

# 5G THE NANOCORE''

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## Abstract

*Telecommunications is the growth Engine of the modern science & technology. Mobile network infrastructures are being deployed at a rapid pace around the globe, with the capabilities and bandwidth to finally deliver human needs as per the requirement. Mobile broadband is becoming a reality, as the internet generation grows accustomed to having broadband access wherever they go and not just at home or in the office. Of the estimated 3.4 billion people who will have broadband by 2014, about 80 percent will be mobile broadband subscribers and the majority will be served by High Speed Packet Access (HSPA) and Long Term Evolution (LTE) networks. There is strong evidence supporting predictions of increased mobile broadband usage.*

*This paper will show a personal view on 5G networks, especially for Operators & services providers. The document has been separated in to 4 parts. Which deals with Evolution of Wireless technology, Latest 4G trends, Need for 5G? 5G-The NanoCore depiction.*

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## **Introduction:**

### **What is 5G Technology**

5G Technology stands for 5th Generation Mobile technology. 5G mobile technology has changed the means to use cell phones within very high bandwidth. User never experienced ever before such a high value technology. Nowadays mobile users have much awareness of the cell phone (mobile) technology. The 5G technologies include all type of advanced features which makes 5G mobile technology most powerful and in huge demand in near future.

The gigantic array of innovative technology being built into new cell phones is stunning. 5G technology which is on hand held phone offering more power and features than at least 1000 lunar modules. A user can also hook their 5G technology cell phone with their Laptop to get broadband internet access. 5G technology including camera, MP3 recording, video player, large phone memory, dialing speed, audio player and much more you never imagine. For children rocking fun Bluetooth technology and Piconets has become in market.

**What 5G Technology offers:** 5G technology going to be a new mobile revolution in mobile market. Through 5G technology now you can use worldwide cellular phones and this technology also strike the china mobile market and a user being proficient to get access to Germany phone as a local phone. With the coming out of cell phone alike to PDA now your whole office in your finger tips or in your phone. 5G technology has extraordinary data capabilities and has ability to tie together unrestricted call volumes and infinite data broadcast within latest mobile operating system. 5G technology has a bright future because it can handle best technologies and offer priceless handset to their customers. May be in coming days 5G

technology takes over the world market. 5G Technologies have an extraordinary capability to support Software and Consultancy. The Router and switch technology used in 5G network providing high connectivity. The 5G technology distributes internet access to nodes within the building and can be deployed with union of wired or wireless network connections. The current trend of 5G technology has a glowing future

### **Features of 5G Technology:**

- 5G technology offer high resolution for crazy cell phone user and bi-directional large bandwidth shaping.
- The advanced billing interfaces of 5G technology makes it more attractive and effective.
- 5G technology also providing subscriber supervision tools for fast action.
- The high quality services of 5G technology based on Policy to avoid error.
- 5G technology is providing large broadcasting of data in Gigabit which supporting almost 65,000 connections.
- 5G technology offer transporter class gateway with unparalleled consistency.
- The traffic statistics by 5G technology makes it more accurate.
- Through remote management offered by 5G technology a user can get better and fast solution.
- The remote diagnostics also a great feature of 5G technology.
- The 5G technology is providing up to 25 Mbps connectivity speed.

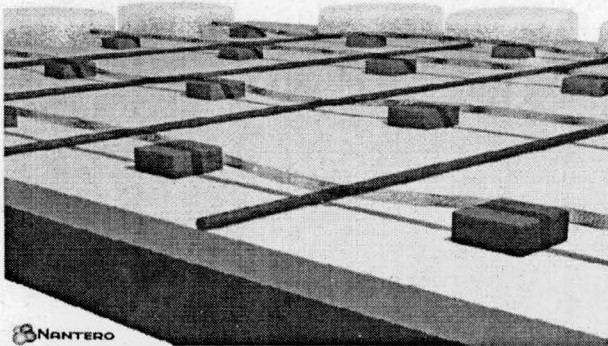
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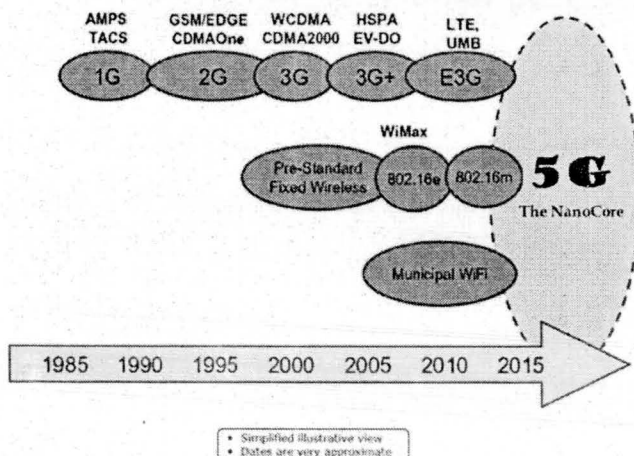
- The 5G technology also support virtual private network.
- The new 5G technology will take all delivery service out of business prospect
- The uploading and downloading speed of 5G technology touching the peak.
- The 5G technology network offering enhanced and available connectivity just about the world

A new revolution of 5G technology is about to begin because 5G technology going to give tough completion to normal computer and laptops whose marketplace value will be effected. There are lots of improvements from 1G, 2G, 3G, and 4G to 5G in the world of telecommunications. The new coming 5G technology is available in the market in affordable rates, high peak future and much reliability than its preceding technologies.

**Evolution Of Wireless Technology:**



Evolution of Wireless Technologies: In 1895, Guglielmo Marconi opened the way for modern wireless communications by transmitting the three-dot Morse code for the letter „S? over a distance of three kilometers using electromagnetic waves. From this beginning, wireless communications has developed into a key element of modern society. From satellite transmission, radio and television broadcasting to the now ubiquitous mobile telephone, wireless communications has revolutionized the way societies function. The evolution of wireless begins here.



The 1st generation was pioneered in early 1980?s. First generation cellular mobile telephones developed around the world using different, incompatible analogue technologies. It support speed up to 2.4kbps. Major contributors were AMPS, NMT, and TACS. In terms of overall connection quality, 1G

compares unfavorably to its successors. It has low capacity, unreliable handoff, poor voice links, and no security at all since voice calls were played back in radio towers, making these calls susceptible to unwanted eavesdropping by third parties.

**2G:**

The 2nd generation was accomplished in later 1990?s. 2G mobile telephones used digital technology. Group Special Mobile (GSM) was first developed in the 1980s and was the first 2G system. Mainly used for Voice communication and supports speed up to 64kbps. Another advantage of 2G over 1G is that the battery life of a 2G handset lasts longer, again due to the lower-powered radio signals. Since it transmitted data through digital signals, 2G also offered additional services such as SMS and e-mail. Major prominent technologies were GSM, CDMA, and IS95.

**2.5G:**

In term "2.5G" usually describes a 2G cellular system combined with General Packet Radio Services (GPRS), or other services not generally found in 2G or 1G networks. A 2.5G system may make use of 2G system infrastructure, but it implements a packet-switched network domain in addition to a circuit-switched domain..It can support data rate up to 144kbps.GPRS, EDGE, & CDMA 2000 were the focal 2.5G technologies. This does not necessarily give 2.5G an advantage over 2G in terms of network speed, because bundling of timeslots is also used for circuit-switched data services (HSCSD).

**3G:**

An attempt to establish an international standard for 3G mobile is being moderated through the ITU, under the auspices of its IMT-2000 program. It was inveterate in late 2000.It provides transmission speed up to 2Mbps. Third generation (3G) services combine high speed mobile access with Internet Protocol (IP)-based services. Apart from transmission speed innovative enhancement was made in Quality of services. Add on services such as global roaming, better voice quality, always on made 3G as a significant generation. In addition to being more expensive, 3G handsets also require more power than most 2G models. The major disadvantage for 3G network plans centers around pricing. Generally, 3G network price points are much higher than 2G networks with comparable features.

**4G:**

Mobile operators face a decision: Their 3G networks will soon be overwhelmed by the amount of data traffic they?re handling. And demand is growing faster and faster as customers become accustomed to "anywhere, anytime" access to the Internet. How can operators expand capacity while continuing to lower operating costs to maintain their margins and keep customers happy? We believe that the future of mobile data services lies with Long-Term Evolution technology, or LTE. Offering vastly improved network performance at just a fraction of the cost of 3G technology, LTE has the capabilities to greatly expand network capacity and offer a large number of customers the ability to access a wide range of high-speed services such as video-on-demand, peer-to-peer file sharing, and complex Web services. At the same time, additional spectrum is becoming available that will enable operators to manage their networks more flexibly, offering greater coverage and better performance for less money.

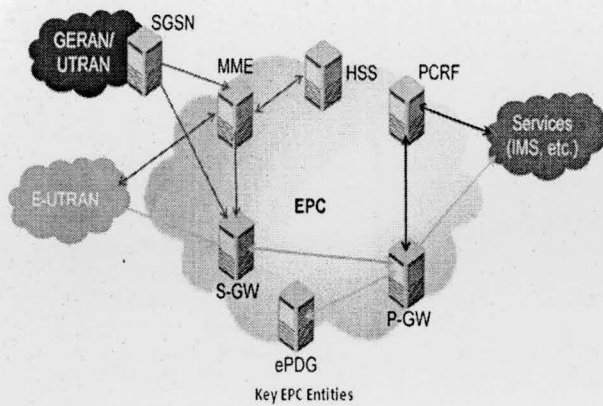
4G usually refers to the successor of the 3G and 2G standards. In fact, the 3GPP is currently standardizing LTE Advanced as future 4G standard. A 4G system may upgrade existing communication networks and is expected to provide a comprehensive and secure IP



based solution where facilities such as voice, data and streamed multimedia will be provided to users on an "Anytime, Anywhere" basis and at much higher data rates compared to previous generations. One common characteristic of the new services to be provided by 4G, is their demanding requirements in terms of QoS. Applications such as wireless broadband access, Multimedia Messaging Service (MMS), video chat, mobile TV, HDTV content and Digital Video Broadcasting (DVB) are being developed to use a 4G network.

**4G Architecture:**

In parallel with the LTE radio access, packet Core networks are also evolving to the flat SAE architecture. This new architecture is designed to optimize network performance, improve cost efficiency and facilitate the uptake of mass market IP-based services. The Evolved Packet Switched System (EPS) provides IP connectivity between a UE and an external packet data network using the Evolved Universal Terrestrial Radio Access Network (E-UTRAN). Consists of an Evolved Packet Core (EPC) and Evolved UTRAN (E-UTRAN). E-UTRAN consists of eNBs, providing the E-UTRA user plane and control plane protocol terminations towards the UE.



The goals for LTE include improving spectral efficiency, lowering costs, improving services, making use of new spectrum and reformed spectrum opportunities, and better integration with other open standards. LTE Advanced Requirements: The requirement specification TR 36.913 has already been approved in TSG-RAN#40. Detailed Technical proposals will be investigated within the working groups. Current agreements on the requirements for LTE Advanced:

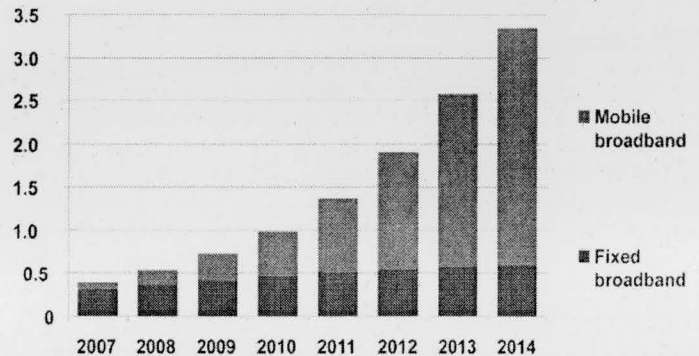
- Peak data rate DL: 1 Gbps, UL: 500 Mbps
- Transmission bandwidth: Wider than approximately 70 MHz in DL and 40 MHz in UL
- Latency: C-plane from Idle (with IP address allocated) to Connected in <50 ms and U plane latency shorter than 5 ms one way in RAN taking into account 30% retransmissions (FFS)
- Cell edge user throughput 2 times higher than that in LTE
- Average user throughput 3 times higher than that in LTE
- Capacity (spectrum efficiency) 3 times higher than that in LTE

- Peak spectrum efficiency DL: 30 bps/Hz, UL: 15 bps/Hz
- Spectrum flexibility: Support of scalable bandwidth and spectrum aggregation
- Mobility: Same as that in LTE
- Coverage should be optimized or deployment in local areas/micro cell environments with ISD up to 1 km
- Backward compatibility and interworking with LTE with 3GPP legacy systems

LTE is not a revolutionary technology, nor is it meant to be. The goal of the technology is to be able to meet the future demand of wireless broadband access, and thus satisfy customer expectations of improved data transmission performance, as well as voice transmission, without having to pay more money. Ultimately, every operator has a choice: Move now to begin the transition to LTE and capture the early cost advantage, or wait until demand rises to the point where LTE investments become necessary.

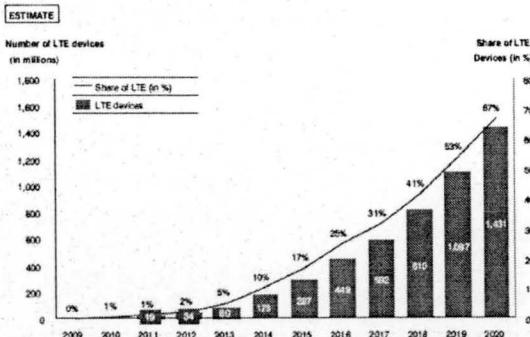
**Need for 5G?**

Mobile broadband is becoming a reality, as the internet generation grows accustomed to having broadband access wherever they go and not just at home or in the office. Of the estimated 3.4 billion people who will have broadband by 2014, about 80 percent will be mobile broadband subscribers and the majority will be served by High Speed Packet Access (HSPA) and Long Term Evolution (LTE) networks. There is strong evidence supporting predictions of increased mobile broadband usage.



**But you might have a uncertainty at this movement (i.e) all the above requirements are expected to be satisfied by LTE advance itself. Then why there is a need for 5G? Yes of course LTE might support peak data rate of DL: 1Gbps, UL: 500Mbps within a scalable bandwidth where the user can gratify his requirement. Inturn LTE advance provides beyond the demand. The actual dilemma starts here As per the present status all over the world WCDMA is commercially launched .Some nations has planned to launch LTE within next quarter. Operator is looking ahead for wide-scale deployment of LTE in 2012. Operators will also find that the timing is right to make the switch because much of the first generation of 3G equipment will need to be upgraded soon. LTE networking equipment and handsets, already under development, will become available in 2010, and should be rolled out in large quantities in Europe by 2012.**

NUMBER OF MOBILE DEVICES SHIPPED WORLDWIDE ANNUALLY  
SHARE OF LTE DEVICES; NUMBER OF LTE DEVICES, 2009-2020



This clearly shows that within 2020 LTE will become the latest trend for wireless communication all over the world. But yet our question remains unanswered. Why there is a need for 5G? Even though LTE provides wide range of growth for present wireless telecommunication. People are not in a circumstance to make use of those benefits in an effective manner. LTE might be rigorously used in Commercial/Industrial areas. But think of a common man who utmost utilize LTE for downloading a movie or make a video call. Fact is that there is no such ground-breaking application exists in real world to be utilized by a common man. You might doubt how this verdict is applicable for current innovative world, where we have enormous splendid real time applications. Concern is that our present wireless telecommunications is bottlenecked to use those applications in an effective manner. This paper mainly focuses on how a 5G network can provide more approach to a common man to utilize his available possessions in an immense way to make him to feel the real progress.

While considering a 5G network now it is very obvious that the access network is almost freeze and there will not be any further modification. Current OFDMA is appropriate for at least next half a century. Then what could be the amendment for 5G? Furthermore their won't be any alter in the wireless infrastructure as it happened from 1G to 4G instead there could be add-on application or up gradation done at the core network to satisfy customer needs. This will make the operators/Service providers to sense preminent to migrate for a 5G as soon as possible once 4G is commercially deployed. While considering a smooth migration for 5G it is apparent that it should be valid for all sorts of radio access technologies. So that it could make better revenue for current global operators as well as interoperability will become more feasible. To make 5G practical for all sorts of radio access technologies there should be a common platform unique for all the technologies. One of those unique platforms is Flat IP network.

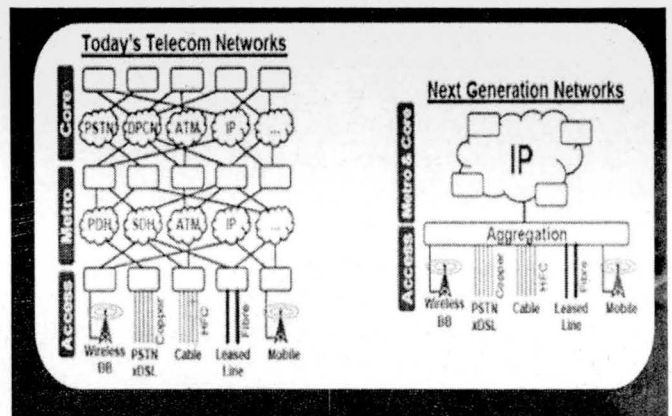
**Flat IP network:**

Certainly Flat IP network is the key concept to make 5G acceptable for all kind of technologies. To meet customer demand for real-time data applications delivered over mobile broadband networks, wireless operators are turning to flat IP network architectures. Flat IP architecture provides a way to identify devices using symbolic names, unlike the hierarchical architecture such as that used in "normal" IP addresses. This is of more interest to mobile broadband network operators.

With the shift to flat IP architectures, mobile operators can:

- Reduce the number of network elements in the data path to lower operations costs and capital expenditure
- Partially decouple the cost of delivering service from the volume of data transmitted to align infrastructure capabilities with emerging application requirements
- Minimize system latency and enable applications with a lower tolerance for delay; upcoming latency enhancements on the radio link can also be fully realized
- Evolve radio access and packet core networks independently of each other to a greater extent than in the past, creating greater flexibility in network planning and deployment
- Develop a flexible core network that can serve as the basis for service innovation across both mobile and generic IP access networks
- Create a platform that will enable mobile broadband operators to be competitive, from a price/performance perspective, with wired networks

Flat network architecture removes that voice-centric hierarchy from the network. Instead of overlaying a packet data core on the voice network, separate and much-simplified data architecture can be implemented that removes the multiple elements from the network chain. But with the advantages of IP come some dangers - The Internet is open not just to well-meaning developers but also to all manner of criminals and vandals, and our always-on DSL connections bring us not only voice and video, but also viruses, along with phishing attacks and Trojan horses. That's why the developers of the next generation of mobile networks are trying to build security in from the start. 5G networks make use of this flat IP concept to make it easier for different RAN to upgrade in to a single NanoCore network. Our 5G network uses Nanotechnology as defensive tool for security concern that arises due to flat IP. The fore coming sessions will deal how a NanoCore acts as a global server for prevailing 5G networks. And what all the technologies incorporated in it to craft it as a global server.



**Applications**

- If you can able to feel yours kid stroke when she/he is in her mother's wombs
- If you can able to charge your mobile using your own heart beat.
- If you can able to perceive your grandmother sugar level with your mobile.
- If you can able to know the exact time of your child

birth that too In Nano seconds.

- If your mobile rings according to your mood.
- If you can Vote from your mobile.
- If you can get an alert from your mobile when someone opens your intelligent car.
- If you can able to view your residence in your mobile when someone enters.
- If you can able to locate your child when she/he is unfortunately missed.
- If you can able to pay all your bills in a single payment with your mobile.
- If you can able to sense Tsunami/earthquake before it occurs.
- If you can able to visualize lively all planets and Universe.
- If you can able to navigate a Train for which you are waiting.
- If you can get the share value lively.
- If you can lock your Laptop, car, Bike using your mobile when you forgot to do so.
- If you're mobile can share your work load.
- If you're mobile can identify the best server.
- If you're mobile can perform Radio resource management.
- If your mobile can intimate you before the call drops.
- If your mobile phone get cleaned by its own.
- If you can able to fold your mobile as per your desire.
- If you can able to expand your coverage using your mobile phones.
- If you can able identify your stolen mobile with nanoseconds.
- If you can able to access your office desktop by being at your bedroom.
- If you're mobile can able to suggest you possible medicine as per your healthiness.
- If you're mobile can able to calculate approximate Hike.
- If you're mobile can estimate the quality of your new build house.
- If you're mobile can able to provide recent worth on products using its barcode.

**in different fields creating future concepts of mobile communication, Internet services, Cloud computing, All IP network, and Nanotechnologies. We conclude that it is a great time to invest in startups. As in evolution and the explosion, many will become extinct. But some will change the world. So we pursue the strategy of a diversified portfolio.**

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#### **Conclusion:**

While the future is becoming more difficult to predict with each passing year, we should expect an accelerating pace of technological change. We conclude that nanotechnology, Cloud computing, All IP are the next great technology wave and the next phase of Moore's Law. NanoCore innovations enable Myriad disruptive businesses those were not possible before, driven by entrepreneurship. We hope that this Paper helps to promote stronger links between people working