RECOMMENDATION ITU-R M.829-1*

FREQUENCY SHARING IN THE 1 660-1 660.5 MHz BAND BETWEEN THE MOBILE-SATELLITE SERVICE AND THE RADIOASTRONOMY SERVICE

(Question ITU-R 83/8)

(1992-1994)

The ITU Radiocommunication Assembly,

considering

a) that the 1 660-1 660.5 MHz frequency band is allocated to the radioastronomy service on a shared, primary basis with the land mobile-satellite service in the Earth-to-space direction;

b) that, in accordance with Provision 730A of the Radio Regulations (RR), aircraft earth stations and ship earth stations can also be authorized to communicate with space stations in this band;

c) that the importance of the allocation at 1 660-1 660.5 MHz to the radioastronomy service was confirmed by Resolution 6 of the 20th General Assembly of the International Astronomical Union (IAU) (Baltimore, United States, August, 1988) and reconfirmed at the 21st General Assembly of the IAU (Buenos Aires, Argentina, July, 1991);

d) that RR Provision 736 requests Administrations to take all means to protect the radioastronomy service operating in the band 1 660-1 670 MHz from any harmful interference when channel assignment is made to earth stations;

e) that RR Provision 736 and RR Article 36 also point out that emissions from space or airborne stations can be particularly serious sources of interference to the radioastronomy service;

f) that the transmission loss can be calculated as is shown in ITU-R PN Series Recommendations,

recommends

1. that the possibility of harmful interference from mobile earth stations (MES) operating in the band 1 660-1 660.5 MHz, to radioastronomy observatories resulting from various propagation mechanisms should be taken into account;

2. that, when the land MES terminal and the radioastronomy observatory are both operational in the band 1 660-1 660.5 MHz, examples of separation distances from radioastronomy observatories which may be required for land MES as given in Annex 1 should be taken into consideration;

3. that the separation distances necessary for aircraft earth stations which, due to the height of the aircraft above the Earth, will be larger than those for the land MES, should be taken into account.

Note 1 – Further studies are required for ship and aircraft earth stations.

Note 2 – The examples of separation distances given in Annex 1 should be considered with caution due to uncertainties concerning the propagation model, the value of the transmission bandwidth of the land MES and the single-entry analysis of interference considered in deriving the values contained in Table 1.

Further studies are required of the assumptions used in the calculations of the values for separation distances.

* This Recommendation should be brought to the attention of Radiocommunication Study Group 7.

ANNEX 1

Interference from land mobile earth stations to radioastronomy observatories

Examples of separation distances are shown in Table 1 based on the assumption in Note 3 below. It is assumed that the mobile earth station (MES) transmits in a 4 kHz or less bandwidth, that is co-channel with the radioastronomy receiver. Column 1 lists the e.i.r.p. assumed for the land MES, and column 2 indicates the associated minimum required basic transmission loss. Columns 3, 4, 5, 6 and 7 show the resulting separation distances for smooth-Earth diffraction and troposcatter propagation modes, respectively. The angles indicated in the headings for columns 4 to 7 are assumed horizon angles, as measured at the observatory antenna.

TABLE 1

Summary of sharing calculations for reference transmitter and receivers and model propagation paths

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Land mobile earth station e.i.r.p./4 kHz (dBW)	Required transmission loss L_b (10%) (dB)	Separation distance, d (km)				
		Propagation path				
		Smooth Earth	Tropospheric scatter			
			0°	1°	4°	8°
–5.0	215	82	380	340	185	Note 1
–2.5	217.5	85	405	365	210	Note 1
0.0	220	87	430	390	235	Note 1
2.5	222.5	90	455	410	260	150
5.0	225	92	480	440	290	190

Note 1 – Transmission loss via the tropospheric scatter mode of propagation is always greater than the required loss (column 2) for these horizon angles.

Note 2 – 10% in column 2 implies the percentage of time for which actual or predicted transmission loss exceeds the required transmission loss shown below in the same column.

Note 3 – The harmful interference level for a radioastronomy receiver is defined as the input power which produces a change in receiver output equal to one tenth of the output level, and it is calculated for this Annex to be –220 dBW in a reference bandwidth of 20 kHz, based on an integration time of 2 000 s. The gain of the radioastronomy antenna is assumed to be 0 dBi in the direction of interference. Such a value for the radioastronomy antenna gain could be conservative. Use of more appropriate assumptions could lead to significant reduction of the values of separation distances.