



5G

Presentation to the Independent Communications Authority of South Africa (ICASA)

On the future of 5G Broadcasting

April 2022

THE ACT

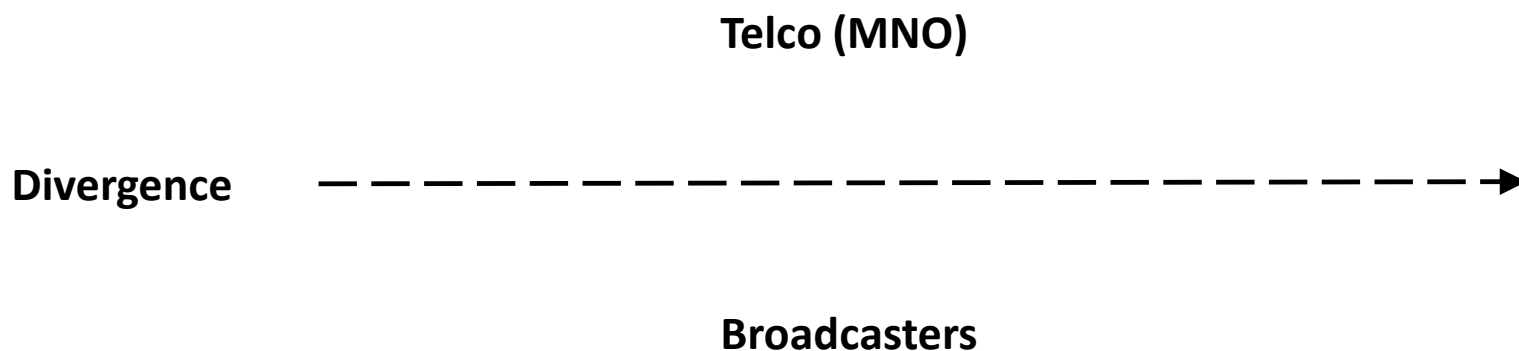
The Electronic Communications Act (ECA) 36 of 2005 during the drafting stage was titled the Convergence Bill.

In chapter 1 in subsection 2 the Object of the Act stipulates the following:- The primary object of this Act is to provide for the regulation of electronic communications in the Republic in the public interest and for the purpose to –

- (a) promote and facilitate the convergence of telecommunications, broadcasting, information technologies and other services contemplated in the Act;
- (b) promote and facilitate the development of interoperable and interconnected electronic networks, the provision of the services contemplated in the Act and to create a technologically neutral licensing framework;
- (c) promote the universal provision of electronic communications networks and electronic communications services and connectivity to all;
- (d) encourage investment, including strategic infrastructure investment, and innovation in the communications sector;
- (s) ensure that broadcasting services, viewed collectively- (i) promote the provision and development of a diverse range of sound and television broadcasting services on a national, regional and local level, that cater for all language and cultural groups and provide, entertainment and education and information.

THE ACT – What is really happening?

The events of the last few years including the recent 2021 Draft National Radio Frequency Plan seek to promote divergence. This has included the removal of broadcasting from spectrum post 700 MHz which is now being auctioned for future use by mobile telephony companies. eMedia supports the auction of the spectrum and during the process of DTT migration will in due course vacate this spectrum and occupy the spectrum below 694MHz which is reserved for broadcasting.



Digital convergence refers to the convergence of four industries, ITTCE (Information Technologies, Telecommunication, Consumer Electronics, and Entertainment).

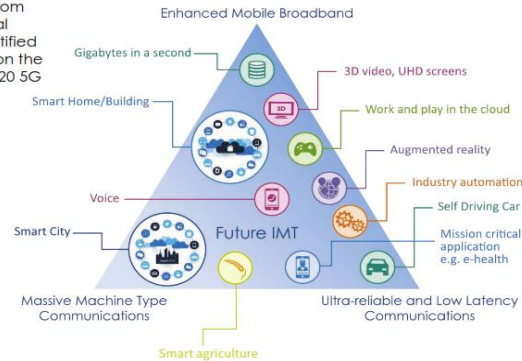
Technology has enabled entertainment to imminently include broadcasting.

IMT Service and Broadcasting

- In the latest Frequency Plan, spectrum below 700 MHz is allocated to broadcasters which would include 5G broadcasting.
- 5G broadcasting will bring free-to-air content to mobile phone users without requiring an internet connection.
- Companies in Europe are testing how 5G broadcasting will operate in the frequencies above and below 700MHz. The countries testing below 700MHz are those in which post 700MHz spectrum has already been licensed to the MNO's.
- Testing has shown that 5G broadcasting can co-exist with DTT systems in the sub 700 MHz bands. As the sub 700 MHz spectrum below has been set aside for broadcasting, this coexistence permits the development of 5G broadcasting as a future technology. This will allow for greater universal access to broadcasting services.
- As the spectrum above 700MHz has been auctioned to the mobile operators in South Africa, and given developments in technology which show that 5G broadcasting can coexist with DTT in the spectrum below 700MHz, eMedia intends to apply to ICASA for a testing license for purposes of testing 5G in the spectrum below 700MHz. eMedia will involve a team from ICASA in this testing which will demonstrate how 5G broadcasting is evolving.
- The next slides show how the standard for 5G broadcast/Multicast is evolving and developing.

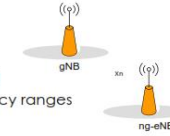
IMT-2020

The 5G NR access technology and the 5G core network from 3GPP will meet the potential deployment scenarios identified during the ITU-R discussion on the requirements for the IMT-2020 5G system



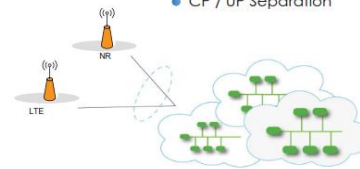
3GPP 5G NR

- Operation from low to very high bands: 0.4 –100GHz
- Ultra wide bandwidth (Up to 100MHz in <6GHz, Up to 400MHz in >6GHz)
- Set of different numerologies for optimal operation in different frequency ranges
- Native forward compatibility mechanisms
- New channel coding
- Native support for Low Latency and Ultra Reliability
- Flexible and modular RAN architecture: split fronthaul, split control- and user-plane
- Native end-to-end support for Network Slicing



5G Core Network

- Functional entities → Services
- Virtual Core
- Internal Communication: APIs
- Harmonized protocols
- Function/service exposure
- CP / UP Separation



Machine Type Communications

- EC-GSM-IoT
- eMTC (LTE-M)
- NB-IoT
- 5G Cellular IoT
- NR IIoT

3GPP LPWA KPIs

- Connection density
- UE Battery life
- Coverage extension
- UE complexity & cost

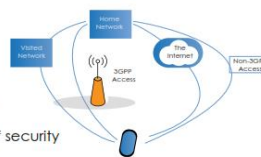
25.2 billion IoT connections

5.8 billion IoT subscriptions

Security architecture and procedures for 5G systems

TS 33.501

- Network access security
- Network domain security
- User domain security
- Application domain security
- SBA domain security
- Visibility and configurability of security



The Mobile Broadband Standard

- Self-driving Cars
- Industry Automation
- Smart Cities
- Smart Homes
- Work & Play in the Cloud
- Augmented Reality
- 3D video, UHD screens
- Gigabytes per second

Release 15

- NR
- The 5G System – Phase 1
- Massive MTC and Internet of Things (IoT)
- Vehicle-to-Everything Communications (V2x) Phase 2
- Mission Critical (MC) Interworking with legacy systems
- WLAN and unlicensed spectrum use
- Slicing – logical end-2-end networks
- API Exposure – 3rd party access to 5G services
- Service Based Architecture (SBA)
- Further LTE Improvements
- Mobile Communication System for Railways (FRMCS)

Release 16

- The 5G System – Phase 2
- V2x Phase 3: Platooning, extended sensors, automated driving, remote driving
- Industrial IoT
- Ultra-Reliable and Low Latency Communications (URLLC) enhancements
- NR-based access to unlicensed spectrum
- 5G Efficiency: Interference Mitigation, SON, eMTC, Location and positioning, Power Consumption, eDual Connectivity, Device capabilities exchange, Mobility enhancements
- Enhancements for Common API Framework for 3GPP Northbound APIs (eCAPIF)
- FRMCS Phase 2

Release 17

- NR MIMO
- NR Sidelink enh.
- 52.6 - 71 GHz with existing waveform
- Dynamic Spectrum Sharing (DSS) enh.
- Industrial IoT / URLLC enh.
- Study - IoT over Non Terrestrial Networks (NTN)
- NR over Non Terrestrial Networks (NTN)
- NR Positioning enh.
- Low complexity NR devices
- Power saving
- NR Coverage enh.
- Study - NR eXtended Reality (XR)
- NB-IoT and LTE-MTC enh.
- 5G Multicast broadcast
- Multi-RAT DSS enh.
- Multi SIM
- Integrated Access and Backhaul (IAB) enh.

- NR Sidelink relay
- RAN Slicing
- Enh. for small data
- SON / Minimization of drive tests (MDT) enh.
- NR Quality of Experience
- eNB architecture evolution, LTE C-plane / U-plane split
- Satellite components in the 5G architecture
- Non-Public Networks enh.
- Network Automation for 5G - phase 2
- Edge Computing in 5G
- Proximity based Services in 5GS
- Network Slicing Phase 2
- Enh. V2x Services
- Advanced Interactive Services
- Access Traffic Steering, Switch and Splitting support in the 5G system architecture

- Unmanned Aerial Systems
- 5G LoCaTion Services
- Multimedia Priority Service (MPS)
- 5G Wireless and Wireline Convergence
- 5G LAN-type services
- User Plane Function (UPF) enh. for control and 5G Service Based Architecture (SBA)

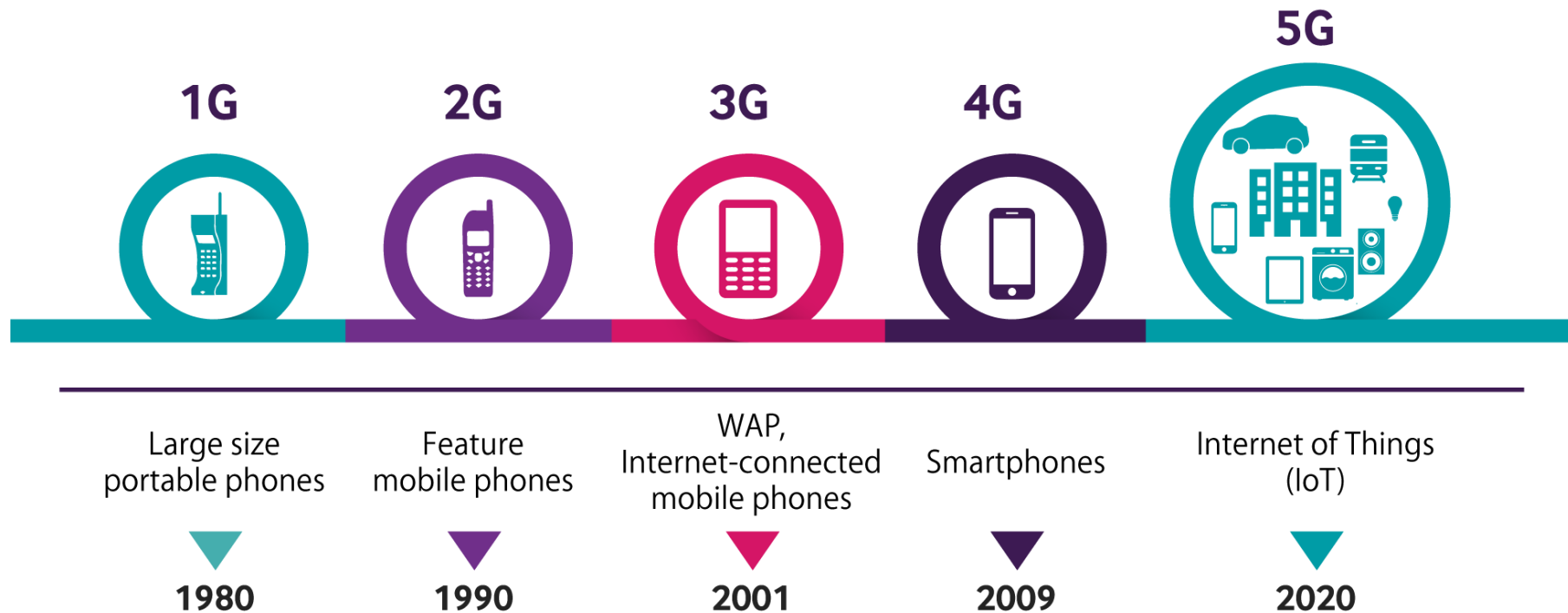
These are the Rel-17 headline features, prioritized during the December 2019 Plenaries (TSG#86)

Start of work: January 2020

www.3gpp.org/specifications/work-plan

Leapfrogging in the latest technological developments

Evolution of Mobile Communications from 1G to 5G (Internet of things)



New technologies allow previously separate technologies such as voice (and telephony features), data (and productivity applications), and video can now share resources and interact with each other synergistically.

5G for Broadcast – What is it ?

A new technology that is being developed and trialed in line with market requirements to address the shift in media usage. It allows broadcast content to be distributed directly to mobile devices. Unlike streaming, users do not need an internet connection to receive content on 5G-compatible end devices

The 5G Broadcast technology uses a process named FeMBMS (Further evolved Multimedia Broadcast Multicast Service). As a TV or radio broadcaster, this standard gives you the full spectrum of High-Power High Tower (HPHT) applications in the downlink-only mode for the first time by employing 5G

What's so special about FeMBMS?

- 100% downlink signal
- Supports SFN networks

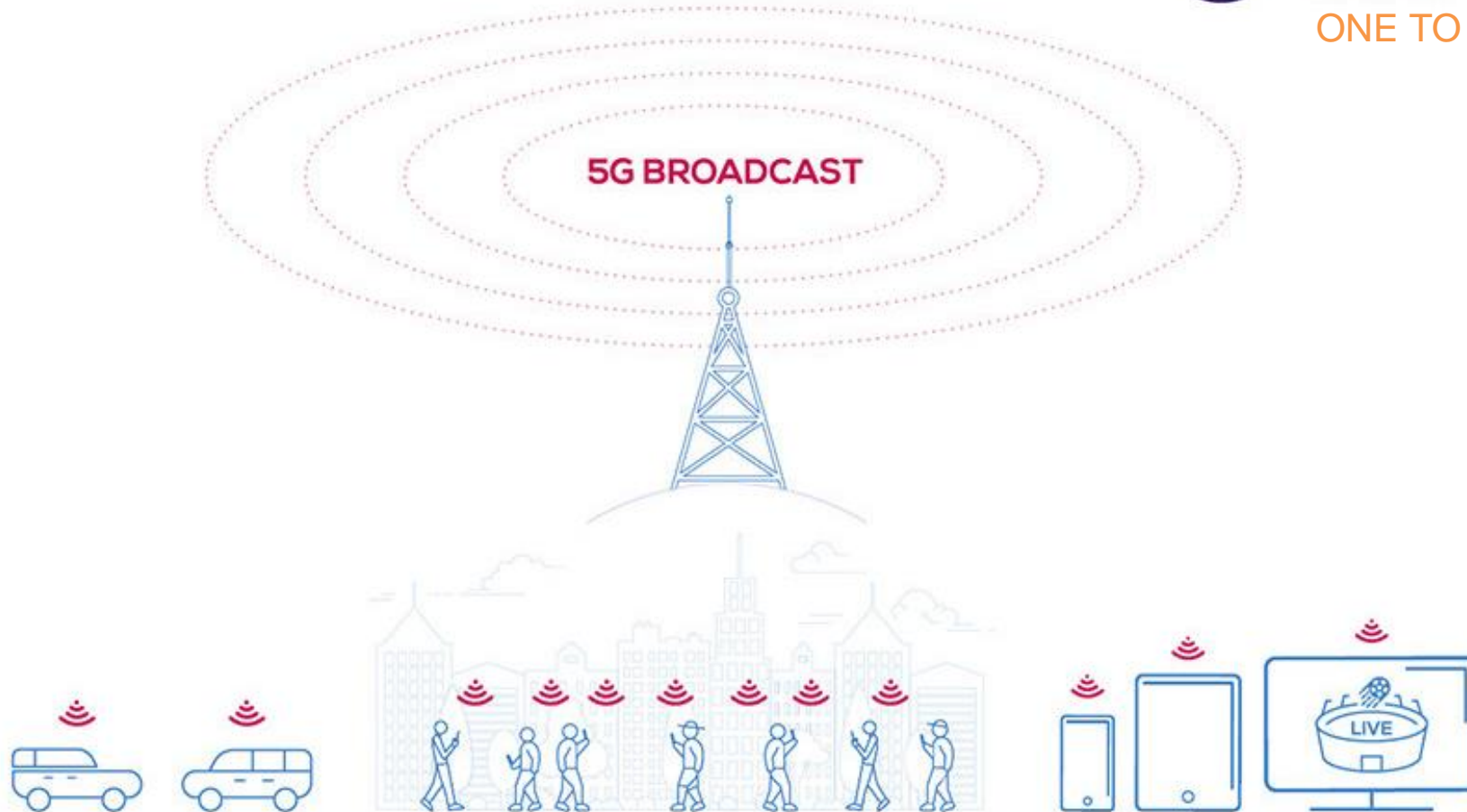
One of the biggest advantages of 5G Broadcast is that the distributed content can reach an unlimited number of users simultaneously. In contrast to mobile networks

5GBC



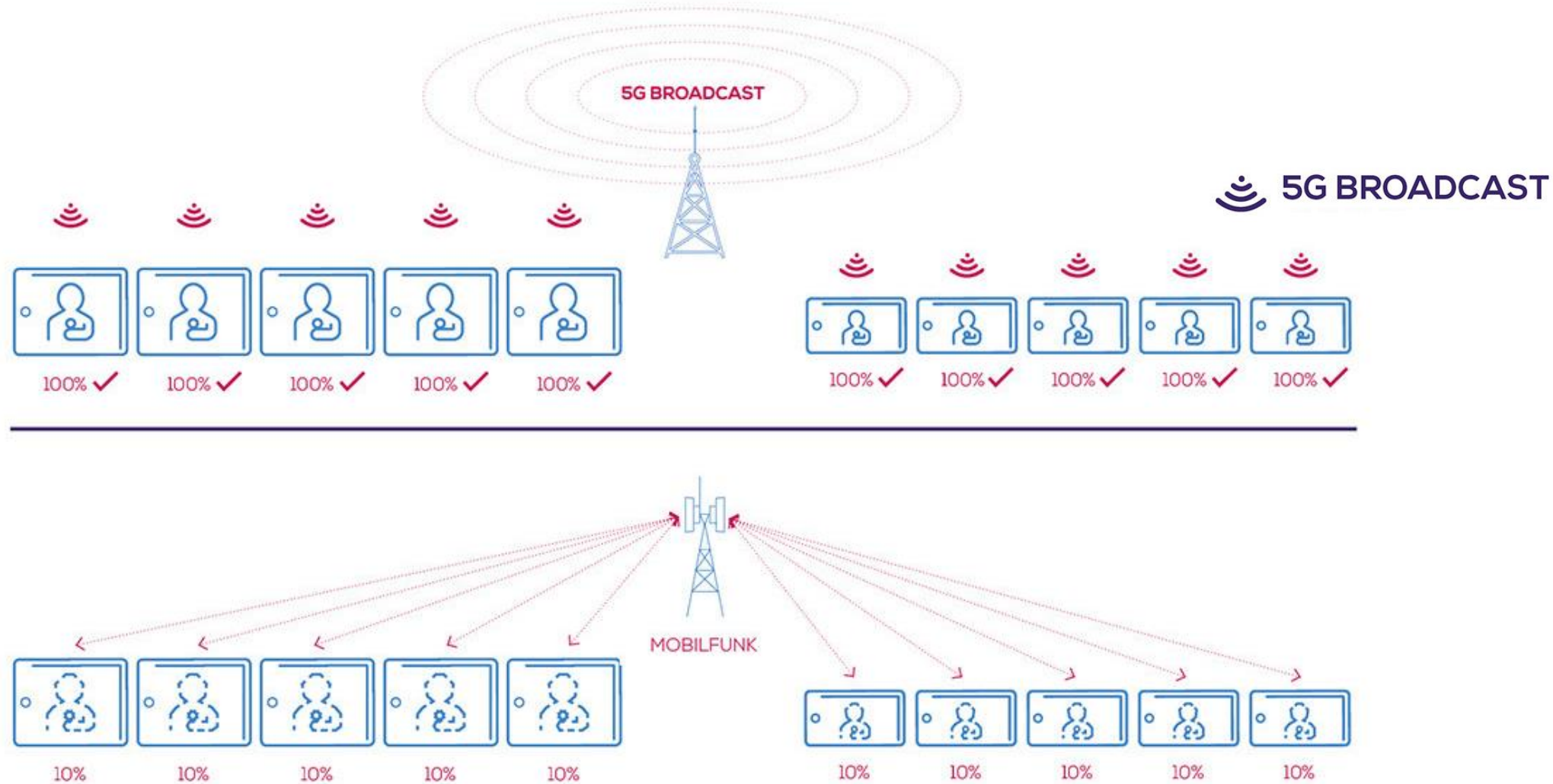
5G BROADCAST

ONE TO MANY DEVICES



With 5G Broadcast, a transmitter serves an unlimited number of users and devices.

5GBC



Unlike mobile communications, video data transmitted with 5G Broadcast will not consume any data volume of mobile contracts

5G defines two modes of broadcast communication

Standalone broadcast

Dedicated broadcasting network to provide a common delivery platform for richer contents and services

Addressing broadcaster requirements for content delivery



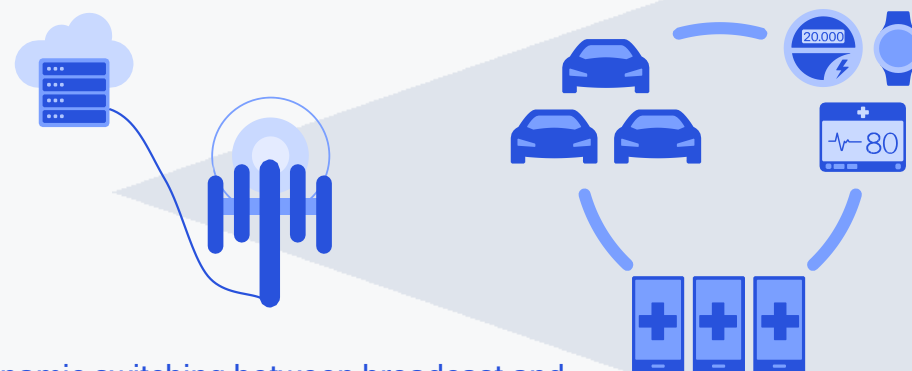
Single Frequency Network (SFN)
for downlink broadcast only

Live distribution of mass media content
e.g., digital TV, live sports, and digital signage

Mixed-mode multicast

Low-power network supporting dynamic mode switching between unicast and broadcast to more efficiently deliver identical content

Addressing mobile operator requirements for improved capacity



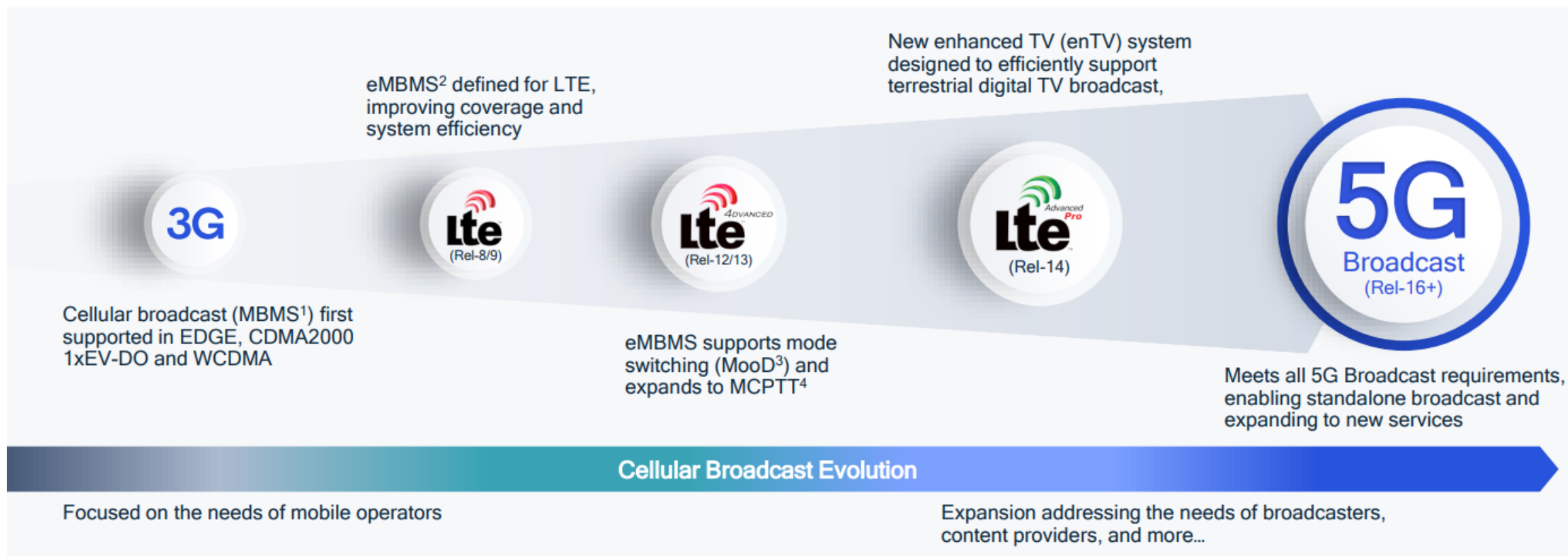
Dynamic switching between broadcast and unicast,

Broader 5G use cases

e.g., efficient eMBB delivery, SW/FW update, IoT, V2X, and public safety

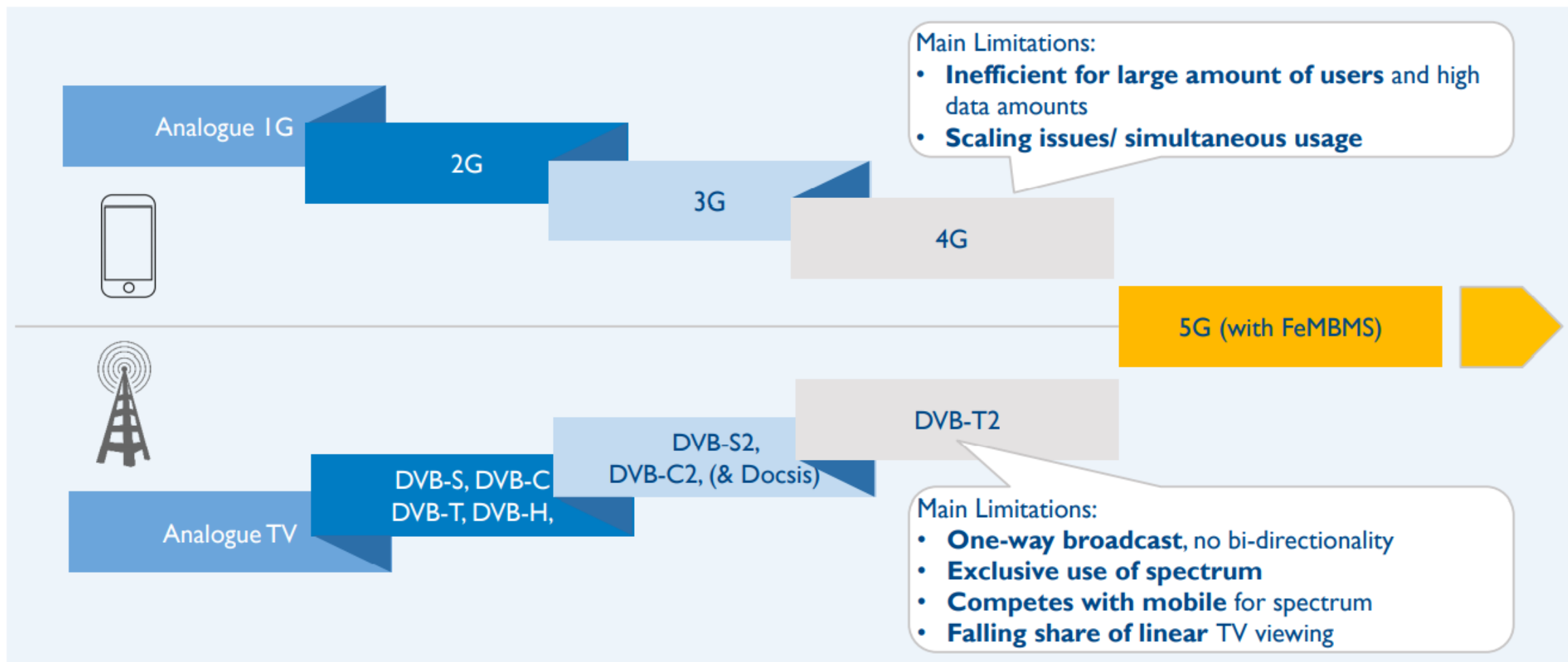
Addressing diverse ecosystem, deployment, and use case requirements

The Foundation for 5G Broadcast spans across generation



Building on the learnings from multiple generations of cellular broadcast

5G – Converging technologies for broadcasting and mobile broadband



Where in the world is 5GBC being tested?

Significant interests to pilot 5G broadcast for digital TV delivery

Germany

2020-22: 5G Media2Go audiovisual service for autonomous vehicles with Rel-14/16 enTV in Stuttgart/Heilbronn

2017-20: Distribution of TV with Rel-14 enTV in Munich and Bavarian alpine region

United Kingdom

2018-19: Distribution of linear and nonlinear BBC radio using Rel-12/14 broadcast in rural Orkney Islands

Spain

2020: Distribution of free-to-air linear radio and TV using Rel-14 enTV with HPHT in Barcelona

Colombia

2020-21: Delivery of TV and radio with Rel-14 broadcast trial deployment in Santiago de Tolú

Brazil

2020+: TV 3.0 project calling for proposals

Italy

2018: TV delivery with Rel-14 enTV using HPHT in Aosta during European Championship

2020: TV delivery to mobile devices with Rel-14/16 enTV using HPHT in Turin

Austria

2020-23: Distribution of TV and radio with Rel-14/16 enTV, also interplaying with eMBB in Vienna

South Korea

Late 2021: Distribution of live TV using Rel-16 enTV near Seoul

China

2019-20: NRTA¹ is cooperating with ABS² and CBN³ to setup 5G Broadcast field trials in Beijing

2022: Targeting to commercially deploy 5G broadcast by Winter Olympics in Beijing, and broader national expansion planned afterwards

India

2020+: Growing interest in latest broadcast⁴ technologies

Source: 5G-MAG and Qualcomm Technologies, Inc.

5G broadcast first in Russia

JUNE 3, 2021 07:48 EUROPE/LONDON BY CHRIS DZIADUL



NTV has become the first Russian TV channel to use 5G broadcast.

According to its parent company Gazprom-Media, it has opened a studio at the St Petersburg Economic Forum (PMEF-2021), from where, working in partnership with MegaFon, it will broadcast live 5G throughout the country.

5G broadcast progresses in Spain

JULY 28, 2021 09:19 EUROPE/LONDON BY CHRIS DZIADUL



Telefónica has carried out the first direct TV broadcast with 5G in Spain on the 700 MHz band.

According to the telco, it was undertaken in the town of Alcázar de San Juan and in collaboration with Castilla-La Mancha Media. Ericsson supplied the 5G radio infrastructure, while the 5G backpack of the Dutch manufacturer Mobile Viewpoint was provided by Ges-IT, its distributor in Spain.

5G for Broadcast Standard (3GPP)

3GPP manages the cellular standards: GSM, 3G UMTS, LTE; and now 5G. 3GPP, 3rd Generation Partnership Project is an industry collaboration that manages the standards for the on-going mobile communications systems. Unites Seven Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC)

3GPP sitting in September 2021, working on release 17 which has now formerly include 5G broadcast

3GPP Release 17

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The Solution and Opportunity

1. To investigate and understand the absolute use and the effectiveness of spectrum in the 5G world.
2. To investigate and understand that broadcasters can utilize the spectrum below 700MHz and coexist with the DTT.
3. To ensure that content can be delivered to the households in South Africa without the cost of data.
4. To capitalize on the fortuitous opportunity provided to South Africa by the delay in rolling out DTT.
5. This will not only enable eMedia to use the spectrum below 700 MHz for 5G broadcasting alongside DTT but will enable the auctioned spectrum above 700MHz to be used by mobile telephony companies after it has been vacated by all broadcasters in the near future.

THANK YOU