# SG-RFC Focal Points on EESS (active) Issues

## Report on EESS (active) Issues

## Introduction

## This document provides a status update on issues affecting active remote sensing that may be of interest to SG-RFC members. Agenda items for the 2019 World Radiocommunication Conference (WRC-19) involving EESS (active) include AI 1.11, AI 1.16, and AI 10. Preparation work towards Working Party 7C of the ITU-R Study Group 7 is also summarized. Finally, any items currently outside of the ITU-R are also discussed.

## WRC-19 Agenda Items (WRC AI 1.11, 1.16, 10)

1. WRC-19 Agenda Item 1.11

This agenda item deals with facilitating global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations. In document 5A/255, 90-GHz frequencies are proposed as candidate global and regional harmonized frequency bands. Work is being proposed within Study Group 5 to protect the EESS (active) systems within 94.0-94.1 GHz frequency band from OOB emission of proposed RSTT systems in the adjacent bands 92-94 GHz and 94.1-100 GHz.

1. WRC-19 Agenda Item 1.16

This agenda item deals with considering 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 allocation to the mobile service. The 5250-5570 MHz portion of the band is allocated worldwide on a primary basis to the EESS (active) and SRS (active) services and the 5350-5470 MHz portion currently has no mobile allocation. Work is being done in the ITU-R in Study Group 7 to follow this action item and if necessary, to initiate sharing studies for the affected EESS (active) bands.

1. WRC-19 Agenda Item 1.10

This agenda item deals with recommending to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention. Agenda Item 2.2 as port of the preliminary agenda WRC-23 deals with conducting and completing in time for WRC-23, studies for a possible new allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent service. Work is being done in the ITU-R in Study Group 7 to follow this proposed future action item and if necessary, to initiate sharing studies for the proposed new EESS (active) band.

## ITU-R Working Party 7C

During the 2017-2019 Study Cycle, the work so far concerning active sensors has involved the following from preparing contributions to WP7C:

Proposed Method to Progress PDN Recommendation ITU-R RS.[EESS\_RNSS\_METH] – “Evaluation method to determine compatibility between terrestrial receivers in the radionavigation-satellite service and spaceborne sensors in the Earth exploration-satellite (active) service in the 1 215‑1 300 MHz band”, with a view to providing a working document towards a replacement to Rec. ITU-R RS.1347-0 that may be considered by WP 7C. The annexes to the PDNR provide examples of applying those criteria and methodologies of the relevant M-series to evaluate interference caused by EESS (active) SARs and scatterometers to RNSS receivers in the 1 215 – 1 300 MHz frequency range. It is proposed that the material in the annexes of the PDNR be divided into two separate PDN Reports, one of which would contain the material relevant to the SARs and the other of which would contain the material relevant to the scatterometers.

Proposed Preliminary Draft New Report ITU-R [EESS\_SARs-RNSS], “Evaluation of interference from EESS (active) SARs operating in the 1215-1300 MHz frequency range into RNSS receivers”- Studies to evaluate interference from EESS (active) SARs operating in the 1215-1300 MHz frequency range into RNSS receivers.

Proposed Preliminary Draft New Report ITU-R [EESS\_SCAT-RNSS], “Evaluation of interference from EESS (active) scatterometers operating in the 1215-1300 MHz frequency range into RNSS receivers”- Studies to evaluate interference from EESS (active) scatterometers operating in the 1215-1300 MHz frequency range into RNSS receivers.

Proposed Preliminary Draft New Report ITU-R [SPACE-WEATHER\_SENSORS], “Technical and Operational Characteristics of RF-Based Space weather Sensors”- Studies to determine typical technical and operational characteristics of space weather sensors

Proposed Preliminary Draft Revised Recommendation ITU-R RS.2042 “Typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz band” - A spaceborne radar sounder is proposed to provide remote sensing in the vicinity of 40-50 MHz for remote measurements of the Earth’s subsurface. The spaceborne radar sounder provides radar maps of subsurface scattering layers with the intent to locate water/ice/deposits using active spaceborne sensors. The revision will include updated system and operational specifications that can be used conduct sharing studies between Earth exploration-satellite (active) service and the fixed, mobile, broadcasting, radio astronomy, amateur, space research and oceanographic radar services in the 40-50 MHz frequency range.

Proposed Preliminary Draft Revised Recommendation ITU-R RS.1166-4 “Performance and interference criteria for active spaceborne sensors” - This PDRR proposes revisions to the Recommendation which reflects the performance and interference criteria for spaceborne active sensors in the bands allocated to the EESS (active).

Modifications to Preliminary Draft Revised Report ITU-R RS.2310: Worst-case interference levels from mainlobe-to-mainlobe antenna coupling of systems operating in the radiolocation service into active sensor receivers operating in the 35.5-36 GHz band - several typical EESS (active) systems and a typical RLS system at 35 GHz are presented and the potential interference from RLS into the EESS (active) receivers at 35.5-36.0 GHz is analyzed statically and dynamically for worst case conditions of mainlobe-to-mainlobe coupling. A study was added to analyze the RFI from a very powerful MMW radar into the InSAR. It is proposed that ESA/France analyzed the RFI from the MMW radar into the AltiKa altimeter to include into this PDR Report.

Modifications to Preliminary Draft Revised Recommendation ITU-R RS.1260: Feasibility of sharing between active spaceborne sensors and other services in the range 420-470 MHz - this Recommendation presents technical and operational constraints on EESS (active) systems operating in the 420-470 MHz frequency band, including the restriction of not operating within view of the terrestrial space object tracking radars without detailed analysis on a case-by-case basis. It is proposed to verify the decommissioning of two additional radars in addition to the decommissioned radar in Turkey and correspondingly update Table 2 “Space object tracking radars operating in 430-440 MHz” of Annex 1 and Figure 1 “Example of exclusion zone around space object tracking radars for a SAR in a 550 km orbit” of Annex 1 to account for the decommissioning of one or more of the listed terrestrial space object tracking radars.

Modifications to Preliminary draft new Recommendation ITU-R RS.[ACTIVE\_CHAR] – Typical technical and operational characteristics of Earth exploration-satellite service (active) systems using allocations between 432 MHz and 238 GHz. Typical technical and operational characteristics are given for EESS (active) systems in bands between 432 MHz and 238 GHz to support sharing studies with other services.

Modifications to Preliminary draft new Report ITU-R RS.[EESS-RNSS] – Dynamic simulation results of aggregate RFI from ALOS-2 SAR and SMAP scatterometer on the SBAS ground reference receiver operating in the 1 215‑1 300 MHz frequency band-to provide revisions the PDN Report that will put it in the form of a Draft New Report.

Proposed Preliminary Draft New Report ITU-R [SPACE-WEATHER\_SENSORS], “Technical and Operational Characteristics of RF-Based Space weather Sensors”- Studies to determine typical technical and operational characteristics of space weather sensors

## Proposed Preliminary Draft New Report “Results of compatibility studies between a 45 MHz Radar Sounder and incumbent fixed, mobile, broadcasting, and space research services operating in the 40-50 MHz frequency range”- Studies to conduct compatibility analyses that will determine the impact that a spaceborne 45 MHz Radar Sounder will have on incumbent fixed, mobile, broadcasting, and space research services operating in the 40-50 MHz frequency range.

## ITU-R Reports:

[**RS.2068-2**](http://www.itu.int/pub/R-REP-RS.2068)  “Current and Future Use of the Band 13.25-13.75 GHz by Spaceborne Active Sensors”

[**RS.2178**](http://www.itu.int/pub/R-REP-RS.2178-2010)  “The essential role and global importance of radio spectrum use for Earth observations and for related applications”

[**RS.2310**](http://www.itu.int/pub/R-REP-RS.2310) “Worst-case interference levels from mainlobe-to-mainlobe antenna coupling of systems operating in the radiolocation service into active sensor receivers operating in the Earth exploration-satellite service (active) in the 35.5-36.0 GHz band “

[**RS.2311**](http://www.itu.int/pub/R-REP-RS.2311) “Pulsed radio frequency signal impact measurements and possible mitigation techniques between Earth exploration-satellite service (active) systems and RNSS systems and networks in the band 1 215-1 300 MHz”

## ITU-R Recommendations:

[**RS.1859**](http://www.itu.int/rec/R-REC-RS.1859-0-201001-I/en) “Use of remote sensing systems for data collection to be used in the event of natural disasters and similar emergencies”

[**RS.1883**](http://www.itu.int/rec/R-REC-RS.1883-0-201102-I/en) “Use of remote sensing systems in the study of climate change and the effects thereof”

[**RS.2042**](http://www.itu.int/rec/R-REC-RS.2042/en) “Typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz band”

## Other Active Sensing Issues

Other items affecting active remote sensing spectrum are planned to arise from SFCG-37 contributions:

NI-SAR RFI to ARNS/RLS and RNSS Systems in 1215-1300 MHz Band –NASA presented a preliminary analysis of the interference levels from the NASA-ISRO SAR (NI-SAR) L-band radar to operate in the EESS (active) to radars in the aeronautical radionavigation service (ARNS) and the radiolocation service (RLS) and RNSS receiver systems in the 1215-1300 MHz band. This information will be integrated into updates of Report SFCG-33-1(EESS-ARNS) and Report SFCG-32-2R1 (EESS-RNSS).

Survivability Analysis for EESS (active) Systems- NASA will present worst-case RF interference levels into EESS (active) sensors for EESS (active) frequency bands from 432 MHz to 238 GHz. A new SFCG report could include the highest EIRP of RFI sources in the EESS (active) frequency bands, as well as including worst-case RFI analyses from previous SFCG reports (SF36-12/D and SF26-15/D).

EESS (active) OOB Emissions- NASA will present the results of measurements of the NASA Raincube precipitation radar emissions spectra and show the mask with the -20 dB/ decade roll-off from the -40 dB bandwidth.

5 GHz EESS (active) Sensors-NASA will provide information on NASA’s 5 GHz EESS (active) systems relevant for consideration under WRC-19 agenda item 1.16.

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