

**12<sup>th</sup> Meeting of the ITU Expert Group on Telecommunication/ICT Indicators  
(EGTI)**

**Online meeting,  
13-16 September 2021**

**Spectrum for IMT  
From RR Identification  
to National Allocation and Assignment  
Survey 2017-2019**

**Joaquin RESTREPO**

**Capacity Building Coordinator; Study Groups Dept. SGD  
Radiocommunications Bureau, BR**



# IMT Definition

*From: Recommendation ITU-R M.1224\**

International Mobile Telecommunications (IMT) systems are mobile systems that provide access to a wide range of telecommunication services including advanced mobile services, supported by mobile and fixed networks, which are increasingly packet-based

IMT systems support low to high mobility applications and a wide range of data rates in accordance with user and service demands in multiple user environments. IMT also has capabilities for high quality multimedia applications within a wide range of services and platforms, providing a significant improvement in performance and quality of service.

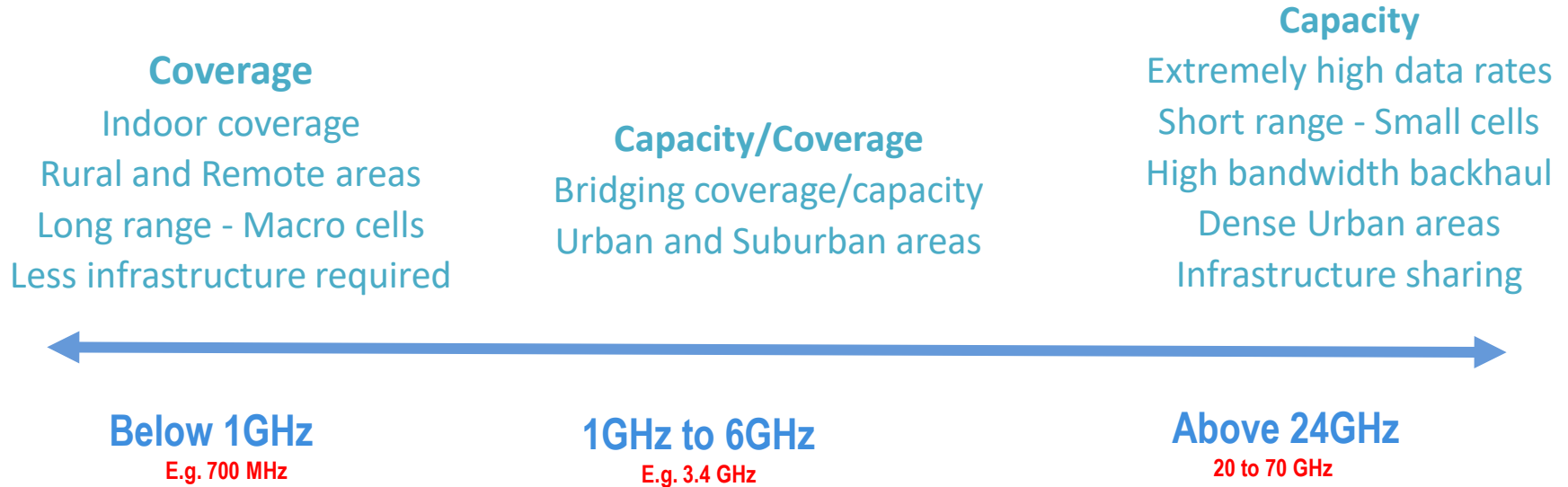
**IMT encompasses all its versions: IMT-2000, IMT-Advanced, IMT-2020**

\* [Recommendation ITU-R M.1224-1 \(03-2012\):](#)

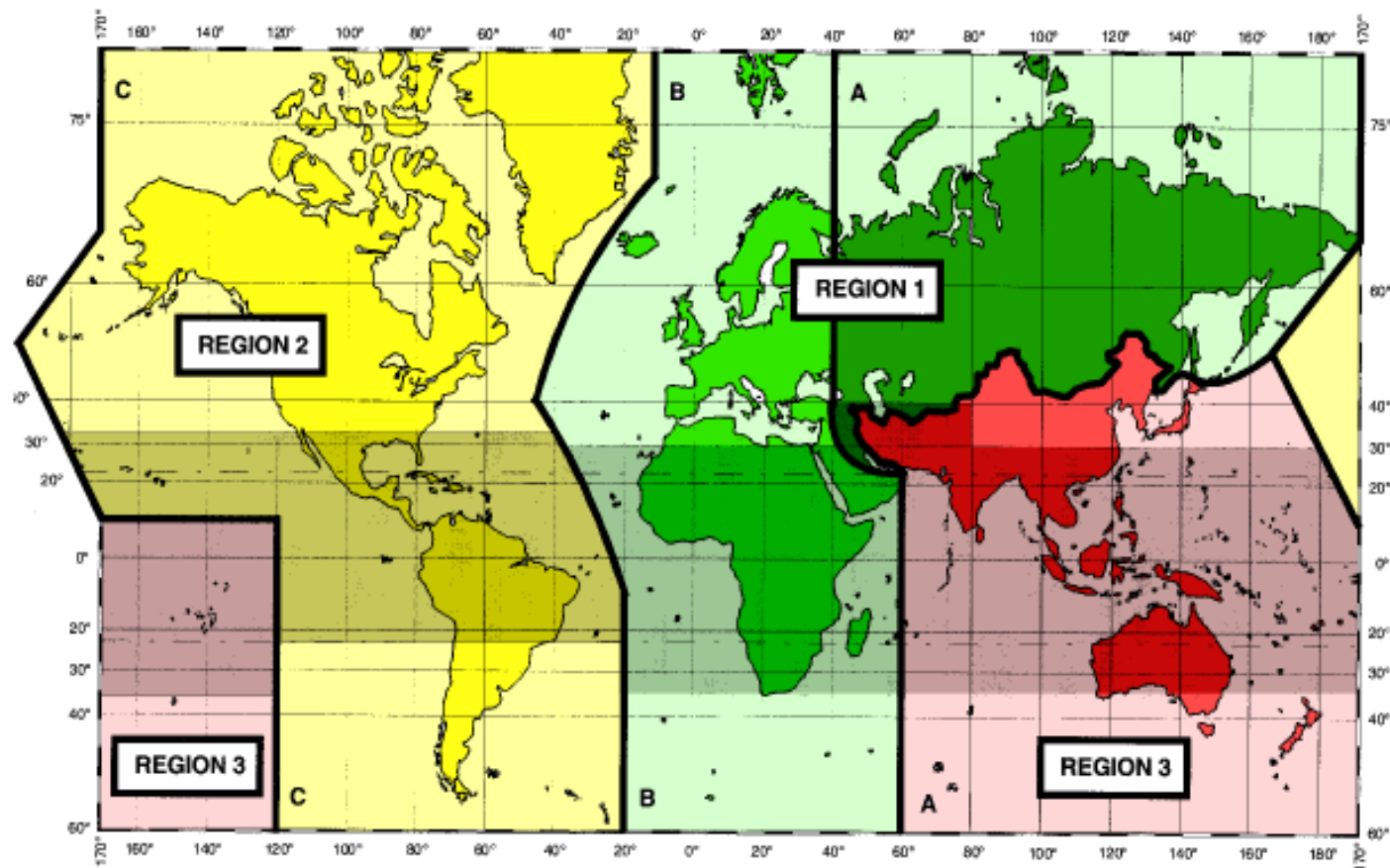
Vocabulary of terms for International Mobile Telecommunications (IMT)



# IMT-2020 spectrum bands



## Radio Regulations: World Regions



# IMT on the Radio Regulations

On the Radio Regulations:

- IMT is an application of Mobile Service → **NO** allocation to IMT on the Main Table
- Some frequency bands priorly allocated to MOBILE services in a primary basis

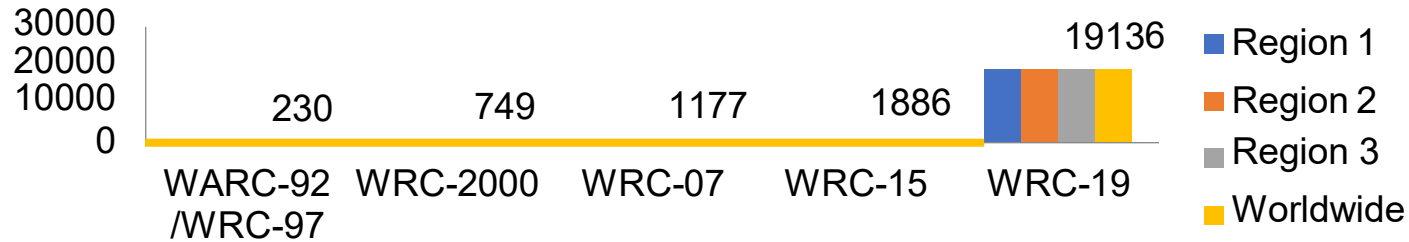
Have been

- Identified (through footnotes) for the deployment of IMT systems in general
- **NO** specific version of IMT

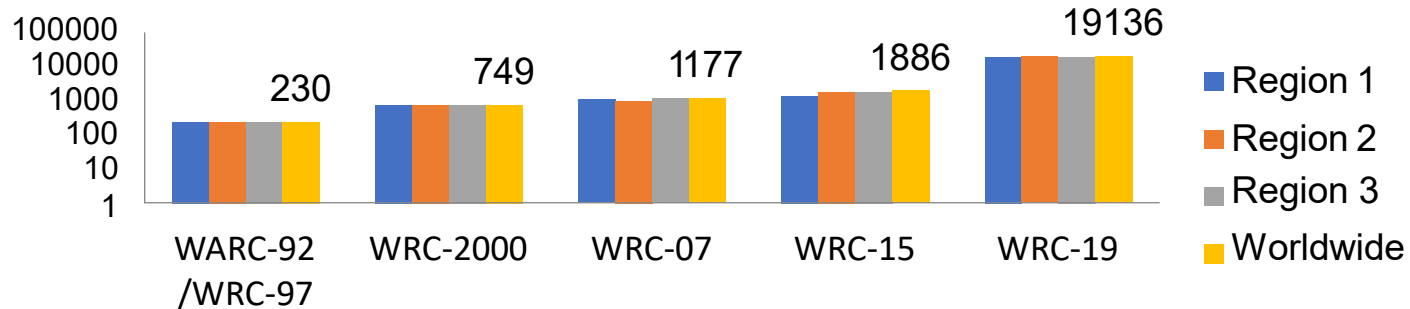
450-455	FIXED
	MOBILE 5.286AA
	5.209 5.271 5.286 5.286A 5.286B 5.286C 5.286D 5.286E

**5.286AA** The frequency band 450-470 MHz is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT).... This identification does not preclude the use of this frequency 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)



## Total amount of spectrum identified for IMT (MHz, log-scale)



# IMT Bands: from RR to final Users

## International Level:

### 1. Band Identification (from IMT) on the RR

during the World Radio Conferences, WRC, administrations work together looking for international (and global) harmonization of frequency Bands Identified for IMT

## National Level:

National Regulators in charge of Spectrum Management will

### **2. NATIONAL ALLOCATION**

2a. IF necessary reallocate pertinent Bands to MOBILE service in a primary basis

2b. Reserve the Bands identified for IMT within their National Frequency Allocation Tables, NFAT (usually through national footnotes)

### **3. ASSIGNMENT**

NRA proceed with the Band assignment to Mobile Broadband Networks (IMT) through different mechanism: auctions, bidding, beauty contest, direct license, etc.

# Spectrum for IMT: indicators agreed by EGTI

**GOAL:** to measure the actual impact of WRC IMT Bands identification on the mobile ecosystem (and final users)

**Indicator 2.11: Amount of spectrum allocated for IMT systems, in MHz (i271\_spec\_a)**  
refers to the total spectrum, in MHz, made available (i.e., allocated) through any formal national publication, such as a national frequency plan, for IMT systems...

**Indicator 2.12: Amount of spectrum licensed for IMT systems, in MHz (i271\_spec\_li)**  
refers to the total spectrum, in MHz, assigned nationally, including any of the air interfaces in accordance with ITU-R Recommendations concerning these standards for mobile communications



# Spectrum for IMT: indicators

## Sub-indicators for Indicator 2.11 and 2.12:

1. **By Bands** (considering their different technical and regulatory matters):

- a) Block < 1 GHz                      b) Block 1 GHz- 6 GHz                      c) Block > 6 GHz (> 24 GHz, mm waves)

2. **by Radio Regulations Regions** (as they have different identification in some Bands):

- a) R1 Europe, Africa, CIS (121)    b) R2: Americas (35)    c) Asia&Pacific (37)

For every Region and Band:

1. it was considered those sub bands being identified by the majority of countries( >50% of administrations)
2. a total IMT RR identified bandwidth is calculated and used as denominator to measure (in %) the countries national allocation and assignment to IMT

$$\text{Indicator (Region, Band)} = \frac{\text{amount of spectrum [allocated] [assigned] in band}_i}{\text{identified spectrum by ITU in band}_i}$$

# Harmonization of IMT bands after WRC-19: < 1 GHz

			Quantity of Countries									
			Band (MHz)	Bandwidth (MHz)	Region 1 (121 Countries)	%	Region 2 (35 Countries)	%	Region 3 (37 Countries)	%	World (193 Countries)	%
< 1 GHz	450-470	20	121	100%	35	100%	37	100%	193	100%		
	470-608	138	0	0%	5	14%	4	11%	9	5%		
	608-610	2	0	0%	0	0%	4	11%	4	2%		
	610-614	4	0	0%	0	0%	7	19%	7	4%		
	614-694	80	0	0%	8	23%	7	19%	15	8%		
	694-698	4	121	100%	8	23%	7	19%	136	70%		
	698-790	92	121	100%	35	100%	27	73%	183	95%		
	790-902	112	121	100%	35	100%	37	100%	193	100%		
	902-928	26	121	100%	0	0%	37	100%	158	82%		
	928-960	32	121	100%	35	100%	37	100%	193	100%		

# Harmonization of IMT bands after WRC-19: 1 GHz to 6 GHz

		Quantity of Countries										
		Band (MHz)	Bandwidth (MHz)	Region 1 (121 Countries)	%	Region 2 (35 Countries)	%	Region 3 (37 Countries)	%	World (193 Countries)	%	
1 GHz to 3 GHz		1427-1452	25	121	100%	35	100%	37	100%	193	100%	
		1452-1492	40	53	44%	35	100%	37	100%	125	65%	
		1492-1518	26	121	100%	35	100%	37	100%	193	100%	
		1710-1885	175	121	100%	35	100%	37	100%	193	100%	
		1885-2025	140	121	100%	35	100%	37	100%	193	100%	
		2110-2200	90	121	100%	35	100%	37	100%	193	100%	
		2300-2400	100	121	100%	35	100%	37	100%	193	100%	
		2500-2690	190	121	100%	35	100%	37	100%	193	100%	
3 GHz to 6 GHz		3300-3400	100	33	27%	13	37%	7	19%	53	27%	
		3400-3500	100	121	100%	35	100%	16	43%	172	89%	
		3500-3600	100	121	100%	35	100%	13	35%	169	88%	
		3600-3700	100	0	0%	7	20%	0	0%	7	4%	
		4800-4900	100	32	26%	3	9%	6	16%	41	21%	
		4900-4990	90	32	26%	1	3%	6	16%	39	20%	

# Harmonization of IMT bands after WRC-19: > 6 GHz (mm waves)

			Quantity of Countries								
	Band (MHz)	Bandwidth (MHz)	Region 1 (121 Countries)	%		Region 2 (35 Countries)	%	Region 3 (37 Countries)	%	World (193 Countries)	%
24 GHz to 50 GHz	24250-27500	3250	121	100%		35	100%	37	100%	193	100%
	37000-43500	6500	121	100%		35	100%	37	100%	193	100%
	45500-47000	1500	50	41%		1	3%	2	5%	53	27%
	47200-48200	1000	62	51%		0	0%	7	19%	69	36%
> 60 GHz	66000-71000	5000	121	100%		35	100%	37	100%	193	100%

# Spectrum for IMT: indicators

RR Region	ITU-D Regions	Countries	Survey*	%
R1	Africa (Subsaharan)	44	12	27%
R1	Arab States	22	10	45%
R1	CIS countries	12	4	33%
R1	Europe countries	42	23	55%
R2	The Americas	35	11	31%
R3	Asia & Pacific	39	15	38%
	Total R1	122	49	40%
	Total R2	35	11	31%
	Total R3	37	15	41%
	Worldwide	194	75	39%

BW > 50% identifications (MHz)			
< 1 GHz	1 to 6 GHz	> 6 GHz (mm waves)	TOTAL
286	946	15,750	16,982
286	946	15,750	16,982
286	946	15,750	16,982
286	946	15,750	16,982
256	986	14,750	15,992
282	786	14,750	15,818
286	946	15,750	16,982
256	986	14,750	15,992
282	786	14,750	15,818

Survey:  
2017  
2018  
2019

\*: as per 2019



# Spectrum for IMT: indicators

Amount of spectrum **offered** for IMT systems / spectrum **identified** for IMT systems in the Radio Regulations

RR Region	ITU-D Regions	< 1 GHz			1 to 6 GHz			> 6 GHz (mm waves)			TOTAL (mm waves)		
		2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
R1	Africa (Subsaharan)	56%	56%	49%	81%	81%	85%	2%	2%	48%	6%	6%	35%
R1	Arab States	45%	45%	48%	49%	52%	66%	0%	0%	17%	3%	4%	17%
R1	CIS countries	84%	84%	75%	69%	76%	74%	0%	0%	4%	5%	6%	9%
R1	Europe countries	51%	53%	56%	72%	77%	79%	0%	1%	6%	5%	6%	10%
R2	The Americas	74%	69%	67%	52%	54%	58%	0%	0%	0%	5%	5%	5%
R3	Asia & Pacific	38%	41%	50%	55%	83%	88%	0%	29%	20%	3%	10%	16%
	Total R1	53%	54%	55%	69%	73%	77%	0%	1%	16%	5%	6%	17%
	Total R2	74%	69%	68%	52%	54%	60%	0%	0%	0%	5%	5%	5%
	Total R3	38%	41%	49%	55%	83%	89%	0%	29%	21%	3%	10%	17%
	Worldwide	54%	54%	56%	66%	71%	78%	0%	3%	15%	5%	6%	16%

# Spectrum for IMT: indicators

Amount of spectrum **assigned** for IMT systems / spectrum **identified** for IMT systems in the Radio Regulations

RR Region	ITU-D Regions	< 1 GHz			1 to 6 GHz			> 6 GHz (mm waves)			TOTAL (mm waves)		
		2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
R1	Africa (Subsaharan)	26%	28%	32%	23%	24%	51%	0%	0%	8%	2%	2%	7%
R1	Arab States	32%	32%	34%	37%	38%	51%	0%	0%	4%	3%	3%	1%
R1	CIS countries	32%	37%	46%	29%	37%	47%	0%	0%	4%	2%	3%	1%
R1	Europe countries	37%	39%	46%	39%	40%	48%	0%	0%	4%	3%	3%	0%
R2	The Americas	48%	46%	45%	19%	22%	31%	0%	0%	3%	2%	2%	0%
R3	Asia & Pacific	32%	36%	34%	49%	66%	52%	0%	5%	5%	3%	7%	3%
	Total R1	34%	35%	40%	35%	37%	49%	0%	0%	2%	3%	3%	5%
	Total R2	48%	46%	45%	19%	22%	29%	0%	0%	0%	2%	2%	3%
	Total R3	32%	36%	36%	49%	66%	55%	0%	5%	4%	3%	7%	6%
	Worldwide	35%	37%	40%	35%	38%	48%	0%	0%	2%	3%	3%	5%

# Spectrum for IMT: indicators

% of spectrum <b>assigned</b> vs <b>offered</b> for IMT systems													
RR Region	ITU-D Regions	< 1 GHz			1 to 6 GHz			> 6 GHz (mm waves)			TOTAL (mm waves)		
		2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
R1	Africa (Subsaharan)	46%	50%	65%	28%	29%	61%	5%	5%	16%	26%	28%	21%
R1	Arab States	70%	70%	71%	76%	74%	77%	0%	0%	25%	77%	77%	7%
R1	CIS countries	38%	44%	61%	42%	48%	64%	0%	0%	95%	41%	47%	7%
R1	Europe countries	73%	73%	81%	54%	52%	60%	0%	0%	66%	58%	48%	0%
R2	The Americas	65%	67%	67%	36%	42%	54%	0%	0%	0%	45%	49%	0%
R3	Asia & Pacific	84%	86%	67%	89%	79%	59%	0%	19%	25%	88%	70%	17%
	Total R1	64%	65%	73%	51%	51%	63%	5%	1%	11%	52%	47%	27%
	Total R2	65%	67%	65%	36%	42%	49%	0%	0%	0%	45%	49%	53%
	Total R3	84%	86%	73%	89%	79%	62%	0%	19%	18%	88%	70%	34%
	Worldwide	65%	67%	71%	53%	54%	61%	5%	13%	12%	54%	52%	30%



# THANKS

**Joaquin RESTREPO**

[joaquin.restrepo@itu.int](mailto:joaquin.restrepo@itu.int)

