protection means that the invention cannot be commercially made, used, distributed or sold without the patent owner's consent. A patent owner has the right to decide who may - or may not - use the patented invention for the period in which the invention is protected. The patent owner may give permission to, or license, other parties to use the invention on mutually agreed terms. The owner may also sell the right to the invention to someone else. Patents provide not only protection for the owner but valuable information and inspiration for future generations of researchers and inventors.

Trademark

A trademark identifies the brand owner of a particular product or service. It is a distinctive sign that identifies certain goods or services as those produced or provided by a specific person or enterprise. It may be one or a combination of words, letters, and numerals. They may consist of drawings, symbols, three-dimensional signs such as the shape and packaging of goods, audible signs such as music or vocal sounds etc. It helps consumers identify and purchase a product.

Industrial design

Industrial design is a process of design applied to products that are to be manufactured through techniques of mass production. Industrial designs are an element of intellectual property. The essential purpose of design law is to promote and protect the

design element of industrial production. It is also intended to promote innovative activity in the field of industries.

Geographical Indications (GI)

GI are signs used on goods that have a specific geographical origin and possess qualities or a reputation that are due to that place of origin. Agricultural products typically have qualities that derive from their place of production and are influenced by specific local factors, such as climate and soil. A geographical indication points to a specific place or region of production that determines the characteristic qualities of the product that originates therein. It is important that the product derives its qualities and reputation from that place. Place of origin may be a village or town, a region or a country.

Copyright

Copyright is a legal right that grants the creator of an original work exclusive rights for its use and distribution. This is usually only for a limited time. Copyright is a form of intellectual property. They are considered as territorial rights, which means that they do not extend beyond the territory. In India copyright Act came effect from January 1958. Under Indian Copyright Act, a work is automatically protected by copyright when it is created. Copyright registration is handled by Copyright Office under Ministry of HR Development.

The copyright act safeguards the following

- It prohibits reproduction in any form.
- Public performance and broadcasting.
- Translation into other languages.
- Adaptation of novel as screenplay or film.

Computer Software can be copyrighted as literary work. It is now a days getting patented as software development is considered as an industry. Patents provide better protection compared to copyright.

Infringement

“Infringement” is a legal term for an act that means breaking a law. The unauthorised use of intellectual property such as patent, copyrights and trademarks are called as intellectual property infringement. It is the use or selling a patented invention without permission from the patent holder. Trademark infringement occurs when one company uses a trade mark identical to a trademark owned by another company. Copyright infringement is reproducing, distributing, displaying or adapting a work without permission from the copyright holder. It is often called piracy. Software piracy is illegal copying, distribution and use of software. Music piracy is the copying and distribution of a piece of music without permission of the composer.

Cyber space

Cyber space is a virtual environment created by computer systems connected to the internet. It refers to a simulated world where we can do many things at a place. The term Cyberspace was coined by William Gibson. Cyberspace is also known as Virtual Reality. It is an unreal world in which communication occurs over network. Some consider cyberspace as uncontrolled and unregulated electronic space where anyone is free to do anything as they wish and express themselves freely. This provides a space for criminals.

Cyber Crime

Cyber crime is defined as criminal activity in which computer or computer network is used as a tool, target or a place of criminal activity. It includes phishing, hacking,

Denial of service attack etc. Computer crime mainly consists of unauthorised access to computer, credit card frauds, cyber terrorism etc. Cyber crimes are divided into three categories crime against individual, against property and against government.

1) Cyber crime against individual

Cyber crime against individual includes identity theft, harassment, impersonation and cheating, violation of privacy, dissemination of obscene material.

a) Identity theft

Identity theft occurs when someone's personal information such as credit card number, name etc are used to commit crime (fraud). Identity theft places a burden on its victims and presents a challenge to businesses, organizations and government agencies.

b) Harassment

Harassment involves posting humiliating comments on gender, race, religion etc. The use of vulgar (indecent) language is also considered as harassment. Cyberstalking is a crime in which the attacker harasses a victim using electronic communication.

c) Impersonation and cheating

Impersonation is an act of pretending to be another person for harming the victim. Cheating may occur in the form of e-mail demanding cash for delivery of item which had not ordered or to dispose asset.

d) Violation of privacy

Violation of privacy is the intrusion into personal life of another. It involves distributing private information (personal data, photos, videos etc). Posting images of others in social media is a form of violation of privacy.

e)Dissemination of obscene material

Distributing and posting obscene material is a cyber crime.It takes many forms such as hosting websites,downloading obscene materials, etc.These obscene contents may misguide adolescents.

Cyber crime against property

Cyber crime property includes credit cards,intellectual property etc.They includes hacking,piracy,intrusion etc.Some of the cyber crimes against property are

1)Credit cards fraud

Credit card fraud involves unauthorised usage of another persons credit card information for purchase or fund transfer.

2)Intellectual property theft

An intellectual property infringement is the infringement or violation of an intellectual property right. There are several types of intellectual property rights, such as copyrights, patents, and trademarks.

Infringement of trade marks and copyrights can be criminal offences.

3)Internet time theft

The use of internet time by unauthorised persons without permission of the person who pay for it is called internet time theft.This causes loss of internet time and money.

Cyber crime against government

The popularity of e-governance has made governments attacks of cyber crime. The different types of cyber attacks against government are cyber terrorism, website defacement, e-governance denial attack etc.

1) Cyber terrorism

Cyber terrorism is a cyber attack against sensitive computer networks like nuclear power plant, air traffic control, telecom etc. This types of attacks are increasing globally. These attack effects a nation's economic and technological infrastructure.

2) Website defacement

Website defacement is an attack on a website that changes the visual appearance of the site or a webpage. These are typically the work of system crackers, who break into a web server and replace the hosted

website with one of their own.

3) Attacks against e-governance websites

These type of attack deny a particular online service. This is done by using DDoS (Distributed Denial of Service) attack.

Cyber Ethics

Ethics are principles or standards of human conduct. Cyberethics is a code of behavior on the Internet. Based on common sense and good judgment, cyberethics also includes obeying laws that apply to online behavior. When you practice cyberethics, you are more likely to have a safer and enjoyable Internet experience.

The following are the ethical practices over the internet

1. Use antivirus, firewall and Spam blocking software for PC.

2. Ensure security of websites while doing online transactions.
3. Do not respond to e-mail from unknown sources.
4. Use unique and complex password,change password regularly.
5. Do not click on pop-up ads.
6. Avoid the use of unauthorised softwares.
7. Don't hide your identity and fool others.
8. Do not use bad languages on e-mail and social networks.
9. Remove check mark against 'Remember me' before logging using computers.

Cyber Laws

Cyber laws refers to legal and regulatory aspect of internet.They are the rules that governs the use of computer and internet.

Information Technology Act 2000

The Information Technology Act 2000,regulates the use of computers,computer networks,data and information in electronic format.The act provides legal support for transactions carried out by electronic methods.It gives legal acceptance for electronic communication.It describes the offenses and disputes in cyberspace and provides justice to victims of cyber crime.The act aims to provide legal infrastructure for e-commerce in India.The act was amended in 2008.The sections 65-74 of the Act deals with cyber crimes.

<i>Section</i>	<i>Offences</i>
65	Tampering with computer source code
66	Computer related offences
66B	Punishment for dishonestly

	receiving stolen computer resources or communication device.
66C	Punishment for identity theft.
66D	Punishment for cheating by personation by using computer resource.
66E	Punishment for violation of privacy.
66F	Punishment for cyber terrorism.
67	Punishment for publishing or transmitting obscene material in electronic form.
67A	Punishment for publishing or transmitting materials containing sexually explicit act in electronic form.
67B	Punishment for publishing or transmitting of materials depicting children in sexually explicit act in electronic form

Cyber Forensics

Computer forensics is the application of investigation and analysis techniques to gather and preserve evidence from a particular computing device in a way that is

suitable for presentation in a court of law. **OR** Computer forensics is the practice of collecting, analysing and reporting on digital data in a way that is legally admissible.

Infomania

Infomania is the state of being overloaded with information from the Internet, email, and cell phones. It is the excessive enthusiasm for acquiring knowledge.

