

FARS Meeting Minutes  
7/26/2011 17:30-18:45  
IGARSS 2011, Vancouver, BC Canada

The meeting was called to order at 17:30 by chair Bill Blackwell. Slides presented are available at:

[http://www.grss-ieee.org/wp-content/uploads/2009/09/FARS\\_July2011\\_Blackwell\\_IGARSS\\_Meeting.pdf](http://www.grss-ieee.org/wp-content/uploads/2009/09/FARS_July2011_Blackwell_IGARSS_Meeting.pdf)

In addition to the slides presented, the following items are intended to capture additional discussion:

1) We would like to congratulate Jasmeet Judge (U. Florida) and Todd Gaier (JPL) on their recent appointments to the Committee On Radio Frequencies. Steve Reising (current CORF member) was also present at the meeting. FARS would like to continue the close working relationship with CORF to advance the cause of both organizations.

2) There was quite a bit of discussion on interference to GPS caused by sensitivity of most GPS receivers to LightSquared emissions in the Mobile Satellite Services (MSS) band adjacent to GPS. LightSquared plans to provide 4G-LTE services using a combination of satellite and ground-based transceivers. It is the ground-based systems that are causing the grief, as 40,000 stations are planned with maximum transmission power of 15kW. The MSS band was not intended to support such services, but the FCC approved LightSquared's request. Public comments were invited through July, and responses to the comments are solicited until Aug. 15. Jim Mentzer (NOAA) provided several links with more information. These are now posted on the FARS web site (GRSS): <http://www.grss-ieee.org/community/technical-committees/frequency-allocations-in-remote-sensing/>

3) 700-MHz LTE issue - second harmonic potentially impacts L-band observations. Additional comments provided by Joel Johnson: Recent L-band satellite observations in the protected spectrum (1400-1427 MHz) have shown substantial interference. The growing deployment of 700 MHz systems for cellular communications (e.g. LTE systems in the US) are an additional concern for interference. Any 2nd harmonics produced by the systems will lie in the protected band, and the ~20 MHz 700 MHz bandwidth available will produce 2nd harmonics that could cover the entire 1400-1427 MHz spectrum. The primary concern for these systems would be 2nd harmonics of the cellular handsets, because price constraints limit the quality of filters deployed. While regulations limit the 2nd harmonic emissions of a single device, RFI to satellites results from the aggregate across many devices within the satellite footprint (of up to ~40 km diameter.) Current regulations do not adequately address the issue of RFI caused by an aggregate of devices. Future efforts to create regulatory procedures for aggregate effects are of importance, based on a "density of interferers" approach. Note also that Jeff Piepmeier (NASA GSFC) is preparing a draft memo on this topic - this memo may be available in the near future for FARS review.

4) Prof. Korehiro Maeda (University of Tokyo) made the following points regarding protection of C-band radiometer observations and allocation of spectrum for constellation and formation flight of small satellites:

- Sea surface temperature: 6-7 GHz is the best frequency to observe sea surface temperature and others in ocean area. However, there is no protection in Radio Regulations (R.R.). In the future, R.R. should be modified to protect 6-7 GHz. Sharing studies between microwave radiometer and mobile satellite feeder link are presented in IGARSS2011 for the first time in the world. Our objectives are that feeder link of a mobile satellite to gateway in land should not contaminate ocean. There is possibility to share mobile satellites under some conditions.

- Soil moisture: 6-7GHz is also important frequency to observe soil moisture with relatively higher spatial resolution in land area. However, there is no protection in Radio Regulations (R.R.). In the future, R.R. should be modified to protect 6-7GHz. There is much contaminated area in some countries. However, there is not much contaminated area in other many countries. Our objectives are not to increase interference in 6-7GHz band.
- In order to observe the earth timely and precisely, constellation and formation flight of small satellites for remote sensing are very important. In this case, S band, X band and Ka band for data transmission are considered. Both S band and X band are used very often in most earth observation satellites. In this case, it is very difficult to find proper bandwidth in S band and X band for small satellites.

5) General agreement that some type of FARS certificate of recognition would be a good idea. First award to be presented at the FARS evening meeting at IGARSS 2012 (Munich).

6) General agreement that a FARS special issue for TGRS would be a good idea. Dave Kunkee agreed to be a guest editor, along with Bill Blackwell and Ian Adams. A fourth guest editor from the European region will be selected.

7) Note added in postscript: Werner Wiesbeck sent along a thought provoking suggestion via email that is worthy of further discussion and consideration. Werner suggests that the time of transmitting and receiving in remote sensing just simple linear chirps in the frequency domain will come to an end. Future remote sensing techniques will apply intelligent codes like OFDM or DSSS or similar, which will improve nearly all measurable parameters and will especially improve correlation and de-correlation. This in turn would allow the use other frequency bands that are already used for example by communications. Werner's comments dovetail with the discussion of "bandwidth sharing" as presented on slide 9.

Meeting adjourned at 18:45.