RECOMMENDATION ITU-R SA.1161-1

SHARING AND COORDINATION CRITERIA FOR DATA DISSEMINATION AND DIRECT DATA READOUT SYSTEMS IN THE EARTH EXPLORATION-SATELLITE AND METEOROLOGICAL-SATELLITE SERVICES USING SATELLITES IN GEOSTATIONARY ORBIT

(Question ITU-R 141/7)

(1995-1999)

The ITU Radiocommunication Assembly,

considering

a) that the frequency bands allocated to the Earth exploration-satellite service (EESS) and the meteorological-satellite (MetSat) service may be shared by several systems, including those operating in other services;

b) that Recommendation ITU-R SA.1160 specifies the interference criteria needed to determine the sharing criteria;

c) that the sharing criteria may be determined using the methodology described in Recommendation ITU-R SA.1023;

d) that the typical deployment of interfering stations may change over a period of years as a result of growth in the number of systems and revisions to frequency band allocations that are adopted by world radiocommunication conferences;

e) that by governing the use of the radio-frequency spectrum in their territory and through international coordination of frequency assignments, administrations may exercise a degree of control over the number of systems that may generate interference at significant levels;

f) that the interference level encountered by ship-borne earth stations in the MetSat service is unlikely to be worse than that encountered by earth stations operating on land;

g) Recommendation ITU-R IS.848, which provides the methodology for determining when coordination is warranted between receiving and transmitting earth stations that operate in the same frequency band,

recommends

1 that the single-entry interference levels presented in Table 1 be used as sharing criteria, or as the basis for alternative forms of sharing criteria (e.g., power flux-density limits), for the protection of stations operating in the EESS and MetSat service;

2 that the criteria specified in § 1 be used as the basis for coordination thresholds for receiving stations operating in the EESS and MetSat service in bands shared with terrestrial services;

3 that a 6% increase in equivalent link noise temperature be used as the threshold for coordination between transmitting space stations and receiving earth stations operating in the EESS and MetSat service;

4 that the deployment of interferers specified in Annex 1 be reviewed periodically in order to determine whether the typical interference environment and consequential sharing criteria should be revised.

NOTE 1 – The sharing criteria of Table 1 (including the Notes thereto) are intended to be applied in frequency sharing analyses and the coordination of frequency assignments (i.e., as the minimum levels of accepted interference for applicable earth stations). In coordination applications, the actual interference seen by the receiving earth station should be compared with that assumed in Annex 1 in order to help determine whether an interfering signal power greater than the permissible single entry level can be accepted. Generally, this consideration may enable acceptance of interference levels that may be as high as those specified in the applicable interference criteria in Recommendation ITU-R SA.1160.

NOTE 2 – The coordination threshold specified in § 3 is sufficiently conservative to assure that interference will be below permissible levels in cases where coordination is not triggered. In order to apply that criterion when determining whether interference from transmitting spacecraft might be unacceptable, the methodology of Appendix S8 to the Radio Regulations may be adapted and applied to the stations concerned. In order to avoid unnecessary coordination, administrations may wish to assume that a certain amount of antenna discrimination is available from the receiving station (e.g., a level of discrimination that is available for 99.9% of the time).

NOTE 3 – The criteria in Table 1 are based on the interference environment given in Annex 1 (also see § 4).

TABLE 1

Sharing criteria for stations in the EES and MetSat services using spacecraft in geostationary orbit

Frequency band (MHz)	Function and type of earth station	Interfering signal power (dBW) in the reference bandwidth to be exceeded for no more than 20% of the time		Interfering signal power (dBW) in the reference bandwidth to be exceeded for no more than *p*% of the time	
		Space	Terrestrial	Space	Terrestrial
1 670-1 710 down-link	Direct data readout High gain antenna	–170.7 dBW per 2.6 MHz(1)	–150.7 dBW per 2.6 MHz(1)	–159.4 dBW per 2.6 MHz(1) $p = 0.0025$	–152.7 dBW per 2.6 MHz(1) $p = 0.011$
	Data dissemination Low gain antenna	–182.4 dBW per 4 kHz(1)	–162.4 dBW per 4 kHz(1)	–163.2 dBW per 4 kHz(1) $p = 0.0025$	–162.4 dBW per 4 kHz(1) $p = 0.011$
	Data dissemination High gain antenna	–165.3 dBW per 2.11 MHz(1)	–145.4 dBW per 2.11 MHz(1)	–153.4 dBW per 2.11 MHz(1) $p = 0.0025$	–147.2 dBW per 2.11 MHz(1) $p = 0.011$
25 500-27 000	Direct data readout 60.1 dBic antenna	–152 dBW per 10 MHz(2)	–135 dBW per 10 MHz(2)	–116 dBW per 10 MHz(2) $p = 0.05$	–116 dBW per 10 MHz(2) $p = 0.1$

(1) The interfering signal powers (dBW) in the reference bandwidths are specified for reception at elevation angles ≥ 3°.

(2) The interfering signal powers (dBW) in the reference bandwidths are specified for reception at elevation angles ≥ 5°.

NOTE 1 – The single-entry interfering signal power thresholds in Table 1 is the permissible level of interfering signal power that falls within the specified reference bandwidth. Accordingly, the total power in interfering signals that are narrower than the reference bandwidth should be considered in frequency sharing analyses. In cases where the interfering bandwidth exceeds the reference bandwidth or does not fully overlap the passband of a specific receiver under study, the available frequency dependent rejection should be applied in conjunction with the specified permissible interference levels. The pertinent ITU-R SM Series Recommendations should be consulted for guidance on this matter.

NOTE 2 – The sharing criteria presented in Table 1 are based on representative stations having the specified antenna gain values.

NOTE 3 – In deriving the above sharing criteria from permissible total levels of interfering signal power, no allowance has been made for interference from spurious emissions.

NOTE 4 – The specified level of single-entry interfering signal power may be directly converted to, and applied as, equivalent values of power flux-density only for earth stations that use low-gain, non-tracking antenna.

NOTE 5 – Both the long-term (20% of the time) and short-term (*p*% of the time) sharing criteria must be met in order for interference to be at or below permissible levels.

NOTE 6 – Sharing criteria specified for terrestrial signal paths are applicable to transmitting stations in terrestrial services and transmitting earth stations.

ANNEX 1

Basis of sharing criteria

1 Introduction

This Annex presents the implementation of Recommendation ITU-R SA.1023 using the interference criteria arrived at in Recommendation ITU-R SA.1160. The permissible interference levels are subdivided according to Recommendation ITU-R SA.1023 into space and terrestrial categories and then into the number of anticipated interferers in each category. The basis for these allotments is shown in Table 2 and a discussion of the interference environment in each band is presented below.

TABLE 2

Parameters used to derive sharing criteria

Frequency band (MHz)	Function and type of earth station	Long-term apportionment between categories of interferers		Short-term apportionment between categories of interferers		Equivalent number of long-term interferers		Equivalent number of short-term interferers	
		Interfering signal path		Interfering signal path		Interfering signal path		Interfering signal path	
		Space-Earth	Terrestrial	Space-Earth	Terrestrial	Space-Earth	Terrestrial	Space-Earth	Terrestrial
1 670-1 710	Direct data readout High gain antenna	1%	99%	10%	90%	1	1	1	2
	Data dissemination Low gain antenna	1%	99%	10%	90%	1	1	1	2
	Data dissemination High gain antenna	1%	99%	10%	90%	1	1	1	2

2 Considerations for the 1 670-1 710 MHz

The 1 670-1 690 MHz band is allocated on a primary basis to the MetSat (space-to-Earth), meteorological-aids, fixed and mobile (except aeronautical mobile) services. The 1 675-1 690 MHz band is allocated on a primary basis to the mobile-satellite (Earth-to-space) service in Region 2.

The 1 690-1 700 MHz band is allocated on a primary basis to the meteorological-aids and MetSat (space-to-Earth) services and, in Region 2, to the mobile-satellite service (Earth-to-space). The EESS is permitted provided such operations do not interfere with primary allocations. In ten countries a primary allocation exists for the fixed and mobile (except aeronautical mobile (R)) services. In two countries the fixed and mobile (except aeronautical mobile (R)) services have a secondary allocation.

The 1 700-1 710 MHz band is allocated on a primary basis to the fixed, mobile, and MetSat (space-to-Earth) services and, in Region 2, to the mobile-satellite (Earth-to-space) service. The EESS is permitted provided such operations do not interfere with primary allocations. In Region 3 space research (space-to-Earth) is allocated on a primary basis in four countries.

Space-to-Earth systems in the 1 670-1 675 MHz band may need to limit their emissions in order to protect the radioastronomy service operating in the adjacent band, such that terrestrial stations produce most of the interference. Above 1 675 MHz, it is expected that a greater number of space stations will operate and produce about the same long-term interference levels as terrestrial systems and relatively greater interference levels in the short term (i.e., as a result of temporal variations in MetSat earth station antenna gain towards the interfering satellites). The expectation that mobile earth stations could contribute substantially to interference arriving via terrestrial paths does not warrant different interference allocations for interfering terrestrial paths in Region 2, since terrestrial stations and mobile earth stations are unlikely to use the same frequencies in the same area. Further information is provided in Recommendation ITU-R SA.1158.