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5Th Generation Networks

Depending upon the facilities and technological development, 4 generations of the network have been introduced so far. This include, 1G, 2G, 2.5G, 2.75G, 3G and 4G. Starting from analogous form of communication through PSTN networks, digital wireless networks with gigabytes of downlink and uplink speed, have been introduced. These networks have been using techniques of Time Davison Multiplexing, Frequency Division Multiplexing, Wide Code Division Multiplexing and Orthogonal Frequency Division Multiplexing. These generations have so fat optimized wireless communication to the extent that video telephony, cloud computing and HD Displays are finally a reality.

Owing to these very generations, next generation networks and technologies have also been developed and researched. Software defined networking and cloud at edge are some of such applications. Software defined networking has been able to revolutionize the conventional manual network maintenance into an automated and centralized system. Similarly, cloud at edge has also allowed users to have cloud services at their door step. However, due to the limited bandwidths and other issues like latency and delay etc., these technologies cannot be cherished to their fullest.

As implementation of every generation has led to research on the next generation, so, similarly, 5G research also started with the launch of 4G. 5th generation is on its verge of being launched in

some countries and by 2020 it is expected to be used as commonly as 3G and 4G networks. 5G is almost similar in its services to 4G and 3G with the exception that it is able to provide increased bandwidth with reduced latency, delay and distortions during communication. 3G and 4G have been providing services of IP telephony and video conferencing but due to extreme latency issues, these services are hindered for the user experience and service quality. (Gemalto) Similarly, Internet of things is another technology that has already been introduced and is being used for the communication of devices. However, technology has to make certain trade offs of quality for its provision. In this regard, 5G is expected to solve this service issue through the increased bandwidth of about 10Gbps downlink speed, decreased latency and almost no distortions. (Gemalto)

5Th Generation technology:

5G is going to use multiplexing technologies which are a mix and match of old techniques. This would include, LAS-CDMA (Large Area Synchronized Code Division Multiplexing), MC-CDMA (Multi Carrier CMDA), OFDM, Network LDMS and IPv6. (Patil, 2014)All these multiplexing technologies are focused on provision of high data rate with almost nil interference, delay and power issue.

5G is basically based on the concept of All-Cloud service point of view where cloud-Radio Access Network (Cloud RAN) could be used for the provision of services and connection of devices. Cloud RAN is a communication method in which all of the services that are required to be accessed by the user. (Huawie, 2016)Are present on the cloud. These services are then accessed via a radio link to the service provider. Cloud service is most probably cloud at edge, meaning that it would be close to user premises, so that a radio link may be established. This

would allow dedicated connection and high data rate facilities with reduced latency due to direct communication.

Moreover, it would allow a single network to be divided in such a way that it may become able to handle many services simultaneously. Unlike today's network, where each equipment and network is dedicated to some certain operations only, these networks would be at much smaller scale, yet they would be optimized to handle on demand configuration of the network through separation of controls and users. This would in turn cause reduction on cost of service and operation and maintenance services.

5G is described to be divided into three main sections which include, Enhanced Mobile Broadband (eMBB), Massive Machine type communication (mMTC) and Ultra reliable and low latency communication (uRLLC). (Huawie, 2016) All these services are aimed to be provided with the bandwidth of 10Gbps, 1ms Latency, 1000 time bandwidth per unit area, 99.999% availability, 100% of coverage, 90% reduction in network energy usage and more than 10 years of device battery lives. (Gemalto)

Enhanced mobile broad band is related to the common user services which mainly include mobile services and local premises connectivity. These services include high definitions video at live streaming, augmented reality and virtual reality. These applications are included as the routine resources that would be accessed by users so, they should be seamless and robust.

Ultra-reliable and low latency communication is mainly commercially centered and includes services that would be used as highly sophisticated tools by users. This may include autonomous connected vehicles, remote management and software defined networking etc. owing to the

sophistication of applications, this sector would demand extra precision and efficiency of services.

Massive machine type communication is a new innovation of 5G which has not been introduced practically yet. Video streaming and video conferencing and SDN services are already implemented at commercial level, however smart city is still in its research level and has not yet been made available to the customers due to the real time constraints it has to face. Here, IoT and cloud at edge applications would be implemented as a service to practically implement idea of smart city and advanced global village.

Opportunities and business ventures through 5G:

It is expected that IT business sector would get a major boast due to 5G and opportunities would be created through introduction of smart gadgets and tools of operations. Owing to the fact that 5G is focused on providing services of smart city and industrialized services, business opportunities created would also revolve around the emerging technologies that require 5G for their better user experience and enhanced services.

First of all, IoT would become the most popular business venture in which services of device communication would be focused to add extra value. At the moment, IoT is only confined to the industrial sector but after advent of 5G it would be household application and IT businesses would be able to create new ventures out of it. In this regard, industrial sector of large businesses would gain more advantage, as, IoT is mainly large scale oriented. At the small scale, 5G services for enhanced downlink and uplink speed and low latency would be used to create mobile applications and so, application and web development business would get a boast.

As, with the introduction of 3G, video calling applications got better opportunity for businesses, similarly, 5G would allow cloud computing technologies to grow better. 5G is all about enhanced network services, direct access to applications and virtualization of technological tools. Although cloud computing is still being used at a wide level, yet it is confined to leased services from large organizations like Google and Apple etc. one cannot directly access their cloud storage servers and have to use internet platform. 5G, in this regard, would allow services like cloud at edge to be introduced at a wider level.

At the mobile service level, connection providers would be able to provide better calling services, increased connectivity and real time communication between users which allow users to have decreased battery timing issues, lost connections, unavailability of services and expensive coverage of broadband network.

Automated vehicles is another concept which still needs to be commercialized and latency issues are hindering its way to popularity. 5G would make these automated cars, a commercialized reality where vehicles and even robotics could be remotely operated via 5G services. As this technology requires that a strong and uninterrupted communication stays established between the vehicle and connection provider, so, 5G would allow to fulfill this need of uninterrupted string end to end communication.

Overall, industrial sector would get a major boast where they would be allowed to create new technological ventures. Up till now, only value that is being added to IT services, is of better user experience and uninterrupted services, while in future, IT business growth would be around new and latest applications. This in turn would increase employment opportunities in the IT sector where new workers could be employed at fields of robotics, IT, software and computer field.

Constraints of 5 Generation:

5G is said to be the new idea of smart communication and latest trend of sophistication. Services, such as hologram, IP telephony, Internet of Things and Cloud at edge are expected to be provided at the user level rather than just at industrial level.

As the 5G service is being said to be just available soon enough, method and tools of provision of 5G are still a big question mark in front of service providers. So far, there has been no mobile device launched that is 5G compatible, nor there are any networks launched that may practically use IoT services. (Cheng, 2018)

Latest launched mobile phones, such as, IPhone X, Samsung S9 and Lenovo extra, are only able to provide 4G services at maximum, due to which, even after launch of 5G, users would have to wait a long time before they would become able to use it practically. Moreover, IoT seems to be an even farfetched application. No company or business has yet talked about IoT even, resulting in the fact that majority of non-tech audience is not even aware of the terminology. This means that even if 5G gets launched in near future, a long span of time would be required to introduce and publicize it as a life style amongst users.

Another important issue is of network security. As 5G would put almost all communication at broadband level and internet access would become a new reality, so, it would directly increase chances of breaches. Today, only online data can be breached which is present at any online application, however, in future, every asset including cell phones, laptops and sensor devices etc. would be at stake of getting attacked by hackers. If this happens, no application would remain as beneficial as it seems to be.

Conclusion:

5G is no doubt a new way forward that holds potential of bringing things at a whole new level. Companies such as Huawei, Sony Ericson, Sprint and AT&T etc. are working on 5G for its provision to their customers which means that 5G is at the doorstep to be launched.

For a better and expected experience through 5G, providers should focus on knowledged use of 5G with proper security implementations of security on every new service that is going to be introduced through 5G.

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