

# **Spectrum Allocation for 5G International Framework**

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**Workshop on Economics, Finance and Business models for 5G and new Technologies  
for Digital Africa (RED-AFR19)**

**Session 4: Spectrum allocation for 5G - regulatory, economic and financial challenges  
Lomé, Republic of Togo**

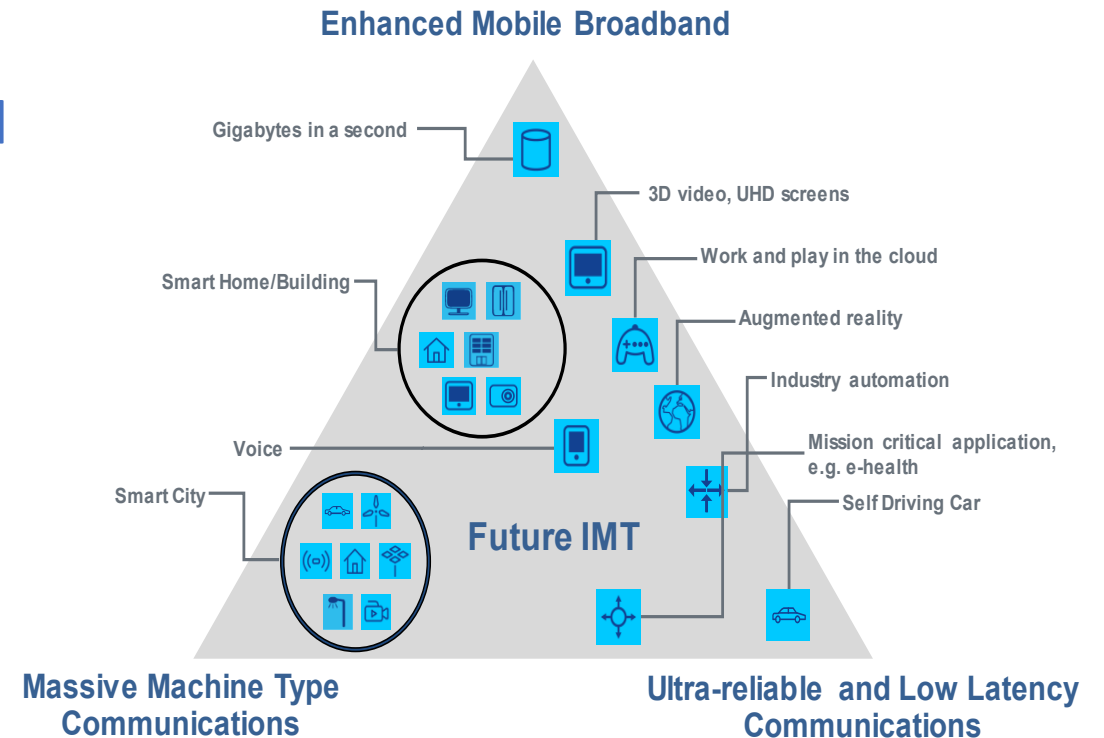
**9-11 September 2019**

# 5<sup>th</sup> Generación (5G) – IMT 2020

## *Connecting People and Things*

The 5G systems (IMT-2020) will provide:

- Improved performance for mobile broadband
- Actual data rates > 100 Mbps
- Peak rate of up to 20 Gbps
- M2M communications and smart devices
- 1 000 000 devices per km<sup>2</sup>
- Receptive and ultra reliable communications for mission critical applications
- Less than 4 ms of latency

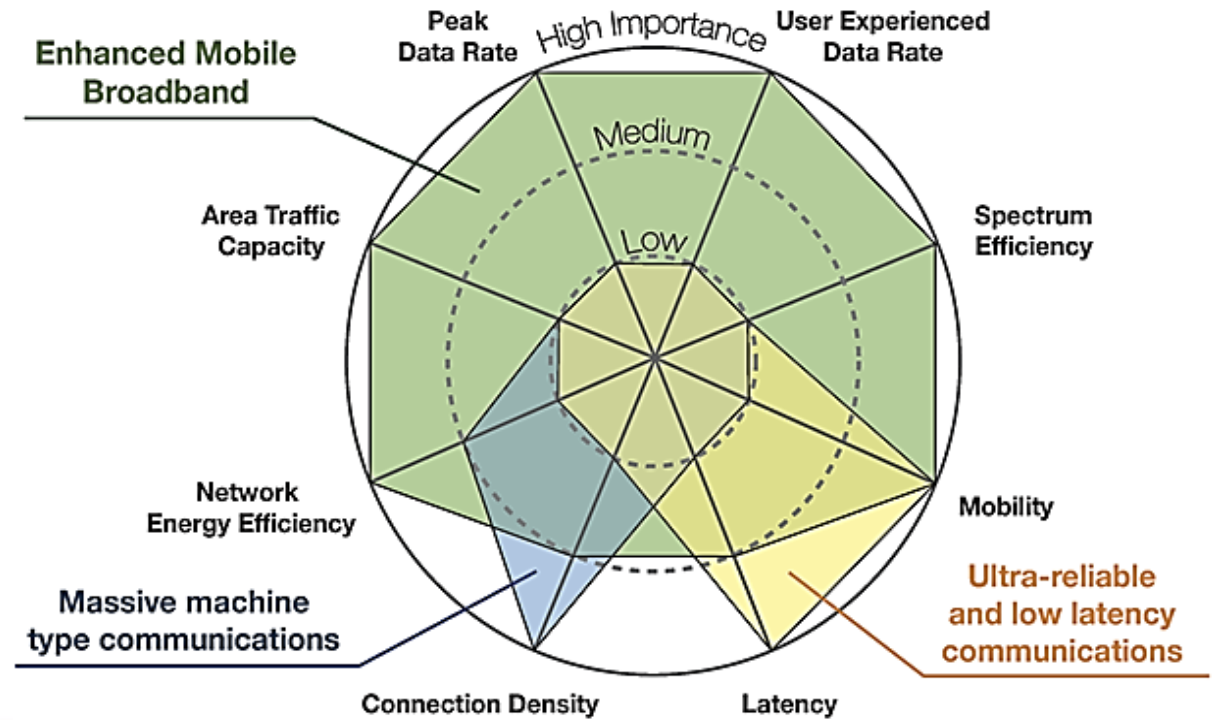
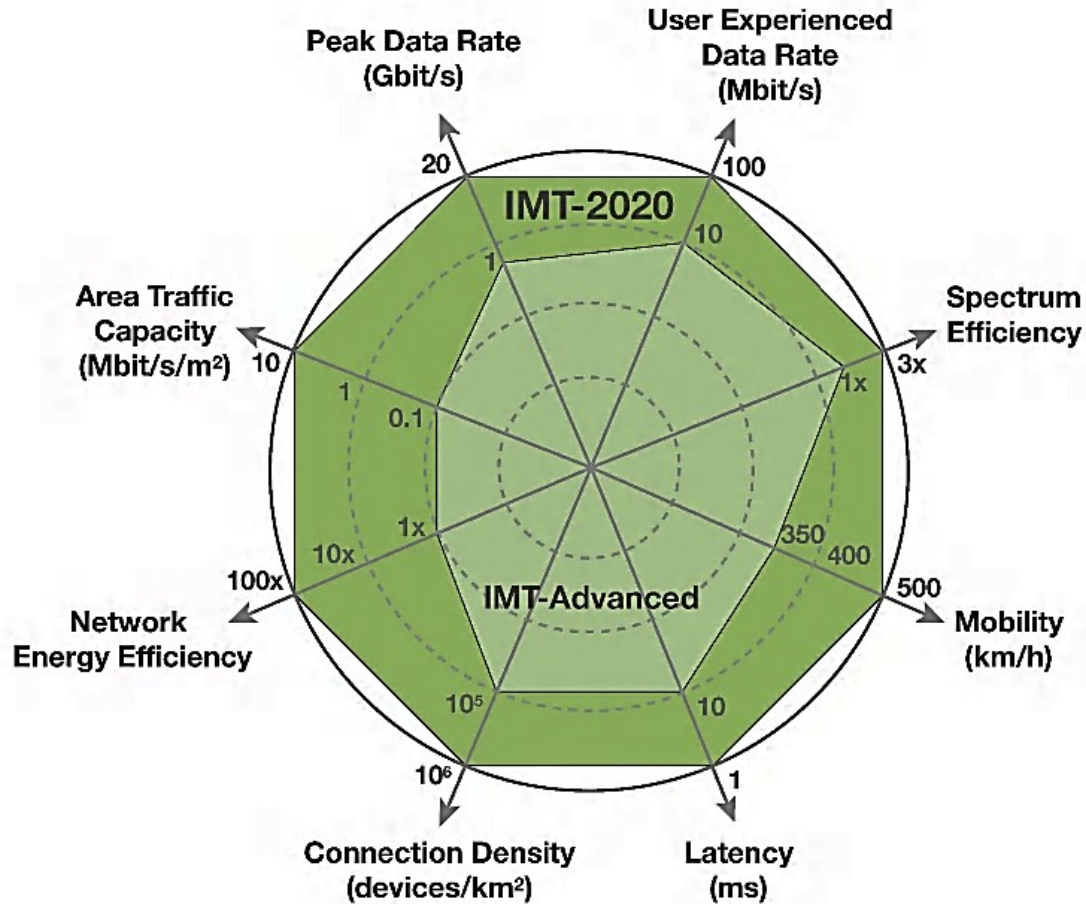


2020s

**WRC-19** will consider which frequencies above 24 GHz could be identified for IMT in the **Radio Regulations**

# 5<sup>th</sup> Generation (5G) – IMT2020

## IMT performances: from IMT-Advanced to IMT2020





# IMT-2020



- ITU-R Study Group 5 Process
- IMT-2020 Vision, overall requirements, radio interface specifications
- ITU membership, other standard making bodies
- Industry driven

- ITU WRC Process
- Mobile spectrum allocations and IMT identifications
- ITU membership, ITU-R Study Groups, Regional Groups, International organisations
- Member States driven

# Reglamento de Radiocomunicaciones, RR

El accionar del espectro no se puede limitarse a un territorio determinado; la coordinación internacional es necesaria

**Reglamento de Radiocomunicaciones (RR) de la UIT:** Tratado Internacional para la regulación internacional del espectro; elaborado y revisado por las administraciones y los miembros, durante las Conferencias Mundiales de Radiocomunicaciones (CMR)

El RR tiene un carácter vinculante para los Estados Miembros de la Unión. La UIT actúa como depositario del RR

Última versión: RR-12 (revisada durante la CMR-12). El RR se puede descargar, de forma gratuita, para el público en general, en los 6 idiomas de la ONU, en:

<http://www.itu.int/pub/R-REG-RR-2012>

# RADIO REGULATIONS, RR

Spectrum cannot be limited to a given territory; international coordination is necessary

ITU Radio Regulations (RR) is an International Treaty, elaborated and revised by administrations and membership, during World Radio Conferences (WRC); RR has a binding nature for ITU Member states.

ITU acts as depositary of RR

Last version: RR-16 (as revised during WRC-15)

RR can be downloaded, free of charge, for the general public, in the 6 UN Languages, at:

<http://www.itu.int/pub/R-REG-RR-2016>

# Spectrum for IMT

*World Radio Conference, WRC*

The **World Radiocommunication Conference (WRC)** modifies and updates the **Radio Regulations**

(for example, allocation / identification of frequency bands)

They are conducted every 4 years.

The next WRC will be in October 2019 (4 weeks)

Preceded by the **World Radiocommunication Assembly, AR-19**



# RADIO REGULATIONS, RR

**VOLUME 1:** Articles (60)

**VOLUME 2:** Appendices (23)

**VOLUME 3:** Resolutions (160) and  
Recommendations (24)

**VOLUME 4:** ITU-R Recommendations  
incorporated by reference (40)

**MAPS:** Set of Maps for App. 27



\* Non consecutive numbering, some with number and letters



## RR: FREQUENCY MANAGEMENT (Sect. II)

**RR, No. 1.16 allocation (of a frequency band):** *Entry in the Table of Frequency Allocations\* of a given frequency band for the purpose of its use by one or more terrestrial or space radiocommunication services or the radio astronomy service under specified conditions. This term shall also be applied to the frequency band concerned.*

**RR, No. 1.17 allotment (of a radio frequency or radio frequency channel):** *Entry of a designated frequency channel in an agreed plan, adopted by a competent conference, for use by one or more administrations for a terrestrial or space radiocommunication service in one or more identified countries or geographical areas and under specified conditions.*

**RR, No. 1.18 assignment (of a radio frequency or radio frequency channel) :** *Authorization given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions.*

\*Regulators commonly refers to it as: International Table of Frequency Allocations, IFTA, to easily remind its links to their respective national counterpart: National Table of Frequency Allocations, NFTA

NOTE: Most of dictionaries display the expressions “*Allocation*” and “*Assignment*” as being synonymous; in the context of Spectrum Management and Regulation they are different

# CATEGORY OF SERVICES

Category of Services (basis) might be in a:

- a) PRIMARY basis (indicated by capital letters)\*; e.g.: FIXED
- b) Secondary basis (indicated by lower case); e.g.: Fixed

**RR, No. 5.28** Stations of a secondary service:

**RR, No. 5.29** a) shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

**RR, No. 5.30** b) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;

**RR, No. 5.31** c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date\*\*  
(\*first in time, first in right)

\* In Arabic and Chinese versions, allocations in a primary basis are indicated by bold characters, it, e.g.:

• Primary:

• Secondary:      متنقلة بحرية      无线电定位

متنقلة بحرية      无线电定位

# RR: FREQUENCY MANAGEMENT

Allocations are granted to Radiocommunications Services

Assignments are granted to Radiocommunications Stations

RR in general does not deal with Allotments nor Assignments\*, because it is an sovereign and autonomous right of administrations

However, national Allotments and farther Station Assignments shall be consistent with its NTFA and also the RR (No. 4.4) e.g.: assignment of a TV Station, in a channel/area as defined on the National TV Plan, and only into a band allocated to Broadcasting Services

*Art. 4.4: Administrations of the Member States shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations in this Chapter or the other provisions of these Regulations, except on the express condition that such a station, when using such a frequency assignment, shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the Constitution, the Convention and these Regulations.*

\* Due to their inherent international coverage nature, some services in some bands need an allotment, that can be also accompanied by an international assignment of their associated stations (so called: Planned Bands, contained on Vol. 2: Appendices)

# RADIO REGULATIONS PRINCIPLES

RR is technically neutral, hence, it

1. Does allocate frequency bands to radiocommunication services
2. Does not allocate to specific applications
3. Does not allocate to particular technologies
4. Does not define users profile

e.g.: allocation can be made to: “*mobile*” (*service*; by default: terrestrial, land)

- not specifically to :

- a) cellular networks (*application*)
- b) GSM, LTE, Wimax, etc. (*technology*)
- c) Official/commercial/particular use

# RADIO REGULATIONS

**Other concepts:** In the allocation of frequencies (Art. 5), the use in the footnotes of the expressions: "identified" and "designated" expresses **in a non-binding manner (there is no regulatory definition)** the interest / intention of some administrations in a future use of that band for a specific application in view of the harmonization of the use of that band in the medium and long term\*

**RR, Nos. 5.138, 5.150:** Bands designated for industrial, scientific and medical (ISM) applications.

**RR, No. 5.552A:** Bands designated for use by high altitude platform stations

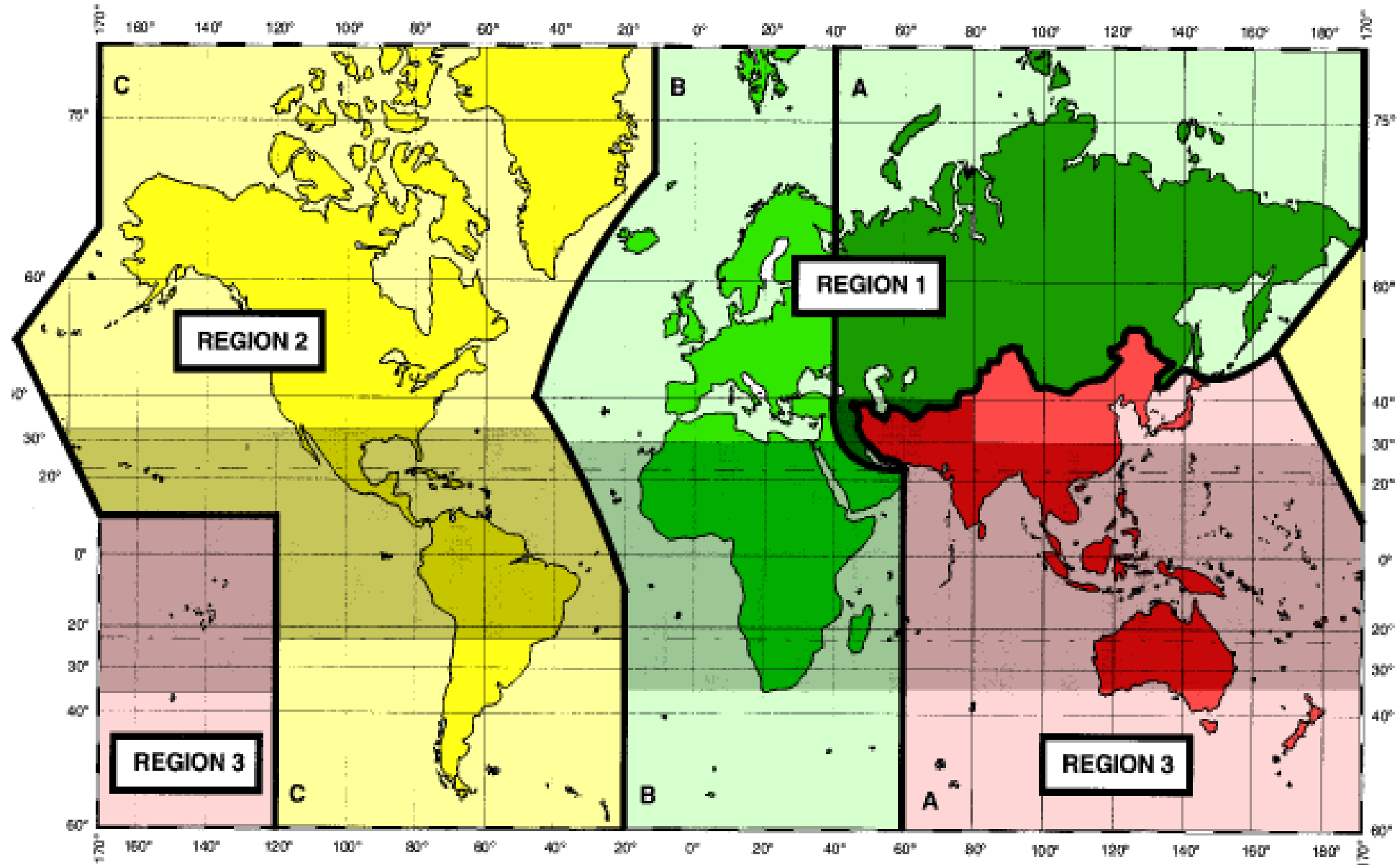
**RR, No. 5.516B:** bands identified\* for use by high-density applications in the fixed-satellite service

**RR, Nos. 5.286AA, 5.313.A, 5.317A, 5.3: 84A, 5.388, 5.430A. 5432A, 5.432B, 5.433A:** Bands identified\*\* for International Mobile Telecommunications (IMT)

\* Despite its non-binding nature, "identification" has been very useful for regulatory agencies that have taken it as a support to award (at national level) these bands to IMT applications

\*\* Footnotes stated that: "*This identification does not preclude the use of this band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations*".

# RR REGIONS



# RR: Table of Frequency Allocations

Allocation to services			
Region 1	Region 2	Region 3	
495-505			← Harmonized
505-526.5	505-510	505-526.5	
MARITIME MOBILE 5.79 5.79A 5.84	MARITIME MOBILE 5.79	MARITIME MOBILE 5.79 5.79A 5.84	
AERONAUTICAL RADIONAVIGATION	510-525 MARITIME MOBILE 5.79A 5.84	AERONAUTICAL	← PRIMARY
	AERONAUTICAL RADIONAVIGATION	Aeronautical mobile	← Secondary
	Land mobile		
Footnote (below)	Footnote (right)	CO-PRIMARY	Shared: PRIMARY and Secondary
90-110			
RADIONAVIGATION 5.62 Fixed 5.64			

# IMT from RR to National Spectrum Rules

Band (MHz)	BW (MHz)	Footnote RR
450 - 470	20	5.286AA
<u>470 - 698</u>	<u>228</u>	<u>5.295, 5.296A, 5.308A</u>
698 - 960	262	5.313A, 5.317A
1 427 - 1 518	91	5.341A, 5.341B, 5.341C, 5.346, 5.346A
1 710 - 2 025	315	5.384A, 5.388
2 110 - 2 200	90	5.388
2 300 - 2 400	100	5.384A
2 500 - 2 690	190	5.384A
3 300 - 3 400	100	5.429B, 5.429D, 5.429F
3 400 - 3 600	200	5.430A, 5.431B, 5.432A, 5.432B, 5.433A
3 600 - 3 700	100	5.434
4 800 - 4 990	190	5.441A , 5.441B

Radio Regulations		
1. Allocation	Mobile Service (Terrestrial) PRIMARY	Art.5: TFA
2. Identification	IMT	Footnotes Art.5 (TFA)
National Regulations		
1. Allocation	Mobile Service (Terrestrial) PRIMARY	Art.5: TFA
2. Allotment	IMT	Frequency Plans (e.g.: associated to NTFA)
3. Assignment	Broadband Mobile Operators	Frequency Register

**Total: 12 Bands, 1, 886 MHz (RR 2016, with WRC-15 updates)**

The *identifications* do not preclude the use of this band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations”.

**There is not identification for a specific versión of IMT** (indentifying IMT, o IMT-2000 or IMT-2020)



# WRC-15 numbers

- 4 weeks; preceded from the ITU Radio Assembly RA-15 (1 week); followed by WRC-19 CPM-1 (2 days)
- Around 3300 participants from 162 Member States,
- Around 500 participants representing 130 other entities, including industry, also attended the conference as observers
- 667 Documents submitted before WRC-15 which include 2700 proposals
- WRC-15 addressed over 40 topics related to frequency allocation and frequency sharing for the efficient use of spectrum and orbital resources.

# Main WRC-15 key achievements

1. Providing spectrum for mobile broadband (IMT) on a global basis
2. Providing frequencies for Global Flight Tracking
3. Making new allocations to the FSS, MMSS and EEES
4. Authorizing frequency bands and establishing regulatory conditions for unmanned aircraft systems
5. Providing required spectrum for WAIC as well as for
6. automotive and maritime transports
7. Improving the satellite frequency assignments regulatory procedures

These results have demonstrated once again the **ITU ability to keep up with the pace of technological advancements** and to **timely respond to the urgent needs of the Membership**



- **Background**
- Satisfy growing traffic requirements for IMT (estimated IMT additional spectrum by 2020: from 159 to 1075 MHz)
- Bands considered: 470 MHz -6425 MHz. Harmonized bands were highly desirable to facilitate global roaming and economies of scale
- WRC-15 had to specify conditions for mobile service in 694-790 MHz already allocated by WRC-12
- **WRC-15 results:** Allocations to mobile service and/or identifications for IMT in:
- **470-694/698 MHz, 694-790 MHz** (Region 1), 1427-1518 MHz, 3300-3400 MHz, 3400-3700 MHz, 4800-4990 MHz
- **470–698 MHz:** IMT identification of parts of this band for 14 Regions 2, 3 countries (9.21, non-interference basis). For R1: consideration at WRC-23
- **1427-1518 MHz:** IMT identification in R2 and 3. Also in R1, except 1452–1492 MHz that identified only in 54 R1 countries (9.21 for R.1, 3)
- **3300 -3400 MHz:** allocation to, or upgrade of MS in 36 countries worldwide. IMT identification in 33 R1, 6 R2 and 6 R3 countries
- **3400 -3600 MHz:** upgrade of MS and identification for entire R.1, 2 and for 11 R3 countries (subject to 9.17, 9.18, 9.21 and pfd limit)
- **3600 -3700 MHz:** IMT identification in 4 Region 2 countries subject to coordination under 9.17, 9.18, 9.21
- **4800–4990 MHz** IMT identification in 1 Region 2 and 3 Region 3 countries

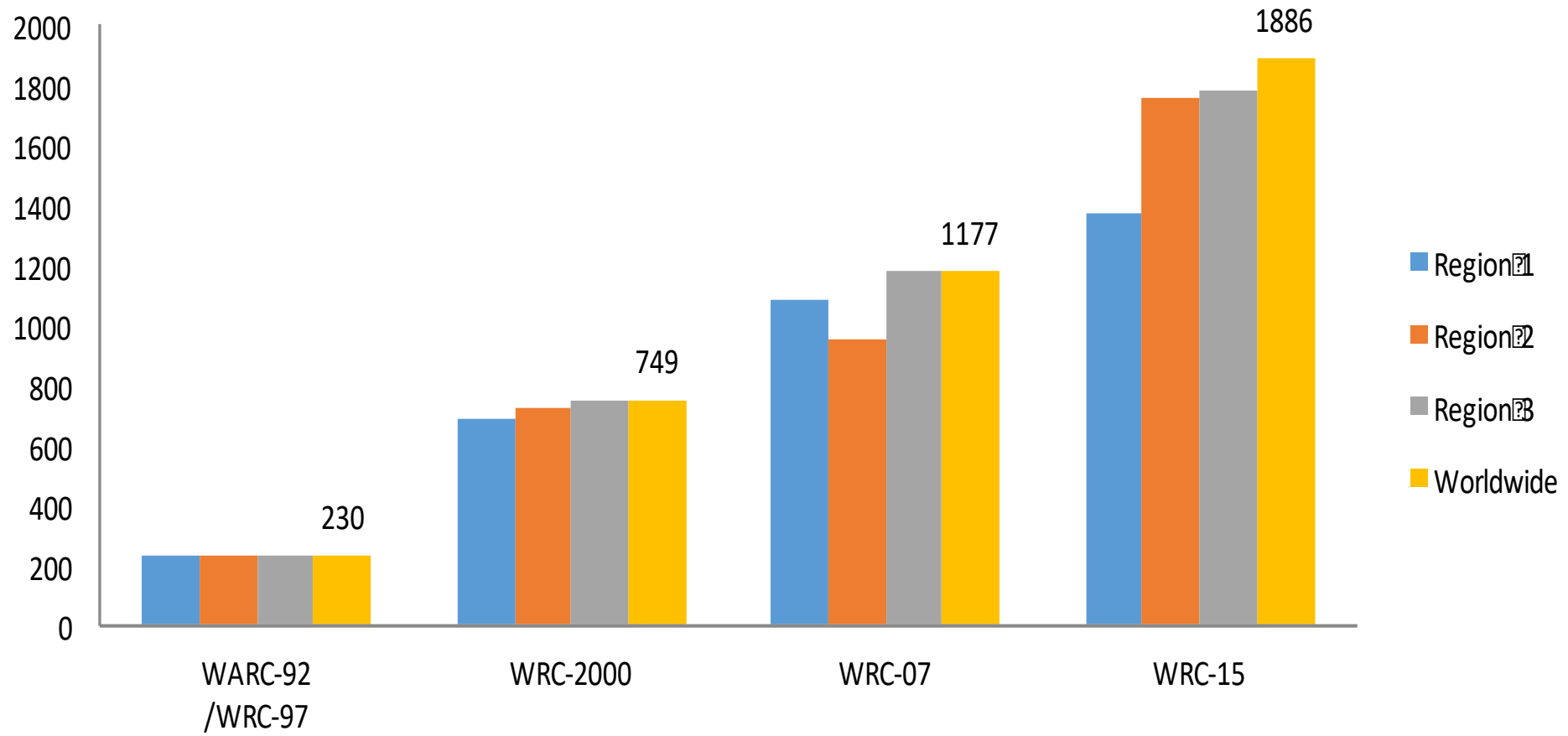
# RADIO REGULATIONS: IMT Bands

	BW (MHz)	Band (MHz)	RR Footnote	Global?
< 1 GHz	20	450-470	5.286AA	100%
	228	470-698	5.295 5.296A 5.308A 5.317A	<5%
	262	698-960	5.313A 5.317A	~100%
1 GHz to 3 GHz	91	1427-1518	5.341A 5.341B 5.341C 5.346 5.346A	~100%
		1518-1710		
	315	1710-2025	5.384A 5.388	100%
		2025-2110		
	90	2110-2200	5.388	100%
		2200-2300		
3 GHz to 5 GHz	100	3300-3400	5.429B 5.429D 5.429F	~20%
	200	3400-3600	5.430A 5.431B 5.432A 5.432B 5.433A	>85%
	100	3600-3700	5.434	2%
		3700-4800		
	190	4800-4990	5.441A 5.441B	2%

All footnotes related to IMT indicates that:

*the band X MHz is identified for International Mobile Telecommunications (IMT). This identification does not preclude the use of this band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations*

# Total amount of spectrum identified for IMT (MHz)



# IMT and Mobile Broadband

**UHF band: 470-698 MHz**

Identified by some Administrations

**DIGITAL  
DIVIDEND**

**700 MHz – Quasi-Global Harmonization**

Except some Administrations in Region 3

**L-Band: 1427-1518 MHz – Quasi-Global Harmonization**

Except some Administrations in Region 1 in the 1452-1492 MHz band

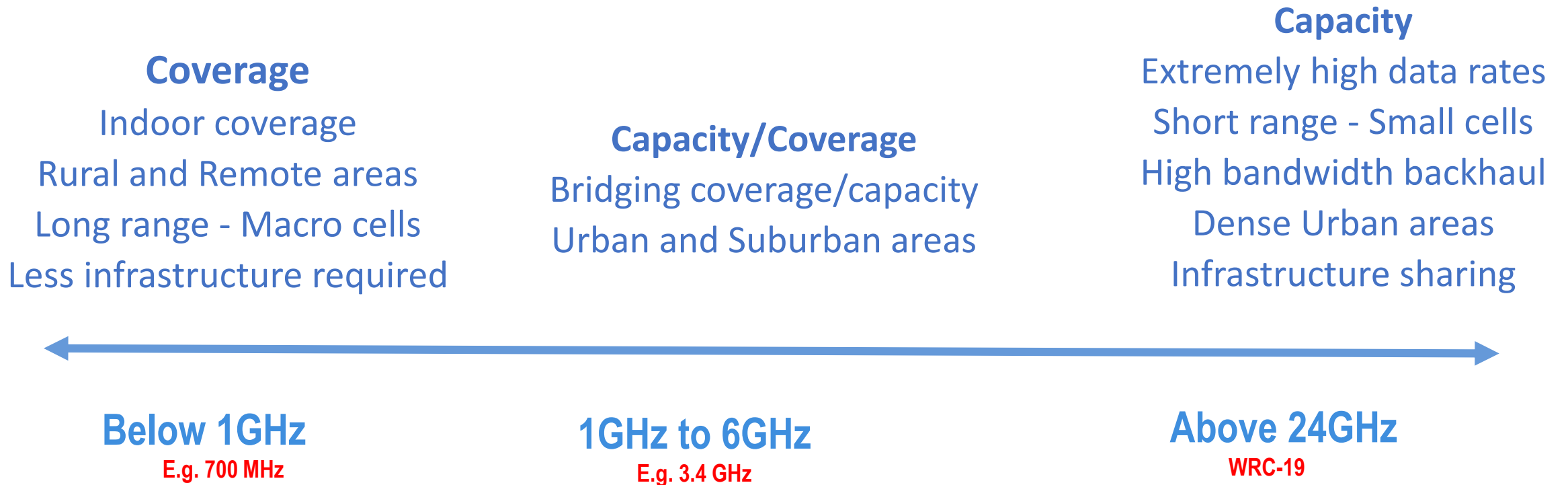
**C-Band: 3400-3600 MHz – Quasi-Global Harmonization**

Except some Administrations in Region 3

**3300-3400 MHz, 3600-3700 MHz, 4800-4990 MHz Bands**

Identified by some Administrations

# IMT-2020 spectrum bands



# WRC-19 Process



- Defines the agenda for WRC-19

- Allocates the work of the agenda items to relevant study groups, defines chapter rapporteur and the structure of the CPM report

- Conducts studies for 4 years and prepares draft CPM text

- Attempts to consolidate Regional positions

- Consolidates the CPM text that includes the methods to solve each agenda item

- The Radio Assembly appoints the chairmans and vice charmans of the study groups, revises the structure of the study groups, approves or revises ITU-R resolutions.

- Modifies the Radio Regulations (e.g. allocation/identification of frequency bands)





## WRC-19 standing agenda items

1. List of **specific agenda items** from 1.1 to 1.16 (see next slide)
2. **Incorporated by reference** in the **RR** of revised **ITU-R Recommendations**
3. **Consequential RR changes & amendments** as decided by the WRC
4. **Review of Resolutions and Recommendations of previous WRCs**
5. Review of the **Report from the Radiocommunication Assembly**
6. Identify items requiring **urgent action by ITU-R SGs** for the next WRC
7. Review the **RR procedures** related to **coordination-notification-registration of satellite network** frequency assignments, to facilitate rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;
8. Consider **deletion of country names in footnotes** of RR Art. 5 TFA
9. Consider and approve the **BR Director's Report** on:
  - 9.1 ITU-R activities (see 2<sup>nd</sup> next slide);
  - 9.2 Difficulties/Inconsistencies in RR;
  - 9.3 Res.80
10. **Agenda Next WRC** ([in 2023]) & preliminary agenda subsequent WRC

# Topics on the WRC-19 Agenda

17 specific & 6 standing items, **Res.809** (WRC-15)

*1.13*  
*1.14*  
*1.15*  
*1.16*

**Fix. & Mob. BB Apps**  
(24.25 < IMT < 86 GHz,  
HAPS, Apps.Id>275 GHz,  
WAS/RLAN @ 5 GHz)



**Maritime (GMDSS modernization (+Sat.), use of radio devices, VDES Sat component)**



*1.8*  
*1.9.1*  
*1.9.2*

*1.1*

**Amateur in R1 @ 50-54 MHz**  
(4WW allocation)

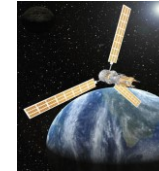


**Aeronautical (GADSS needs)**

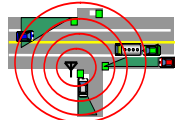


*1.10*

**Satellite issues**  
(BSS/FSS @12 GHz,  
ESIM, regul. for N-GSO FSS @ 37.5 to 51.4 GHz)



*1.4, 1.5, 1.6*



**New Transport systems**  
(harmonized bands for railways, ITS)

*1.11*  
*1.12*



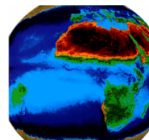
**Regulatory issues**  
(Sat. regulations, harmonization of spectrum use, etc.)



*7*  
*8*

*1.2*  
*1.3*  
*1.7*

**Earth resources & Climate monitoring**  
**Weather forecast, DCS improvement, TT&C for N-GSO Sat. of short duration**



*Note: WRC-19 agenda item numbers indicated in italic*

➤ See additional information in the slides attached to this presentation

## New spectrum: Bands under study for WRC-19

BW (GHz)	Existing mobile allocation	No global mobile allocation	Gaps
3.25	24.25 GHz – 27.5 GHz		
			27.5-31.8 GHz
1.6		31.8 – 33.4 GHz	
			33.4-37 GHz
3.5	37 – 40.5 GHz		
2		40.5 – 42.5 GHz	
			42.5-45.5 GHz
1.5	45.5 – 47 GHz		
0.2		47 – 47.2 GHz	
3	47.2 – 50.2 GHz		
			50.2-50.4 GHz
2.2	50.4 – 52.6 GHz		
			52.6-66 GHz
10	66 – 76 GHz		
			76-81 GHz
5	81 – 86 GHz		

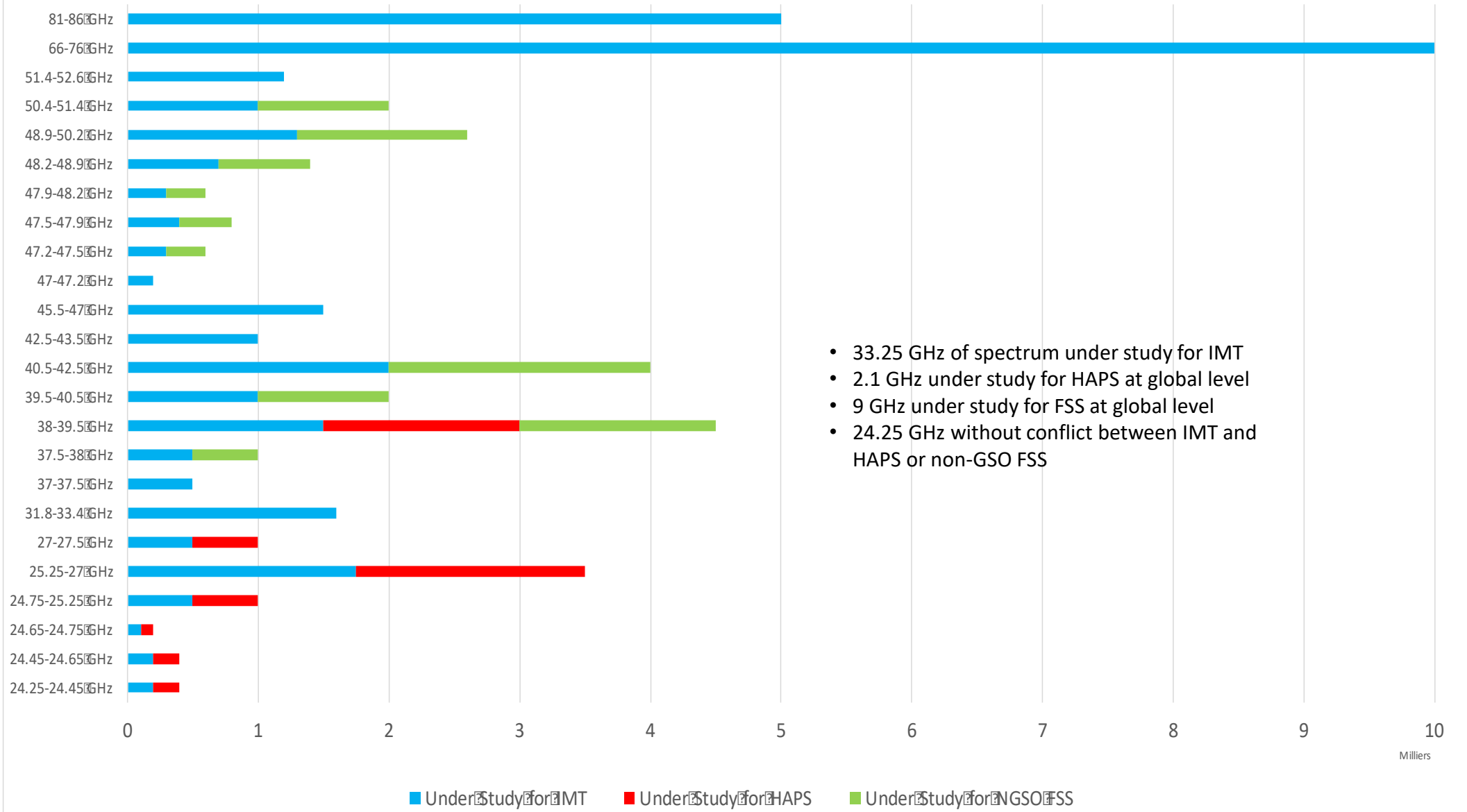
## Overlapping frequency bands (GHz) between some WRC-19 agenda items

AI1.6 – NGSO FSS <u>Res. 159 (WRC-15)</u>	AI1.13 – IMT <u>Res. 238 (WRC-15)</u>	AI1.14 – HAPS <u>Res. 160 (WRC-15)</u>	AI9.1 (9.1.9) – FSS <u>Res. 162 (WRC-15)</u>
	24.25-27.5	24.25-27.5 (Reg. 2)	
37.5-39.5 (s-E*)	37-40.5	38-39.5 (globally)	
39.5-42.5 (s-E*)	40.5-42.5		
47.2-50.2 (E-s*)	47.2-50.2		
50.4-51.4 (E-s*)	50.4-52.6		51.4-52.4 (E-s*)
* E-s: Earth-to-space; s-E: space-to-Earth.			

Studies to address mutual compatibility & sharing feasibility among the **services/applications** for which **allocation/identification is envisaged** under the corresponding Res. relating to the AI in the overlapping bands

# WRC-19 Challenges

## Spectrum (GHz) under study for IMT identification by WRC-19



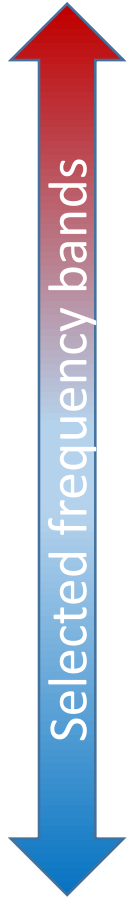
# WRC-19 AI 1.13 sharing & compatibility studies

Mobile service  
IMT-2020



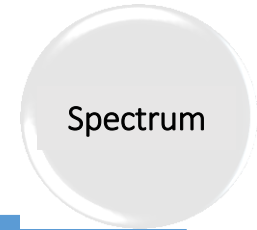
<b>Incumbent services</b>
Mobile-satellite Radionavigation-satellite service
Fixed-satellite Broadcasting-satellite
Radio astronomy
Space research Earth exploration-satellite
Inter-satellite
Earth exploration-satellite (passive) Space research (passive)
Fixed
Mobile – Multiple gigabit wireless systems
Aeronautical mobile Radiodetermination

24.25 GHz



86 GHz

# Frequency bands under study for WRC-19



	Frequency bands (GHz) mentioned in Resolution 238 (WRC-15) in which studies are focused/prioritized											
	24.25-27.5	31.8-33.4	37-40.5	40.5-42.5	42.5-43.5	45.5-47	47-47.2	47.2-50.2	50.4-52.6	66-71	71-76	81-86
CEPT	X			X	X					X		
ASMG	X	X		X	X							
RCC	X	X		X						X		
APT	X	X	X	X	X					X	X	X
ATU	X		X	X	X							
CITEL												

Reference docs:

<https://www.itu.int/en/ITU-R/conferences/wrc/2019/Pages/reg-prep.aspx>

APT: indication in grey reflects the views of some administrations with regards to studies /identification

ATU: frequency bands as priority candidates for IMT identification

# Main Steps towards WRC-19

**WRC-15: WRC-19 Agenda - Resolution 809 (WRC-15)**

**1<sup>st</sup> Session of Conference Preparatory Meeting: CPM19-1**  
30 Nov – 1 Dec. 2015; **Results @CA/226 of 23/12/2015**

**C-16: WRC-19 agenda & dates in **Res. 1380** with **MOD** venue @ C-17**

Text of Res. 1380 (C-17) at [www.itu.int/md/S17-CL-C-0141](http://www.itu.int/md/S17-CL-C-0141), see also the [WRC-19 booklet](#)  
CL No. 17/52 of 18 Dec. 2017 confirmed RA-19 & WRC-19 venue in **Sharm el-Sheikh (Egypt)**

**2<sup>nd</sup> Session of Conference Preparatory Meeting: CPM19-2**

Planned dates at CICG in Geneva from 18 to 28 February 2019

Final meetings of regional groups  
Member States' proposals to WRC-19

**RA-19: 21 to 25 Oct. 2019 ; WRC-19: 28 Oct. to 22 Nov. 2019**



# Overview of the ITU-R Calendar towards WRC-19

Year	January – March	April – June	July – September	October – December
2015	CPM15-2	Last meetings of the Responsible Groups	WS on WRC-15	RA-15 WRC-15 CPM19-1
2016	WP 5D (1 <sup>st</sup> )	WPs 7B & 7C (1 <sup>st</sup> ) WP 4C+WP 4A (1 <sup>st</sup> ) WPs 5A, 5B & 5C (1 <sup>st</sup> ) TG 5/1 (1 <sup>st</sup> ) WPs 1A & 1B (1 <sup>st</sup> ) WP 5D (2 <sup>nd</sup> )	WP 4C+WP 4A (2 <sup>nd</sup> )     CPM-19 Steering	WP 5D (3 <sup>rd</sup> ) WPs 7B & 7C (2 <sup>nd</sup> ) WPs 5A, 5B & 5C (2 <sup>nd</sup> ) WPs 1A & 1B (2 <sup>nd</sup> )
	WP 5D (4 <sup>th</sup> )	WPs 7B & 7C (3 <sup>rd</sup> ) WP 4C+WP 4A (3 <sup>rd</sup> ) TG 5/1 (2 <sup>nd</sup> ) WPs 5A, 5B & 5C (3 <sup>rd</sup> ) WPs 1A & 1B (3 <sup>rd</sup> ) WP 5D (5 <sup>th</sup> )	TG 5/1 (3 <sup>rd</sup> )	WP 5D (6 <sup>th</sup> ) WP 4C+WP 4A (4 <sup>th</sup> ) WPs 7B & 7C (4 <sup>th</sup> ) WPs 5A, 5B & 5C (4 <sup>th</sup> ) WS on WRC-19 WPs 1A & 1B (4 <sup>th</sup> )
	TG 5/1 (4 <sup>th</sup> ) WP 5D (7 <sup>th</sup> ) WP 4C+WP 4A (5 <sup>th</sup> ) RAG (25 <sup>th</sup> )	TG 5/1 (5 <sup>th</sup> ) WPs 7B & 7C (5 <sup>th</sup> ) WPs 5A, 5B & 5C (5 <sup>th</sup> ) WPs 1A & 1B (5 <sup>th</sup> ) [WP 5D (8 <sup>th</sup> )] [WP 4C+WP 4A (6 <sup>th</sup> )]	[TG 5/1 (6 <sup>th</sup> )]	[WPs 7B & 7C (6 <sup>th</sup> )] [WP 5D (9 <sup>th</sup> )] [WPs 5A, 5B & 5C (6 <sup>th</sup> )] [WS on WRC-19] [WP 1B (6 <sup>th</sup> )]
	CPM19-2	[Last meetings of the Responsible Groups]	[WS on WRC-19]	RA-19 WRC-19 CPM 23-1

[ ... ] = planned meetings

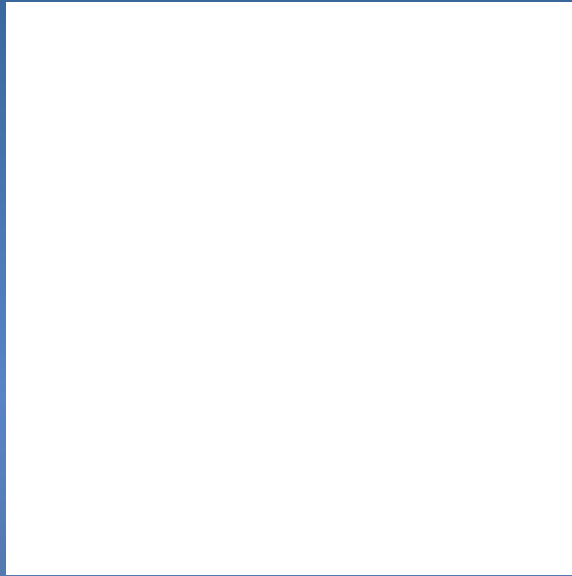
WS on WRC-19 = ITU Inter-regional Workshop on WRC-19 Preparation

Up-to-date information on ITU-R meetings at: [www.itu.int/en/events/Pages/Calendar-Events.aspx?sector=ITU-R](http://www.itu.int/en/events/Pages/Calendar-Events.aspx?sector=ITU-R)

Information on CPM19-2 Preparation (e.g. dates, deadlines) at: [www.itu.int/md/R00-CA-CIR-0226](http://www.itu.int/md/R00-CA-CIR-0226)

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