

ITU WORKSHOPS

1st ITU Inter-regional Workshop on WRC-19 Preparation

21 - 22 November 2017

Geneva, Switzerland

www.itu.int/go/ITU-R/wrc-19-inwsp-17



1st ITU INTER-REGIONAL WORKSHOP ON WRC-19 PREPARATION (Geneva, 21-22 November 2017)

The Technology path from LTE to 5G

*Ericsson, Huawei, Intel, Nokia,
Samsung and Qualcomm*



90th Anniversary
CCIR - ITU-R Study Groups
(1927-2017)



Organized by

The Technology path from LTE to 5G



The Industry Voice of Global Mobile Suppliers

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Devices - Networks - Technologies - Spectrum - Databases

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📢 Promoting the family of 3GPP Technologies

ITU 1st Inter-regional workshop on WRC-19

Global mobile Suppliers Association



The Technology path from LTE to 5G

Spectrum

Making 26 GHz a Successful 5G band

The first phase of 5G has been specified and the knowledge building are well underway. Subsequent commercial services are planned for the 26 GHz band in Asia and North America. Countries around 26 GHz. Countries in China and Canada. It is therefore of vital importance that European competitiveness that European

LTE Unlicensed

LTE in Unlicensed Spectrum

GSA summarises LAA network trials as well as deployments, and the availability of chipsets, modules and devices. GSA welcomes additional

GSA REPORT | 3 OCT 2017

5G

Evolution from LTE to 5G - October 2017

This report is the latest update in a series of studies published by GSA tracking the development of mobile technology markets worldwide. We summarize network trials, deployments, and the availability of services across a variety of technology innovations and spectrum bands. Key metrics: 814 operators investing in LTE 644 commercially launched LTE or LTE-Advanced networks in 200

GSA REPORT | 12 OCT 2017

LTE

Progress to Gigabit LTE Networks

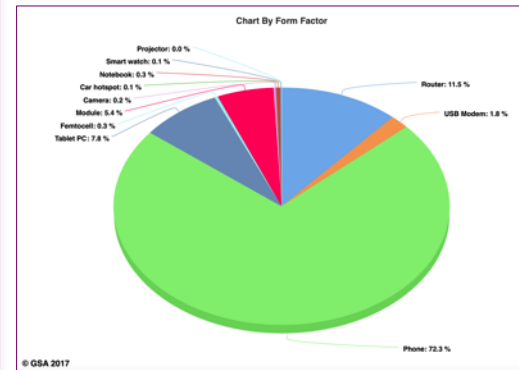
Over the past 12 months, mobile network operators and their vendor partners have been deploying a range of technology features... [Read more](#)

GSA REPORT | 5 OCT 2017

Report on the range 3300 – 4200 MHz C-band for 5G use



<https://gsacom.com>



Spectrum reports

Industry reports

Ecosystem reports

The Technology path from LTE to 5G

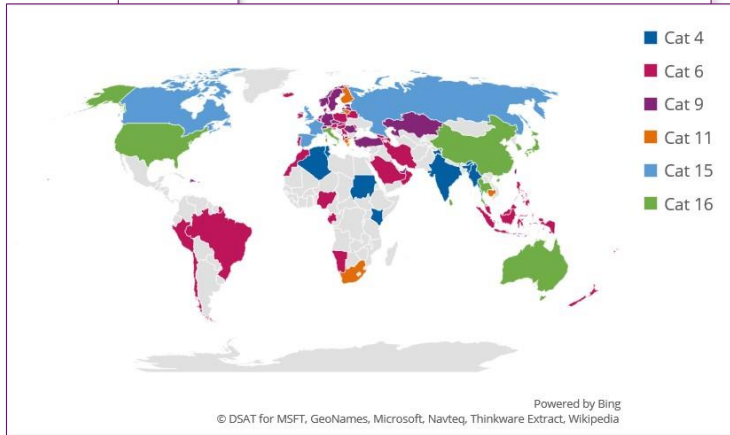
GSA

**Evolution from LTE to 5G -
October 2017 Update**

GSA LTE and 5G report based on intelligence gathered as part of the ongoing industry research program



<https://gsacom.com>



- 814 operators investing in LTE
- 644 commercially launched LTE, or LTE-Advanced, networks in more than 190 countries, including 100 LTE-TDD (TD-LTE) networks launched in 57 countries
- 212 launched networks are LTE-Advanced, in 105 countries
- Cat-16 networks now 6 % of total
- GSA forecasts 680 – 700 commercially launched LTE networks by end of 2017

The Technology path from LTE to 5G

Cable & Wireless Communications (Flow)	Antigua	Ooredoo	Qatar	Deutsche Telekom	Germany	Mobitel	Sri Lanka
Optus	Australia	Telekom Romania	Romania	Telefonica	Germany	TeliaSonera	Sweden
Telstra	Australia	MegaFon	Russia	Vodafone	Germany	Swisscom	Switzerland
3 Austria	Austria	MTS	Russia	3 Hong Kong	Hong Kong	Chungwha	Taiwan
Batelco	Bahrain	Rostelecom	Russia	Smartone	Hong Kong	Far Eastone	Taiwan
beCloud	Belarus	Tattelecom	Russia	Magyar Telecom	Hungary	AIS	Thailand
Proximus	Belgium	Tele2	Russia	Telkomsel	Indonesia	True Corp	Thailand
Telenet	Belgium	Vimpelcom (Beeline)	Russia	Fastweb	Italy	Turk Telekom	Turkey
Claro	Brazil	TIM San Marino	San Marino	Linkem	Italy	Turkcell	Turkey
Bell Canada	Canada	STC	Saudi Arabia	Telecom Italia	Italy	Du	UAE
Telus	Canada	Zain	Saudi Arabia	Vodafone	Italy	Etisalat	UAE
China Mobile	China	M1	Singapore	Wind	Italy	Arqiva	UK
China Telecom	China	Singtel	Singapore	KDDI	Japan	EE	UK
China Unicom	China	Starhub	Singapore	NTT Docomo	Japan	Vodafone	UK
Tele2 Eesti	Estonia	KT	South Korea	Softbank	Japan	Lifecell	Ukraine
Elisa	Finland	LG U+	South Korea	Viva	Kuwait	AT&T Mobility	USA
Sonera	Finland	SK Telecom	South Korea	LMT	Latvia	C Spire	USA
Bouygues Telecom	France	Telefonica	Spain	Alpha	Lebanon	Sprint	USA
Orange	France	Dialog Axiata	Sri Lanka	Celcom Axiata	Malaysia	T-Mobile	USA
				Telenor	Norway	US Cellular	USA
				PLDT	Philippines	Verizon Wireless	USA
				Smart	Philippines		



- 81 operators in 42 countries are currently investing in 5G
- more than 41 trials, most within the range 26.5 – 29.5 GHz for assessments of 5G networks performance, propagation, capacity, high vehicular speeds and applications
 - the lead countries are the USA, Korea, and Japan, according to national or operator announcements

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GSA views on agenda item 1.13 (IMT-2020, 5G)

24.25 - 27.5 GHz identification supported

- suitable for broadband by means of at least 400-500 MHz and up to 1 GHz per network of contiguous bandwidth for nationwide use

31.8 – 33.4 GHz not preferred

- not suitable for broadband use due to its moderate size

37.0 – 43.5 GHz identification supported

45.5 – 50.2 GHz identification supported

- suitable for broadband by means of at least 800 – 1000 MHz and up to 2000 MHz per network of contiguous bandwidth for nationwide use

50.4 – 52.6 GHz could be supported

- lower interest for broadband use due to its moderate size

66.0 – 71.0 GHz identification supported

- suitable for broadband use, both licensed and unlicensed use

71.0 – 86.0 GHz could be supported

- but is preferred for backhaul solutions

- in combination with identification around 3.5 GHz and/or 4.5 GHz, would provide optimal solutions to deliver on the 5G promises
- indeed at 3.5 GHz and 4.5 GHz solutions can expect to provide in excess of a couple of Gbps peak data rates over 100 MHz of contiguous bandwidth
- while above 24.25 GHz blocks of 400 - 1000 MHz of contiguous spectrum would, by means of higher order modulation techniques, provide peak data rates of the order of tens of Gbps

The Technology path from LTE to 5G

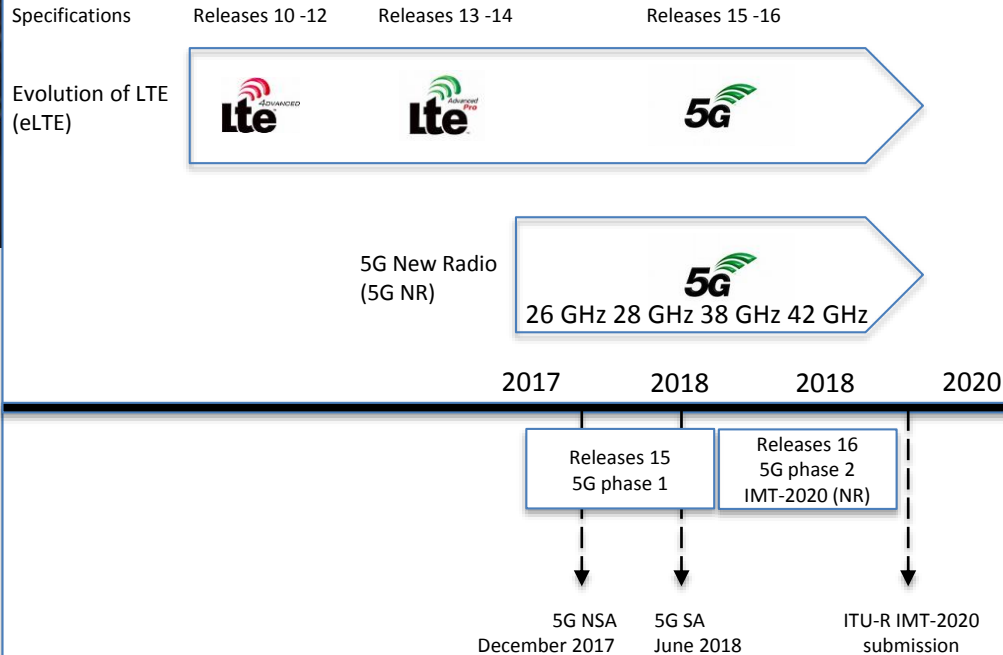
Regional status on 5G spectrum considerations and use;
general understanding of the GSA member companies

APT/APAC	still building views, some focus on 3.5 GHz, 4.9 GHz, support for 24.25 / 24.75 – 27.5 GHz, and also 26.5 – 29.5 GHz
ASMG	3.5 GHz, support for 24.25 – 27.5 GHz, and 42 GHz
ATU	support for 24.25 – 27.5 GHz, 37.0 – 40.5 GHz, 40.5 – 42.5 GHz and 42.5 – 43.5 GHz
CEPT/EU	700 MHz, 3.5 GHz, support for 24.5 – 27.5 GHz (studies are ongoing on coexistence conditions by December) and 42 GHz
CITEL	still ongoing work, a survey was performed collecting the country views which will be debated in a upcoming meeting
CJK	very similar to the situation as in APT / APAC above
RCC	support compatibility studies in bands 24.25 – 27.5 GHz, 31.8 – 33.4 GHz, 40.5 – 42.5 GHz and 66 – 71 GHz
US/C	600 MHz, support for 27.5 – 28.35 GHz, 37 GHz, and 38 GHz

on the WRC-19 agenda item 1.13, regional bodies' and their support for priority candidate bands for IMT identification under Resolution 238 (WRC-15), and support for sharing and compatibility studies for the band indicated, as well as other considerations

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3GPP status and evolution



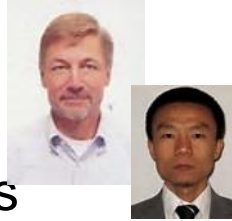
eLTE evolution for backwards compatibility securing smooth migration to 5G

5G NR for forward compatibility to ensure that new advanced features can be added over time, to efficiently addressing new use cases and requirements

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Region 3 team coordinators

- APT - Hakan Ohlsen
- CJK – Wang Hu



Region 1 team coordinators

- ATU – Elizabeth Migwall
- ASMG – Noel Kirkaldy

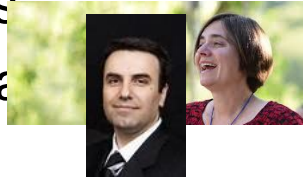


- CEPT/EU – Anne Leino
- RCC – Lidia Varukina



Region 2 team coordinators

- CITEL – Jayne Stancava
- US/C – Reza Arefi



The Spectrum Group within GSA is available to support regional and national regulators and policy makers

- the eight teams in the three Regions are supporting the work and studies towards WRC-19
- the team coordinators are the points of contact to provide support to the regional and national regulators and policy makers
- the 50+ team members will support the technical and regulatory work



Promoting the 3GPP Family of Technologies

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