

## RECOMMENDATION ITU-R SA.1629\*

**Sharing between command links in the space research and space operation services with the fixed, mobile and mobile-satellite services in the frequency band 257-262 MHz**

(2003)

The ITU Radiocommunication Assembly,

*considering*

- a) that in the range between 0.1 and 1 GHz, the space research service (SRS) and space operation service have a combined primary allocation of 3.9 MHz and a combined secondary allocation of 10.35 MHz in the space-to-Earth direction, but only a combined 2.4 MHz in the Earth-to-space direction (telecommand links), the latter allocation being subject to agreement under No. 9.21 of the Radio Regulations;
- b) that Recommendation ITU-R SA.363 contains recommendations on the necessary bandwidth and protection criteria for space operation systems in the frequency range from 0.1 GHz to 30 GHz;
- c) that Recommendations ITU-R SA.364 and ITU-R SA.609 contain recommendations on the necessary bandwidth and protection criteria for manned and unmanned near-Earth satellites in the SRS;
- d) that Recommendation ITU-R SA.514 contains interference criteria for command links in the Earth-to-space direction in bands below 1 GHz;
- e) that Recommendation ITU-R SA.1017 provides a method for calculating link performance in the SRS;
- f) that criteria are given in Recommendation ITU-R F.758 for sharing between the terrestrial fixed service and other services which may be used in bands below 1 GHz;
- g) that the method of determining the coordination area around an earth station operating with non-GSO satellites in frequency bands shared with terrestrial services is set out in Recommendations ITU-R SM.1448 and ITU-R M.1185,

*noting*

- a) that a small number of earth stations (less than ten) operating in the space research and space operation services (Earth-to-space) may be expected to be deployed in the frequency band 257-262 MHz by a very limited number of administrations (one or two),

*noting further*

- a) that necessary sharing, compatibility and protection criteria need to be established in the frequency band 257-262 MHz,

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\* This Recommendation should be brought to the attention of Radiocommunication Study Groups 8 and 9.

*recommends*

1 that analysis of compatibility with other services in the frequency band 257-262 MHz be based on the characteristics of space research and space operations (Earth-to-space) systems given in Annex 1;

2 that in those countries operating SRS and space operation service systems in the band 257-262 MHz, the coordination distance for earth stations of these services be 400 km.

## Annex 1

### Link performance analysis and technical equipment characteristics for command links of space research and space operation systems

This Annex sets out the parameters used under the method in Recommendation ITU-R SA.1017 for analysing the performance characteristics of command links in the SRS and space operation service in the band 257-262 MHz. A generalized link performance analysis is given in Table 1. The technical characteristics of command systems that may be used for analysing compatibility with other radio systems in the band 257-262 MHz are given in Table 2.

TABLE 1

No.	Characteristic	Value
1	Frequency (MHz)	257-262
2	Satellite circular orbit height (km)	400.0      2 000.0
3	Maximum link distance (km) (for 5° elevation angle)	1 800.0      5 000.0
4	Earth station e.i.r.p. (dBW)	12.0      20.0
5	Earth station antenna gain (dB)	12.0
6	Free-space propagation loss (dB)	145.85      154.73
7	Atmospheric attenuation (dB)	0.2
8	Space station antenna gain (dB)	0
9	Polarization loss (dB)	0.3
10	Modulation/demodulation loss (dB)	1.0
11	Implementation loss (dB)	2.0
12	Necessary bandwidth (kHz)	20.0
13	Space station receiver noise temperature (K)	1 000
14	Link function/modulation	Data/PSK

TABLE 1 (*end*)

No.	Characteristic	Value	
15	Data transmission rate (dB/Hz)	40.0	
16	Applicable energy per bit $E_b$ (dB(W/Hz))	-177	-178.23
17	Spectral noise power density $N_0$ (dB(W/Hz))	-198.6	
18	Ratio $E_b/N_0$ (dB)	21.58	20.37
19	Threshold ratio $E_b/N_0$ , (dB) (for an error probability $10^{-6}$ )	10.5	
20	Link margin (dB)	11.08	9.87

TABLE 2

**Technical characteristics of command systems in the SRS and space operation service which may be used for compatibility analysis**

No.	Characteristic	Minimum value	Maximum value
1	Height of orbit (km)	400.0	2 000
2	Power at input to earth station antenna (dBW)	0	10.0
3	Gain of earth station transmitting antenna (dB)	12.0	20.0
4	Necessary emission bandwidth (kHz)	2.4	26.0
5	Width of main lobe of transmitting antenna pattern (degrees)	10.0	20.0
6	Level of side lobes of transmitting antenna (dB) (from main lobe)	-20 (far side lobes)	-15 (first side lobe)
7	Space station antenna gain (dB)	0	0
8	Noise temperature of space station receiver (K)	1 000	1 000