

RECOMMENDATION ITU-R M.1141-2*, **

Sharing in the 1-3 GHz frequency range between non-geostationary space stations operating in the mobile-satellite service and stations in the fixed service

(Questions ITU-R 201/8 and ITU-R 118/9)

(1995-1997-2005)

Scope

Levels of power flux-density (pfd) and fractional degradation in performance are presented as thresholds for coordination of frequency assignments for non-geostationary orbit (non-GSO) space station transmitters in the mobile-satellite service MSS and receiving stations in the fixed service (FS) in frequency bands shared between these services in the 1-3 GHz frequency range. In the annexes, the methodology for sharing between constellations of non-GSO space station transmitters and receiving fixed stations is described and a summary of studies of frequency sharing between transmitting fixed stations and non-GSO space station receivers is presented.

The ITU Radiocommunication Assembly,

considering

- a) that there is a need to study criteria for sharing and coordination between systems in the mobile-satellite service (MSS) and the fixed service (FS) and mobile service;
- b) that the bands 2 170-2 200 MHz, 2 483.5-2 500 MHz and 2 500-2 535 MHz are allocated to the MSS (space-to-Earth) and fixed service (FS) on a co-primary basis;
- c) that the bands 1 518-1 525 MHz, 1 525-1 530 MHz and 2 160-2 170 MHz are allocated to the MSS (space-to-Earth) and FS in some regions or by some administrations, on a co-primary basis;
- d) that for several decades, systems in the FS have been operated by many administrations in the bands newly allocated to the MSS;
- e) that broadcasters in many countries operate ancillary services which have both fixed and mobile characteristics in certain bands shared with the MSS;
- f) that the performance of FS systems (analogue point-to-point, digital point-to-point, digital point-to-multipoint including local access systems) needs to be considered when evaluating sharing situations in the 1-3 GHz range;
- g) that the performance of non-GSO MSS systems need to be considered for sharing in the 1-3 GHz range;
- h) that a specific value of pfd produced by different non-GSO MSS satellite constellations gives rise to different values of fractional degradation of performance (FDP) (Recommendation ITU-R F.1108);

* This Recommendation applies only for sharing in the space-to-Earth direction. No specific criteria have been developed for sharing in the Earth-to-space direction.

** The revision of this Recommendation was jointly prepared by Radiocommunication Study Groups 8 and 9 and any future revision will also be undertaken jointly.

- recommends*

- 1** that the criteria expressed as FDP values for a 1 MHz reference bandwidth, presented in Table 1, should be used as coordination threshold values between non-GSO MSS (space-to-Earth) and digital systems in the FS, in the bands listed, except as noted in § 3 (see Note 2);
- 2** that the criteria expressed as pfd values using reference bandwidths of 1 MHz, presented in Table 1, and 4 kHz, presented in Table 2, should be used as coordination threshold values between non-GSO MSS (space-to-Earth) and analogue systems for telephony in the FS in the bands listed (see Note 1); for analogue systems for television in the FS, only the pfd values using the 1 MHz reference bandwidth, presented in Table 1, should apply (see Notes 1, 3, 4, 5 and 6);
- 3** that in order to accommodate non-GSO MSS systems in the 2483.5-2500 MHz band, new digital point-to-point and point-to-multipoint radio-relay systems may need to be designed and operated to be compatible with the pfd values given in Table 1.

TABLE 1

**Coordination threshold values for specific bands used for non-GSO MSS
(space-to-Earth) and FS systems (pfd for analogue and FDP for digital)**

Frequency band (MHz)	pfd per space station at angle of arrival δ (degrees) (dB(W/(m ² · MHz)))	FDP (%) (See Note 2)
1 518-1525	-128 for $0^\circ \leq \delta < 5^\circ$ -128 + 0.5 ($\delta - 5$) for $5^\circ \leq \delta < 25^\circ$ -118 for $25^\circ \leq \delta < 90^\circ$	25
1 525-1 530	-128 for $0^\circ \leq \delta < 5^\circ$ -128 + 0.5 ($\delta - 5$) for $5^\circ \leq \delta < 25^\circ$ -118 for $25^\circ \leq \delta < 90^\circ$	25
2 160-2 170	-123 for $0^\circ \leq \delta < 5^\circ$ -123 + 0.5 ($\delta - 5$) for $5^\circ \leq \delta < 25^\circ$ -113 for $25^\circ \leq \delta < 90^\circ$ (See Note 3)	25
2 170-2 200	-123 for $0^\circ \leq \delta < 5^\circ$ -123 + 0.5 ($\delta - 5$) for $5^\circ \leq \delta < 25^\circ$ -113 for $25^\circ \leq \delta < 90^\circ$ (See Note 3)	25
2 483.5-2 500	-126 for $0^\circ \leq \delta < 5^\circ$ -126 + 0.65 ($\delta - 5$) for $5^\circ \leq \delta < 25^\circ$ -113 for $25^\circ \leq \delta < 90^\circ$ (See Note 4)	pfd values in the preceding column apply to digital radio-relay systems in this band (See Note 4)
2 500-2 535	-128 for $0^\circ \leq \delta < 5^\circ$ -128 + 0.5 ($\delta - 5$) for $5^\circ \leq \delta < 25^\circ$ -118 for $25^\circ \leq \delta < 90^\circ$	25

NOTE 1 – In cases involving sharing with analogue systems for telephony in the FS, further coordination is only required when the pfd values are greater than or equal to the coordination threshold values in both Tables 1 and 2.

NOTE 2 – The concept for calculating the FDP for a FS network is contained in Recommendation ITU-R F.1108.

NOTE 3 – The pfd values specified for the 2 160-2 200 MHz band provide full protection for analogue radio-relay systems using the sharing criteria established by Recommendation ITU-R SF.357, for operation with a non-GSO MSS system employing narrow-band time division multiple access/frequency division multiple access (TDMA/FDMA) techniques.

NOTE 4 – The pfd values specified for the 2 483.5-2 500 MHz band provide full protection for analogue radio-relay systems using the sharing criteria established by Recommendation ITU-R SF.357, for operation with multiple non-GSO MSS systems employing CDMA techniques (see Annex 1). The pfd values specified will not provide full protection for existing digital fixed systems in all cases. However, these pfd values are considered to provide adequate protection for digital fixed systems designed to operate in this band, where high power ISM and possible low power applications are expected to produce a relatively high interference environment.

TABLE 2

**Coordination threshold values for specific bands used for non-GSO MSS (space-to-Earth)
and FS systems (analogue systems for telephony)**

Frequency band (MHz)	pfd per space station at angle of arrival δ (degrees) (dB(W/(m ² · 4 kHz)))		
1518-1 525	–146	for	$0^\circ \leq \delta < 5^\circ$
	$-146 + 0.5 (\delta - 5)$	for	$5^\circ \leq \delta < 25^\circ$
	–136	for	$25^\circ \leq \delta < 90^\circ$
1 525-1 530	–146	for	$0^\circ \leq \delta < 5^\circ$
	$-146 + 0.5 (\delta - 5)$	for	$5^\circ \leq \delta < 25^\circ$
	–136	for	$25^\circ \leq \delta < 90^\circ$
2 160-2 170	–141	for	$0^\circ \leq \delta < 5^\circ$
	$-141 + 0.5 (\delta - 5)$	for	$5^\circ \leq \delta < 25^\circ$
	–131	for	$25^\circ \leq \delta < 90^\circ$
	(See Note 3)		
2 170-2 200	–141	for	$0^\circ \leq \delta < 5^\circ$
	$-141 + 0.5 (\delta - 5)$	for	$5^\circ \leq \delta < 25^\circ$
	–131	for	$25^\circ \leq \delta < 90^\circ$
	(See Note 3)		
2 483.5-2 500	–144	for	$0^\circ \leq \delta < 5^\circ$
	$-144 + 0.65 (\delta - 5)$	for	$5^\circ \leq \delta < 25^\circ$
	–131	for	$25^\circ \leq \delta < 90^\circ$
2 500-2 535	–146	for	$0^\circ \leq \delta < 5^\circ$
	$-146 + 0.5 (\delta - 5)$	for	$5^\circ \leq \delta < 25^\circ$
	–136	for	$25^\circ \leq \delta < 90^\circ$

NOTES 1 to 4 – See Table 1.

NOTE 5 – Based on Recommendation ITU-R F.1246 regarding the reference bandwidth, the pfd values specified in Table 2 for a 4 kHz reference bandwidth are 18 dB lower than the pfd values specified in Table 1 for a 1 MHz reference bandwidth. These values are appropriate to protect analogue FS systems of medium and low capacity (960 channels or less), as explained in Recommendation ITU-R F.1246.

NOTE 6 – The approach of employing both 1 MHz and 4 kHz reference bandwidths as adopted in *recommends* 2 is applicable only to the frequency bands in the 1-3 GHz range, shared by the MSS and the FS. This result is based on the fact that the analogue systems in the FS in these bands are generally used for low to medium capacity of 960 channels or less. This approach is not appropriate for other frequency bands where high-capacity analogue radio-relay systems are employed.