ITU-R Study Group Issues for 2023-2027 of Likely Interest to Wireless Researchers

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The International Telecommunications Union (ITU) is the United Nations specialized agency for information and communication technologies. Its Radiocommunication Sector (ITU-R) plays a vital role in the global management of the radio-frequency spectrum and satellite orbits [1]. ITU acts through both its Radio Regulations (RR) [2], a treaty obligation of its 195 member nations, and through recommendations and other documents developed in ITU-R committees that have a broad influence on both international and national spectrum regulations throughout the world. ITU-R has six Study Groups spanning various areas of spectrum use, as shown in Table 1, for preparing documents that impact RR and for its other publications that are not binding on ITU member states but are often influential in national and regional spectrum policies. These study groups in turn each have several working parties that divide its work into more specialized areas [3].

The April 2020 issue of this publication had an article with a similar title to this one that described ITU-R issues at that time that might be of interest to academic researchers and thesis students [4]. This article updates those issues based on results of the ITU Radiocommunication Assembly [5] 2023 (RA-23) November 13–17, 2023 and the ITU World Radiocommunication Conference [6] 2023 (WRC-23) November 20–December 15, 2023. RA-23 focused on the ongoing studies of ITU-R and the internal organization of the group while WRC-23 dealt with changes to the RR and studies that would be needed to decide such changes. Thus, some of the studies under way in ITU-R deal with pending spectrum allocation decisions for future WRCs and others deal with long term issues in radio technology and its regulation. (At the time of drafting this article the results of these conferences were still in provisional documents. Minor changes may be made in the final documents. In particular, WRC-23 resolutions with numbers such as "COMα/β," where α and β are 1–2 digit integers, will be relabeled in the final documents with a permanent designation in the form "RESOLUTION δ" where δ is a 3 digit integer.)

In previous columns of this series we have made the point that spectrum policy does not have to be viewed solely as a "spectator sport." That is, wireless engineers need not view national and international spectrum policy actions as decisions that came from a distant and isolated governmental mechanism but rather from a process that they could have input into on key technical issues related to their research interests. Just as IEEE has many technical publications of interest to such researchers, so does the ITU. Most of these technical publications are developed in the process of developing spectrum policy decisions and thus may have more immediate and direct impact on radio systems around the world than many technical journals. These ITU technical publications do not have individual author identifications as professional journals have. Thus, researchers might be concerned that effort spent on them could impact career goals such as academic tenure decisions. Balancing against this concern is that fact that inputs to ITU-R publications may have larger and more immediate impact on the wireless systems around the world. Hopefully the academic leadership community can clarify how ITU-R participation can be evaluated fairly in career decisions.

Participation in ongoing ITU-R study groups is a possible path to pursue technical research interests that also influence ITU and national policy for radio technology. The authors urge readers to consider becoming involved in such deliberations *either* through their country's national ITU-R deliberations or through universities and other private entities that have joined ITU-R individually and that participate in studies independent of national regulators [7]. The cost of organization membership varies with lower costs for universities and small businesses as well as for all entities in developing nations. At present more than 160 universities worldwide are ITU-R members [8]. Opportunities to participate in ITU-R study groups through a country's national delegation should be discussed with the national spectrum regulator in that country, but collaboration with a university or private sector ITU-R member does not directly require national governmental approval.

In the remainder of this article, we will give a sample of questions that are now being reviewed in ITU-R study groups. The questions discussed in the 2020 article are generally still applicable and will not be repeated here. The large total number of questions makes it impractical to review all in this article, rather we have selected a few that are likely to be of interest to readers that show the range of issues under consideration. The referenced documentation of RA-23 and WRC-23 have more information on all the pending questions. These examples are drawn from two sources. First, the ongoing studies that have been underway for several years and are enumerated in the RA-23 document and, second, the questions that were approved in the *Final Acts* of WRC-23 requesting ITU-R input for decisions at WRC-27 and WRC-31. In the discussion below, the ITU designation of each issue is given. Issues beginning with a "Q" are from the long term ITU-R study list while those beginning with "Res." are both resolutions from WRC-23 and, in many cases, updates of requests for studies from earlier WRCs.

ITU-R Study Group	Subject Areas	Number of Working Parties	Number of Questions from RA
1	Spectrum management	3	16
3	Radio-wave propagation	4	25
4	Satellite services	3	56
5	Terrestrial services	4	33
6	Broadcasting service	3	32
7	Science services	4	37

Table 1. ITU-R study groups, areas, and questions.

Res. 168 "Use of the frequency band 38–39.5 GHz by high-altitude platform Stations (HAPS) in the fixed service." This seeks to develop a Recommendation to provide technical guidance to facilitate the implementation of HAPS operations for greater broadband connectivity in underserved communities and in rural and remote areas while ensuring the protection of non-GSO FSS earth stations.

Res. 223 "Additional frequency bands identified for IMT/5G" This asks for guidance to ensure that IMT can meet the telecommunication needs of developing countries and rural areas and to continue providing guidance to regulators planning to facilitate the implementation of IMT in the frequency band 3,300–3,400 MHz.

Res. 246 "Use of the frequency band 66–71 GHz for International Mobile Telecommunications and coexistence with other applications of the mobile service" This seeks to develop ITU-R Recommendations and/or Reports, to assist National regulators in ensuring the efficient use of the frequency band through coexistence mechanisms between IMT/5G and other spectrum uses including space services.

Res. 731 "Consideration of sharing and adjacent-band compatibility between passive and active services above 71 GHz." While passive allocations are a minor issue below 30 GHz, they are much more frequent and use a much larger faction of available spectrum above 71 GHz where technology is now becoming available for telecommunications. This question asks whether spectrum sharing with adequate protection for passive users might be possible in the 11 bands in 71–275 GHz where presently "all emissions are prohibited" [9].

Res. 775 "Power flux-density and equivalent isotropically radiated power limits for inclusion in Article 21 for the fixed-satellite, mobile-satellite and broadcasting-satellite services to protect the fixed and mobile services in the frequency bands 71–76 GHz and 81–86 GHz" This calls for studies to determine power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits to be included in RR Article 21 for satellite services to protect the current and planned fixed and mobile services in the frequency bands 71–76 GHz and 81-86 GHz

Res. COM6/5 "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" The many passive allocations above 76 GHz complicate use of active transmitters there. This asks for compatibility studies between the various active service and passive satellites in 82–209 GHz and for further studies on interference from active satellites to passive satellites and radio astronomy facilities.

Q. 77-8/5 "Consideration of the needs of developing countries in the development and implementation of IMT/5G" This asks about the optimal technical and operational characteristics for IMT to meet the needs of developing countries for cost effective broadband access to the global telecommunication networks considering factors such as the need to provide an economical, reliable and high-quality telecommunication infrastructure.

Q. 229-5/5 "Further development of the terrestrial component of IMT/5G " This asks questions such as : What are the overall objectives and user needs for the further development of IMT, beyond the work carried out so far by ITU-R? What are the new applications and service requirements associated with further development of IMT? What factors need to be considered in developing a migration strategy to facilitate transition from current IMT technologies to more advanced ones?

Q. 256-1/5 and 257-1/5 "Technical and operational characteristics of the land mobile (and fixed) service in the frequency range 275–1 000 GHz" These two questions deal with the technical and operational characteristics of these services in the frequency range 275–1 000 GHz.

There are many more questions on a wide variety of radio technology topics all over the spectrum and dealing with a wide variety of radio services. They range from very technical issues to more policy related issues. The authors urge readers to review both the questions given here and the others to see if there is a topic that he/she can contribute to. If so, consider seeking out an ITU-R member entity to participate in a study group or publish through other mechanisms your analysis and suggestions. Spectrum policy need not be just a spectator sport — wireless researchers should get involved and contribute to the process! We hope readers will consider the topics listed above as well as the topics enumerated in the references given.

References

[1] ITU-R; https://www.itu.int/en/ITU-R/information/Pages/default.aspx.
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Biographies

Michael J. Marcus (m.marcus@northeastern.edu) is Principal Research Scientist at Northeastern University Institute for the Wireless Internet of Things and Director of Marcus Spectrum Solutions. He retired from the Federal Communications Commission in 2004 after nearly 25 years in senior spectrum policy positions. While at FCC, he proposed and directed the policy developments that resulted in the bands used by Wi-Fi, Bluetooth, and licensed and unlicensed millimeter wave systems above 59 GHz. He was an exchange visitor from FCC to the Japanese spectrum regulator (now MIC) and has been a consultant to the European Commission and the Singapore regulator (now IMDA). During 2012–2013 he was chair of the IEEE-USA Committee on Communication Policy. In 2013, he was awarded the IEEE ComSoc Award for Public Service in the Field of Telecommunications "for pioneering spectrum policy initiatives that created modern unlicensed spectrum bands for applications that have changed our world." He received S.B. and Sc.D. degrees in electrical engineering from MIT.

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