



NGMN BRIEFING PAPER

FUTURE IMT SPECTRUM GOALS FOR ITU WRC-15

Introduction

The NGMN White Paper on 5G mobile¹ published in February 2015 identified the critical importance of spectrum availability to deliver the vision for 5G. The new capabilities that 5G is expected to deliver, and the increasing demand for network capacity by consumers, will require additional spectrum, beyond that currently available to mobile operators or expected to be identified by WRC-15. Some of these capabilities will require very wide channel bandwidths that can only be accommodated in bands above 6GHz. NGMN therefore welcomes the proposals by several regional groups to include additional spectrum bands/ranges to be studied for IMT² on the agenda of WRC-19.

Summary of NGMN views on the new 5G spectrum requirements

1. NGMN believes that **additional new bands will be required** to support the new applications and services that future IMT is expected to deliver. The wide range of applications will require a correspondingly wide range of frequency bands to deliver them.
2. NGMN expects that operators will be able to deploy 5G (or future IMT) in their existing mobile bands that are identified for IMT.
3. Whilst in a 5G context access to additional spectrum above 6GHz is of interest, it should be emphasized that in general low frequency spectrum (below 6GHz) is absolutely essential for an economical delivery of mobile services and this holds true for existing systems as well as future 5G systems. Therefore, priority must be put on how to make more spectrum in those low bands available, and how to use that spectrum much more efficiently. Depending on the outcome of WRC-15, there may also be a need for a future Conference to consider further spectrum for mobile broadband, both for coverage and capacity.
4. NGMN notes that **new bands in addition to the bands currently under discussion for action at WRC-15 are required** because of the need to accommodate much wider channel bandwidths than are used in the mobile systems in operation today in order to support a new very high speed short range capability that is envisaged as an essential component of 5G. Today's 4G/LTE technology is limited to 20MHz channel bandwidths (aggregation of a limited number of these channels is possible). Early trials and demonstrations of potential future 5G technology components have used much wider channels, for example 500MHz, 1000MHz³. Recognising that a large number of bands could potentially be suitable, **NGMN advocates an agenda item for WRC-19 that covers a broad frequency range, for example bands in the range 6GHz - 100GHz.**

¹ NGMN 5G White Paper, February 2015. https://www.ngmn.org/uploads/media/NGMN_5G_White_Paper_V1_0.pdf

² Within the ITU terminology what NGMN terms 5G mobile is provisionally referred to as IMT-2020.

³ See the - Report ITU-R M2376- Technical feasibility of IMT in bands above 6 GHz <http://www.itu.int/pub/R-REP-M.2376>.

5. However, in order to keep the studies manageable and to focus on bands with best prospects, **the agenda item should indicate a specific set of bands for which studies could be focused and prioritized**, whilst not excluding any band from consideration by WRC-19 if sufficiently justified.
6. NGMN notes that **spectrum bands as close as possible to 6GHz are a priority** from the perspective of more favourable radio propagation characteristics, which may deliver greater coverage of base stations and may be particularly important to serve sub-urban and rural areas.
7. NGMN considers that **spectrum in the 6 – 30GHz range will offer the best technical characteristics** in terms of balancing propagation characteristics and available bandwidths.
8. NGMN considers that bands already allocated to mobile or fixed services may offer greatest potential for sharing with other existing services and suggests that **a specific number of bands should be studied within each of the following three broad frequency ranges**:
 - a. **6 – 20 GHz** (e.g. 5.9 - 8.5 GHz, 9.9 - 10.6 GHz)
 - b. **20 GHz – 30 GHz** (e.g. 21 - 23.6 GHz, 24.5 - 29.5 GHz, as well as other bands proposed by Regional Groups and by other multi-country proposals – see Appendix)
 - c. **30 – 86 GHz** (e.g. 31.8 - 33.4 GHz, 40 - 43.5 GHz, 66-76 GHz, 81-86 GHz, as well as other bands proposed by Regional Groups and by other multi-country proposals – see Appendix)
9. The **total amount of spectrum to be identified and the minimum block size should be part of the studies and investigations**. While for some future IMT applications a minimum bandwidth of about 200 MHz could be sufficient, for other applications wider bandwidth of c. 500 – 1000 MHz would be required. However, less than this minimum bandwidth could still be of interest in the lowest frequency ranges and larger bandwidths would in general support greater capabilities. The need to accommodate multiple channels and multiple networks should additionally be considered.

Appendix - Analysis of Regional proposals for IMT above 6GHz

Regional Group	Frequency ranges		
	6-20GHz	20-30GHz	30-86GHz
APG		25.25-25.5GHz	31.8-33.4 GHz 39-47 GHz 47.2-50.2 GHz 50.4-52.6 GHz 66-76 GHz 81-86 GHz
ASMG			Support the general principle of allocation of bands above 31 GHz
ATU	Support the general principle of allocation of bands above 6GHz		
CITEL	10-10.45 GHz ^[1]	23.15-23.6 GHz, 24.25-27.5 GHz, 27.5-29.5 GHz	31.8-33 GHz 37-40.5 GHz 45.5-47 GHz 47.2-50.2 GHz 50.4-52.6 GHz 59.3-76 GHz
CEPT		24.5-27.5 GHz	31.8-33.4 GHz 40.5-43.5 GHz 45.5-48.9 GHz 66-71 GHz 71-76 GHz 81-86 GHz
RCC		25.5-27.5 GHz	31.8–33.4GHz 39.5–40.5GHz 40.5–41.5GHz 45.5–47.5GHz 48.5–50.2GHz 50.4–52.6GHz 66–71GHz 71–76GHz 81–86GHz

Note: Analysis made on 1 October 2015 (any later proposals for the work of the WRC-15 are not reflected).

^[1] The band 10-10.45 GHz applies to countries listed in ITU Radio Regulations footnote 5.480.

About NGMN Alliance (www.ngmn.org)

The NGMN Alliance was founded by leading international network operators in 2006. Its objective is to ensure that the functionality and performance of next generation mobile network infrastructure, service platforms and devices will meet the requirements of operators and, ultimately, will satisfy end user demand and expectations. The NGMN Alliance will drive and guide the development of all future mobile broadband technology enhancements with a focus on 5G. The targets of these activities are supported by the strong and well-established partnership of worldwide leading operators, vendors, universities, and successful co-operations with other industry organisations.

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