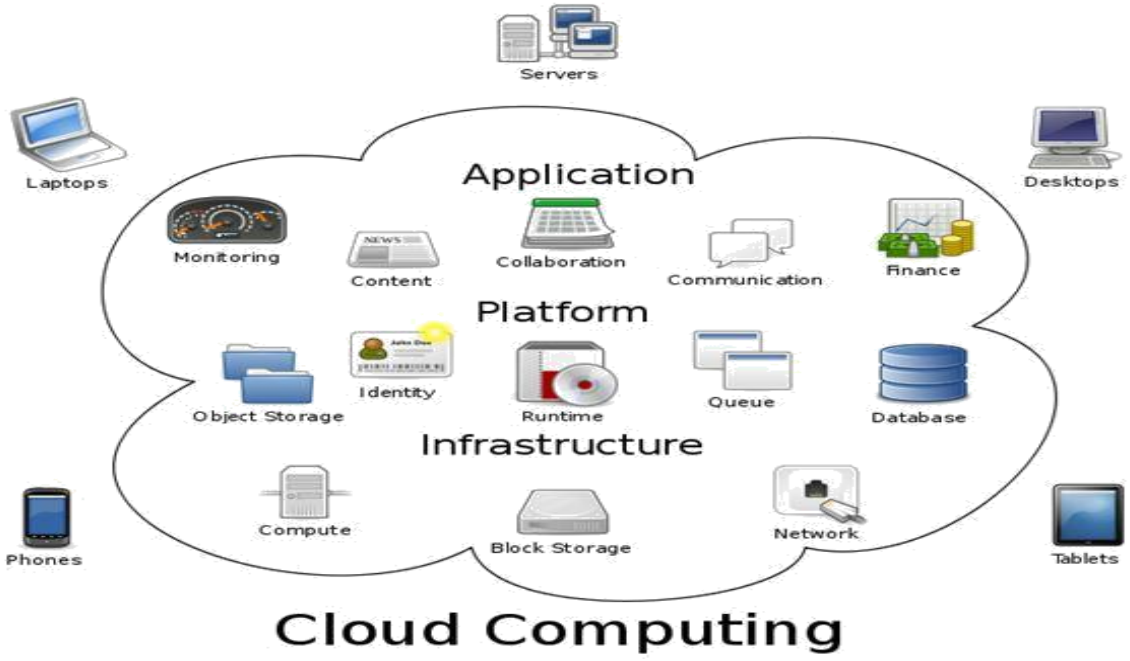
UNIT - 8

EMERGING TRENDS IN COMPUTER TECHNOLOGY

8.1.1Define cloud:

- ✓ The cloud refers to a **centralized location on the internet** that stores data, making it accessible anytime, anywhere, from any device.
- ✓ Cloud computing refers to **manipulating, configuring, and accessing the application** ONLINE. It offers online data storage, infrastructure and applications shown below.



Examples of cloud computing:

- ✓ Simple example is gmail **o**
- ✓ When you send (or) receive email, you never need any application software installed in your computer.
- ✓ You just need an internet connection to send your emails.

8.1.2 USES OF CLOUD:

They have number of reasons why cloud computing is so widely used which are the following

- ➢ **REDUCTION OF COST:** unlike on-site hosting the price of deploying applications in the cloud can be less due to lower hardware costs and gives effective use of physical resources.
- ➢ UNIVERSAL ACCESS: Cloud computing can allow remotely located employees to **access application and** work **via the internet.**
- ➢ FILE STORAGE: CLOUD offers you the possibility of **storing your files and accessing, storing and retrieving** them from any web enabled interface.
- ➢ SECURITY: The cloud computing provides **secured data storage** than desktop component the data is **not lost even if the computer crashes** because the cloud automatically duplicates the stored the data. So whatever data is stored into the cloud always stays safe in the clouds. And also, it does not require any back up.
- ➢ **up to date software:** a cloud provider will also able to upgrade **software, keeping in mind feedback** from previous software releases.
- ➢ **Choice of applications:** this allows flexibility for cloud users to experiment and **choose the best option** for their needs .cloud computing also allows a **business to use , access and pay only for what they use** , with a fast implementation time.

8.1.3 TYPES OF CLOUD:

Clouds computing is typically classified in two ways:

- Location of the cloud computing
- Type of services offered

The clouds are classified into 4 types based on location of the cloud

1. Public cloud
2. Private cloud
3. Hybrid cloud
4. Community cloud

Public cloud:

- ✓ In public cloud system a third party vendors provides data center both disk space and computing power for all the application software.
- ✓ Google apps and Amazon web and IBM are the most popular public cloud computing service providers.

Public cloud allows system and services to be easily accessible to the general public. Public cloud may be less secure because of its openness.

Ex: E-mail

Private cloud:

- ✓ The private cloud allows system and services to be accessible within an organization.
- ✓ It offers increased security because of its private nature. Here, we need to set up our own data center and the same time we have complete control of all our data.

Private clouds are two types:

1)On-premise private clouds .
2)Externally hosted private clouds.

Externally hosted private clouds

- This clouds are also exclusively used by **one organization** , but are hosted by a third party specializing in cloud infrastructure.
- Externally hosted private clouds **are cheaper** than On-premise private clouds.

On-premise private clouds

- On-Premise Private Cloud, often called *Internal Cloud*, is hosted within an organizations own offices, or data center, and provides an *internal* solution for hosting needs.
- Since an *Internal Cloud* is completely controlled in-house this means you often have more flexibility.

Hybrid cloud:

- ✓ Hybrid cloud means combination of both public and private clouds.
- ✓ The critical activities are performed using private cloud while non critical activities are performed using public cloud.
- ✓ The community cloud allows system and services to be accessible by a group of organisation seeking similar operations and seek to share information.
- ✓ This is a more expensive option as compared to public cloud but offer a high level of privacy, security.

Community Cloud:

- this involves **sharing of computing infrastructure in between organizations** of the same community .
  For example all Government organizations within the state of California may share computing infrastructure on the cloud to manage data related to citizens in California.

Based on service offered cloud are classified into

Infrastructure as a Service(Iaas)

- ✓ IaaS is the most basic category of cloud computing services that allows you rent IT infrastructure (servers or VM's) from a cloud provider on a pay-as-you-go basis.
- ✓ Leading vendors that provide infrastructure as a service are Amazon EC2,Amazon S3, Rack space Cloud Servers and **FlexiScale**.

Platform as a service (PaaS):

- ✓ Platform-as-a-service (PaaS) refers to the supply an on-demand environment for developing, testing, delivering and managing software applications. It is designed to quickly create web or mobile apps, without worrying about setting up or managing the underlying infrastructure of servers, storage, network and databases needed for development.
- ✓ platform on the **cloud platform provides by different vendors** are typically in PaaS are Google Aplication Engine, Microsoft Azure, Salesforce.com, IBM Cloud, Oracle Cloud.

Software as a service (SaaS):

- ✓ Software-as-a-service (SaaS) is a method for delivering software applications over the Internet as per the demand and on a subscription basis. **different vendors** are typically in SaaS are Google, MailChimp, Microsoft.

8.1.4 Explain Cloud Components With a Diagram

The components of a cloud which are the following:

- ✓ Client computers.
- ✓ Distributed servers.
- ✓ Data center.

Client:-

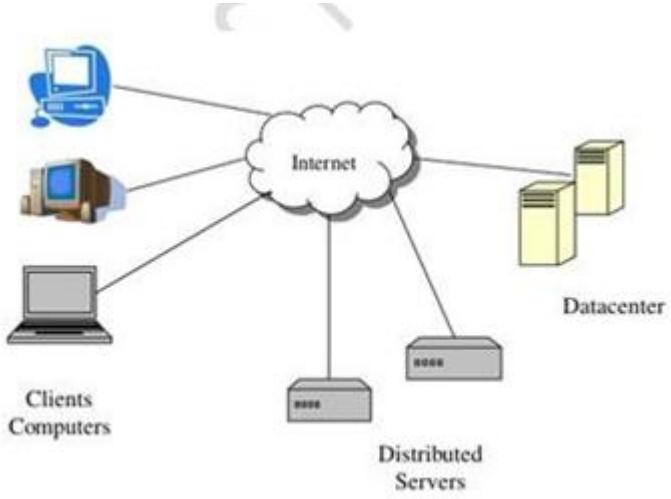
- ✓ Clients are the devices that the end users interact with cloud to manage their information on cloud

Clients generally fall into three categories:

Mobile: Mobile devices include smart phones like BlackBerry, Windows mobile smart phones.

Thin Client: Clients are computers that do not have internal hard drives, but rather let the servers do all the work, then display the information.

Thick Clients: This type of client is a regular computer, using a web browser like Firefox or Internet Explorer to connect to the cloud.



Components of a Cloud

Datacenter:

- ✓ The datacenter is the **collection of servers ,**where the application to which you subscribe is housed.
- ✓ It could be a large room in the basement of your building or a room full of servers on the other side of the world that you access via internet.

Distributed Servers:

- ✓ These servers are **not housed in the same location** but are placed at geographically disparate locations.
- ✓ These servers act as if they are placed at one place. This gives the service provider more flexibility in options and security.
- ✓ For example, Google has their cloud solution in servers all over the world if one server is causing failure, the service would still be accessed through another server.
- ✓ Cloud also many other components to know the other components of cloud consider the diagram shown below.

Clients
Services
Applications
Plat form
Storage
infrastructure

8.1.5 List Any Five Applications of Cloud Computing:

Cloud computing has its applications in almost all the field such as **business, entertainment, data storage**, **social networking**, **management**.

widely famous cloud computing applications are given below

MailChimp :it offers an **e-mail publishing platform** it is widely employed by the businesses to design and send their e-mail campaigns.

Chatter: Chatter app helps the employee to **share important information about organization** in real time one can get the instant feed regarding any issue.

Google Apps for business: Google offers **creating text documents , spreadsheets, presentation**, etc….. on Google Docs which allows the business uses to share them in collaborating manner

Quickbooks:it offers **online accounting solutions for a businesses** it helps in monitoring cash flow, creating VAT returns and creating business report.

Data Storage and Backup :

Box.com, Mozy, Joukuu are the application offering **data storage and backup services** in cloud.

box.com:offers **drag and drop** service for files. It just required to drop the files into box and access form anywhere.

Mozy:offers **online backup service** for files during a data loss.

Jouku:jouku is a web –based interface. It allows **to display a single list** of contents for files stored In Google Docs, box.net and Drop box.

Toggl:it helps **in tracking time period** assigned to a particular project. It allows you to create tasks and projects and assign amount of time to each project. It also logs how long tasks take to complete and how much time you have left to spend in a project.

Evernote: Evernote is an application **that organizes the sticky notes** and even can read the text from images which helps the user to locate the notes easily.

Outright:it is an accounting app. It helps to track income, expenses and losses in real time

Face book: Face Book offers **social networking service** one can share photo ,video, files,status and much more.

Twitter: Twitter helps to **interact directly with the public one can follow** any celebrity, organizing and any person, who is on twitter and can have latest update regarding the same.

Skype

a) Skype is an application that provides video chat and voice call services. Skype also allows be creation of video conference call.
b) Users may exchange such digital documents such as images, text, video and any others, and may transmit both text and video message.
c) Skype allows users to communicate over the internet by voice using a microphone, by video using a web cam.

8.2 INTRODUCTION TO NETWORK SECURITY

8.2.1 DEFINE VIRUS

Define virus

- ✓ A computer virus is a program or **piece of code**.that is loaded on to your computer with out your knowledge and runs against your wishes viruses can replicate themself . even a simple **virus is dangerous** .
- ✓ Since 1987, when a virus infected ARPANET, large network used by the Defense Department and many universities.many antivirus programs have become available These programs periodically check your computers system.
- ✓ Computer viruses are small software programs that are designed to spread from one computer to another.
- ✓ Even simple virus is dangerous because it will quickly use all available memory and brings the system to a halt.
- ✓ The following are the some virus they are
    - Malware

- Melissa virus
- Coffee shop virus
- Rose on virus
- Nuclear virus

Computer virus effects are:-

1) Corrupts data on a computer
2) Deletes data form a computer
3) Erases everything on the hard disk

Computer virus generally spread through.

1) Executable files
2) Download from the internet
3) Attainments in e-mail messages

8.2.2 Define worm:-

- ✓ 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.**
- ✓ A computer worm is a **self-replicating computer program**.

Ex: - code red
Nimadastorm worm
Blasting worm
Morris worm

8.2.3 Define Cyber crime

- ✓ Cyber crime is any criminal activity involving computers and networks.
- ✓ It can range from fraud to spam to the distant theft of government or corporate secrets through criminal trespass into remote system, even on other countries or on other continents.

Examples of cyber crime include:

- ✓ Downloading illegal music files.
- ✓ Stealing huge amount of money from online bank accounts.
- ✓ Non-monetary offenses, such as creating and distributing viruses on other computers posting confidential business information on the internet.
- ✓ Identity theft: stealing personal information from users through internet.

Types of cyber crime:

Cyber fraud:

- ✓ Online theft for credit card number, expiration date, and other information for criminal use

Cyber contraband:

- ✓ Transferring illegal items the internet (such as encryption technology) that is banned in some locations.

Cyber talking:

- ✓ Express or implied physical threads that create fear through the use of computers technology such as email, phones, text messages, web cams, web sites or videos.

Cyber theft:

- ✓ Stealing of financial or personal information through the use of computers for making other illegal issue.

Assault by threat:

- ✓ threatening a person with **fear for their lives** or the lives of their families or persons whose safety they are responsible for through the use of a computer network such as email, videos, or phone.

Cyber terrorism:

- ✓ premeditated usually **politically – motivated violence** committed agains civilians through the use of (or) with the help of computer technology.

8.2.4 Need of network security

Computer network security is required for the following reasons:

- ✓ To protect company assets.
- ✓ To gain competitive advantage
- ✓ To comply with regulatory and fiduciary responsibilities
- ✓ To keep your job.
- ✓ To protect the information from unwanted editing, accidently or intentionally by unauthorized users.
- ✓ To protect the information from loss make it to be delivers to its destination properly.
- ✓ To protect the confidentiality which means information in the network remains private.
- ✓ To protect the message from unwanted delay in the transmission lines in order to deliver it to required destination in time.

To protect company assets:

- ✓ information stored on company's computers and network is a vital organizational asset.
- ✓ Network and computer security is required for **protection, integration, and availability** of information

To gain competitive advantage:

- ✓ Network security is particularly in the area of internet financial services and e-commerce.

For example

- ✓ assume that state bank has been hacked by intruders in the past, capital Bank was never hacked by intruders, Customers prefer only capital Bank instead of SB, that their account will be safely operated and protected in Andhra Pradesh rather than SB.

8.2.5 KNOW ABOUT ENCRYPTION

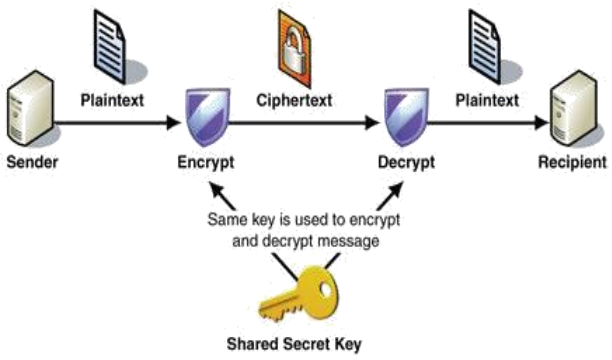
- ✓ **ENCRYPTION** is the process of converting plaintext into cipher text(unreadable text)
- ✓ The primary purpose of encryption is to protect the confidential data transmitted via internet or other computer networks.

There are two types of encryption:

1. Symmetric (**private/secret**) key encryption.
2. Asymmetric (**public**) key encryption.

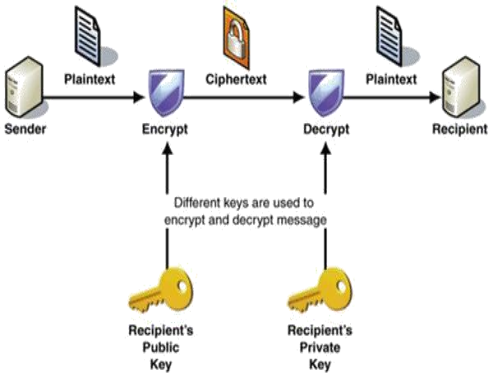
Symmetric key encryption:

- ✓ Here same key is used for both encryption and decryption processes.
- ✓ It is relatively inexpensive to produce a strong key.
- ✓ The keys tend to be much smaller for the level of protection they afford.
- ✓ The algorithms are relatively inexpensive to process.



Advantages	Disadvantages
1.Fast	1.Require secret sharing
2.Relatively secure	2.Complex administration
3.widely understood	3.No authentication

Asymmetric key encryption:



✓ Public key cryptography involves a pair of keys known as **PUBLIC KEY AND PRIVATE KEY** (a public key pair), which are associated with an entity that need to authenticate its identify electrically or to sign or encrypt data.

✓ **Each public key is established and the corresponding private key is kept secret.** Data that is encrypted with the public key can be decrypted only with the corresponding private key. This process is shown below.

Advantages	Disadvantages
No secret sharing necessary	**Slower or computationally intensive**
Authentication supported	**Certificate authority required**

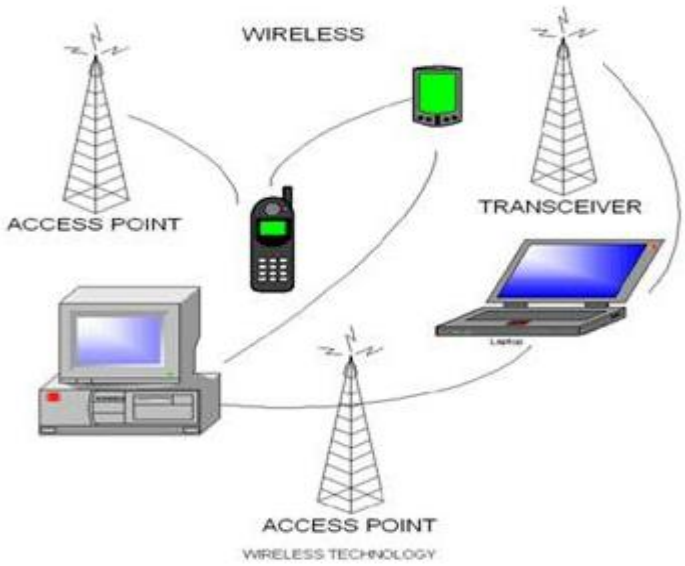
8.3 INTRODUCTION TO MOBILE COMMUNICATION

8.3.1 Define Wireless Communication

- ✓ Wireless communication is a **type of data communication** that is performed and **delivered wirelessly that works through electromagnetic signals.(OR)**
- ✓ Wireless communication is the **transfer of information between two or more points that are not connected by an electrical conductor.**

Wireless communication procedure:

- ✓ The sender **propagates wireless signals.**
- ✓ The receiver **captures these signals.**
- ✓ Wireless communication is creating a wireless communication **bridge between the sender and receiver device.**



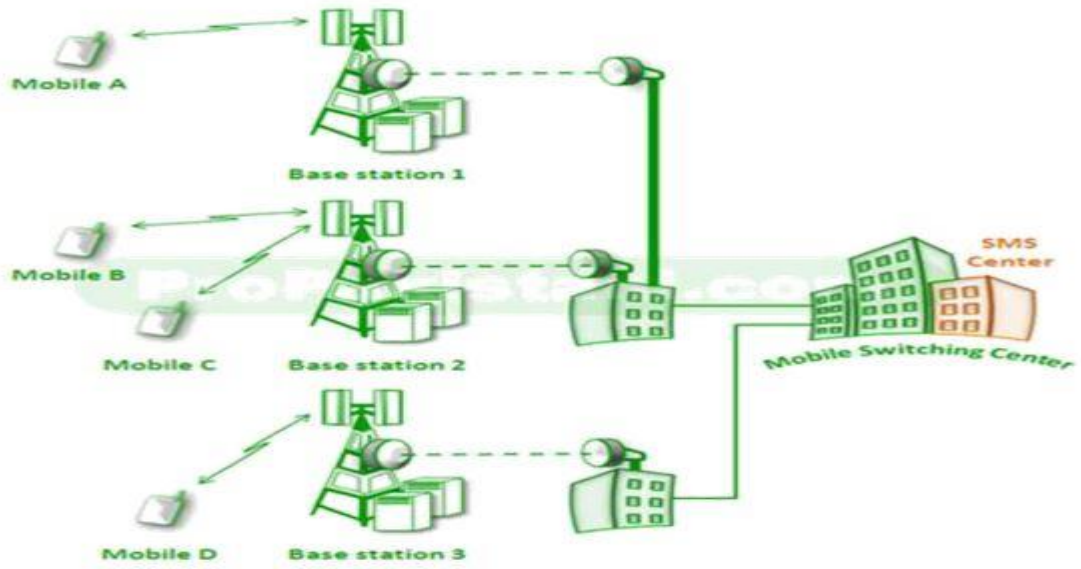
Example: Wireless communication has various forms, technology and delivery methods including

- ✓ **Satellite communication.**
- ✓ **Mobile communication.**
- ✓ **Wireless network communication.**
- ✓ **Infrared communication.**
- ✓ Bluetooth communication

All of them will not use a physical or wired connection between their respective devices,but have different underlying architecture.

8.3.2 Define Cellular System

- These are the communication system, especially the **Advantage Mobile Phone Service (AMPS) that** divide a geographic **region in to section, called cells**.
- The purpose of this division is to make the most **use out of a limited number of transmission frequencies.**
- Each connection, or a **conversation, requires its own dedicated frequency,** and the total number of available frequencies is about 1000.
- To support more than 1000 simultaneous conversation, cellular system allocates a set number of frequencies for each cell.
- Two cells can use the same frequency for different conversation so long as the cells are not adjacent to each other.
- For digital communication, **several compating cellular systems exits like GSM and CDMA.**



Cellular system

8.3.3 Define GSM and CDMA

GSM

- GSM stands for **Global system for Mobile communication Cell phones use a cell phone service carrier's** GSM network by searching for cell phone tower in the nearby area.
- GSM operates on the **Wedge spectrum called a carrier** is divided in to **a number of slots** and each user is assigned a different time slots so that until the ongoing call is finished, no other subscriber can have access to this.
- GSM uses **both time division multiple access and frequency division multiple access** for user and cell separation.
- TDMA provides multi user access by chopping up the channel into different time slices and FDMA provides multi user access by separating the used frequencies.
- The origins of GSM can be tracked back to 1982. GSM digital technologies and is a second generation cell phone system latter extended to 3G and 4G also
- GSM network operates in the frequency spectrum of GSM services.
- Some most popular GSM network providers are airtel, idea, BSNL, Vodaphone, reliance and uninor.
- While the GSM network operates in the frequency spectrum of GSM 850MHz and 1900MHz

CDMA:

- CDMA stands for code division multiple accesses. It uses a "spread-spectrum" technique where by electromagnetic energy is spread to allow for a signal with a wider bandwidth.
- This allows multiple people on multiple cell phones are to be "multiplexed" over the same channel to share a bandwidth of frequency.
- With CDMA technologies, data and voice packets are separated using codes and then transmitted using a wide frequency range.
- Since more space is often allocated for data with CDMA, this standard became attractive for 3G and 4G high speed mobile internet use.
- CDMA is based on spread spectrum technology which makes the optimal use of available bandwidth.
- It allows each user to transmit over the entire frequency spectrum all the time.
- The CDMA network operates in the frequency spectrum of CDMA 850MHz and 1900MHz.

Example:

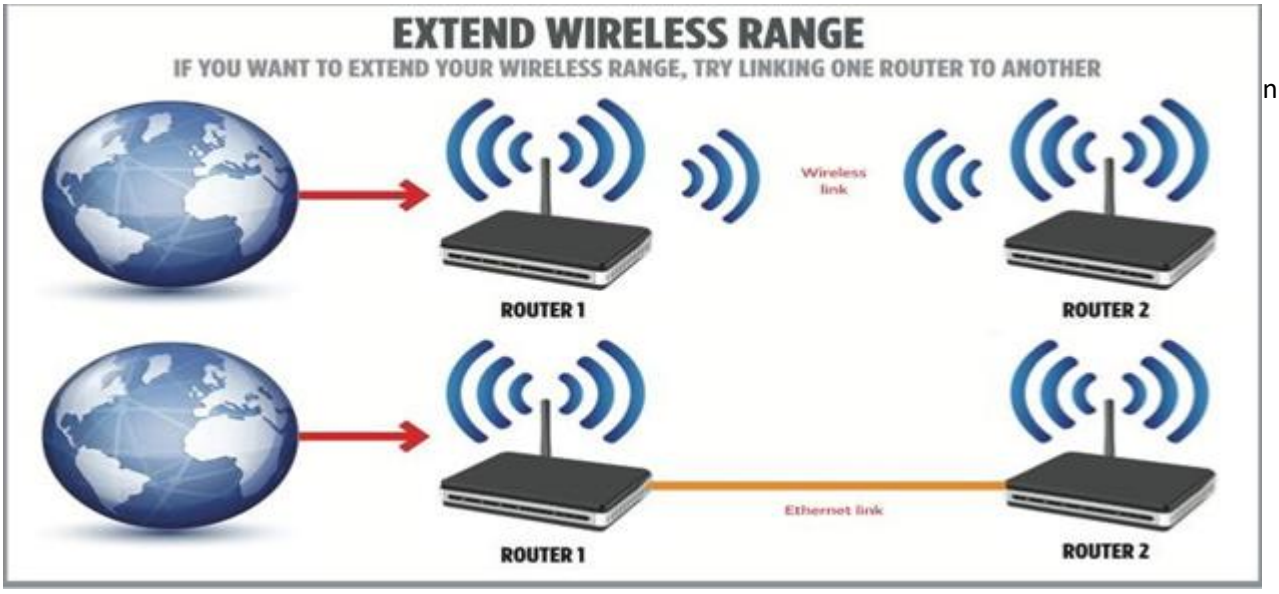
Indian mobile network operators offering CDMA services are virgin mobile, tata-indicom and reliance CDMA.

the differences between CDMA and GSM networks are

GSM	CDMA
Stands for global system mobile communication	Stands for code multiple access
Operates on the wedge spectrum called carrier this carrier is divided into a number of time slots	Uses spread spectrum technology which makes the optimal use of available bandwidth
Less secured	More secured
GSM signal can be easily tapped by others	Tapping signal is difficult
Frequency range: GSM850MHZ-1900MHZ	Frequency range: CDMA 850MHZ-1900MHZ
Less flexible and difficult to implement	More flexible and can be easily implemented
76% of cellular systems use GSM	24% of cellular system use CDMA
Slower data rates and less qualities transmission	Faster data rates and more quality data transmission
Produces more radiation	Produces less radiation
Covers less area with a single cell	Covers more area with single cell

8.3.4 Define Wireless LAN and Bluetooth Wireless LAN

- Wireless local area network is a communications network that provides connectivity to wireless device with in a limited geographic area. "Wi-Fi" is the universal standard for wireless networks and is the wireless equivalent of wired Ethernet networks.



n service as th

- Wi-fi is archived with a wireless base station, called an "access point" its antennas transmitted and receive a radio frequency within a range of 30 to 150 feet through walls and other non-metal barriers.
- Since all wireless and wired computers are interconnected, they can exchange data, with each other backup and file sharing .the WLAN is shown below.

Some of the features of WLAN are:

- ✓ Suitable for local short distance networking.
- ✓ Compatible with existing LAN'S.
- ✓ WLAN'S are unlicensed radio frequency
- ✓ WLAN is already affordable and popular on mobiles, laptops and Personal Computers and wi-fi adapter
- ✓ Used widely in airports, railway stations, hotels, business parks and office buildings
- ✓ Integrates laptops and PDA devices.

Bluetooth:

- Bluetooth is a wireless technology developed by **Ericsson** that is designed the name Bluetooth is barrowed from herald Bluetooth, a king in Denmark more than 1000 years ago.
- Bluetooth is to cable replacement it operates on the 2.4 ghz frequency band like wi-fi and is officially known as IEEE standard 802.15.1.
- It is most commonly used with **wireless headsets and car kits**, but can also be used for network access moving files from one device to another or with wireless input device.
- Bluetooth uses **low-power radio communication to link phones ,computers And other network devices** over short distance without wires .Bluetooth technology was **designed primarily to support simple wireless networking of personal consumer devices and peripherals, including cell phones**, PDAS and wireless headsets.
- Wireless signals transmitted with Bluetooth cover short distance, typically up to 30 feel (10 meters) Bluetooth devices generally communicate at less than 1mbps.
- Bluetooth networks feature a dynamic topology called piconet or PAN (Personal Area Network). piconets contain a minimum of two and a maximum of eight Bluetooth per devices .devices communicate using protocols that are part of the Bluetooth specification.
- Multiple versions of the Bluetooth specification exits **such as 1.1, 1.2 and 2.0** and above.
- Compared to wi-fi, Bluetooth networking in **much slower limited in range and supports fewer devices**.
- Difficulties with Bluetooth technology **include security and interoperability with other networking standards**.

EXTRA

Benefits of cloud computing

- ✓ **Easy to maintain** as they don't haven to installed on each user's computer.
- ✓ By using cloud computing we can **store large amount data** from any where with out worryingabout their mantainence .
- ✓ Allows the enterprise to focus on its core business.
- ✓ Thousand of virtual machines and applications can be used managed more easily using a cloud-like environment.
- ✓ **Location independence**, so long as there is a access to the internet.
- ✓ increased competitive advantage.
- ✓ **Increased security** at a much lesser cost.

Assignment questions

1)explain grid computing.2)explain encryption.3)explain wifi,Bluetooth.4)write the advantages of wifi. 5)write the use of 3g and 4g.