



Recommendation ITU-R SA.1626-1
(12/2013)

**Feasibility of sharing between the space
research service (space-to-Earth)
and the fixed and mobile services
in the band 14.8-15.35 GHz**

SA Series
Space applications and meteorology



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Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R SA.1626-1*

**Feasibility of sharing between the space research service (space-to-Earth)
and the fixed and mobile services in the band 14.8-15.35 GHz**

(2003-2013)

Scope

This Recommendation provides the characteristics of space research systems and the results of analysis on feasibility of sharing between the space research service (space-to-Earth) and the fixed and mobile services in the band 14.8-15.35 GHz.

The ITU Radiocommunication Assembly,

considering

- a) that in the band 14.8-15.35 GHz, the fixed and mobile services are allocated on a primary basis, the space research service (SRS) is allocated on a secondary basis;
- b) that the SRS (passive) and Earth exploration-satellite service (EESS) (passive) are allocated on a secondary basis by No. 5.339 of the Radio Regulations (RR), Edition of 2012 in the 15.20-15.35 GHz band;
- c) that requirements exist for wideband SRS downlinks to transmit future high data rate scientific data;
- d) that under favourable conditions the required separation distances between receiving SRS earth stations and transmitting fixed stations are relatively small (under 30 km) and under less favourable conditions may be relatively large (up to 200 km);
- e) that separation distances may decrease significantly due to frequency channelization, natural site shielding, terrain clutter, and other terrain features,

noting

- a) that due to the small number of expected SRS earth stations to be deployed worldwide (10-40 stations), coordination between fixed and land mobile systems and the SRS stations would not put undue constraints on either of the services,

recommends

- 1 that sharing between a GSO SRS satellite transmitting in the space-to-Earth direction and a receiving GSO data relay satellite (DRS) operating near 15 GHz is feasible if the satellites are separated by 12 km (equivalent to an orbital separation of 0.02°) or more;
- 2 that, when designing SRS systems, the probability of receiving brief periods of interference from DRS user satellites should be taken into account. This interference should exist for less than 0.1% of the time;
- 3 that GSO SRS systems operate within the following pfd limits at the Earth's surface under assumed free space propagation conditions in the band 14.8-15.35 GHz:

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

Limit (dB(W/m ²)) in 1 MHz bandwidth for angle of arrival, δ , above the horizontal plane		
0°-5°	5°-25°	25°-90°
-126	$-126 + 0.5(\delta - 5)$	-116

4 that non-GSO SRS systems operate within the following pfd limits at the Earth's surface under assumed free space propagation conditions in the band 14.8-15.35 GHz:

Limit (dB(W/m ²)) in 1 MHz bandwidth for angle of arrival, δ , above the horizontal plane		
0°-5°	5°-25°	25°-90°
-124	$-124 + 0.5(\delta - 5)$	-114

5 that separation distances required by SRS receiving earth stations for protection from fixed and mobile transmitting stations may be derived using the methodology outlined in Annex 1 and the protection criterion for space-to-Earth SRS links contained in Recommendation ITU-R SA.609;

6 that suitable measures related to the deployment of SRS earth stations may need to be identified in order not to constrain the use of the band 14.8-15.35 GHz by the fixed service.

Annex 1

Feasibility of sharing between the SRS (space-to-Earth) and the fixed and mobile services in the band 14.8-15.35 GHz

1 Introduction

International space agencies are currently planning on implementing high data rate space research missions with bandwidth requirements up to 400 MHz. Satellites for these missions will carry telescopes and/or other passive instruments to measure phenomenon such as the Earth's magnetosphere and solar flares. In the 2012 Edition of the Radio Regulations, 8450-8500 MHz is the only band below the 37-38 GHz band that is available on a primary basis in the SRS to transmit moderate to high-rate data directly from Earth orbiting satellites to earth stations. Since this band will not meet the requirements of future high rate space research missions, a new primary allocation is needed.

The current allocations in the band 14.8-15.35 GHz (Radio Regulations, Edition of 2012) are shown in Table 1. They include primary allocations to the fixed and mobile services and a secondary allocation to the SRS. In addition, RR No. 5.339 allocates the 15.20-15.35 GHz segment of the band to the SRS (passive) and the EESS (passive) on a secondary basis.

TABLE 1

Allocations in the band 14.8-15.35 GHz (from the Radio Regulations, Edition of 2012)

Allocation to services		
Region 1	Region 2	Region 3
14.8-15.35	FIXED MOBILE Space research 5.339	

5.339 The bands 1 370-1 400 MHz, 2 640-2 655 MHz, 4 950-4 990 MHz and 15.20-15.35 GHz are also allocated to the space research (passive) and Earth exploration-satellite (passive) services on a secondary basis.

Based on these allocations, establishment of a primary SRS allocation in this band requires the consideration of a variety of interference scenarios, as detailed in Table 2. An analysis of these environments to facilitate the identification of appropriate sharing conditions has been performed and is documented herein. Section 2 provides information on the SRS system characteristics used for this analysis. Section 3 provides example fixed service system characteristics for the 14.8-15.35 GHz band. Section 4 provides the key characteristics of the DRS system operating in this band. The criteria for protection of fixed service or mobile service stations from SRS emissions are derived in Section 5. Section 6 addresses interference to SRS receiving earth stations from fixed or mobile service transmissions. Section 7 derives sharing conditions for SRS (space-to-Earth) and receiving DRS operations. Protection of SRS (passive) and EESS (passive) links is not addressed at this time as none of these systems are known to exist in this band.

TABLE 2

Applicable interference scenarios

Interferer	Victim	Comments
SRS (space-to-Earth) Low-orbiting satellite GSO satellite	Receiving fixed/mobile service station	Line-of-sight propagation assumed
Transmitting fixed/mobile service station	SRS receiving earth station	Separation distances determined using the methods of Recommendation ITU-R SM.1448 assuming mode (1) propagation over an inland great-circle path (zone A2)
SRS (space-to-Earth) Low-orbiting satellite GSO satellite	Receiving DRS Adjacent Near antipodal	Line-of-sight propagation assumed
SRS (space-to-Earth) Low-orbiting satellite GSO satellite	SRS/EESS (passive)	No known use of the 15.20-15.35 GHz band under the provisions of RR No. 5.339