Study Notes

(Communication Technologies)

(For CBSE - Class XII students Subject: Computer Science (083))

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**Evolution of Networking**

**ARPANET –**

The **Advanced Research Projects Agency Network** (**ARPANET**) was the world's first operational [packet switching](http://en.wikipedia.org/wiki/Packet_switching) network. It was created by the United States Defense Advanced Research Project Agency (ARPA) in 1969.

**Internet –**

The Internet is a global system of interconnected [computer networks](http://en.wikipedia.org/wiki/Computer_network) that use the standard [Internet protocol suite](http://en.wikipedia.org/wiki/Internet_protocol_suite) (often called TCP/IP, although not all applications use TCP) to serve billions of users worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic, wireless and optical networking technologies.

**Interspace –**

It is client server software that allows multiple users to communicate online with real time audio and video.

**Switching Technique –**

These are the techniques of sending data across a network.

**Circuit Switching –**

Circuit switching is a methodology of implementing a [telecommunications network](http://en.wikipedia.org/wiki/Telecommunications_network) in which two [network nodes](http://en.wikipedia.org/wiki/Network_nodes) establish a dedicated [communications channel](http://en.wikipedia.org/wiki/Communications_channel) (circuit) through the network before the nodes may communicate. The circuit guarantees the full bandwidth of the channel and remains connected for the duration of the communication session. The circuit functions as if the nodes were physically connected as with an electrical circuit.

**Packet Switching –**

In [packet switching](http://en.wikipedia.org/wiki/Packet_switching)  the data to be transmitted is divided into [packets](http://en.wikipedia.org/wiki/Network_packet) transmitted through the network independently. In packet switching, instead of being dedicated to one communication session at a time, network links are shared by packets from multiple competing communication sessions.

Packet switching results in variable delay and [throughput](http://en.wikipedia.org/wiki/Throughput) depending on the traffic load in the network.

**Channel –**

A medium of data transmission on a computer network is called a channel. Channel may be wired (guided) or wireless (unguided).

**Bandwidth –**

Bandwidth refers to a range within a band of frequencies or wavelengths. Bandwidth also refers to the amount of [data](http://www.webopedia.com/TERM/D/data.html) that can be transmitted in a fixed amount of time.

For [digital](http://www.webopedia.com/TERM/D/digital.html) [devices](http://www.webopedia.com/TERM/D/device.html), the bandwidth is usually expressed in bits per second ([bps](http://www.webopedia.com/TERM/B/bps.html)) or [bytes](http://www.webopedia.com/TERM/B/byte.html) per second. The units of bandwidth are bps, Kbps, Mbps, Gbps, and Tbps. For [analog](http://www.webopedia.com/TERM/A/analog.html) devices, the bandwidth is expressed in cycles per second, or Hertz (Hz). Units of bandwidth are HZ, KHz, MHz, and GHz.

**Data Transfer Rate –**

The speed with which [data](http://www.webopedia.com/TERM/D/data.html) can be transmitted from one [device](http://www.webopedia.com/TERM/D/device.html) to another is called data transfer rate. Data transfer rates are often measured in [megabits](http://www.webopedia.com/TERM/M/megabit.html) (million [bits](http://www.webopedia.com/TERM/B/bit.html)) or [megabytes](http://www.webopedia.com/TERM/M/megabyte.html) (million [bytes](http://www.webopedia.com/TERM/B/byte.html)) per second. These are usually abbreviated as Mbps and MBps, respectively. Bigger units of Data Transfer Rate are Gbps and Tbps.

Another term for data transfer rate is [throughput](http://www.webopedia.com/TERM/T/throughput.html).

**Transmission Media –**

Same as Communication channel.

**Twisted Pair Cable –**

Twisted pair cabling is a type of wiring in which two conductors of a single [circuit](http://en.wikipedia.org/wiki/Electronic_circuit) are twisted together for the purposes of canceling out [electromagnetic interference](http://en.wikipedia.org/wiki/Electromagnetic_interference) (EMI) from external sources.

**Coaxial Cable –**

Coaxial cable, or coax, has an inner conductor surrounded by a flexible, tubular insulating layer, surrounded by a tubular conducting shield. The term [coaxial](http://en.wikipedia.org/wiki/Coaxial) comes from the inner conductor and the outer shield sharing the same geometric axis.

**Optical Fiber Cable –**

An optical fiber cable is a [cable](http://en.wikipedia.org/wiki/Cable) containing one or more [optical fibers](http://en.wikipedia.org/wiki/Optical_fiber). The optical fiber elements are typically individually coated with plastic layers and contained in a protective tube suitable for the environment where the cable will be deployed. Optical fibers use the concept of total internal reflection of light for data transmission.

**Comparison of wired media:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Paramater** | **Cable** | **Twisted Pair Cable** | **Coaxial Cable** | **Fiber Optic Cable** |
| Data Transfer Rate | | 10Mbps-1Gbps | 100 Mbps | More than100 Gbps |
| Data Transfer Range | | 100 m | 185m-500 m | 2km – 10 km |
| Interference Susceptibility | | More | Less than Ethernet cable | NIL |
| Cost of Cable | | Least Cost | More than Ethernet | Expensive |

**Wireless Media –**

Electromagnetic waves are used for wireless communication over computer networks. From the electromagnetic spectrum only radio waves, microwaves, and infrared rays are used for wireless communication.

**Radio Waves -**

Radio waves have a frequency range of 3 KHz to 3GHz. Radio waves are used for communication over distances ranging from a few meters (in walkie-talkies) upto covering an entire city. These waves are easy to generate, can travel long distances and can penetrate buildings easily. That’s why they are widely used for communication, both indoors and outdoors. Cordless phones, AM and FM radio broadcast, Garage door openers etc. are examples of radio wave transmission.

Characteristics of Radio Wave Transmission:

* These waves are omni-directional, so the transmitting and receiving antennas need not be aligned.

(*Recall when you throw a stone in a pond, circular waves are generated and spread outwards. Similarly, radio waves are generated by the transmitter and spread in all the directions.*)

* Relatively inexpensive than wired media.
* It offers ease of communication over difficult terrain
* The transmission can be interfered by motors or other electrical equipment
* Permission from concerned authorities is required for use of radio wave transmission
* Less secure mode of transmission

**Micro Waves:**

Micro waves have a frequency range of 300MHz (0.3 GHz) to 300 GHz. This range has some overlapping portion (0.3GHz – 3GHz) with radio waves as there is no clear-cut demarcation between radio waves and micro waves. Microwaves travel in straight lines and cannot penetrate any solid object. Therefore for long distance microwave communication, high towers are built and microwave antennas are put on their tops. Distance between two microwave towers depends on many factors including frequency of the waves being used and heights of the towers. These waves are unidirectional and therefore the sending and receiving antennas have to be aligned with each other.

An example of usage of microwaves for communication is as follows:

*In the big cities where land is very costly and a lot of formalities have to be completed to get permission to dig land for cabling, microwave antennas can be put on top of high rise buildings and communication can be started in a short time.*

Characteristics of Micro Wave Transmission:

* Free from land acquisition rights
* Relatively inexpensive than wired media
* Offers ease of communication over difficult terrain
* The transmission is unidirectional so the transmitting and receiving antennas need to be properly aligned ( line of sight transmission)

**Infrared Waves:**

Infrared waves have a frequency range of 300 GHz to 400 THz. These waves are used for short range communication (approx. 5m) in a variety of wireless communications, monitoring, and control applications. Home-entertainment remote-control devices, Cordless modems, and Intrusion detectors are some of the devices that utilize infrared communication.

Characteristics of Infrared Wave Transmission:

* The transmission is line of sight transmission; therefore information passed to one device is not leaked to another device.
* No government license is required for their use
* The transmission is line of sight transmission, therefore at a time only two devices can communicate.
* The waves do not cross any solid object in between
* Performance drops off with longer distances

**Bluetooth -**

Bluetooth technology uses radio waves in the frequency range of 2.402 GHz to 2.480 GHz. This technology is used for short range communication (approx. 10m) in a variety of devices for wireless communication.

Characteristics of Bluetooth Transmission:

* Line of sight between communicating devices is not required.
* Bluetooth can connect upto eight devices simultaneously.
* Slow data transfer rate (upto 1Mbps).

**Satellite Link -**

Satellite links are used for long distance wireless communication which may range from intercity to intercontinental. The satellite system is very expensive but its area coverage and fringe benefits compensate for the expenses. Communication satellites are normally owned by governments or by government approved organizations of various countries

Characteristics of Transmission using satellite link:

* Satellites cover large area of earth
* Since communication over very long distances is possible, this becomes a commercially attractive option.
* This system is expensive

**Modem –**

A modem (modulator-demodulator) is a device that modulates an [analog carrier signal](http://en.wikipedia.org/wiki/Analog_signal) to encode [digital information](http://en.wikipedia.org/wiki/Digital_information), and also demodulates such a carrier signal to decode the transmitted information. A Modem is needed when a computer is to be connected to Internet using telephone network.

**RJ45 Connector –**

It is a modular connector commonly used to [terminate](http://en.wikipedia.org/wiki/Electrical_termination) twisted pair and multiconductor [flat cable](http://en.wikipedia.org/wiki/Flat_cable). These connectors are commonly used for [unshielded twisted pair](http://en.wikipedia.org/wiki/Unshielded_twisted_pair), [shielded twisted pair](http://en.wikipedia.org/wiki/Shielded_twisted_pair), and multiconductor flat cable.

**Ethernet –**

Ethernet is the most widely-installed local area network (LAN) technology. . An Ethernet LAN typically uses [coaxial cable](http://searchdatacenter.techtarget.com/definition/coaxial-cable) or special grades of [twisted pair](http://searchdatacenter.techtarget.com/definition/twisted-pair) wires. Ethernet is also used in [wireless LAN](http://searchmobilecomputing.techtarget.com/definition/wireless-LAN)s.

**Ethernet Card –**

An Ethernet card is one kind of network adapter. These adapters support the Ethernet standard for high-speed network connections via cables. Ethernet cards are sometimes known as network interface cards (NICs).

**Router –**

A router is a [networking device](https://en.wikipedia.org/wiki/Networking_device) that forwards [data packets](https://en.wikipedia.org/wiki/Data_packet) between [computer networks](https://en.wikipedia.org/wiki/Computer_network). A router is connected to two or more data lines from different networks. When a data packet comes in on one of the lines, the router reads the address information in the packet to determine the ultimate destination. Then, using information in its [routing table](https://en.wikipedia.org/wiki/Routing_table) or [routing policy](https://en.wikipedia.org/wiki/Routing_policy), it directs the packet to the next network on its journey until it reaches its destination.

**WiFi Card –**

A Wi-Fi card connects to a computer to an Internet hotspot. A Wi-Fi card acts as both a receiver and transmitter. It receives the wireless signal and communicates with the network, enabling one to access the Internet wirelessly.

**Switch -**

A Switch is an intelligent device that connects several nodes to form a network and redirects the received information only to the intended node(s).

**Repeater -**

A Repeater is a device that is used to amplify a signal which is on its way through a communication channel. A repeater amplifies the received signal and re-transmits it to its destination.

**Gateway -**

A Gateway is a device which is used to connect two different types of networks and perform the necessary translation so that the connected networks can communicate properly.

**Network Topologies and types**

**Node –**

A Node is a device which is directly connected to a computer network. It can be a computer or any other device like printer, scanner etc.

**Topology –**

A Topology is an arrangement of physical connections among nodes in a network.

**Bus Topology –**

In bus topology all the nodes are connected to a main cable called backbone.

Characteristics of Bus topology:

* It is easy to install.
* It requires less cable length and hence it is cost effective.
* Failure of a node does not affect the network.
* In case of cable (backbone) or terminator fault, the entire network breaks down.
* Fault diagnosis is difficult.
* At a time only one node can transmit data.

**Star Topology –**

In star topology each node is directly connected to a hub/switch. If any node has to send some information to any other node, it sends the signal to the hub/switch. This signal is then broadcast (in case of a hub) to all the nodes but is accepted by the intended node(s). In the case of a switch the signal is sent only to the intended node(s).

Characteristics of Star topology:

* It is easy to install
* It is easy to diagnose the fault in Star topology.
* It is easy to expand depending on the specifications of central hub/switch
* Failure of hub/switch leads to failure of entire network
* It requires more cable length as compared to bus topology.

**Tree Topology –**

Tree topology is a combination of bus and star topologies. It is used to combine multiple star topology networks. All the stars are connected together like a bus. This bus-star hybrid approach supports future expandability of the network.

Characteristics of Tree topology:

* It offers easy way of network expansion
* Even if one network (star) fails, the other networks remain connected and working.

**PAN –**

A PAN is a network of computing/Communicating devices (Computer, Phone, MP3/MP4 Player, Camera etc.) in the proximity of an individual. It can cover an area of a few meters radius.

**LAN –**

A LAN is a network of computing/Communicating devices in a room, building, or campus. It can cover an area of a few meters to a few kilometers radius. A networked office building, school, or home usually contains a single LAN, though sometimes one building can contain a few small LANs (Like some schools have independent LANs in each computer lab.). Occasionally a LAN can span a group of nearby buildings.

**MAN –**

A MAN is a network of computing/Communicating devices within a city. It can cover an area of a few kilometers to a few hundred kilometers radius. Network of schools, or banks, or Government offices etc., within a city, are examples of MANs.

**WAN –**

A WAN is a network of computing/Communicating devices crossing the limits of a city, country, or continent. It can cover an area of over hundreds of kilometer radius. A network of ATMs, BANKs, National Government Offices, International Organizations’ Offices etc., spread over a country, continent, or covering many continents are examples of WANs.

**Network Protocols**

**TCP/IP –**

TCP/IP (Transmission Control Protocol / Internet Protocol): It is the basic protocol of the Internet. Communication between two computers on internet is done using TCP/IP protocol.

**FTP –**

**File Transfer Protocol** (**FTP**) is a standard [network protocol](http://en.wikipedia.org/wiki/Network_protocol) used to transfer files from one [host](http://en.wikipedia.org/wiki/Host_(network)) to another host over a [TCP](http://en.wikipedia.org/wiki/Transmission_Control_Protocol)-based network, such as the [Internet](http://en.wikipedia.org/wiki/Internet). It is often used to upload web pages and other documents from a private development machine to a public web-hosting server.

**PPP –**

PPP (Point to Point Protocol): It is an Internet standard protocol for direct communication between two computers, typically a personal computer connected by phone line to a server. Most Internet service providers (ISPs) use PPP for customer dial-up access to the Internet.

**Remote Login (Telnet) –**

Telnet is a [network protocol](http://en.wikipedia.org/wiki/Network_protocol) used on the [Internet](http://en.wikipedia.org/wiki/Internet) or [local area networks](http://en.wikipedia.org/wiki/Local_Area_Network) to provide a bidirectional interactive text-oriented communications facility using a virtual [terminal](http://en.wikipedia.org/wiki/Text_terminal) connection.

**Internet wireless/Mobile Communication**

**GSM –**

**GSM** (**Global System for Mobile Communications**, originally ***Groupe Spécial Mobile***) is a standard set developed by the [European Telecommunications Standards Institute](http://en.wikipedia.org/wiki/European_Telecommunications_Standards_Institute) (ETSI) to describe technologies for second generation ([2G](http://en.wikipedia.org/wiki/2G)) digital [cellular networks](http://en.wikipedia.org/wiki/Cellular_network).

**CDMA (Co**de-**D**ivision**M**ultiple**A**ccess) **–**

CDMA is a digital cellular technology that uses spread-spectrum techniques. In CDMA every communicator is allocated the entire spectrum all of the time. CDMA uses codes to identify connections.

For radio systems there are two resources, frequency and time. Division by frequency, so that each pair of communicators is allocated part of the spectrum for all of the time, results in Frequency Division Multiple Access (FDMA). Division by time, so that each pair of communicators is allocated all (or at least a large part) of the spectrum for part of the time results in Time Division Multiple Access (TDMA). In Code Division Multiple Access (CDMA), every communicator will be allocated the entire spectrum all of the time. CDMA uses codes to identify connections.

**GPRS (General packet radio service) –**

**GPRS** is a [packet oriented](http://en.wikipedia.org/wiki/Packet_oriented) [mobile data service](http://en.wikipedia.org/wiki/Mobile_Data_Service) on the [2G](http://en.wikipedia.org/wiki/2G) and [3G](http://en.wikipedia.org/wiki/3G) [cellular communication](http://en.wikipedia.org/wiki/Cellular_communication) system's [global system for mobile communications](http://en.wikipedia.org/wiki/Global_System_for_Mobile_Communications) (GSM). GPRS usage is typically charged based on volume of data. This contrasts with [circuit switching](http://en.wikipedia.org/wiki/Circuit_switching) data, which is typically billed per minute of connection time, regardless of whether or not the user transfers data during that period.

**WLL –**

WLL (Wireless in Local Loop) is a network technology based on CDMA (Code Division Multiple Access) principle. This technology is useful for providing cost effective mobile services and wireless telephone connection in areas where provision of landline telephone connection is not feasible or where demand for mobile phones is very high.

**1G (First Generation of Mobile Technology) –**

1G technology was used in the first mobile phones. 1G used analog radio signals. 1G was introduced in 1980s and continued until 1992 when 2G was introduced.

**2G –**

2G technology used a digital format and introduced text messaging. 2G also introduced data services for mobiles, starting with SMS.

**3G –**

3G technology has introduced more efficient ways of carrying data, making it possible to have faster web-services, live chat, fast downloading, video conferencing etc. over mobile phones. Today we are living in the age of 3G.

**4G –**

4G is the fourth generation of [wireless](https://en.wikipedia.org/wiki/Wireless) [mobile telecommunications](https://en.wikipedia.org/wiki/Mobile_telephony) technology. Potential and current applications of 4G include amended [mobile web](https://en.wikipedia.org/wiki/Mobile_web) access, [IP telephony](https://en.wikipedia.org/wiki/IP_telephony), gaming services, [high-definition](https://en.wikipedia.org/wiki/HDTV) [mobile TV](https://en.wikipedia.org/wiki/Mobile_TV), [video conferencing](https://en.wikipedia.org/wiki/Video_conferencing), and [3D television](https://en.wikipedia.org/wiki/3D_television)

**Wi-Fi –**

Wireless-Fidelity is a popular technology that allows an electronic device to exchange data wirelessly (using radio waves) over a computer network, including high-speed Internet connections. The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network(WLAN) products that are based on the Institute of Electricall and Electronics Engineers' (IEEE) 802.11 standards".

**WiMAX-**

WiMAX (Worldwide Interoperability for Microwave Access) It is a wireless communications standard designed to provide 30 to 40 megabit-per-second data rates, with the 2011 update providing up to 1 Gbit/s for fixed stations. It is a part of “fourth generation,” or 4G, of wireless-communication technology. WiMax far surpasses the 30-metre wireless range of a conventional Wi-Fi [local area network](http://en.wikipedia.org/wiki/Local_area_network) (LAN), offering a metropolitan area network with a signal radius of about 50 km.

**Electronic Mail Protocols**

**POP3 (Post Office Protocol)–**

POP3 (Post Office Protocol 3) is the most recent version of a standard protocol for receiving e-mail. POP3 is a [client/server](http://searchnetworking.techtarget.com/definition/client-server) [protocol](http://searchnetworking.techtarget.com/definition/protocol) in which e-mail is received and held for the recipient by an Internet server.

**SMTP –**

SMTP (Simple Mail Transfer Protocol): It is an [Internet standard](https://en.wikipedia.org/wiki/Internet_standard) for [electronic mail](https://en.wikipedia.org/wiki/Email) (email) transmission.

**IMAP –**

IMAP (Internet Message Access Protocol) is an [Internet standard](https://en.wikipedia.org/wiki/Internet_standard) [protocol](https://en.wikipedia.org/wiki/Protocol_(computing)) used by [e-mail clients](https://en.wikipedia.org/wiki/E-mail_client) to retrieve [e-mail](https://en.wikipedia.org/wiki/E-mail) messages from a [mail server](https://en.wikipedia.org/wiki/Mail_server) over a [TCP/IP](https://en.wikipedia.org/wiki/Internet_protocol_suite) connection

**Protocols for Chat and Video Conferencing**

**UDP –**

**U**ser **D**atagram **P**rotocol.

**RTP –**

**R**eal**-**time **T**ransport **P**rotocol**.**

**VoIP –**

VoIP (Voice over Internet Protocol): It is a is a for the delivery of [voice communications](https://en.wikipedia.org/wiki/Voice_communication) and [multimedia](https://en.wikipedia.org/wiki/Multimedia) sessions over [Internet Protocol](https://en.wikipedia.org/wiki/Internet_Protocol) (IP) networks, such as the [Internet](https://en.wikipedia.org/wiki/Internet).

**Network Security Concepts**

**Malware –**

Malware is the common name given to all malicious [programs](http://www.webopedia.com/TERM/P/program.html) that can cause damage to [computer](http://www.webopedia.com/TERM/C/computer.html)s. [Malware](http://en.wikipedia.org/wiki/Malware) includes computer viruses, [computer worms](http://en.wikipedia.org/wiki/Computer_worm), [Trojan horses](http://en.wikipedia.org/wiki/Trojan_horse_(computing)), [spyware](http://en.wikipedia.org/wiki/Spyware), dishonest [adware](http://en.wikipedia.org/wiki/Adware) and other malicious or unwanted software.

**Virus –**

A program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes. A **computer virus** can replicate itselfand spread from one computer to another.

A [computer](http://www.webopedia.com/TERM/C/computer.html) virus attaches itself to a [program](http://www.webopedia.com/TERM/P/program.html) or [file](http://www.webopedia.com/TERM/F/file.html) enabling it to spread from one computer to another, leaving infections as it travels. Like a human virus, a computer virus can range in severity: some may cause only mildly annoying effects while others can damage your [hardware](http://www.webopedia.com/TERM/H/hardware.html), [software](http://www.webopedia.com/TERM/S/software.html) or [files](http://www.webopedia.com/TERM/F/file.html).

**Worms –**

A program or algorithm that replicates itself over a computer network and usually performs malicious actions. A worm is similar to a virus by design and is considered to be a sub-class of a virus. Worms spread from computer to computer, but unlike a virus, it has the capability to travel without any human action.

**Trojan Horse –**

The Trojan Horse is a software that appears to be useful but actually does damage once installed or run on your computer.  Those on the receiving end of a Trojan Horse are usually tricked into opening them because they appear to be receiving legitimate software or files from a legitimate source.

Trojans are also known to create a [backdoor](http://www.webopedia.com/TERM/B/backdoor.html) on your computer that gives malicious users access to your system, possibly allowing confidential or personal information to be compromised. Unlike viruses and worms, Trojans do not reproduce by infecting other files nor do they self-replicate.

[**Blended threat**](http://www.webopedia.com/TERM/B/blended_threat.html) **–**

Blended threats combine the characteristics of viruses, worms, Trojan Horses, and malicious code with server and Internet vulnerabilities.

[**Antivirus program**](http://www.webopedia.com/TERM/A/antivirus_program.html) –

A utility that searches the computer (RAM and Storage devices) for malware and removes any that are found.

**Spams –**

**Spam** is the use of [electronic messaging](http://en.wikipedia.org/wiki/Email) systems to send unsolicited bulk messages indiscriminately. While the most widely recognized form of spam is [e-mail spam](http://en.wikipedia.org/wiki/E-mail_spam), the term is applied to similar abuses in other media: [instant messaging spam](http://en.wikipedia.org/wiki/Messaging_spam), [Usenet newsgroup spam](http://en.wikipedia.org/wiki/Newsgroup_spam), [online classified ads](http://en.wikipedia.org/wiki/Classified_advertising) spam, [mobile phone messaging spam](http://en.wikipedia.org/wiki/Mobile_phone_spam). (It is named for [Spam](http://en.wikipedia.org/wiki/Spam), a luncheon meat, by way of a [Monty Python sketch](http://en.wikipedia.org/wiki/Spam_(Monty_Python)) in which Spam is included in almost every dish.)

**Cookies –**

A **cookie**, also known as an **HTTP cookie**, **web cookie**, or **browser cookie**, is usually a small piece of data sent from a website and stored in a user's web browser while a user is browsing the website. When the user browses the same website in the future, the data stored in the cookie can be retrieved by the website to notify the website of the user's previous activity.

**Firewall –**

A **firewall** is a device (usually a router or a computer) installed between the internal network of an organization and the rest of the Internet. It is designed to protect the internal network from malware and data theft. It controls the incoming and outgoing network traffic by analyzing the data packets and determining whether these should be allowed through or not, based on a predetermined rule set.

A network's firewall builds a bridge between an internal network that is assumed to be secure and trusted, and another network, usually an external (inter)network, such as the Internet, that is not assumed to be secure and trusted.

**India IT Act –**

*“Information Technology Act”* defines cyber crimes and suggests penalty for such crimes committed in India.

**Cyber Law –**

It refers to all the legal and regulatory aspects to curb cyber crimes.

**Cyber Crimes –**

In Simple way we can say that cyber crime is unlawful acts wherein the computer is either a tool or a target or both. Cyber crimes can involve criminal activities such as theft, fraud, forgery, defamation and mischief, all of which are subject to the Indian Penal Code.

**IPR (Intellectual Property Rights) Issues –**

IPR stands for Intellectual Property Rights, which can be defined as Rights acquired over a property created with the intellectual effort of an individual. The property is intangible in nature. IPR was divided into 7 main branches under the TRIPS agreement (Trade Related Aspects of Intellectual Property Rights). These branches are:-

1) Patents

2) Copyrights

3) Trademarks

4) Geographical Indications

5) Integrated Circuits and Design Layouts

6) Designs

7) Confidential Information(Trade secrets)

IPR Issues include software piracy, copyright infringement, trademarks violations, theft of computer source code, patent violations. etc.

**Cyber Squatting –**

Domain names are also trademarks and protected by ICANN’s domain dispute resolution policy and also under trademark laws.

Cyber Squatters registers domain name identical to popular service provider’s domain so as to attract their users and get benefit from it.

**Hacking –**

It is the process of finding weaknesses in a computer or computer network and exploiting them through a process called penetration or penetration testing (depending on the motive). Hackers (persons involved in hacking) may be motivated by a multitude of reasons such as profit, protest, challenge.

Hacking may also be done to aid security by pointing out vulnerabilities.

**Web Services**

**WWW –**

A multimedia Internet service that allows users to traverse the Internet by moving from one document to another via links that connect them together.

**HTML –**

Hyper Text Markup Language. A computer language for specifying the contents and format of a web document. HTML defines the format of a web page using tags that define fonts, layouts, embedded graphics, and hypertext links etc.

**XML (Extensible Markup Language) –**

XML allows designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations.

**HTTP (Hyper Text Transfer Protocol)–**

It is the protocol for transferring Hyper Text from web server to web browser.

**Domain Names –**

A domain name is a sequence of labels separated by dots which identifies a particular server on the internet.

**URL –**

A string of characters (address) that identifies a page on the World Wide Web.

**Protocol Address (or IP Address)–**

Every machine in a network has a unique identifying number, called its IP Address. An IP address is a group of four bytes (or 32 bits) each of which can be a number from 0 to 255. A typical IP address looks like this:

59.177.134.72

To make it easier for us to remember, IP addresses are normally expressed in decimal format as a "dotted decimal number" like the one above.

**Website –**

It is a collection of interlinked web pages under a name called web-site name. It is stored in a web server.

**Web Browser –**

It is a [software application](http://www.webopedia.com/TERM/A/application.html) used to locate, retrieve and also display contents on the [World Wide Web](http://www.webopedia.com/TERM/W/World_Wide_Web.html), including [Web pages](http://www.webopedia.com/TERM/W/web_page.html), images, video and other files. As a [client/server model](http://www.webopedia.com/TERM/C/client_server_architecture.html), the browser is the [client](http://www.webopedia.com/TERM/C/client.html) run on a computer that contacts the Web [server](http://www.webopedia.com/TERM/S/server.html) and requests information. The [Web server](http://www.webopedia.com/TERM/W/Web_server.html) sends the information back to the Web browser which displays the results on the computer or other Internet-enabled device that supports a browser.

Although browsers are primarily intended to access the World Wide Web, they can also be used to access information provided by [web servers](http://en.wikipedia.org/wiki/Web_servers) in [private networks](http://en.wikipedia.org/wiki/Private_networks) or files in [file systems](http://en.wikipedia.org/wiki/File_systems). The major web browsers are [Firefox](http://en.wikipedia.org/wiki/Firefox), [Google Chrome](http://en.wikipedia.org/wiki/Google_Chrome), [Internet Explorer](http://en.wikipedia.org/wiki/Internet_Explorer), [Opera](http://en.wikipedia.org/wiki/Opera_(web_browser)), and [Safari](http://en.wikipedia.org/wiki/Safari_(web_browser)).

**Web Server –**

A computer that delivers (serves) content, such as web pages, using the Hypertext Transfer Protocol (HTTP), over the World Wide Web.

**Web Hosting –**

It is the procedure to manage and administer a website on a web server.

**Web Scripting –**

Web scripting is programming the behavior of the client and server in a network.

**Client Side Scripting (VBScript, JavaScript, PHP) –**

**Client-side scripting** generally refers to the class of [computer programs](http://en.wikipedia.org/wiki/Computer_program) on the [web](http://en.wikipedia.org/wiki/World_Wide_Web) that are [executed](http://en.wikipedia.org/wiki/Execution_(computers)) on [*client-side*](http://en.wikipedia.org/wiki/Client-side), by the user's [web browser](http://en.wikipedia.org/wiki/Web_browser).

This type of [computer programming](http://en.wikipedia.org/wiki/Computer_programming) is an important part of the [Dynamic HTML](http://en.wikipedia.org/wiki/Dynamic_HTML) (DHTML) concept, enabling [web pages](http://en.wikipedia.org/wiki/Web_page) to be [scripted](http://en.wikipedia.org/wiki/Script_(computer_programming)); that is, to have different and changing content depending on user input, environmental conditions (such as the time of day), or other variables.

**Server Side Scripting (ASP, JSP, PHP) –**

**Server-side scripting** generally refers to the class of [computer programs](http://en.wikipedia.org/wiki/Computer_program) on the [web](http://en.wikipedia.org/wiki/World_Wide_Web) that are [executed](http://en.wikipedia.org/wiki/Execution_(computers)) on [*server-side*](http://en.wikipedia.org/wiki/Client-side), by the [web server](http://en.wikipedia.org/wiki/Web_browser).

Normally, when a browser requests an HTML file, the server returns the file. However, if the file contains a server-side script, the script is executed on the server before the file is returned to the browser as plain HTML.

**Web 2.0 –**

**Web 2.0** refers to web application features that facilitate participatory [information sharing](http://en.wikipedia.org/wiki/Information_sharing), [interoperability](http://en.wikipedia.org/wiki/Interoperability), [user-centered design](http://en.wikipedia.org/wiki/User-centered_design), and [collaboration](http://en.wikipedia.org/wiki/Collaboration) on the [World Wide Web](http://en.wikipedia.org/wiki/World_Wide_Web). A Web 2.0 site allows users to interact and collaborate with each other in a [social media](http://en.wikipedia.org/wiki/Social_media) dialogue as creators of [user-generated content](http://en.wikipedia.org/wiki/User-generated_content) in a [virtual community](http://en.wikipedia.org/wiki/Virtual_community), in contrast to websites where users are limited to the passive viewing of [content](http://en.wikipedia.org/wiki/Content_(media_and_publishing)) that was created for them. Examples of Web 2.0 include [social networking sites](http://en.wikipedia.org/wiki/Social_networking_site), [blogs](http://en.wikipedia.org/wiki/Blog), [video sharing](http://en.wikipedia.org/wiki/Video_sharing) sites.