

RECOMMENDATION ITU-R RA.611-4*

Protection of the radio astronomy service from spurious emissions

Question ITU-R 145/7)

(1986-1990-1992-2003-2006)

Scope

This Recommendation provides guidance for administrations and/or operators to protect the radio astronomy service (RAS) from interference by spurious emissions that may be caused by active services with allocations in bands adjacent to or neighbouring to the RAS bands.

The ITU Radiocommunication Assembly,

considering

- a) that radio astronomy continues to be in the forefront of the expansion of scientific knowledge;
- b) that the radio astronomy service (RAS) requires frequency bands free of interference in order that astronomical observations can be made;
- c) that the growing use of the radio spectrum, particularly in space, increases the possibility of interference detrimental to the radio astronomy service from spurious emissions (see Annex 1 to this Recommendation);
- d) that the use of certain modulation techniques with inadequate filtering of spurious products can affect radio astronomy bands far removed from the wanted emission band;
- e) that Appendix 3 to the Radio Regulations (RR) establishes the maximum permitted levels of spurious emissions and provides for consideration of more stringent levels of spurious emissions for adequate protection of stations in the RAS;
- f) that in the case of radio systems using digital modulation techniques the spurious emission levels specified in Appendix 3 to the RR are not applicable, but may be used as a guide. It may be noted that protection of the RAS from unwanted emissions resulting from applications of wideband digital modulation is considered in Recommendation ITU-R RA.1237;
- g) that radio astronomy observations are conducted in frequency bands up to 1 000 GHz;
- h) that the threshold levels of interference detrimental to the RAS are given in Annex 1 to Recommendation ITU-R RA.769;
- j) that Recommendation ITU-R RA.1513 provides the acceptable levels of data loss to radio astronomy observations and percentage-of-time criteria resulting from degradation by interference for frequency bands allocated to the RAS on a primary basis;

* NOTE – The levels of the detrimental interference to the RAS referred to in Annex 1 to Recommendation ITU-R RA.769 are not accepted by the Arab Administrations, being unrealistic, as confirmed by previous Radiocommunication Conferences in 1995, 1997 and 2000 dealing with RR Recommendation 66.

k) that the technical criteria for the case of interference detrimental to the radio astronomy service due to spurious emissions from transmitters in GSO space stations should, in respect of the RAS be those set out in Annex 1 to Recommendation ITU-R RA.769 enabling radio astronomy observations to be made at 5° or more from the GSO;

l) that progress has been made in meeting the requirements of the RAS without detrimental effects on other services;

m) that there are continuing improvements in antenna design and in techniques for filtering spurious emissions,

recognizing

1 that stations in the space services operating at frequencies above 960 MHz and installed on or before 1 January 2003 are excluded from the application of RR Appendix 3 until 1 January 2012,

recommends

1 that radio astronomy observatories should continue to be placed in locations that have good natural protection from interference that may be detrimental to the RAS;

2 that all practicable efforts should be made to minimize the side-lobe gains of radio astronomy antennas;

3 that, in bringing stations into operation, administrations should take into account, to the maximum extent practicable, interference to radio astronomy observations due to spurious emissions from high-powered terrestrial stations or from space stations;

4 that, for the case of GSO space stations, administrations should take into account, to the maximum extent practicable, the objective of the RAS to be free of interference detrimental to the RAS (see Recommendation ITU-R RA.769) from spurious emissions when observing at 5° or more from the GSO.

Annex 1

Interference to the RAS from spurious emissions

1 Protection criteria for the RAS

The sensitivity limit of most radio astronomy observations is at a pfd level far below that used for reception of radiocommunication signals. Annex 1 to Recommendation ITU-R RA.769 discusses threshold levels of interference and protection criteria for frequency sharing between RAS and other services; in Tables 1, 2 and 3 the sensitivity limits are listed for different frequencies. However, interference detrimental to the RAS can also occur from transmitters that do not share the same band, that may be classified as adjacent band interference (see Recommendation ITU-R RA.517) and interference from spurious emissions of transmitters in other bands. All other parameters being equal, the effect of spurious emission due to wideband digital modulation using spread-spectrum techniques in a transmitter will be more severe and is considered in Recommendation ITU-R RA.1237.

2 Harmonic and intermodulation interference

Interference from harmonic radiation or by the intermodulation of two or more signals may be caused by transmitters well separated in frequency from the radio astronomy band. Similarly,