

5G – Enabler of Economic & Social Inclusivity in South Africa

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Agenda

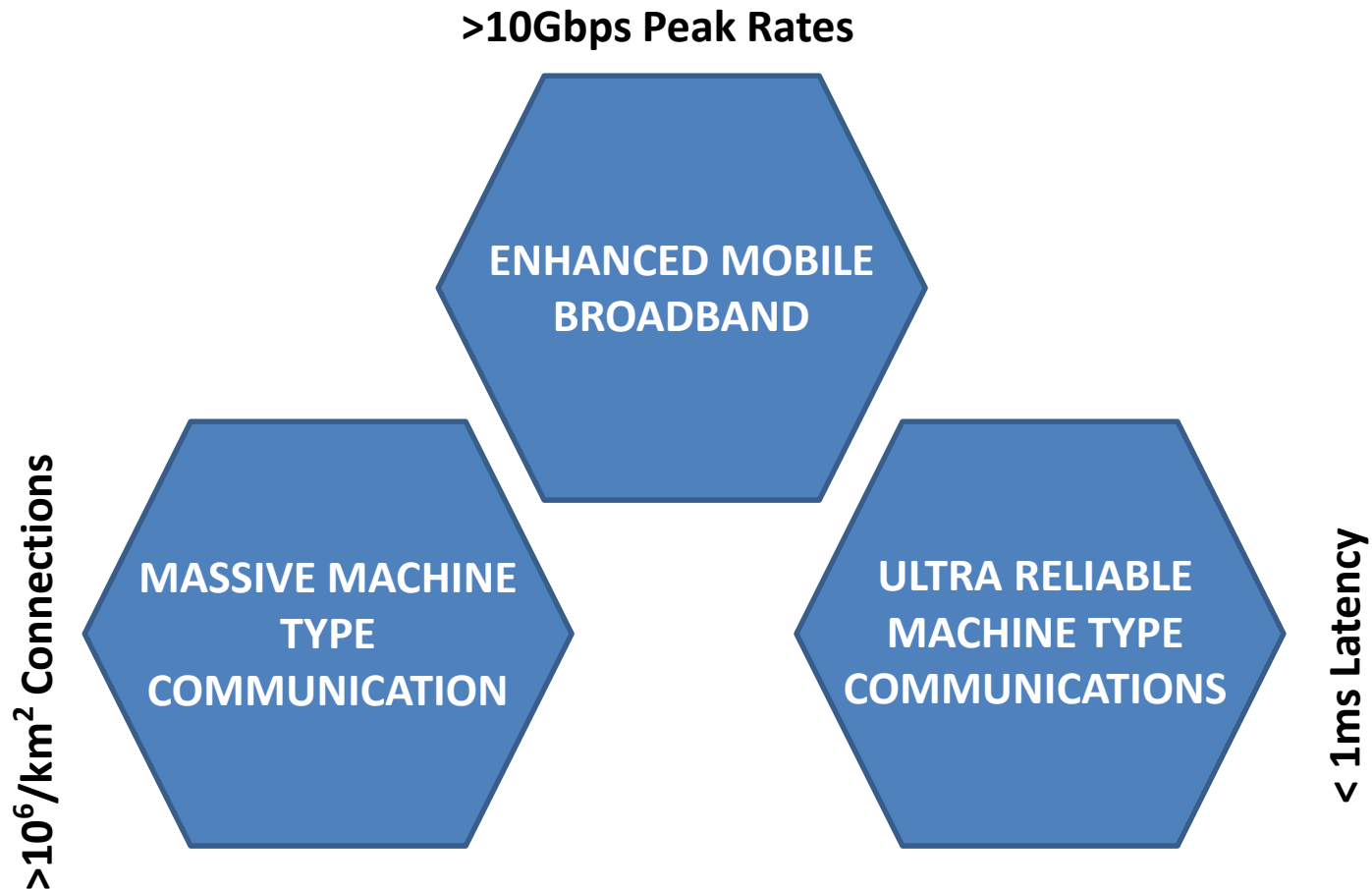
1. Overview of 5G Technology
2. Benefits
 1. Economic growth stimulation
 2. Inclusivity
 3. Using foundation technologies to extend connectivity
 4. Use cases in Healthcare and Job Creation
3. Challenges in deploying 5G
4. Conclusion

What is 5G?

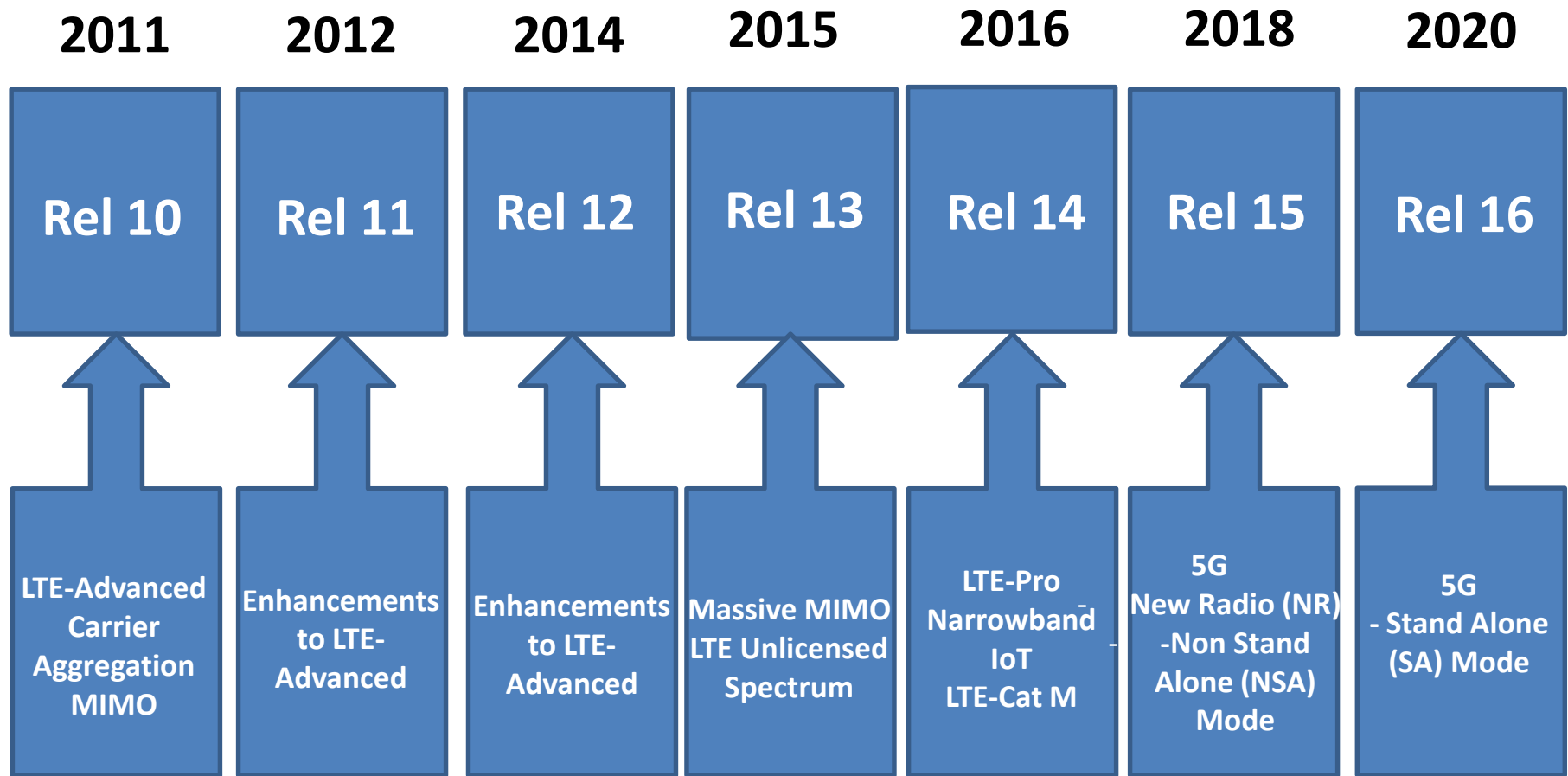
Next generation of *Cellular Wireless* communication technologies, following on from the second, third and fourth generation technologies defined as part of the International Mobile Telecommunications (IMT) standards defined by the various standards fora (ITU-T, 3GPP, ETSI etc.



5G Generic Use Cases



3GPP Standards



5G NR Characteristics

New Radio

Massive IoT

- Low Complexity Narrowband
- Low power modes for deep sleep
- Efficient signalling
- Grant-free uplink transmission
- Optimized link budget
- Managed multi-hop mesh

Enhanced Mobile Broadband



- Wider bandwidth
- Mobilising mmWave (24GHz and 86GHz)
- Shared spectrum
- Device-centric mobility

Mission-Critical Control

- Low latency with bounded delay
 - Efficient multiplexing
 - Simultaneous redundant links
 - Reliable device-to-device links
 - Optimised PHY/pilot/HARQ
- Dynamic low latency TDD/FDD
 - Massive MIMO
 - Advanced channel coding
 - HetNet support

Foundation Technologies

Software Defined Networking (SDN)

- Separating control and forwarding plan
- Central controller
- Makes networks programmable

Network Functions Virtualization (NFV)

- Emulating functionality in software
- Running software on off-the-shelf servers and using orchestration to provide service
- Increases flexibility and agility

Off-shoot Technologies

- **Network Slicing**
 - Form of virtual network architecture that allows multiple logical networks to run on top of a shared physical network infrastructure
- **Multi Access Edge Computing (MEC)**
 - A cloud based IT service environment located at the edge of a network to bring real-time, high bandwidth and low latency access to applications
- **Cloud RAN**
 - Radio access architecture in which all control and base-band processing functionality is virtualized

5G Deployment Status

Currently 224 Operators in 88 countries are investing in 5G networks in the form of tests, trials pilots, planned and actual commercial deployments

By 8th April 2019, 39 Operators have deployed either non-3GPP-compliant or 3GPP-compliant 5G technology on a commercial basis in their networks. Included in this list are:

- **all the major operators in the US (AT&T, Verizon, Century Century & T-Mobile)**
- **Sunrise in Switzerland is the latest operator to join this list**

South Africa

- **RAIN is the only company so far to have launched a 5G network in Johannesburg using access that they have to 3.6GHz. Will soon extend to Cape Town.**
- **Other operators have only implemented single base-station trials**
- **Main barrier in deploying 5G in South Africa is that the DTPS & ICASA have as yet not allocated any spectrum**

Inclusivity

From our perspective *Inclusivity* means providing access to services, via a telecommunications platform, to those individuals who were previously excluded from using such services predominantly because of location and affordability

ECONOMIC

- Access economic growth benefits
- Access to employment opportunities
- Access to markets
- Access to financial services – banking, loans, insurance etc.
- Access to knowledge, advice, support and mentorship

SOCIAL

- Access to primary health care
- Access to education and skills development
- Access to services that promote networking and the building of relationships
- Access to legal services
- Access to social services

Economic Impact of Broadband

Growing recognition of the transformational role that Broadband is playing in enabling social inclusion and economic wellbeing.

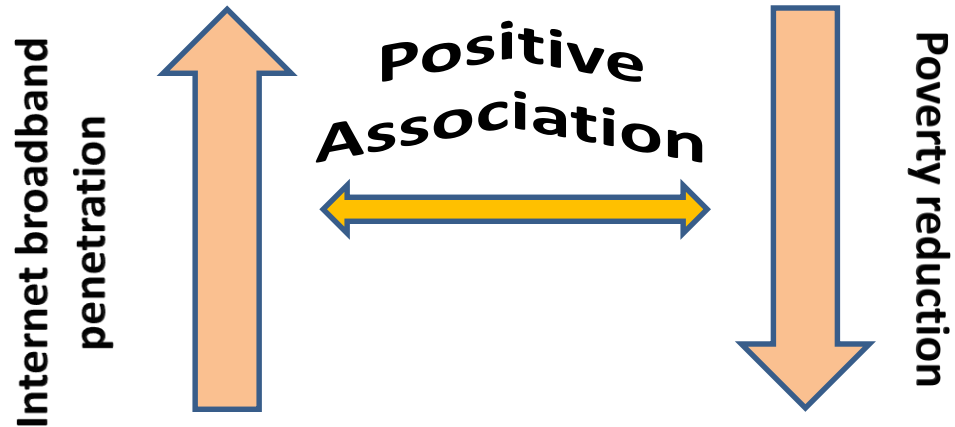
Research undertaken by the World Bank indicates that for high-income countries a 10% increase in Broadband Penetration adds a 1.21% increase to GDB, and for low and medium-income countries a 1.38% increase to GDP. In China, for example, every 10% increase in broadband penetration could contribute an extra 2.5% to GDP growth

Both the United Nations and World Bank have identified broadband as crucial to:

- Socio-economic benefits to local, regional and national economies through the creation of jobs and markets
- Lifting people out of poverty
- Empowering people with knowledge
- Creating a conducive environment for business and technological innovation

Empirical Studies

Paul Terna Gbahabo &
McCowell Fombang
Stellenbosh University



Study by Katz and Callorda 2013:

- Survey data from 24 028 households
- Collected over 3-years (2009 – 2011)
- Broadband presence in a household would lead to an increase in annual income by 3.67%

Benefit of mmWave Capability in 5G

GSMA study “Study on Socio-Economic Benefits of 5G Services Provided in mmWave Spectrum Bands”

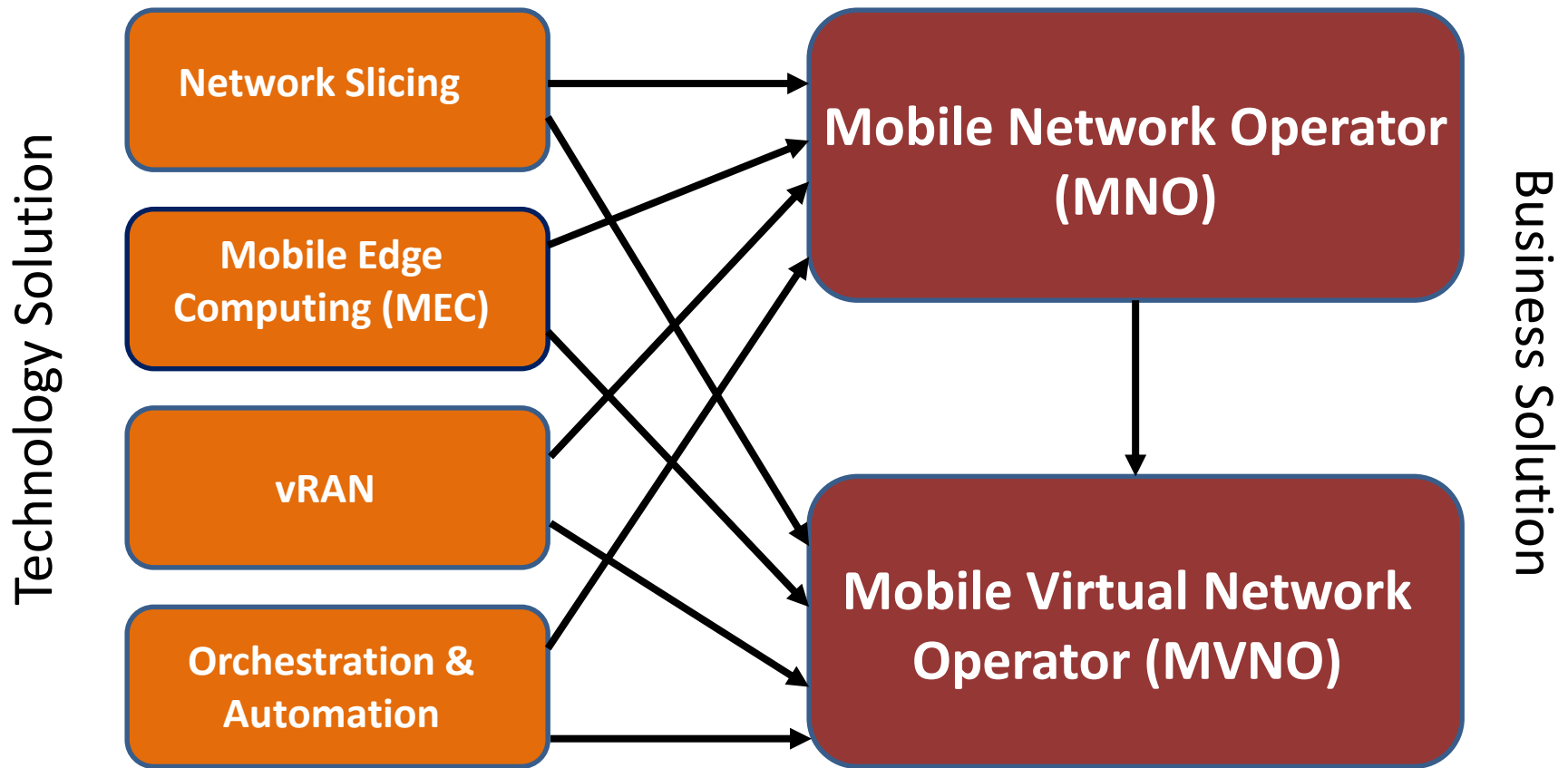
Findings:

- ❑ 5G is expected to provide important economic benefits globally
- ❑ mmWave spectrum will grow to become a significant component of this impact over time
- ❑ Although economic benefits are greater in the early adopting economies, the rate of contribution of mmWave in later adopting economies outpaces that of earlier adopters in the later years of the study

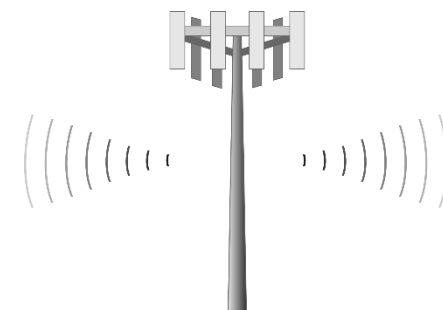
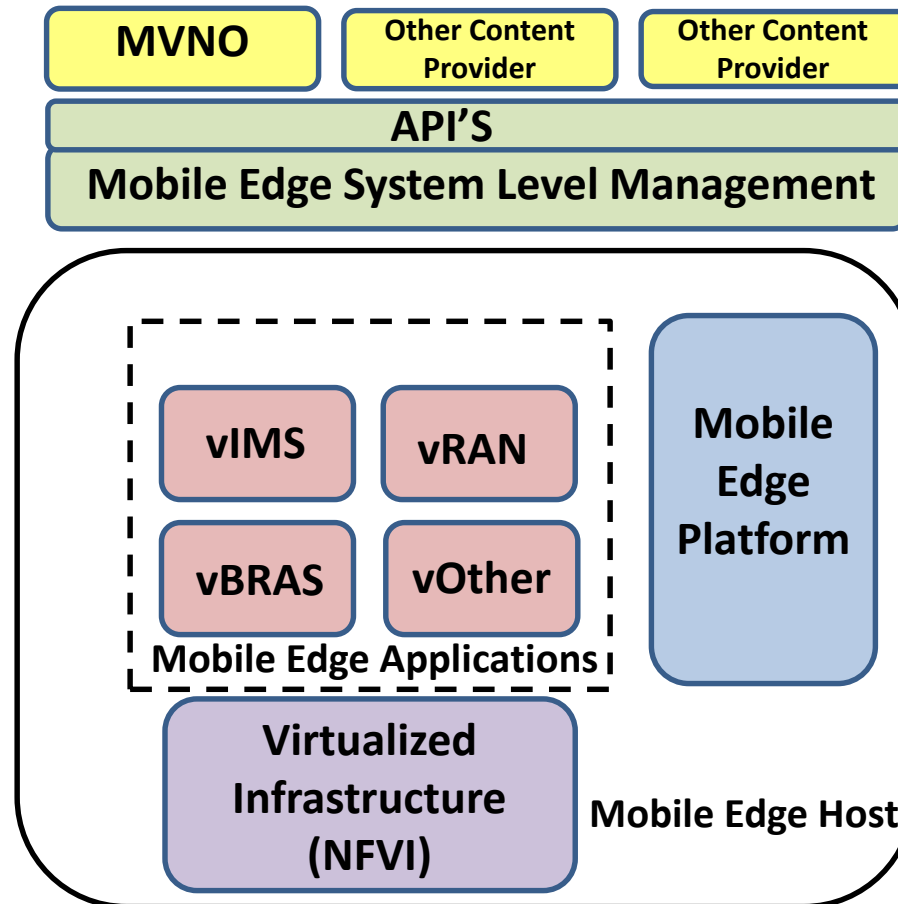
Conclusion:

- ❑ By 2034 mmWave adoption will support an increase of \$565 billion in GDP globally and \$152 billion in tax revenue accounting for 25% of the expected value created by 5G (conservative assumption)
- ❑ At the Sub-Saharan level the expected boost in GDP is \$5.2 billion. 0.7% of total GDP growth, and a contribution of \$970 million to tax revenue

Using Foundation Technologies to Service Rural Areas



High Level Architecture (Village)



**4G Or 5G
RAN**

Advantages of Using Foundation Technologies

- **Generic drivers:**
 - **Agility and flexibility**
 - **Leveraging economies of scale with COTS**
 - **Lower capex and opex**
- **Using Network Slicing together with the MVNO concept will allow partnership with local entrepreneurs who can manage the marketing and commercial side of service delivery**
- **The use of a distributed MEC platform in each Village will reduce the amount of backhaul capacity required, normally a high cost for rural service delivery**
- **Opening the MEC platform to 3rd party application and service providers will further stimulate to the local village economy as well as ensuring that such services and applications are aligned to the local needs of individuals e.g. local peering with local information**
- **The ability to scale the solution to the demand for service – flexibility in varying the fixed cost**

5G Use Cases in Healthcare

Use Case Category

Patient Applications



Description

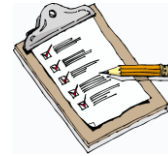
Patient centred applications used outside the traditional hospital environment

Hospital Applications



Applications used in hospitals for training and administration

Medical Data Management



Systems to manage and analyse patient records and other medical data

Other



Applications that facilitate quick access to medical assistance

Examples

- ☐ Precision Medicine
- ☐ Applications to monitor, alert and administer medicine

- ☐ Telemetry
- ☐ VR training in surgical procedures

- ☐ Electronic health records
- ☐ Real time delivery of data sets

- ☐ 3D printing
- ☐ Ambulance drones

5G Use Cases in Job Creation in Rural Areas

- The emergence of IoT and its relationship to the 4th Industrial Revolution will create a number of job opportunities in most vertical industries
 - Manufacturing
 - Automotive
 - Logistics and Transport
- Deploying connectivity in rural areas can also lead to easing the urban/rural digital divide, and could even lead to the scenario whereby companies would choose rural areas for HQ and campus locations instead of the cities:
 - Lower cost base
 - Better working environment and lifestyle
 - Upliftment of rural areas
- Revolutionizing current rural jobs especially in agriculture:
 - Providing data on weather, crops etc.
 - Helping farmers understand more about how they operate
 - How to increase yields especially through deploying IoT sensors

Challenges in Deploying 5G

- **Spectrum Ratification and Availability**
 - **WRC-19 will ratify spectrum bands for 5G later this year in Geneva (28th October to 22nd November)**
 - **National Regulators will then need to action allocation**
 - **In South Africa the current spectrum allocation impasse in terms of not having a specified and industry agreed to policy will have to be rectified.**
- **Availability of network deployment strategies, and in particular in hybrid scenarios. Included here is the need for architecture and platform innovation.**
- **Availability of a rich 5G device eco-system, including the need to address new device innovation for example within the IoT space.**
- **The availability of use cases and business models that have been monetized, or have the ability to be monetized**
- **The need to overcome operational complexity especially with the application of intelligence and automation.**

Conclusion

The benefits of 5G as an enabler of economic and social inclusivity have been discussed, including:

- **The generic benefit of economic growth as a result of broadband penetration**
- **The economic growth due to the use of mmWave technology**
- **Using the foundation technologies associated with 5G to extend connectivity into rural areas**
- **Use cases for 5G in healthcare and job creation in rural areas**

The challenges in deploying 5G were also discussed