Review on 3G Technology- UMTS

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Abstract- **Rapid developments in information communications technology have already had a profound influence on in today's generation. The development of information-based communities is posing excellent opportunities and threats for political and economic safety for all places.UMTS is one of the 3G mobile wireless networks that are commonly used throughout the world. Such system has made it easier to use innovative new features like streaming content, mobile games, video conferencing and video conferencing.New communications innovations like UMTS can play a key role in the gradual transition to a knowledge age by giving people with quick, unrestricted access to knowledge and resources from everywhere, at a certain moment.UMTS wireless telecommunications, nevertheless, has been evolving at an even steady pace than its counterpart GSM, plagued by significantly higher cost of producing a platform functional. Many mobile network providers offer services from the UMTS system. The paper gives a detailed overview on UMTS technology, its architecture, and issues.**

Keywords- Advantages of UMTS,Architecture of UMTS, Technologies of UMTS, UMTS.

INTRODUCTION

After, the creation of the 2nd-generation broadband network in early periods has transformed the way of interaction from analogue to digital.People may start utilizing the handheld device to upload ringtones and photos from such a time.It is also possible to submit an "SMS or MMS (Multimedia Messaging Service)."Nonetheless, such system's data speeds are restricted to 14.4 Kbps that is not high enough just to accommodate video content or mobile games requiring good internet connection[1]. The way people use the wireless wireless connection has prompted rapid evolution on such a system.To a great extent, such networks should be focused on the huge success of 2nd-generation modern mobile radio systems, like the" Global System for Mobile Communications (GSM) family."Third-generation devices will be run in all network settings from large cities, mountainous and rugged areas, "microcell, picocell, and indoor" areas to support anybody, anytime wherever. Therefore, international roaming is an important objective to increase economic collaboration nationwide.The radio design must be more bandwidth-efficient than 2nd-generation technologies with regard to the limited spectrum spectrum and necessary multiband facilities.UMTS is the integration of telecommunication systems, information systems and video[2].UMTS produces new ways to generate income and win share of the market for mobile operators, service providers and cable companies.UMTS ' profit is better, more efficient connectivity.UMTS is a suite of radio and network innovations that provide:

• Greater spectrum performance.

• Higher data transfer speeds (up to 2 Mbit / s).

• Nationwide mobility capacity.

• The ability to deliver new interactive applications and services.

• Integration with both static and cellular telecom services.

UMTS is the natural development of GSM as well as other 2nd-generation (2 G) network systems. It offers interdependence with 2 G services and other cellular and satellite-based devices. UMTS offers a different chance to meet the demands of people within the Data System.UMTS, as a dual-national, dual-sector system that encourages multiple standards and transportation innovations, removes obstacles that one place communication difficulties and facilitates the development and distribution of completely customized internet services to both the mainstream market and business users[3].Universal Mobile Telecommunications Network is the descendant of the GSM community of GPRS and EDGE specifications. 3 G UMTS uses a completely different network system based on using "Direct Sequence Spread Spectrum" as CDMA or a Multiple Access Code Section.While 3 G UMTS uses a completely different wireless access system, the core network is like the one used for GPRS and EDGE to handle different speech and packet information transmitted to the network.In addition to voice and data, UMTS can provide video and audio via fixed, cellular, and ground stations to wireless networks anywhere else in the country.The whole network is defined by the Universal Mobile Telecommunications Network[4].Which means it involves cellular phones (and other portable devices), the radio infrastructure required to provide calling and application connection facilities, the network infrastructure for client communications and data transmission, routing algorithms, and safety systems, and others.Because UMTS is based on GSM systems, it benefits from the same regional connectivity features.Virtually all UMTS telephones can shift to GSM format.It ensures that if you use a UMTS Smartphone and back away from a UMTS system and into a GSM network, you can still use the same phone to use cellular networks (provided, for example, which the correct roaming arrangements are in location). The concept of UMTS is explained below in Fig. 1 Concept of UMTS.
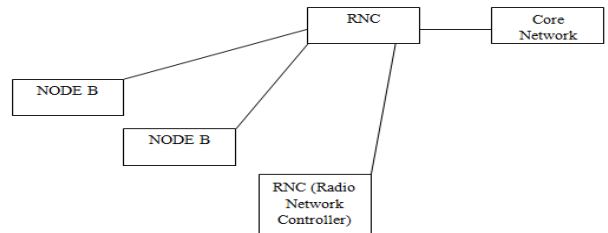

Fig.1: The Figure Portrays the Concept of UMTS

Advantages:

There are many main 3 G UMTS / WCDMA zones. These include many core technologies used to allow UMTS / WCDMA to offer a quality leap over its predecessor of 2G.3 G enables sophisticated technology, digital capabilities & greater network capacity, it encourages a wider range of mobile phones to work on the network, it enables a wider wireless spectrum that supports higher data transfer, and it allows providers to offer 3 G at a lower cost than 2G[5].This allows place-based services such as cellular weather forecasts, but, it is simpler for operators, due to high cost of 3 G system deployment, 3 G technology allows voice calls, corporate conferences among towns, countries and nations.Picture communication enables visual display of goods, progress or issues, apps that are more information-intensive can be created and used, 3 G technology helps citizens consume art, images and videos with simplicity and create a larger and much more world market in ads for all those sectors.This offers access which is always in use, ensuring that your internet access is always accessible whenever you are prepared to be used, the connection is packet-based, so that you only pay for the internet access if you use it to send data packet like emails or browsing the web.Entrepreneurs with 3 G mobile phones can fly without buying or renting new devices due to the 3 G system, bandwidth is the indicator of transmitting power, higher connectivity provides immediate access to all your favourite entertainment and web devices, like you were at home on your desktop and it's one of the 3 G sales factors[6].The high-speed access allows mobile phone consumers to use teleconferencing, surf the internet, and interact with each other via social networks and easily access content, as well as utilizing all 2 G software with the exception of greater throughput.Many Providers provide you with 3 G data certificates & 3 G routers to

provide your desktop Computer with big-speed Internet connectivity, if you have a connection with your ISP, you can easily plug your data card into your PC or attach the 3 G router to your computer through one of the Connectors.

UMTS ARCHITECTURE

Inside the UMTS framework there are a variety of practical system modules with their own features, and the system modules are grouped in the "CN (Core Network), UTRAN (Universal Terrestrial Radio Access Network) and UE (User Equipment)."All the features connected with radio are handled by "UTRAN while the CN "transfers cells and cellular networks and routes them to external networks (Public Switched Telephone Network, Unified Digital Communications Network, Internet, etc.); the UE serves as the radio used for radio communication over the Uu interface ("air interfaces using WCDMA technology").The "UTRAN" consists of "RNCs" (Radio Network Controllers) and Bs nodes (equivalent to GSM's Base Transceiver Station) in the middle of Iu (architectures carrying word or information) and Uu[7].The RNC is a conceptual point within the RNS (Radio Network Subsystem) with the purpose of controlling the use and credibility of radio redress, whereas the RNS establishes the link between "UE and UTRAN".The UE, which are usually mobile apps such as hand-held tablets, can thus use the UMTS network service provided by Uu interfaces.The UMTS infrastructure can be developed by updating the prior wireless system named GSM (Global Mobile Communication Network) which has the service GPRS. The various components of UMTS are-

Core Network:

Circuit Switched Core Network- Contains elements enabling loop links transferred to. Circuit-switched links are communications where the user uses the loop in complete exclusive way until the link is published. CSCN R99 features include-

Mobile services Switching Center (MSC)- MSC is the gateway between the Radio Access Network and defined stations, offering functionality for "mobility management, call control and switching to support circuit-converted" facilities to and from mobile stations.

Gateway Mobile services Switching Center (GMSC) - The GMSC architectures with specified channels, manages HLR subscriber location data and conducts routing to and from mobile stations. Based on channel setup, the GMSC function can be produced in some or the entire channel MSCs.

Inter Working Function (IWF) -The Inter Working Function offers interworking functionalities between a "Public Land Mobile Network (PLMN)" and defined channels "(such as ISDN, PSTN, and PDN)". The IWF translates the applications used in the PLMN to the standards used for the correct defined system.

Packet-Switched Core Network (PSCN) -It contains elements promoting packet switching processing. Packet switching software transports user information messages separately of one another. No specific loop is set up. Each message can be sent through different tracks based on the appropriate computing resources.

Serving GPRS Support Node (SGSN) -The SGSN and GGSN are the interface components between the Radio Access Network and defined channels. To facilitate the transmission of packet-switched internet services, the SGSN offers mobilities management, session management and transmission and routing features.

Gateway GPRS Support Node (GGSN) -The GGSN manages information about user locations and offers packet data transmission functionality to and from cellular devices.

Border Gateway (BG) -The Border Gateway offers networking and interworking and commuting functionality for two separate "PLMNs". Components being used by the "CSCN and PSCN" are standardized testing system components.

Home Location Register (HLR) -The HLR is the definitive repository for phone location information, and the HLR is responsible for managing mobile subscribers.

Visitor Location Register (VLR) -The "VLR" handles phone users in the PLMN home and those in an international LMN commuting operation. The "VLR" shares data with the "HLR".

Authentication Center (AuC) -The AuC offers Device Safety verification and authorization features.

Equipment Identity Register (EIR) -The EIR records identification details for mobile devices. SMS MSCs allow texts to be transmitted between the "SMS Center and the PLMN."

MSC Server- The Mobile Switching Center server offers call control and mobility management functionalities for an MSC. It also keeps data about the subscription service and offers network channel access power in a CS-MGW.

GMSC server- The GMSC server offers a GMSC interface for "call control and mobility management."It is a specific type of MSC used to direct communications beyond the mobile network. Each time a request for a mobile user arrives from outside the cellular network or the user wishes to make a request to someone outside the cellular network, the message is redirected via the Gateway Mobile Switching Center.

Circuit-Switched-Media Gateway (CS-MGW) -The CS-MGW is a Universal Terrestrial Radio Access Network and Core Network client. The CS-MGW assists all media of UMTS and of GSM. CS-MGW ends the bearer networks from circuit-converted networks and from packet-network information sources. The Architecture of UMTS is shown below in Fig. 2 Architecture of UMTS
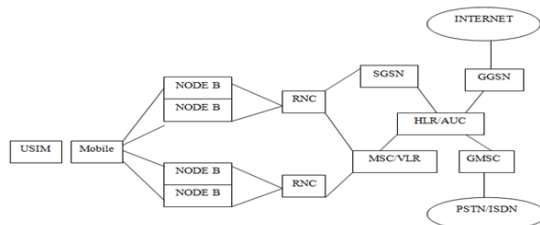

Fig.2: The Figure Portrays the Architecture of UMTS

UMTS TECHNOLOGY

The biggest technical distinction between 2 G and 3 G networks is the modern multiple access strategy that improves bandwidth and reliability within the Radio Access Network (RAN). Such technology is called "multiple access code division (CDMA)".

Wideband Code Division Multiple Access (WCDMA) - WCDMA efficiently splits the usable air interface wireless spectrum into a number of platforms and determines how all these networks are assigned to the many applications who use the system. WCDMA permits adjustable bit levels and adjustable quality service variables[8].When WCDMA's mobile coverage grows, it enables WCDMA channels to hold a larger share of wireless broadband traffic. WCDMA technology allows the user with some benefits in that it allows information, but also enhances core speech.A WCDMA system requires precise power monitoring to solve the "near-far" issue.A high-powered signal near the base point (Node B) overpowers the other cell phone transmissions that are too far away.The aim of "power control in WCDMA" is to have the transmissions from all User Equipment reaching with the same energy level at the ground station.If the sender is near to the receiver it needs less energy. If the emitter is farther away, it takes more energy.Open-loop power management is dependent on the amount of the UE level of power and the Node B power level. The two power output has to stay static[9].In other terms, if node B gives the UE a clear data transmission message, then the User Equipment will speak small.Closed loop power control is quite easy. WCDMA devices have less power requirements due to various power controls which ensure they can accommodate smaller, lighter, bigger-life batteries. Rake collector In UMTS, a rake collector is introduced in the UEs and antennas.A Rake receiver can concurrently interpret multiple messages and merge them to boost the signal attenuation even at the same time to access multiple utilities.The 10 intensity of a signal will reduce in radio transmissions for many purposes.Natural barriers such as structures and mountains trigger distortion, refraction and dispersion.Multipath transmission thus exists which ensures the very same transmitter appears at the receptor via various transmitted routes. The Rake converter uses WCDMA's intrinsic bandwidth range features as a way of providing stability within the channel.Even though the message is distributed over a broad frequency range, it is broadcast and obtained at two or more wavelengths concurrently. The Rake receiver recognizes the various routes the signal follows and integrates these to enhance signal attenuation.WCDMA will add a lot of unlimited text messaging to consumers. While WCDMA can also boost mobile phone service with AMR codec, which

obviously offers greater voice quality than traditional fixed line telephones. In brief, WCDMA can offer more minutes and texts with higher quality. WCDMA enables synchronized mobile broadband, for instance when voice video calls or social networking in real-time during video calls, to surfing or emails.Because of the wireless network, the high penetration rate in the WCDMA is attained: a huge number of users served by the provider, and less radiofrequency (RF) providers are needed to provide power.The WCDMA Technology is explained below in Fig. 3 WCDMA
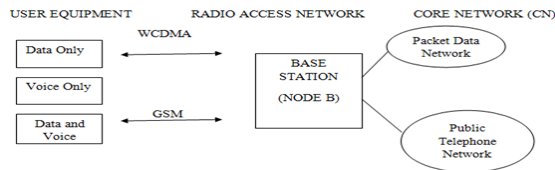

Fig.3: The Figure Portrays the WCDMA Technology

Asynchronous transfer mode (ATM) -UMTS utilizes ATM in the RAN for secure digital data transmission. ATM is selected as the transmission software in "UMTS Radio Access Networks" because it embraces a dual-service system with adjustable bandwidths and the ability to sustain Quality of Service level[10].ATM is also highly efficient making it ideal for linking old systems and LANs and developing WANs on elevated-performance fibre-optic systems.In the context of universal mobile telecommunications system) web access, use of packet-switched communication (ATM for the first program launch) and the multi service essence of the data to be transported; the difficulty of the method of dimensioning is increased.

CONCLUSION

Technology never gets out of the path. There's a revolution in scientific and technological, one way or another. Some Cellular innovations such as Global System for Mobile Communication, Universal Mobile Telecommunication Systems, LTE, WiMAX, Wireless Ethernet and Ethernet have transformed the way people connect and securely connect by having networks such as telecommunications and the Web immediately available and from nearly everywhere. UMTS, the 3G cellular telecommunications system, is becoming a digital

platform offering larger data levels for broadband access that allows UMTS system consumers to use sophisticated application forms and music streaming functionality from multiple devices.UMTS system design can also be generated by updating the current GSM architecture. Universal Mobile Telecommunication Service is one of third Generation mobile broadband networks commonly utilized worldwide.A certain system has made use of sophisticated digital functionality like video streaming, online services, teleconferencing, and text messaging possible.Security plays an important role in UMTS, like monitoring one's location via gps, and of necessity costly. One of biggest concerns about 4 G is that this will suffer from severe disruption from multipath primary transmissions bouncing off other artifacts due to high bandwidth level.

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