Advance Trends in IT

Mobile Internet

- Mobile Internet refers to the use of the internet on mobile devices like smartphones and personal digital assistants (PDAs), allowing people to stay connected to a wide range of information, services, and social interactions through applications like friend locator services and micro-blogging sites.

Some benefits of mobile internet

- Communication: Mobile internet allows for 2-way communication and real-time sharing.
- Entertainment: Mobile internet can be used for entertainment.
- Education: Mobile internet can be used for education.
- Healthcare: Mobile internet can be used for healthcare.
- Commerce: Mobile internet can be used for commerce.
- Advertising: Mobile internet can be used for advertising.
- Social networks: Mobile internet can be used for social networks.
- Government: Mobile internet can be used for government.

GPS

- The Global Positioning System (GPS) is a space-based radio-navigation system consisting of a constellation of satellites broadcasting navigation signals and a network of ground stations and satellite control stations used for monitoring and control.
- Provides location, speed, and time information
- GPS was started in 1973 as a joint civil/military program.

How GPS works

- GPS uses a network of satellites and ground stations to transmit signals to GPS receivers on Earth. The receiver calculates its location by comparing the time it takes to receive the signal with the time the signal was sent, and then multiplying that difference by the speed of light

How GPS used

- GPS is used in many ways, including in cars for navigation, in shipping and sailing, and in personal technology.
- It also helps police and ambulance crews respond to emergencies by providing real-time traffic data

How accurate it is:

- GPS is generally accurate to about 10 meters horizontally and 20 meters vertically, but some receivers can be accurate to within 1 centimeter.

What is 3G Technology?

- The term 3G stands for the third generation. It is a generation for the standards of the services for mobile telecom, satisfying the IMT-2000 (International Mobile Telecommunications – 2000). It provides a user with the ability to transfer data and voice simultaneously over the very same network in the form of instant messaging, emails, and downloads.
- The 3G is the successor of 2G, and it delivers a comparatively better broadband capacity and supports a larger customer base for data and voice at a much lower incremental cost. The 3G communication performs voice communication via circuit switching and data communication via packet switching.

What is 4G Technology?

- The term 4G stands for the fourth generation. It is basically a venture for developing and incorporating the 3G, 2G, Wireless LAN (WLAN), short-range systems, and fixed wire systems into a broadcast of a single network that is not only coherent and consistent but also functional.

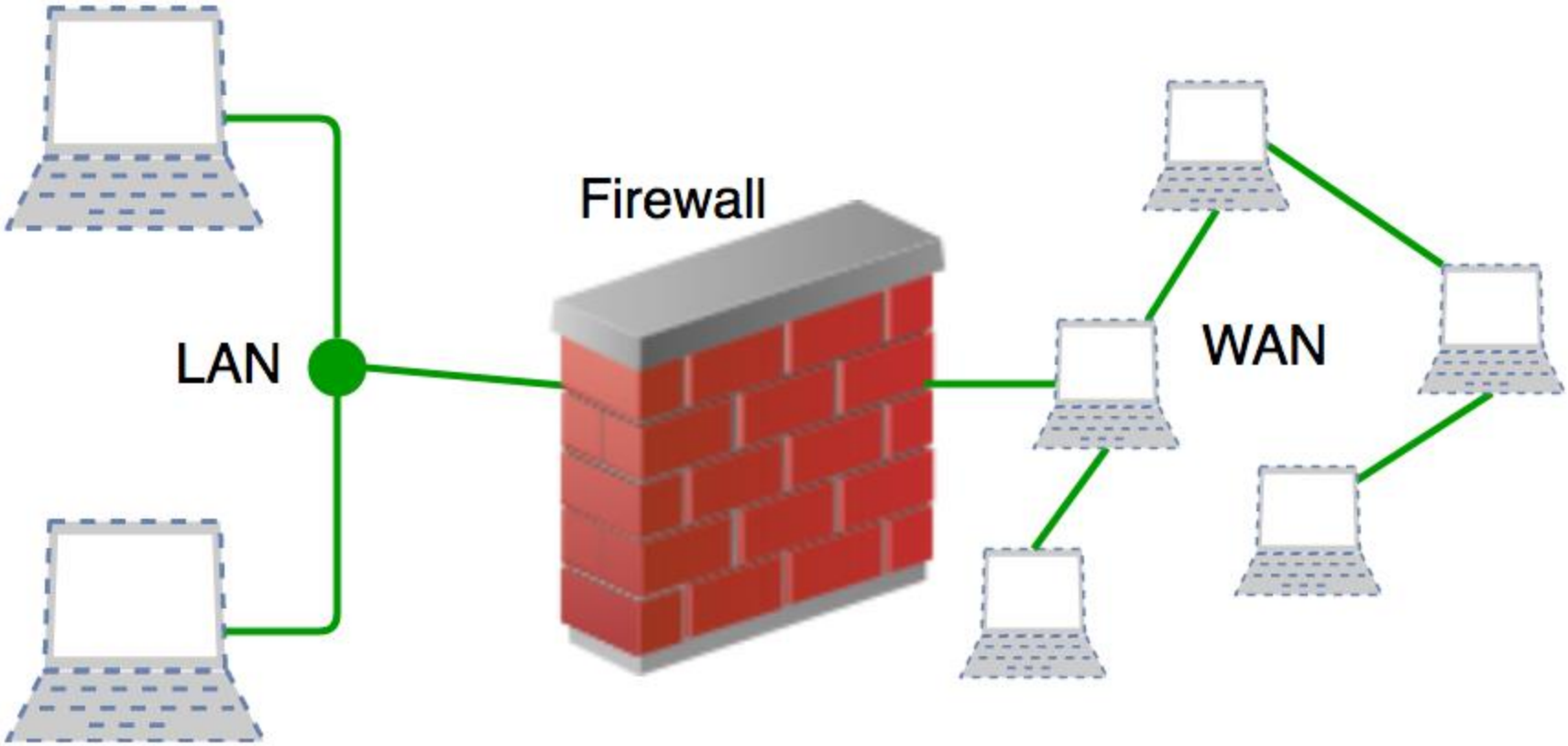
- The 4G technology comes with various customised services for multimedia, data, as well as voice at a very high data rate (this can go up to 500 Mbps). 4G also comes with some very advanced services compared to 2G and 3G, like gaming, 3D TV, video conferencing, IP telephony, etc.

Difference between 3G and 4G Technology

Parameters	3G Technology	4G Technology
Full Form	The term 3G is an abbreviation for the third generation technology.	The term 4G is an abbreviation for the fourth generation technology.
Maximum Upload Rate	It can go up to 5 Megabytes per second.	It can go much higher, about 500 Megabytes per second.
Maximum Rate of Download	The 3G technology offers a maximum download rate of about 21 Megabytes per second.	The 4G technology can download videos at a much faster rate, that can go as high as 1 Gigabyte per second.
Switching Techniques	It utilises the packet switching technique.	It utilises both the message switching as well as the packet switching techniques.
Range of Frequency	The frequency of the 3G technology ranges somewhat between 1.8 to 2.5 Gigahertz.	The frequency range of the 4G technology ranges somewhat between 2 to 8 Gigahertz.
Network Architecture	The network architecture of the 3G technology is a wide area cell-based one.	The network architecture of the 4G technology is cell-based for a wide area along with the integration of WLAN.
Error Correction	The 3G technology performs error correction using the turbo codes.	The 4G technology performs error correction using the concatenated codes.

Firewall

- A Firewall is a network security device that monitors and filters incoming and outgoing network traffic based on an organization's previously established security policies.
- At its most basic, a firewall is essentially the barrier that sits between a private internal network and the public Internet.
- A firewall can be hardware, software OR software-as-a service (SaaS)


Firewall
LAN
WAN

Firewall

- **Definition**: A Network Firewall is a system or group of systems used to control access between two networks -- a trusted network and an untrusted network -- using pre-configured rules or filters.

Types of Firewall

- **Packet filtering firewall**

Analyzes each data packet and filters it based on parameters like IP addresses, port numbers, and protocol types

- **Stateful inspection firewall**

Monitors active connections to determine which network packets to allow through

- **Proxy firewall**

Also known as a web application or application layer firewall, this type of firewall routes data packets through separate proxy servers

- **Next-generation firewall (NGFW)**

Builds on other firewall types and adds extra functionality. NGFWs are trending towards increased usage of artificial intelligence (AI) and machine learning (ML)

- **Network address translation (NAT) firewall**

Matches a local private address to a public address to transfer information. This helps the device communicate with external networks.

- BPO and KPO

- **Outsourcing** of routine or peripheral business functions is very common today. It implies contracting with the third party service provider, with respect to operations and responsibilities of business processes.
- At present, there is hardly any multinational company which is left untouched from outsourcing its business operations.
- Over the time, **Business Process Outsourcing (BPO)** has gained ample importance, by providing services related to marketing, human resources, customer support, technical support, etc.

BPO

- BPO or **Business Process Outsourcing** involves outsourcing non-core business functions to specialized BPO vendors who can perform these functions at a lower cost and with greater efficiency.
- BPO services can include customer service, call center operations, human resources, and front-office functions.
- By outsourcing their non-core functions, businesses can focus on their core business functions and achieve greater efficiency.
- While offshore outsourcing is a type of BPO where the work is outsourced to vendors in countries with lower labor costs,
- nearshore outsourcing involves outsourcing to vendors in nearby countries, typically with similar cultures and languages, to reduce communication and cultural barriers.

KPO

- **Knowledge Process Outsourcing or KPO** is a subset of BPO
- KPO refers to the outsourcing of processes such as research and development, data analysis, engineering services, healthcare services (e.g., medical coding and writing), to service providers specialized in these areas.
- Legal process outsourcing services (LPO) are also a special type of KPO dealing with legal services.
- KPO processes involve work that requires advanced analytical and technical skills
- KPO helps enterprises meet customer demand for high-quality services, drive operational efficiency, and add value to their products and services.

BPO	KPO	
Definition	BPO provides services like customer care, technical support through voice processes, tele-marketing, sales, etc.	KPO provides in-depth knowledge, expertise and analysis on complex areas like Legal Services, Business and Market Research, etc.
Stands for	Business Processing Outsourcing	Knowledge Processing Outsourcing
Requires	Good communication skills and basic computer knowledge	Specialized knowledge
Services	Low end services	High end services
Process	Pre-defined process	Requires application and understanding of business
Employees	Not so qualified employees	Skill and expertise of knowledge employees
Expertise in	Process	Knowledge
Relies on	Cost	Knowledge

Nanotechnology

- Nanotechnology is a field of science and engineering that involves manipulating atoms and molecules to create materials, devices, and structures at the nanoscale.
- The nanoscale is defined as having one or more dimensions of 100 nanometers or less, where a nanometer is one billionth of a meter

Nanotechnology has many applications, including:

- **Electronics**

Flexible, bendable, and stretchable electronics are being used in smartphones, tablets, wearable technology, and medical devices.

- **Biomedicine**

Nanotechnology can improve the early diagnosis and treatment of cancer and neurodegenerative diseases. It can also enhance pharmaceutical products like sunscreen

- **Food security**

Scientists have used nanoparticles to create coatings for fruit that extend its shelf-life

- **Household products**

Nanotechnology is used to create superior degreasers, stain removers, air purifiers, and filters

Nanotechnology has improved the design of products such as light bulbs, paints, computer screens, and fuels. Nanotechnology is helping inform the development of alternative energy sources, such as solar and wind power. Solar cells, for instance, turn sunlight into electric currents.

Cloud Computing

Cloud computing, or cloud technology, is the delivery of computing resources over the internet, such as storage, servers, and databases. It offers a number of advantages, including:

- Cost savings

Users only pay for what they use, which can help reduce operating costs.

- Flexibility

Cloud computing offers flexible resources that can scale as a business grows.

- Access to advanced tools

Cloud technology provides access to powerful tools like machine learning, artificial intelligence, and big data analytics.

- Better collaboration

Cloud storage allows users to access data from anywhere, as long as they have an internet connection.

- Security

Cloud technologies offer robust security measures, such as data encryption and regular updates.

- Reliability

The distributed nature of cloud infrastructure reduces the risk of downtime.

TYPES OF CLOUD COMPUTING:

There are several types of cloud computing, including:

- Public cloud

Owned and operated by a third-party provider, with the user accessing services and managing their account through a web browser.

- Private cloud

Used exclusively by a single business or organization, and can be located on-site or hosted by a third-party provider.

- Hybrid cloud

Combines public and private clouds, allowing data and applications to be shared between them.