

Countdown to WRC-23

World Radiocommunication Conference
20 November – 15 December 2023
Dubai, United Arab Emirates



ITUWRC
DUBAI2023



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A futuristic digital interface with various icons and glowing lines. The background is dark blue with a grid pattern. Several colorful icons are scattered across the screen, connected by glowing lines. The icons include a Wi-Fi symbol, a globe, a target, a lightbulb, a document, a laptop, a magnifying glass, a location pin, a gear, a speech bubble, and a person silhouette. The overall aesthetic is high-tech and modern.

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Building the digital world we want

Doreen Bogdan-Martin
ITU Secretary-General

Early in my years at the International Telecommunication Union (ITU), I learned a lesson that would guide my entire career: that behind every new technology we help bring to the world, there are women and men who push the boundaries of what's possible, not for personal gain but for humanity's benefit.

As I begin my new role as ITU Secretary-General, I pay tribute to all those who have shared their insights, stories, accomplishments, challenges, and ideas through this magazine. They have inspired me, along with generations of ITU news readers, to reach higher and dream bigger.

Just as we owe those who bring us life-changing technologies, we must ensure that everyone shares the same opportunities – including the one third of humanity who have still never used the Internet and the many more who struggle with inadequate or unaffordable broadband access.

Together, we can change that within this decade. It won't be easy. But think about what we have accomplished so far.

Radiocommunications is a perfect example of how we can succeed. With so much of our digital future resting on the use of frequency spectrum and associated satellite orbits, ITU's upcoming World Radiocommunication Conference (WRC-23) will pave the way for new, more innovative ways to connect the world.

I hope you find this edition on WRC-23 preparations as valuable as I do, and I look forward to working with you in the months and years ahead to build the digital world we want.



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Editorial

3 Building the digital world we want

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Introduction

7 WRC-23: Laying a firm foundation for future new technologies to connect the world

Mario Maniewicz
Director, ITU Radiocommunication Bureau

11 Host country UAE preparing for WRC-23

Engineer Majed Sultan Al Mesmar
Director General, Telecommunications and Digital
Government Regulatory Authority, UAE

Conference overview

14 From Conference Preparatory Meeting to World Radiocommunication Conference

Cindy-Lee Cook
Chairperson of the Conference Preparatory Meeting for WRC-23

18 WRC-23 agenda in brief

Regional preparations

23 Regional preparations for WRC-23

Philippe Aubineau
Counsellor, ITU-R Study Group 1, and the Conference Preparatory Meeting

26 Global regions for spectrum allocation

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27 Representing the Arab States

Tariq Al Awadhi
Chairman, Arab Spectrum Management Group (ASMG)

29 Representing Africa

John Omo
Secretary General, African Telecommunication Union (ATU)

31 Representing Europe

Alexandre Kholod
Chairman, Conference Preparatory Group, European Conference of Postal and Telecommunications Administrations (CEPT)

34 Representing the Commonwealth of Independent States

Albert Nalbandian
Chairman, Working Group on preparation for WRC-23/RA-23 Regional Commonwealth in the Field of Communications (RCC)

36 Representing the Americas

Víctor Martínez
Chairman, Working Group for Regional and World Radiocommunication Conferences, Inter-American Telecommunication Commission (CITEL)

38 Representing Asia and the Pacific

Kyu-Jin Wee
Chairman, APG-23, Asia-Pacific Telecommunity (APT)

Technical perspectives

41 International regulation of satellite services

Victor Strelets
Chairman, ITU Radiocommunication Sector Study Group 4

45 Why WRC-23 will be pivotal for terrestrial services

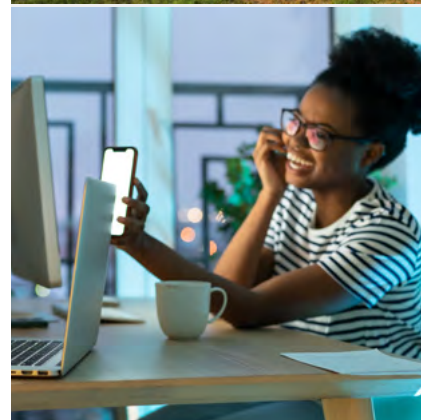
Martin Fenton
Chairman, ITU Radiocommunication Sector Study Group 5

50 Safeguarding high-quality broadcasting services

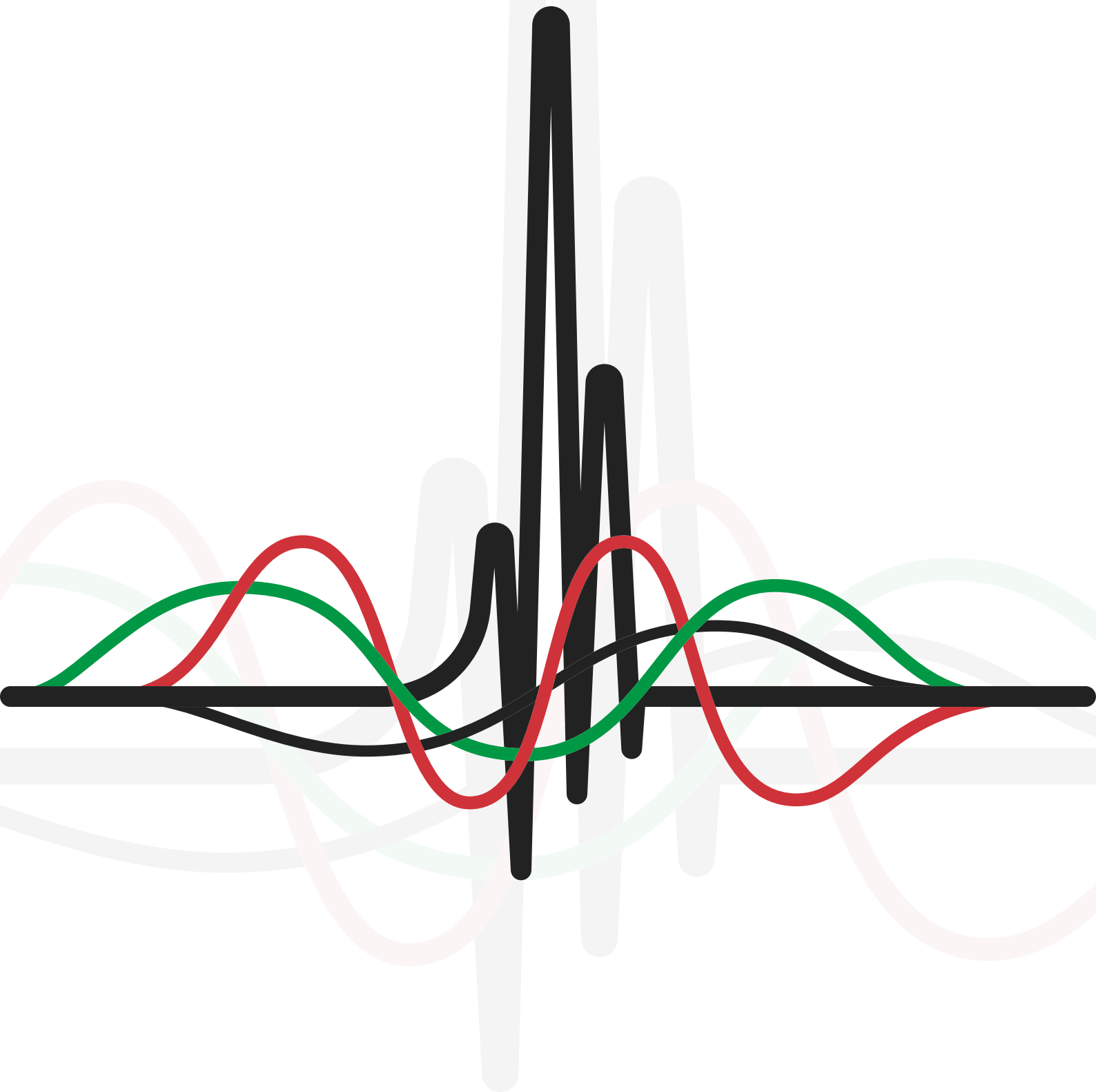
Yukihiko Nishida
Chairman, ITU Radiocommunication Sector Study Group 6

54 WRC-23 technical preparations for science services

John Zuzek
Chairman, ITU Radiocommunication Sector Study Group 7



Quick links for WRC-23



WRC-23: Laying a firm foundation for future new technologies to connect the world

Mario Maniewicz

Director, ITU Radiocommunication Bureau

Less than a year from now, Member States of the International Telecommunication Union (ITU) will convene in Dubai, United Arab Emirates for the next World Radiocommunication Conference (WRC-23).

The conference gives ITU Member States the opportunity to update the Radio Regulations – the international treaty that governs the use of the frequency spectrum and associated satellite orbits.

The ITU Radio Regulations enable countries to provide access to new wireless terrestrial and satellite systems, technologies and services while simultaneously ensuring that all radio systems can coexist without receiving harmful interference.

The visionary signatories of the first International Radio Telegraph Convention back in 1906 already foresaw that future conferences would modify the Convention and the complementing Regulations.



The conference gives ITU Member States the opportunity to update the Radio Regulations – the international treaty that governs the use of the frequency spectrum and associated satellite orbits. ”

Mario Maniewicz

Opening doors to new applications

Indeed, the digital revolution has opened the doors to a variety of new applications that are spurring greater interest in, and demand for, the world's limited spectrum and orbital resources. This increased demand sometimes requires changes to the regulatory framework.

The Radio Regulations have continuously taken advantage of technological developments to increase the efficient use of the spectrum and facilitate spectrum access. Modifications to the international treaty have addressed the needs of new services along with the spectrum requirements of existing services; ensured the timely availability of spectrum and corresponding regulatory provisions; and maintained the benefits of globally harmonized frequency bands.

Draft CPM Report now available

Looking at all that is at stake at each World Radiocommunication Conference (WRC) can be a challenging task. However, I am delighted to say we have reached an important landmark towards WRC-23 with the completion of the [draft Conference Preparatory Meeting Report](#) – now available on our portal in English, with other languages to follow.

The draft CPM Report includes important study results from the ITU Radiocommunication Sector (ITU-R) ahead of WRC-23 as well as proposed ways forward to resolve issues on the conference agenda.

I should here acknowledge all the efforts put into this process by our members, under the exceptional leadership of the chairs of all responsible groups and of the CPM chair and her steering committee and management team.

Without all those efforts over the last three years, we would not have been able to carry out complex ITU-R preparatory studies and meet the deadline for completion of the draft CPM texts by the responsible ITU-R groups.

The over 900 pages of the draft CPM Report, the numerous methods and alternatives proposed to satisfy agenda items, and the many views presented in the draft CPM texts all reflect the complexity of the issues on the WRC-23 agenda and the challenges of virtual meetings during the first two years of this cycle.

“

I am delighted to say we have already reached an important landmark towards WRC-23 with the completion of the draft Conference Preparatory Meeting Report. ”

”

ITU's tradition of consensus building

To guarantee the same level of achievement in the next conference cycle, we need to continue the trend of consolidating common and coordinated proposals. This process, which highlights the great spirit of international cooperation that marks the ITU tradition of consensus building, has proved more and more successful within and between the various regional groups for each World Radiocommunication Conference.

In this ITU News Magazine edition on WRC-23 preparations, we offer you the big picture, outlining the pressing issues on the conference agenda.

These include:

- The continued development of International Mobile Telecommunications (IMT) systems, including the use of high altitude platform stations as IMT base stations (HBS) (items 1.1 to 1.5).
- The enhancement of aeronautical and maritime communications, including by satellite (items 1.6 to 1.11).
- The increasing importance of the science services for weather forecast and climate change monitoring and other scientific missions (items 1.12 to 1.13).
- The framework for the use of earth stations in motion on board vessels and ships for communication with geostationary orbit (GSO) and non-geostationary (NGSO) satellites (items 1.15 and 1.16).
- Changes to the coordination, notification and recording procedures for frequency assignments pertaining to satellite networks (item 7).



In this ITU News Magazine edition on WRC-23 preparations, we offer you the big picture, outlining the pressing issues on the conference agenda. ”

Pivotal outcomes

The outcomes of WRC-23 will be pivotal in shaping the future technical and regulatory frameworks for the provision of radiocommunication services in all countries.

This edition also contains an overview of the four-year preparatory process towards WRC-23, involving extensive studies, as well as technical discussions at the international and regional levels.

The chair of the Conference Preparatory Meeting (CPM23-2) and the chairs of ITU-R study groups will provide technical perspectives on the work that has been conducted, the results of which are compiled in the draft CPM text, in ITU-R recommendations and reports, and in other supporting documents for WRC-23.

Representatives of the six regional groups give their perspectives on the preparatory process that takes place within the Arab States, Africa, Europe, the Commonwealth of Independent States, the Americas, and Asia and the Pacific.

This multi-stakeholder approach engages governments, regulatory authorities, network operators, equipment suppliers, and regional and international organizations in the development of convergent technical and regulatory solutions that create a stable, predictable environment, which is universally applied. This is essential for the provision of and future investment in radiocommunication services.

I thank all experts that contributed to this edition for bringing their perspectives to the table. Moreover, I thank the chairs and vice-chairs of CPM, ITU-R study groups, and regional groups, for their leadership and their commitment in preparation for WRC-23.

We are confident these articles offer a well-informed read on some of the main issues and look forward to welcoming all ITU Member States and the ITU-R member observers to the conference.



The outcomes of WRC-23 will be pivotal in shaping the future technical and regulatory frameworks for the provision of radiocommunication services in all countries.”

Host country UAE preparing for WRC-23

Engineer Majed Sultan Al Mesmar

Director General, Telecommunications and Digital Government
Regulatory Authority, UAE

It was only six months since the inception of the United Arab Emirates (UAE) when our leadership decided, on 27 June 1972, to officially join the International Telecommunication Union (ITU).

Since then, the UAE has continued to play a pivotal role in shaping the global telecommunications community, participating actively in ITU activities, including conferences, studies, and the work of specialized teams.

We have exchanged ideas, experiences, best practices, and standards in the information and communication technology (ICT) sector, and we shall pursue our global mission under the umbrella of ITU, believing in the importance of this industry and the role of technologies in creating a sustainable future for all humankind.

The UAE has been working tirelessly – along with the rest of ITU's 193 Member States and over 900 companies, universities, international and regional organizations, and more than 20 000 specialists – to harness digital technologies for sustainable development.

The UAE has hosted many important ITU events, and by hosting the upcoming World Radiocommunications Conference (WRC-23) will become the only country in the world to have hosted all major ITU-affiliated assemblies and conferences.

Our track record reflects the exceptional importance we attach to this international organization. Today, as we enter the era of the Fourth Industrial Revolution with its emerging and disruptive technologies, this relationship has become increasingly key, and global cooperation in the field of digital technologies has gained added urgency.

As we prepare to host WRC-23 with our traditional Emirati hospitality, we are also discovering anew the importance of our relationship with ITU.



We look forward to making WRC-23 another success story to add to our joint record with ITU. ”

Engineer Majed
Sultan Al Mesmar



Preparing for success

We look forward to making WRC-23 another success story to add to our joint record with ITU. As we did for the ITU Plenipotentiary Conference in 2018, which we proudly hosted in Dubai, we will spare no effort to achieve that goal.

We are delighted to host the world here in the UAE to discuss matters of interest in the radiocommunications sector. Like other countries of the world, we view radio frequencies as a natural resource that we are keen to conserve and use efficiently and safely.

WRC-23 is an occasion to review the Radio Regulations, which govern the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits.

This next update is of exceptional significance given current rapid change in an era of digital transformation, as well as the need to connect the almost 40 per cent of the world's population who are still offline.

The coming conference will help extend telecommunication access to unconnected areas worldwide. It should also secure the frequencies necessary to provide digital services to the broadest segment of our planet's people.

While preparations for WRC-23 are in full swing, many updates may yet arise before it convenes in November and December. In the age we live in, such a time span can feel like an eternity.

What is certain, however, is that the delegates coming together in Dubai for WRC-23 will be ready, not only to deal with current issues, but also to prepare the world for the future.



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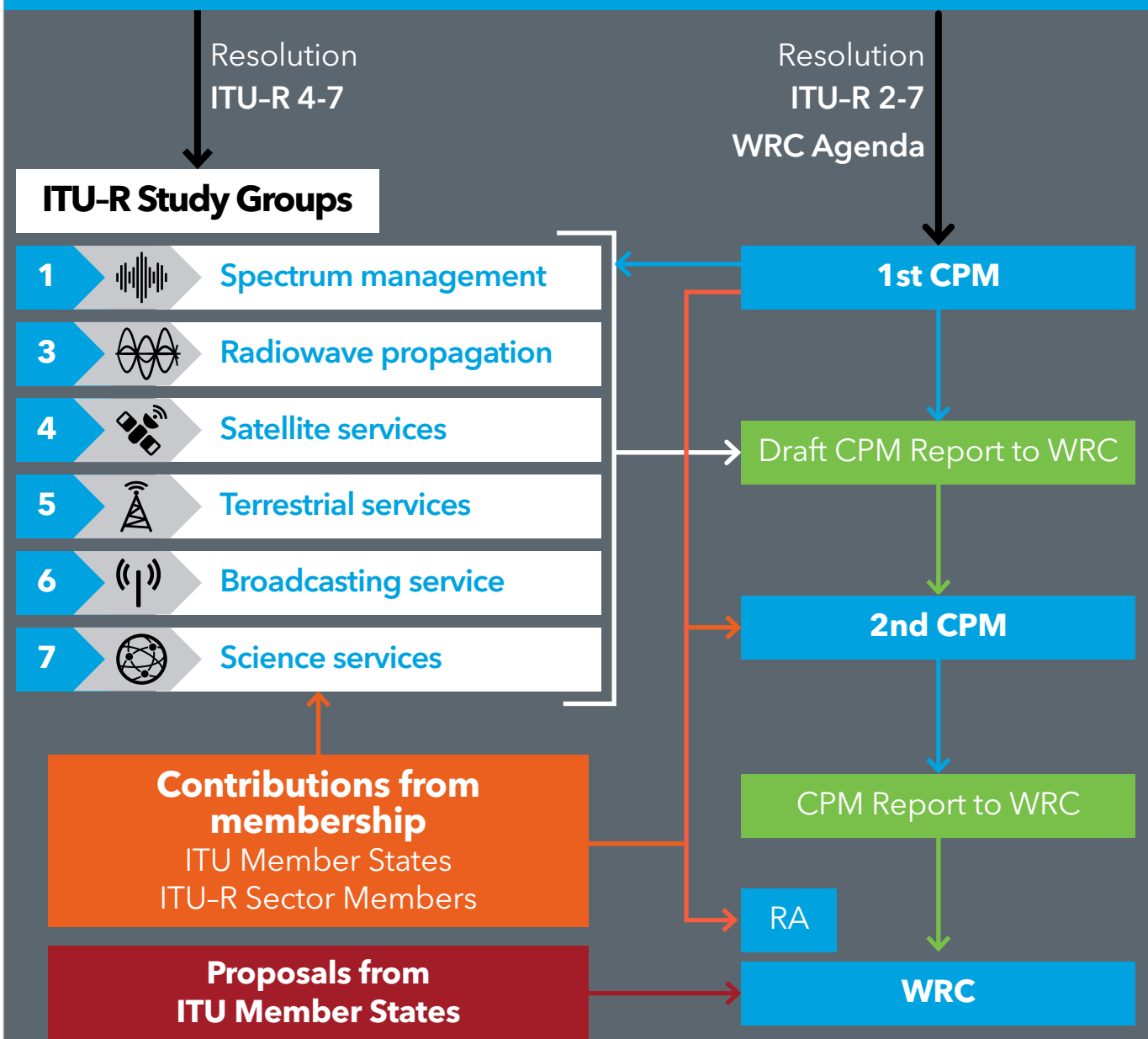
ITU members will meet in late 2023 at the World Radiocommunication Conference (WRC-23) in Dubai, United Arab Emirates.

See [video](#).



Organization of WRC preparatory work

Radiocommunication Assembly + World Radiocommunication Conference



ITU-R = ITU Radiocommunication Sector
 CPM = Conference Preparatory Meeting
 RA = Radiocommunication Assembly
 WRC = World Radiocommunication Conference



From Conference Preparatory Meeting to World Radiocommunication Conference

Cindy-Lee Cook

Chairperson of the Conference Preparatory Meeting for WRC-23

In preparation for the upcoming World Radiocommunication Conference ([WRC-23](#)), a significant amount of work takes place at, and between, the first and second Conference Preparatory Meetings (CPM23-1 and 2). The outcome of this work results in the consolidated CPM Report that will be used as a baseline for ITU Member State proposals to WRC-23.

The work of the ITU Radiocommunication Sector ([ITU-R](#)) during the 2020–2023 study cycle has been particularly challenging, as ITU-R Sector Members and ITU staff dealt with the personal and professional impacts of the COVID-19 pandemic.

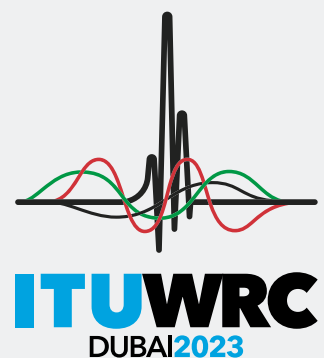
When we pivoted to virtual meetings, we experienced firsthand how essential digital connectivity is. To me, this further highlighted the importance of the work we do to find new and innovative ways to provide broadband connectivity using terrestrial and space-based communication technologies. WRC-23 agenda items covering earth stations in motion (ESIM), high-altitude platform stations as IMT base stations (HIBS), and International Mobile Telecommunications (IMT) are just a few examples of this.

Other items on the agenda that have been the subject of much interactive discussion during this cycle include inter-satellite links, new and upgraded frequency band allocations for expanding services, modernization of the Global Maritime Distress and Safety System (GMDSS), and the regulatory framework for satellite networks.



When we pivoted to virtual meetings, we experienced firsthand how essential digital connectivity is.

Cindy-Lee Cook



Outcomes of first preparatory meeting

The current cycle's first conference preparatory meeting, CPM23-1, took place in Sharm el-Sheikh, Egypt, from 25 to 26 November 2019. It organized the preparatory studies for WRC-23, assigning each agenda item and topic to a working party responsible for conducting the studies, reaching agreement on working procedures, and proposing the structure for the CPM Report to WRC-23.

The CPM Report consists of five chapters, with agenda items grouped under each by type of service. Eight chapter rapporteurs and co-rapporteurs were nominated to assist with developing the draft CPM text for specific WRC-23 agenda items within those chapters.

CPM23-1 allocated the preparatory work based on the existing ITU-R working party structure, with one exception: studies related to WRC-23 agenda item 1.5, on the use of the ultra-high frequency (UHF) band in Region 1, which were performed within a new task group, TG 6/1.

See map showing how the world is divided into three regions for the allocation of radio spectrum frequencies.

Groundwork for second preparatory meeting

Two years of teleworking and virtual ITU-R meetings due to the COVID-19 pandemic eliminated the possibility for frank and open hallway discussions to resolve differences, and thus slowed progress on some agenda items. I am happy to report, however, that all the responsible groups provided their draft CPM texts to the chapter rapporteurs by the deadline, noting some of the texts include open issues that will need to be addressed at the second conference preparatory meeting (CPM23-2) in March and April 2023.

The chapter rapporteurs, CPM counsellor and myself reviewed the draft texts to ensure clarity and alignment with ITU language and style guidance. Proposed changes were then reviewed with the CPM management team at the 9-10 November 2022 meeting. The consolidated draft CPM Report that emerged from that management meeting will be translated and made available to ITU's membership in the organization's six official languages at least two months before CPM23-2, by the end of January 2023.



Conference preparatory meeting

The CPM prepares a consolidated CPM Report on preparatory studies from the ITU Radiocommunication Sector (ITU-R) and possible solutions addressing World Radiocommunication Conference (WRC) agenda items. The report is used in support of the work of the WRC.

[Learn more.](#)

ITU-R's inter-regional workshop from 29 November to 1 December 2022 provided an excellent opportunity to inform the membership about completed studies, proposed draft methods, and the initial views of regional groups on WRC-23 agenda items. I also found that the workshop discussions gave an indication of which agenda items might result in easier or more difficult work at the upcoming CPM and WRC meetings.

Now that the draft CPM Report and studies are completed, coordination between regional groups can begin. This will put us in good stead ahead of the second conference preparatory meeting.

The goal of CPM23-2 is to reach consensus on final text in the consolidated report on ITU-R preparatory studies and on possible solutions for WRC-23 agenda items. This stage of preparations should include, as much as possible, reconciled differences in approaches, ensuring that the number of methods for addressing each agenda item is kept to the minimum possible, and that those methods are clear, precise and concise.

As can be seen in the draft CPM Report, this may be easier for some agenda items than others.

Thinking ahead to WRC-27

As was discussed at WRC-19 and CPM23-1, the membership is encouraged to begin discussions on future agenda items early in the cycle. In particular, possible items for consideration under WRC-23 agenda item 10, which deal with recommendations to the ITU Council on items for inclusion in the agenda for WRC-27, could be shared between regional groups now.

Executive summaries of no more than half a page can be contributed to CPM23-2 for possible future agenda items, beyond those already included in Resolution **812 (WRC-19)**. These contributions will be considered for information purposes only and may be included in an annex to the CPM Report.



The membership is encouraged to begin discussions on future agenda items early in the cycle. ”

What we need to succeed

From my perspective, for CPM23-2 to be an effective meeting, we need to have open **conversations** to understand each other; maintain **cooperation** to advance our work; facilitate **coordination** to reduce options; and pursue **compromise** to achieve **consensus**.

If we work this way, we can make significant progress – not just at CPM23-2, but also as we collaborate to find solutions ahead of WRC-23.

Having followed the work in the responsible groups as they drafted CPM text for their agenda items, I never cease to be amazed at how much effort, how many hours, and how many individuals' time goes into preparing for the second conference preparatory meeting and in the build up to the World Radiocommunication Conference.

In advance of CPM23-2, I'd like to acknowledge everyone's hard work and time in getting us to this point. Your efforts have been extraordinary, particularly in this difficult cycle where the groups responsible for studies and drafting CPM text only had one or two physical meetings to finalize their work.

An opportunity to advance our work

The output of CPM23-2, taking place between 27 March and 6 April, will set the stage for WRC-23, where we will endeavour to find solutions that enable the introduction of new technologies, provide a stable regulatory framework for satellite networks, modernize global radiocommunication systems, and protect existing services.

I look forward to working collaboratively with the entire ITU-R membership at CPM23-2 to advance our work towards WRC-23.

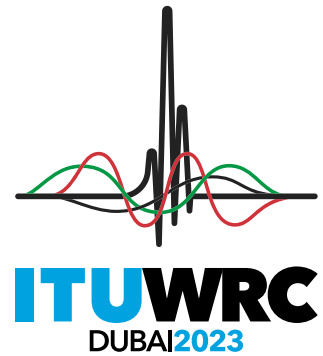


The output of the second conference preparatory meeting will set the stage for WRC-23. ”



I look forward to working collaboratively with the entire ITU-R membership at CPM23-2 to advance our work towards WRC-23. ”

WRC-23 agenda in brief




Key items for consideration at the upcoming World Radiocommunication Conference include:

1.1	Possible measures to address, in the frequency band 4 800–4 990 MHz, protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories
1.2	Identification of the frequency bands 3 300–3 400 MHz, 3 600–3 800 MHz, 6 425–7 025 MHz, 7 025–7 125 MHz and 10.0–10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis
1.3	Primary allocation of the band 3 600–3 800 MHz to mobile service within Region 1 and take appropriate regulatory actions
1.4	The use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level
1.5	To review the spectrum use and spectrum needs of existing services in the frequency band 470–960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470–694 MHz in Region 1
1.6	Regulatory provisions to facilitate radiocommunications for sub-orbital vehicles
1.7	A new aeronautical mobile-satellite (R) service (AMS(R)S) allocation for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications in all or part of the frequency band 117.975–137 MHz, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands
1.8	Appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution 155 (Rev.WRC-19) and No. 5.484B to accommodate the use of fixed-satellite service (FSS) networks by control and non-payload communications of unmanned aircraft systems

1.9	Appropriate regulatory actions and updates to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernized HF systems
1.10	Studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications
1.11	Possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System and the implementation of e-navigation
1.12	In time for WRC-23, studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, including in adjacent bands
1.13	Possible upgrade of the allocation of the frequency band 14.8-15.35 GHz to the space research service
1.14	Possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz, to ensure alignment with more up-to-date remote-sensing observation requirements
1.15	Harmonize the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service globally
1.16	Study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-GSO FSS earth stations in motion, while ensuring due protection of existing services in those frequency bands
1.17	Appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service allocation where appropriate

1.18	Studies relating to spectrum needs and potential new allocations to the mobile-satellite service for future development of narrowband mobile-satellite systems
1.19	A new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2, while protecting existing primary services in the band
2	Examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, and decide whether or not to update the corresponding references in the Radio Regulations
3	Consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference
4	Review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation
5	Review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the ITU Convention
6	Identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference
7	Consider possible changes on advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, to facilitate the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit
8	Consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required

9	Consider and approve the Report of the Director of the Radiocommunication Bureau
9.1	<p>on the activities of the ITU Radiocommunication Sector since WRC-19:</p> <ul style="list-style-type: none"> ▶ Review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services ▶ Review the amateur service and the amateur-satellite service allocations in the frequency band 1 240-1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite service (space-to-Earth) operating in the same band ▶ Study the use of International Mobile Telecommunication systems for fixed wireless broadband in the frequency bands allocated to the fixed service on a primary basis
9.2	on any difficulties or inconsistencies encountered in the application of the Radio Regulations; and
9.3	on action in response to Resolution 80 (Rev.WRC-07)
10	Recommend to the ITU Council items for inclusion in the agenda for the next world radiocommunication conference, and items for the preliminary agenda of future conferences



WRC-23 Booklet:

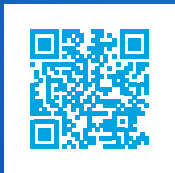
Agenda and relevant resolutions

[Download](#)

Network of Women for WRC-23

NOW4WRC23

– a forum for
networking,
mentoring, and
knowledge
sharing at the
upcoming World
Radiocommunication
Conference



#NOW4WRC23
www.itu.int/NOW4WRC23

Regional preparations for WRC-23

Philippe Aubineau

Counsellor, ITU-R Study Group 1, and the Conference Preparatory Meeting

Regional preparations for the upcoming World Radiocommunication Conference, [WRC-23](#), follow a well-established process that is a key element of the success of this quadrennial gathering of the International Telecommunication Union (ITU) to update the Radio Regulations international treaty.

The history behind regional common proposals

Just over 25 years ago, WRC-97 adopted Resolution 72 to recognize the benefits of Member States submitting coordinated common proposals to the conferences. This process, originally developed by some regional telecommunication organizations (RTOs), ensures consolidated views at the regional level, as well as encouraging interregional discussions prior to the conferences. Its usefulness for the preparation of following WRCs was also recognized.

The following year, ITU's 1998 Plenipotentiary Conference approved Resolution 80 to emphasize the benefits of regional preparation, and to encourage both formal and informal collaboration between conferences, with a view to resolving differences on new or existing agenda items. That resolution, updated in 2002, instructs the Director of ITU's Radiocommunication Bureau to consult with ITU Member States and RTOs and assist them in organizing information sessions and regional and interregional preparatory meetings.

Based on this well-recognized framework and considering the complex regulatory and technical issues involved, Resolution 72 was amended at WRC-2000, WRC-07 and WRC-19 to enhance the preparatory processes at both the regional and global levels.

At the global level, the WRC preparatory process has been clarified with respect to the activities of the [Conference Preparatory Meeting](#) (CPM).



“Regional preparations for WRC-23 follow a well-established process that is a key element of the success of this quadrennial gathering.”

Philippe Aubineau

Resolution 72 (Rev. WRC-19) now calls for organizing information sessions, preferably before and after the second session of the CPM, and for facilitating formal and informal regional and interregional meetings, aiming for a convergence of interregional views on major issues.

Regional telecommunication organizations

The WRC preparatory process continues to evolve at the regional level, with crucial input from RTOs spanning the world.

The six main RTOs – namely the Asia-Pacific Telecommunity (APT), the Arab Spectrum Management Group (ASMG), the African Telecommunications Union (ATU), the European Conference of Postal and Telecommunications Administrations (CEPT), the Inter-American Telecommunication Commission (CITEL), and the Regional Commonwealth in the Field of Communications (RCC) – have all established dedicated groups and internal working methods to develop and approve well-coordinated common proposals to the WRC.

ITU Inter-regional workshops

The Radiocommunication Bureau, in accordance with Resolution 72 (Rev. WRC-19), continues to support regional preparations and inter-regional consensus-building by organizing three ITU inter-regional workshops during the four-year study cycle between conferences.

The first [ITU Inter-regional Workshops on WRC-23 Preparation](#), held in December 2021, at the middle of the study cycle, informed members on the progress of ITU-R preparatory studies and allowed the six main RTOs to present their organization, leadership, and WRC-23 preparation plans. Involved UN agencies, such as the International Maritime Organization (IMO), International Civil Aviation Organization (ICAO), and World Meteorological Organization (WMO), and other stakeholders were also given the opportunity to inform everyone of their interests.

The second Inter-Regional Workshop, held between 29 November and 1 December 2022, presented the draft CPM Report and provided explanations on the preparatory studies and proposed solutions to satisfy WRC-23 agenda items and topics. It also provided another opportunity to facilitate exchanges between experts and coordinators from the six main RTOs and other stakeholders.

The third Inter-Regional Workshop, planned for a few months prior to WRC-23, will focus more on the complex issues expected at the conference.

The CPM

Read more about the CPM, its objectives and working methods in [Resolution ITU-R 2-8](#).

Regional telecommunication organizations

Read more about the six RTOs and [WRC-23 regional preparations](#).

ITU Inter-regional Workshops

Learn more about the [ITU Inter-regional Workshops on WRC-23 Preparation](#).

WRC-23 informal group

The Director of the ITU Radiocommunication Bureau also supports the discussions among an informal group of representatives from the six main RTOs, whose main objective is to prepare an informal draft structure for the conference. This draft structure should include the committees in charge of WRC-23 agenda items and topics, along with their various working groups.

Implementation of WRC decisions at the regional level

After each conference, the six main RTOs facilitate the implementation of WRC decisions at the regional level. The collaboration process between ITU's Radiocommunication Bureau and those regional telecommunication organizations is now well established and has proven highly successful.

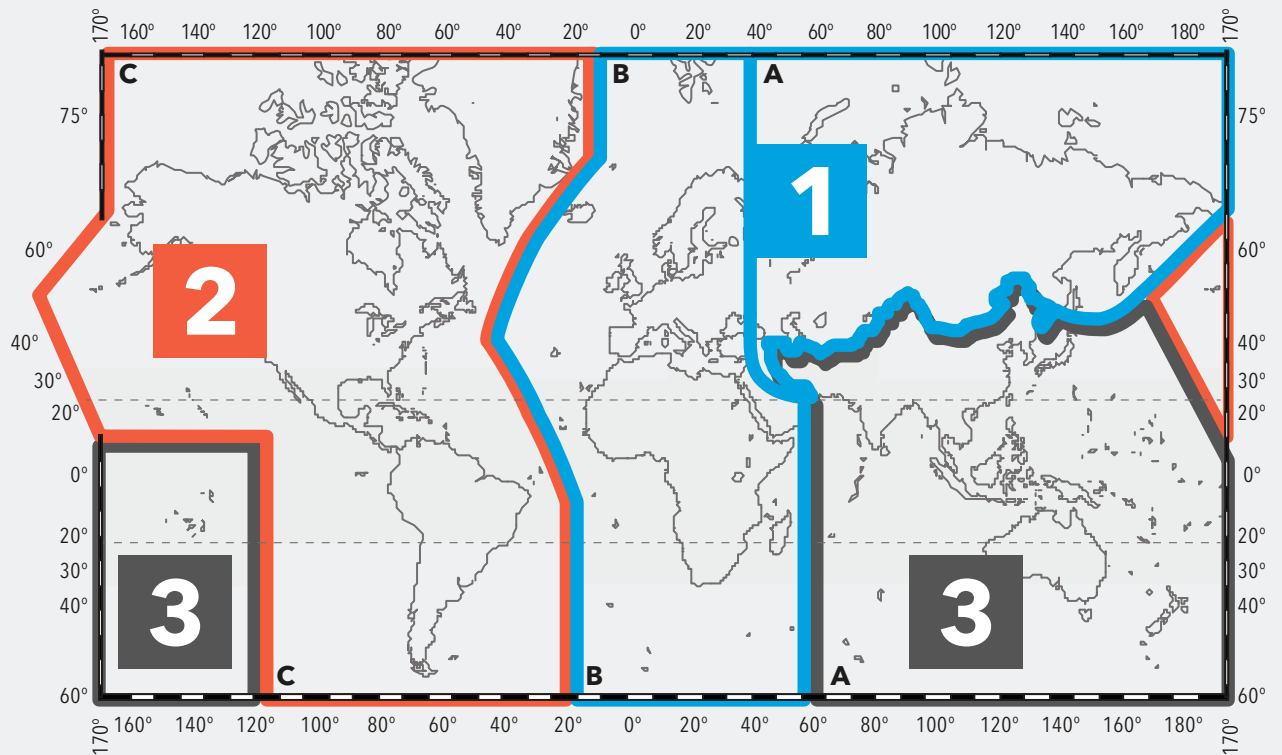


The collaboration process between ITU's Radiocommunication Bureau and regional telecommunication organizations is now well established and has proven highly successful.



Global regions for spectrum allocation

For the allocation of radio spectrum frequencies the world is divided into three regions



Region 1	Region 2	Region 3
Arab States	Americas	Asia-Pacific
Africa		
Europe		
Commonwealth of Independent States		

Representing the Arab States

Tariq Al Awadhi

Chairman, Arab Spectrum Management Group (ASMG)

Since the beginning of the 2020–2023 study cycle, the Arab Spectrum Management Group has held four preparatory meetings. These served as a platform for shaping the views of the Arab States region on the different agenda items to be discussed at the upcoming World Radiocommunication Conference (WRC-23) and were instrumental in establishing Arab common proposals.

Results of the meetings have shaped common regional positions on agenda items related to various radiocommunication services and applications.

Broadband to boost connectivity

The Arab States are keen to enhance broadband, considering it a key solution for improving connectivity. There is, therefore, a strong focus on WRC-23 agenda items 1.2, 1.4, 1.5 and 9.1c.

Satellite technologies for motion vehicles

The Arab States are eager to examine how satellite technologies can enhance broadband services in vehicles such as ships and aircraft. Introducing new earth station in motion (ESIM) systems in the Ku and Ka band looks promising for the region. However, countries in the region are concerned about the effect these new systems might have on existing, incumbent services in those two bands. The Arab States therefore need to participate in any studies conducted in this regard.

Crucial narrowband connectivity

Narrowband mobile satellite services are another promising technology. Given the current move towards smart cities and Internet of Things (IoT) solutions, the availability of narrowband connectivity has become a major requirement – particularly in remote areas where terrestrial services are unavailable or out of reach.



“The Arab States are eager to examine how satellite technologies can enhance broadband services in vehicles such as ships and aircraft.”

Tariq Al Awadhi

Space science

Current topics in space science have also captured the attention of the Arab States. Providing the appropriate spectrum and necessary protection for the use of the Earth exploration-satellite service and the space research service were the main issues considered in the study cycle under agenda items 1.12, 1.13 and 1.14.

Studies need to be conducted on spectrum harmonization to enhance the systems used for those services – such as spaceborne radar sounders and meteorological satellite operations, as well as aiming for appropriate recognition of space weather sensor systems in the Radio Regulations.

Converging views

By facilitating various study group and working party meetings (particularly remote meetings during the surge of the COVID-19 pandemic), the ITU Radiocommunication Sector (ITU-R) has significantly contributed to converging different views between regional organizations.

The Arab Spectrum Management Group looks forward to continuing its collaborative participation at WRC-23, in cooperation with other groups and organizations from other regions.

“
ITU-R has significantly contributed to converging different views between regional organizations.”



Representing Africa

John Omo

Secretary General, African Telecommunication Union (ATU)

As Africa prepares for the next World Radiocommunication Conference, [WRC-23](#), key issues under discussion in the region include the ultra-high frequency (UHF) band and spectrum-sharing between satellite and mobile-broadband services.

Based on my participation in the conference preparations, I see the expected outcomes shaping spectrum management in Africa substantially. The regional preparatory group also recognizes the beneficial impact of the last WRC in 2019.

Key issues for the Africa region

We should not discount the interest of African countries in the full range of agenda items (topics) for WRC-23. Yet, based on my participation in the conference preparations, three items stand out as particularly hot topics:

- **Item 1.5** – looking at the future of the ultra-high frequency (UHF) band.
- **Item 1.2** – relating to possible studies on International Mobile Telecommunications (IMT) in frequency bands 3 300–3 400 megahertz (MHz), 3 600–3 800 MHz, 6 425–7 025 MHz, 7 025–7 125 MHz and 10.0–10.5 gigahertz (GHz).
- **Item 1.3** – considering primary allocation of the band 3 600–3 800 MHz to the mobile service in Region 1.

For all three of these agenda items, the challenge lies in balancing the current and future spectrum needs of incumbent services against those of proposed new ones. Ultimately, we must ensure coexistence between incumbent and emerging radiocommunication services and systems.



“The regional preparatory group also recognizes the beneficial impact of the last WRC in 2019.”

John Omo

Proponents versus opponents of change

My own observation has been that views tend to differ between the proponents of change, who favour spectrum use for new systems, and opponents of such change. I believe such differences are anchored, primarily, in deeply vested interests in the use of the spectrum bands.

The outcomes of WRC-19 significantly shaped spectrum management in our region, with Resolution 559, for example, setting out remedial measures affecting the broadcasting satellite resources of 31 African countries.

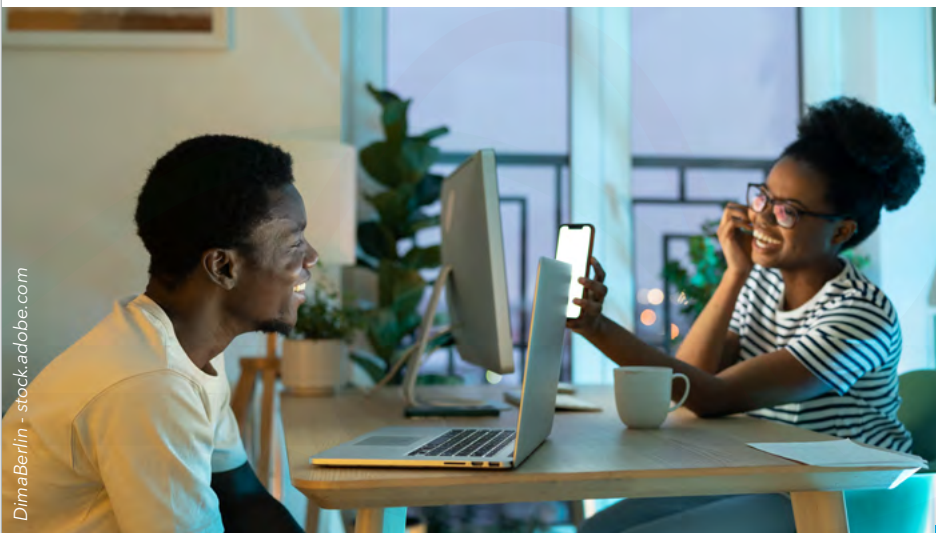
Africa's expectations

WRC-23's outcomes, particularly on those three key agenda items, are also sure to shape spectrum management in Africa in a significant, lasting way.

We must, therefore, exert all our efforts to ensure that WRC-23 guarantees the optimal allocation and use of radio spectrum to enhance connectivity in Africa.



We must exert all our efforts to ensure that WRC-23 guarantees the optimal allocation and use of radio spectrum to enhance connectivity in Africa. ”



Representing Europe

Alexandre Kholod

Chairman, Conference Preparatory Group, European Conference of Postal and Telecommunications Administrations (CEPT)

The World Radiocommunication Conference (WRC) process involves a lot of effort to reach consensus on a wide range of spectrum and space-related issues. But this process is crucial for managing and harmonizing the use of finite spectrum resources.

European regulators and policymakers, supported by industry and other stakeholders, are actively engaged through the conference preparatory group (CPG) of the European Conference of Postal and Telecommunications Administrations (CEPT).

The principal task is to develop and agree on European common proposals for the work of the conference. To address the different issues on the WRC-23 agenda, the preparatory group has organized activities through five project teams, each with a well-defined scope and area of responsibilities.

For each agenda item, CEPT coordinators have been nominated to mobilize preparations and ensure effective CEPT engagement in meetings of the ITU Radiocommunication Sector (ITU-R) over the coming months, as well as at the conference itself in late 2023.

For the first time, CEPT has also appointed a coordinator for the [Network of Women for WRC-23](#), welcoming this initiative of the ITU Radiocommunication Bureau to encourage and empower more women to participate.

Overcoming obstacles

Restrictions imposed due to the COVID-19 pandemic in the last three years have inevitably affected the WRC-23 preparatory cycle. Despite this, CEPT has made good progress on key agenda items and topics – working remotely through online meetings in 2020–2021 and holding hybrid meetings (with simultaneous physical and remote attendance) thereafter.

In particular, preliminary CEPT positions have been defined for all issues on the table, with a European common proposal being already well advanced for many of them.



The WRC process involves a lot of effort to reach consensus on a wide range of spectrum and space-related issues.

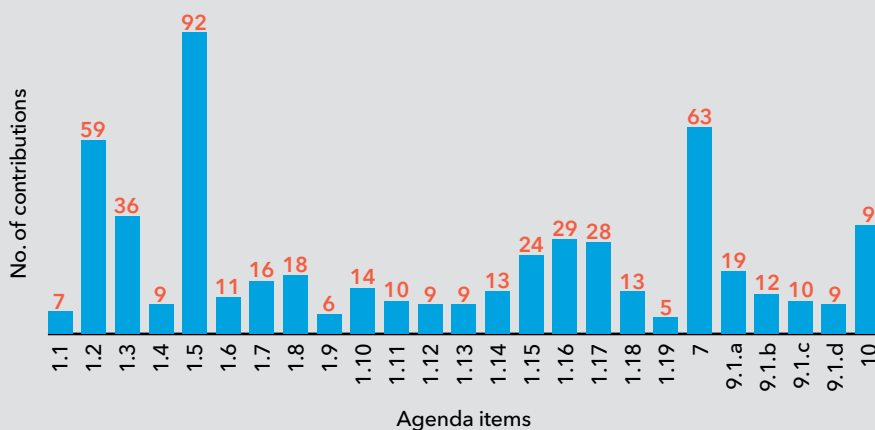
Alexandre Kholod



Among the roughly 25 items and topics on the WRC-23 agenda, some have so far been given special attention in the contributions received by the preparatory group (see figure).

Contributions discussed in CPG and project teams

(up to November 2022)



Future of UHF broadcasting

The highest-profile issue is probably the future of the ultra-high frequency (UHF) broadcasting band. There is a lot at stake here for European industries, including television broadcast, programme-making and special events (PMSE), public protection and disaster relief (PPDR), and mobile communications. CEPT is looking closely at all aspects of UHF broadcasting, aiming to propose a sustainable long-term solution for this band.

“The highest-profile issue is probably the future of the UHF broadcasting band.”

Opening the 6 GHz band to 5G

Another important issue relates to the potential identification of the upper 6 gigahertz (GHz) band for International Mobile Telecommunications (IMT), specifically open more capacity for 5G – or IMT for 2020 and beyond – in urban areas. The possibility of making this spectrum available for Wi-Fi use, together with protecting incumbent services in the same band, including point-to-point links and satellite reception, brings additional complexity to the discussions.

“Another important issue relates to the potential identification of the upper 6 GHz band for IMT.”

As we approach next year’s worldwide radiocommunication gathering, CEPT also hopes for global harmonization in the use of geostationary satellite orbit and non-geostationary satellite orbit (GSO and NGSO) fixed-satellite service (FSS) networks, that would provide connectivity to aircraft and vessels in the Ku- and Ka- bands. Furthermore, CEPT seeks to set clear rules for unmanned aircraft controlled via FSS networks, recognizing safety concerns on aviation routes.

Another priority for CEPT at WRC-23 is the need for regulatory certainty and international recognition for space weather sensors.

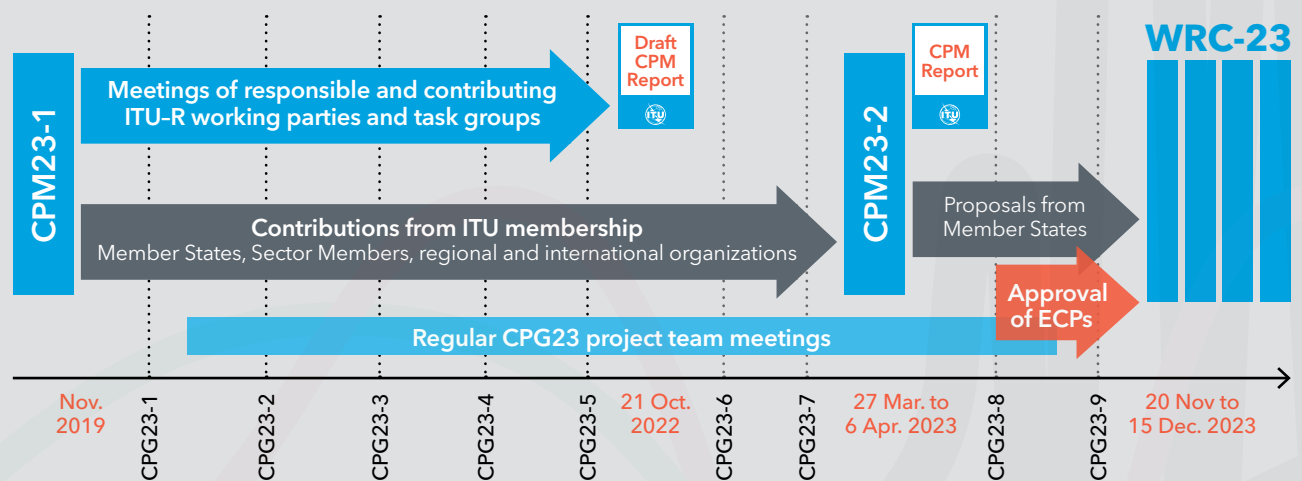
Further steps

The next major milestone for CEPT’s conference preparatory group will be the second conference preparatory meeting (CPM23-2), taking place from 27 March to 6 April 2023 (see conference preparation timeline). The group’s two last meetings will be devoted to finalizing and agreeing on the European common proposals to be submitted to WRC-23.

Throughout the run-up process, our European preparatory group will maintain dialogue and cooperation with other regional organizations. Our ultimate goal, as all of us recognize, is a successful conference for all regions and their industry stakeholders.

“*CEPT hopes for global harmonization in the use of GSO and NGSO fixed satellite service networks.*”

Conference preparation timeline



CPM = Conference preparatory meeting
 CPG = Conference preparatory group
 ECPs = European common proposals
 WRC = World Radiocommunication Conference

Representing the Commonwealth of Independent States

Albert Nalbandian

Chairman, Working Group on preparation for WRC-23/RA-23
Regional Commonwealth in the Field of Communications (RCC)

To guarantee the interference-free operation of satellite and terrestrial systems, the Radio Regulations (RR) need to be updated in an efficient and timely manner. Revising the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits is the prerogative of the World Radiocommunication Conference (WRC) held every four years by the International Telecommunication Union (ITU).

A rich agenda

WRCs, including the upcoming WRC-23, have had rich agendas in the 21st Century, with difficult issues for ITU Member States to resolve through consensus-based decision-making. This has underlined the importance of the conference to governmental, civilian, and commercial users of the radio-frequency spectrum and satellite-orbit resources.

The WRC-23 agenda covers a wide range of topics relating to spectrum allocation and radiocommunication services and applications.

Of particular interest to the region

Among those are issues of particular interest to the Regional Commonwealth in the Field of Communications (RCC), representing the Commonwealth of Independent States at WRC-23.

These include spectrum allocation for International Mobile Telecommunications (IMT) systems; the implementation of IMT-2020 and beyond (5G) networks; and preparing the way for mega non-geostationary-satellite orbit (NGSO) satellite systems – totalling between 20 000 and 30 000 low-orbit satellites – in different frequency bands.



Concern and special attention should be paid to the possible negative impact of increasing electromagnetic radiation on the environment. ”

Albert Nalbandian



Regardless of WRC decisions on these issues, the development of such technologies will continue. However, concern and special attention should be paid to the possible negative impact of increasing electromagnetic radiation on the environment.

In RCC's opinion, it is advisable to determine non-overlapping frequency bands for these items before WRC-23.

Six regional groups will develop common proposals for submission to the conference – greatly facilitating consensus-building on the various items to be discussed on the WRC-23 agenda.

The basis for CIS common proposals

The common proposals from administrations of the Commonwealth of Independent States are based on a need to ensure:

- Smooth operation and continued improvement of radiocommunications, taking into account the development of new digital technologies.
- Consideration of differing technical and economic capabilities between ITU Member States.
- Effective use of the spectrum/orbit resource.
- Continued balance between existing and new allocations.
- Regional and international cooperation.

Towards a successful WRC

The ITU membership accords increasing importance to the WRC process, both to continue improving regulatory procedures and to provide sufficient spectrum/orbit resources for emerging technologies, as well as existing uses.

A successful WRC will rely on good, thorough preparation. This happens through cooperation within each region, coordination among different regions, and compromise to reach consensus.

Ultimately, spectrum and orbit harmonization will be key to connecting everyone, anywhere, at any time.



Ultimately, spectrum and orbit harmonization will be key to connecting everyone, anywhere, at any time. ”

Representing the Americas

Víctor Martínez

Chairman, Working Group for Regional and World Radiocommunication Conferences, Inter-American Telecommunication Commission (CITEL)

The Inter-American Telecommunications Commission (CITEL) is an entity of the Organization of American States (OAS) with a mission to promote the continuous development of telecommunications and information and communication technologies (ICTs) in alignment with sustainable development.

This can only be achieved through cooperation and coordination that facilitates infrastructure deployment, telecommunication service provision, radio-frequency spectrum harmonization, ICT capacity building, and other activities.

As a collaborative regional workspace, CITEL seeks the common good in the Americas and promotes unified criteria and common proposals. On this basis, the organization is responsible for regional cooperation with the International Telecommunication Union (ITU).

The regional preparatory group's work

Regional work on radiocommunication issues is carried out for the Americas through CITEL's Permanent Consultative Committee II: Radiocommunications, which is in charge of coordinating preparations for the World Radiocommunication Conference (WRC). Thus, the committee prepares and submits Inter-American Proposals (IAPs) for consideration by ITU Member States.

CITEL's Permanent Consultative Committee II (PCC.II) gives all WRC-23 agenda items equal levels of importance and relevance for the region. The conference preparatory work reflects regional priorities that were defined last year at the latest World Telecommunication Development Conference (WTDC).



“As a collaborative regional workspace, CITEL seeks the common good in the Americas and promotes unified criteria and common proposals.”

Victor Martínez

Preparatory activities

WRC-23 preparatory activities for the Americas will strengthen the deployment of modern, resilient, secure telecommunications/ICT infrastructure and help enhance the region's policy and regulatory frameworks to connect the unconnected – all with a special emphasis on vulnerable populations and remote areas with difficult access.

As the region readies itself for the upcoming conference, the preparatory group has submitted five inter-American proposals, with ten more in draft form. Discussions are underway about several preliminary proposals for CITELE to present to WRC-23 on behalf of national administrations.

Additional harmonized frequency bands for different services

CITELE is striving to define a regional position that would allow the identification of additional harmonized frequency bands for International Mobile Telecommunications (IMT) at the global and regional level, as well as the development of satellite services to expand connectivity everywhere, especially in remote areas with difficult access. The regional position would also support Earth exploration-satellite services (EESS), meteorology, space research, and other vital functions.

These priorities call for efficient use of the radio spectrum. The successful and sustainable development of our region remains CITELE's prime objective.



The successful and sustainable development of our region remains CITELE's prime objective.



Representing Asia and the Pacific

Kyu-Jin Wee

Chairman, APG-23, Asia-Pacific Telecommunity (APT)

The Asia Pacific Telecommunity (APT) is an intergovernmental organization founded in 1979 with the aim of promoting information and communication technology (ICT) development in the Asia-Pacific region. It has 38 member administrations, four categorized as associate members, and 135 private companies and academic entities as affiliate members.

The Asia-Pacific Conference Preparatory Group, or “APG-23”, was formed to prepare regional positions and to collaborate with other regional groups ahead of each World Radiocommunication Conference.

The region’s diversity

The preparatory group, like the Asia Pacific region, is highly diverse, reflecting the wide range of geographical circumstances and population sizes among its members. When combined with different economic and industrial drivers, this means the international spectrum management interests of APT members are often widely varied. Nonetheless, APT members always show their utmost goodwill to cooperate and recognize the needs of other members, with the goal of strengthening the region’s collective voice at the forthcoming WRC-23.

Mobile telecommunications

While the WRC-23 agenda is as extensive as ever, considerations about possible International Mobile Telecommunications (IMT) identifications have been of great interest within the regional preparatory group. Even though most bands under consideration for IMT services would be for other regions of the world, APT members are looking to the outcomes of WRC-23 as an indication of how to utilize those bands in some Asia-Pacific countries.



“The preparatory group, like the Asia Pacific region, is highly diverse, reflecting the wide range of geographical circumstances and population sizes among its members.”

Kyu-Jin Wee

High-altitude platform stations

Given the region's long interest in high-altitude platform stations (HAPS), members of the preparatory group have taken the view that a decision is needed at WRC-23 on the proper technical and regulatory conditions for HAPS roll out and expansion. This would include modifying the definition in the Radio Regulations of "HIBS", or "high-altitude platform stations as IMT base stations".

Satellite agenda

WRC-23's extensive satellite agenda is another priority – particularly given the comparatively remote geographic positions of many countries and communities across the region.

APT members favour supporting new kinds of satellite services, such as earth stations in motion (ESIM), subject to protection of existing services.

One APT preliminary view specifies that the notification of any frequency assignment for ESIM be made by a single administration.

The importance of well-drafted agenda items

Studies on some WRC-23 agenda items have faced difficulties due to different understandings about the intended scope of certain agenda items. Recognizing the crucial need for well drafted texts, both for conference discussion and for subsequent resolutions, APT will likely propose a way forward through the modification of WRC Resolution 804: *Principles for establishing agendas for world radiocommunication conferences*.

Enhanced collaboration with other regional groups

The preparatory group recognizes the importance of collaboration with other regional groups for a successful WRC decision-making process. Accordingly, it has modified its working methods to enhance this collaboration.

I wish all regional groups and other WRC-23 participants the best of luck in their preparations. On behalf of the Asia Pacific group, I look forward to working with everyone over the remainder of the current conference cycle.



“APT members favour supporting new kinds of satellite services, such as earth stations in motion, subject to protection of existing services.”

Roadmap to WRC-23

WRC-19

Defined the agenda for WRC-23







CPM-1

(November 2022)

→ allocated work under agenda items to relevant study groups, appointed rapporteurs, and defined chapters and structure of CPM Report

ITU-R Study Groups

→ have conducted studies over four-year cycle and prepare draft CPM text

1 Spectrum management 	3 Radiowave propagation 	4 Satellite services 
5 Terrestrial services 	6 Broadcasting service 	7 Broadcasting service 

CPM-2

(March-April 2023)

→ will consolidate CPM text, including methods to address each agenda item

Radiocommunication Assembly

→ will appoint study group chairs and vice-chairs, revise study group structure, and approve or revise ITU-R Resolutions

WRC-23

→ will update Radio Regulations (e.g. allocation/identification of frequency bands)



Regional groups

consolidate regional and multicountry proposals

Asia-Pacific Telecommunity (APT)

Arab Spectrum Management Group (ASMG)

African Telecommunications Union (ATU)

European Conference of Postal and Telecommunications Administrations (CEPT)

Inter-American Telecommunication Commission (CITEL)

Regional Commonwealth in the Field of Communications (RCC)

International regulation of satellite services

Victor Strelets

Chairman, ITU Radiocommunication Sector [Study Group 4](#)

At the Plenipotentiary Conference (PP-22) held in Bucharest in September and October last year, Member States of the International Telecommunication Union (ITU) raised important issues related to enhancing ITU's role in regulating the use of satellite communications.

PP-22 new resolution

The *resolves* part of PP-22 New Resolution 219, "Sustainability of the radio-frequency spectrum and associated satellite orbit resources used by space services," instructs the Radiocommunication Assembly, as a matter of urgency, to undertake studies through ITU Radiocommunication Sector (ITU-R) study groups on the increasing use of radio-frequency spectrum and associated orbit resources in non-geostationary (non-GSO) orbits and the long-term sustainability of these resources. It also calls for ITU-R studies on equitable access to, and rational and compatible use of, GSO and non-GSO orbit and spectrum resources, consistent with the objectives of Article 44 of ITU's Constitution.

Sharing spectrum and orbital resources on an equal footing, and without unacceptable interference, is key to the ability of all ITU Member States to meet the world's growing demand for all types of satellite services.

Within ITU-R, efficient use of the radio-frequency spectrum and associated satellite orbits is considered by Study Group 4, both as part of ongoing activities and when considering agenda items for World Radiocommunication Conferences (WRCs).

Under COVID-19 restrictions, the task of preparing materials for WRC-23 agenda items and conducting the studies was assigned to correspondence groups that worked diligently between working party meetings.



“Sharing spectrum and orbital resources on an equal footing without unacceptable interference is key to the ability of the ITU membership to meet the worldwide growing demand for all types of satellite services.”

Victor Strelets

Satellite broadband communication on platforms in motion

Two agenda items for the upcoming WRC-23 relate to the global demand for satellite broadband communication on aircraft and ships while in motion, with a growing requirement for bandwidth to meet the increasing need for continuous connectivity along travel routes:

- Under **agenda item 1.15**, studies were conducted on the deployment of earth stations in motion (ESIM) communicating with GSO fixed-satellite service space stations, following a similar approach to that of previous conferences, notably WRC-19 and WRC-15, on agenda items that considered the operation of ESIM. However, since the 12.75–13.25 GHz band is subject to a worldwide plan (Appendix 30B of the Radio Regulations), it was necessary to develop regulatory and technical measures to ensure its protection. The results of the studies suggest the possible adoption of a resolution specifying the regulatory, technical, and operational conditions for ESIM on aircraft and ships.
- Under **agenda item 1.16**, studies were performed to establish a regulatory framework for Ka-band ESIM communicating with non-GSO fixed-satellite service space stations. Studies expected to be concluded in time for WRC-23 under this agenda item aim to develop appropriate regulatory, technical and operational provisions for ESIM to co-exist efficiently with other spectrum users, including GSO systems and other services. These provisions are expected to be included in a resolution that allows national administrations to authorize non-GSO ESIM effectively on a global basis.

Satellite-to-satellite transmissions

Agenda item 1.17 proposes investigating the possibility of allowing satellite-to-satellite transmissions within the current fixed-satellite service allocation in the 11.7–12.7 GHz, 18.1–18.6 GHz, 18.8–20.2 GHz and 27.5–30 GHz frequency bands. This is meant to ensure efficient, fast, and cost-effective transmission to Earth of data received on-board a satellite in low-Earth orbit (LEO) via space relay.

Studies indicate no impact for most incumbent services, although a potential impact could be observed in some specific configurations. There is general consensus that compatibility can be achieved in the considered frequency bands, or in portions of them, that would allow satellite-to-satellite operations while safeguarding existing services.



PP-22 outcomes

The previous edition of *ITU News Magazine* highlights outcomes of ITU's recent Plenipotentiary Conference.

[Download your copy](#)

Addressing deficiencies or improvements

One standing WRC issue is **agenda item 7**, focused on addressing deficiencies or making improvements in current procedures for advance publication, coordination, registration, and recording procedures for satellites. During ITU-R's current, 2019-2023 study period, 13 topics related to this agenda item were identified for discussion at WRC-23. Some of these remained from WRC-19, where ITU-R requested urgent follow-on study, while others were brought forward by the ITU-R membership. During WRC-19, held in Egypt in 2019, one of the main issues discussed under agenda item 7 was the development of a milestone procedure for non-GSO satellite systems. While WRC-19 largely resolved this, two sub-issues emerged.

The first was the requirement for non-GSO satellites to be deployed on a "notified orbital plane," defined by four specific orbital parameters. The second was how to accurately reflect in the Master International Frequency Register (MIFR) any changes to non-GSO system deployment over time.

A third topic that also arose from WRC-19 is the protection of geostationary networks of the mobile satellite service from non-GSO satellite systems in specified portions of the 7/8 GHz and 20/30 GHz bands. The problem stems from some potential gaps in the current Radio Regulations in terms of the protection of such networks from non-GSO systems in the frequency bands being studied.

Improving access to planned bands

Another area of significant focus during the study cycle was potential improvement to planned band procedures in Appendices 30/30A/30B.

Four topics were agreed for studies: 1) improved Appendix 30B procedures for new ITU Member States; 2) excluding the territory of one administration from the uplink service area of another administration's planned band network; 3) enhanced protection of the planned bands in Appendices 30/30A/30B; and 4) the possibility for special agreements for Appendix 30B between administrations with an additional use network and administrations with Appendix 30B allotments.

All four topics were driven by the same underlying goal – to improve ITU Member State access to planned bands.

The expectation is that by continuing the process of incremental improvement to the satellite processing procedures, they become more efficient and more effective in regulating the scarce orbit and spectrum resources available to all.

While WRC-23's agenda item 7 includes other important topics, those mentioned took up the greatest share of time and attention to find possible solutions. Through incremental improvement, satellite processing procedures will continue to become more efficient, enabling more effective regulation of the scarce orbit and spectrum resources available to all.

SG 4 working parties were also responsible for preparing the following WRC-23 agenda items:

- **1.11**, considering possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System and the implementation of e-navigation.
- **1.18**, focused on making available spectrum for low-power narrowband mobile satellite service non-geostationary satellite systems for Internet-of-Things and related uses.
- **1.19**, regarding new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2, while protecting existing primary services in the band.

New engineering solutions outpacing regulations

New engineering solutions and their associated services, especially in the field of satellite communications, continually outpace the enhancement of the international regulatory framework.

For example, satellite terminals operating with global non-GSO systems are already widely implemented on aircraft, ships and other vehicles. Yet the relevant regulatory decisions for such applications are still to be discussed and adopted at WRC-23 under **agenda item 1.16**.

This gives rise to situations where spectrum use for new technologies happens in the absence of the relevant Radio Regulations provisions, creating obvious difficulties for administrations. Yet ITU-R continues its work to ensure smooth, interference-free operation and global harmonization for the growing range of uses worldwide.

Investors, developers, and operators of the systems and networks for terrestrial and space services need to be confident in the transparency, predictability, and sustainability of international regulation, regardless of the timing of the change of various radio technologies.



Investors, developers and operators of systems and networks of terrestrial and space services must be confident in the transparency, predictability and sustainability of international regulation.

Why WRC-23 will be pivotal for terrestrial services

Martin Fenton

Chairman, ITU Radiocommunication Sector [Study Group 5](#)

Since 2019, working parties of Study Group 5 in the ITU Radiocommunication Sector ([ITU-R](#)) have been leading the preparatory work on ten agenda items, plus Issues b) and c) of agenda item 9.1, for the next World Radiocommunication Conference, [WRC-23](#).

This work falls into two broad areas:

- Spectrum for mobile/wireless broadband connectivity.
- Aeronautical and maritime spectrum issues.

Mobile/wireless broadband connectivity

Several WRC-23 agenda items address spectrum for new, upgraded or additional identifications for International Mobile Telecommunications (IMT).

Agenda item 1.1: Various countries are interested in the 4.8–4.99 (GHz) band for expanding their IMT services.

The band was first identified for IMT use in 2015, with a set of technical conditions including a power flux density (pfd) limit to protect the aeronautical mobile service (AMS).

At the next World Radiocommunication Conference, in 2019, this IMT identification was extended to 40 countries worldwide, but with diverging views on the pfd limit, which was not applied in 11 countries. WRC-23, therefore, will consider measures to protect AMS stations in international airspace and waters from stations located in national territories, as well as reviewing the pfd limit.

Agenda item 1.2: With increasing demand for IMT applications, additional spectrum identifications in the mid-band frequencies are being considered to help support IMT services that might be difficult to implement using lower or higher frequency bands. Several bands are being considered between 3.3 GHz and 10.5 GHz (see list in the margin).



Several WRC-23 agenda items address spectrum for new, upgraded or additional identifications for International Mobile Telecommunications. ”

Martin Fenton

Identifying spectrum for IMT at the global and regional levels is important to ensure mobile networks can meet the world’s growing demand for mobile data and provide coverage for anyone, anywhere, at any time.

Agenda item 1.3: The band 3 600 to 3 800 MHz supports various wide-area mobile services (including for wireless broadband connectivity) in several countries. In Region 1 (see map of regions under “Regional perspectives”), the band is allocated to the mobile service on a secondary basis. An upgrade to primary could provide greater regulatory certainty for countries wishing to use the band to develop their mobile services.

Agenda item 1.4: Mobile broadband services can be a challenge to provide in large, sparsely populated areas where the use of ground-based infrastructure is difficult.

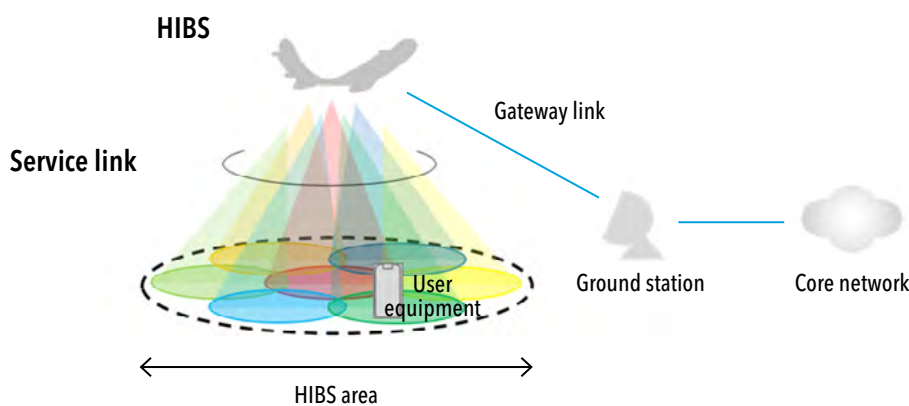
The use of high-altitude platform stations as IMT base stations (HIBS), typically flying in the stratosphere at altitudes between 20 and 50 kilometres, can provide cost-effective mobile coverage over wide areas. However, these airborne base stations can cause interference to systems in neighbouring countries.

To address this risk, the conference will look at HIBS in bands below 2.7 GHz that are already identified for IMT.

Frequency bands considered for IMT

- ▶ 3 600 to 3 800 MHz and 3 300 to 3 400 MHz (Region 2)
- ▶ 3 300 to 3 400 MHz (amend footnote in Region 1)
- ▶ 7 025 to 7 125 MHz (globally)
- ▶ 6 425 to 7 025 MHz (Region 1)
- ▶ 10 000 to 10 500 MHz (Region 2)

System-level diagram



HIBS = High-altitude platform stations as IMT base stations
Source: Document 5D/1361, ITU

Agenda item 9.1 b): Some countries have reported harmful interference from amateur radio use in the 1 240 to 1 300 MHz band to certain radionavigation satellite service (RNSS) ground receivers. Additional measures will be considered to protect the radionavigation-satellite service in the same band, with a possible new ITU-R recommendation to provide guidelines for avoiding harmful interference to RNSS receivers in future.

Agenda item 9.1 c): Several countries are interested in using IMT for fixed wireless broadband in bands allocated to the fixed service. The International Telecommunication Union (ITU) is studying such uses on a primary basis, taking relevant ITU-R studies, handbooks, recommendations, and reports into account.

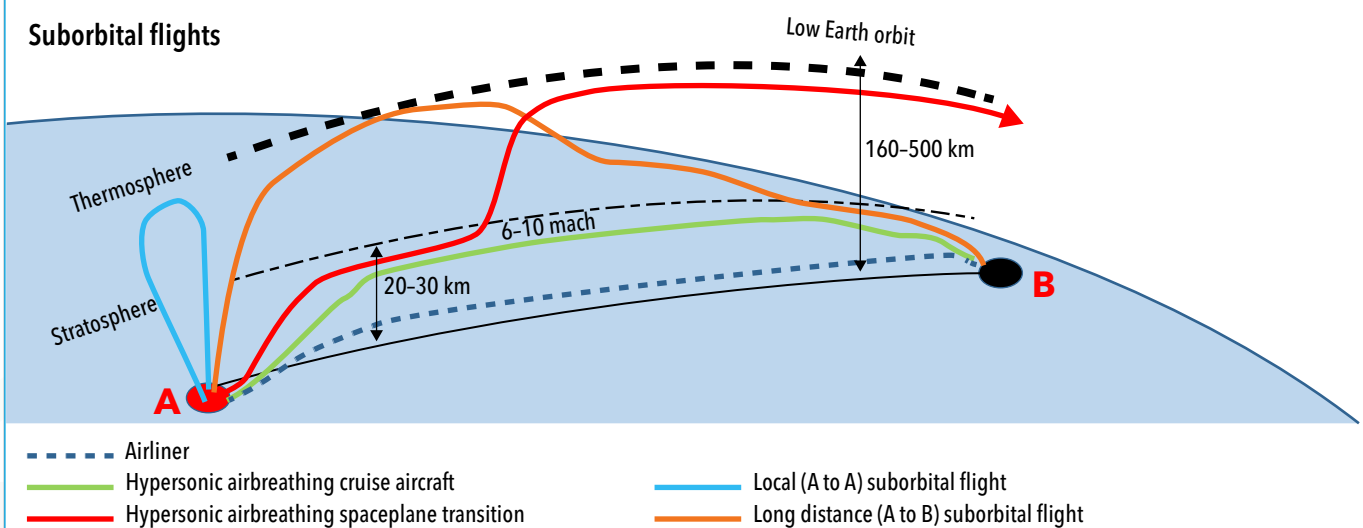
Aeronautical and maritime

Aeronautical and maritime spectrum are crucial for safety of life and the operation of global navigation systems. Six agenda items for WRC-23 are especially important in this regard.

Agenda item 1.6: Sub-orbital vehicles can support scientific research, passenger transport, and potentially satellite launches. Operating at higher altitudes than traditional aircraft, they may enter space but are not intended to complete a full orbit before returning to Earth.

“ Mobile broadband services can be a challenge to provide in large, sparsely populated areas where the use of ground-based infrastructure is difficult. ”

Examples of operational concepts for a sub-orbital flight



Source: Draft CPM Report

The conference will consider the regulatory provisions needed for these vehicles to operate safely and communicate reliably with air traffic management systems and ground control facilities.

Agenda item 1.7: Growing interest in non-geostationary satellites is opening up new opportunities for their use, including very high-frequency (VHF) aeronautical communications over large oceanic and other remote areas where terrestrial systems cannot reach. VHF communications via non-geostationary satellites would complement existing terrestrial VHF systems by facilitating satellite communication with the standard VHF radios already installed on aircraft.

WRC-23 will consider a possible new allocation to the aeronautical mobile-satellite (R) service, AMS(R)S, for such communications in all or part of the 117.975 MHz to 137 MHz band, provided this would not interfere with or constrain existing aeronautical VHS systems.

Agenda item 1.8: Interest is growing in the use of unmanned aircraft systems, which are piloted remotely, in international airspace.

The WRCs in 2012 and 2015 considered how unmanned aircraft could operate safely using fixed-satellite service (FSS) networks and frequency allocations. WRC-23 will now consider regulatory actions to accommodate FSS network use for the control and non-payload communications (CNPC) by unmanned aircraft. Payload applications are unrelated to aircraft control.

A key question is whether FSS allocations that are not designated as “safety” allocations in the Radio Regulations can be used to control unmanned aircraft.

Other safety considerations, such as redundancy, may also come into play. Defining how to ensure safe CNPC operation for unmanned aircraft systems is a responsibility of the International Civil Aviation Organization (ICAO), as specified in relevant standards and recommended practices.

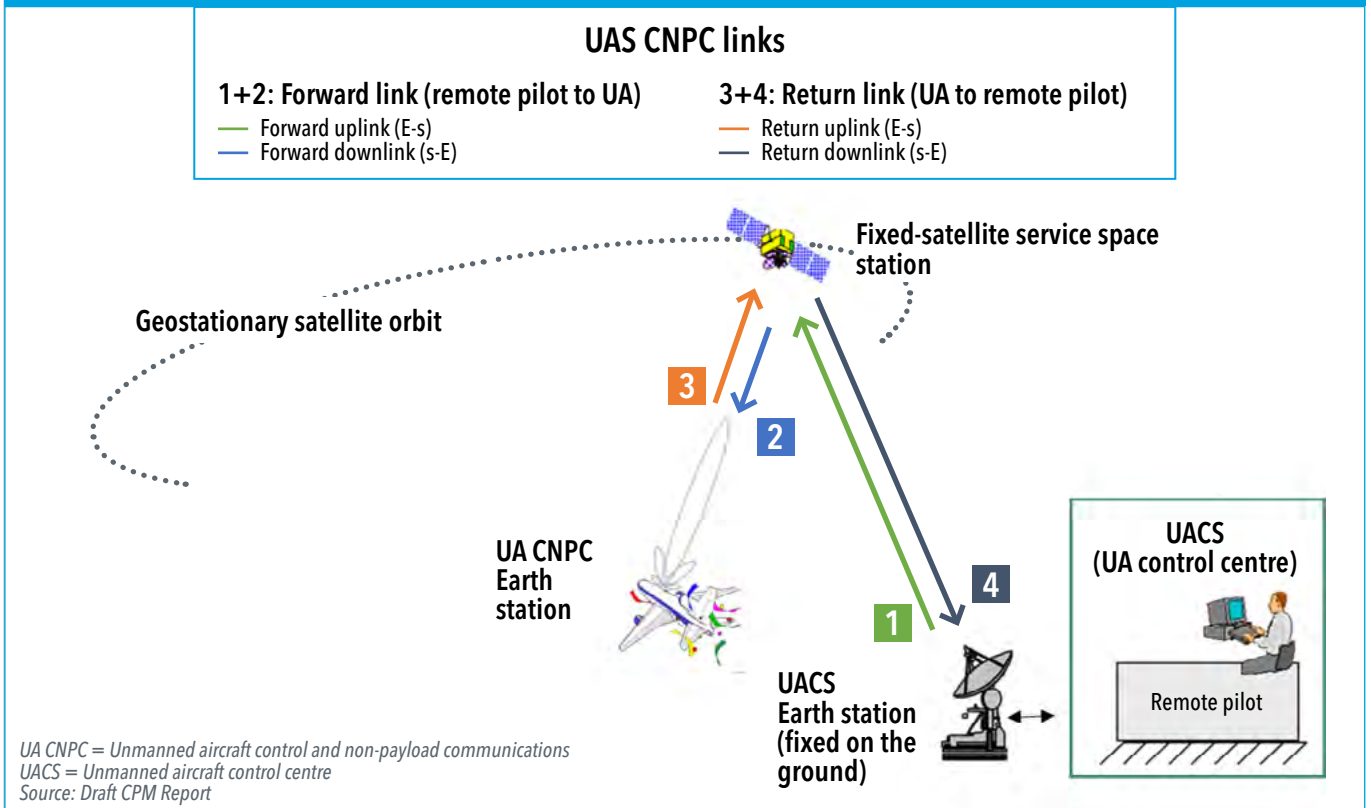
Agenda item 1.9: Spectrum in the high-frequency (HF) range, between 2.85 MHz and 22 MHz, has supported long-range communications to aircraft that are beyond the range of VHF terrestrial systems (noting that satellite communication is also used). WRC-23 will consider changes to the Radio Regulations that would allow the use of existing HF bands by digital technologies in safety-of-life applications for commercial aircraft.

Agenda item 1.10: The conference will also look at potential new spectrum allocations for “non-safety” applications within the aeronautical mobile service in the 15.4–15.7 GHz and 22–22.21 GHz bands for wideband line-of-sight data links. This would allow the exchange of data between aircraft, and from aircraft to the ground, to support observation missions, search and rescue, earth science, and land management.

“Growing interest in non-geostationary satellites is opening up new opportunities for their use.”

“Interest is growing in the use of unmanned aircraft systems, which are piloted remotely, in international airspace.”

Unmanned aircraft system using fixed-satellite service



Agenda item 1.11: Three issues relate to the Global Maritime Distress and Safety System (GMDSS).

WRC-23 will continue the work of previous WRCs on **modernization** and **e-navigation**. Recent changes by the International Maritime Organization (IMO) to the [International Convention for the Safety of Life at Sea \(SOLAS\), 1974](#) need to be considered in relation to GMDSS. These include changes to the frequencies used for emergency position-indicating radio beacons (EPIRBs) and the resulting potential to use, for example, the 1 645.5-1 646.5 MHz frequency band for general maritime radiocommunication.

Two geostationary MSS (mobile satellite service) systems currently provide safety communication in the GMDSS, the latter of which was introduced at WRC-19. The IMO is considering introducing **additional satellite systems** for GMDSS. These may require new or modified provisions in the Radio Regulations based on the results of ITU-R studies.

Safeguarding high-quality broadcasting services

Yukihiro Nishida

Chairman, ITU Radiocommunication Sector [Study Group 6](#)

Study Group 6 (SG 6) in the ITU Radiocommunication Sector (ITU-R) is responsible for the international standardization of broadcasting services, covering programme production, international exchange, quality assessment, and delivery to the general public. This includes spectrum management for the protection of broadcast services worldwide.

Recommendations and reports produced by the study group address the need for global, harmonized solutions to improve the interoperability, accessibility, and environmental sustainability of broadcasting technologies. This crucial ITU-R guidance allows the industry to innovate and guarantees the quality of experience that the audience expects in an ever-changing information and communication technology environment.

These activities have never been so important as they are now to support current and future broadcasting services.

Continuously evolving

Broadcasting continuously evolves to better serve the public, and broadcasters have always been expected to provide the best service based on state-of-the-art technologies.

ITU-R first standardized digital terrestrial television broadcasting (DTTB) systems about 25 years ago. DTTB first- and second-generation systems, and more recently 5G broadcasting systems, are all specified in ITU-R standards, known as "Recommendations".

Frequency bands – ranging from low frequency (LF) to ultra-high frequency (UHF) – are assigned and used worldwide for radio, television, and multimedia terrestrial broadcasting. Although no additional spectrum has been allocated to broadcasting for years, the demand for more and better services continues to grow.



“
Broadcasting
continuously
evolves to
better serve
the public.”

Yukihiro Nishida



Parts of the frequency bands allocated to broadcasting remain under threat from competing uses, including new and emerging technologies and services. Several agenda items for the upcoming World Radiocommunication Conference, WRC-23, are highly relevant to future terrestrial broadcasting services in the UHF, very high frequency (VHF), and high frequency (HF) bands.

UHF band

Broadcasting has relied for many years on globally harmonized use of the UHF band for the delivery of terrestrial television. Terrestrial TV will remain vital for the distribution of public service media in many countries, with the transition from analogue to digital broadcasting enabling more efficient spectrum utilization for terrestrial broadcast services.

Along with ensuring universal access to public service media, improved spectrum efficiency has provided a digital dividend, allowing the release of part of the UHF band to mobile services. The “digital dividend” is defined as the upper segment of the UHF band, lying between 694/698 and 862 MHz.

The UHF band is also vital for services ancillary to broadcasting and programme making. These include the daily use of radio microphones, talkback systems and in-ear monitors – essential tools for audio content production.

Agenda items on the table for discussion at WRC-23 include various issues with implications for spectrum allocation for broadcasting.

Agenda item 1.4 – To consider, in accordance with Resolution 247 (WRC-19), the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level

The allocation to the broadcasting service in the 694–862 MHz band for parts of Regions 1 and 3 continues to be subject to the [GE06](#) Agreement regulating the use of terrestrial services. In addition, the primary allocation to the broadcasting service in the 862–960 MHz band in the African Broadcasting Area remains subject to ITU [Radio Regulations](#) provision No. 5.322.



Terrestrial TV will remain vital for the distribution of public service media in many countries.

Resolution 247 (WRC-19)

Facilitating mobile connectivity in certain frequency bands below 2.7 GHz using high-altitude platform stations as IMT base stations

Country regulatory variations found in the Radio Regulations may also apply to existing arrangements for broadcasting services in the 694–960 MHz band. Both existing and prospective broadcasting services, therefore, need to be shielded from any possible interference from HIBS in that frequency band.

Agenda item 1.5 – To review the spectrum use and spectrum needs of existing services in the frequency band 470–960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470–694 MHz in Region 1 on the basis of the review in accordance with Resolution 235 (WRC-15)

**Resolution 235
(WRC-15)**

Review of the spectrum use of the frequency band 470–960 MHz in Region 1

The use of radio spectrum varies considerably across Region 1 for all existing services.

Parts of the frequency band 470–960 MHz are currently allocated for broadcasting, mobile (except aeronautical mobile), radio astronomy, radiolocation, fixed services, mobile-satellite (except aeronautical mobile-satellite (radiocommunication)), and aeronautical radionavigation uses.

Some administrations in Region 1 indicate that the amount of spectrum in the 470–694 MHz band currently allocated for the broadcasting service is sufficient and necessary and that they will continue with current usage. Others have expressed interest in providing additional spectrum for international mobile telecommunications (IMT), public protection and disaster relief, and non-IMT trunked ad-hoc land mobile systems in the band below 694 MHz.

Co-channel sharing and compatibility studies have examined the impact of IMT base stations and user terminals on digital terrestrial television broadcasting reception. The results, however, vary widely, depending on assumptions in the studies and show different separation distances required to comply with the assumed protection criteria.

Some study results suggest that coexistence between IMT systems and broadcasting systems is feasible, while others show difficulties arising from spectrum sharing, particularly where large separation distances – ranging from tens to hundreds of kilometres – are required to protect digital terrestrial television broadcasting from possible interference by IMT base stations and vice-versa.

VHF band

Agenda item 1.12 – To conduct, and complete in time for WRC-23, studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, including in adjacent bands, in accordance with Resolution 656 (Rev. WRC-19)

Frequency allocations for existing broadcasting services are found in the range 47–68 MHz in the Radio Regulations, which also include some country regulatory variations.

The frequency allocation to the broadcasting service in Region 1 for the 47–68 MHz band continues to be subject to the Stockholm Frequency Plan of 1961 (ST61) and the Regional Agreement relating to the Planning of VHF/UHF Television Broadcasting in the African Broadcasting Area and Neighbouring Countries, Geneva, 1989 (GE89), both revised in Geneva, Switzerland, in 2006.

HF band

Agenda item 1.9 – To review Appendix 27 of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies, in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernized HF systems, in accordance with Resolution 429 (WRC-19)

Possible out-of-band emissions from aeronautical mobile (radiocommunication (R)) stations may cause interference to high-frequency broadcasting (HFBC). In particular, the aeronautical mobile (R) ranges of 3 400–3 500 kilohertz (kHz) and 17 900–17 970 kHz are adjacent to the HFBC bands 3 230–3 400 kHz and 17 550–17 900 kHz, respectively.

HFBC transmissions require protection from any possible out-of-band interference from aeronautical mobile (R) stations operating near HFBC bands and should not be subject to additional constraints from such stations.

Resolution 656 (Rev. WRC-19)

Possible secondary allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the range of frequencies around 45 MHz

Resolution 429 (WRC-19)

Consideration of regulatory provisions for updating Appendix 27 of the Radio Regulations in support of aeronautical HF modernization

WRC-23 technical preparations for science services

John Zuzek

Chairman, ITU Radiocommunication Sector [Study Group 7](#)

In the ITU Radiocommunication Sector (ITU-R), Study Group 7 deals with the radio services supporting scientific pursuits. The group's technical work is divided among four working parties, 7A, 7B, 7C and 7D, each developing technical documentation in preparation for the World Radiocommunication Conference (WRC-23).

Study Group 7's technical studies will help national administrations formulate positions ahead of the conference, whose outcomes will shape critical systems for our everyday lives on Earth and lay the groundwork for exploring our solar system and studying the universe.

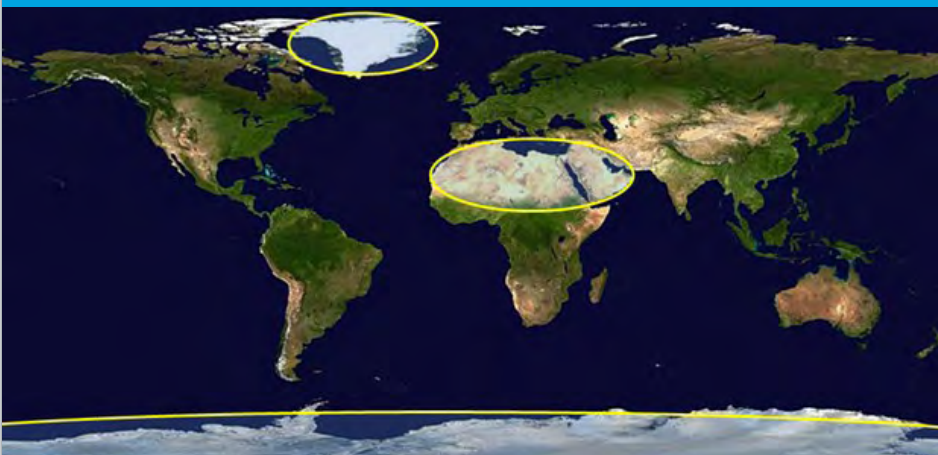
Three new topics on the WRC-23 agenda relate directly to space science services, while two more topics fall under agenda item 9.1, on ITU-R activities since WRC-19.



“Study Group 7’s technical studies will help national administrations formulate positions ahead of the conference, whose outcomes will shape critical systems for our everyday lives on Earth...”

John Zuzek

Possible coverage areas for radar sounders



Agenda item 1.12 – This item considers a possible secondary allocation to EESS (active) – the Earth exploration-satellite service (active) – or for use by radar sounders that would operate around 45 megahertz (MHz).

Those frequencies around 45 MHz are under consideration for space-based active remote sensing of the Earth's surface, both to detect water tables and to measure ice thickness in polar regions. Working Party 7C has been studying these possibilities since prior to 2015.

The first studies established technical and operational characteristics for the radar sounders to be used in compatibility studies with other radiocommunication services, resulting in Recommendation ITU-R RS-2042-1. Spaceborne active sensors, including radar sounders that are under consideration in this agenda item, can only obtain repetitive measurements of subsurface water deposits, which are crucial for these studies, from desert environments like North Africa and the Arabian Peninsula, or from ice sheets in such areas as Greenland and Antarctica (illustrated on previous page).

More recent studies have focused on compatibility, looking at how to protect incumbent radiocommunication services while a radar sounder is operating.

Agenda item 1.13 – This item considers a possible upgrade of the allocation to space research in the frequency band 14.8-15.35 gigahertz (GHz), which is currently a global secondary allocation.

Working Party 7B's studies aim to determine the operating characteristics that would allow the space research service in this band to operate on a co-primary basis with existing primary allocations. This would open up the band for a variety of space research activities within 2 million kilometres from Earth, including exploration missions to or around the Moon.

Systems under consideration include direct data downlinks from spacecraft to earth stations, Earth-to-space links to data relay satellites, and space-to-space links from spacecraft to data relay satellites.

1.12: Radar sounders around 45 MHz

Issue: Space-based active sensing could help detect water tables below ground and assess ice thickness in polar regions.

1.13: Possible primary upgrade of the space research service in the 14.8-15.35 GHz frequency band

Issue: Current space research links to data relay satellite are on a secondary basis, while future systems also require use of this band.

Agenda item 1.14 – This item calls for reviewing existing and possible new primary frequency allocations to the EESS (passive) in the frequency range 231.5–252 GHz, ensuring they align with up-to-date requirements for passive remote sensing observation.

Allocations above 71 GHz were adjusted in 2000 when less was known about requirements in this range. Current usage has been limited to instruments for microwave limb sounding, which point towards the Earth’s limb (the edge of the atmosphere) and are unaffected by interference from terrestrial sources.

Spurred by new observation requirements for studying cloud ice, the proposed passive system uses conical scanning sensors pointed at clouds above the surface of the Earth. Ice clouds, covering more than 33 per cent of the Earth’s surface, greatly affect the climate and hydrological cycle, including precipitation, atmospheric structure, and cloud processes.

Global measurements are urgently needed of ice cloud properties. Although no terrestrial services are currently deployed in the 231.5–252 GHz frequency range, technical studies under Working Party 7C focused on how to avoid incompatibilities when such deployments happen.

1.14: Adjustments to EESS (passive) allocations in the 231.5–252 GHz frequency band

Issue: Envisioned remote sensing operations need to be compatible with scientific needs.

Agenda item 9.1 a) – This item considers the protection and possible recognition of radio spectrum reliant space weather sensors that help to predict and warn about global risks.

Space weather systems are used to observe solar activity such as coronal mass ejections (CME), geomagnetic storms, solar radiation, and solar winds, along with other phenomena in space that can affect our activities on or around Earth.

Working Party 7C has focused on identifying space weather sensors and the radio spectrum in which they operate. These systems are currently deployed in a few locations for global observation, with involvement by numerous countries and institutions, and operate relatively free of harmful interference.

But changes in the Radio Regulations could change the future radio interference environment. Sensors monitoring low-level natural solar or atmospheric emissions can be very sensitive to harmful interference.

Working Party 7C has also proposed a possible definition for space weather.

9.1 a): Space weather

Issue: Space weather sensors await regulatory recognition.

Agenda item 9.1 d) – This item considers how to protect passive remote sensing systems in frequency band 36–37 GHz, in the EESS (passive) sensing channel, from emissions of non-geostationary (non-GSO) fixed-satellite service (FSS) satellites. This was a matter not fully resolved under WRC-19 agenda item 1.6.

Since then, Working Party 7C has studied two potential interference scenarios from non-GSO FSS systems operating in 37.5–38 GHz: interference into the sensing channel of EESS (passive) from non-GSO FSS constellations operating at a lower altitude than EESS (passive) sensors; and interference into the cold calibration channel of EESS (passive) from non-GSO FSS constellations operating at a higher altitude than EESS (passive) sensors.

The results of these studies are summarized in a text to be considered at the Conference Preparatory Meeting (CPM), ahead of WRC-23.

Definition of reference time scale

Resolution 655 (WRC-15), concerning the definition of the international reference time scale and the dissemination of time signals via radiocommunication systems, required ITU-R to strengthen cooperation with the International Bureau of Weights and Measures (BIPM) and report study results on reference time scales.

The first part of this work was completed in June 2020 with a Memorandum of Understanding between ITU-R and BIPM. Working Party 7A completed the second part in October 2022 with the approval of Report ITU-R TF.2511-0 – *Content and structure of time signals to be disseminated by radiocommunication systems and various aspects of current and potential future reference time scales*, including their impacts and applications in radiocommunications.

Potential interference with science services

Several WRC-23 agenda items are of concern for science services. Working Parties 7B, 7C and 7D have sought to ensure that any impacts on science services are fully considered, with technical studies looking at either in-band or adjacent band compatibility with other radiocommunication services.

9.1 d): EESS (passive) in the 36–37 GHz frequency band

Issue: EESS (passive) service in the frequency band needs protection from non-GSO FSS space stations

Agenda items of concern

- 1.2 – International Mobile Telecommunications
- 1.4 – Use of high-altitude platforms
- 1.6 – Radiocommunications for sub-orbital vehicles
- 1.10 – Non-safety aeronautical mobile applications
- 1.16 – Earth stations in motion
- 1.17 – Satellite-to-satellite links
- 1.18 – Mobile satellite service
- 1.19 – Fixed satellite service (space-to-Earth)

Safeguarding and enhancing science services

WRC-23 decisions will affect the science services directly.

Allocating spectrum near 45 MHz for space radar sounders should enable us to monitor polar ice thickness and detect aquifers in desert areas.

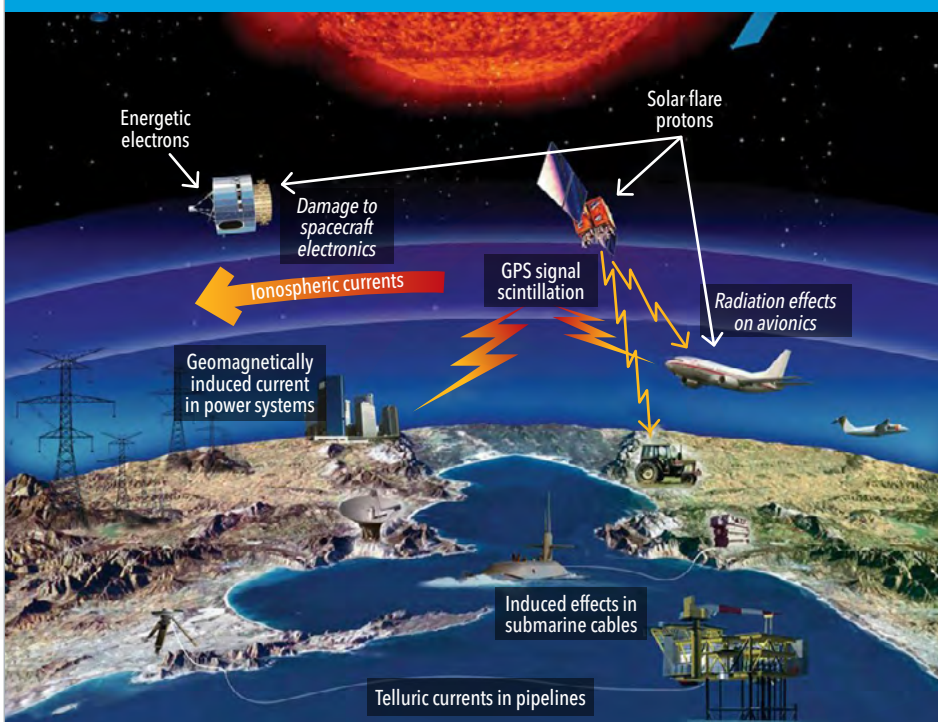
Rearranging 231.5-252 GHz allocations would greatly enhance our ability to make global ice-cloud measurements while safeguarding atmospheric measurement through microwave limb sounding.

Upgrading the secondary space research allocation in 14.8-15.35 GHz can enhance our ability to send Moon missions and explore space in our immediate vicinity.

Finally, by defining space weather and continuing studies in this field with a WRC-27 agenda item, we can ensure the protection of critical space weather sensors (see figure) and systems for the future.

“Working Parties 7B, 7C and 7D have sought to ensure that any impacts on science services are fully considered, with technical studies looking at either in-band or adjacent band compatibility with other radiocommunication services.”







Possible effects of space weather



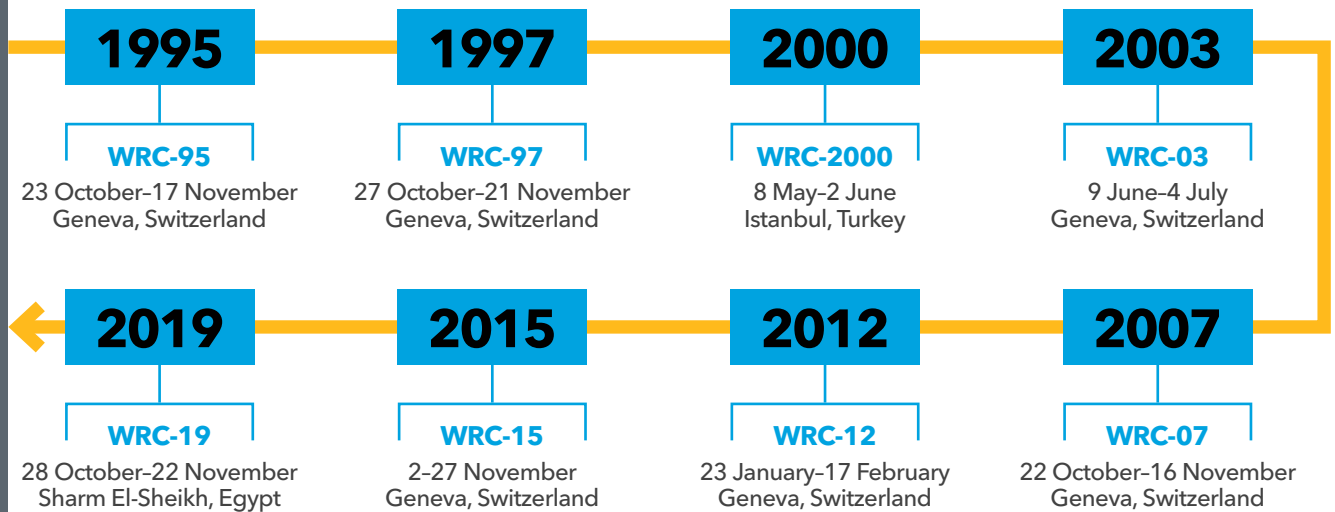
World Radiocommunication Conferences

The World Radiocommunication Conference (WRC) organized by the International Telecommunication Union (ITU) every four years:

- ➔ updates the Radio Regulations, the international treaty governing the use of radio-frequency spectrum and satellite orbits
- ➔ ensures the rational, equitable, efficient and economical spectrum use by all radiocommunication services

Mobile 	Satellite 	Maritime 	Emergency 	Aviation 	Broadcasting 	Science 
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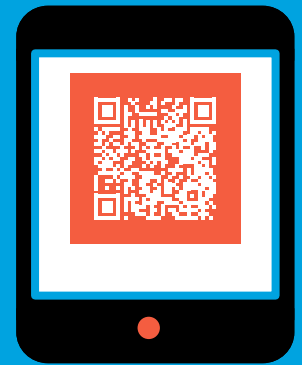
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