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1a. THE 3G ARCHITECTURE

Universal Mobile Telecommunications System (UMTS), is a 3G networking standard used throughout much of the world as an upgrade to existing GSM module.

UMTS makes use of WCDMA, a technology that shares much with CDMA networks used throughout the world, though it is not compatible with them, The UMTS architecture takes advantage of the existing GSM and GPRS networks which serve as a core network in UMTS infrastructure, and Base level UMTS networks are generally capable of downlink speeds as 384 kbps.

The UMTS is made up of 3 main components

User Equipment

UMTS Terrestrial Radio Access Network (UTRAN)

Core Network (CN)

User Equipment:

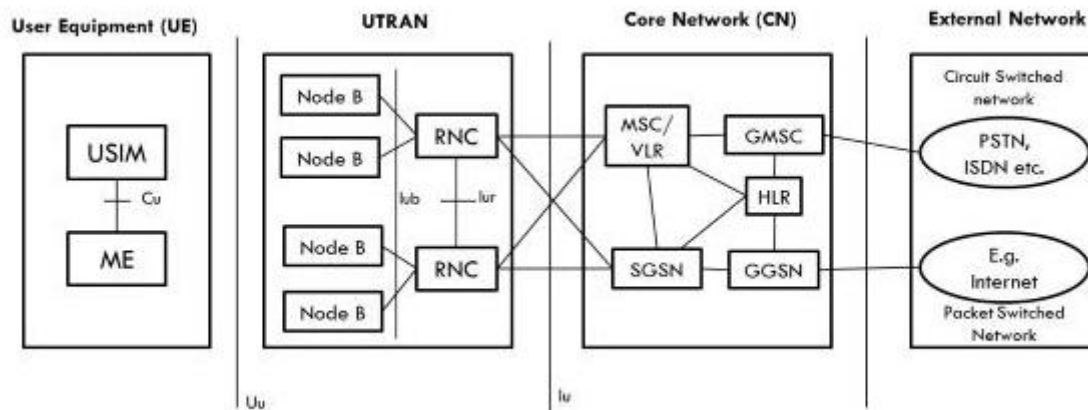
It is assigned to a single user and contains all the functions needed to access UMTS services.

UMTS Terrestrial Radio Access Network (UTRAN):

It handles cell-level mobility. It is a system of base station and controller handling function related to mobility.

Core Network (CN):

The core network is shared with GSM and GPRS. The CN contains functions for intersystem handover, gateways to other networks and performs location management.



ARCHITECTURAL DIAGRAM OF 3G NETWORK

4G ARCHITECTURE

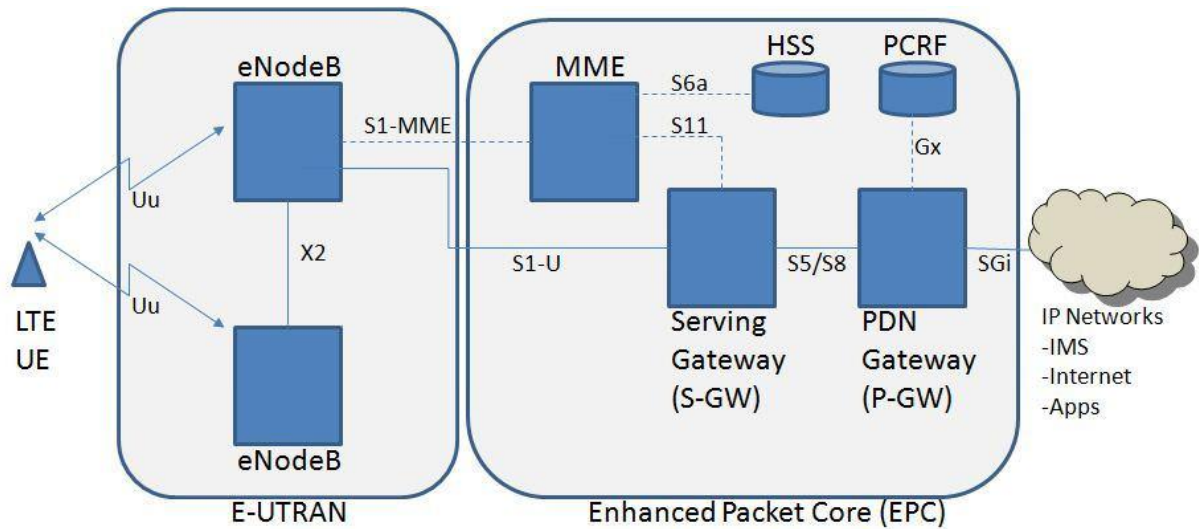
“4g” essentially stands for fourth generation. It works the same way as 3g but faster. It uses high speed download and upload packets. Users can normally access speeds up to 21mb on the go depending on the location. It is essentially a highly advanced radio system. Where masts broadcast signals for 4g to work. 4g is a protocol that sends and receives data in packets, and it is entirely IP based. It works through your devices by communicating with a base station which are the masts. These masts relay data from your device to the internet and vice versa.

Features:

1. Fully IP based Mobile System.
2. It supports interactive multimedia, voice, streaming video, internet and other broadband service.
3. It has better spectrum efficiency.
4. It supports Ad-hoc and multi hop network.

4 G Architecture

1. Figure shows Generic Mobile Communication architecture.
2. 4 G network is an integration of all heterogeneous wireless access networks such as Ad-hoc, cellular, hotspot and satellite radio component.
3. Technologies used in 4 G are smart antennas for multiple input and multiple output (MIMO), IPv6, VoIP, OFDM and Software defined radio (SDR) System.



MME- Mobility Management Entity

It is used for Paging ,Authentication, Handover and Selection of Serving Gateway

SGW- Serving gateway

It is used to Routing and Forwarding user data packet.

PDN-GW Packet Data Network Gateway

It is used for user equipment (UE) IP allocation

HSS -Home Subscriber Server

It is a user Database used for service subscriber, user identification and addressing

PCRF -Policy and Charging Rule Function

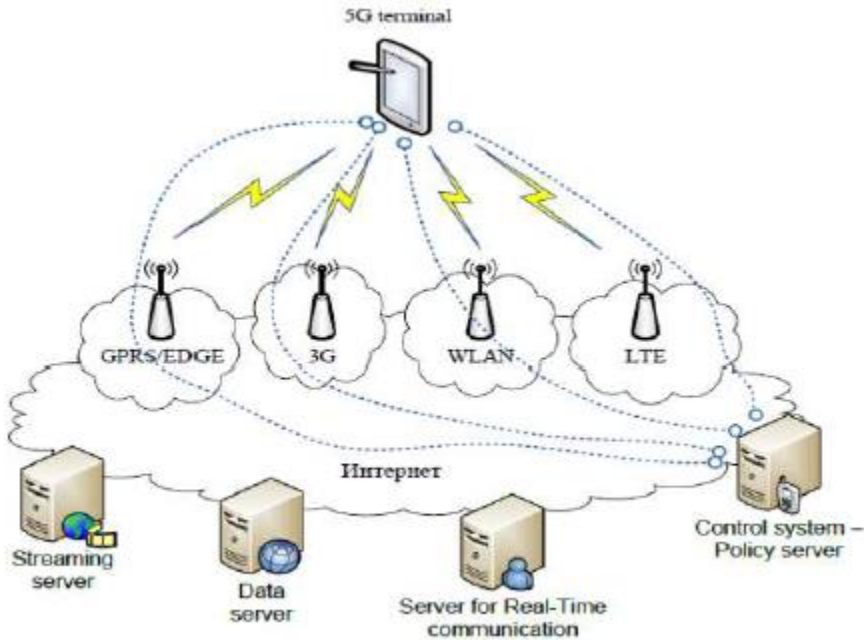
It provide quality of service and charging

eNode B-evolved Node B

It is used as radio resources management and radio bearer control

5G ARCHITECTURE

This is the 5th generation of mobile wireless systems. It integrates perfectly with the internet of things like other cellular networks, 5g uses a system of cell sites that divide their territory into sectors and send encoded data through radio waves. Each cell site must be connected to a network backbone, whether it is wired or wireless connection. It uses a type of encoding called OFDM, which is similar to the encoding 4gLTE uses. The air interface is designed so it has much lower latency and much greater flexibility than LTE.



The figure above shows the system model of 5G is entirely IP based model designed for the wireless and mobile networks.

1b.

	ADVANTAGE	DISADVANTAGE
3G	<ul style="list-style-type: none"> • New radio spectrum to relieve overcrowding in existing systems • Customers can use all facilities bat same time • Works well for data intensive applications 	<ul style="list-style-type: none"> • Power consumption is high • Requires closer base stations which is expensive • 3G has only one carrier option
4G	<ul style="list-style-type: none"> • 4G system is able to provide a comprehensive IP solution where voice, data and images are provided better than 3G • Higher bandwidth • Seamless network of multiple protocol and air interfaces 	<ul style="list-style-type: none"> • New frequencies mean new components in the cell towers • Higher data prices for consumers • Needs complex hardware
5G	<ul style="list-style-type: none"> • Increased Bandwidth for all users • More bandwidth means faster speed 	<ul style="list-style-type: none"> • The radio frequency may become a problem • An increased bandwidth means less coverage

2.

FEATURE	2G	3G	4G	5G
Core network	PSTN	Packet network	Internet	Internet
Web standard	www	www(IPv4)	www(IPv4)	Wwww(IPv6)
Frequency	1.8 Ghz	1.6 – 2 GHz	2 – 8 GHz	3 – 30 GHz
Bandwidth	14.4-64 kbps	2 Mbps	200Mbps-1Gbps	1Gbps and above

3a. NO

3b. The Correlation Between 5G and COVID-19

Since the beginning of the year there have been ongoing conversations about the COVID-19 virus for obvious reasons. Social gatherings have become illegal, airspaces are being shut, countries are on lockdown, and more importantly — people are dying.

What exactly is 5G?

Simply put, 5G is the Fifth generation of wireless network technology.

There are a host of things that qualify 5G as the next generation of this technology, but two of the main distinguishing factors between 5G and 4G are **speed** and **reliability**. At its best, 4G speeds max out at about 100 Megabits per second while 5G is designed to deliver peak data rates of up to 20 Gigabits per second. Almost 200 times the speed of 4G!

How “5G” Technology and other Electromagnetic waves work

When you take apart the speed and reliability of 5G networks, at the end of the day, they are just still (radio frequency) electromagnetic waves.

Without getting into how electromagnetic waves are generated, we know that they are classified into two types based on how powerful they are, lets call these Type 1 and Type 2 electromagnetic waves:

- **Type 1:** On the electromagnetic spectrum, these types of Electromagnetic waves have lower frequencies, are packed with lower energies and consequentially, are relatively less harmful than the type 2 electromagnetic waves. Examples of type 1 waves are ***Radio frequencies***, Infrared waves (remote controls), Visible light and Ultraviolet rays (Rays from the sun).
- **Type 2:** These types of waves have extremely high frequency and power. We know through research these waves cause damage to humans and biological matter. An example of these kind of electromagnetic waves are X-rays and Gamma rays. A lot of us are familiar with X-rays, and it may be a bit difficult to think about how dangerous they are, so it's worth noting that before X-ray scans are carried out, the risk of cell damage to the patient is weighed carefully against the benefit of the diagnostic information obtained before proceeding with the process. and Even at that, a typical X-ray scan only exposes the person to X-rays for very short periods of time.

As a general rule of thumb, how harmful electromagnetic waves are depend on the frequency of the wave (Which loosely translate in their ability to penetrate objects). The lower the frequency, the less harmful it is, and vice versa.

COVID-19

The origins of viruses are still being debated by scientists but two of the many things we know that make them interesting are:

- They are extremely tiny (Billions can fit on the point of a needle) and
- They don't just infect humans; they can infect basically any living organism — from bacteria to horses; seaweed to people.

As far as we know, COVID-19 got transmitted from a Bat to a Pangolin and then to a human. Considering how obsessed we (humans, including us Nigerians) are with Pangolins, the transmission to humans is not difficult to imagine. Viruses jumping from one organism to another was expertly depicted in the 2011 movie; Contagion where we see a virus make its way from Bat to Pig and then to humans.

In summary, COVID-19 and 5G technology are two things that exist at the two ends of completely separate universes. One is a contagious virus that is in no shape or form related to electromagnetic waves and the other is wireless network technology that the WHO has classified as “Possibly carcinogenic” to humans right in the same bucket as caffeine and aloe vera.

Other facts that make this theory nothing more than a conspiracy is the fact that the virus has hit countries like Zambia, Chad, Niger, Mali, etc where 5G isn't even in use yet.

