Fundamental of 5G Network and Beyond wireless Communication

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ABSTRACT

5G wireless networks will aspect new contests, as well as growing claim on network capacity to support a huge number of devices running applications necessitating high data rates and always-on connectivity, hugely and supportive of the emerging business models in the wireless network market demanding networks to be more open. New challenges initiate new resolutions and involve changed plans in the network positioning, management, and operation of future 5G wireless networks equated to those of current wireless networks. One of the key purposes of 5G wireless networks is to compliantly provide service-customized networks to a wide service using integrated cloud reserve and wireless, which may be presented by several infrastructure providers or operators.

Keywords: 5G, Network, Wireless, Telecom

INTRODUCTION

5th Generation enables a new kind of network that is designed to connect virtually everything. 5G Technology contribute the services in Manufacturing, electronic communications & including all the objects and devices. As the buyer become more & more aware with the mobile technology. The aim of a 5G based telecommunication network would perfectly answer the challenges that a 4G prototypical would present once it has entered ever-present use. 5G is a once breakthrough with the potential to transform every aspect of this fully networked economy. 5G build a one network with multiple Industries it's a global development and global standard in the technology evolution.

WHAT IS 5G?

5G is the foundation for efficient technology in the industries & society. It meant to provide high delivery of data speed in multi-GBPS, multi domain Performance, Flexibility, robustness etc. 5G is a one network with multiple industries, it's a common network platform with dynamic & secure network slices. Users require unlimited access to information & services, anytime &

anywhere. 5G provides broadband experience from everywhere at any time, massive machine type of communication.

ENHANCED MOBILE BROADBAND

- Upto 10Gpbs data rate range between 10 to 100x improvement speed over 4.5G Network.

- Gigabytes in a second

- Ultra-reliable 3D video with UHD Screen

- Voice Communication

- Virtually work & play in the cloud

- Industry automation & Self Driving car

- E-health facility in the form of critical application
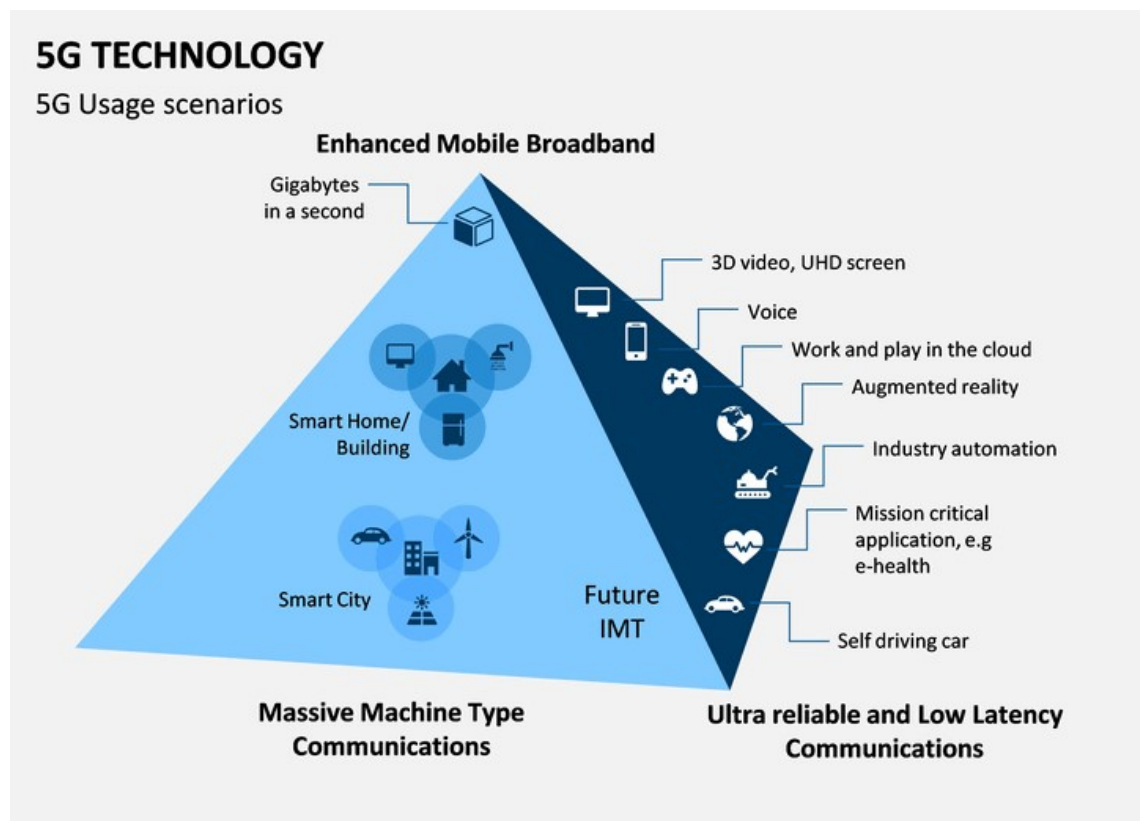
What impact will it bring to consumers?

1. **Potential Consumer expectations.**

2. **IoT increased abilities of troubleshoot.**

3. **Low latency & fast speed (10 Gbps)**

4. **Interconnected devices, sensors & systems**

5. **Industrial Digitalization**

EVOLUTION OF 5G TECHNOLOGY:

Over the last 40 years, the world has witnessed four generations of mobile communication and now fifth generation roll out started. The main aim to deliver new level of performance & efficiency to enhance today's mobile broad band services & also expand mobile network to be a unifying connectivity fabric for a wide range of use cases. It driven to the world leading research together with industry & Academia. Tracking record in digitalization of industries.

The transition to 5G will transform our lives, our economy, our private or public jobs, our industries as evidence of early signs develops each day.

- ❖ *Wearables* such as cellular smart watches or connected glasses are evolving to become self-contained mobile computing devices.

- ❖ *Autonomous vehicle* one of the most highly anticipated 5G technologies, are expected to help us reclaim commute time for new activities in our lives.

- ❖ *Health Sector* is changing as services like remote monitoring and Telemedicine provide new opportunities for care.

- ❖ *Drones & GPS trackers* will be used for transportation, surveillance and rescue operations.

- ❖ *Robots and Artificial Intelligence* (AI) will create new dynamics for both humans and machines.

- ❖ *Cellular to Everything* connectivity expected to save lives and increase transportation efficiency.

- ❖ *Automated end-to-end manufacturing* processes enabled by 5G connectivity.

5G Migration Path

Non-Standalone Architecture enables Smooth Migration to 5G
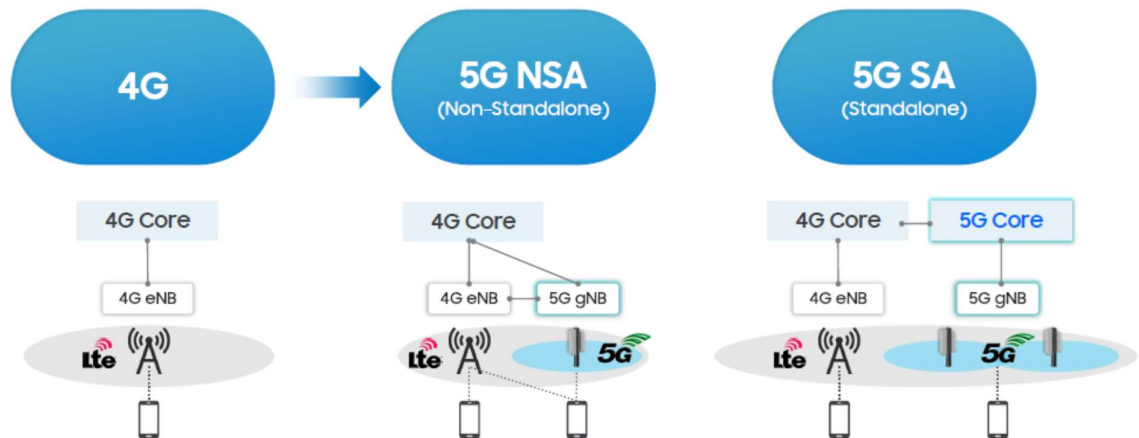
APPLICATION OF 5G:

1. **5G IoT in smart city Infrastructure & Traffic Management:** Network availability will be everywhere in the society with inclusion o creativity & training system. IoT in the smart city provides Quality of life, environmental effect in sustainable & resource management, Open data infrastructure administration online services, productive towards economy, mobility infrastructure & technology with efficient transport.

2. **Augment reality & Virtual reality:** Augment reality puts virtual things into users real world augmenting them. Augment reality is the combination of 25% of virtual & 75% real. Virtual reality puts users inside virtual worlds immersing them. Virtual reality is the combination of the 75% of virtual & 25% of real.

3. **5G Iot applications for Drones:** Integration & interoperability between 5G network providers drone operators. Safe operations & trials ensured by dedicated airbus services provided by robot's exports. 5G network supports the rigorous requirement throughput, capacity, effectiveness & availability of unified design.

4. **Wearable devices with AI capability:** Smart wearable devices market will sustain double digit growth 780M units. By 2022, smart headset devices shipments will take over as the top wearable segments. New wearable devices with AI are innovative & beneficial in Health & safety, intelligence assistants.

VISION OF 5G TECHNOLOGY

1. Massive Capacity & Connectivity packet aggregation with the capacity, scalability and density of 100GbE to the cell site & 100G switching. Flexible bandwidth with centralized segment routing & multiple layer optimization.

2. Communication scenario in the range of 350-500km/hr compared to 250 km/hr in 4G Networks.

3. 10-100 times higher number of connecting devices & user data range e.g. peak data rate of 10 Gbps for low mobility & peak data rate of 1 Gbps for high mobility.

4. A super-fast mobile network comprising the next generation of small cell densely clustered to give a contiguous coverage over at least urban areas & gets the world to the final frontier for true "wide area mobility"

5. 10 times longer battery life from this reduces the app load time to 1-2 sec.

6. 1000 times higher mobile data volume per unit area (1000x challenges)

7. 5G envision to design a real wireless world, that is free from obstacles of the earlier generation.

CONCLUSION

3G also saw the first introduction of mobile communication in irregular range based on the China-developed TD-SCDMA technology based on Time Division Duplex.The later evolution of Long-Term Evolutions has also extended the operation of mobile-communication networks into unlicensed bands.LTE the world has thus converged into a single global technology for mobile communication, used by essentially all mobile-network operators and applicable to both paired and unpaired bands.We are now, and have been for several years, in the fourth generation (4G) era of mobile communication, represented by the LTE technology (Long Term Evolution) forhigher achievable end-user data rates. 5G, or "Fifth Generation" mobile wireless technologies, are projected to be a disruptive force central to the development of the Fourth Industrial Revolution. These sets of technologies are expected to be a major driver for a dizzying array of ground-breaking digital services and changes that will sweep across the world over the next decade. In this digital era of the country technology upgrade day by day with new rebellion in wireless & mobile computing. Technology offers the facilitate potential the evolution of the future growth of the network.

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