

IEEE-GRSS
Frequency Allocations in Remote Sensing
Technical Committee
(FARS-TC)



Minutes of 2020 Annual Meeting

Date: October 15, 2020

Location: Virtual meeting

Participants: Paolo de Matthaeis, Roger Oliva, Tobias Bollian, Thomas Von Deak, Mingliang Tao, Mike Bettenhaus, Melanie Brunnen, Kaushal Buch, Martin Cadirola, Judy Deng, Glenn Feldhake, Ren He, Yann Kerr, Ed Kim, Steen Savstrup Kristensen, Joel Johnson, Jasmeet Judge, David Lubar, Priscilla Mohammed, Ryo Natsuaki, Jinzhang Peng, Yan Soldo, Jia Su, Li Yinan, Tianlin Wary, Feng Zhou.

Agenda

1. Guest talk
2. Summary of past and ongoing activities
3. New topics
4. Discussion

Discussion

The annual meeting begins at 10:30 EDT. Chair Paolo de Matthaeis shows a slide (see separate "FARS Meeting 2020 Presentation" file) to introduce the FARS Technical Committee (FARS-TC) to newcomers and presents the agenda.

Paolo then hands the screen to the Guest Speaker Glenn Feldhake, who is the international spectrum program manager at NASA. He presents results of the WRC-19 and Agenda Items of WRC-23 relevant to remote sensing.

Main points of his presentation are follows.

Regarding the WRC-19 decisions:

- AI 1.6 – Non-Geostationary Orbit (NGSO) Fixed-satellite service (FSS) in various bands from 37.5 GHz to 51.4 GHz: improved protections to passive sensing and full protection for nadir-scanning sensors in the 50.2-50.4 GHz band
- AI 1.13 – International Mobile Telecommunication (IMT) systems in various bands between 24.25-86 GHz for 5G:
 - new protection of 23.6-24 GHz passive band from IMT in 24.25-27.5 GHz from January 1, 2021, becoming more restrictive after September 1, 2027
 - new protection of 36-37 GHz band from IMT in 37-40.5 GHz;

- no change to the Radio Regulations for protection of 50.2-50.4 GHz passive band from IMT in 47.2-50.2 GHz and 50.4-52.6 GHz;
- no change to the Radio Regulations for Protection of 86-92 GHz passive band from IMT in 86-92 GHz.
- AI 1.14 – High Altitude Platform Stations (HAPS) in various bands between 24.25-48.2 GHz:
 - protection of 23.6-24 GHz passive band from HAPS in 24.25-27.5 GHz HAPS-to-ground only;
 - protection of 31.3-31.8 GHz from HAPS in 31-31.3 GHz.
- AI 1.15 – Fixed and Land Mobile Service in 275-450 GHz: new footnote 5.564A

“The frequency bands 275-296 GHz, 306-313 GHz, 318-333 GHz and 356-450 GHz are identified for use by administrations for the implementation of land mobile and fixed service applications, where no specific conditions are necessary to protect Earth exploration-satellite service (passive) applications.

The frequency bands 296-306 GHz, 313-318 GHz and 333-356 GHz may only be used by fixed and land mobile service applications when specific conditions to ensure the protection of Earth exploration-satellite service (passive) applications are determined in accordance with Resolution 731 (Rev. WRC-19)

The use of the above-mentioned frequency bands by land mobile and fixed service applications does not preclude use by, and does not establish priority over, any other applications of radio services in the range of 275-450 GHz.”

- AI 1.16 – Radio Local Area Network (RLAN) systems, basically WiFi, at 5250-5470 MHz: no change to the Radio Regulations, thereby protecting active sensing.
- AI 9.1.9 – Fixed-satellite service in 51.4-52.4 GHz:
 - To protect NGSO passive sensing in 52.6-54.25 GHz;
 - To protect Geostationary Orbit (GSO) passive sensing in 52.6-54.25 GHz with nominal orbital positions: 0°, 9.5° E, 76° E, 79° E, 99.5° E, 105° E, 123.5° E, 133° E, 165.8° E, 14.5° W and 137.2° W

For the WRC-23 Agenda Items of Relevance to Remote Sensing, a distinction is made between:

- Agenda Items of Concern to remote sensing

WRC-23 Agenda Item	Agenda Item Bands	Potential Concern
1.2 Possible IMT identification below 15 GHz	<ul style="list-style-type: none"> • 3300-3400 MHz • 3600-3800 MHz • 6425-7125 MHz • 10.0-10.5 GHz 	<ul style="list-style-type: none"> • Protection of unallocated 6425-7250 MHz range • Protection of the 10.6-10.7 GHz EESS (passive) band
1.16 Fixed-satellite service Earth stations in motion around 18.6-18.8 GHz and adjacent to 27.5 GHz	<ul style="list-style-type: none"> • 17.7-18.6 GHz • 18.8-19.3 GHz • 19.7-20.2 GHz • 27.5-29.1 GHz • 29.5-30 GHz 	<ul style="list-style-type: none"> • Protection of the 18.6-18.6 GHz EESS (passive) systems

- Agenda Items of Advocacy for remote sensing

WRC-23 Agenda Item	Agenda Item Bands	
1.12 Earth exploration-satellite service (active) at 45 MHz	40-50 MHz	New JPL mission planning to use a 45 MHz sounder to study underground aquifers
1.14 New allocations to Earth exploration-satellite (passive) service in 231.5-252 GHz	231.5-252 GHz	New JPL mission planning to use a 45 MHz sounder to study underground aquifers
9.1a Space weather	No bands specified	Obtaining regulatory recognition of space weather sensors
9.1d Protection of the 36-37 GHz passive band from FSS systems	36-37 GHz	Protection of the 36-37 GHz EESS (passive) band

Paolo thanks Glenn for his presentation and there is a brief discussion on the advantages and disadvantages of holding virtual spectrum meetings due to the COVID-19 situation.

Paolo then starts listing and commenting on the various FARS activities of the past year:

- FARS currently has 169 members from 25 countries, with about half of them in the USA. In January 2020, all - FARS members received a link to participate in the membership survey. This survey showed an almost uniform distribution of the frequency bands of interest among the FARS members and of their fields of expertise.
- FARS contributed to the organization of a very successful RFI 2019 workshop in Toulouse on September 23-26 with more than 89 participants, 11 oral sessions, 1 poster session and 2 panel discussions. A follow-on is tentatively planned for next year in the UK on September 27-30.
- FARS organized a special invited session of RFI at the virtual IGARSS 2020 and is already preparing for IGARSS 2021, which takes place in Brussels, Belgium, on July 11-16, 2021. Paolo invites all members that are willing to present their work at IGARSS 2020 to reach out to the FARS committee for potential inclusion in an invited session organized by the technical committee.
- Paolo lists the spectrum management involvement of FARS at the ITU-R Study groups. The SFCG 2020 annual meeting, which IEEE GRSS attends as an observer, was postponed to 2021. Paolo also shows a summary slide on all the ITU-R Study Groups contributions.
- Tobias Bollian presents the status on the FARS online tools, which specifically are a Database of RFI Observations (http://www.grss-ieee.org/rfi_observations.html) and a Frequency Allocations Display Tool (http://www.grss-ieee.org/frequency_allocations.html).

- Paolo shows an introductory slide on the newly formed FARS TC China Subcommittee, which took place in August 2019. He hands the screen to Mingliang Tao, who presents the work of the China chapter.
The opening ceremony included talks by various speakers and was attended by 100 participants. Due to the success, a second seminar was scheduled for October but was canceled due to COVID-19. Instead the China work focused on developing RFI detection and mitigation methods for RFI observed by the active C-Band satellites Sentinel-1A and GF-3. Additional work on passive remote sensing included the analysis of RFI in K- and L-band.
- FARS is working on organizing a Spectrum Management School, modelled after the successful School on Spectrum Management for Radio Astronomy. The school was originally supposed to be held at the end of 2020 but was postponed to the second half of 2021 due to the pandemic.
- Roger Oliva presents a slide on the technical committee effort to constantly monitor the requests for comments on frequency regulatory matters from the US Federal Communication Commission (FCC). He gives an insight into the FARS reply to comments submitted by the US Committee on Radio Frequencies (CORF) on the possible future use of the 70/80/90 GHz bands.
- FARS has initiated work supported by the IEEE Standards Association to standardize the evaluation of the impact of interference on remote sensing frequency bands. Areas of focus were the potential standards for RFI measurements and the quality assessment of EESS bands with respect to interference presence. A first meeting was planned for IGARSS 2020 but canceled due to Covid-19. Instead, there will be a meeting at the MicroRad 2020 Virtual Symposium in November.
- Paolo acknowledges the work of FARS members who have actively participated in the recent activities and gives a brief outlook on future topics. As part of this he also presents the idea of a document provided by FARS, to be approved by GRSS, on the society official views on WRC-23 issues.
- Tom von Deak introduces a Spectrum Innovation Initiative by the NSF. NSF is accepting proposals with regards to the funding of a National Center for Wireless Spectrum Research. This center is supposed to act as a main focal point to connect research performed on this topic in the US. The process is divided into two stages. The first stage was merely to seed-fund universities and other entities that could develop such a proposal. This stage concluded in June 2020. The next stage has a submission window from March 1st to April 1st 2021. A presentation about this is expected to be held by NSF at MicroRad.
- Paolo presents a slide that describes WRC-23 Agenda Item 1.2. This item is looking to identify frequency bands for use by International Mobile Telecommunications (IMT). A Considered band includes 6425 MHz - 7025 MHz, in which several passive remote sensing instruments are operated. Paolo stresses that it is important that FARS helps to contribute to the discussion on the ITU level by figuring out all the uses of this band.
- The Revision of Recommendation ITU-R RS.1861 is under review. This document describes

technical and operational properties of passive EESS systems and is used for compatibility studies. Paolo suggests that FARS contributes by finding out the technical specifications of planned and future systems, so that their characteristics are taken into account for studies on future allocations in the EESS band.

After the last slide, Paolo opens the floor to questions and discussion. The main points are as follows:

- Yan Soldo asks how the output of the new center considered by NSF is going to be used. Paolo's impression is that they are still trying to define the responsibilities of this new center that it is not well defined. Tom agrees that it is only a high-level description at this time. He suggests to Yan to read the NSF solicitation 20-557 at <https://www.nsf.gov/pubs/2020/nsf20557/nsf20557.htm>, which has a full description of the program.
- David Lubar asks if FARS has considered looking at the other frequencies used by remote sensing instruments without an allocation. Paolo mentions that FARS is currently looking into the bands that will be under consideration at WRC-23 because of the immediate urgency for this work. Investigating other non-allocated bands is not a time sensitive matter. Tom agrees with Paolo. Paolo suggests that we could create a document similar to the CORF manual on the usage of the bands, specific to remote sensing.
- David also asks how we could raise awareness of the fact that the situation in the millimeter waves is different than at lower frequencies such as L-band, particularly because existing protection against interference may be inadequate. For example, while in the passive L-band all emissions are prohibited so it is easier to complain about RFI at millimeter waves some out-of-band emissions may not be illegal and nothing can be done to stop them. Roger points out that even at L-band there is a lot of out-of-band RFI at levels that comply with regulations and there is pressure on the CEPT countries to enforce stronger regulations for these out-of-band interferers, but he agrees that it is difficult to do. Paolo says that these issues need to be documented and brought to the attention of the ITU, especially if the out-of-band emission limits are not sufficient to avoid interference. Tom points out that reversing a decision made in the past at WRC level regarding emission limits is very difficult, but it is still worth reporting these cases.

At the end of the discussion, Paolo thanks everyone for their participation and adjourns the meeting at 12:15 EDT.