2025 International Spectrum Sharing Workshop

Egypt NTRA on WRC-27

2025 International Spectrum Sharing Workshop

*Mohamed El-Moghazi on WRC-27 & **SHARING***

The author is solely responsible for the opinions expressed in this presentation

- WRC are held every 3-5 years.
- Agenda Items are determined by previous WRC.
- WRC resolutions: part of the ITU Radio Regulations - have an international treaty status.
- Every country is entitled to one vote - private sector can attend WRCs on a non-voting capacity.

Battle of the Bands: What's at stake for space at WRC-23

Even hard-fought negotiations rarely come down to a vote as groups in the minority typically fold to consensus, WRC veterans said.

"It's better to do that and get half a loaf than attempt a vote where you get nothing," said a regulatory expert at a satellite operator who did not want to be named.

After negotiating into the early hours for much of the conference, sometimes breakthroughs come from chance meetings of opposing factions in a coffee shop.

"They all hate each other at this point but then there's a napkin that comes out and goes, look, I'll give you this if you give me that … and then that's it, you go back and it gets turned into legislative text."

The *Hitchhikers Guide to the Galaxy* definition of the ITU

At these meetings, called Working Parties, the ITU gurus present many long and learned papers. Why they do this is a mystery because they then only discuss the first page of each paper, and they argue at greatest length about the most trivial points.

(Simon Pike, 2001)

Simon Pike

The WRC Process

ITUWRS GENEVA2024

(WRC-23 Docs)

APT (Doc. 62)

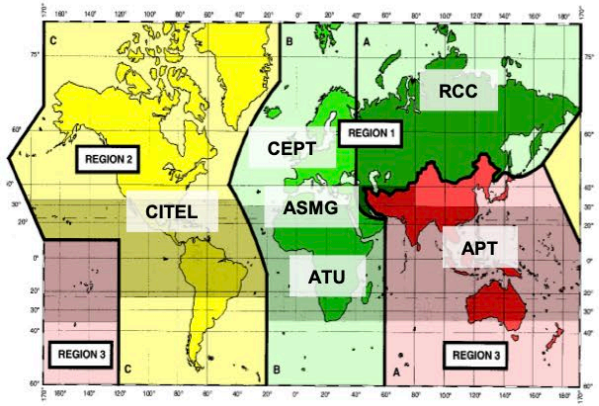
ASMG (Doc. 100)

ATU (Doc. 87)

CEPT (Doc. 65)

CITEL (Doc. 44)

RCC (Doc. 85)



Regional preparation
Resolution 72 (Rev.WRC-07)

Agenda in WRC Res. & finalize in Council Res.

Informal Group (Structure & Chairs)

Proposals

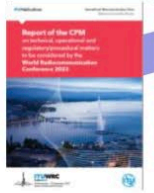
Coordinated common proposals

Proposals

Member States

RA

RA Report (Doc. 217)

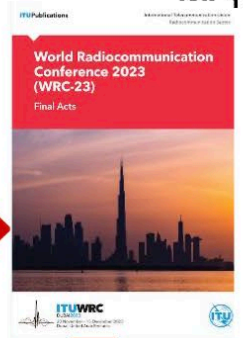


CPM Report (Doc. 3)

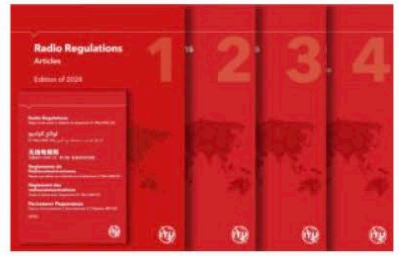
Director's Report (Doc. 4)

ITUWRC DUBAI 2023 WRC

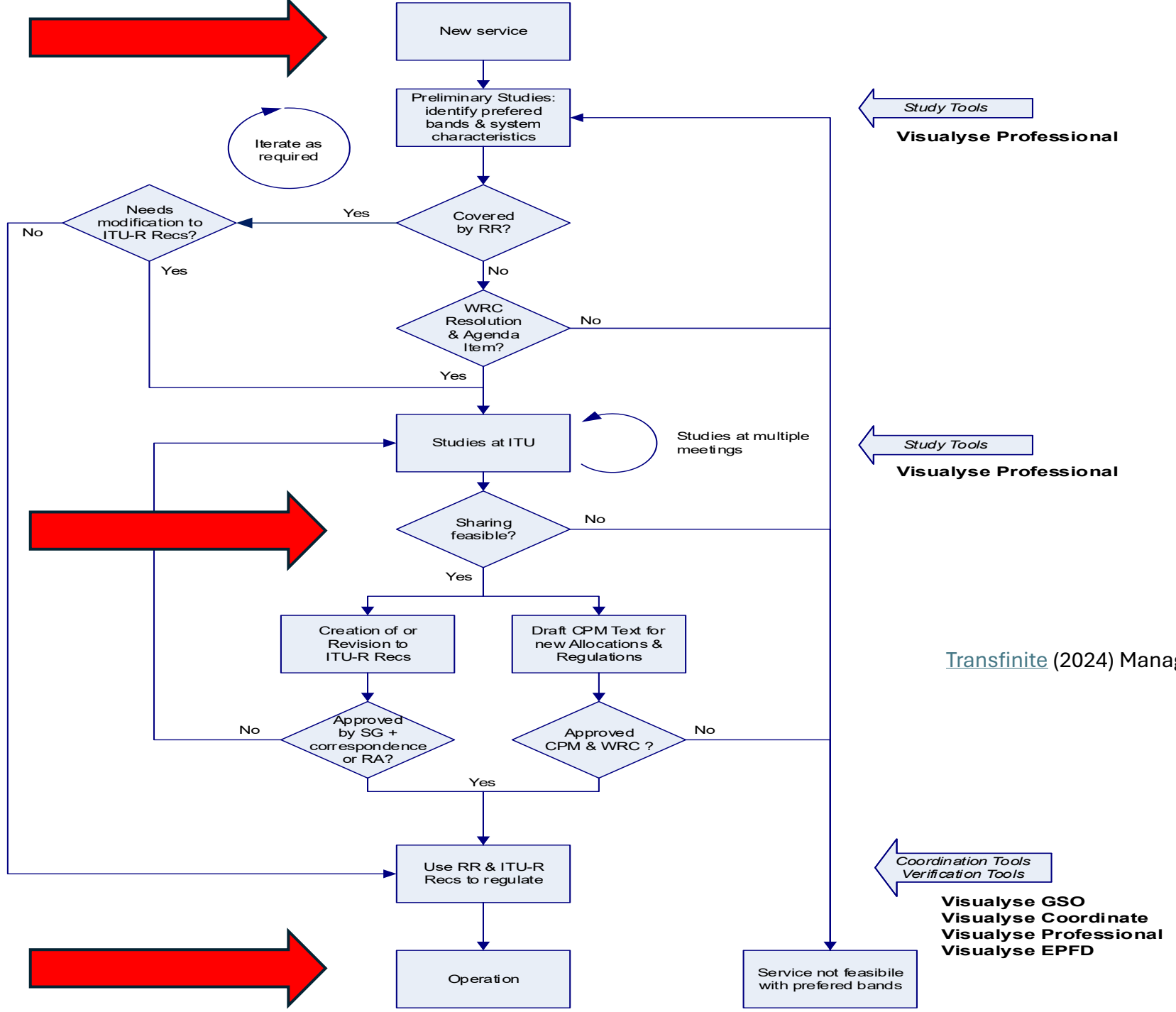
Conference Secretariat (BR & GS)



Final Acts

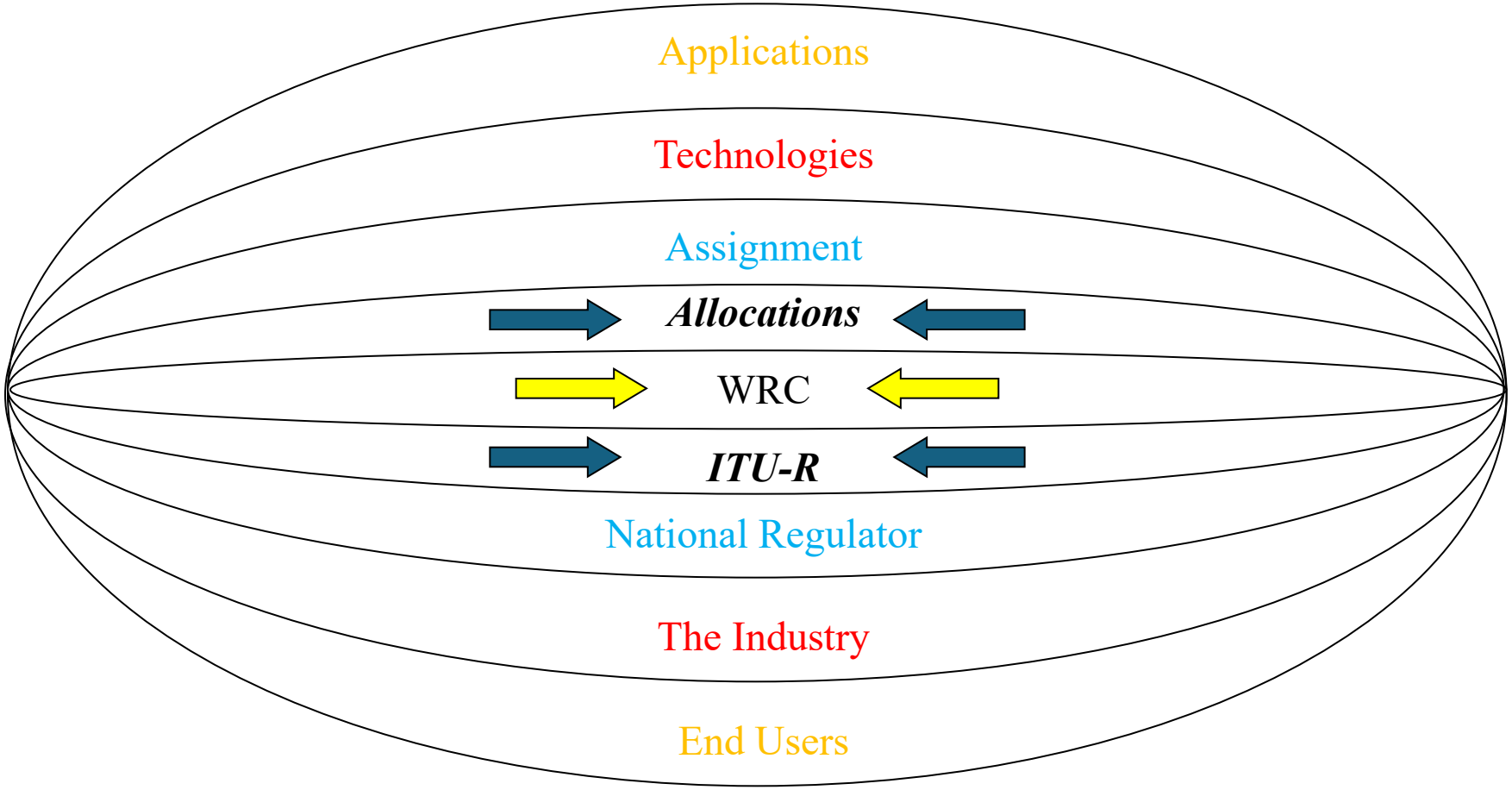


Radio Regulations (CS89)



Transfinite (2024) Managing_Change_at_the_ITU_R

Spectrum Ecosystem



Sharing through WRCs

Washington D.C., 1927: The Conference canceled the use of high-power spark transmitters (greater than 150 Watts) and included the right to be protected from interference.

The RR1927 provides the initial TFA. However, RR1927, RR1938, and RR1947 do not indicate any service priority, namely, all services have the same priority.

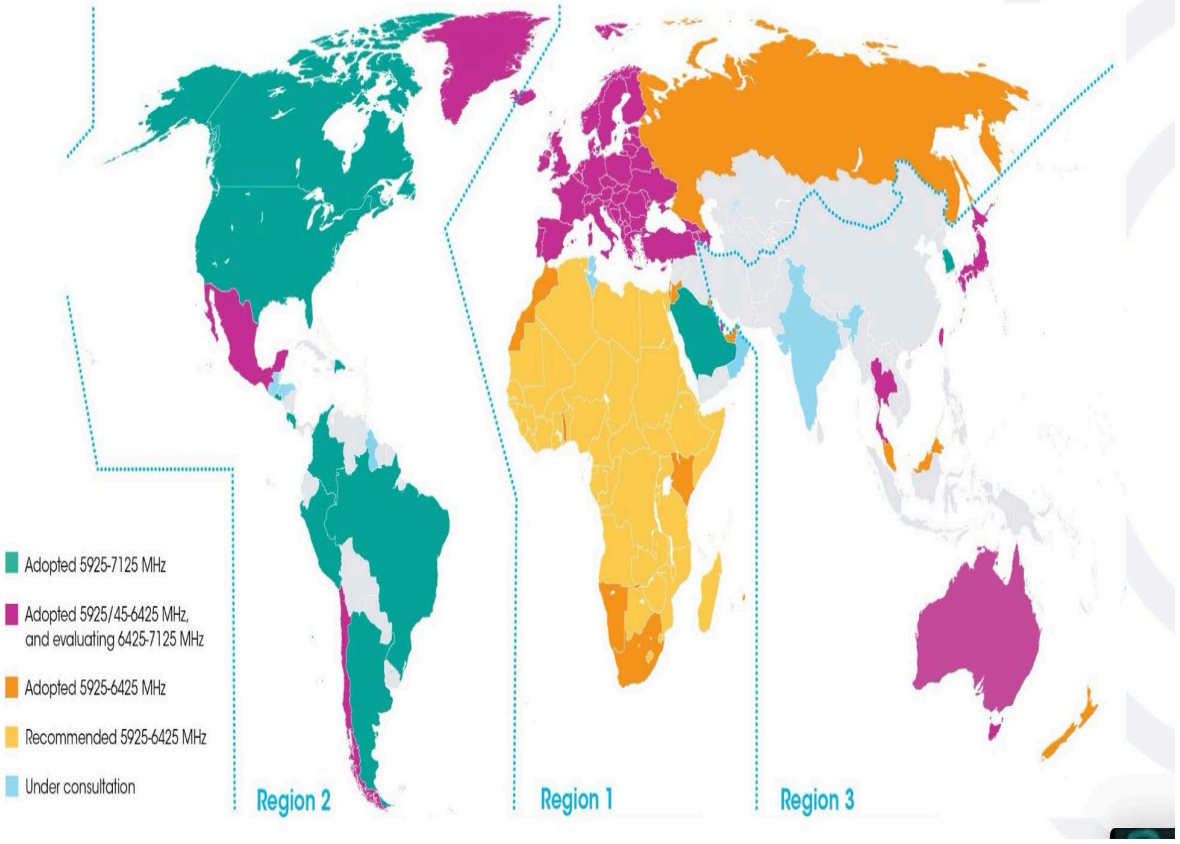
In Geneva in 1959, the service priority was officially established, i.e., primary, permitted, and secondary services.

RR1996 revised the priority by removing permitted services from the TFA in Article S5.

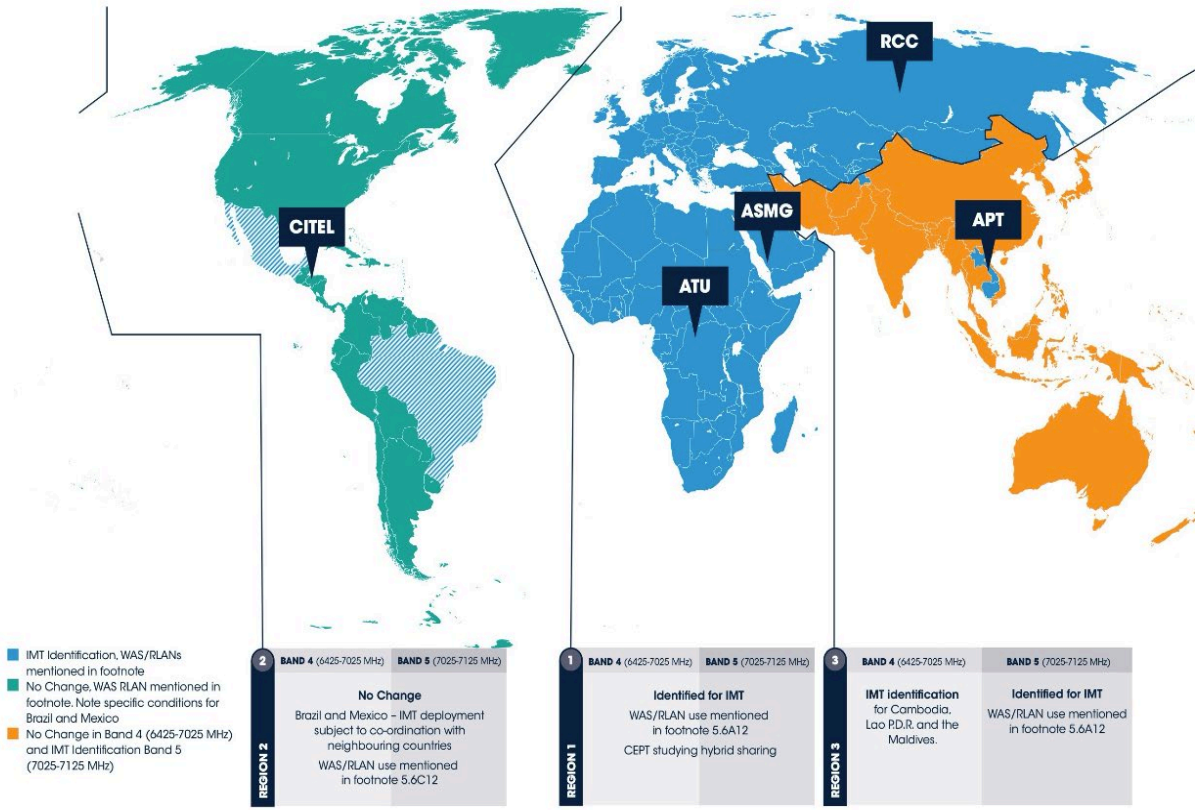
Frequencies in Kilocycles per Second (kc/s.)	Approximate Wave-lengths in Metres.	Services.
10–100	30,000–3,000	Fixed services.
100–110	3,000–2,725	Fixed services and mobile services.
110–125	2,725–2,400	Mobile services.
125–150[1]	2,400–2,000[1]	Maritime mobile services *open to public correspondence exclusively*.
150–160	2,000–1,875	Mobile services.
160–194	1,875–1,550	(*a*) Broadcasting. (*b*) Fixed services. (*c*) Mobile services. The conditions for use of this band are subject to *the following* regional arrangements : All regions where broadcasting stations now exist working on frequencies below 300 kc/s (above 1,000 m.). } broadcasting. Other regions { Fixed services. / Mobile services. Regional arrangements will respect the rights of other regions in this band.
194–285	1,550–1,050	(*a*) Mobile services. (*b*) Fixed services. (*c*) Broadcasting. The conditions for use of this band are subject to the following regional arrangements : Europe { (*a*) *Air* mobile services *exclusively*. / (*b*) *Air* fixed services *exclusively*. / (*c*) Within the band 250–285 kc/s (1,200–1,050 m.). Fixed services *not open to public correspondence*. / (*d*) Broadcasting within the band 194–224 kc/s (1,550–1,340 m.). Other regions { (*a*) Mobile services except commercial ship stations. / (*b*) *Air* fixed services *exclusively*.

WRC-23: Sharing in the 6 GHz

Licence-exempt access to the 6 GHz band



WRC-23 outcome on U6 by region



WRC-23: Sharing in the 6 GHz

5.457E The frequency bands 6 425-7 125 MHz in Region 1 and 7 025-7 125 MHz in Region 3 are identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. Resolution **220 (WRC-23)** applies.

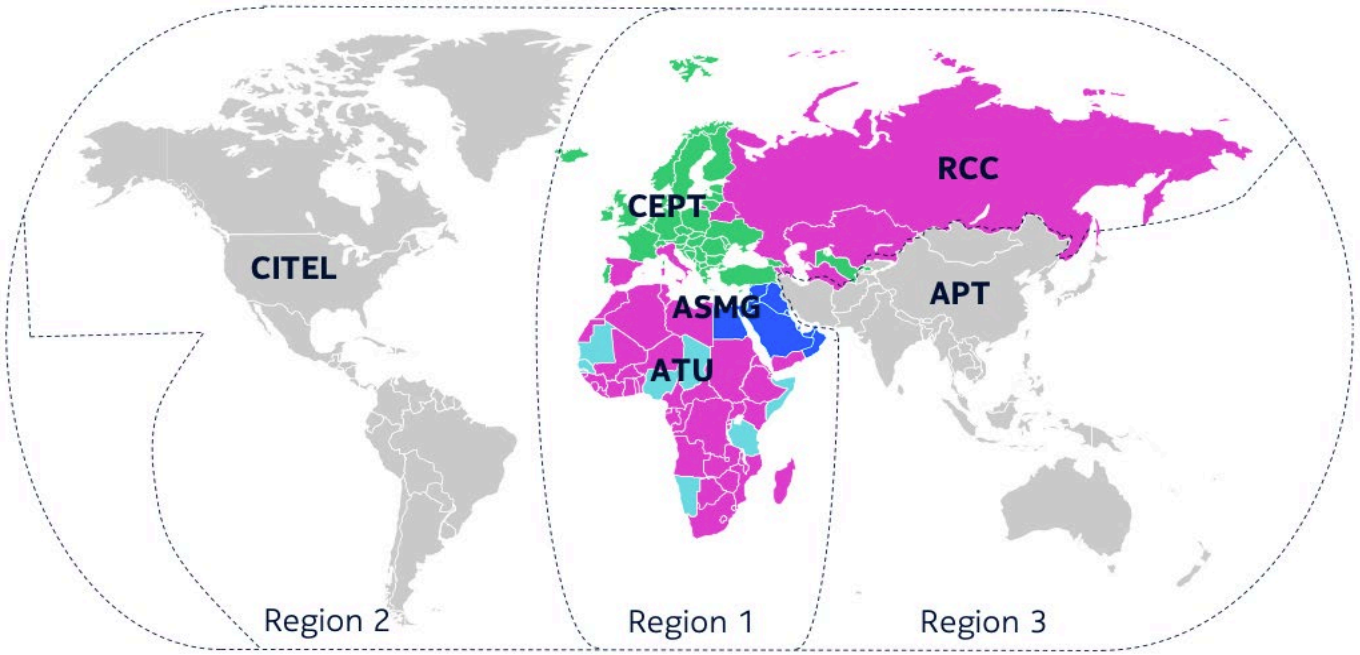
The frequency bands are also used for the implementation of wireless access systems (WAS), including radio local area networks (RLANs). (WRC-23)

5.457F In Brazil and Mexico, the frequency band 6 425-7 125 MHz is identified for the terrestrial component of International Mobile Telecommunications (IMT). The use of this frequency band for the implementation of IMT is subject to seeking agreement under No. **9.21** with neighbouring countries. 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. Resolution **220 (WRC-23)** applies.

The frequency band is also used for the implementation of wireless access systems (WAS), including radio local area networks (RLANs). (WRC-23)

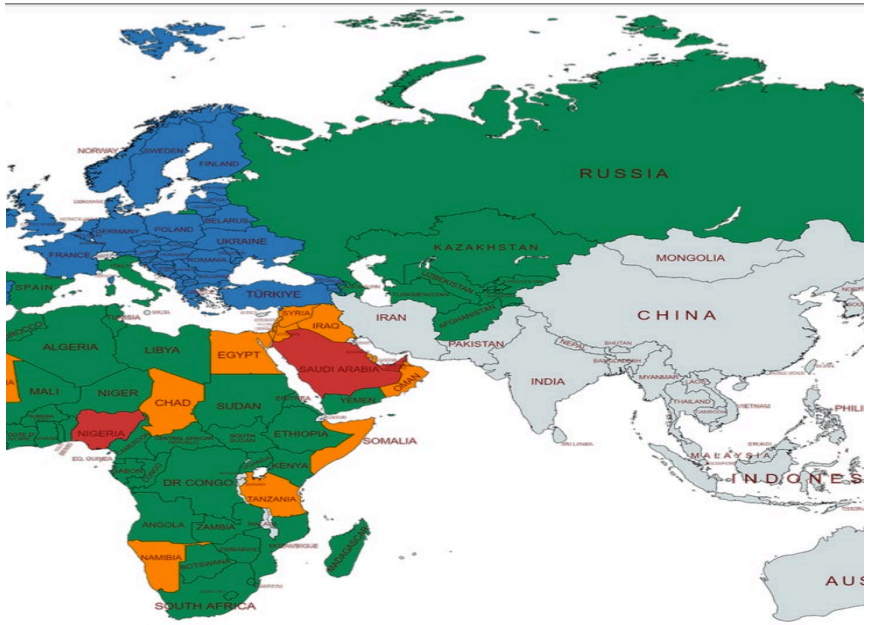
5.457D In Cambodia, Lao P.D.R. and the Maldives, the frequency band 6 425-7 025 MHz is identified for the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Resolution **220 (WRC-23)** applies. (WRC-23)

WRC-23: Sharing in the UHF Band



- Primary mobile with IMT in 614-694 MHz
- Secondary mobile full 470-694 MHz
- Secondary mobile in 614-694 MHz
- No Change (NOC)

NOKIA



No Change in most countries

- **Nationwide mobile in 614-694MHz plans**
- **Limited/localized Mobile deployments**
- **Support mobile in 614-694MHz**
- **No change**

WRC-23: Sharing in the UHF Band

5.307A *Additional allocation*: in Saudi Arabia, Bahrain, Egypt, the United Arab Emirates, Iraq, Jordan, Kuwait, Oman, Palestine*, Qatar and the Syrian Arab Republic, the frequency band 614-694 MHz is allocated to the mobile, except aeronautical mobile, service on a primary basis and identified for International Mobile Telecommunications (IMT) – see Resolution **224 (Rev.WRC-23)** subject to the agreement obtained under No. **9.21.** Stations in the mobile service shall not create a field strength for more than 1% of the time at the highest of the clutter height or 10 m above ground level at the border of the territory of any other administration that exceeds the field strength value as calculated using § 4.1.3.2 of Annex 2 to the GE06 Agreement with regard to allowance for multiple interference, Table A.1.10 and the methodology given in the GE06 Agreement. Stations in the mobile service of the countries listed in this footnote shall not cause harmful interference to, or claim protection from the existing and future broadcasting stations of the neighbouring countries operating in accordance with the GE06 Plan. This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations and shall in no way adversely affect the development of the existing and future broadcasting service in accordance with the GE06 Agreement. For countries party to the GE06 Agreement, the use of stations in the mobile service is also subject to the successful application of the procedures of that Agreement. This allocation does not establish priority in the Radio Regulations and shall allow the implementation and development of the broadcasting service in accordance with the GE06 Agreement. The countries listed in this footnote and located in the African Broadcasting Area should ensure protection of the radio astronomy service within the frequency band 606-614 MHz, as allocated in No. **5.304**, consistent with the most recent version of Recommendation ITU-R RA.769. The countries listed in this footnote, which are neighbouring to the countries listed in No. **5.312**, should ensure the protection of the aeronautical radionavigation service in the frequency band 645-862 MHz. (WRC-23)

WRC-23: Future Agenda Items

"Agenda Item 10 tends to get kicked to the third and fourth weekend," the spectrum negotiator said, "and it gets really testy in there because people are tired, they're ugly, and they have strong views — they haven't slept in like the last 24 hours, and they haven't bathed either."

GSA	**7 - 24 GHz**
GSMA	**7 - 15 GHz**
Apple and Samsung	**3800 - 4200 MHz** **4400 - 4800 MHz** **10.7 - 15.35 GHZ**
Huawei Technologies Sweden AB, LM ,Ericsson, Nokia Corporation Qualcomm, ZTE France SASU	**7.125 - 8.5 GHZ** **10.7 - 11.7 GHz** **11.7 - 12.75 GHz** **12.75 - 13.25 GHz** **14 - 14.5 GHz** **14.5 - 15.35 GHz**
ASMG	**3.8 – 4.2 GHz & 7-15 GHz**
CEPT	**7.125-24 GHz (Not supported)**
CITEL	**3.1-3.1 GHz – 7125-8500 MHz – 14.75 – 15.35 GHz**
RCC	**4400-4800 MHz &10-10.5 GHz & 14.8 - 15.35 GHz**

CEPT position (cont.)

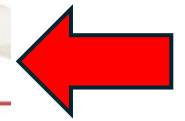
6425-7025 MHz (Region 1) and 7025-7125 MHz (Globally)

CEPT is neither proposing nor supporting an IMT identification of the frequency range 6425-7125 MHz but could accept it if the conditions below are fulfilled. If these conditions are not fulfilled, CEPT will support NOC (underlined).

CEPT will only accept an IMT Identification if all of the following 5 conditions are fully met:

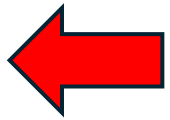
1. the protection of relevant primary services is ensured (as provided in the European Common Proposal - ECP)
2. continued operation of other services (i.e. those identified in RR Nos. **5.458** for EESS (passive) and **5.149** for Radioastronomy) is addressed (as provided in the ECP) with additionally new EESS (passive) primary allocations in the frequency bands 4.2 – 4.4 GHz, and 8.4 – 8.5 GHz, to allow the continued operation of sea surface temperature (SST) measurements
3. no limitations are imposed on the existing services and their future development
4. the IMT Resolution clearly outlines opportunities for other broadband applications in the mobile services (i.e. WAS/RLAN) as well as sufficient flexibility regarding the future wireless broadband usage, i.e. by IMT, WAS/RLAN or under a shared framework between IMT and WAS/RLAN as provided in the ECP
5. WRC-23 does not approve an agenda item for WRC-27 studying additional IMT identifications in frequency bands between 7 and 30 GHz where IMT would have the potential to jeopardize important European space and governmental spectrum.

10



In case WRC-23 does not approve new primary allocation of the frequency bands 4.2-4.4 GHz and 8.4-8.5 GHz to EESS (passive) for Sea Surface Temperature (SST) (as a consequence of WRC-23 agenda item 1.2), CEPT will propose during WRC-23 a new agenda item for WRC-27 related to new passive EESS allocation in these frequency bands.

74



1.19 ➢ possible **primary allocations in all Regions to the EESS (passive)** in the frequency **bands 4 200-4 400 MHz and 8 400-8 500 MHz**

► **Resolution 674 (WRC-23)**

WRC-23 Insights

The support of the satellite industry to Wi-Fi in the 6 GHz.

The protection of IMT from the existing services and the protection of secondary services from IMT.

The IMT identification in the 6 GHz clearly outlines opportunities for Wi-Fi.

Global harmonization is becoming quite diffiuclt.

Unilteral approach is still apparent within discussions.

The future of the ITU WRC cycle: Keeping pace with technological progress

From WRC-23 to the next cycle: How to Make Everyone Happy? (Hint: You Can't)

WRC-27: A Three-Course Meal from a Very Slow Kitchen

WRC-27: The satellite-heavy WRC

3 July 2024

thomas.welter@anfr.fr

Will WRC-27 be the last WRC of its kind as we know it?

Or: How to keep the ITU relevant in an ever-faster changing world

Simon Pike

WRC-27: The satellite-heavy WRC

3 July 2024

thomas.welter@anfr.fr

Service	WRC								Total
	1993	1995	1997	2000	2003	2007	2012	2015	
Non-service	0	0	2	2	9	4	5	4	**26**
FSS	0	1	1	6	6	2	0	5	**21**
MSS	0	4	1	5	5	2	1	1	**19**
EESS	0	1	4	2	3	3	0	2	**15**
MMS	0	0	4	2	3	1	2	2	**14**
BSS	0	0	1	5	4	2	1	0	**13**
FS	0	0	1	3	3	0	3	0	**10**
SS	0	2	2	2	2	2	0	0	**10**
MS	0	0	1	2	1	1	3	2	**10**
BS	0	1	2	0	3	2	1	0	**9**
SRS	0	1	1	1	1	3	1	1	**9**
MMSS	0	0	4	0	1	1	0	1	**7**
RLS	0	0	0	0	2	1	3	1	**7**
RNSS	0	0	0	3	2	0	1	0	**6**
AM(R)S	0	0	1	1	1	1	1	0	**5**
AMS	0	0	0	0	3	1	1	0	**5**
TS	0	0	1	2	0	1	1	0	**5**
ARS	0	0	0	0	1	1	1	1	**4**
RAS	0	0	0	2	1	1	0	0	**4**
AMSS	0	0	0	0	3	0	0	0	**3**
MetSat	0	0	1	0	0	1	1	0	**3**
MetAids	0	0	1	0	0	0	1	0	**2**
AMS(R)S	0	0	0	0	0	0	1	0	**1**
ARSS	0	0	0	0	1	0	0	0	**1**
ARNS	0	0	0	0	1	0	0	0	**1**
SOS	0	1	0	0	0	0	0	0	**1**
Total	**0**	**11**	**28**	**38**	**56**	**30**	**28**	**20**	**211**

From 1993 to 2012, the most specified WRC agenda items are non-service (26), followed by

What are IMT Bands to be studied in WRC-27?

WRC-27 IMT bands under consideration

Region 1	Region 2	Region 3
4 400-4 800 MHz		4 400-4 800 MHz
7 125-7 250 MHz 7 750-8 400 MHz	7 125-8 400 MHz	7 125-8 400 MHz
14.8-15.35 GHz	14.8-15.35 GHz	14.8-15.35 GHz

WRC-07

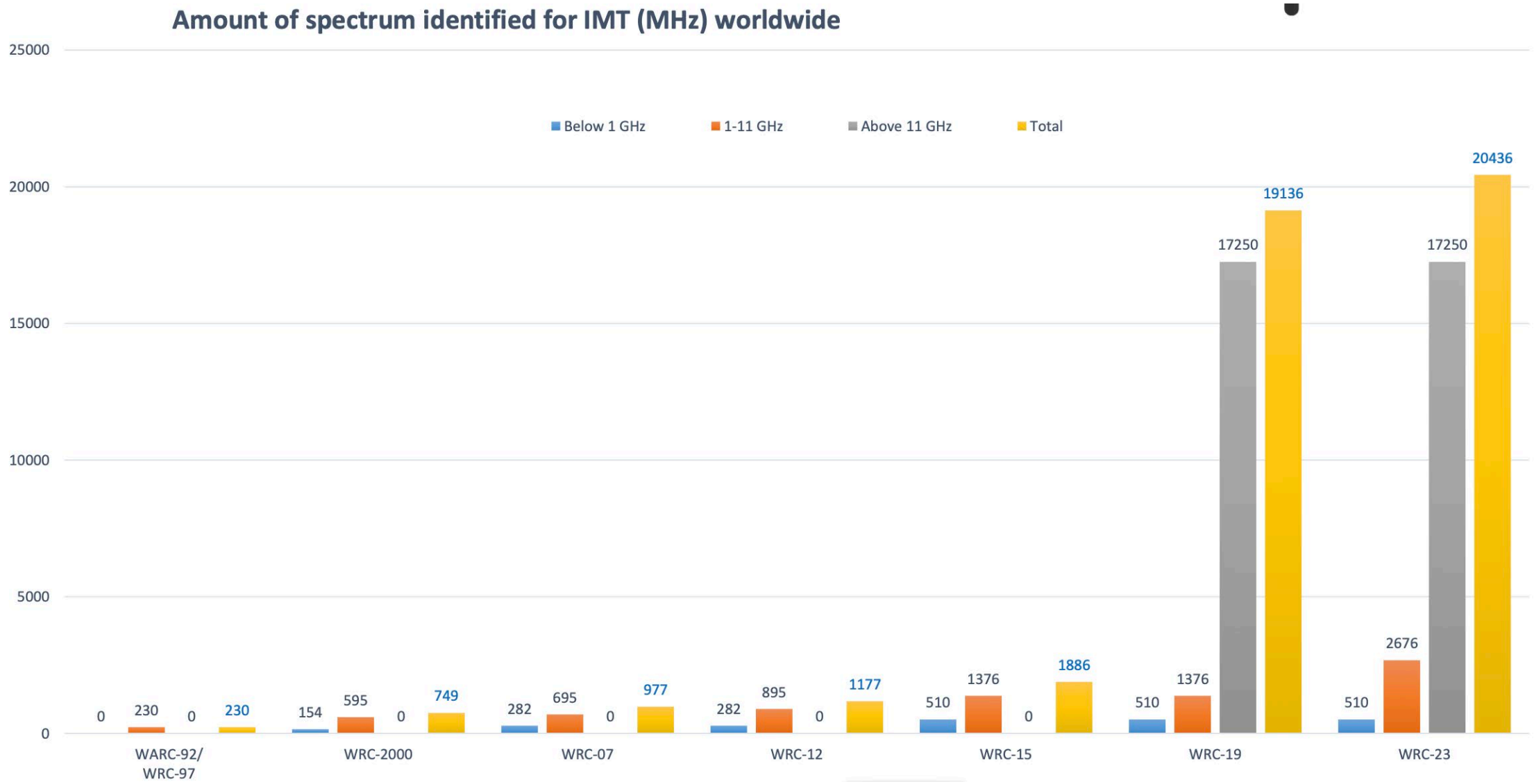
1. 410 - 430 MHz
2. 450 - 470 MHz
3. 470 - 862 MHz
4. 2300 - 2400 MHz
5. 2700 - 2900 MHz
6. 3400 - 3600 MHz
7. 3600 - 3800 MHz
8. 3800 - 4200 MHz
9. 4400 - 4990 MHz

WRC-19

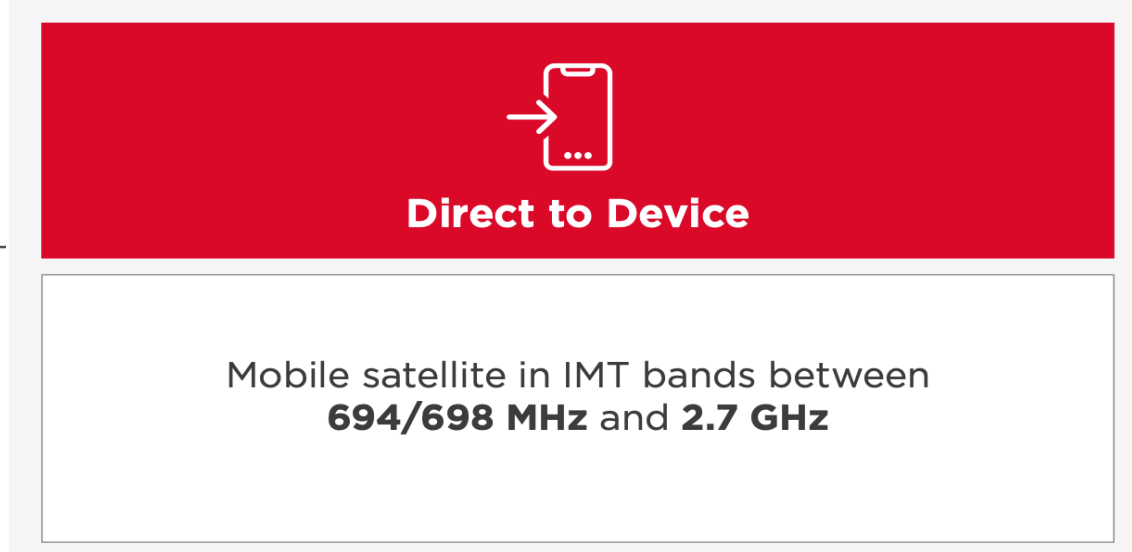
24.25-27.5 GHz
31.8-33.4 GHz
37-43.5 GHz
45.5-50.2 GHz
50.4-52.6 GHz
66-71 GHz
71-76 GHz
81-86 GHz

WRC-15

1. 470-694/698 MHz
2. 1350-1400 MHz
3. 1427-1452 MHz
4. 1452-1492 MHz
5. 1492-1518 MHz
6. 1518-1525 MHz
7. 1695-1710 MHz
8. 2700-2900 MHz
9. 3300-3400 MHz
10. 3400-3600 MHz
11. 3600-3700 MHz
12. 3700-3800 MHz
13. 3800-4200 MHz
14. 4400-45 00 MHz
15. 4500-4800 MHz
16. 4800-4990 MHz
17. 5350-5470 MHz
18. 5725-5850 MHz
19. 5925-6425 MHz


Amount of spectrum identified for IMT (MHz) worldwide
25000
20000
15000
10000
5000
0
Below 1 GHz
1-11 GHz
Above 11 GHz
Total
0
230
0
230
154
595
0
749
282
695
0
977
282
895
0
1177
510
1376
0
1886
510
1376
17250
19136
510
2676
17250
20436
WARC-92/ WRC-97
WRC-2000
WRC-07
WRC-12
WRC-15
WRC-19
WRC-23

Topic	Responsible group	Action to be taken by the group	Contributing group
1.13 to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution **253 (WRC-23)**;			
Resolution **253 (WRC-23)** Studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage	**WP 4C***	*resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference* 1 studies on possible allocations to the MSS in the frequency range between 694/698 MHz and 2.7 GHz, taking into account the IMT frequency arrangements addressed in the most recent version of Recommendation ITU-R M.1036; 2 studies on spectrum requirements and on technical, operational and regulatory matters related to the implementation of the mobile-satellite service for direct connectivity to the IMT user equipment to complement the terrestrial IMT network coverage, *further resolves* 1 to conduct studies on sharing and compatibility between incumbent services, including in adjacent frequency bands, ensuring the protection of incumbent services in accordance with the Radio Regulations; 2 to study possible technical and operational measures to ensure that the stations in the MSS do not cause harmful interference to, or claim protection from, stations operating in the mobile service, …uding possible new allocations to … to complement terrestrial IMT	**WP 3L** **WP 3M** **WP 4A** **WP 4B** **WP 5A** **WP 5B** **WP 5C** **WP 5D*** **WP 6A** **WP 7B** **WP 7C** **WP 7D**



Will WRC-27 be the last WRC of its kind as we know it?

Or: How to keep the ITU relevant in an ever-faster changing world

Simon Pike

WRC Objectives, Benefits & Purposes

Successful history

ITUWRS GENEVA2024

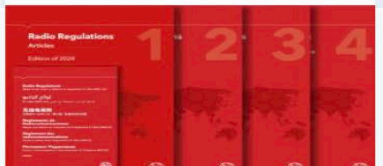
Year	Place
1903 1906	Berlin
1912	London
1927	Washington, D.C.
1932	Madrid
1938	Cairo
1947	Atlantic City
1951	Geneva
1959	Geneva
1963	Geneva
1967	Geneva
1971	Geneva
1974	Geneva
1977	Geneva
1979	Geneva
1983	Geneva

Delegates at the Preliminary Conference on Wireless Telegraphy (Berlin, 1903)

LES GOUVERNEMENTS des États signataires de la CONVENTION TELEGRAPHIQUE INTERNATIONALE

TITRE PREMIER. Du réseau international.

Year	Place
1988	Geneva
1992	Malaga-Torremolinos
1993	Geneva
1995	Geneva
1997	Geneva
2000	Istanbul
2003	Geneva
2007	Geneva
2012	Geneva
2015	Geneva
2019	Sharm el-Sheikh
2023	Dubai



ITU

Or: How to keep the ITU relevant in an ever-faster changing world

Simon Pike

ITU Timeline

WRC-07	WRC-12	WRC-15	WRC-19	WRC-23
80 countries sign into footnotes for 3.4-3.6 GHz	New Agenda Item agreed to discuss 3.4-4.2 GHz, inter alia	3.4-3.6 GHz harmonised; some additional identifications at 3.3-3.4 and 3.6-3.7 GHz	New Agenda Item agreed for WRC-23	Parts of 3.3-3.8 GHz being discussed for Regions 1 and 2

Outside ITU

2011	2017	2017	2018	2018	2018
Conditions of 3.4-3.8 GHz finalised in EU for 4G	First auctions of 3.4-3.8 GHz in Europe following agreement of use by 5G	CITEL approves 3.3-3.7 GHz bandplan for TDD	US announces flexible use of mid-band spectrum at 3.7-4.2 GHz	Arab countries announce use of 3.3-3.8 GHz	China assigns use of 3.4-3.6 GHz

2019	2019	2020	2020	2020	2021
Japan assigns spectrum between 3.6-4.2 GHz	Gulf Cooperation Council countries assign 3.4-3.8 GHz (Kuwait, Oman, Qatar, Saudi, UAE)	Canada considers flexible use in the band 3.650-4.0 GHz through public consultation	Brazil announces auction of 3.3-3.7 GHz in 2021	New Zealand assigns 3.590-3.750 GHz	US assignment of 3.7-3.98 GHz

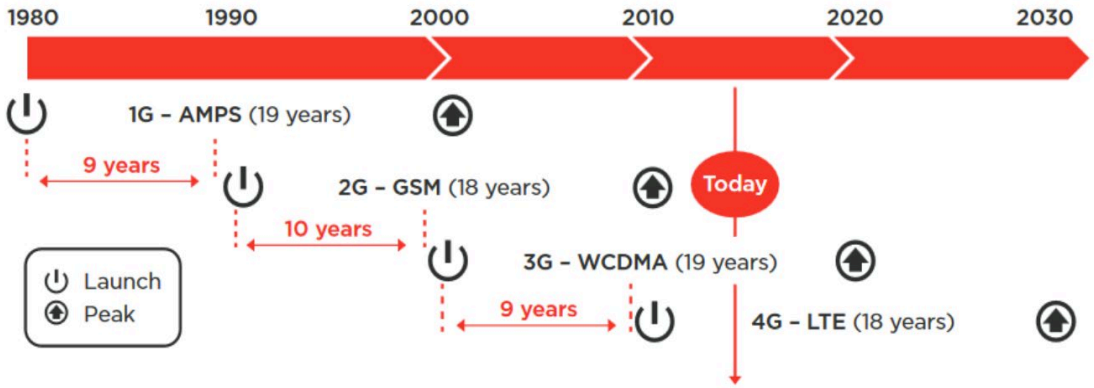


Figure 5: Evolution of mobile technology by generation, 1980 onwards
Source: GSMA Intelligence

Source: GSMA

2.14 ➢ review **spectrum use and needs** of **applications of BS and MS** and consider possible regulatory actions in the band **470-694 MHz** or parts thereof ► **Resolution 235 (Rev.WRC-23)**

Section II – Control of interference to geostationary-satellite systems

22.2 § 2 1) Non-geostationary-satellite systems shall not cause unacceptable interference to and, unless otherwise specified in these Regulations, shall not claim protection from geostationary-satellite networks in the fixed-satellite service and the broadcasting-satellite service operating in accordance with these Regulations. No. **5.43A** does not apply in this case. (WRC-07)

*"WRC-23 invites ITU-R to conduct technical studies on the epfd limits in Article **22**, including the epfd limits referred to in No. **22.5K**, in order to ensure the continued protection of GSO FSS and GSO BSS networks, and to inform WRC-27 of the results of the studies, without any regulatory consequences.."*

Statement of Chairman Brendan Carr (2025)

You see, these next-generation systems are still governed today by rules that were adopted over 30 years ago. The power limits developed in the 1990s hamper satellite broadband by degrading signal quality, reducing coverage, limiting capacity, and making it harder to share spectrum with other satellite systems. Back then, high-speed satellite broadband was considered the stuff of science fiction and the ability to share between satellite systems was primitive. Fast forward to today, and breakthrough advances enable efficient spectrum use and sharing, making satellite broadband a real competitive option.

Michael O'Rielly, FCC Commissioner (2016)

"Science should dictate the efficient allocation of spectrum, not politics or international protectionism. *Global technological leaders, such as the U.S., will continue to innovate outside and without input from the ITU and its many nation states. This will, in turn, make the ITU and the WRC process less relevant*".

WRC-27 Insights

ITU process timing is not synchorized with technology development?

The mobile industry will be in the defense position!

The age of Satellite?