



Welcome – ATU Region



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Impact of mmWaves in Sub-Saharan Africa

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5G needs spectrum across three ranges



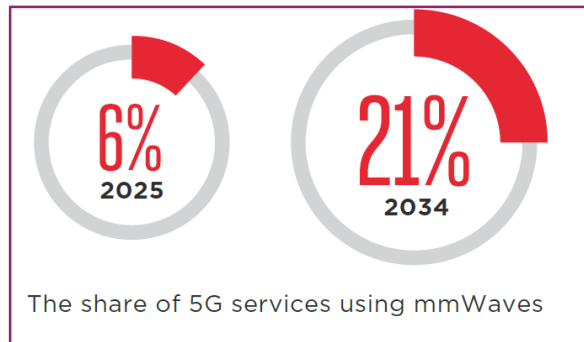
Sub-1 GHz
1 – 6 GHz
AND ABOVE
6 GHz



The socio-economic benefits of mmWave 5G (2020-2034)

Sub-Saharan Africa Edition

GDP impact of mmWave spectrum by 2034





Use cases for mmWave spectrum

5G: reaching it's full potential



**Remote
manipulation**



**Industrial
automation**



**Quick/temp.
deployment**



**High-speed
broadband**



**Virtual reality
and meetings**



**Next-gen
transport
connectivity**



A lot at stake – WRC-19

A successful identification of spectrum for IMT under Agenda Item 1.13 is vital to realise the full potential of 5G networks

The GSMA supports the **26 GHz and 40 GHz** bands

The GSMA also supports **66-71 GHz**

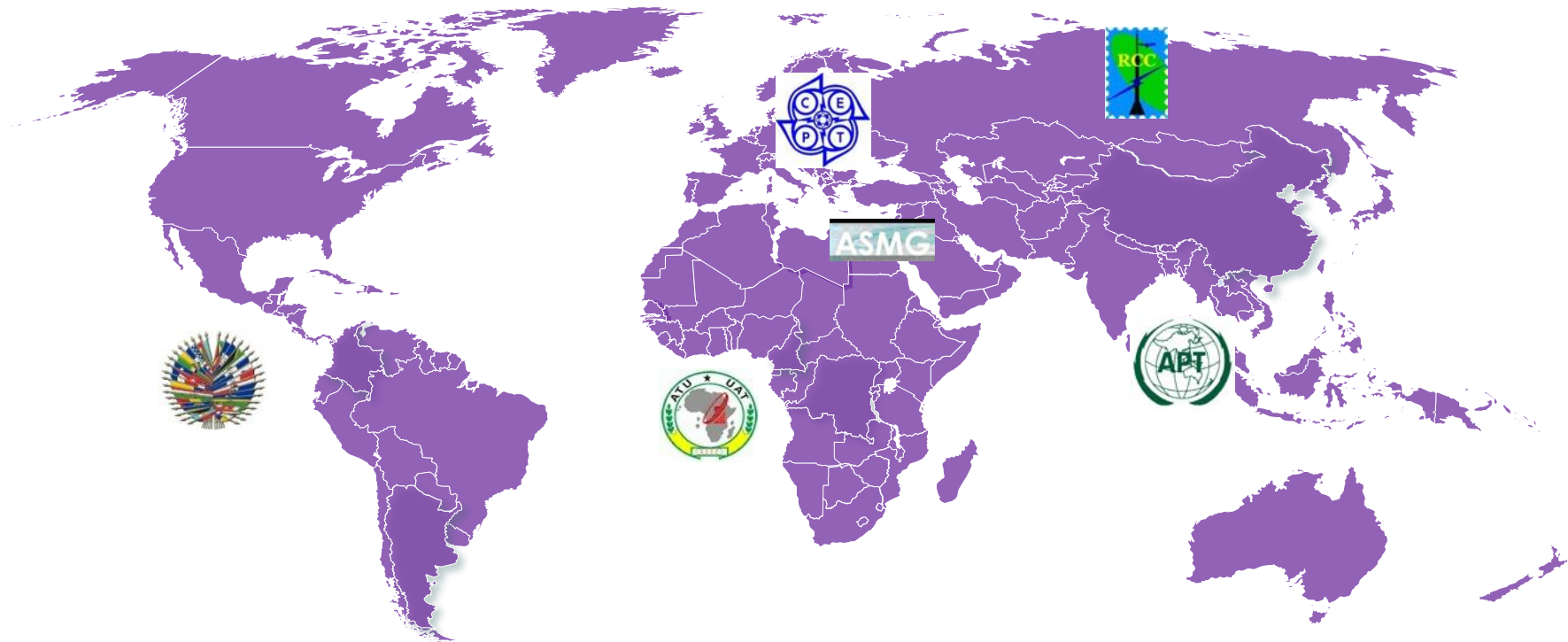
Due to the large amount of spectrum needed for 5G services, the range **45.5-52.6 GHz** also needs to be considered

Technical studies show coexistence between IMT and other services is possible

The result will have a major impact on the future of 5G



Target bands around the world





Mr Shergen Padayachee
Executive Head, Technology & Wholesale
Vodacom Group

Shergen Padayachee

Executive Head – Technology Regulation

Vodacom Group Regulatory

19 Feb 2019

The future is exciting.

Ready?

Spectrum for 5G - Lesotho's 5G Launch

« **Africa's 1st 5G
Network** »

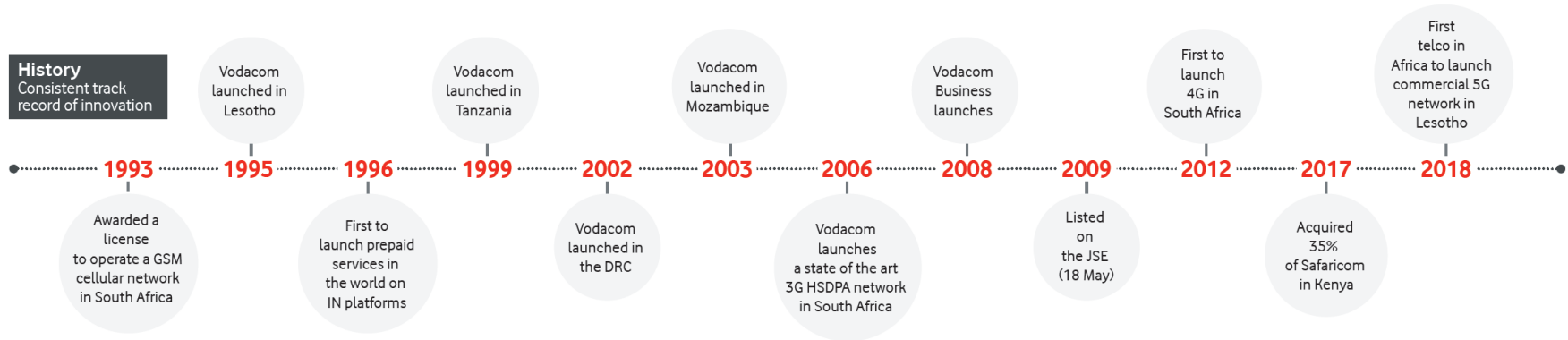


About Vodacom Group Limited

Vodacom is a leading African telecommunications company providing services to 109* million subscribers.

We operate mobile networks in 6 African countries namely South Africa, Tanzania, Mozambique, DRC, Lesotho and Kenya (Safaricom)

Vodacom is majority owned by Vodafone, one of the world's largest telecommunications company**



Vodacom Lesotho launched 5G | 1st Commercial 5G Network in Africa

(25 Aug'18)

5G Launch

- 1st in Africa, Commercial 5G service
- 3GPP Rel. 15 Non-standalone
- 1x100MHz on 3.5GHz spectrum
- Service: Fixed-Wireless with Dedicated Internet Access



World's 1st 5G 3GPP CPE

Customers in Lesotho



1st Commercial 5G Network in Africa | Key Enablers

- ✓ Technology readiness
- ✓ Investment capable & committed operator
- ✓ Investment friendly regulatory environment
- ✓ Availability of sufficient 5G Pioneer Spectrum
 - 1x100MHz of 3500MHz for Vodacom alone



Technology | What is 5G?

Characteristics

Enhanced
Mobile
Broadband

- >20Gbps peak speed; 100+Mbps user experience






Mission Critical
Control

- Extreme capacity
- Ultra-low latency: 1ms
- Optimised applications hosted at the edge

Massive IoT

- Billions of devices: 1 million / km²
- Long life (10 years); very low cost

Spectrum for Africa

	Hot Spot	Urban	Sub-urban	Rural
				
700 MHz (Coverage)		✓	✓	✓
3.5 / 3.7 GHz (Coverage & Capacity)	✓	✓	✓	
mm Wave (Performance)	✓			

Use-Cases



- **Fixed Wireless Access**
- Augmented / Virtual reality



- Precision farming, smart security and operations
- Remote telemedicine



- Industrial robotics
- IoT wearables
- Connected cities



Investment



- **Require new spectrum**
- Re-use of radio site grid initially
- **New Base Band and Radio equipment required**
- New antenna technology drives 5G performance



- Existing 4G core will be upgraded to support 5G NSA, new core for SA
- Mobile Edge Computing



- Expand fibre, upgrade equipment (10/100 Gbps), Phase sync, E-Band, SDN
- Transmission upgrades for 5G/GI LAN capacity and transmission network and facilities



4G vs 5G | What's the difference?



4G

Spectrum

Bandwidth

Transmit/Receive

Radio & Antenna

Speed

Latency

Device density

Architecture

Devices

- 1800MHz, 900MHz, 2.1GHz, 2.3GHz, 2.6GHz
- **20MHz** & Carrier Aggregation
- Frequency separation predominantly
- Antenna elements - 4x4
- **1Gbps**
- **<10ms**
- 100k / km²
- Central Core in primary data centre
- 4G Core (EPC – Enhanced Packet Core)
- Transmission – Microwave, Fibre
- Wireless router and Mobile smartphones

5G

- 700MHz, 3.5GHz, 3.7GHz, 26GHz (pioneer bands)
- **100MHz** & Carrier Aggregation
- Time separation predominantly
- New Radio (larger bandwidth, new coding)
- Antenna elements - 64x64, 128x128, beam forming
- **20Gbps**
- **1ms**
- 1 million / km²
- End-to-End Network slicing
- Non-standalone (EPC + 5G support), Stand-alone (5G core)
- Transmission – E-Band Microwave, Fibre (10 Gbps)
- Wireless router (2018) and Mobile smartphones (2019)



Concluding Remarks | Making 5G a Reality across Africa

- 5G needs large channel bandwidths ($\geq 1 \times 50\text{MHz}$)
- License spectrum now - no dependency on 5G standardisation process
 - License in minimum contiguous increments of $1 \times 50\text{MHz}$ or greater
- Harmonised spectrum is key to achieve economies of scale – critical for Africa
 - Pioneer bands – 3.5GHz, 3.7GHz, 700MHz and mm Wave eg: 26GHz
- 5G enables new promising use cases but does not replace 4G
 - Spectrum for 4G and spectrum for 5G
- One key 5G use case – fixed wireless alternative for fibre access





Elizabeth Migwalla
Senior Director Government Affairs-Africa
Qualcomm

GLOBAL HARMONISATION OF MILLIMETER WAVE SPECTRUM FOR IMT-2020

February 2019

Global mobile Suppliers Association

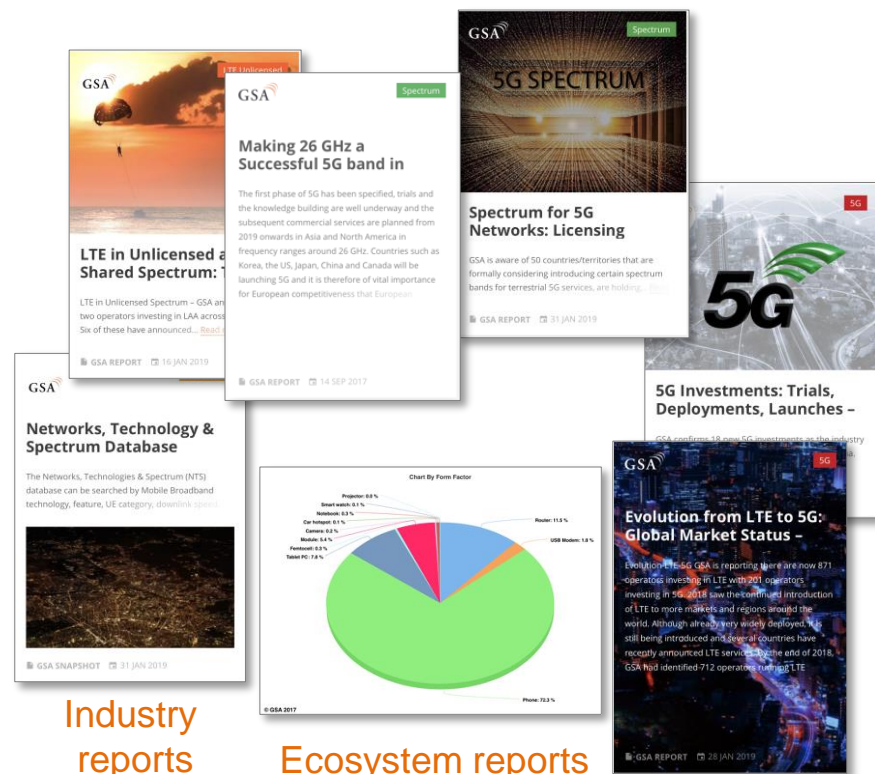


ABOUT GSA

See <https://gsacom.com/>

- GSA (the Global mobile Suppliers Association) is the *Voice of the Global Mobile Ecosystem* and has been supporting the industry since 1998
- GSA actively promotes the 3GPP technology and spectrum road-map – 3G; 4G; 5G – and is a single source of information resource for industry reports and market intelligence
- GSA reports are free to download and are based on our leading industry database – **GAMBoD**
- Regulators can access specific reports and consultation responses at <https://gsacom.com/regulators/>
- Regulator members have access to GAMBoD

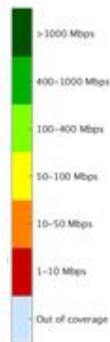
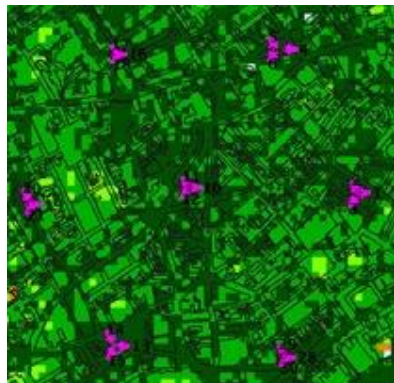
Spectrum reports



5G Reports

<https://gsacom.com/gambod/>

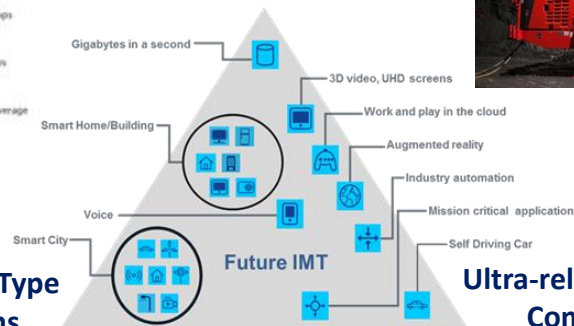
ENABLE A VARIETY OF USE CASES



Enhanced Mobile Broadband



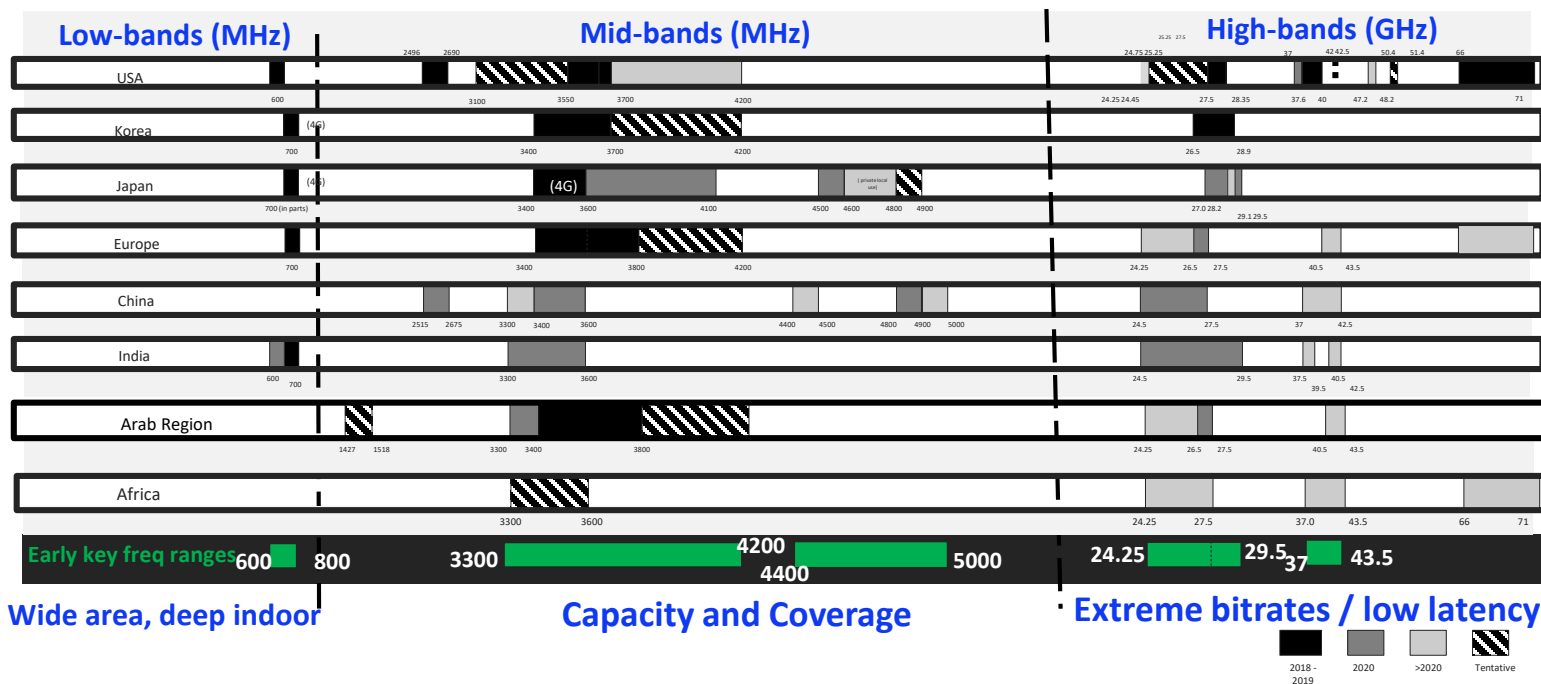
Massive Machine Type Communications



ITU-R M.2083

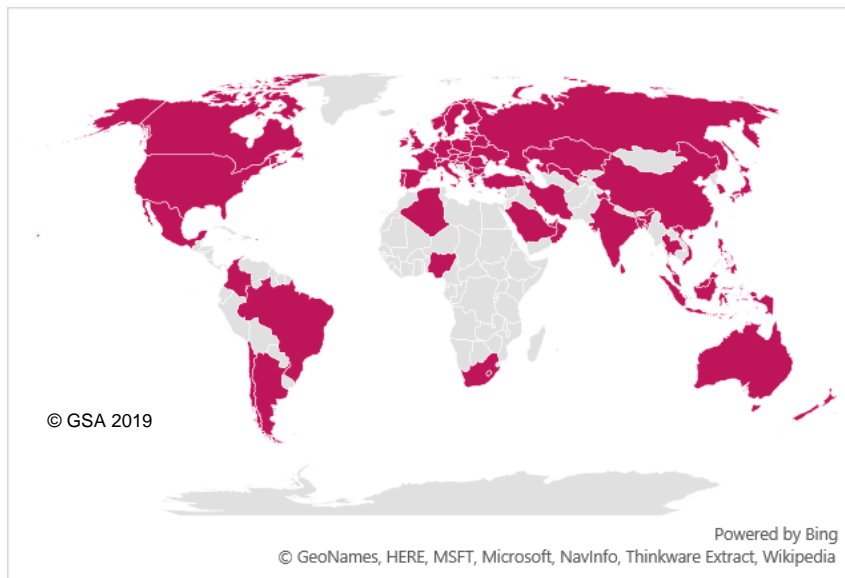


ENABLE A VARIETY OF FREQUENCY BANDS - EXAMPLES

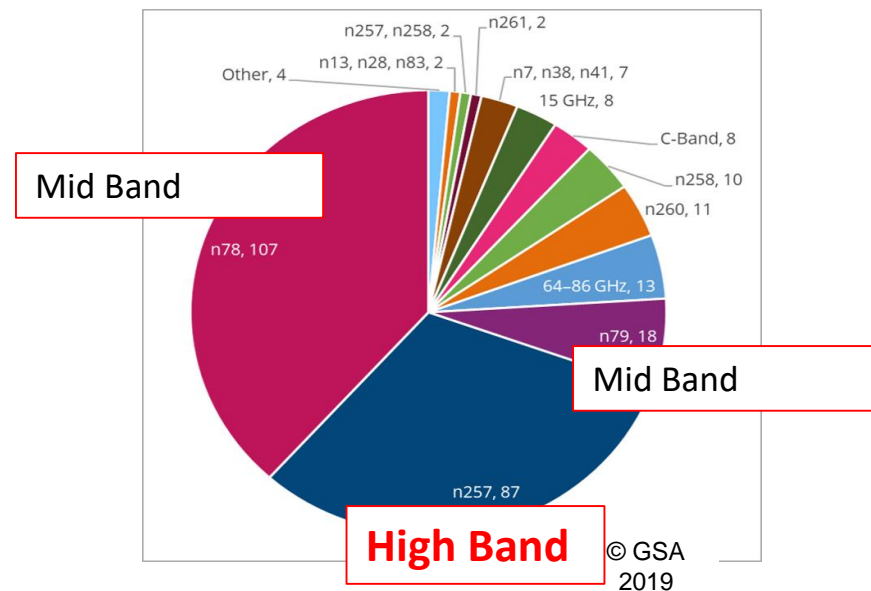


Key frequency ranges for early 5G NR deployments globally:
600/700 MHz, 3.3-5 GHz, 26/28 GHz and 37-43.5 GHz

*Tests/trials/launches:
201 operators, 83 countries*



*Spectrum bands used in IMT-2020 / 5G trials, mapped to
3GPP 5G spectrum band allocations (November 2018)*



3GPP

- Initial 3GPP standard (Rel 15) completed
- Work started on release 16
- mmWave frequency bands specified, in addition to mid and low bands

NR – mmWave			
Band	Frequencies GHz	BW MHz	Duplex mode
n257	26.5 – 29.5	50 – 400	TDD
n258	24.25 – 27.5	50 – 400	TDD
n259	[40.5] – 43.5	50 - 400	TDD
n260	37.0 – 40.0	50 - 400	TDD
n261	27.5 – 28.35	50 – 400	TDD

Commercial equipment

- 5G Infrastructure base stations, chipsets, 5G/Wi-Fi routers and phones available 2018 – 2020 to support frequency bands available
- 5G Operator commercial deployments commenced



**Key frequency ranges for early 5G NR deployments globally:
600/700 MHz, 3.3-5 GHz, 26/28 GHz and 37-43.5 GHz**



The Industry Voice of the Global Mobile Ecosystem

<https://gsacom.com>



Closing remarks

Luciana Camargos
Senior Director, Future Spectrum
GSMA



How will the industry prepare for 5G?

26 GHz

24.25-27.5 GHz

EESS (passive)
-32 to -35
dB(W/200MHz)

FSS / ISS sharing
studies show
significant
protection margin

40 GHz

37-43.5 GHz

EESS (passive)
Res 752 applies
Active band

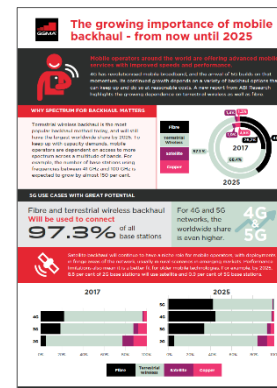
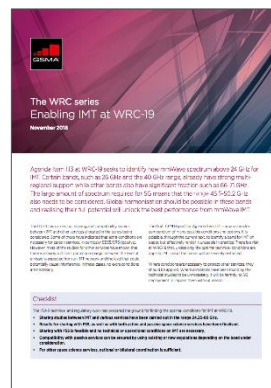
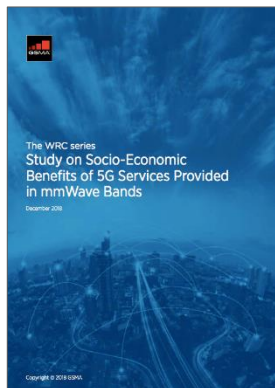
FSS sharing is a
national issue

66 GHz

66-71 GHz

Flexible use by 5G
systems

Enabling both IMT
and non-IMT
technologies



<https://www.gsma.com/spectrum/wrc-series>

<https://www.gsma.com/spectrum/5g-spectrum-guide/>



MOBILE CHANGES EVERYTHING

mmWaves: unlock the full potential of 5G