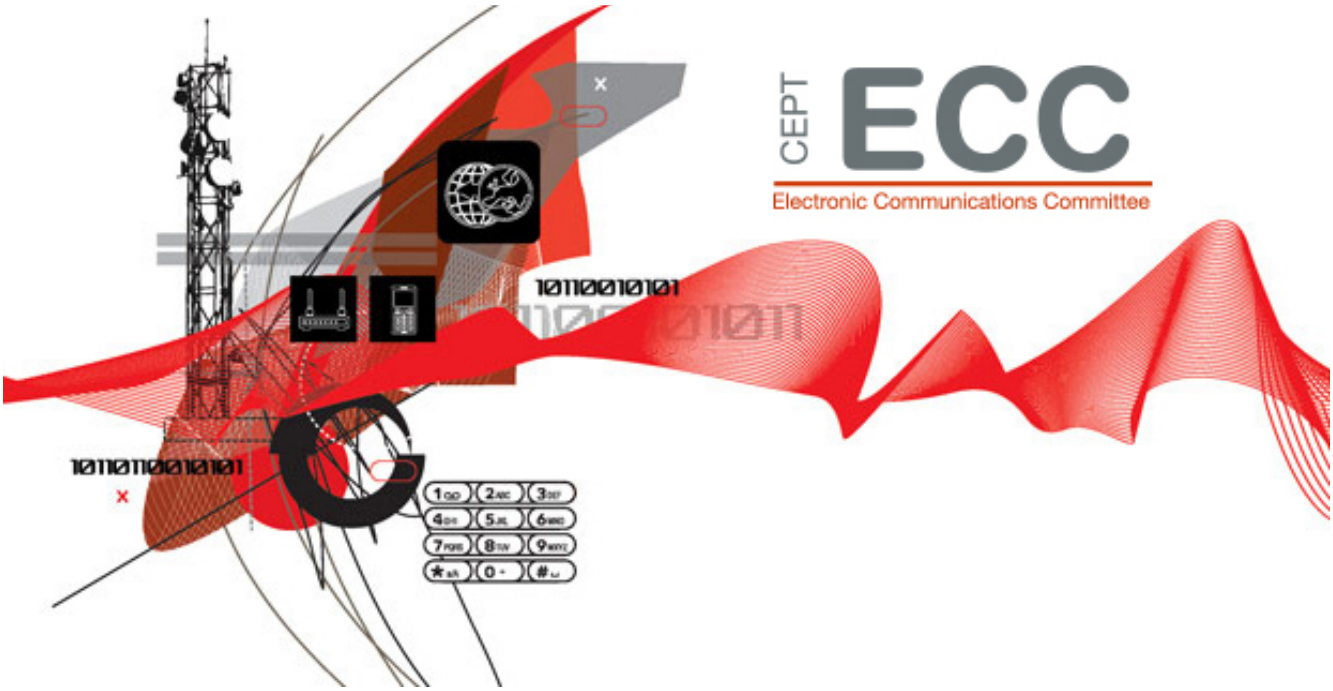

ECC Newsletter January 2024

Conference agrees updated global regulations for 5G, satellite and other wireless applications

With thousands of attendees and some intense discussions, the month-long World Radiocommunication Conference 2023 paves the way for the technology of the future, writes ECO Expert Peter Faris

The headlines in December may have been dominated by COP28, the UN climate change conference, but across town in Dubai another major UN conference was working intensively to agree on emission limits of a different kind. The International Telecommunication Union (ITU) World Radiocommunication Conference (WRC-23) reached consensus on regulations to enable future wireless technologies while ensuring protection of existing services from interference.

WRC-23 took place over four weeks from 20 November to 15 December, bringing together almost 4000 participants, representing 163 ITU Member States, various international organisations and industry.

Figure 1: WRC-23 plenary session (source: ITU, CC BY-NC-SA 2.0)

The main objective of WRC, which takes place every four years, is to update the ITU Radio Regulations – an international treaty governing the use of radio spectrum internationally. The treaty allocates spectrum to different services in different frequency bands, with appropriate emission levels to ensure interference-free operation.

As technology evolves and the demand for new applications increases it is necessary to review these Regulations periodically. To this end, WRC-23 discussed 19 main agenda items covering proposals for new or updated allocations for mobile, satellite, maritime, aeronautical and scientific services, as well as other procedural matters such as management of satellite orbits.

The outcomes of studies on these topics during the previous four years were discussed, with consensus reached on all topics by the end of the Conference – including up to the very last moments in the case of the most contentious agenda items.

CEPT is one of six regional groups representing different regions of the world at the Conference. The CEPT coordination team worked tirelessly to promote and defend the European positions developed during the preparatory process, and to negotiate with representatives of the other regions. Successful outcomes were reached on several topics in line with the CEPT position going into WRC- 23, while it was necessary to compromise on other issues.

Figure 2: The CEPT coordination team at WRC-23 (source: ITU, CC BY-NC-SA 2.0)

Mobile – New frequencies for 5G and 6G

The Conference agreed proposals to improve and enable mobile technology. In ITU Region 1 (encompassing Europe, the Middle East and Africa), it agreed that the 6425-7125 MHz band would be identified for International Mobile Telecommunications (IMT). This will enable the use of 5G and future 6G technologies in this band, while taking into account appropriate measures to protect satellite networks from interference. The use of this band for Wi-Fi was also recognised, in line with ongoing work within ECC to facilitate sharing between these technologies. Additional IMT identifications were agreed in some countries and regions outside Europe in 3.3-3.4 GHz, 3.6-3.8 GHz and 10-10.5 GHz.

The Conference also agreed that existing mobile allocation in 3.6-3.8 GHz in Region 1 will be upgraded from secondary to primary status, which allows more flexibility in the use of this band, in line with the existing ECC framework (see December 2020 newsletter article).

The Conference identified various existing mobile bands below 3 GHz for “high altitude platforms operating as IMT base stations” (HIBS). This will enable unmanned aerial platforms such as airships to provide wide-area mobile coverage in remote unserved areas.

The status of 470-960 MHz (the UHF band) was reviewed, with a new secondary mobile allocation created in 470-694 MHz encompassing most CEPT countries. Possible further actions will be considered in the wider UHF band in eight years’ time at WRC-31. This solution allows for countries to deploy mobile networks to make use of the beneficial radio propagation properties in this frequency range and to provide wide area coverage, while ensuring that TV broadcasting can continue to use this band in other countries.

The Conference also agreed on how to adapt decades-old regulatory emission limits so they can be applied to modern 5G active antenna systems while ensuring protection of satellites from interference.

Figure 3: Delegates in the Conference venue (source: ITU, CC BY-NC-SA 2.0)

Satellite – Enabling new high speed applications and accommodating megaconstellations

The Conference reached several agreements to enable new satellite applications. It agreed regulatory measures to allow operation of "earth stations in motion" communicating with geostationary satellites in 12.75-13.25 GHz and non-geostationary satellites in portions of

17.7-20.2 GHz and 27.5-30 GHz. This built on the existing CEPT and global frameworks in these bands to enable a wider range of high-speed services to passengers on board aircraft and ships.

New frequency allocations were also agreed to support the operation of inter-satellite links in 18.1- 18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz.

The Conference also agreed on a wide range of updated measures related to the procedural aspect of management of satellite networks, in particular reflecting the need for updated regulatory measures to deal with the increase in demand for large constellations of non-geostationary satellites (see December 2022 newsletter article). The updated procedures for coordination and notification aim to facilitate wider access to satellite connectivity, including for new Member States, while ensuring protection of existing geostationary satellite networks.

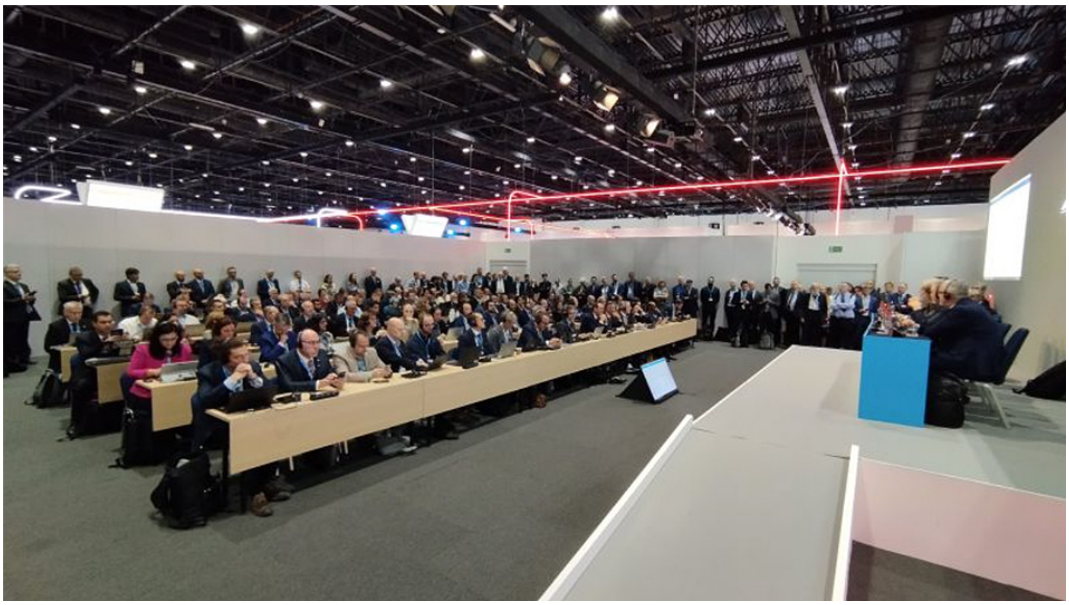

Figure 4: CEPT coordination meetings during WRC-23

Scientific services – Protecting the needs of climate monitoring and space science applications

The Conference agreed on several measures to enable and protect important scientific applications including various European-funded projects related to climate monitoring.

A new secondary allocation to the earth exploration-satellite service (EESS) in 40-50 MHz was agreed, which will allow the use of spaceborne radar sounders to monitor the movement of polar ice sheets. The Conference also agreed on new EESS allocations in 239.2-242.2 GHz and 244.2-247.2 GHz to enable passive microwave sensing, including ice cloud imagery used in weather forecasting. It was agreed that existing allocations to fixed

and mobile services in this range would be moved to 235-238 GHz to ensure interference-free operation. Limits were agreed for protection of EESS in 36- 37 GHz from interference from satellites in adjacent bands.

The Conference agreed that existing secondary allocation to the space research service in 14.8-15.35 GHz will be upgraded to primary status, which will facilitate the use of this band for satellite data relay systems. Such systems transmit scientific data between deep space missions, satellites and Earth, including communications with the International Space Station and possible use for lunar missions.

Solutions were agreed on how to enable sharing between satellite navigation and radio amateurs in the 1240-1300 MHz band, so that amateurs can continue to make use of this band without causing interference to Galileo satellite navigation receivers.

Aeronautical and maritime services – Enhancing communications in remote regions and over the seas

A range of solutions were agreed relating to aeronautical services. New allocations for aeronautical mobile-satellite in 117.975-137 MHz will enhance bi-directional communication between pilots and air traffic controllers flying over the oceans and remote continental regions. Meanwhile, new allocations were added for aeronautical mobile in 15.41-15.7 GHz and 22-22.2 GHz limited to non-safety communications, mainly for airborne sensors employed in various fields from agriculture to surveillance and disaster management.

On the maritime side, the Conference continued the work started at WRC-19 to support the modernisation of the Global Maritime Distress and Safety System (GMDSS). It reached consensus on a range of measures which take into account the work finalised in the meantime by he International Maritime Organization.

Setting the future agenda

Finally, one of the most intensive and challenging discussions surrounded the agenda for future conferences, which sets the work plan and priorities for the next four years towards WRC-27, as well as the preliminary agenda for WRC-31. This is explored in detail in the following article.

The final outcome was formally agreed through the signing of the Final Acts of the Conference by all participating Member States. It will be published in an updated version of the Radio Regulations during 2024.

Figure 5: The signing ceremony at WRC-23 (source: ITU, CC BY-NC-SA 2.0)

For more information on the outcome for the individual topics compared to the CEPT position, see the CEPT weekly reports from the Conference.

Radiocommunications are not a man's world - women turn up in numbers at WRC-23

"Each one of us can make a difference. Together we make change." This is the motto the CEPT Network of Women for the 2023 World Radiocommunication Conference (NOW4WRC23) chose to highlight the importance of encouraging and empowering more women to participate actively at WRC-23. And change is finally happening, writes ECO Expert Doriana Guiducci

There is still a long way to go to reach gender parity and to provide equal opportunities for women but the numbers from the 2023 World Radiocommunication Conference (WRC-23) confirm a positive trend. There is a continuous increase in women´s participation, writes Doriana Guiducci.

Women accounted for 22% of the almost 4 000 delegates who attended the conference. With nearly 880 women attending, it was the highest attendance of women at any WRC to date.

There were 216 women heads of delegation, 28 women ministers, 14 women deputy ministers and 17 women ambassadors. Three of the seven committee chairs and 10 committee vice-chairs were women, as well as two working group chairs and eight sub-working group chairs.

CEPT representation of women was in line with these figures: about 190, nearly 23%, out of nearly 800 delegates from CEPT countries were women. In addition, one quarter of the coordination team comprised women, who led the CEPT strategy and promoted European views at WRC-23.

The Radiocommunication Assembly which preceded WRC-23 in Dubai in early November was also chaired for the first time by a woman, Carol Wilson from Australia. It was that assembly which approved the new Resolution on "promoting gender equality and equity, and bridging the contribution and participation gap between women and men in ITU-R activities". This Resolution is based on the WRC-19 Gender Declaration and applies to the entire ITU Radiocommunication Sector (ITU-R) with the aim to “strengthen and accelerate” all efforts to ensure that its policies, work programmes and so on “reflect the commitment to gender equality and the empowerment of women”.

The approval and adoption of this Resolution follows four years of preparation by a dedicated correspondence group of the Radio Advisory Group. It has been the result of the joint effort and cooperation at global level between all the six Regional Telecommunication Organisations recognised by the ITU.

Dec 2020:	The CEPT NOW4WRC23 is established at the Conference Preparatory Group
21stMay 2021:	CEPT NOW4WRC23 statement and the mentoring program are approved
June 2021:	The CEPT NOW4WRC23 coordination team is established to organise and lead the CEPT NOW4WRC23 activities
22ndSept 2021:	The CEPT NOW4WRC23 mentoring program is launched
21stJune 2022:	The CEPT Workshop for newcomers on the WRC process takes place at the ECO
1st Feb 2023:	The survey on the CEPT NOW4WRC23 mentoring program is run
28th March and 4th April 2023:	The CEPT NOW4WRC23 "OPEN HOUSE" sessions take place at the CPM23-2 to provide information on activities and to offer ad-hoc mentoring
23rd November and 7th December 2023:	The CEPT NOW4WRC23 "OPEN HOUSE" is replicated at WRC-23
April 2021 – September 2023:	40 interactive sessions with guest speakers have been held

Figure CEPT NOW4WRC23 facts (see more here)

The Network of Women for WRC-23 in CEPT

The involvement of the Regional Telecommunication Organisations and the introduction at regional level of the NOW4WRC23 initiative have been significant enhancements, started for the first time in the preparatory cycle toward WRC-23. When the NOW4WRC23 was launched at the World Radiocommunication Seminar in December 2020, CEPT responded promptly by appointing Amela Hatibovic Sehic from Sweden as the CEPT Regional Co-chair (see also the ECC newsletter from May 2023).

By June 2021 the co-ordination team was formed. The activities were then started and progressively increased at the Conference Preparatory Group and in all the project teams involved in the preparation of WRC-23. Forty interactive sessions have been organised for those groups, such as panel discussions and presentations of prominent guest speakers from all over the world and from different sectors, who shared their inspiring stories, as well as their knowledge and experience.

One of the most appreciated initiatives in CEPT has undoubtedly been the Mentoring Program (see the survey) which was successfully launched back in September 2021 with the intent to develop and share knowledge and experience for women newcomers in the WRC-23 preparations. Mentees were matched according to their specific needs for skills or competence with experienced delegates, without regards to gender. Thirty-two participants joined the programme and 20 mentoring pairs were arranged.

Additional activities were made available to newcomers, such as ad hoc mentoring and the CEPT workshop on spectrum management in Europe and on the European process for the preparation of WRCs. This workshop was organised by the European Communications

Office in 2022 and was specifically designed for newcomers in the area of regulations for electronic communications. It also had the aim to support the inclusion of women in all aspects and levels of ITU-R activities.

The CEPT NOW4WRC23 at the conference

During WRC-23, the work of the CEPT NOW4WRC23 continued. Following the successful pioneer experience from the second meeting of the Conference Preparatory Group for WRC-23, held last year from 28 March until 4 April, the CEPT NOW4WRC23 invited all delegates attending the conference to its "open house". Two informal *rendezvous* took place on 23 November and 7 December, where female and male delegates both from CEPT and other regions were welcomed in an informal environment.

The NOW4WRC23 co-chair and coordinators were available with the aim of providing information on CEPT activities and, more importantly, to offer ad-hoc mentoring support during the conference. The open house was also an excellent opportunity to meet, exchange views and connect with delegates from organisations outside CEPT, providing information on our activities and learning more about the actions in their regions. Many visitors participated in the open house events, with many clusters of delegates engaged in stimulating conversations.

Figure – CEPT NOW4WRC23 "Open House"

Looking ahead to the NOW4WRC27

WRC-23 was also the place to discuss the future of the ITU Network of Women for the WRC-27 cycle. The Radiocommunication Bureau organised a goal setting session, where representatives from the ITU, regional co-chairs and many female delegates joined. They talked about the results achieved and the lessons learned within the NOW4WRC23 and collected suggestions to define the goals for the future initiative towards WRC-27.

CEPT representatives shared their ideas with the attendees, joining the very inspiring discussion and recalling the importance to undertake a variety of specific actions to promote and increase the interest of and opportunities for women. The debate also highlighted the relevance of establishing and strengthening contacts and cooperation with the academic world to facilitate access in the world of spectrum and satellite regulations for girls in STEM fields, particularly in electrical engineering and computer science.

Figure – CEPT Coordination team at the NOW4WRC27 goal-setting sessions

In CEPT, the Conference Preparatory Group already endorsed in May last year the continuation of the NOW initiative for the WRC-27 study cycle. Furthermore, the administrations and sector organisations were invited to encourage women delegates to participate actively in the preparatory work and to assume leading responsibilities. To further define the goals and actions for CEPT NOW4WRC27, the feedback, views and proposals of the European delegates were sought through two questionnaire last August and during the WRC-23.

Therefore, CEPT was not caught off guard when the Director of the Radiocommunication Bureau, Mario Maniewicz, announced and launched the new cycle of the ITU Network of Women for WRC-27, anticipating that the Regional Groups will be asked in early 2024 to nominate or re-nominate their co-chairs so to start planning the future activities in a timely manner.

CEPT preparation for WRC-27 will officially start in March when the ECC will appoint the new chair of the Conference Preparatory Group, but the message is already clear. The future of radiocommunications does not go only through the updating of regulations for the use of spectrum and satellite orbits but requires also an open approach to provide gender parity, equal opportunities and bridge the gap between women and men. Be the one who makes the difference!

What's next on the agenda after WRC-23?

Every World Radiocommunication Conference has the task of developing the general scope of the agenda for the next event, in four years' time. Here, Alexander Kühn, Chairman of the ITU-R Conference Preparatory Meeting towards WRC-27, explains how the agenda for the next event was reached

It has not been an easy task to reach a new agenda for World Radiocommunication Conference 2027 (WRC-27). WRC-23 received 37 different proposals for new agenda items with support from regional groups, Member States and sector members. All of those proposals had an urgency for studies, and their implementation requires regulatory action. Therefore, the process to conclude on 19 specific agenda items for WRC-27 was an exhaustive and lengthy process throughout the duration of the Conference.

Furthermore WRC-23 also had to consider a proposal to improve the quality and consistency of new agenda items and associated studies. This should, in particular, avoid intense considerations at ITU-R level on the scope of an agenda item and whether or not specific studies are to be carried out. In that regard, WRC-23 decided to modify Resolution 804, which contains more specific provisions on the development of text for corresponding Resolutions on an agenda item.

Those new provisions were implemented immediately and applied by WRC-23. Consequently, each WRC-27 agenda item has a corresponding Resolution which contains detailed elements for studies during the preparatory phase.

Nineteen specific agenda items for WRC-27

Resolution COM6/23, which contains the agenda of the 2027 Conference, addresses various frequency areas and usages.

Space

The race to space has reached the WRC – a majority of agenda items address issues in relation to space radiocommunication services. They either request the development of new, or the modification of existing, usage conditions, or aim for new allocations to space services.

Specific usage conditions for satellite systems are sought for:

- Earth stations in motion (ESIM), which following previous WRCs are again under consideration. The bands 47.2-50.2 and 50.4-51.4 GHz in the Earth-to-space direction are

to be studied for ESIM uplink to geostationary and non-geostationary space stations in order to increase the available capacity for ESIM in the fixed satellite service (FSS);

- the implementation of smaller antenna sizes in 13.75-14 GHz (Earth-to-space);
- the use of the FSS allocation in the band 51.4-52.4 GHz by gateways to non-geostationary satellite systems;
- the implementation of equivalent power flux density limits in Regions 1 and 3 to non-geostationary satellite systems in the FSS;
- the implementation of provisions to limit unauthorised operations of non-geostationary satellite orbit stations in the FSS and mobile satellite services (MSS) and associated issues related to the service area of such systems.

New allocations are under study for the following:

- FSS (space-to-Earth) in the band 17.3-17.7 GHz and the broadcasting satellite service in 17.3-17.8 GHz in Region 3.
- new intersatellite service or MSS (space-to-space) allocations in order to allow space- to-links between non-geostationary and geostationary space stations in the frequency bands 1518-1544, 1610-1645.5, 1646.5-1660, 1670-1675 and 2483.5-2500 MHz;
- MSS for low data rate non-geostationary systems in certain bands between 1427 and 2025 MHz;
- MSS (space-to-Earth) to complement terrestrial IMT networks;
- MSS in the bands 2010-2025 MHz (Earth-to-space), 2160-2170 MHz (space-to-Earth) in Regions 1 and 3 and 2120-2160 MHz (space-to-Earth) in all regions;
- Earth exploration satellite service (passive) in the band 4200-4400 and 8400-8500MHz

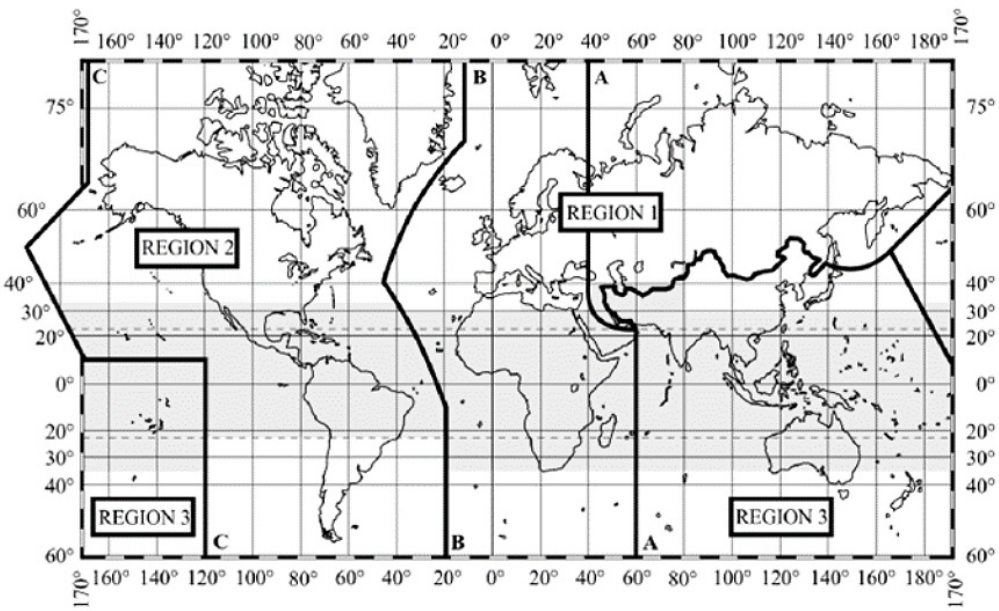

Figure - The ITU Radio Regulations divide the world in 3 Regions for the allocation of frequencies

Terrestrial services

- New IMT identifications for 5G and 6G applications in the bands (or parts thereof):
  - 4400-4800 in Region 1 and 3
  - 7125-7250 and 7750-8400 MHz in Region 1; 7125-8400 MHz in Region 2 and 3;
  - 14.8-15.35 GHz
- New allocations to the radiolocation service in 231.5-275 GHz and identifications for millimetric and sub-millimetric wave imaging systems in 275-1000 GHz

Radioastronomy and science services

The agenda contains for the first time since 2007 two specific agenda items in relation to radioastronomy. One item is dedicated to the protection of radioastronomy stations in Radio Quiet Zones from interference caused by non-geostationary satellite orbit systems. The radioastronomy stations are performing measurements in bands allocated to the radioastronomy service on a primary basis. Two specific arrays have already been identified, the Square Kilometre Array Observatory in South Africa and the Atacama Large Millimeter/submillimeter Array in Chile. Due to the utmost importance of the reliability and accuracy of their observations, it has been decided by WRC-23 that the probability of interference by non-geostationary satellite systems, either with a single satellite or by multiple satellites, needs to be studied.

The second agenda item is in relation to radioastronomy observations and Earth exploration satellite service (passive) above 76 GHz. In that case unwanted emissions from active services may cause interference and may require modifications to existing threshold levels.

As a follow-up to the decisions on space weather sensor studies by WRC-23, a new agenda item is dedicated to study possible allocations to the meteorological aids service in the subset "MetAids (space weather)" in certain bands between 27.5-38.325 MHz, 73.0-74.6 MHz and 608-614 MHz.

Last, but not least: LUNAR

One rather peculiar new agenda item is dealing with communication systems on the Moon. The proposal is a result of the growing interest in several countries to return to the Moon within this decade. As a consequence, the need for communications system operating on the lunar surface and between the lunar surface and lunar orbit has been outlined.

WRC-23 decided that studies on frequency-related matters are necessary. They include possible allocations to the space-research-service (space-to-space). Therefore, WRC-27 will be faced with the results of such studies and the further question of how to address possible additional requirements and their impact on other radiocommunication services in the future.

The agenda that WRC-23 prepared for WRC-27 will be formally adopted by the ITU Council at least two years before the Conference. In the meantime, the preparatory cycle has started. The first session of the Conference Preparatory Meeting (CPM-27), which took place after the WRC on 18 and 19 December, has carefully and thoroughly analysed all agenda items. It has identified for each item a responsible group in the ITU-R which is tasked with collecting all relevant information and performing, as indicated by CPM27-1, the necessary studies and developing a draft CPM text.

After the first meeting of the ECC this March, during which a new Chair for the Conference Preparatory Group (CPG-27) will be appointed, it is expected that CEPT will immediately start its preparation towards WRC-27.