Chapter 12 – Internet and Mobile Computing

Internet is an interconnected system of computer networks that serves the users all over the world. Vinton Gray Cerf is considered as the father of Internet. Tim Berners Lee proposed the idea of World Wide Web (WWW).

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Intranet is considered as a private computer network similar to Internet that uses TCP/IP protocol to share information, software or services within an organisation.

Hardware and software requirements for connecting to the Internet: (i) A computer with Network Interface Card (wired/wireless) facility and an operating system that supports TCP/IP protocol (ii) Modem (iii) An Internet account given by an Internet Service Provider (ISP) (iv) Software like browser, client application for e-mail, chat, etc.

Dial-up connectivity Vs Wired broadband connectivity:

Dial-up connection	Wired broadband connection
• Slow connection, speed upto 56 kbps	• High speed connection, speed usually higher than 256 kbps
• Requires dialing to connect to ISP	• Always on connection
• Uses telephone line exclusively	• Simultaneous use of voice and Internet
• Uses dial-up modem	• Uses broadband modem

Popular broadband technologies: Integrated Services Digital Network (ISDN), Cable Internet, Digital Subscriber Line (DSL), Leased Lines and Fiber to the Home (FTTH).

ISDN: It is a broadband service capable of transporting voice and digital data.

Cable Internet: Internet access is provided using coaxial cables laid for television signal transmission to our homes.

DSL: It is another broadband service that provides connection to the Internet through standard telephone lines.

Leased lines: These are dedicated lines used to provide Internet facility to ISPs, business, and other large enterprises.

Fibre to the Home (FTTH): It uses optical fibres for data transmission. Optical fibres are laid from the ISP to our homes. FTTH technology has been accepted worldwide to implement high speed Internet to the home.

Wireless broadband connectivity: It provides almost the same speed as that of a wired broadband connection. The popular wireless broadband accesses are Mobile Broadband, Wi-MAX, Satellite Broadband and Wi-Fi.

Mobile broadband: It is wireless Internet access using mobile phone, USB wireless modem, tablet or other mobile devices. The modem is built into mobile phones, tablets, USB dongles, etc.

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Wi-MAX: Worldwide Interoperability for Microwave Access (Wi-MAX) offers a Metropolitan Area Network which can provide wireless Internet up to a distance of 50 Km.

Satellite broadband technology: It is a method by which Internet connectivity is provided through a satellite.

Sharing an Internet connection: Internet connection can be shared among several computers using a LAN, Wi-Fi network or Li-Fi network.
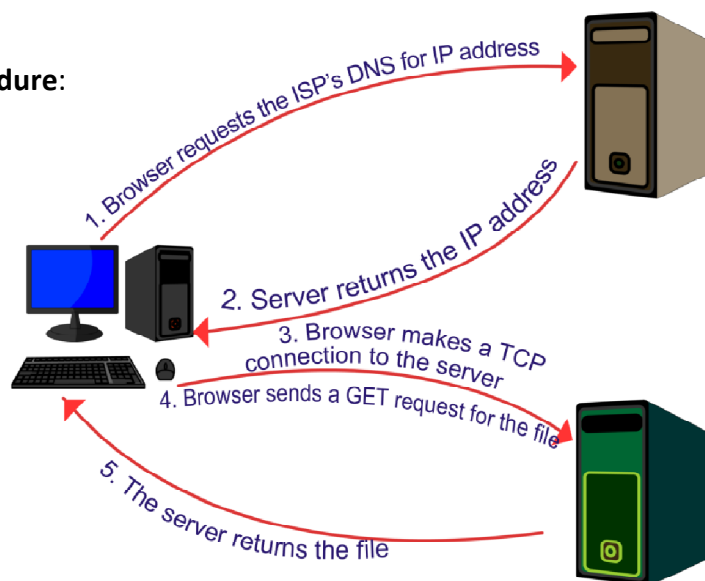
Services on the Internet: Services like WWW, e-mail, search engines, social media, etc. are widely used throughout the globe.

World Wide Web (WWW): It is a system of interlinked hypertext documents accessed via the Internet. It is a huge client-server system consisting of millions of clients and servers connected together. Each server maintains a collection of documents and they can be accessed using a reference called Uniform Resource Locator (URL).

Web browser: It is a software use to retrieve or present information and to navigate through web pages in the World Wide Web. Eg: Google Chrome, Internet Explorer, Mozilla Firefox, Opera, and Safari.

Web browsing procedure:

1. Browser requests the ISP's DNS for IP address
2. Server returns the IP address
3. Browser makes a TCP connection to the server
4. Browser sends a GET request for the file
5. The server returns the file

Search engines: Internet search engine websites are special programs that are designed to help people to find information available in World Wide Web. Search engine web sites use programs called web crawlers or spiders or robots to search the web.

Working of Search engines: Web crawlers search the web pages stored in the different web servers and find possible keywords. These keywords are stored along with their URLs to form an index in the search engine's web servers. When a particular topic (keyword), is searched, the web crawler searches the index, and select a list of URLs where the particular topic is found and displays the list as the result.

Electronic mail or **e-mail:** It is a method of exchanging digital messages between computers over Internet.

Sections of e-mail: To (Recipient Address), Cc (Carbon copy to the secondary recipients), Bcc (Blind carbon copy to the tertiary recipients), Subject, Content, Attachments.

Working of e-mail:
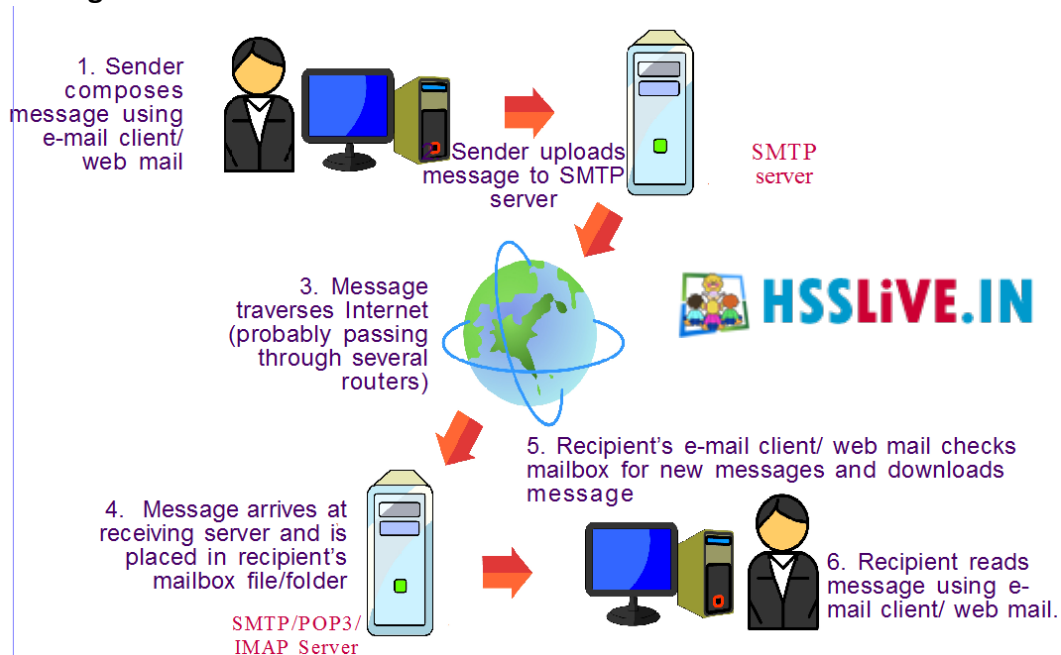
Advantages of e-mail: Speed, easy to use, provision of attachments, environment friendly, easy reply to an e-mail, cost-effective, available anywhere anytime.

Types of social media: Internet forums, social blogs, micro blogs, wikis, social networks, content communities and a lot more.

Internet forums: It is an online discussion website where people can engage in conversations in the form of posted messages. Eg: Ubuntu Forum

Social blogs: It is a discussion or informational website consisting of entries or posts displayed in the reverse chronological order i.e., the most recent post appears first. Eg: Blogger.com, Wordpress.com.

Microblogs: They allow users to exchange short sentences, individual images or video links. It offers a communication mode that is spontaneous and can influence public opinion. Twitter.com is a popular micro blogging site.

Wikis: Wikis allow people to add content or edit existing information in a web page, to form a community document. Wiki is a type of content management system. Eg: wikipedia.org.

Social networks: These sites allow people to build personal web pages and then connect with friends to communicate and share content. We can share text, pictures, videos, etc. and comment to the posts. Eg: facebook.com, linkedin.com.

Content communities: These are websites that organise and share contents like photos, videos, etc. Eg: Youtube.com, flickr.com.

Advantages of social media: Bring people together, help to plan and organise events, promoting business, enhance social skills.

Limitation of social media: Intrusion to privacy, addiction, spread rumours.

Computer virus: It is a program that attaches itself to another program or file enabling it to spread from one computer to another without our knowledge and interferes with the normal operation of a computer.

Computer worm: It is a stand-alone malware (malicious software) program that replicates itself in order to spread to other computers.

Trojan horse: It will appear to be a useful software but will actually do damage once installed or run on your computer.

Spams or junk mails: These are unsolicited e-mails sent indiscriminately to persons to promote a product or service.

Hacking: It is a technical effort to manipulate the normal behaviour of network connections and connected systems. Computer experts perform hacking to test the security and find the vulnerabilities in computer networks and computer systems. Such computer experts are often called '**white hats**' and such hacking is called ethical hacking. Computer criminals break into secure networks to destroy data or make the network unusable for those who are authorised to use the network. Such criminals are called '**black hats**'. There are '**grey hat** hackers', who sometimes act illegally, though with good intentions, to identify the vulnerabilities.

Denial of Service (DoS): It is a network attack is usually aimed at a web server. Such an attack forces the server/computer to restart.

Phishing: It is an attempt to acquire information such as usernames, passwords and credit card details by posing as the original website, mostly that of banks and other financial institutions. Phishing websites have URLs and home pages similar to their original ones. The act of creating such a misleading website is called spoofing.

Man-in-the-middle attack: It refers to an attack in which an attacker secretly intercepts electronic messages between the sender and the receiver and then captures, inserts and modifies messages during message transmission. Encrypted connections such as HTTPS (HTTP Secure), SFTP (Secure FTP) etc. should be used for secure transactions, so that intruders cannot modify the messages.

Firewall: It is a system of computer hardware and software that provides security to the computer network in an organisation. It denies malicious data from entering into the computer networks.

Antivirus programs: These tools are used to detect viruses and cure the infected system. It scans files in the computer system for known viruses and removes them if found.

Cookies: These are small text files that are created when we use a browser to visit a website. It remembers our user name, preferences, e-mail address, etc. It is always possible for a hacker to use cookies for malicious purposes. Cookies can be used to act as a spyware.

Mobile computing: It is a technology that has computing capability and can transmit/receive data while in motion. Mobile computing requires portable computing devices like laptops, tablets, smart phones, etc., wireless communication networks and connectivity to Internet.

Generations of mobile communication: 1G mobile phones were based on the analog system and provided basic voice facility only. 2G networks follow digital system for communication. Picture messages and MMS (Multimedia Messaging Service) were introduced in 2G. 3G networks offered multimedia services combining voice and data. It has the facility to send and receive large amounts of data using a mobile phone. 4G system, also called Long Term Evolution (L.T.E.), provides mobile ultra-broadband Internet access to mobile devices. 4G networks offer very high speeds and provide good quality images and videos.

Mobile communication technologies: SMS, MMS, GPS and smart cards. Short Message Service (**SMS**) is a text messaging service in mobile communication systems that allows exchanging short text messages containing up to 160 characters. Multimedia Messaging Service (**MMS**) is a standard way to send and receive messages that consists of multimedia content using mobile phones. MMS does not specify a maximum size for a multimedia message and it supports contents such as text, graphics, music, video clips and more. Global Positioning System (**GPS**) is a satellite based navigation system that is used to locate a geographical position anywhere on earth, using its longitude and latitude. GPS is used for vehicle fleet tracking by transporting companies to track the movement of their trucks. A **smart card** is a plastic card embedded with a computer chip / memory that stores and transacts data. The advantages of using smart cards is that it is secure (data is protected), intelligent (it can store and process data) and that it is convenient (it is easy to carry).

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Mobile Operating System: The software that manages the hardware, multimedia functions, Internet connectivity, etc. in a mobile device. Eg: Android from Google, iOS from Apple, BlackBerry OS from BlackBerry and Windows Phone from Microsoft.

Android mobile OS: It is a Linux-based operating system designed mainly for touch screen mobile devices such as smart phones and tablet computers. It was originally developed by Android Inc. that was founded in Palo Alto, California in 2003 by Andy Rubin and his friends. In 2005, Google acquired Android Inc. making it a wholly owned subsidiary of Google.

Questions from Previous Years' Question Papers

1. SIM card is a smart card used inside a mobile phone. What is the full form of SIM?
   a) Subscriber Identity Module   b) Subscriber Identity Mobile
   c) Subscriber Identification Mobile   d) Single Identity Mobile   (1) (July 2017)

2. Which one of the following terms refers to ethical hacker?
   a) Black hat   b) Blue hat   c) Grey hat   d) White hat   (1) (July 2017)

3. Explain the influence of social media in society.   (3) (July 2017)

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4. Find the best matches from the given definitions for the terms in the given list.
   (Worm, Hacking, Phishing, Spam)
   a) Unsolicited emails sent indiscriminately.
   b) A technical effort to manipulate the normal behavior of networked computer system.
   c) A stand alone malware program usually makes the data traffic slow.
   d) Attempt to acquire information like user names and passwords by posing as the original websites.
   e) Appear to be a useful software but will do damage like deleting necessary files.
   (2) (March 2017)

5. Susheel's email id is susheel@gmail.com. He sends an email to Rani whose email id is rani@yahoo.com. How is the mail sent from Susheel's computer to Rani's computer?
   (3) (March 2017)

6. Which one of the following technologies is used for locating geographic positions according to satellite based navigation system?
   a) MMS   b) GPS   c) GSM   d) SMS   (1) (Sept. 2016)

7. Explain DoS attack on servers.   (2) (Sept. 2016)

8. What is browsing? Briefly explain the steps needed for browsing.   (3) (Sept. 2016)

9. Briefly explain any three mobile communication services.   (3) (March 2016)

10. Define Internet. Compare two types of Internet connectivities namely Dial-up and Broadband.   (3) (March 2016)

11. Write the full form of FTTH.   (1) (March 2016)

12. Pick the odd one out from the following list:
    (a) Spam   (b) Trojan horse   (c) Phishing   (d) Firewall   (1) (March 2016)

13. Which one of the following statements is TRUE in relation with Wi-MAX Internet connectivity?   (1) (March 2016)
    (a) Make use of satellite connection   (b) Uses cable connection
    (c) Uses laser beam for connection   (d) Microwave is used for connectivity

14. a) Acquiring information such as username, password, credit card details etc. using misleading websites is known as …………   (1)

    b) Pick odd one out:
       Google, Safari, Mozilla Firefox, Internet explorer   (1) (Sept. 2015)

15. One of your friends wants to send an email to his father abroad to convey him birthday wishes with a painting done by him. Explain the structure and working of email to him.
    (3) (Sept. 2015)

16. (a) Define Intranet.   (1) (March 2015)
    (b) Write the structure of an e-mail address.   (1) (March 2015)

17. Social media plays an important role in today's life. Write notes supporting and opposing its impacts.   (3) (March 2015)