

Qualcomm

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5G For Developing Countries

WSIS Forum 2019
Thematic Workshop

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Introduction

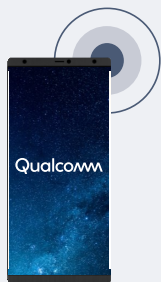


Leading mobile innovation for over 30 years



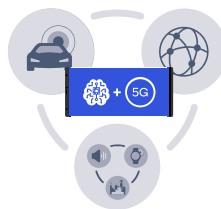
Digitized mobile communications

Analog to digital



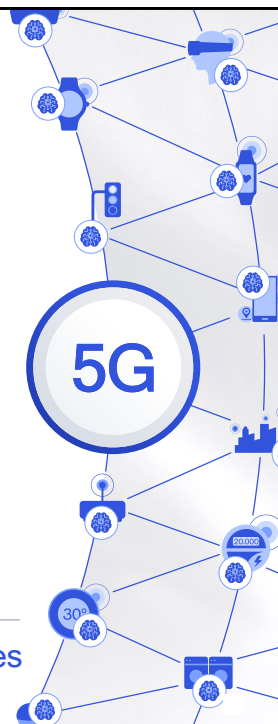
Redefined computing

Desktop to smartphones



Transforming industries

Connecting virtually everything at the wireless edge



Transforming how the world connects, computes and communicates

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

GSA

Spectrum reports

Making 26 GHz a Successful 5G band in Europe

The first phase of 5G has been specified, trials and the knowledge building are well underway and the subsequent commercial services are planned from 2018 onwards in Asia and North America. In Europe, the 26 GHz band is being studied for 5G and it is therefore of vital importance for European competitiveness that Europe...

■ GSA REPORT ■ 13 JUN 2017

Spectrum for 5G Networks: Licensing

GSA is aware of 5G countries/territories that are formally considering introducing certain spectrum bands for terrestrial 5G services. See list below.

■ GSA REPORT ■ 07 JUL 2017

LTE in Unlicensed Shared Spectrum

LTE in Unlicensed Shared Spectrum – GSA and 3GPP operators meeting in 5G shared. Six of these have announced...

■ GSA REPORT ■ 13 JUN 2017

Networks, Technology & Spectrum Database

The Networks, Technology & Spectrum (NTS) Database can be searched by NDSN (Broadband Technology Network ID) category...

■ GSA SNAPSHOT ■ 01 JUL 2017

5G Investments: Trials, Deployments, Launches

■ GSA REPORT ■ 01 JUL 2017

Evolution from LTE to 5G: Global Market Status

Over the past few years, GSA is reporting that the 5G market is growing rapidly. In 2017, the market is expected to reach \$12.2 billion, up from \$10.1 billion in 2016. This is due to the increasing introduction of 5G in more markets and reports from the market. Multiple 5G trials are in progress, with the first commercial 5G services expected to be launched in 2018. GSA has identified 72 operators that are...

■ GSA REPORT ■ 01 JUL 2017

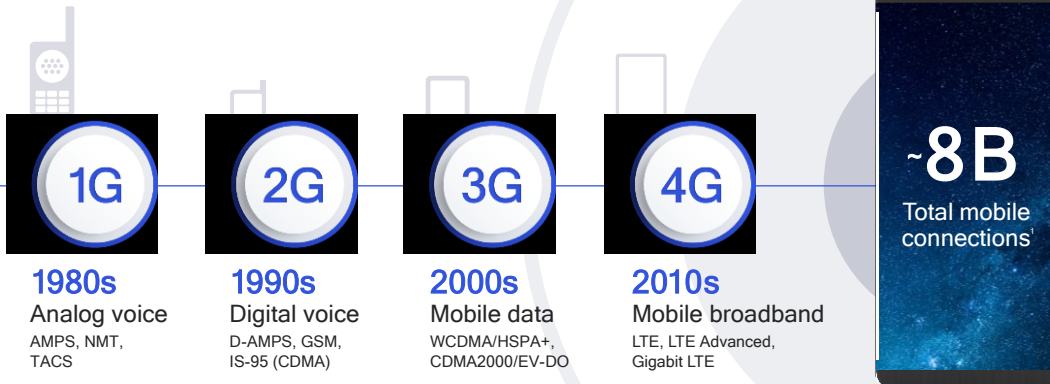
Industry reports

Ecosystem reports

5G Reports

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

Mobile is the largest technology platform in human history



1. GSMA Intelligence, July 2018, excluding licensed cellular IoT

A unifying connectivity fabric for society

Like electricity, you will just expect it everywhere



Scalable to extreme simplicity

Multi-gigabit speed

Ultra-low latency

Extreme reliability

Virtually unlimited capacity

On-device intelligence



A LARGE VARIETY OF NEW ADVANCED 5G USE CASES

Massive machine type communication

- Smart meters
- Tracking
- Fleet management
- IoT



Critical machine type communication

- Industrial applications
- Traffic safety and control
- Remote manufacturing



Enhanced mobile broadband

- Internet/applications
- VR/AR
- UHD Video
- New smartphones



Fixed wireless access

- Stationary, portable and transportable
- Enterprises
- Home
- Replacing fiber access



Why Does 5G Matter?

More than just faster 4G

Properties of 5G

- Lower latency
- Faster connection speeds
- Increased mobility
- Greater traffic capacity

Conducive to

- Faster broadband
- More connected devices
- Complex, intelligent networks
- Economy-wide impacts
- Mobile broadband
- Mission-critical control
- Internet of Things

Wide range of benefits

- Enabling ultra-low latency, high data-rate applications**
 - Virtual reality
 - Self-driving cars
- Rapid, massive-scale information exchange**
 - Cloud storage and processing
 - Artificial intelligence
 - Internet of Things
- Global economic impact**
Impact by 2035:
 - USD 12 trillion of goods and services enabled by 5G
 - USD 3.5 trillion 5G value chain
 - 22 million jobs
- Innovation platform**
 - Future 5G uses not yet identified

5G SPECTRUM APPLYING A MULTI LAYER APPROACH



Various applications and services will require access to appropriate spectrum from within the three layers already in the initial phase of deployments



High band

Layer for extreme capacity requirements

Above 6 GHz

(e.g. 24.25-29.5, 37-43.5 GHz)
1 GHz per MNO/Network



Mid band

Layer for both coverage and capacity

2 GHz to 6 GHz

(e.g. 2.3, 2.6, 3.3-4.2, 4.4-5 GHz)
100 MHz per MNO



Low band

Layer for extended coverage

Below 2 GHz

(e.g. 600, 700 MHz)

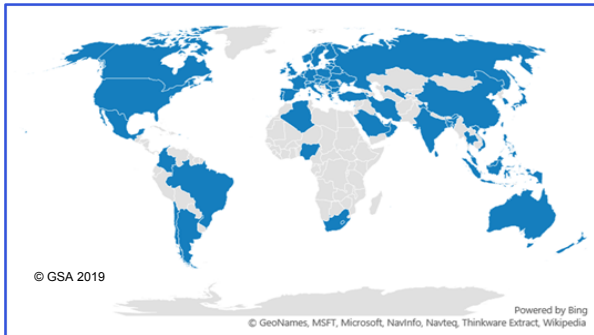
5G Global Developments



TRIALS AND FREQUENCY BANDS USED

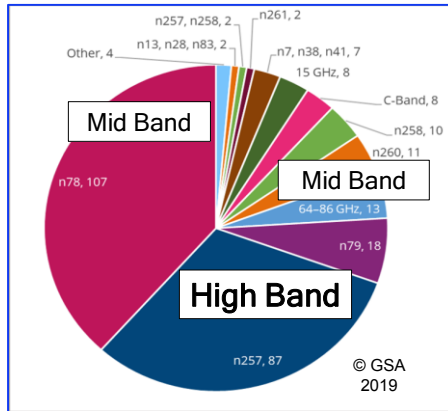


Tests/trials/launches:
201 operators, 83 countries

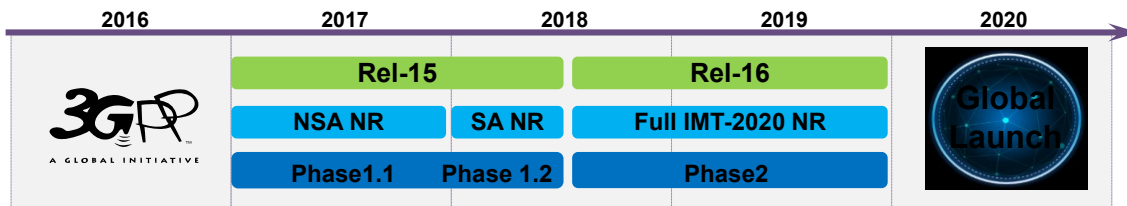


extracts from the GSA report "Global Progress to 5G - Trials, Deployments and Launches" available www.gsacom.com

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



5G STANDARDIZATION AND ECOSYSTEM DEVELOPMENTS



- Initial standard (Release15) is completed
- Work ongoing on Release 16
- mmWave frequency bands specified, in addition to mid bands and low bands

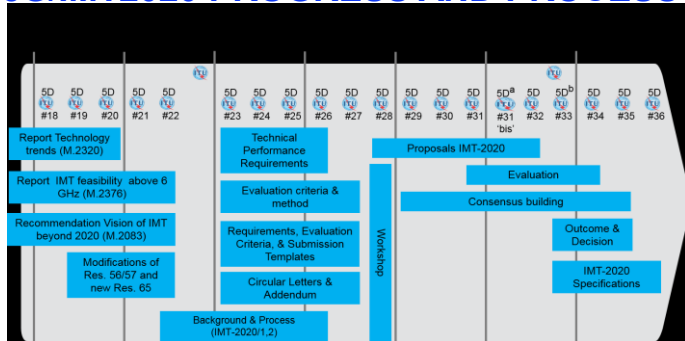
NR – mmWave (high bands)			
Band	Frequencies GHz	BW MHz	Duplex mode
n257	26.5 – 29.5	50 – 400	TDD
n258	24.25 – 27.5	50 – 400	TDD
n259	[40.5] – 43.5	50 - 400	TDD
n260	37.0 – 40.0	50 - 400	TDD
n261	27.5 – 28.35	50 – 400	TDD

Commercial equipment

- base stations, chipsets, routers are now available
- commercial deployments have commenced (e.g. Dec. 2018 in Korea)
- smartphones will be available in 2019



5G/IMT2020 PROGRESS AND PROCESS IN ITU-R



- The IMT process is designed to follow a particular technology across the Steps of the IMT “radio-interface-development” sequence and provides traceability in the life cycle from an RIT/SRIT initial submission (or an update to a technology) all the way into the ITU-R Recommendation that captures the final technology specifically in a “Recommends” section
- There is a need to assure that global interoperability and appropriate technical operations can be established and maintained, which is a key mandate of the ITU-R for globally meeting the connected society goals.

SUBMITTED PROPOSALS FOR IMT-2020



SPECTRUM RELEASE AND PLAN FOR EARLY 5G DEPLOYMENT

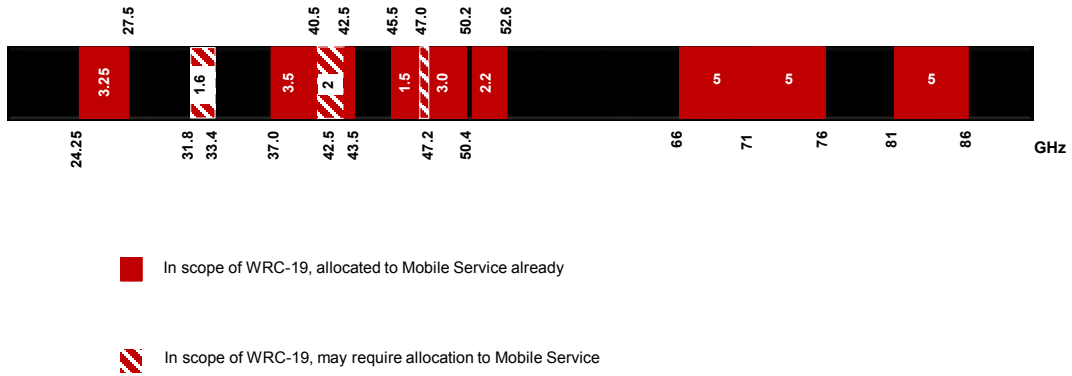


	Low Freq. (MHz)	Middle Frequencies (GHz)			High Frequencies (GHz)	
	600 / 700	2.6	3.3 - 4.2	4.4 - 5.0	26 / 28	40
USA	✓	✓	✓		✓	✓
Korea			✓		✓	
Japan			✓	✓	✓	
EU	✓		✓		✓	✓
China		✓	✓	✓	✓	✓
Arab Region			✓		✓	✓
Africa			✓		✓	

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

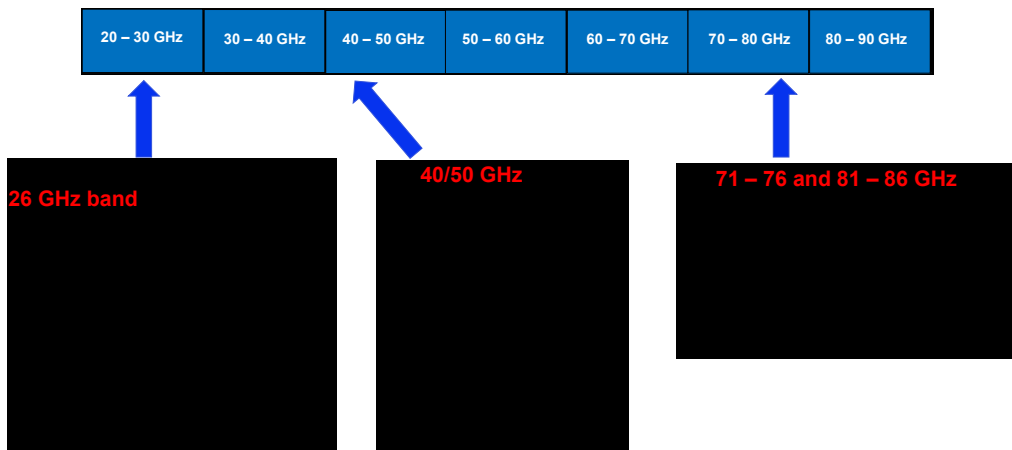
WRC-19 Agenda Item 1.13 – Spectrum for IMT-2020

Bands between 24.25 GHz and 86 GHz were studied for WRC-19 (Agenda Item 1.13)



WRC-19 Agenda Item 1.13 – Spectrum for IMT-2020 (Cont.)

Results of sharing and compatibility studies in ITU-R Task Group 5/1



Developing Countries Perspectives



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5G for developing countries

- Is 5G designed for developing countries and/or rural communities?
- Can developing countries afford to not/to implement 5G?
- Are there alternatives to 5G for developing countries?
- 5G implementation challenges for developing countries
- Implications for leapfrogging to 5G (Why or why not) for countries using 2G and/or 3G?
- Best practices on implementing flexible/elastic infrastructure for 5G and future technologies
- Affordability and accessibility for developing countries and/or rural communities
- What cost can make 5G attractive for developing countries

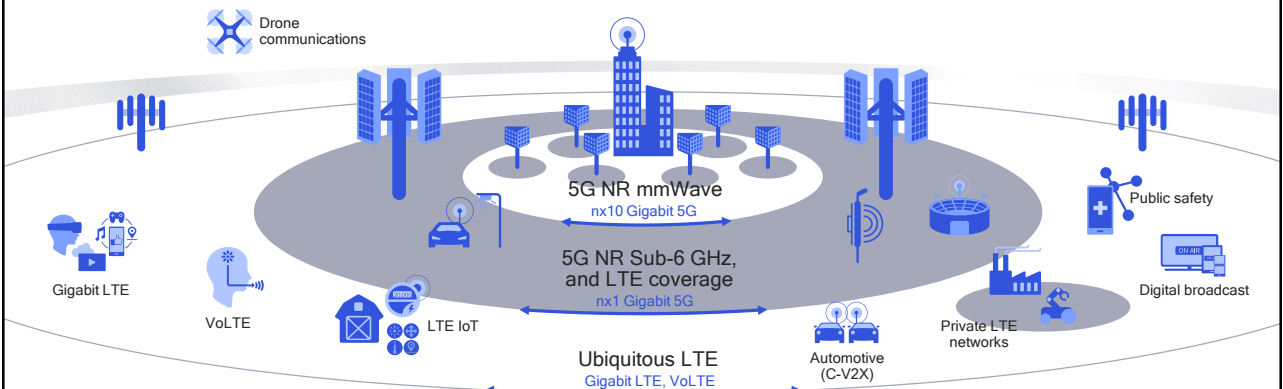
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National and Regional 5G Strategy

A comprehensive approach to integrating 5G into overall digital policy to foster the roll-out of 5G networks

- ✓ Regulatory and policy strategies to ensure affordable access to public assets (e.g., spectrum, rights of way)
- ✓ Increased regulatory harmonization, promoting economies of scale and enhancing cooperation on roaming, interoperability, device theft, Internet exchange points, and development of backhaul infrastructure
- ✓ **Establish a 5G strategy in the short term to foster spectrum harmonization**
 - ✓ Identify key 5G use cases to enable
 - ✓ Establish plans for the release of regional/globally harmonized spectrum

LTE Advanced Pro accelerates the 5G mobile expansion





Thank you!

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