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Outcomes of the World Radiocommunication Conference 2023

Enabling technological advances for a better global future

Doreen Bogdan-Martin, ITU Secretary-General

Let's build further on WRC-23 to create a more inclusive, safer, and sustainable future for all.

Doreen Bogdan-Martin

The recent World Radiocommunication Conference (WRC-23) achieved impressive outcomes for telecommunications, space and science services that will improve how we communicate on land, in the air, and at sea.

Ultimately, it was about everyone served by the world's radio-frequency spectrum – including women, young people, older persons, refugees, rural communities, indigenous communities, and other vulnerable groups – and ensuring a brighter future for all.

WRC-23 showed that multilateralism is alive and strong, with first-rate technical collaboration strengthening my confidence in our global digital future.

ITU now sets out to explore better and more efficient ways to use the finite radio spectrum, whether on Earth or in space, for the benefit of humanity.

The next ITU Radiocommunication Sector (ITU-R) study cycle will break new ground, preparing for global discussions in 2027 on lunar communications, direct-to-device connectivity, and terrestrial-space convergence, among other important topics. Those are just a few of the possibilities before us.

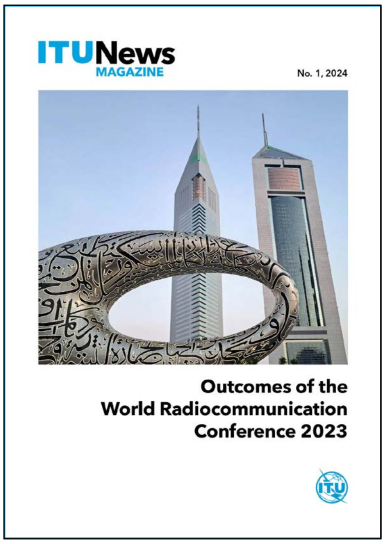
I sincerely thank the United Arab Emirates, six-time host of global ITU conferences, for enabling WRC-23's success.

Going forward, radio services will continue to drive game-changing technological solutions to make sustainable development a reality.

The Summit of the Future in September 2024 offers a once-in-a-generation opportunity to place advanced technology and radiocommunications front and centre.

Let's build further on WRC-23 to create a more inclusive, safer, and sustainable future for all.

Outcomes of the World Radiocommunication Conference 2023



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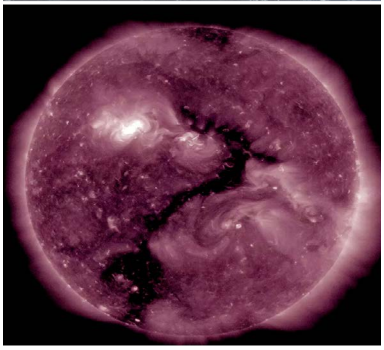



WRC

Radiocommunications in a changing world

Mario Maniewicz
Director of the ITU Radiocommunication Bureau

The recent World Radiocommunication Conference (WRC-23) paved the way for new terrestrial and space services that will make social, economic, and environmental impact on all nations for generations to come.

Member State delegates of the International Telecommunication Union (ITU) put their energy and devotion into the discussions that took place between 20 November and 15 December 2023 in Dubai, United Arab Emirates.

The periodic review of the Radio Regulations ensures that the international framework for managing the radio-frequency spectrum and associated orbital resources is kept up to date.

The world we live in is changing rapidly, and technologies, as well as the needs of administrations, will continue to evolve.

Our conference participants found a solution for wide-ranging technical challenges, supporting spectrum sharing and ongoing innovation to enable global harmonization over the next four years and beyond.

The draft agenda for WRC-27 and preliminary agenda for WRC-31 address anticipated radiocommunication issues even further into the future.

The world we live in is changing rapidly, and technologies, as well as the needs of administrations, will continue to evolve.

Mario Maniewicz

WRC-23 welcomes ITU Member States

From left to right: Cosmas Zavazava, Director of the ITU Telecommunication Development Bureau; Seizo Onoe, Director of the ITU Telecommunication Standardization Bureau; Mario Maniewicz, Director of the ITU Radiocommunication Bureau; Engineer Majed Sultan Al Mesmar, Director General of the United Arab Emirates Telecommunications and Digital Government Regulatory Authority (TDRA); Doreen Bogdan-Martin, ITU Secretary-General; His Highness Sheikh Ahmed bin Mohammed bin Rashid Al Maktoum, Second Deputy Ruler of Dubai and Chairman of the Dubai Media Council; His Excellency Tala Humaid Belhoul, Chairman, TDRA; His Excellency Mohammad Al Zarooni, Deputy Director General of TDRA and Dean of the World Radiocommunication Conference 2023 (WRC-23).

His Highness Sheikh Ahmed bin Mohammed bin Rashid Al Maktoum, Second Deputy Ruler of Dubai, and Chairman of the Dubai Media Council, presents a souvenir gift to Doreen Bogdan-Martin, ITU Secretary-General.

While today's world is full of challenges, this conference comes to set the course and direct the compass towards sustainable human development – by updating the Radio Regulations – and establishing consensus on the radio frequencies necessary for the coming era.

Engineer Majed Sultan Al Mesmar
Director General of the Telecommunications and Digital Government Regulatory Authority, United Arab Emirates

(Speaking at the WRC-23 Opening Ceremony)

The entire World Radiocommunication Conference process is a testament to the power of collaboration in setting high goals and being able to follow through on them.

Doreen Bogdan-Martin
Secretary-General of the International Telecommunication Union (ITU)

(Speaking at the WRC-23 Opening Ceremony)

During this WRC-23, we bear the responsibility of updating the Radio Regulations, the 117-year-old, legally binding international treaty that governs humanity's use of this limited natural resource – the radio-frequency spectrum – whether on Earth or anywhere in space.

Mario Maniewicz
Director of the ITU Radiocommunication Bureau

(Speaking at the WRC-23 Opening Ceremony)

António Guterres
United Nations Secretary-General, sends a message to the WRC-23 Opening Ceremony

(Maximillian Jacobson-Gonzalez, Senior Communications Officer at ITU, delivered these remarks on the UN Secretary-General's behalf)

From education to health care – from agriculture to climate monitoring – expanding radio services and bridging the digital divide are key to reducing inequalities and advancing the Sustainable Development Goals.

Setting the agenda …

The 39th World Radiocommunication Conference (WRC-23) opened on 20 November 2023 in Dubai, United Arab Emirates.

ITUWRC DUBAI2023

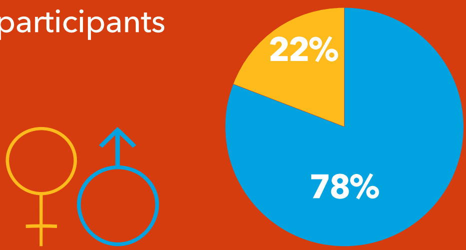
Some of the key topics discussed at WRC-23:

- Identifying additional frequency bands for the continued development of International Mobile Telecommunications (IMT), including the use of high-altitude platform stations as IMT base stations for the universal deployment of wireless networks.
- Improvements to the international regulatory framework for geostationary orbit (GSO) and non-geostationary orbit (non-GSO) satellites while promoting equitable access for all countries.
- Use of satellite technologies for broadband services to improve connectivity, particularly in remote areas.
- New spectrum to enhance radiocommunications in the aeronautical mobile service, including by satellite, and to facilitate the use of the space research and Earth exploration-satellite services for climate monitoring, weather prediction and other scientific missions.
- The modernization of the Global Maritime Distress and Safety System (GMDSS).
- The regulatory framework for the use of earth stations in motion on board aircraft and ships for communication with GSO and non-GSO satellites.
- The future of the ultra-high frequency (UHF) broadcasting band which has implications for television broadcast, programme-making and special events, as well as public protection and disaster relief.

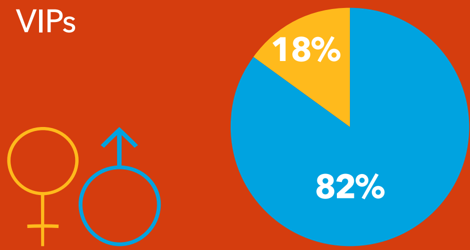
… for a digital future that works for everyone and for our planet.

WRC-23 by the numbers

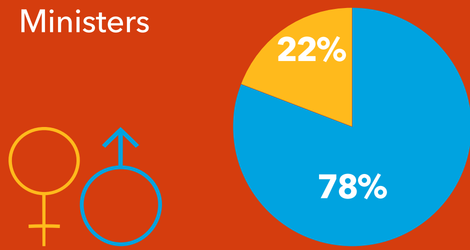
3986
participants



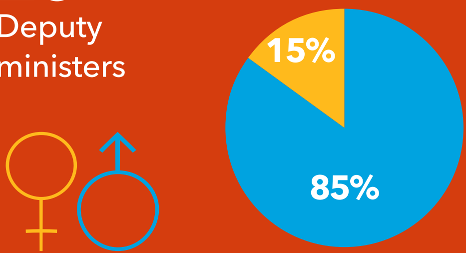
88
VIPs



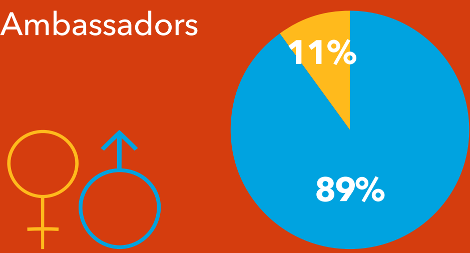
46
Ministers



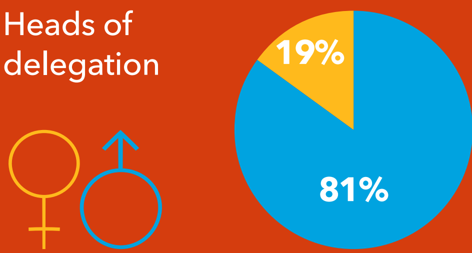
20
Deputy ministers



22
Ambassadors



284
Heads of delegation



163
Member States

1091
documents

15
plenaries

56
amended existing resolutions

43
new resolutions

A 117-year old international treaty

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Addressing future radiocommunications

The World Radiocommunication Conference 2023 (WRC-23) opened on 20 November in Dubai, United Arab Emirates, bringing governments together for negotiations on the allocation of radio-frequency spectrum.

The conference, organized every three to four years by the International Telecommunication Union (ITU), reviewed and updated the Radio Regulations, the international treaty governing the use of spectrum and geostationary and non-geostationary satellite orbits.

His Highness Sheikh Ahmed bin Mohammed bin Rashid Al Maktoum, Second Deputy Ruler of Dubai, attended the WRC-23 opening ceremony.

RA-23

WRC-23 was preceded by the ITU Radiocommunication Assembly which met in Dubai from 13–17 November to establish the structure, working methods and programme of the ITU Radiocommunication Sector.

Download the book of ITU-R Resolutions.

For the opening, United Nations Secretary-General António Guterres noted that the World Radiocommunication Conference, "is a testament to the power of international cooperation in tackling global challenges." In the message delivered on his behalf, Guterres added, "Radio frequencies, whether on Earth or in space, form the backbone of advanced communications for all of humanity. From education to healthcare, from agriculture to climate monitoring, expanding radiocommunication services and bridging the digital divide is key to reducing inequalities and advancing the Sustainable Development Goals."

Much of the technology in everyday life uses radio-frequency spectrum allocated by ITU's world radiocommunication conferences. Ensuring that the Radio Regulations reflect the changing demand for spectrum use is critical for the efficient operation of existing and future radiocommunication services and equipment.

"We are at an inflection point in tech history, and radiocommunications are at the top of the global agenda," said Doreen Bogdan-Martin, ITU Secretary-General. "Equitably managed spectrum and the associated satellite orbits are among the best tools in our toolbox to make good on our commitment to build a digital future that works for everyone and for our planet."

"While today's world is full of challenges, this conference comes to set the course and direct the compass toward sustainable human development by updating the Radio Regulations and establishing international consensus on the frequencies necessary for the coming era," said H.E. Eng. Majed Sultan Al Mesmar, Director General of the UAE Telecommunications and Digital Government Regulatory Authority (TDRA). "With the broad horizons it brings in the fields of smart cities, digital economy, knowledge society, space and others, we are confident that this conference will achieve the results that meet the expectations and aspirations of our peoples."

H.E. Eng. Mohammed Al Ramsi, Deputy Director General for the Telecommunication Sector of TDRA was elected as the chair of WRC-23.

The conference – hosted by TDRA – took place from 20 November to 15 December.

WRC-23 studio interviews

ITU interviewed several participants at WRC-23 to learn their different viewpoints and perspectives of the various topics on the table for discussion.

See snapshot video.

"This conference will revise and update the Radio Regulations to support the introduction of new radio-based technologies, systems, technologies and services and their growing spectrum requirements while continuing to protect the vital radio services we rely on today," said Mario Maniewicz, Director of the ITU Radiocommunication Bureau. "Newer, innovative technologies will allow us to better monitor our changing planet, and better connect communities and people everywhere: on land, at sea, in the air, and in space. I count on the spirit of cooperation of the ITU Membership and your technical expertise to make WRC-23 a resounding success and leave a legacy of prosperity for billions of people across the globe."

Newer, innovative technologies will allow us to better monitor our changing planet, and better connect communities and people everywhere: on land, at sea, in the air, and in space.

Mario Maniewicz, Director of the ITU Radiocommunication Bureau

The Radio Regulations ensure that the use of the radio-frequency spectrum is rational, equitable, efficient, and economical – all while aiming to prevent harmful interference between different radiocommunication services.

The international treaty on radiocommunications dates back to 1906, when the International Radiotelegraph Convention was signed. In the 117 years since, the Radio Regulations have undergone 38 revisions and expanded to a four-volume agreement of more than 2000 pages.

Overall, nearly 4000 participants attended WRC-23, including delegates from ITU Member States and ITU Radiocommunication Sector Members representing international organizations, equipment manufacturers, network operators and industry forums attending as observers.

Conference structure

H.E. Mohammed Al Ramsi, Deputy Director General for the Telecommunication Sector of the Telecommunications and Digital Government Regulatory Authority (TDRA), was appointed Chair of the World Radiocommunication Conference 2023 (WRC-23).

Across the globe, numerous countries, institutions, and companies eagerly anticipate the outcomes of this conference.

H.E. Mohammed Al Ramsi

See video interview.

Committee 1:
Steering Committee

Composed of the Chair and Vice-Chairs of the Conference and the Chairs and Vice-Chairs of the Committees.

Committee 1 coordinated all matters connected with the smooth execution of the work of WRC-23. This included planning the order and number of meetings, while avoiding overlap wherever possible in view of the limited number of members of some delegations.

Committee 2:
Credentials Committee

Chaired by Basebi Mosinya of Botswana

See video interview.

Committee 2 verified the credentials of delegations and reported on its conclusions to the Plenary Meeting within the time specified by the latter.

Committee 3:
Budget Control Committee

Chaired by Cindy Cook of Canada

See video interview.

Committee 3 determined the organization and the facilities available to the delegates and examined and approved the accounts for expenditure incurred throughout the duration of the Conference. It also reported on the estimated total expenditure and submitted an estimate of the financial implications.

Considering items on the conference agenda

On the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, taking account of the decisions of WRC-19, and with due regard to the requirements of existing and future services in the bands under consideration, Committees 4, 5 and 6 considered and took appropriate action with respect to items on the conference agenda.

Committee 4: Specified agenda items

Chaired by Hiroyuki Atarashi of Japan

See video interview.

Committee 4 dealt the following items on the WRC-23 agenda: (item 1.1); (item 1.2); (item 1.3); (item 1.4); (item 1.5); (item 1.6); (item 1.7); (item 1.8); (item 1.9); (item 1.10); (item 1.11); (item 3); (item 5); (item 6); (item 9); (item 9.1).

Committee 5:
Specified agenda items

Chaired by Anna Marklund of Sweden

See video interview.

Committee 5 dealt the following items on the WRC-23 agenda: (item 1.12); (item 1.3); (item 1.14); (item 1.15); (item 1.16); (item 1.17); (item 1.18); (item 1.19); (item3); (item 5); (item 6); (item 7); (item 9); (item 9.1); (item 9.2); (item 9.3).

Committee 6:
Specified agenda items

Chaired by El Hadjar Abdouramane of Cameroon

See video interview.

Committee 6 dealt the following items on the WRC-23 agenda: (item 2); (item 3); (item 4); (item 5); (item 6); (item 8); (item 9); (item 9.1); (item 9.2); (item 10).

Committee 7: Editorial

Chaired by Christian Rissone of France

The Editorial Committee perfected the form of the texts to be included in the Final Acts of the Conference without altering the sense for submission to the Plenary Meeting.

WRC-23 video interviews

Thought leaders from both the public and private sector shared their insights on the various topics being discussed at the World Radiocommunication Conference (WRC-23).

Tariq Al Awadhi, Executive Director, Spectrum Affairs, Spectrum Management Affairs Department, Telecommunications and Digital Government Regulatory Authority (TDRA)

See video interview.

The ITU Radiocommunication Sector has an excellent procedure for preparing a WRC – there is a cycle – starting with the WRC, going to the CPM, to study groups, and back to CPM, and then to WRC.

Tariq Al Awadhi

Bernadette Lewis, Secretary General, Commonwealth Telecommunications Organization

See video interview.

Many of our members have remote, isolated, rural communities that have not been served for any number of reasons, and wireless communications are essential.

Bernadette Lewis

Jon Paulo V. Salvahan, Deputy Commissioner, NTC, Phillippines

See video interview.

> *The target is to increase connectivity, broadband speed, and network coverage, and some of the key items that will be forged here at WRC-23 are towards that direction.*

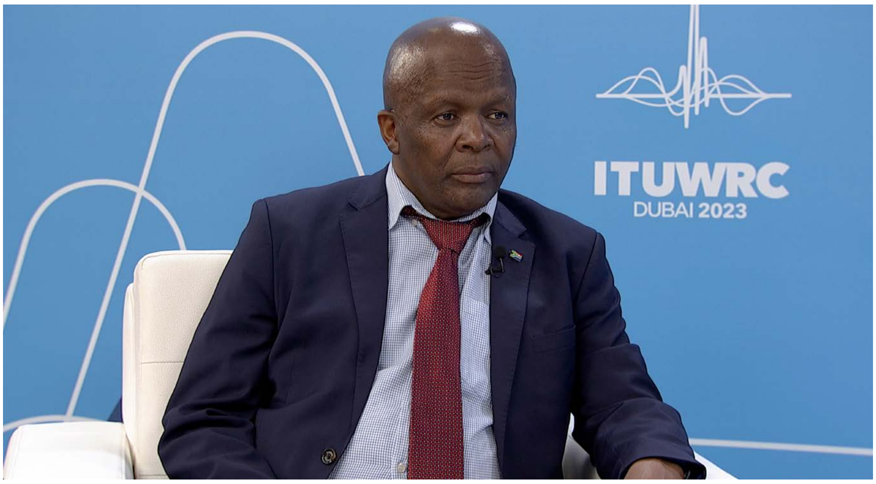
Jon Paulo V. Salvahan

Natalia Donoho, Head, Space Systems and Utilization Division, WMO

See video interview.

> *I am hoping that national administrations here continue to recognize that the use of spectrum for Earth observation applications has considerable societal and economical value.*

Natalia Donoho



H.E. Mondli Gungubele, Minister of Communications and Digital Technology, South Africa

See video interview.

The big challenge is connectivity, in particular to the extent that it affects the far-flung areas – poor people – even if you go to the urbanized provinces in the periphery – you still have poor people.

H.E. Mondli Gungubele

Isabelle Mauro, Director General of the Global Satellite Operators Association

See video interview.

For the satellite industry this is really a key conference, because it is at a time where we've never seen so much innovation and growth in the space economy and in the satellite industry.

Isabelle Mauro

See more video interviews.

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Key outcomes of WRC-23

Member States of the International Telecommunication Union (ITU) agreed on revisions to the global treaty governing the use of the radio frequency spectrum, both on Earth and in space, at the close of the World Radiocommunication Conference 2023 (WRC-23), in Dubai, United Arab Emirates.

The agreement on updates to the Radio Regulations identified new spectrum resources to support technological innovation, deepen global connectivity, increase access to and equitable use of space-based radio resources, and enhance safety at sea, in the air, and on land.

A total of 151 Member States signed the WRC-23 Final Acts – a record of the decisions taken at the conference including both new and revised provisions of the Radio Regulations, all Appendices, and new and revised Resolutions and ITU-R Recommendations incorporated by reference into the treaty by the conference.

Member States of ITU agreed on revisions to the global treaty governing the use of the radio frequency spectrum

Revisions to ITU's Radio Regulations

Among the decisions, WRC-23 identified spectrum for International Mobile Telecommunications (IMT), which will be crucial for expanding broadband connectivity and developing IMT mobile services, also known as 4G, 5G and, in the future, 6G. That new spectrum includes the 3300-3400 megahertz (MHz), 3600-3800 MHz, 4800-4990 MHz and 6425-7125 MHz frequency bands in various countries and regions.

WRC-23 also identified the 2 gigahertz (GHz) and 2.6 GHz bands for using high-altitude platform stations as IMT base stations (HIBS) and established regulations for their operations. This technology offers a new platform to provide mobile broadband with minimal infrastructure using the same frequencies and devices as IMT mobile networks. HIBS can contribute to bridging the digital divide in remote and rural areas and maintain connectivity during disasters.

For non-geostationary fixed-satellite service earth stations in motion (ESIMs), the conference identified new frequencies to deliver high-speed broadband onboard aircraft, vessels, trains, and vehicles. These satellite services are also critical following disasters where local communication infrastructure is damaged or destroyed.

Provisions were included to protect ship and aircraft mobile service stations located in international airspace and waters from other stations within national territories.

To support the modernization of the Global Maritime Distress and Safety System (GMDSS), WRC-23 took regulatory actions including the implementation of e-navigation systems to enhance distress and safety communications at sea.

The conference provisionally recognized the BeiDou Satellite Messaging Service System for GMDSS use, subject to successful completion of coordination with the existing networks and elimination of interference.

Other key WRC-23 outcomes include:

- Allocation of additional frequencies for passive Earth exploration-satellite services to enable advanced ice cloud measurements for better weather forecasting and climate monitoring.
- Allocation of new frequencies to the aviation industry for aeronautical mobile-satellite services (117.975-137 MHz). The new service will enhance bidirectional communication via geostationary satellite orbit (non-GSO) satellite systems for pilots and air traffic controllers everywhere, especially over oceanic and remote areas.
- Allocation of the bands 15.41-15.7 GHz and 22-22.2 GHz in Radio Regulations Region 1 and some Region 3 countries to the aeronautical mobile service for non-safety aeronautical applications. This will enable aircraft, helicopters, and drones to carry sophisticated aeronautical digital equipment for purposes such as surveillance, monitoring, mapping, and filming, and have the capacity to transfer large data from these applications using wideband radio links.
- Adoption of regulatory actions for the provision of inter-satellite links. This will allow data to be made available in near-real time, enhancing the availability and value of instrument data for low-latency applications such as weather forecasting and disaster risk reduction.
- Endorsement of the decision by the International Bureau of Weights and Measures (BIPM) to adopt Coordinated Universal Time (UTC) as the *de facto* time standard by 2035, with the possibility to extend the deadline to 2040 in cases where existing equipment cannot be replaced earlier.
- Recognition of the importance of space weather observation in a new Resolution and a new Article in the Radio Regulations to recognize the operation of space weather sensors as part of the meteorological aid service to observe space weather phenomena, including solar flares, solar radiation and geomagnetic storms which can interfere with radiocommunication services including satellites, mobile phone services and navigation systems.
- Approval of a recommendation by the Radio Regulations Board to allow 41 countries to acquire new and usable orbital resources for satellite broadcasting. The countries were unable to use their assigned orbital slots in recent years due to factors such as lack of coordination and interference from other satellite networks. The decision aims to enable countries to implement subregional satellite systems.

The articles that follow explain a few of the key outcomes of WRC-23 in more detail.

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Safer seafaring: Modernizing the Global Maritime Distress and Safety System

Decisions taken at the World Radiocommunication Conference (WRC-23) have made way for modernizing the Global Maritime Distress and Safety System (GMDSS) based on newer communication technologies.

The GMDSS is an internationally agreed set of safety procedures, frequencies, types of equipment and communication protocols.

The new resolutions align the ITU Radio Regulations with the latest requirements of the International Maritime Organization (IMO) – a fellow United Nations specialized agency that sets global standards for the safety, security, and environmental performance of international shipping.

The GMDSS, developed through cooperation between IMO and ITU, comprises terrestrial and satellite technology and ship- board systems.

Its fundamental aim is to provide vessels in distress with the ability to quickly alert shore-based search and rescue authorities, as well as nearby vessels, to enable a coordinated search and rescue response.

The GMDSS is an internationally agreed set of safety procedures, frequencies, types of equipment and communication protocols.

Aligning the Radio Regulations with SOLAS

The decisions by ITU Member States at WRC-23 follow amendments last year to the Safety of Life at Sea (SOLAS) Convention, one of core treaties maintained by IMO.

The IMO amendments entered into force on 1 January 2024.

Modern technologies will ensure efficient radio spectrum use while giving seafarers more reliable access to required radio links.

Integrating digital techniques

Another WRC-23 decision has removed medium- and high-frequency narrow-band direct printing (NBDP) for distress and safety communications from the Radio Regulations. Instead, new provisions enable the use of an automatic connection system (ACS) using digital selective calling (DSC) on frequencies previously reserved for NBDP.

These modern technologies will ensure efficient radio spectrum use while giving seafarers more reliable access to required radio links.

WRC-23 decisions also list the medium- and high-frequency Navigational Data (NAVDAT) system in Radio Regulations Appendix 15, which provides frequencies for distress and safety communications. Relevant regulatory provisions have been modified to accommodate NAVDAT into the GMDSS for broadcasting meteorological information, navigational warnings, and urgent information from coast stations to ships.

By providing ships with relevant, up-to-date information more quickly, NAVDAT has the potential to enhance navigational safety.

By providing ships with relevant, up-to-date information more quickly, NAVDAT has the potential to enhance navigational safety.

Improved AIS applications

WRC-23 has also enabled the adoption of new automatic identification system (AIS) equipment on ships worldwide.

AIS search-and-rescue transmitter (AIS-SART) locating equipment has also been incorporated into the Radio Regulations at WRC-23.

Survival craft stations may carry AIS-SART equipment as an alternative to a radar-SART to facilitate the location of craft in distress, or to locate and help rescue survivors.

Satellite-supported maritime distress communications

Key decisions at WRC-23 permit the continued use of the existing frequency band for maritime needs by the mobile-satellite (Earth-to-space) service and for inter-satellite links, limiting this usage to distress, urgency and safety communications.

Clarified alert cancellations

Resolution 349 (Rev. WRC-23) clarified an earlier ITU measure on cancelling false distress alerts.

The revisions adopted at WRC-23 include examples of cancellation messages, along with a new provision aiming to reduce false alerts and eliminate interference that might divert valuable search and rescue resources.

Responsible authorities can now act to address repeated violations.

An additional GMDSS satellite system

WRC-23 made a notable step towards introducing a third GMDSS satellite system, in addition to the existing Inmarsat and Iridium systems.

The conference provisionally recognized the BeiDou Message Service System (BDMSS) for use in the GMDSS, subject to the successful completion of coordination with the two existing networks and the elimination of interference.

This decision aims to protect GMDSS systems from harmful interference and ensure the provision of reliable communication services that will continue to support safety of life at sea.

WRC-23 made a notable step towards introducing a third GMDSS satellite system, in addition to the existing Inmarsat and Iridium systems.

WRC-23 made a notable step towards introducing a third GMDSS satellite system, in addition to the existing Inmarsat and Iridium systems.

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More spectrum for terrestrial broadband services

The World Radiocommunication Conference (WRC-23) identified 1300 MHz of additional radio-frequency spectrum for International Mobile Telecommunications (IMT).

New spectrum identified by Member States of the International Telecommunication Union (ITU) includes frequency ranges between 3300 megahertz (MHz) and 10.5 gigahertz (GHz) in various countries or on a regional basis. This comes with conditions for protection of existing services, such as radiolocation service or fixed satellite service.

WRC-23 also allocated the band 470-694 MHz, or parts thereof, to the mobile (except aeronautical mobile) service in several countries in Region 1 (Europe, Africa, the Commonwealth of Independent States, Mongolia, and the Middle East west of the Persian Gulf, including Iraq), with conditions for protection of the broadcasting service.

These additional frequency bands will support the expansion of mobile broadband globally, further advancing ITU's goal of universal connectivity.

WRC-23 identified 1300 MHz of additional radio-frequency spectrum for IMT.

They will also facilitate the continued rollout of IMT-2020 – commonly referred to as fifth-generation (5G) mobile networks – and possibly support the future development of 6G services, which are now officially designated "IMT 2030" after a decision by the Radiocommunication Assembly that preceded WRC-23.

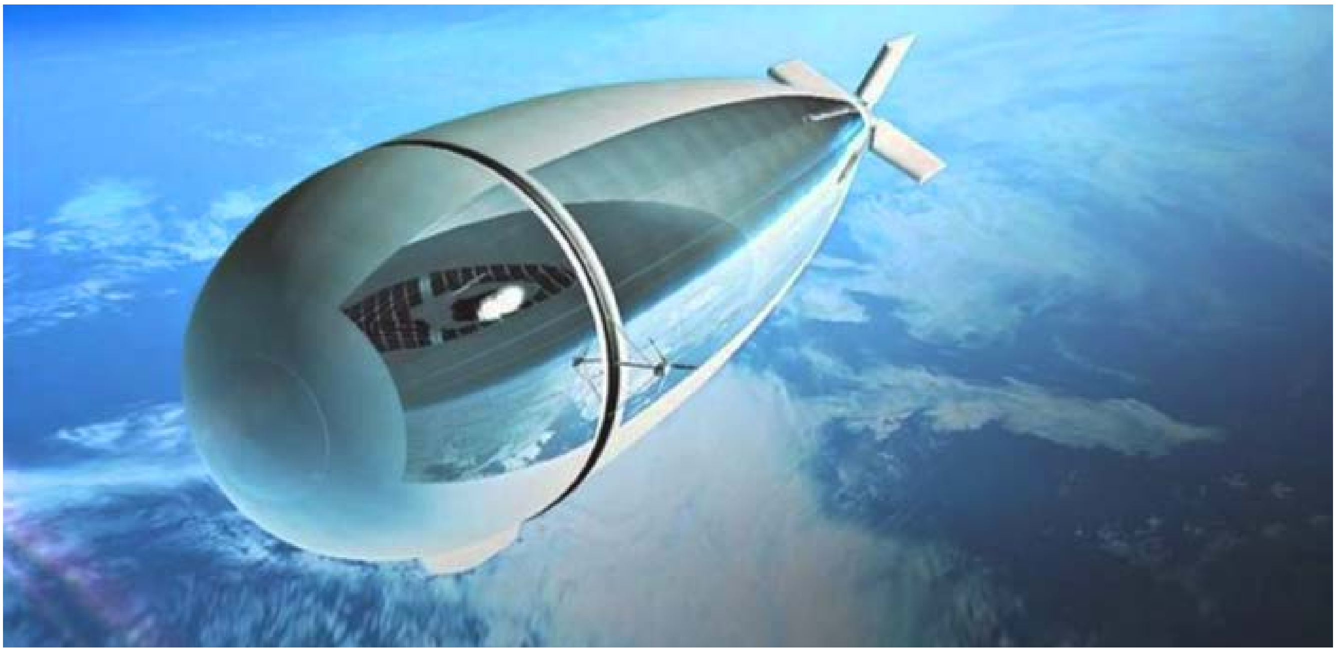
Agreements on 6 GHz and 10 GHz bands

Countries wishing to implement the terrestrial component of IMT may consider using the 6425-7125 MHz band in Region 1 or the 7025-7125 MHz band in Region 3 (the rest of Asia and most of Oceania) with conditions for protection of the existing services, such as the fixed satellite service.

WRC-23 took into account the interests of many national administrations to introduce other mobile application in these 6 GHz bands. Some examples include wireless access systems (WAS) or radio local area networks (RLANs). Therefore, its decisions regarding the 6 GHz band maintained flexibility for national and regional decisions on the designation of this band for RLANs or IMT

WRC-23 further agreed on a new resolution identifying the frequency band 10-10.5 GHz for IMT in countries in Region 2 (the Americas including Greenland, and some of the eastern Pacific Islands).

WRC-23 took into account the interests of many national administrations to introduce other mobile application in these 6 GHz bands.



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New frequencies to support high-altitude platform stations as IMT base stations

Growing demand for mobile broadband access necessitates new connectivity systems that tap into more radio spectrum.

The World Radiocommunication Conference (WRC-23) identified additional radio-frequency bands to support the use of high-altitude platform stations – known as HAPS – as base stations for International Mobile Telecommunications (IMT).

Enabling this technology combination – referred to as HIBS – comes as a welcome step in a world containing [as many actively used mobile phones as people](https://www.itu.int/).

HIBS operate in part of the stratosphere between 18 and 25 kilometres of altitude. This is much closer to Earth's surface than satellite systems in low-Earth orbit, but high enough to augment terrestrial networks by widening their coverage.

WRC-23 identified additional radio-frequency bands to support the use of high-altitude platform stations – known as HAPS – as base stations for IMT.

HIBS can help deliver mobile broadband connectivity over wide areas with minimal ground network infrastructure using the same frequencies and devices as IMT terrestrial networks.

HIBS can help deliver mobile broadband connectivity over wide areas with minimal ground network infrastructure.

This makes HIBS ideal to connect underserved communities in rural and remote areas, accelerate 5G deployment at a lower cost, and support disaster recovery communications.

The additional frequencies identified for worldwide use by HIBS are in bands below 2.7 gigahertz (GHz) that had been identified for IMT by previous World Radiocommunication Conferences.

Those frequency bands include 694–960 megahertz (MHz), 1710–1885 MHz, and 2500–2690 MHz.

Prior to the recent WRC-23 decisions, only the 2 GHz band (2010-2025 MHz and 2110-2170 MHz) was available for use by HIBS.

In addition to increasing regulatory flexibility by opening up more bands, the new decision specifies how HIBS should share spectrum with other radio services in the same or adjacent bands, without imposing any additional technical or regulatory constraints on existing applications.

This is a key consideration, because HIBS – due to their altitude – could otherwise cause interference for radio systems in neighbouring countries.

Those services, including IMT terrestrial systems, will be protected achieved in part by power flux-density (pfd) limits for HIBS. Such limits are to be imposed on HIBS unless affected administrations explicitly agree otherwise.

Power flux-density refers to the power from a radio signal, usually expressed in units like "decibels relative to one milliwatt per square metre" (dBm/m^2). The pfd limits agreed by Member States of the International Telecommunication Union (ITU) at WRC-23 will allow HIBS to operate smoothly side-by-side with other radio services.

These key agreements offer a global framework to facilitate the roll-out of HIBS worldwide. HIBS, in turn, will help to extend IMT coverage in general and advance global access to mobile broadband service.

WRC-23's decisions and recommendations on HIBS ensure global and regional harmonization for a vital new means of expanding mobile coverage.

WRC-23's decisions and recommendations on HIBS ensure global and regional harmonization for a vital new means of expanding mobile coverage.

This is an important step towards connecting everyone, worldwide.

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Studying spectrum for future lunar communications

The World Radiocommunication Conference, WRC-23, took a historic step to recognize growing interest in scientific discovery and exploration on and around the Moon.

As part of those proceedings, Member States of the International Telecommunication Union (ITU) adopted a new agenda item on lunar radio frequencies for discussion at the next World Radiocommunication Conference, WRC-27.

The new resolution invites the ITU Radiocommunication Sector (ITU-R) to conduct studies on frequency-related matters, including possible new or modified research service (space-to-space) allocations, for future development of communications on the lunar surface, as well as between lunar orbit and the lunar surface.

ITU adopted a new agenda item on lunar radio frequencies for discussion at the next World Radiocommunication Conference, WRC-27.

"At an exciting time for space exploration and scientific discovery, WRC-23 will go down in history as a major leap forward in humanity's return to the Moon and exploration of the universe beyond," commented Mario Maniewicz, Director of the ITU Radiocommunication Bureau.

At an exciting time for space exploration and scientific discovery, ITU radiocommunications guidance will facilitate humanity's return to the Moon and exploration of the universe beyond.

WRC-23 will go down in history as a major leap forward in humanity's return to the Moon and exploration of the universe beyond.

Mario Maniewicz
Director of the ITU Radiocommunication Bureau.

A timely decision

The WRC-23 decision reflects the growing number of lunar missions being planned by various governments and commercial entities around the world.

The resolution came 60 years after ITU first began assigning frequencies to space services.

Several administrations have already begun exploring the lunar surface remotely, and human return to the Moon is planned for as early as 2025.

Some even expect long-term lunar bases and regular space travel – in both crewed and non-crewed missions – to be established by the end of the decade.

Through the WRC-27 agenda item, ITU Member States are paving the way for lunar and cislunar (between Earth and lunar orbit) radiocommunications to support scientific and commercial activities.

Several countries have already begun exploring the lunar surface remotely, and human return to the Moon is planned for as early as 2025.

Balancing innovation with protection

The new resolution notes how the unique conditions on the Moon, including its shielded zone (SZM) and absence of water vapour and oxygen in its atmosphere, enable radio astronomers to conduct scientific observations that would be impossible on Earth.

Local communications between systems operating on the Moon's surface or between its surface and orbit will require dedicated frequencies in the lunar vicinity. Recognizing this need, the new resolution invites ITU-R to start researching future spectrum needs for lunar communications and systems, including potential communications between Earth, lunar-orbiting spacecraft, and the lunar surface.

Those ITU-R studies will explore technical and operational characteristics, protection criteria, propagation considerations, and sharing and compatibility issues related to radiocommunication systems on and around the Moon.

Based on the upcoming studies, WRC-27 will consider new or modified frequency allocations, as well as specific identifications in the space research service (SRS) for use in the vicinity of the Moon.

Lunar scientific and exploration activities can advance the development of potential future space activities beyond space research. At the same time, the new resolution aims to protect existing radiocommunication services and the radio astronomy service (RAS), both on Earth and in the Moon's shielded zone.

The landmark resolution underscores the increasing importance of the lunar radio environment to support the growing space economy and future space activities. It also recognizes the need for a regulatory framework to ensure these activities are conducted without causing harmful interference.

The landmark resolution underscores the increasing importance of the lunar radio environment to support the growing space economy and future space activities.

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Key agreements for non-geostationary satellite systems

The World Radiocommunication Conference (WRC-23) produced some pivotal agreements addressing issues related to non-geostationary orbit (NGSO) satellites, crucial to facilitating mobile broadband coverage and global connectivity.

The decisions come at a time when submissions for registering NGSO frequency assignments – some composed of hundreds to thousands of satellites – are at an all-time high, especially in bands allocated to the fixed- and mobile-satellite services (FSS and MSS).

NGSO satellites, unlike geostationary orbit (GSO) satellites, are constantly moving in relation to the Earth's surface.

NGSO frequency assignments – some composed of hundreds to thousands of satellites – are at an all-time high.

Orbital tolerance transparency

As orbits around the Earth become increasingly crowded, the need has grown for satellites to stay in their assigned orbital "lanes" and radio frequencies. By adhering to recorded orbital characteristics, each satellite's communications system avoids interfering with other radio systems.

During WRC- 23, Member States of the International Telecommunication Union (ITU) agreed on specific tolerances regarding the orbital characteristics of NGSO space stations in the FSS, MSS and broadcast-satellite services (BSS) that operate within 15000 kilometres of the Earth's surface. This equates with part of the medium-Earth orbit (MEO) and the entire low-Earth orbit (LEO) range.

In practice, the actual operational orbital parameters of a satellite system may differ from what is recorded in the Master International Frequency Register (MIFR) managed by ITU.

The new resolution explains how administrations should report such deviations, which can negatively impact the efficient use of spectrum and associated orbital resources.

Administrations in charge of an NGSO system must explain any discrepancy between "notified" values, meaning where the satellite system is supposed to be, and "observed" values, meaning where it actually is.

The notifying administration must also prove that the discrepancy necessitates no additional protective measures against harmful interference, compared to what would be needed if the system were to match its position as recorded in the MIFR.

Where interference has occurred, the administration must submit modifications to the system's frequency assignments to ITU.

Failing to provide either kind of notification by the deadline can result in penalties, including a change of status – so that the system is not considered as brought into use – omission from ITU's milestone procedure for NGSO frequency assignments.

As orbits around the Earth become increasingly crowded, the need has grown for satellites to stay in their assigned orbital "lanes" and radio frequencies.

The new resolution reduces uncertainty about how satellites are notified compared to their actual operations in orbit.

The new resolution agreed by ITU Member States at WRC- 23 reduces uncertainty about how satellites are notified compared to their actual operations in orbit. This allows for a more transparent approach to the question of orbital tolerances.

The new approach minimizes risks of unanticipated radio interference between previously coordinated satellite systems.

> The Radio Regulations require administrations to bring at least one satellite into use within a mandatory seven-year period after registering a planned system.

Modified post-milestone procedure

ITU Member States agreed on new post- milestone procedures for NGSO systems in the FSS, MSS, and BSS, building on the landmark Resolution 35 agreed four years before at WRC-19.

The newly agreed mechanism addresses medium-and long-term reductions in the number of satellites in NGSO systems that have completed the milestone process set out in Resolution 35.

The Radio Regulations require administrations to bring at least one satellite into use within a mandatory seven-year period after registering a planned system. The seven-year clock starts ticking as soon as the satellite filing is made.

For multi-satellite deployments, administrations must deploy 10 per cent of a constellation within two years, 50 per cent in five years, and 100 per cent in seven years.

WRC-23 delegates decided that if the number of satellites falls short in the complete constellation, administrations must modify the characteristics of their frequency assignments.

> As satellite orbits become increasingly crowded, the agreement reached at WRC-23 will be crucial to minimize radio interference.

Additionally, the new rules set deadlines for notifying administrations to submit required information to the ITU Radiocommunication Bureau, depending on when the regulatory period ends.

The new procedure also details what happens if administrations fail to provide the required information, including reminders from ITU and potential changes to frequency assignments.

Like with orbital tolerances, the post-milestone procedure strives to keep the MIFR reflective of actual realities in space over time. With these new procedures, ITU Member States have taken an important regulatory step to ensure satellite systems can operate effectively and transparently while using spectrum efficiently.

The revised resolution discourages "spectrum warehousing" — acquiring spectrum rights and then not using them. Yet it balances regulatory controls with smooth coordination and the operational requirements of NGSO systems.

As satellite orbits become increasingly crowded, the agreement reached at WRC-23 will be crucial to minimize radio interference.

WRC-23 has adjusted the aggregate interference limits for NGSO-FSS systems.

Protecting GSO networks

WRC-23 has adjusted the aggregate interference limits for NGSO-FSS systems.

These updates apply to Resolution 76 (Rev. WRC-23), which sets such limits to protect GSO-FSS and BSS networks in the frequency range between 10 and 30 gigahertz (GHz).

NGSO satellite system operators are required to take all possible steps, including system modifications, to avoid exceeding the specified aggregate limits. If actual interference exceeds those limits, operators must act quickly to reduce it.

Regular consultation meetings are intended to ensure compliance. According to the WRC-23 resolution, NGSO operators can assess the level of aggregate interference caused by their satellite systems and decide on necessary reduction measures.

The updated resolution calls for transparency in the consultation process and fairness about interference allowances.


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Addressing harmful interference to the radionavigation-satellite service

The World Radiocommunication Conference (WRC-23) agreed on taking measures to prevent and mitigate harmful interference to the radionavigation-satellite service (RNSS).

Protecting safety-of-life applications

RNSS uses specified frequency bands for safety-of-life applications, scientific applications, and many uses and devices across all sectors of the global economy.

Harmful interference to the RNSS can affect safety systems used by aeronautical and maritime applications, as well as the regularity and efficiency of civil aviation operations.

Harmful interference to the RNSS can affect safety systems used by aeronautical and maritime applications, as well as the regularity and efficiency of civil aviation operations.

RNSS disruptions, identified globally by the aeronautical and maritime communities, gave rise to a resolution that was eventually adopted at WRC-23 in December.

Through this decision, Member States of the International Telecommunication Union (ITU) recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference.

Measures to avoid interference

The new resolution urges administrations to apply necessary measures to avoid the proliferation, circulation and operation of unauthorized transmitters that cause or have the potential to cause harmful interference to RNSS systems and networks.

This includes possible measures that might need to be taken with respect to the fact that there are other RNSS applications–whether in the same or in other RNSS frequency bands that need to be protected.

The new resolution urges administrations to apply necessary measures to avoid the proliferation, circulation and operation of unauthorized transmitters.

Urging administrations to act

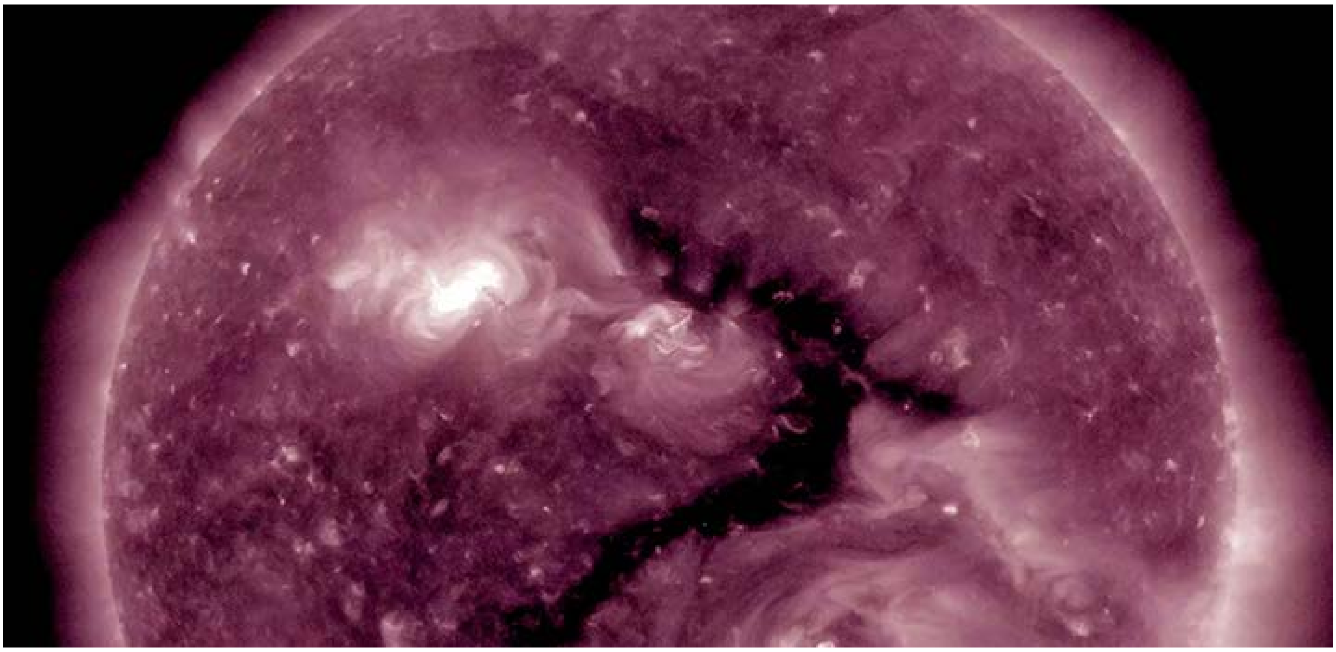
Administrations are urged to take actions to prevent and mitigate harmful interference affecting RNSS, without prejudice to the right of each administration to deny access to RNSS for security or defence purposes.

Specified actions prevention and mitigation actions include:

- Encouraging collaboration between spectrum regulators, enforcement authorities and RNSS stakeholders, in particular in the aeronautical and maritime domains.
- Encouraging cooperation between aeronautical, maritime and security authorities, as well as spectrum regulators, as appropriate, to address interference risks to RNSS systems that may stem from the activities of those security authorities.
- Reporting cases, as the affected administration deems appropriate, of harmful interference to RNSS.

Administrations are urged to take actions to prevent and mitigate harmful interference affecting RNSS.

The Director of the ITU Radiocommunication Bureau will provide, on request, assistance to administrations on this matter.



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Recognizing the importance of space weather sensing

A new resolution adopted at the World Radiocommunication Conference (WRC-23) recognizes the importance of using the meteorological aids (MetAids) service for space weather applications.

Space weather data supports critical forecasting and provides alerts of space weather events. It is also vital for understanding the physical processes behind space weather, developing effective prediction models, and assessing the impacts of such events on societal infrastructure and services.

The collection and exchange of space weather data – conducted regularly by Member States of the International Telecommunication Union (ITU) worldwide – is crucial to detect and monitor solar activity, including solar flares and high energetic particles. Solar events affect the Earth's geomagnetic and ionospheric conditions as well as prompting other space weather phenomena.

All these impacts, in turn, affect key services, economic systems, government operations, and the safety and security of populations.

Space weather data supports critical forecasting and provides alerts of space weather events.

Space weather data is normally collected for the benefit of the whole international community, with the data generally made freely available to users.

The new resolution defines space weather as "*natural phenomena, mainly originating from solar activity and occurring beyond the major portion of the Earth's atmosphere, that impact Earth's environment and human activities*."

Space weather sensors can be highly sensitive to interference. Some of them suffer from harmful interference at levels that could be tolerated by other radiocommunication applications.

The need for regulation and protection from interference

Proposals for the new resolution considered the fact that spectrum-reliant space weather sensor technology was already being developed and operational systems deployed. However, this had been happening without much regard for radio-spectrum regulations and the need for their protection from interference.

Space weather sensors can be highly sensitive to interference. Some of them suffer from harmful interference at levels that could be tolerated by other radiocommunication applications.

This is the case for sensors that operate by receiving signals of low-level natural phenomena, mainly originating from solar activity and occurring beyond the major portion of the Earth's atmosphere.

Several international bodies that collaborate with the ITU Radiocommunication Sector (ITU-R) have emphasized the importance of space weather radiocommunication applications. The World Meteorological Organization (WMO), the Intergovernmental Panel on Climate Change (IPCC), the United Nations Office for Disaster Risk Reduction (UNDRR), the International Civil Aviation Organization (ICAO) and the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) all expressed this concern at WRC-23.

According to the United Nations Office for Outer Space Affairs (UNOOSA), society's growing dependence on space-based systems necessitates a fuller understanding of space weather.

According to the United Nations Office for Outer Space Affairs (UNOOSA), society's growing dependence on space-based systems necessitates a fuller understanding of space weather. Examples include effects on space systems and human space flight, electric power transmission, high frequency radiocommunications, and global navigation satellite system (GNSS) signals.

Unique frequency band requirements

The new resolution notes that *in situ* (local) and remote-sensing space weather observation capabilities depend on the availability of radio frequencies. Certain frequency bands used by space weather applications, however, have unique physical characteristics, which makes migration to alternative frequency bands impossible.

The new WRC resolution urges administrations to take space weather radio-frequency requirements into account, particularly to ensure protection of the related frequency bands. It also encourages administrations to consider the importance of the use and availability of spectrum for space weather applications prior to taking decisions that would negatively impact their operations.

The new WRC resolution urges administrations to take space weather radio-frequency requirements into account, particularly to ensure protection of the related frequency bands.

Possible new MetAids (space weather) spectrum allocations

Radio-frequency allocations for the MetAids service dedicated to space weather observation may be identified at the next World Radiocommunication Conference in 2027, depending on the outcomes of ITU-R studies in the meantime.

Studies over the next four years will consider possible new primary allocations to MetAids (space weather) in several frequency bands. The research will focus on compatibility and potential frequency sharing between space weather sensors and incumbent radiocommunication services.

ITU Member States have also incorporated a new article on space weather into the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and satellite orbits. This new article, adopted at WRC-23, stipulates that space weather sensors may operate under specified MetAids (space weather) allocations.

Radio-frequency allocations for the MetAids service dedicated to space weather observation may be identified at the next World Radiocommuni-cation Conference in 2027.

New resolutions

WRC-23 approved 43 New resolutions, revised 56 existing and suppressed 33.

Committee 4

New resolutions		Agenda item
364	Coordination of services provided by the NAVDAT system	1.11
406	Use of the frequency band 117.975–137 MHz by the aeronautical mobile-satellite (R) service	1.7
213	Use of high-altitude platform stations as International Mobile Telecommunications base stations in the frequency band 694–960 MHz, or portions thereof	1.4
218	Use of high-altitude platform stations as International Mobile Telecommunications base stations in the frequency band 2500–2690 MHz, or portions thereof	1.4
365	Provisional application of the Radio Regulations for the introduction of the new GSO satellite networks into the global maritime distress and safety system	1.11
219	Terrestrial component of International Mobile Telecommunications in the frequency band 10–10.5 GHz in Region 2	1.2
220	Terrestrial component of International Mobile Telecommunications (IMT) within the frequency band 6425–7125 MHz	1.2
674	Studies on possible allocations to Earth exploration-satellite service (passive) in the bands 4200–4400 MHz and 8400–8500 MHz	1.2

Committee 5

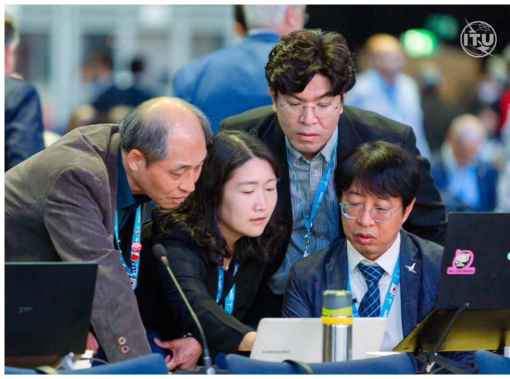
New resolutions		Agenda item
675	Importance of meteorological aids service (space weather) applications	9.1(9.1-a)
121	Use of the frequency band 12.75–13.25 GHz by earth stations in motion on aircraft and vessels space stations in the fixed-satellite service	1.15
123	Use of the frequency bands 17.7–18.6 GHz, 18.8–19.3 GHz and 19.7–20.2 GHz (space-to-Earth) and 27.5–29.0 GHz and 29.5–30 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with non-GSO space stations in the fixed-satellite service	1.16
8	Tolerances for certain orbital characteristics of space stations deployed as part of non-GSO FSS, BSS or MSS systems	7(A)
676	Prevention and mitigation of harmful interference to the radionavigation-satellite service in the frequency bands 1164–1215 MHz and 1559–1610 MHz	9.2
677	Use of the frequency range 40-50 MHz allocated to the Earth exploration-satellite service (active) for spaceborne radar sounders	1.12
678	Use of the frequency band 14.8–15.35 GHz by the space research service (space-to-space) and associated transitional measures	1.13
679	Use of the frequency bands 18.1–18.6 GHz, 18.8–20.2 GHz and 27.5–30 GHz by the inter-satellite service	1.17
126	Temporary regulatory measures in Appendix 30B to improve the reference situation of severely impacted national allotments	7(1)

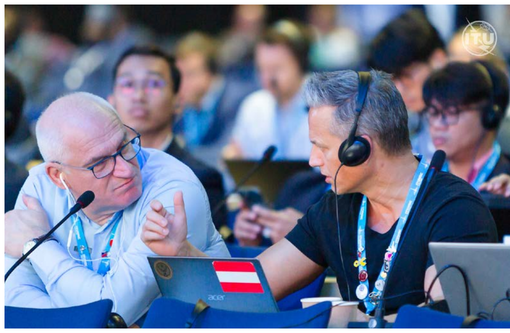



Committee 6

New resolutions		Agenda item
129	Studies on possible revisions of sharing conditions in the frequency band 13.75–14 GHz to allow the use of uplink fixed-satellite service earth stations with smaller antenna sizes	10
411	Consideration of appropriate regulatory actions to update Appendix 26 in support of modernization of high-frequency spectrum use in the aeronautical mobile (OR) service	10
130	Studies relating to the use of the frequency band 51.4–52.4 GHz to enable its use by gateway earth stations transmitting to non-geostationary-satellite orbit systems in the fixed-satellite service (Earth-to-space)	10
680	Studies on frequency-related matters, including possible new or modified space research service (space-to-space) allocations, for future development of communications on the lunar surface and between lunar orbit and the lunar surface	10
712	Studies on compatibility between the Earth exploration-satellite service (passive), the radio astronomy service in certain bands above 76 GHz, and active services in adjacent and nearby frequency bands	10
14	Studies on development of regulatory measures and their implementability thereof, to limit the unauthorized operations of non-GSO earth stations in the FSS and MSS and associated issues related to the service area of non-GSO FSS and MSS satellite systems	10
131	Consideration of technical and regulatory measures for fixed-satellite service satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2–50.2 GHz (Earth-to-space) and 50.4–51.4 GHz (Earth-to-space) for equitable access to these frequency bands	10
252	Studies on potential new allocations to, and regulatory actions for, the mobile-satellite service in the frequency bands 1427–1432 MHz (space-to-Earth), 1645.5–1646.5 MHz (space-to-Earth) (Earth-to-space), 1880–1920 MHz (space-to-Earth) (Earth-to-space) and 2010–2025 MHz (space-to-Earth) (Earth-to-space) required for the future development of low-data-rate non-geostationary mobile-satellite systems	10

253	Studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipmentto complement terrestrial IMT network coverage	10
254	Studies on possible new frequency allocations to the mobile-satellite service in the frequency bands 2010–2025 MHz (Earth-to-space) and 2160–2170 MHz (space-to-Earth) in Regions 1 and 3 and 2120–2160 MHz (space-to-Earth) in all Regions	10
681	Studies of technical and regulatory provisions necessary to protect radio astronomy operating in specific Radio Quiet Zones and, in radio astronomy service primary allocated frequency bands globally, from aggregate radio-frequency interference caused by systems in the non-geostationary-satellite orbit	10
682	Consideration of regulatory provisions and potential primary allocation to the meteorological aids service (space weather) to accommodate receive-only space weather sensor applications in the Radio Regulations	10
721	Studies on potential new allocations to fixed, mobile, radiolocation, amateur, amateur-satellite, radio astronomy, Earth exploration-satellite (passive and active) and space research (passive) services in the frequency range 275–325 GHz with the consequential update of Nos. 5.149, 5.340, 5.564A and 5.565	10
910	[Studies on the possible [frequency bands] for [non-beam and beam] wireless power transmission (WPT) to avoid harmful interference to the radiocommunication services caused by WPT]	10
133	Study of the possible use of the frequency band 12.75–13.25 GHz by aeronautical and maritime earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service (Earth-to-space)	10
683	Study of technical and operational issues and regulatory provisions to support inter-satellite service transmissions in the frequency bands 3700–4200 MHz and 5925–6425 MHz for non -GSO space stations communicating with GSO space stations	10
255	Studies on frequency-related matters for International Mobile Telecommunications (IMT) identification in the frequency bands [102–109.5 GHz, 151.5–164 GHz, 167–174.8 GHz, 209–226 GHz and 252–275 GHz] for the future of IMT	10





366	Improving the utilization and channelization of maritime radiocommunication in the MF and HF bands, including potential revisions to Article 52 and Appendix 17	10
684	Studies on possible new allocations to the radionavigation-satellite service (space-to-Earth) in the frequency bands [5030–5150 MHz and 5150–5250 MHz] or parts thereof	10
685	Studies towards frequency allocations for the Earth exploration-satellite service (space-to-Earth) within the frequency range [37.5–52.4 GHz]	10
686	Possible secondary allocation to the Earth exploration-satellite service (active) in the frequency bands [3000–3100 MHz] and [3300–3400 MHz]	10
722	Studies on the coexistence between spaceborne synthetic aperture radars operating in the Earth exploration-satellite service (active) and radiodetermination service in the frequency band [9200–10 400 MHz]	10
813	Agenda for the 2027 World Radiocommunication Conference	10
726	Possible new primary allocation to the fixed-satellite service (space-to-Earth) in the frequency band 17.3–17.7 GHz and possible new primary allocation to the broadcasting-satellite service (space-to-Earth) in the frequency band 17.3–17.8 GHz in Region 3, and consideration of epfd limits to be applied in Regions 1 and 3 to non-geostationary-satellite FSS systems (space-to-Earth) in the frequency band 17.3–17.7 GHz	
814	Preliminary agenda for the 2031 World Radiocommunication Conference	10
256	Sharing and compatibility studies and development of technical conditions for the use of IMT in the frequency bands 4400–4800 MHz, 7125–8400 MHz (or portions thereof), and 14.8–15.35 GHz for the terrestrial component of IMT	10

H.E. Mohammed Al Ramsi receives a medal and certificate of recognition and appreciation of his exemplary work in chairing WRC-23.

Conclusions

At the closing ceremony ITU Secretary-General Doreen Bogdan-Martin said that WRC-23 had put the world on a solid path towards a more connected, sustainable, equitable and inclusive digital future for all. "Key regulatory achievements on spectrum for space, science and terrestrial radio services build on the momentum of ITU's ongoing work to achieve universal connectivity and sustainable digital transformation," she said.

"The agreements reached at WRC-23 are a testament to the unwavering spirit of cooperation and compromise among all of our members," said Mario Maniewicz, Director of the ITU Radiocommunication Bureau. "Navigating the complexities of spectrum sharing to update the Radio Regulations has helped us forge a path that provides a stable, predictable regulatory environment essential for the development of innovative radiocommunication services for all."

"Across the globe, numerous countries, institutions, and companies eagerly anticipate the outcomes of this conference," said H.E. Mohammed Al Ramsi, Chair of WRC-23 and Deputy Director-General for the Telecommunication Sector of TDRA. "We have emerged from this conference with significant results that contribute to the advancement of numerous radio services, serving the interests of countries, societies, and humanity at large."

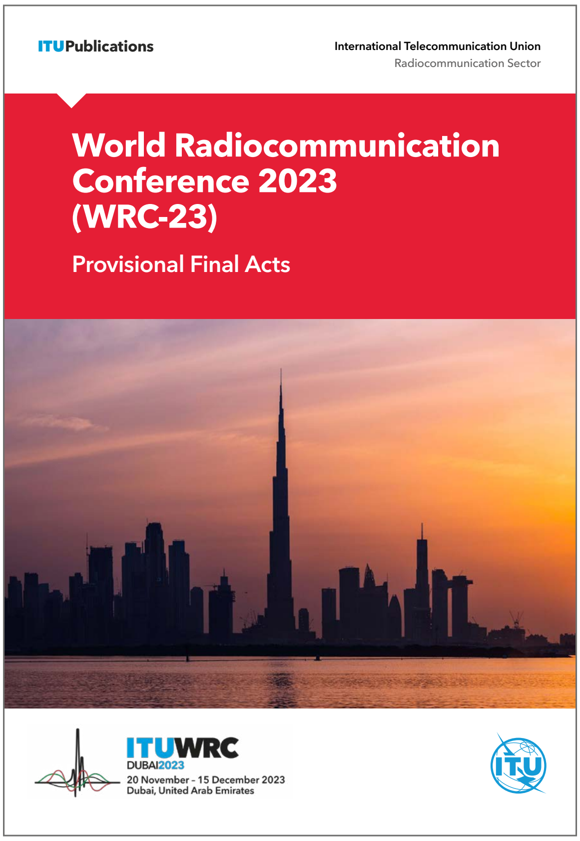
Key regulatory achievements on spectrum for space, science and terrestrial radio services build on the momentum of ITU's ongoing work to achieve universal connectivity and sustainable digital transformation.

Doreen Bogdan-Martin

A total of 151 ITU Member States signed the WRC-23 Final Acts. The Final Acts constitute a record of the decisions taken at the conference including both the new and revised provisions of the Radio Regulations, all Appendices, and the new and revised Resolutions and ITU-R Recommendations incorporated by reference into the treaty by the conference.

The updated Radio Regulations will be published during 2024 and will come into effect on 1 January 2025.

Download the [Provisional Final Acts] to see all WRC-23 outcome documents.



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Mario Maniewicz

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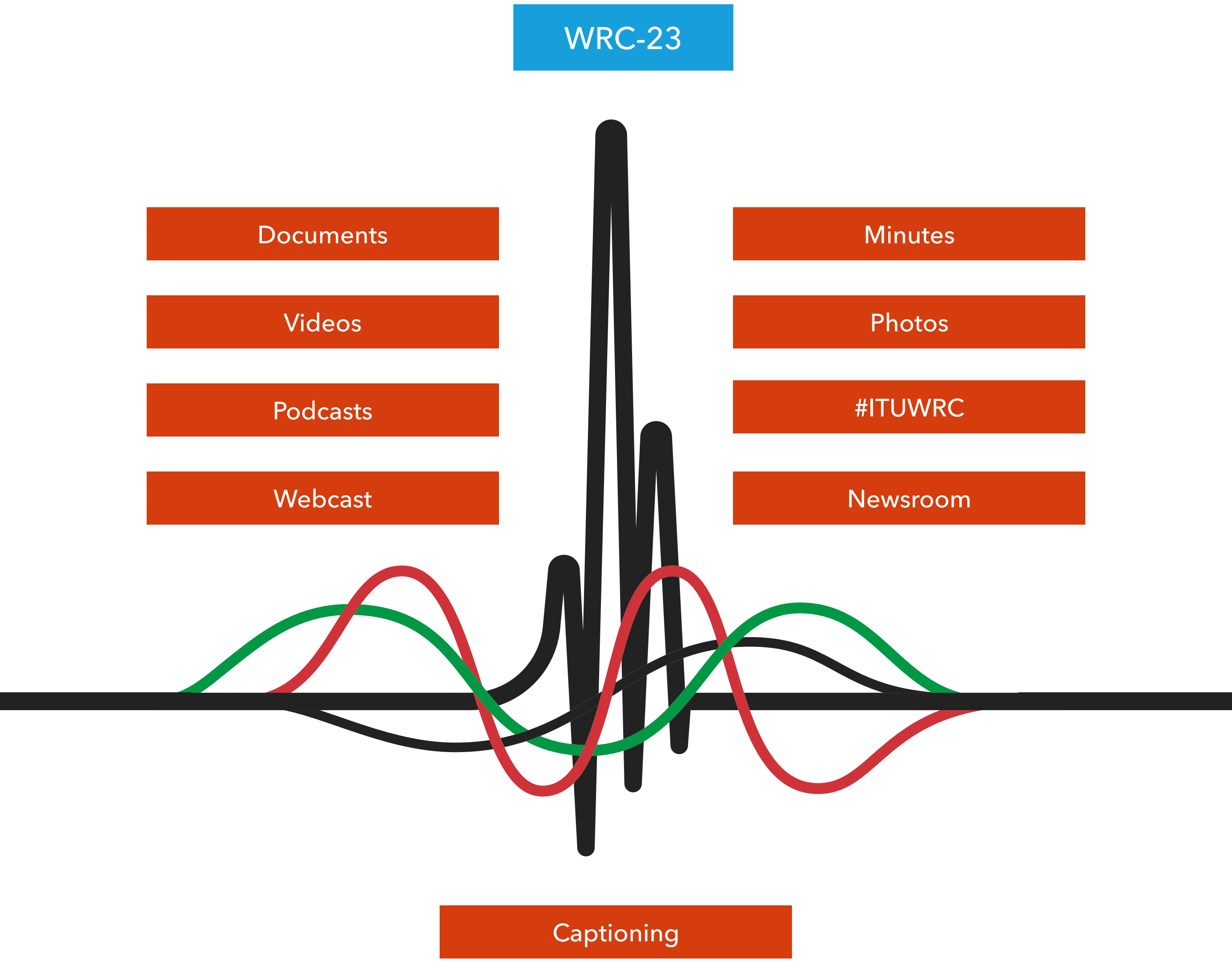
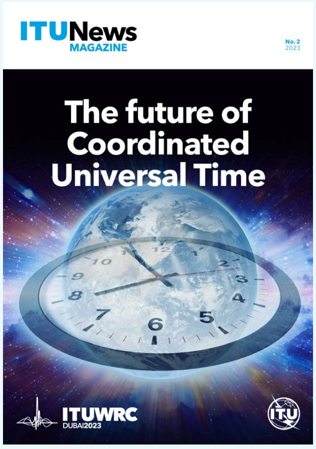
WRC-23 at a glance



ITU News Magazines in the build-up to WRC-23:

[Countdown to WRC-23]



[The future of Coordinated Universal Time]

[Land, sea and airwaves]

[Satellite connectivity]

[Science services]

Looking ahead to WRC-27

WRC-23 established the general scope of the agenda for the next World Radiocommunication Conference in 2027. This prepares for the development of future technologies and guides the work of the ITU Radiocommunication Sector (ITU–R) during the next four-year study cycle.

The agenda items proposed by ITU Member State administrations that could not be included in the agenda of WRC-23, have been deferred to the preliminary agenda of WRC-27.

The preliminary agenda for 2027

1.1 **Aeronautical and maritime ESIM:** consider the use of frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space).

1.2 **Uplink FSS earth stations with small antenna sizes:** consider possible revisions of sharing conditions in the band 13.75-14 GHz.

1.3 **Gateway earth stations:** consider studies relating to the use of the band 51.4-52.4 GHz to enable use by gateway earth stations transmitting to NGSO systems in the FSS (Earth-to-space).

1.4 **Fixed-satellite and broadcasting-satellite services:** consider new primary allocations in Region 3 and equivalent power flux-density limits in Regions 1 and 3.

1.5 **NGSO earth stations:** consider regulatory measures to limit unauthorized operations in the fixed-satellite and mobile satellite services.

1.6 **FSS satellite networks:** consider technical and regulatory measures for FSS satellite networks/systems.

1.7 IMT: consider studies on sharing and compatibility and develop technical conditions for the use of IMT in certain frequency bands.

1.8 Radiolocation service: consider possible additional spectrum allocations to the radiolocation service on a primary basis in the frequency range 231.5-275 GHz and possible new identifications.

1.9 Aeronautical mobile: consider regulatory actions to update Appendix 26 to the Radio Regulations in support of aeronautical mobile (OR) high frequency modernization.

1.10 PFD and equivalent isotropically radiated power limits: consider developing for inclusion in Article 21 of the Radio Regulations for the fixed-satellite, mobile-satellite and broadcasting-satellite services.

1.11 Space-to-space links: consider the technical and operational issues, and regulatory provisions, for space-to-space links among non-geostationary and geostationary satellites in certain frequency bands.

1.12 Future development of low-data-rate non-geostationary mobile-satellite systems: consider, based on the results of studies, possible allocations to the MSS and possible regulatory actions in certain frequency bands.

1.13 Connectivity between space stations and IMT: consider studies on possible new allocations to the MSS for direct connectivity between space stations and IMT user equipment to complement terrestrial IMT network coverage.

1.14 Mobile-satellite service: consider possible additional allocations to this service.

1.15 Lunar communications: consider studies on frequency-related matters, including possible new or modified space research service (space-to-space) allocations, for future development of communications on the lunar surface and between lunar orbit and the lunar surface.

1.16 Radio astronomy: consider studies on protecting radio astronomy operating in specific Radio Quiet Zones and, in frequency bands allocated on a primary basis globally, from aggregate radio-frequency interference caused by NGSO systems.

1.17 Space weather sensors: consider regulatory provisions and their protection in the Radio Regulations.

1.18 Earth exploration-satellite and radio astronomy service: consider, based on study results, possible regulatory measures regarding the protection of the EESS (passive) and the radio astronomy service in certain bands.

1.19 EESS: consider possible primary allocations in all Regions.

The preliminary agenda for WRC-31

2.1 New allocations: consider new allocations to the fixed, mobile, radiolocation, amateur, amateur-satellite, radio astronomy, Earth exploration-satellite (passive and active) and space research (passive) services.

2.2 Wireless power transmission: [consider the possible [frequency bands] for [non-beam and beam] wireless power transmission to avoid harmful interference to the radiocommunication services caused by wireless power transmission.

2.3 ESIM: consider the use of aeronautical and maritime ESIM communicating with non-geostationary space stations in the FSS (Earth-to-space) in the band 12.75-13.25 GHz.

2.4 Inter-satellite service: consider, based on studies, support for inter-satellite service allocations in certain frequency bands, and associated regulatory provisions, to enable links between NGSO and geostationary orbit satellites.

2.5 Aeronautical mobile: consider a possible primary allocation in certain frequency bands to the aeronautical mobile service for the use of International Mobile.

2.6 IMT: consider the identification of certain frequency bands for IMT.

2.7 VHF maritime communication: consider improving the utilization of VHF maritime radiocommunication.

2.8 Maritime radiocommunication: consider improving the utilization and channelization of maritime radiocommunication in the MF and HF bands.

2.9 Radionavigation-satellite service: consider possible allocations to the radionavigation-satellite service (space-to-Earth) in certain frequency bands.

2.10 EESS: consider a possible new primary allocation to the Earth exploration-satellite service (Earth-to-space) in the frequency band 22.55-23.15 GHz.

2.11 Secondary allocation EESS upgrade: consider an upgrade of the secondary allocation to the Earth exploration-satellite service (space-to-Earth) in the band [37.5-40.5 GHz] or possible new worldwide frequency allocations on a primary basis to the Earth exploration-satellite service (space-to-Earth) in certain frequency bands.

2.12 New allocations to EESS: consider possible new allocations to the Earth exploration-satellite service (active) in certain frequency bands on a secondary basis.

2.13 Coexistence studies: consider studies on coexistence between spaceborne synthetic aperture radars operating in the EESS (active) and the radiodetermination service in the frequency band 9200-10 400 MHz.

2.14 Broadcasting and mobile: review spectrum use and needs of applications of broadcasting and mobile services and consider possible regulatory actions in the frequency band 470-694 MHz.

ESIM = Earth stations in motion
FSS = Fixed-satellite service
NGSO = Non-geostationary-satellite orbit
IMT = International Mobile Telecommunications
PFD = Power flux-density
MSS = Mobile-satellite service
EESS: Earth exploration-satellite service

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Network of Women: Gender equality in radiocommunications

> *At every level, women have played and continue to play key roles in this conference.*
>
> Mario Maniewicz
> Director, ITU Radiocommunication Bureau

Network of Women sessions at the World Radiocommunication Conference (WRC-23) aimed to help further boost women's representation at future WRCs.

Women made up 22 per cent of ITU Member State delegates at WRC-23, up from 18 per cent four years earlier at WRC-19.

"At every level, women have played and continue to play key roles in this conference," said Mario Maniewicz, Director of the ITU Radiocommunication Bureau in his address to a Network of Women for WRC-23 reception. "These achievements are in no small measure the result of the work of the Network of Women for WRC-23."

Maniewicz – announcing the launch of a women's network for WRC-27 – urged governments and companies to support continued progress towards gender equity, equality, and parity.

Supporting the new NOW4WRC27 will "help make a better world for everyone," he added.

Women in leadership

Women in leadership roles at WRC-23 included 114 heads and deputy heads of delegation, ten ministers, three deputy ministers and three ambassadors. At the committee level, three chairs and ten vice chairs were women.

Other women in key roles included chairs of the 2023 Conference Preparatory Meetings (CPM23-1 and CPM23-2) and the 2023 Radiocommunication Assembly (RA-23) preceding the WRC. Women were also involved in conference preparatory processes in every regional group.

Celebrating a new resolution

RA-23 – recognizing women's continued underrepresentation in the radio communication sector, – passed a new resolution titled "*Promoting gender equality and equity and bridging the contribution and participation gap between women and men in in the ITU Radiocommunication Sector activities*".

The new resolution calls on the ITU-R to strengthen and accelerate all efforts to ensure that all its policies, work, programmes, information dissemination activities, publications, study groups, seminars, courses, assemblies, and conferences reflect the commitment of the Sector to gender equality for the empowerment of women.

It further calls on Member States, regional telecommunication organizations and ITU Sector Members to accord women opportunities that build their expertise and expand their opportunities in areas such as delegates, heads and deputy heads of delegations during the preparation for and at World Radiocommunication Conferences.

Our challenge, particularly in radiocommunications, is that we don't have enough women in the field in general.

Joanne Wilson
Deputy to the Director
ITU Radiocommunication Bureau

Watch video interview.


No Meeting
GSMA

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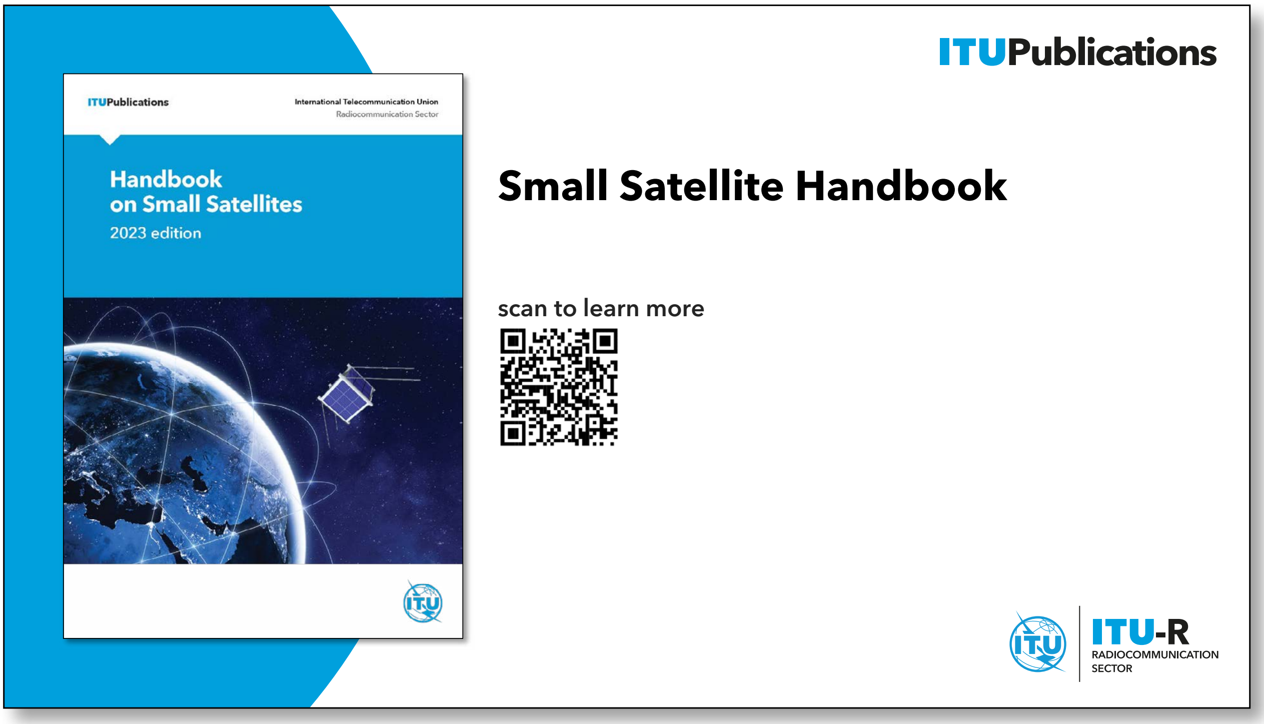
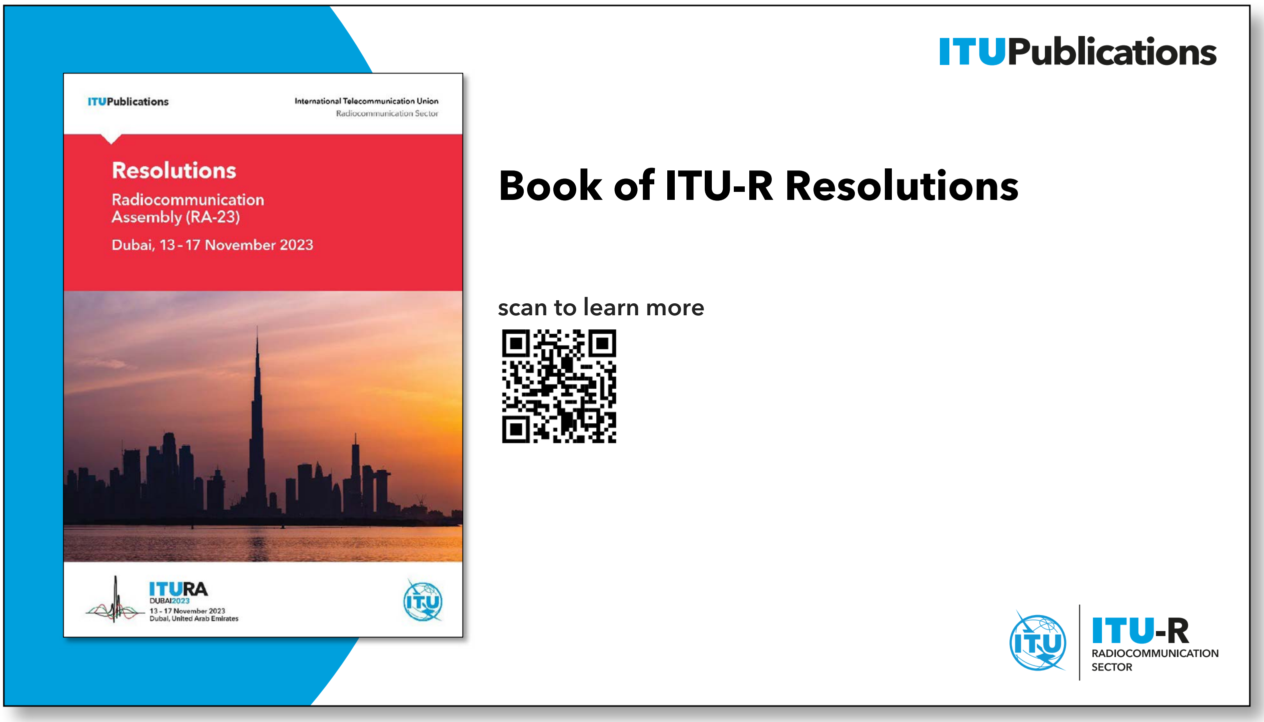


Handbook on Small Satellites



Resolutions RA-23