



# **BUSINESS IMPACT OF 5G TECHNOLOGIES**

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# Agenda

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- **Drivers for 5G**
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# What is 5G ?

- 5G is a term being used to describe the next stage of mobile network infrastructure technology beyond 4G.
- 5G will offer totally new possibilities to connect people, and also things – being cars, houses, energy infrastructures.
- 5G technologies makes a “truly connected world” a reality by providing unprecedented connectivity and allows the future mobile-broadband user experience radio access with “unlimited” performance. It ensures that data is accessible instantaneously and the services are delivered without being hampered by waiting times or unreliable access.

# What is 5G ?

- 5G target features include :
  - 1 Gb/s or more data rates to support ultra-high definition video and virtual reality applications
  - Less than one millisecond latency to support real time communications
  - Seamless delivery of services across licensed and unlicensed spectrum
  - Always-on user experiences
  - Support for billions of users, or M2M systems
  - Energy consumption should be reduced by orders of magnitudes to improve upon M2M device battery life

# Drivers for 5G

5G must be built to meet a number of individual user and enterprise needs.

- At least 1Gbps or more data rates to support ultra-high definition video and virtual reality applications.
- 10Gbps data rates to support mobile cloud service.
- Less than 1 mS latency to support real-time mobile control and vehicle-to-vehicle applications.. New applications in On-line gaming, Augmented reality.
- Max 10-millisecond switching time between different radio access technologies to ensure a consistently seamless delivery of services.
- Current mobile network systems already support five billion users, but this will need to expand to also support several billions of applications and hundreds of billions of machines.
- Energy-per-bit usage should be reduced by a factor of 1,000 to improve upon connected device battery life.

# Business Impact – India

## Favorable factors leading to 5G adoption :

- **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 )

# Business Impact – India

## Current Challenges :

- High % of rural population with lack of connectivity.
- Low Skill & training
- Poor Healthcare facilities etc

## Impact of Better Connectivity

- Video will contribute to the bulk of global data traffic by 2020, majority of which will be Over the Top (OTT) services such as VoIP, Social networking and messaging.
- Increase in Broadband penetration to remote places, will increase labour productivity.
- The connectivity would create new jobs in rural India

# Business Impact – India

- There will be very positive Impact on GDP -As per World Bank estimates, every 10% increase in Broadband penetration can stimulate GDP per capita by as much as 1.38% for developing economy.
- **m-Commerce:**
  - Will ensure financial inclusion by bringing access to remote villages
  - Market for Telcos owing to m-Commerce is expected to grow rapidly.
- **Indian Healthcare industry's** will be greatly benefitted from the new services which are enabled by 5G connectivity, where it can take healthcare to the remotely located masses.
- Mobile TV, powered by high speed connectivity, will dominate as it provides enhanced personal viewing experience anytime-anywhere access



# Business Impact – India

- Mobile phone will emerge as the preferred medium of entertainment over TV, Movies, Radio & newspaper
- Mobile data traffic in India is expected to grow exponentially
- There will be a saturation of Voice revenues and exponential increase of Data and Video revenues

**Voice revenue will decline and future growth will be in Data & Video..**

# Business Impact - Global

- 5G will present new opportunities in a range of business & consumer applications involving video, M2M applications and newer services in order to expand collaboration, communication and surveillance.
- The highest demand will be from emerging markets and in Asia
- Wireless broadband will be the preferred mode of information access
- Smartphones will become a dominant device for personal, business and automotive use.
- Voice-driven wearable device may emerge that may also disrupt the way we communicate using phones
- 5G is a global network and may usher in global mobiles all over the world. Network reach will no longer correspond to national boundaries, which creates both opportunities and also potential problems.

# Business Impact - Global

- Voice requirements will saturate and the growth will be only from Data..
- Video will contribute to majority of global data traffic & will grow higher beyond 2020
- Majority will be OTT video traffic. Nature of traffic would also change to TV shows and movies on HDTV and Mobile devices. This would challenge the traditional Telco's business.
- Over the Top (OTT) services like VoIP, Social networking, Instant Messaging will challenge traditional operators
- Asia pacific and SE Asia will be global data traffic hotspots
- Global market of devices connected to the Internet would grow to **50 billion** units by 2020.

# Business Impact - Global

- 5G will present new opportunities in a range of business & consumer applications involving video, M2M applications and newer services in order to expand collaboration, communication and surveillance.
- 5G is a global network and may usher in global mobiles all over the world. It is expected that a user can move anywhere in the world by holding just 5G mobile network
- Network reach will no longer correspond to national boundaries, which creates both opportunities and also potential vulnerabilities.
- 5G would provide a true convergent environment, where ultra fast broadband connectivity is ensured across one integrated fixed-mobile network. This would allow people to seamlessly access content from wherever they are, from different handsets and access points.

# Impact - Global

- Apart from bring in convenience, this will create more opportunities for businesses, both in terms of how they distribute and make content available and in terms of how they deliver services, organize work flows and internal processes.
- 5G will be part of the industry's move towards an all-IP environment, which will unlock further business opportunities in the area of differentiated premium offers and specialized services. This will lead to collaboration among the different players of the digital value chain.
- The direct and induced employment generation will increase

# Business Impact - Global

## Enterprise Business

- Cloud-based services will dominate the enterprise
- The primary business device will become the mobile business phone
- Data Centre market will be transformed by Big data push.

## Network Service Providers:

- By 2020, Traditional network technologies would have given way to network architectures built on SDN and hybrid Self-Optimizing Networks (SON).
- By 2020, many 2G networks would have closed. 3G networks could still co-exist along with 4G-LTE and 5G networks.

## Media Service providers

- Video Content by OTT providers.
- Subscription services become more commonplace, for all types of content including music,gaming etc through bundled offerings from service providers.

# Business Impact - Use Cases

## **5G would enables new diverse use cases and applications like:**

- Relaxed latency requirements - Remote meter reading for billing purposes
- Strict latency requirements  $< 1\text{mS}$  - Process industry safety & control systems, real-time patient monitoring, Security & Video surveillance, real-time traffic light control, Two way gaming, Virtual & Augmented reality etc.
- High levels of network reliability. -- Electrical grids, industrial control , eTraffic, e-health and smart-city management.
- Relaxed level of network reliability -- Temperature /moisture sensors @ home.
- High Volume of information -- Remote video surveillance etc
- Low volume of information - Cargo tracking in the shipping industry. Etc
- Low device cost/ low energy -- Battery powered sensor networks.

**Video would be the “killer application”**

# Business Impact - Use Cases

## 5G enables communication between billions of connected devices

- Remote Surveillance & Security
  - IP based video surveillance
  - Automatic alarm to prompt incidents
- Consumer & Home
  - Smart Meters
  - Integrated Home entertainment networks
- Monitoring
  - Healthcare
  - Utility / energy industries
- Building Automation:
  - Energy control
  - Entry control & security
- Fleet Management
  - Vehicle tracking
  - Logistics
- Supply Chain Mgmt
  - Inventory tracking etc



# Business Impact - Use Cases

## Healthcare services :

- Increase in Broadband speeds supports advanced e-Health and m-health and can potentially bring new services.
- Other applications include Teleradiology, Telemedicine, Patient remote health monitoring, Tele Surgery, 3D brain imaging, patient EMR etc

## Education & Learning

- Disrupts the traditional way of education by enabling learning anytime at anyplace. It will no longer be classroom based system.
- Platforms could bring top-tier global universities together to offer free and interactive courses for the web. MOOC will become popular.
- 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.

# Business Impact - Use Cases

## Automotive

- Passenger infotainment
- Augmented reality dashboards.
- Cars with built-in driver assistance systems based on 3D imaging and built-in sensors.
- Detection of safety critical situations,
- Remotely controlled or self-driven vehicles

## Virtual Worlds & Augmented Reality

- Meetings, Seminars, Workshops
- Shopping
- Real estate purchases
- War gaming etc

# Business Impact - Use Cases

## Retail

- Virtual shopping malls with Augmented reality would make On-line shopping the preferred mode of purchase.
- Easily >50% of magazine and book sales are digital. Conventional stores will be closed.

## Smart Cities

- Intelligent Traffic Management
- Smart power
- eGovernance
- Smart Homes
- Smart Security – Video Surveillance
- eHealth & mHealth
- Etc

# Business Impact - Use Cases

## Future Homes:

- Full of connected communicating devices,
- Remote monitoring and control of devices/systems in homes
- Interactive security providers will dominate the smart home services

## Home Entertainment

- Smart TVs, Smart Gateways, Games Consoles and even tablets would vie to be the main hub for delivery of entertainment content in the home.
- Ultra HD TVs will have become mainstream with hundreds of Pay UHD channels being available in addition to plentiful streaming UHD services.
- Content based on a viewer's or family's preferences, past viewing history or even mood, would be delivered.
- “Over The Top” content would also be streamed on multiple screens
- **Mood sensors** – reflect person's mood and could be used to determine everything from their experience of music, online ads, TV programs, temperature, lighting in the room etc.

# Business Impact - Use Cases

**Connected Commuting** : Connected commute, enabled by 5G, provides better commute experience:

- Voice-activated alerts -upcoming traffic incident or public transport service disruption.
- Real-time web and app-based comparisons of multiple routes or transportation modes
- Recommended departure times to avoid being stuck in traffic delays.
- GPS navigation visible on car windshield

**Workplace** - White collar Employees can work from anywhere anytime. Only value delivered will be measured and not hours spent in office. However, no impact for employees in Manufacturing sector

**Time saved on the road could lead to reduced fuel consumptions thereby reducing Co2 emissions, increased productivity, and so on.**

# Conclusion

- 5G helps towards building a **Smarter Connected Society**
- There will there be increased scope for mutual collaboration amongst hitherto competing Service Providers for building greater opportunities for all.
- Will disrupt value chains and enable new opportunities on an unprecedented scale for a wide range of industries.
- 5G will meet our long-term vision of unlimited access to information and sharing of data available anywhere and anytime to anyone and anything.
- **5G** Mobile connectivity will empower us as individuals with the freedom to choose how we create, collaborate, communicate and share, and open up opportunities for us to develop and prosper

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