

## WRC-19 ISSUES: A SURVEY

MICHAEL J. MARCUS

On October 28, 2019 the International Telecommunications Union's (ITU) World Radiocommunication Conference (WRC-19) will convene in Geneva for four weeks of multinational deliberations on possible updates to the ITU Radio Regulations (RR). RR is a document setting out the basic international rules of spectrum use and is a treaty between the 193 member nations of the ITU. Such conferences are held every four or five years. This article is the second in a series reviewing the impact of issues on the agenda and their possible impact on radiocommunications spectrum use. The point here is to both inform readers about issues under consideration and to encourage them to get involved in their national process for inputs to the conference. While October 2019 may seem a long way into the future, decisions made at the conference are not made in a vacuum but rather from a growing crescendo of preparatory decisions made in ITU-R meetings as well as meetings of regional groups such as Conference of European Postal & Telecommunications (CEPT, for Europe) and Inter-American Telecommunications Commission (CITEL, for the Americas).

The agenda for the conference was adopted at the end of the 2015 conference.<sup>1</sup> It consists of 17 spectrum proposals and a variety of administrative matters. The 17 proposals deal with bands ranging in frequency from proposed use of 50–54 MHz (6 m) for amateur radio in ITU Region I (Europe, Africa, the Middle East west of the Persian Gulf including Iraq, the former Soviet Union, and Mongolia) up to the proposed use worldwide of some parts of 275–450 GHz for terrestrial communications, which was discussed in the previous article in this column.<sup>2</sup>

Participation in the deliberations on these topics occurs at several levels and is already underway. The voting members of the ITU are the 193 sovereign nations that belong to it. In addition, around 700 public and private entities and regional organizations participate without a formal vote as sector members.<sup>3</sup> In many nations, the national spectrum regulator ("administration" in ITU jargon) invites the private sector to participate in formulating national positions and in related ITU-R deliberations. Individuals associated with one of the nongovernmental ITU sector members may contribute documents to ITU-R independent of any national regulator and attend meetings.

Although the ITU has a large website with open access to many documents reflecting past decisions, documents reflecting topics under discussion are often not on the general website but on a password protected area called Telecommunication Information Exchange Service or TIES.<sup>4</sup> Individuals can request access to TIES only through an ITU member, and this access often comes as a benefit of participating in national ITU or ITU-R activities.

Each WRC agenda item is assigned to one or more ITU-R groups with specific topics for study by each group. By following these study groups one can see how possible decisions are

developing. In addition, the national ITU members participate in regional fora such as CEPT or CITEL, which are a mixture of governmental representatives and private sector representatives. Consensus in these fora is usually a major step toward ultimate consensus at the final conference.

The most visible issue on the WRC-19 agenda is the fifth generation (5G) cellular topic in Item 1.13:

"to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 238 (WRC-15)"

Under consideration at WRC-19 are the following new bands 5G cellular: 24.25–27.5, 31.8–33.4, 37–40.5, and 40.5–42.5 GHz. A contentious issue is the fact that the United States is considering a somewhat different set of bands for use in its territory for the same service: 27.5–28.35 and 37–40 GHz.<sup>5</sup> This disparity is permitted since these bands under consideration in the United States already have coprimary terrestrial mobile ITU allocations, which is a category broad enough to include 5G cellular. At these millimeter-wave frequencies, national differences in spectrum use are much easier to resolve without interference than in VHF and UHF bands. However, such differences have a potential impact on economies of scale in equipment development and production and interoperability issues when users travel to a country with a different band plan. (However, it is expected that mobile user equipment will continue to cover existing lower bands where there is more multinational commonality on band use, although data speeds are less than those expected at millimeter-wave bands.)

The bands under consideration at WRC-19 for 5G have a variety of complex sharing issues with both other allocations to the same band and to adjacent band users. For example, in 40.5–42.5 GHz there is a broadcasting-satellite downlink allocation which depends on terrestrial reception of weak signals and might be impacted by terrestrial mobile use. But antenna performance at this millimeter-wave frequency may allow sharing that is not practical at lower bands with larger wavelengths. In total, ITU-R internal documents have enumerated 72 possible interservice interference pairs that have to be investigated before the final deliberations on this allocation item.

Another issue of wide interest is Item 1.16:

"to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5150 MHz and 5925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution 239 (WRC-15)"

In many countries parts of this spectrum are already used for unlicensed Wi-Fi services, and there is a desire to have more spectrum in order to increase the data rates possible in this band. But as in the 5G case, there are a variety of complex sharing issues that must be addressed. For example 5250–5850 MHz is allocated worldwide on a primary basis to the radio-

<sup>1</sup> [http://www.itu.int/dms\\_pub/itu-r/oth/0c/0a/R0C0A00000C0027PDFE.pdf](http://www.itu.int/dms_pub/itu-r/oth/0c/0a/R0C0A00000C0027PDFE.pdf)

<sup>2</sup> M. Marcus, "WRC-19 Issues: Agenda Item 1.15 and the Use of 275–450 GHz", *IEEE Wireless Comm.*, Dec. 2016, p. 2–3.

<sup>3</sup> <http://www.itu.int/en/membership/Pages/member-states.aspx>.

<sup>4</sup> <http://www.itu.int/en/ITU-T/ewm/Pages/TIES-services.aspx>

<sup>5</sup> [http://apps.fcc.gov/edocs\\_public/attachmatch/FCC-16-89A1\\_Rcd.pdf](http://apps.fcc.gov/edocs_public/attachmatch/FCC-16-89A1_Rcd.pdf)

## SPECTRUM POLICY AND REGULATORY ISSUES

location (radar) service. The Earth exploration-satellite service (active) allocations in the frequency bands 5350–5460 MHz and 5460–5470 MHz are essential for Earth observation programs such as Copernicus (Sentinel-1 and Sentinel-3), Jason, Sentinel-6, and RADARSAT (RADARSAT-2 and RADARSAT-3). The data these provide is vital for reliable and up-to-date information on how our planet and its climate are changing.<sup>6</sup>

The above two examples show how decisions made in WRC-19 may have a long-term impact on both radio technology and the communications options available to users all over the world. These decisions will ultimately be made by nation states, but there is much work that has to be done before the conference convenes to work out the possible interference mechanisms of the new allocations to other services and users and to develop mitigation techniques to prevent and limit such

<sup>6</sup> RESOLUTION 239 (WRC-15), Studies Concerning Wireless Access Systems including radio local area networks in the frequency bands between 5 150 MHz and 5 925 MHz ([https://www.itu.int/dms\\_pub/itu-r/oth/0c/0a/ROCOA00000C0017PDFE.pdf](https://www.itu.int/dms_pub/itu-r/oth/0c/0a/ROCOA00000C0017PDFE.pdf))

interference. Only when the interference mitigation options, their expected effectiveness, and their costs are known can the subjective decision be made on whether the benefits of a proposed change outweigh the costs that will result.

The skills and insights of IEEE members are key to developing the record for these decisions. The author hopes that readers will consider getting involved in WRC-19 studies during the period leading to the conference.

### BIOGRAPHY

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