International Telecommunication Union

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R M.1646
(06/2003)

Parameters to be used in co-frequency sharing and pfd threshold studies between terrestrial IMT-2000 and broadcasting-satellite service (sound) in the 2 630-2 655 MHz band

M Series

Mobile, radiodetermination, amateur and related satellite services

Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
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Note: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

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RECOMMENDATION ITU-R M.1646*, **

Parameters to be used in co-frequency sharing and pfd threshold studies between terrestrial IMT-2000 and broadcasting-satellite service (sound) in the 2 630-2 655 MHz band

(2003)

Scope

In this Recommendation receiving parameters for IMT-2000 mobile stations and base stations are recommended for use when assessing interference from BSS (sound) systems operating in the 2 630-2 655 MHz band. It is also recommended that interference should be assessed in terms of the level of aggregate interference from BSS (sound) systems against the thermal noise at the IMT-2000 receiver under study.

The ITU Radiocommunication Assembly,

considering

a) that the implementation of IMT-2000 in this band is expected in certain countries between 2005 and 2010;

b) that IMT-2000 systems are planned to be deployed over rural and urban areas in this band, and that the rural areas are the most difficult to cover, given the low but important traffic density;

c) that the deployment of BSS (sound) satellite systems in this band may create interference over the whole territory of an administration wishing to implement IMT-2000;

d) that the range of IMT-2000 technologies in Recommendation ITU-R M.1457 need to be taken into account when conducting sharing and pfd threshold studies;

e) that Resolution 539 (WRC-2000), *inter alia*, contains provisional pfd threshold levels for BSS (sound) systems using non-GSO satellites in the band 2 630-2 655 MHz;

f) that Resolution 539 (WRC-2000) invites the ITU-R to conduct the necessary technical studies in time for WRC-03 relating to co-frequency sharing between systems in the BSS (sound) and terrestrial services in the band 2 630-2 655 MHz, with a view to avoid placing undue constraints on either service;

g) that Recommendation ITU-R M.1036 on channelling arrangements for terrestrial IMT-2000 is planned to be revised in 2004;

h) that the antenna pattern to be used in the studies should be modelled accurately to take into account the aggregate nature of the BSS (sound) satellite interference into potentially interfered-with IMT-2000 stations,

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* This Recommendation should be brought to the attention of Radiocommunication Study Group 6.

** Radiocommunication Study Group 5 made editorial amendments to this Recommendation in November 2010.

recognizing

a) that the band 2 500-2 690 MHz, which is allocated, among other services, to the mobile service, except aeronautical, on a primary basis in all three Regions, and is identified for use by administrations wishing to implement IMT-2000 in accordance with Resolution 223 (WRC-2000). This identification does not preclude the use of these bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations (RR);

b) that the band 2 535-2 655 MHz is also allocated on a primary basis to the BSS (sound) and complementary terrestrial broadcasting service subject to Resolution 528 (WARC-92), which limits current use of the band to the upper 25 MHz, and these networks are not subject to the pfd limits in RR Table 21-4 of RR Article 21,

recommends

1 that the level of interference should be assessed in terms of I_{sat}/N_{th}, I_{sat} being the level of aggregate interference from BSS (sound) systems and N_{th} being the thermal noise at the IMT-2000 receiver;

2 that the value for I_{sat}/N_{th} of –10 dB at any IMT-2000 mobile or base station receiver should be used as the trigger value for the sharing studies with the view to protect IMT-2000 from BSS stations;

3 that the following receiving parameters should be used when assessing the interference into IMT-2000 mobile stations:

– maximum noise figure: 9 dB,

– thermal noise level at the receiver: –135 dB(W/MHz),

– antenna gain: 0 dBi,

– polarization: linear;

4 that the following receiving parameters should be used when assessing the interference into IMT-2000 base stations:

– typical noise figure: 5 dB,

– thermal noise level at the receiver: –139 dB(W/MHz),

– feeder loss: 2 dB,

– polarization: linear;

– typical antenna: 120° sector, maximum antenna gain of 18 dBi and downtilt angle of 2.5°. The antenna pattern in the vertical plane should be modelled as described in Annex 1 (see Note 1).

NOTE 1 – The azimuthal variation of gain for sector antennas is currently under study within the ITU-R. Provisionally, for sharing studies, the gain outside the sector may be modelled as the maximum gain minus 30 dB.

NOTE 2 – The recommended IMT-2000 parameters are optimized for a rural deployment but are sufficient to limit interference to IMT-2000 in all environments. It is to be expected that IMT-2000 deployments with some different characteristics, for example those commensurate with time division duplex/frequency division duplex micro and pico base stations, will be more tolerant to external interference.

Annex 1

Vertical antenna pattern to be used for an IMT-2000 base station

$$G(\theta) = \max(G_1(\theta), G_2(\theta)) \tag{1a}$$

$$G_1(\theta) = G_0 - 12\left(\frac{\theta}{\theta_3}\right)^2 \tag{1b}$$

$$G_2(\theta) = G_0 - 12 + 10\log\left(\left(\max\left\{\frac{|\theta|}{\theta_3}, 1\right\}\right)^{-1.5} + k\right) \tag{1c}$$

$$\theta_3 = \frac{31\,000 \times 10^{-0.1\,G_0}}{\varphi_s}$$

where:

$G(\theta)$: gain relative to an isotropic antenna (dBi)

G_0: the maximum gain in or near the horizontal plane (dBi)

θ: absolute value of the elevation angle relative to the angle of maximum gain (degrees), ranging from 0° to 90°

θ_3: the 3 dB beamwidth in the vertical plane (degrees)

φ_s: the 3 dB beamwidth in the azimuthal plane (degrees)

k: parameter which accounts for the side-lobe levels of the antenna; in the case of average side-lobe pattern for studies involving multiple entry satellite interference, the parameter k should be 0.2.