RADIONET3 REPORT FROM SE40

SUBJECT	**Title**
DATE	**28/29-08-2014**
PLACE	**Brest (Fr), ANFR Offices**
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BACKGROUND:

The IRIDIUM satellite system is known to cause severe radio interference for radio astronomy.
New measurements of the interference were made in Leeheim and evaluated with advice and software support from CRAF. The CEPT SE40 committee had requested CRAF to participate in the meeting to explain the procedures and the results.

HIGHLIGHTS:

The measurements carried out by the Leeheim monitoring station confirmed earlier measurements results conducted in 2011. This gives an indication that operational parameters of Iridium have not been modified since then. Measured spectrograms of the radio interference alone are however not seen as sufficient evidence of severe radio interference from satellite constellations. The apparent angular velocity of a transiting satellite depends on its elevation above the horizon. Hence different regions of the celestial sphere will suffer different amounts of interference. A concept called Effective Power Flux Density (EPFD) involves creating a map of the averaged off-beam interference contributions of many satellites for all pointing positions of the radio telescope from previous interference measurements during satellite transits by the Leeheim station. Applying a threshold level to the map allows the determination of the fraction of the sky which has become inaccessible as the result of interference. A maximum of 2% is permissible here, but the simulations using recent measurements from Leeheim and new software by ANFR (French regulatory administration) and CRAF showed that between 94% and 100% of the sky was blocked by interference. A new report was finalised and accepted by the committee. It showed that the level of interference from IRIDIUM satellites did not change over between 2010 and 2013.

NEXT STEPS:

The new report will now be discussed in steering committees such as ECC WG SE and then offered for public consultation on the ECC website.

SE40 advised that the implementation of the EPFD algorithm ought to be investigated for its dependence on various input parameters such as

1. the lower elevation limit of the simulated telescope,
2. the sensitivity to satellite visibility data from other program packages,
3. the sensitivity to the number of discrete intervals that represent the measured data distribution in the Monte-Carlo simulations,
4. the number of Monte-Carlo trials and the resultant statistical errors
5. the frequency dependence. A full bandwidth survey should be used for its assessment .

Then a fully documented (user guide) reference implementation of the software to calculate the EPFD estimate from satellite measurements ought to be created and approved. This software should ideally create automatic documentation of the data reduction and the results. That way results can be reproduced and compared by all interested parties and in the following years when new measurements and perhaps new algorithms are available.