

RECOMMENDATION ITU-R SA.1164-2

**SHARING AND COORDINATION CRITERIA FOR SERVICE LINKS IN DATA
COLLECTION SYSTEMS IN THE EARTH EXPLORATION-SATELLITE
AND METEOROLOGICAL-SATELLITE SERVICES**

(Question ITU-R 142/7)

(1995-1997-1999)

The ITU Radiocommunication Assembly,

considering

- a) that the frequency bands allocated to the Earth exploration-satellite service (EESS) (including the meteorological-satellite (MetSat) service) may be shared by several systems, including those operating in other services;
- b) that Recommendation ITU-R SA.1163 specifies the interference criteria needed to determine the sharing criteria;
- c) that 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 levels encountered by shipborne earth stations in the MetSat service are unlikely to be worse than those encountered by earth stations operating on land;
- g) Recommendation ITU-R IS.850, which provides the methodologies for determining when coordination is warranted between earth stations and radiosondes that operate in the same frequency band;
- h) Recommendation ITU-R IS.849, which provides the methodologies for determining when coordination is warranted between transmitting terrestrial stations and earth stations,

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 a 6% peak increase in equivalent link noise temperature be used as the threshold for coordination between transmitting space stations and receiving earth stations operating in the MetSat service;
- 3** 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 coordination provisions of Radio Regulations (RR) No. S9.11A/Resolution 46 (Rev.WRC-97) are applied in the 400.15-401.00 MHz band. The sharing criteria specified in this Recommendation should be used to determine whether these consultations or coordinations may be warranted in the absence of other established criteria.

NOTE 2 – 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 stations). In coordination applications, the actual interference seen by the receiving 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 (Recommendation ITU-R SA.1163).

NOTE 3 – The coordination threshold specified in § 2 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 might be unacceptable, the methodology of RR Appendix S8 may be adapted and applied to the stations concerned. In order to avoid unnecessary coordination with respect to systems using non-geostationary (non-GSO) satellites, 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 4 – Data collection platform interrogation from non-GSO satellites will be available in the near future.

NOTE 5 – The criteria in Table 1 are based on the interference environment given in Annex 1 (see also § 3).

TABLE 1

Sharing criteria for stations in the EESS and MetSat service

Frequency band (MHz)	Function and type of earth station	Station subject to interference	Interfering signal power (dBW) in the reference bandwidth to be exceeded no more than 20% of the time		Interfering signal power (dBW) in the reference bandwidth to be exceeded no more than $p\%$ of the time	
			Space-to-Earth	Terrestrial	Space-to-Earth	Terrestrial
401-403 Earth-to-space	Non-GSO data collection, low-gain antenna	Space station	-183.1 dBW per 1 600 Hz ⁽¹⁾	-184.8 dBW per 1 600 Hz ⁽¹⁾	-175.9 dBW per 1 600 Hz ⁽¹⁾ $p = 0.05$	-176.2 dBW per 1 600 Hz ⁽¹⁾ $p = 0.05$
137-138 space-to-Earth	Non-GSO data collection, command data acquisition (CDA) station	Earth station	-159.5 dBW per 8 320 Hz ⁽¹⁾	-164.3 dBW per 8 320 Hz ⁽¹⁾	-151.3 dBW per 8 320 Hz $p = 0.05$	-151.7 dBW per 8 320 Hz ⁽¹⁾ $p = 0.05$
401-403 Earth-to-space	GSO data collection, low-gain antenna	Space station	-190.9 dBW per 100 Hz ⁽²⁾	-197.4 dBW per 100 Hz ⁽²⁾	-173.4 dBW per 100 Hz ⁽¹⁾ $p = 0.075$	-173.6 dBW per 100 Hz ⁽²⁾ $p = 0.025$
1 670-1 690 space-to-Earth	GSO data collection, CDA station	Earth station	-214.0 dBW per 100 Hz ⁽²⁾	-194.0 dBW per 100 Hz ⁽²⁾	-181.7 dBW per 100 Hz ⁽²⁾ $p = 0.0025$	-181.6 dBW per 100 Hz ⁽²⁾ $p = 0.011$
2 025-2 110 Earth-to-space	GSO data collection, CDA station	Space station	-208.9 dBW per 100 Hz ⁽²⁾	-192.0 dBW per 100 Hz ⁽²⁾	-185.0 dBW per 100 Hz ⁽²⁾ $p = 0.0025$	-184.2 dBW per 100 Hz ⁽²⁾ $p = 0.011$
460-470 space-to-Earth	GSO data collection platform interrogation	Earth station	-207.3 dBW per 100 Hz ⁽¹⁾	-187.3 dBW per 100 Hz ⁽¹⁾	-183.9 dBW per 100 Hz ⁽²⁾ $p = 0.01$	-183.1 dBW per 100 Hz ⁽²⁾ $p = 0.09$

(1) The interfering signal powers (dBW) in the reference bandwidths are specified for reception at elevation angles $> 5^\circ$.

(2) The interfering signal powers (dBW) in the reference bandwidths are specified for reception at elevation angles $> 3^\circ$.

NOTE 1 – The single-entry interfering signal power thresholds in Table 1 are the permissible levels of interfering signal power that fall 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 Recommendations should be consulted for guidance on this matter.

NOTE 2 – The sharing criteria can be expressed as permissible power flux-density into the main beam of the receive antenna by subtracting $10 \log (G \lambda^2/4\pi)$ from the values given in Table 1, where G is the antenna gain and λ is the wavelength.

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 antennas.

NOTE 5 – Both the long-term (20% of the time) and short-term ($< 1\%$ 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 interfering signal paths are applicable to ground-based stations. The criteria for space-to-Earth interfering signal paths also pertain to air-to-ground paths.

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.1163. 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.

2 401-403 MHz band

The 401-402 MHz band is allocated on a primary basis to the meteorological-aids and space operation (space-to-Earth direction) services. The EESS (Earth-to-space), MetSat (Earth-to-space), fixed, and mobile services are allocated on a secondary basis.

The 402-403 MHz band is allocated on a primary basis to the meteorological-aids service. The EESS (Earth-to-space), MetSat (Earth-to-space), fixed, and mobile services are allocated on a secondary basis.

For most of the time, stations in the EESS and MetSat service are expected to produce higher interference levels than the terrestrial services. In the short-term, propagation enhancements on terrestrial interference paths and the location variability of mobile stations may result in similar interference levels from space-to-Earth and terrestrial stations.

3 460-470 MHz band

The 460-470 MHz band is allocated to the fixed-satellite and mobile-satellite services on a primary basis with the MetSat service (space-to-Earth) as a secondary allocation. For most of the time interference will occur from terrestrial stations. For brief periods additional interference sources from space systems can be expected.

4 1 670-1 690 MHz band

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

5 2 025-2 110 MHz band

The 2 025-2 110 MHz band is allocated on a primary basis to the fixed and mobile services, to the space research service (Earth-to-space and space-to-space), to the space operation service (Earth-to-space and space-to-space), and to the EESS (Earth-to-space and space-to-space).

6 137-138 MHz band

The 137-138 MHz band is allocated on a primary basis to the space operation, MetSat, and space research services. The band is allocated on a secondary basis to the fixed and mobile (excluding aeronautical mobile) services, except in 35 administrations where the allocation is on a primary basis. Parts of the band are allocated on a primary basis to the mobile-satellite (space-to-Earth) service, and other parts of the band are allocated on a secondary basis to this service.

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-to-Earth	Terrestrial	Space-to-Earth	Terrestrial	Space-to-Earth	Terrestrial	Space-to-Earth	Terrestrial
401-403	Non-GSO data collection, low-gain antenna	75%	25%	50%	50%	2	1	2	1
137-138	Non-GSO data collection, CDA station	75%	25%	50%	50%	1	1	1	1
401-403	GSO data collection, low-gain antenna	90%	10%	75%	25%	2	1	1	1
1 670-1 690	GSO data collection, CDA station	1%	99%	10%	90%	1	1	1	2
2 025-2 110	GSO data collection, CDA station	1%	99%	10%	90%	1	2	1	2
460-470	GSO data collection platform interrogation	1%	99%	10%	90%	1	1	1	2