



5 G Communication- A Study On The Impact Of High Speed Internet Connectivity In India With Special Focus On Education And Gaming Sector

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Abstract: the world is fast moving in terms of technology up gradation recently we have seen the up gradation in wireless connectivity of Internet from LTE to 4G and there has been talks to upgrade to 5G connectivity. Due to high speed connectivity there are many sectors and application who are getting benefitted the best advantage of this technology changes is appreciated by the mobile industry whether the hardware or software [app market] is highly affected. Users are experiencing fast and high speed data connectivity, in this paper the author is going to address the changes and impact of the high speed connectivity in various industry sector with special focus on education and gaming sector, as they are most likely segments where the young India is having the maximum business potential.

Keyword: 5G, High Speed Internet, Education Sector, Gaming Sector, 5G Applications.

I. INTRODUCTION

The technology changes are affecting world’s market and as well as Indian market. Young Indian market is having the maximum potential for the world to do business. In recent years we have witness the technology changes in every field especially in mobile technology and data connectivity. Indian market is flooded with mobile operators and handset manufacturers who are continuously targeting the young Indian market. Apart from their marketing strategy and other things Indian customer is also enjoying the benefits of high speed connectivity like LTE – 4G offered my Reliance Jio, Vodafone and Airtel etc. In this paper the author is addressing the facts regarding the application of 5G communication in Indian scenario keeping in focus on education and gaming sector. These two sectors are connected to the young India and have maximum market potential today and for future too. As the technology is rapidly growing and accepted by these young people many market companies Indian as well MNC’s are targeting these two sectors as their prime target. The Education and Gaming sector is of millions of dollars and continuously growing at the rapid pace, due to the large population base education is basic and primary need and gaming is needed for entertainment purpose. There is another sector which is important that is Healthcare but in this paper the author is having education and gaming sector into prime focus.

II. INDIAN MARKET

The Indian market is one of the biggest market in the world due to its large population base and different kind of the need base. Marketing companies from the world are making their efforts to keep up the pace of demand and supply scenario. They are continuously developing their technology base to better serve the market. In Indian market in past few years Mobile sector has shown drastic improvement in terms of mobile data connectivity, high end mobile devices and data usages.

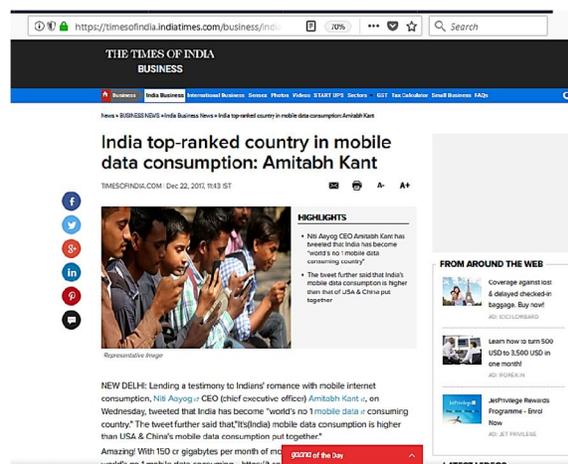


Image 1. Showing India top ranked country in mobile data consumption

Source: <https://timesofindia.indiatimes.com/business/india-business/india-top-ranked-country-in-mobile-data-consumption-amitabh-kant/articleshow/62203927.cms>

III. LARGEST DATA NETWORK

With 100 crore GB of data traffic per month and 200 crore voice and video minutes a day, Jio has become the largest network globally in terms of data carried. “Remember... before Jio, India was 150th in the world in broadband penetration. But, last month... just five months after Jio’s launch...Jio users consumed more than 100 Cr GB of data on the Jio network. That is more than 3.3 Cr GB a day! Today, India is the number one country in the world for mobile data usage. Jio users are today consuming nearly as much data as the USA and 50 per cent more data than China in a clear



indication that India can and will adopt digitization and digital life faster than anyone else in the world," said Ambani.[1]

The above mention facts are the indication of fast growing digital Indian market, becoming Number One from 150th position in data consuming in the world is a strong indication of available market and high adoption to the digital market. The young India is making this possible, indicating that they can fast adapt the changes and the future change is fast and high speed data availability and digital lifestyle.

IV. YOUNG INDIA

Young India and Indian upcoming digital market, people are adopting and accepting digital lifestyle. There are some facts stated below that strength the market potential in near future.

- World's largest youth population
- World's second largest Internet population
- Availability of creative talent
- Huge skills base across IT, Testing and Arts
- World-class infrastructure and advanced technology

As Young nation: India is expected to emerge as the youngest nation in the world by 2025 which will see rise of new generation eager to consume more content related & instant services, driving the demand for better connectivity

•High working population India is expected to have a very high working population by 2025, based on population rise and job opportunities.

•Most of the above are in rural areas and digital connectivity is important to reach out to them and skill & train them.

•Rise of the Middle class - Expected to rise sharply due to rising income levels & job opportunities with better reach of education, which will increase the annual household income. Overall consumption is expected to rise sharply.

•Broadband penetration in India by 2020 – Target 600 Million (NTP 2012)

V. WHAT IS 5G?



Image 2: Showing 5G Logo
http://www.3gpp.org/images/5G-logo_500px.jpg

5G is the 5th generation mobile network. It will take much larger role than previous generations.

5G will elevate the mobile network to not only interconnect people, but also interconnect and control machines, objects, and devices. It will deliver new levels of performance and efficiency that will empower new user experiences and connect new industries.

VI. OTHER GENERATIONS OF MOBILE NETWORKS

The other mobile network generations are 1G, 2G, 3G, and 4G.

- 1G delivered analog voice.
- 2G introduced digital voice (e.g., CDMA).
- 3G brought mobile data (e.g., CDMA2000).
- 4G LTE ushered in the era of mobile Internet.[2]

One of the commonly cited features for 5G is the use of millimeter wave (mmWave) band transmission, which could be the key to unlocking the blazing-fast internet speeds that 5G promises.

VII. WHAT IS MMWAVE TECHNOLOGY? WHY IS IT BETTER?

Cellular technology transmits data over radio waves, which depending on the type of electromagnetic signal is measured as a different frequency. The higher the frequency, the smaller the wavelength, so millimeter wave technology refers to signals with a wavelength that's measured in millimeters, and is generally defined as between 30 GHz and 300 GHz. For 5G, the FCC has already made available swaths of the spectrum in the millimeter wave range for both licensed and unlicensed use as of last summer for companies to begin exploring 5G options (specifically, licensed use in the 28 GHz, 37 GHz, and 39 GHz bands, unlicensed use in the 64-71 GHz band, and shared access in the 37-37.6 GHz band).

"Millimeter wave technology promises higher data capacity than we currently have now"

Why do we care? Because millimeter wave technology promises higher data capacity than we currently have now. A simplified rule of thumb to go by is the higher the frequency, the more data it can transmit. So, FM radio, which transmits just audio, typically broadcasts at between 87.5 to 108.0 MHz, and LTE — which is responsible for far larger data — streams between 700 MHz to 2,100 MHz (i.e., 2.1 GHz). Millimeter wave technology would offer the bandwidth for orders of magnitude of improvement over LTE. We've already even seen commercial use of millimeter wave technology in things like the Starry Beam. (This trend continues up the electromagnetic spectrum into visible light, which has a frequency between 430-770 THz — that's up to 770,000 GHz — which is one of the reasons why fiber optic technology is so fast.)

Another advantage to the shorter wavelengths found in millimeter wave technology is that antennas used to transmit and receive the signals can be made comparably smaller. That means that phones that use millimeter wave technology could take advantage of multiple antennas for different millimeter wave bands in a single device, which could result in a more efficient use of the available spectrum and faster internet when multiple users are connected.



Millimeter wave technology comes with its own challenges, however. With higher frequencies comes shorter transmission ranges, and shorter wavelengths tend to experience greater issues when there's no direct line of sight, along with interference from walls, buildings, window panes, and even raindrops. Whereas older radio and cellular technology were able to rely on a comparatively smaller amount of larger antenna towers, millimeter wave would need lots of smaller antennas peppered around cities and countries to function well. Its technological issues like these that the early 5G tests will be looking to explore and solve.[3]



Image 3: Showing Generation of Mobile Communication from LTE version to 5G
[https://cdn.vox-cdn.com/thumbor/GWJeSZdEqU7odqGYnn5i4xRU5Hs=/800x0/filters:no_upscale\(\)/cdn.vox-cdn.com/uploads/chorus_asset/file/7952773/LTE_logos.png](https://cdn.vox-cdn.com/thumbor/GWJeSZdEqU7odqGYnn5i4xRU5Hs=/800x0/filters:no_upscale()/cdn.vox-cdn.com/uploads/chorus_asset/file/7952773/LTE_logos.png)

There could be 'n' number of applications older one get faster reflexes and users can download and upload their content in few seconds or minutes which earlier takes hours, data becomes secure and the costing will be lower than previous generations of mobile communication technologies.

VIII. FOLLOWING ARE SOME FEATURES OF THE FIFTH GENERATION OF MOBILE COMMUNICATION.

Increased data volume: 1,000x increase over current levels. This means it will be possible for many people and devices, sending large files, to transact across a wireless connection without performance impact.

Low latency: 5x reduction in transit time. The low-latency requirement of as little as 1ms (in certain cases) end-to-end round trip is intended to enable real-time control applications to run across the 5G network. Some have identified a round trip of 5ms as a goal.

Faster data-transfer speed: 10-100x higher speeds. Improvements in bandwidth have characterized every new generation of wireless networks. The goal of 5G is to support 1-10Gbps connections to endpoints in the field.

More devices: 10-100x devices. 5G intends to increase the number supported in a given area by a factor of between 10x and 100x (thereby enabling IoT) – sometimes stated as one million devices per square kilometer – with devices able to travel at up to 500km per hour.

Energy efficiency: The 5G initiative aims to extend device battery life by a factor of 10, and reduce core network consumption by 90%.

100% coverage: The ability to provide good coverage in all areas is another aspirational goal of 5G – the extent and achievability of this is highly debatable.

Rapid service deployment: One goal is to rapidly reduce the time it takes to deploy 5G network connections, using self-organizing network technology.

IX. THE FOLLOWING ARE THE AREAS WHERE THE 5G TECHNOLOGY IS SUPPOSED TO BE APPLIED

- eHealth: Telesurgery /Teleoperation
- Connected homes: Smart Homes
- Secure transport: Smart Transport
- Smart Grids
- **Entertainment**
- **Virtual Reality**/Immersive or Tactile Internet
- Autonomous driving/Connected cars
- One can know weather, temperature, and location etc. of each other when conversation is going on.
- **Students can attend any class of any institute of the world without going there.**
- A doctor can treat patients of other countries from a place.
- Possible to monitor any place of the world from anywhere.
- Batteries can be charged by using network without charger.
- It could be possible to visualize lively all the planets and the Universe.
- One can complete his/her works without going to the office.
- One can be able to predict tsunami/earthquake before it occurs.
- Wireless cloud-based office/Multi-person Videoconferencing
- Machine-to-machine connectivity (M2M)
- Robotics
- Sensor networks

X. EDUCATION AND GAMING SECTOR

These two are most promising sectors where the application will be increase due to high speed Internet availability. As the India has maximum potential due to its large population base and strong point is that it is having large number of young and budding population who is very adaptive to latest technology. Young India almost has smartphone with internet connectivity and people are using the internet at its maximum by using as a media for connectivity through social application such as Facebook, twitter or whatsapp for entertainment purpose and for gaming also. These are the areas other than healthcare and upcoming IoT and D2D communication.

The percentage of gaming is increase due to fast Internet availability in comparisons to the old Nintendo based gaming, people are playing whenever they get time anywhere, any place on their mobile devices. This is the most striking area of mobile based gaming likewise people are also using for education purpose it is like having your college in your mobile device.

The development of technological advancement will unsettle the traditional way of teaching / education by enabling learning anytime at anyplace. It will no longer be classroom based system. The upcoming technological based platforms could bring top-tier global universities together to offer free and interactive courses for the web. The courses



like MOOC will become popular as students can learn and interact at their ease. At high speed internet connectivity and virtual – reality system the teacher or instructor can be present virtually at many location and the students can get the benefit of the best faculty even they are not hired by the college or university. Teachers can give live on-line lessons to large number of students irrespective of their location. From their smartphones, students can listen and interact with the lecturer and tutors who are also online. This would greatly benefit rural students, where people do not have big labeled colleges or universities or they cannot afford to go to the big labeled colleges for education the courses like MOOC can be much of help.

If we talk about the India's mobile gaming market is composed to top \$400 million by 2022, driven by growing adoption of **freemium** and **virtual reality** games in the coming years, a report has said. Freemium is a business model where basic services are provided free of charge but one has to pay for using the more advanced features. According to the CII-TechSci Research report, revenues from mobile-based gaming stood at \$265.8 million last year and is forecast to touch \$286.2 million in 2017.

The number of mobile gamers in the country is also expected to grow substantially from 198 million in 2015 to 628 million by 2020 and further to 1.16 billion by 2030, it added. "Gaming industry in India has witnessed a shift from console gaming to mobile gaming, with growth and improvement of wireless connectivity in the country. Ease of playing mobile games coupled with rising mobile phone subscribers has fuelled growth of mobile gaming in India over the last few years".

The report added that increasing number of mobile internet users, coupled with development of new and advanced games, has also boosted mobile gaming market in the country.[4]

It is very clear from the above information that the two sectors where the customer and marketer are present and the high speed data connectivity is helping the market to fulfill the demand and supply of the market.

XI. 5 G BENEFITS TO EDUCATION SECTOR

TRADITIONAL TEACHING

Traditional teaching methods are described as being teacher- oriented, in a lecture style and are inflexible. Lessons are usually taught by the teacher introducing skills using a blackboard accompanied by a verbal explanation or lecture. Practical work for students is then assigned, followed by feedback from the teacher. A disadvantage of this traditional method is that students who have learning difficulties are unable to cope with how the lessons are delivered. Above-average students are also disadvantaged because the lessons aren't challenging enough. This means that students in either category are at an instant disadvantage compared to an average student without a learning disability.

This is somewhat going through decades, the traditional way of teaching is entirely depending upon the teacher and teacher's skill how experience is the teacher so that the teacher can deliver what is expected from him/ her. Starting from the "Gurukul" to modern teaching facility one thing in the teacher centric scenario has not being changed with time that is the structure one teacher is standing in front of rows of students and shower of knowledge is spared on all of them equally, the teacher is whole and sole of the class, he came and deliver what has to be delivered, this kind of teacher entirely dependent on the teacher there is no other alternative in the class out of the class there is one alternative that is "tuitions" for the subject in which the students face difficulty. The business of imparting tuitions in every part of India has become a big business and people are doing this professionally. The growth of tuition centers in a country like India where the tradition education style is deep rooted from the ancient times from the time of "Gurukul" education system does it reflects something, a requirement of some new alternative to the traditional study, why students are doing extra efforts to get over the edge from competition. May be they want clearer, more precise and more accurate topic description as per the demand of the industry, by the course of the time other things originates like distance learning, student centric learning, open courses etc. this indicates that now the demand is not going to be full filled by the single method of teaching we need to generate the hybrid structure of learning environment for sustainability.

STUDENT CENTRIC LEARNING

The term student-centered learning refers to a wide variety of educational programs, learning experiences, instructional approaches, and academic-support strategies that are intended to address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students and groups of students. Student-centered learning, also known as learner-centered education, broadly encompasses methods of teaching that shift the focus of instruction from the teacher to the student. In original usage, student-centered learning aims to develop learner autonomy and independence by putting responsibility for the learning path in the hands of students. Student-centered instruction focuses on skills and practices that enable lifelong learning and independent problem-solving. Student-centered learning theory and practice are based on the constructivist learning theory that emphasizes the learner's critical role in constructing meaning from new information and prior experience. Student-centered learning puts students' interests first, acknowledging student voice as central to the learning experience. In a student-centered learning space, students choose what they will learn, how they will learn, and how they will assess their own learning. Why the concept of student centric learning evolved, there could be number of reasons a few can be stated as follows: Students want flexibility –students require flexibility in learning the other system is not flexible at all like in due dates, opportunities for extensions, accelerated course completion options, and asynchronous activities. Many times students meet conflicting responsibilities at home, work, and school. The flexibility is the key factor that originates from a decades of adjustment and work according to the rigid educational system. Student want prior knowledge as difference maker– Prior experience should be welcomed and



encouraged whenever possible for assignment credit to allow students to accelerate assignment completion. Online and other courses should be built to allow students to share relevant personal and professional experience and promote inclusion of prior learning whenever possible. As student centric learning environment in which the students come first and their knowledge should be acknowledged. [5]

By looking at the two styles of teaching and involvement of ICT in education at the school level the introduction of smart classes and other tool are helping the students and teachers to deliver the content in more learning way. The ICT based learning is somewhat interactive and uses the Internet and the speed and connectivity is one of the major concern. As the technology up gradation takes place at the rapid pace and major up gradation is coming in near future is 5G communication. The 5G communication will provide a better and faster Internet connectivity then ICT in education can better serve the education system.

XII. SOME OF POSSIBLE USE CASES RELATED TO ICT EDUCATION CAN BE LISTED AS FOLLOWS:

- Tactile Internet & Skillset communication: Having a network capable of transferring our tactile communication through Internet will help us to move from today's content and information delivery Internet to a manual skill set delivery Internet. This will create new ways of Tele-teaching and Tele – mentoring especially for manual training and skill development. The use of Tactile Internet in education can bring new definition and experience for distance learning and distance team-working. In order to have a natural haptic interaction of our limbs with video and audio feedback the response time of service should be very low, i.e., the round trip time of few milliseconds which can be only envisaged by 5G.

- Virtual Reality & education: While the initial use case for VR was the entertainment industry, it also has relevance in education and training, and will have a big role in providing quality education and improving Understanding -based learning among students. By tailoring these services to education, (e.g. by, having virtual tours of the human body with the possibility of interacting with models and moving the different layers of the body), the learning process can be more fun and much more interesting. This also can bring new experiences for distance learning, enabling the virtual presence of students (e.g., located in suburban area) in the classroom. This type of service needs very high bandwidth (bi - directional) and very low latency (i.e., 2-4ms).

- Augmented Reality & education: Similar to the VR, AR has already started to show its relevance and usefulness in education. Providing the necessary information can make contextualized learning ubiquitous and pervasive. AR can be an efficient way of providing the right amount of information at the right time to the right audience. Also, immersive AR can enable new ways of learning and team working in education through services such as mobile cloud classroom and Virtual Presence. Enhancing the learning experience is not the only possible use case for AR. It can also help teachers to get necessary information about each student and be aware of their particular needs and capabilities. The requirements for implementing such services, including optimized routing,

seamless wide-area coverage, virtual presence, low delay speech & video coding, need to be considered.

- Walled-off classroom: By combining Tactile Internet and VR, the future experience in teaching and learning could go far beyond today's experience. This can remove the physical location constraint for experimental practices, and facilitate and enable the sharing of resources between larger numbers of students irrespective of their current location. The impact would be more significant in hands – on - experience with expensive equipment and facilities.

- Personalized learning: Individual access to a mobile device holds the promise to connect each learner into intelligent personalized systems that can suggest learning pathways, enable aggregated analysis and through better data capture of learner experiences enable much better decision making about all aspects of a students' education. Categorising students in different groups and suggesting different multimedia contents can increase the load on the network. However, in - network caching technologies such as Content Centric Networks (CCN) and Information Centric Networks (ICN) can be used to improve efficiency by reducing the service response time and bandwidth consumption.

- Student wireless backpack: Today's cloud-based storage services have made it possible to access files irrespective of device of use. Due to the centralized architecture of cloud providers there is a notable delay in access to the content even with a relatively fast internet connection. Future mobile technology will enable single device content access anywhere by using distributed cloud and mobile edge computing. All the user needs is a device to access any of his personal content and stored files. Using this feature students can resume their work at a convenient time and place through different devices with an impression of immediate response time.

Student with especial needs: Advances in mobile technology and robotics can open new opportunities to assist students with especial needs, making learning easier for them Cloud - based robots can be considered as a full-time assistant for disabled students, helping them to interact with the education environment and their peers. Rather than having to call a teacher over for help (which can cost both the student and the teacher time they could be using more productively) the students can take care of the issue with the help of their robot.

IoT & Smart Classroom/Smart Campus: IoT applications are affecting all aspect of our life, from smart building to smart healthcare. However, one of the fast growing area of these applications is in education which can improve our today's teaching, learning and campus operating experience. IoT applications can also help us change the role of teachers in the classroom, reducing the burden of administrative load on them and allowing them to concentrate more on individuals. Being automatically logged into the classroom as soon as entering to the class , being distracted by a signal as soon as losing concentration during lecture, real-time feedback to a lecturer about areas that students still have problem based on the real-time analyses of their notes, all are just few examples of how IoT and connected classroom can enhance learning and teaching experience.



XIII. 5 G BENEFITS TO GAMING SECTOR



Image 4: Showing clipping from a game

With one of the world's largest youth population, India is poised to become one of the world's leading markets in Gaming Sector. Currently valued at USD 890 million, the Indian Gaming Industry is estimated for the annual growth rate of 14.3 per cent with mobile Gaming taking the lead at 71% share. The growth is driven by rising younger population, higher disposable incomes, introduction of new gaming genres, and the increasing number of smartphone and tablet users.



Image 5: Showing clipping from a game

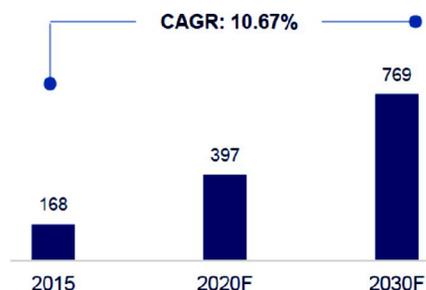
With a growing consumer base and e-commerce solutions in place, the Indian game developer ecosystem will have ample opportunity to innovate and provide compelling content with social and cultural context, which is key in engaging the Indian consumer. With experience outsourcing, QA testing and developing products combined with availability of creative talent, advanced technology and low-cost, Indian markets provide the best opportunity for collaboration and development work.

XIV. QUICK GLANCE AT GAMING SECTOR IN INDIA

If we look at the facts and figures about the smartphones user and users who are using Internet on their mobile devices it is gradually increasing and expected to increase more. In coming years as the user experience fast Internet connectivity and smartphones availability. If we compare the era of 90s with today's scenario of telecom industry there has been a drastic change in telecom service providers and users in terms of technology and way of usage. Earlier mobile device was used majorly for calling, texting and early ear gaming like

snake but in today's scenario smartphone devices has almost replaced computer and gaming consols.

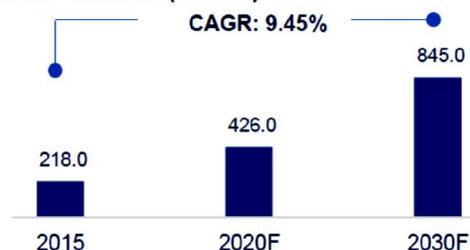
India Smartphone Users, 2015, 2020F & 2030F (Million)



Source: TechSci Research

Image 6: Showing Smartphone users in 2015 and future projection

India Mobile Internet Users, 2015, 2020F & 2030F (Million)



Source: Telecom Regulatory Authority of India (TRAI), TechSci Research

Image 7: Showing Mobile Internet Users users in 2015 and future projection

Mobile Gaming to cross USD 571 million by 2016 at 134.5% CAGR between 2013-2016 leading to 22.8 percent CAGR growth with 208.2 million mobile game users

- Mobile games and app market projected to be worth USD 400 million by 2016
- Estimated at USD 744 million in 2014 the Animation / VFX industry is expected to grow at CAGR 16.3%
- The PC gaming segment is estimated at USD 59.7 million in 2014 and is expected to grow at CAGR of 16.8% to touch USD 130.0 million in 2019
- Cyber Café Market Is currently estimated at 3000 cafes of which 1500 have 5 or more machines dedicated to games
- 95% are mobile centric games
- Growing focus on the 'kids genre'
- Arcade style games are one of the most popular genres, followed by puzzle and racing genre
- Gaming based on famous hyped events like Kaun Banega Crorepati, T2Ofever.com, IPL, Khel Kabaddi, etc. [6]



Image 8: Showing India Mobile Gaming Market Share by Company

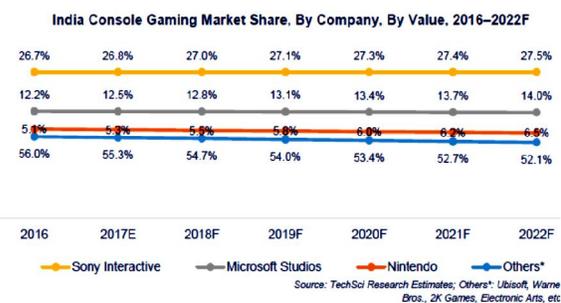


Image 9: Showing India Console Gaming Market Share by Company

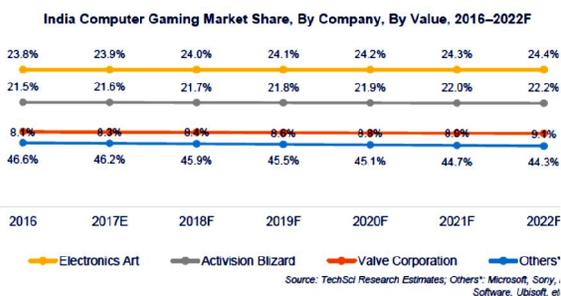


Image 10: Showing India Computer Gaming Market Share by Company

XV. TOP 20 BEST-SELLING VIDEO GAMES OF 2016 BY UNITS SOLD

- 1 Call of Duty: Infinite Warfare (M)
- 2 Battlefield 1 (M)
- 3 Grand Theft Auto V (M)
- 4 Madden NFL 17 (E)
- 5 NBA 2K17 (E)
- 6 Tom Clancy's The Division (M)
- 7 Overwatch (t)
- 8 Minecraft (E10+)
- 9 Call of Duty: Black Ops III (M)
- 10 FIFA 17 (e)
- 11 Pokemon: Sun (e)
- 12 Pokemon: Moon (e)
- 13 The Elder Scrolls V: Skyrim (M)
- 14 Star Wars Battlefront (t)
- 15 Final Fantasy XV (t)
- 16 Titanfall 2 (M)
- 17 NBA 2K16 (e)

- 18 Tom Clancy's Rainbow Six Siege (M)
- 19 Far Cry Primal (M)
- 20 Dark Souls III (M) [7]

XVI. TOP GAMING MANUFACTURING INDUSTRY

- 345 Games
- 505 Games
- Activision Blizzard, Inc.
- Bandai Namco Entertainment, Inc.
- Bethesda Softworks, LLC
- Capcom Co., Ltd.
- Deep Silver
- Disney Interactive Studios, Inc.
- Electronic Arts, Inc.
- Epic Games, Inc.
- Focus Home Interactive
- Gearbox Publishing, LLC
- Grey Box
- GungHo Online Entertainment
- America, Inc.
- Konami Digital Entertainment Co., Ltd.
- Legends of Learning
- LEVEL-5 International America, Inc.
- Magic Leap, Inc.
- Microsoft Corporation
- Natsume, Inc.
- NEXON America, Inc.
- Nintendo of America
- NVIDIA Corporation
- Pop Up Gaming
- Sony Interactive Entertainment, Inc.
- Square Enix, Ltd.
- Take-Two Interactive Software, Inc.
- THQ Nordic
- Tencent
- Triseum
- Ubisoft, Inc.
- Vantiv, LLC
- Warner Bros. Interactive
- Entertainment, Inc.
- XSEED Games [8]

XVII. CHALLENGES TO EDUCATION AND GAMING SECTOR

5G technology is yet to come, the industry is preparing for the road to the future many areas are going to be affected by the use of new technology. The technology is going to change which is used earlier, there will be many up gradation in mobile devices and transmitting technologies. India has larger population base and has maximum market potential. 5G technology will surely provide some great help, but there are some challenges to every step heading towards the goal. Education and gaming sector which has been discussed in this paper has great potential but the Indian geographical background is speeding into variety if demographic factors and in many areas there is a lack of literacy many people in urban areas are still not using online transaction maximum of



them are sticking to use Debit / Credit card to the ATM's only. Young India is the ultimate hope to use the technology at its maximum level. Government and other private players are playing a major part in providing online and MOOC but the level of enrollment into these courses are not upto the satisfactory mark. Similarly, in gaming sector people have moved from the big screen to the mobile screen but for higher end gaming they need robust mobile devices many of these gaming mobile devices are in the market but they are bit costly. As the technology develops and many player come into the market there will be competition in the market and there will be some relaxation in prices, as Indian market is a very price sensitive and bargain seeker market. Overall the major challenge is awareness and usefulness of these technology so that people can get used to it and market flourish.

XIX. FUTURE SCOPE OF STUDY

Talking about the future of 5G, 5G is the future of current evolving technology and it is yet to come. There are many application based advantage like high speed internet connectivity and on that basis many things will be possible in near future. Two subjects are discussed in this paper education and gaming the next important thing according to the Indian scenario is Healthcare sector, as the healthcare facilities are becoming expensive and any super specialist doctors are not available to do surgery in India, they can do or assist the major healthcare operation remotely other than this there could be many help in healthcare sector using this high speed technology.

XX. CONCLUSIONS

To conclude the paper, from the above facts and figures the information we get is there is something big is coming into near future and many areas are going to be affected. There are many potential areas in which 5G technology is very helpful as the application says, the two sectors discussed in this paper education and gaming sector they are growing in India and of kind of necessity education is very much needed to excel and gaming is for entertainment purpose. The level of education and gaming will certainly increase as discussed earlier virtual – reality and high speed data connectivity are major concern area in gaming online gaming with heavy data transfer and booming market of game makers and players and other associated things like advertising and promotion of the products are in the second lead. The manufacturing market of mobile device are upgrading their standards in processing, mobile camera and gaming platforms many high end gaming mobile devices are available but they are costly eventually the demand raises they will come down as the price of internet has come down if we compare from dial-up to the 4G/ LTE prices. The last but not least the people who are using technology has to upgrade themselves they have to educate to use the technology in a better way, young India has set up one example in this month becoming maximum data consuming country in world, this is an indication where the success of 5G technology and its application can be dreamed of.

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