RECOMMENDATION ITU-R F.1338*, **, ***, ****

Threshold levels to determine the need to coordinate between particular systems in the broadcasting-satellite service (sound) in the geostationary-satellite orbit for space-to-Earth transmissions and the fixed service in the band 1 452-1 492 MHz

(Question ITU-R 111/9)

(1997)

The ITU Radiocommunication Assembly,

considering

a) that the World Administrative Radio Conference for Dealing with Frequency Allocation in Certain Parts of the Spectrum (Malaga-Torremolinos, 1992) (WARC-92) allocated the band 1 452-1 492 MHz on a primary basis to the broadcasting-satellite service (sound) (BSS (sound)) subject to the provisions of Nos. 5.342, 5.343, 5.344 and 5.347 of the Radio Regulations (RR), and to Resolution 528 (Rev.WRC-03);

b) that different types of systems in the fixed service (FS) operate on a primary basis in the band mentioned in *considering* a);

c) that BSS (sound) systems are being planned for early implementation in the band 1 452-1 492 MHz;

d) that systems planned for implementation in the interim in the BSS (sound) are required to coordinate under Resolution 33 (Rev.WRC-97);

e) that this Recommendation does not negate the ability of administrations to seek coordination under Resolution 33 (Rev.WRC-97);

f) that Resolution 528 (Rev.WRC-03) considers that it is necessary to ensure that the introduction of the BSS (sound) proceeds in a flexible and equitable manner, and invites the ITU-R to conduct the necessary studies of interference criteria to be employed for sharing between the BSS (sound) and systems of other services;

g) that Recommendation ITU-R M.1142 recommends threshold levels of power flux-density (pfd) at the surface of the Earth for coordination of geostationary space stations in the mobile-satellite service (MSS) with similar analogue and digital systems of the fixed service for some Regions in the adjacent band 1 492-1 530 MHz;

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* The Administrations of Saudi Arabia, Burkina Faso, United Arab Emirates and Iran (Islamic Republic of) reserved their opinion on this Recommendation.

** This Recommendation should be brought to the attention of Radiocommunication Study Groups 6 (Working Party 6S) and 8 (Working Parties 8A and 8B).

*** This Recommendation should be reviewed by Radiocommunication Study Group 9 before being considered by a future competent Radiocommunication Conference.

**** Radiocommunication Study Group 9 made editorial amendments to this Recommendation in 2004.

h) that a digital signal from a geostationary space station in the MSS, and a digital signal of the same pfd from a geostationary space station in the BSS (sound) in some cases will have a similar interfering effect on a receiving station in the fixed service;

j) that, with the use of sound broadcasting receivers with low-gain broadband antennas, the spacing of geostationary BSS (sound) space stations intended to provide regional service using relatively large spot beams will be of the order of 60° or greater;

k) that existing point-to-multipoint (P-MP) systems were designed for economic rural telephony implementation and typically are characterized as having low fade margins,

recommends

1 that for BSS (sound) geostationary space stations with orbital spacing of 60° or greater, the following pfd levels at the surface of the Earth may be applied as coordination thresholds with respect to stations in the FS operating in the band 1 452-1 492 MHz (see Notes 1, 2, 4 and 5):

1.1 for digital FS systems:

–128	dB(W/m^2) in a 1 MHz band	for $0° \le \theta < 5°$
$-128 + 0.5 (\theta - 5)$	dB(W/m^2) in a 1 MHz band	for $5° \le \theta < 25°$
–118	dB(W/m^2) in a 1 MHz band	for $25° \le \theta \le 90°$

1.2 for analogue FS systems:

–152	dB(W/m^2) in a 4 kHz band	for $0° \le \theta < 5°$
$-152 + 0.5 (\theta - 5)$	dB(W/m^2) in a 4 kHz band	for $5° \le \theta < 25°$
–142	dB(W/m^2) in a 4 kHz band	for $25° \le \theta \le 90°$

where θ is the angle of arrival (degrees) above the horizontal plane, and the pfd and angles of arrival are those that would be obtained under free space propagation conditions;

2 that, for FS systems where a small percentage of routes or hops can tolerate additional performance degradation, pfd values somewhat higher than those given in *recommends* 1 may be able to be tolerated (see Note 3);

3 that, for FS systems that need to conform to performance and availability objectives for individual links (e.g. for customer or local grade systems), pfd values somewhat lower than those given in *recommends* 1 may be required to provide adequate protection (see Note 3);

4 that the following Notes should form part of this Recommendation:

NOTE 1 – The pfd thresholds specified in *recommends* 1 pertain to situations where there is any overlap between the necessary bandwidths of the subject frequency assignments.

NOTE 2 – This Recommendation provides guidance on pfd coordination thresholds derived from a wide range of FS system parameters. It represents a compromise between the need to ensure adequate protection for existing and planned FS stations and the desire to facilitate sharing of the band with BSS (sound) systems.

NOTE 3 – In the cases of *recommends* 2 and 3, administrations may determine the appropriate pfd levels at which to initiate coordination.

NOTE 4 – Annex 1 provides guidance concerning additional technical and operational considerations that may be taken into account to facilitate coordination.

NOTE 5 – Further studies should be undertaken to continue the development of sharing methodologies and system characteristics to be applied in the 1 452-1 492 MHz band.

NOTE 6 – This Recommendation takes into consideration the provisions of No. 5.347 of the RR.

Annex 1

Fixed system considerations that may facilitate successful coordination

Fixed wireless systems may be either analogue or digital. Many are mature systems which have been designed to take advantage of known topographical features, equipment parameters and propagation characteristics. The following system parameters or mitigation techniques should be reviewed and used to the extent practical towards achieving successful coordination, especially in the planning and implementation of new systems in the fixed service.

1 Antenna considerations

1.1 Antenna orientation

1.1.1 Existing stations

In the establishment of the coordination threshold levels in this Recommendation, the orientation of the receiving antennas with respect to the interfering satellites is not specifically taken into account. In detailed coordination, this factor may provide additional significant protection for some receiving stations in the FS.

1.1.2 New stations

In the case of receiving omnidirectional antennas of P-MP central stations, improved side-lobe discrimination may contribute to a reduction of BSS interference.

In the case of directional (e.g. parabolic) FS receive antennas, it should be noted that, where practicable, the use of antennas with larger gain will contribute to the reduction of fade margin loss due to BSS interference. In addition, when the direction towards a BSS space station is somewhat different from the direction of the desired signal, a certain degrees offset of the antenna direction away from the direction towards the BSS space station may contribute to the reduction of fade margin loss due to BSS interference. An optimum offset angle will depend on the antenna pattern, separation angle and BSS interference level. This improvement will become greater if coupled with the use of an antenna with larger gain.

Annex 2 to Recommendation ITU-R F.1249 can be used for estimating the separation angle between the FS antenna direction and the direction towards the BSS space station taking into account atmospheric refraction.

1.2 Orbital avoidance by planned stations

Discrimination can be achieved by ensuring that substantial off-axis angles are provided between the received antenna boresights of future fixed stations and the geostationary-satellite orbit.

1.3 Polarization discrimination

In situations where the antennas of fixed systems use different polarizations (e.g. linear) than those employed by BSS (sound) systems (i.e. circular), polarization discrimination (up to 3 dB) may be available in the case of mainbeam-to-mainbeam coupling of the FS antenna and the BSS space station antenna (see Recommendation ITU-R F.1245).

2 Receiver/transmitter considerations

2.1 Frequency offset

Discrimination can be obtained by offsetting channel frequencies of receiving fixed stations and transmitting BSS (sound) space stations, including minor changes to channel allocation consistent with the channel plans of the FS. Interference may be at acceptable levels in cases where the necessary bandwidths of the BSS (sound) space station and fixed station assignments do not overlap. It should be noted that frequency offset is not effective when either the BSS (sound) or FS signal passband characteristics are relatively flat.

2.2 Additional allowance for interference

In probabilistic sharing studies for the determination of coordination threshold level given in *recommends* 1, an allowance of 1 dB has been assumed for a reduction in the fade margin, which has a corresponding impact on system availability and performance of FS systems (but this matter requires further study). However, improved sharing and a successful coordination may be obtained at the expense of fade margin by increasing the allowance for interference from BSS (sound) space stations, and taking into account all factors contributing to the total or overall system availability.