

THE NEED FOR SPECTRUM HARMONIZATION

EXTRACT FROM THE
ERICSSON MOBILITY REPORT

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There is a need for spectrum harmonization between countries planning early 5G deployment. This needs to be done in addition to the current process for WRC-19, which focuses on spectrum for commercial 5G deployment beyond 2020

Following regulatory decisions made at WRC-15 in Geneva, the International Telecommunication Union (ITU) is commissioning international spectrum studies within its Radiocommunication Sector (ITU-R). The studies concern 5G mobile broadband systems of specific frequency bands in the 24.25-86 GHz range, as shown in the table on the right. This will pave the way for decisions in the fall of 2019. Such new spectrum decisions at the ITU WRC-19 will allow for standardized and commercial 5G deployments beyond 2020. This is good news for the future development of more advanced mobile broadband services.

Intensive work by ITU-R and 3GPP is also ongoing to finalize specifications and standards for deployment of 5G networks before 2020. These efforts need to take into account the challenges presented by the many different requirements of future 5G users. In addition, the different properties in the various frequency bands for 5G networks – primarily differing propagation characteristics and available bandwidths – must also be considered. Beyond 2020, the bands included in the ITU-R studies towards WRC-19 will play very important roles in the 5G deployments in many countries.

Mobile industry suppliers are already cooperating with some national regulators and operators in pursuing deployment of innovative 5G services. However, decisions taken at WRC-15 do not include studies of frequency bands below 24.25 GHz, a fact which has generated incentives for the mobile industry to find new ways to enable solutions for early deployments of 5G networks. Therefore, parts of the range 3,100-4,200 MHz is regarded as essential for early deployments of 5G.

In addition, the 27.5-29.5 GHz frequency range is not on the ITU-R list for WRC-19, although several countries



There is a particular need for spectrum harmonization between countries that are planning early 5G deployments

WRC-15 decision on frequency bands/ranges to be studied for 5G within ITU-R

Frequency bands/ranges (GHz)	
24.25-27.5	50.4-52.6
31.8-33.4	66-76
37.0-43.5	81-86
45.5-50.2	

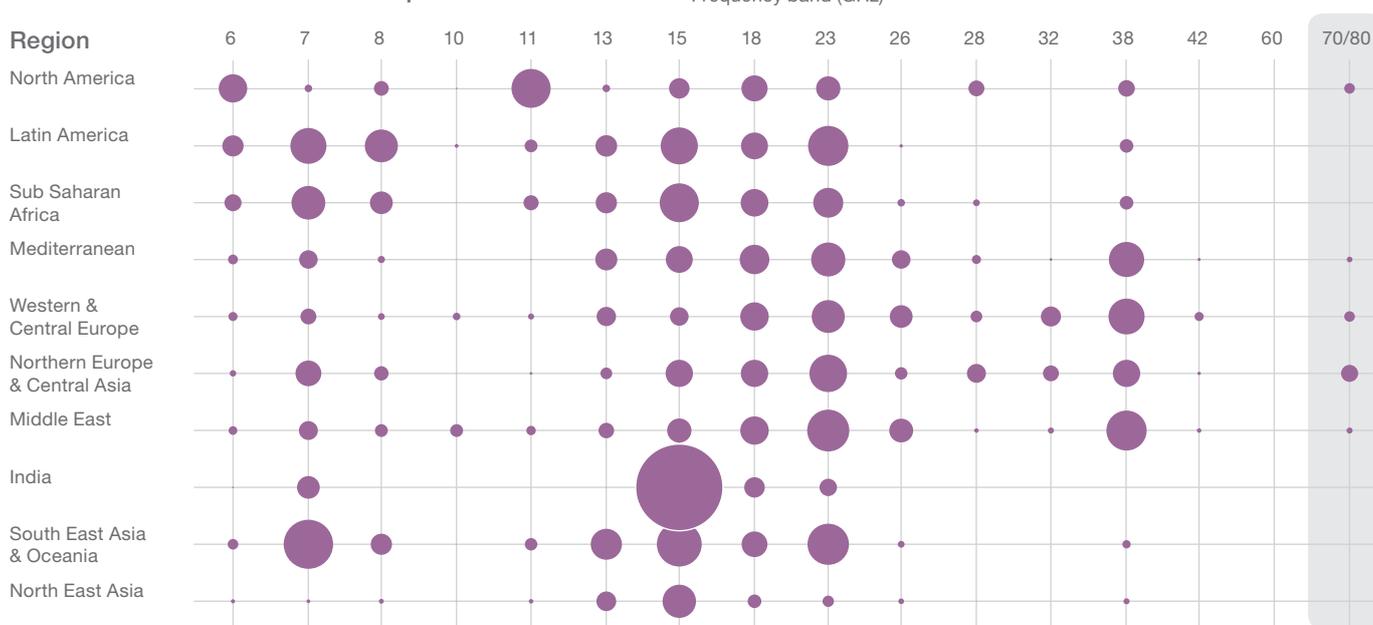
have expressed an intention to use all or parts of that band. In a number of countries, the 600 MHz band is also being considered for 5G services. The mobile industry is considering early 5G deployments in this band, following the spectrum auction in the US this year. Correspondingly, new uses in the 700 MHz band are being considered for early 5G deployments in Europe.

Backhaul spectrum for 5G networks also needs to be considered

Additional challenges exist for microwave backhaul for the evolution of 4G towards 5G. Frequency bands used for microwave vary greatly from one location to the next. This is because the most appropriate band depends on the regional climate and the national spectrum regulations, among other factors. In the figure on the next page, the size of each circle corresponds to the number of microwave hops in operation, which globally amounts to about four million.

As capacity needs have grown, the use of spectrum has shifted towards higher frequencies where larger channel bandwidths are more easily found. Less utilized backhaul frequencies have become more attractive, and about a decade ago the 26 GHz, 28 GHz, and 32 GHz bands were introduced. Since then, the use of these bands to support mobile broadband backhaul has increased in parts of Europe, Central Asia, North Africa and the Middle East. Use of the 38 GHz band is also prevalent in these regions, and is growing in the rest of the world. The attractiveness of the 70/80 GHz band is also increasing. It offers very wide bandwidth, enabling capacities in the order of 10 Gbps or more over distances of a few kilometers.

Global view on used microwave spectrum



Microwave backhaul has traditionally used higher frequencies, from about 6 GHz to 86 GHz, compared with mobile radio access systems. Mobile broadband networks use, or will use, frequency bands ranging from about 450 MHz up to about 5 GHz. Markedly, WRC-15 added some new bands in this range for 4G mobile broadband use, shown in the table below. For 5G systems, spectrum sharing and the ability to have more flexible spectrum use between mobile radio access and microwave backhaul are being pursued. This is primarily for the globally or regionally less used backhaul spectrum bands, such as 26 GHz and 28 GHz. Bands that are also expected to be heavily used for microwave backhaul, such as the new 70/80 GHz band, will need particular consideration.

Spectrum harmonization between countries moving forwards

In order to satisfy a very challenging need for global harmonization, mobile industry suppliers will introduce new



70/80 GHz band enables high backhaul capacities

technical concepts covering larger portions of the new spectrum ranges for countries to select from. This will certainly alleviate the early phases of 5G deployment.

A multiband spectrum approach needs to be addressed for both access systems and backhaul to enable the coverage, capacity and resiliency of 5G services.

ITU WRC-15 added frequency ranges for 4G mobile broadband systems (also possible for 5G use)

Frequency bands/ranges	Geographical distribution	Remarks/amount of spectrum
470–698 MHz (600 MHz)	Some countries in the Americas, and in APAC	Subject to auction proceeds in the US
694–790 MHz (700 MHz)	Global band, now also in Africa, Europe and Middle East, already allocated in the Americas and Asia Pacific (APT700)	60 MHz
1,427–1,518 MHz (L-band)	Global band, in many countries	91 MHz
3,300–3,400 MHz	Global band, in many countries, but not Europe and North America	100 MHz
3,400–3,600 MHz (C-band)	Global band, now in most countries, already allocated in Europe	200 MHz
3,600–3,700 MHz (C-band)	Global band, in many countries, some in APAC, but not in Africa	100 MHz
4,800–4,990 MHz	In some countries in Asia Pacific, and one country in the Americas	190 MHz

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