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| **US Radiocommunication Sector****FACT SHEET** |
| **Study Group:** USWP 7B | **Document No:** US7B\_27\_014\_NC |
| **Reference:** Resolution **253 (WRC-23)** | **Date:** 6 May 2024 |
| **Document Title:** Working documenttowards a preliminary draft new recommendation containing characteristics of SRS and EESS systems in the 2 200 – 2 290 MHz and 2 290 – 2 300 bands. |
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| **Purpose:** To provide characteristics of SRS and EESS systems operating in the (space- to-space) and (space- to-Earth) directions in the 2 200 – 2 290 MHz band and in the (space-to-Earth) direction in the 2 290 – 2 300 MHz bands for use in sharing studies with proposed MSS operations in the (s-E) direction in the adjacent bands 2 110 – 2 200 MHz and 2 300 – 2 400 MHz as part of WRC-27 agenda item 1.13.  |
| **Abstract:** WRC-27 agendaitem 1.13 calls for the consideration of studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution **253 (WRC-23)**. At its April 2024 meeting, WP 4C identified several bands to be considered for new MSS allocations including the 2 110 – 2 200 MHz band and the 2300 – 2400 MHz band. These bands are adjacent to the 2 200 – 2 290 MHz band allocated to the EESS, and SRS in the (space- to-Earth) and (space-to-space) directions and the 2290 – 2300 MHz band allocated to the SRS (deep space) in the (space-to-Earth) direction. In document 7B/44, WP 4C requested concerned working parties provide technical and operational characteristics of systems in the frequency ranges relevant to AI 1.13 **(WRC-27)** for use in sharing and compatibility studies. This document proposes a reply liaison statement to WP4C providing characteristic for systems in the science services in these bands for use in compatibility studies under agenda item 1.13 **(WRC-27)**. |
| **Fact Sheet Preparer:** James Brase, Peraton for NASA |

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| **Radiocommunication Study Groups** | Logo  Description automatically generated |
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| Draft Reply Liaison Statement to Working Party 4C  |

WRC-27 agenda item 1.13 calls for the consideration of studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution **253** **(WRC-23)**. At its April 2024 meeting, WP 4C identified several bands to be considered for new MSS allocations including the 2 110 – 2 200 MHz band and the 2300 – 2400 MHz band. These bands are adjacent to the 2 200 – 2 290 MHz band allocated for EESS, SRS, and SOS (s-E) links in the (space-to-Earth) and (space-to-space) directions, and the 2 290 – 2 300 MHz band allocated to the SRS (deep space) in the (space-to-Earth) direction.

In document 7B/44, WP 4C requested concerned working parties provide technical and operational characteristics of systems in the frequency ranges relevant to AI 1.13 **(WRC-27)** for use in sharing and compatibility studies. This contribution proposes text for a WP 7B reply liaison statement to WP 4C containing characteristic of systems in the EESS and SRS in these bands for use in compatibility studies under agenda item 1.13 **(WRC-27)**.

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| **ATTACHMENT****WORKING PARTY 7B**DRAFT REPLY LIAISON STATEMENT TO WORKING PARTY 4C |
| Technical and operational characteristics of the space research service and Earth exploration-satellite service systems in the 2 200-2 290 MHz and 2 290 – 2300 MHz bands for use in sharing and compatibility studies |

(202X)

Working Party (WP) 7B thanks WP 4C for its liaison statement in Document 7B/44 requesting information on the characteristics of space research service (SRS) and Earth-exploration satellite service (EESS) systems operating in the frequency bands relevant for studies under agenda item 1.13 (**WRC-27**).

The 2 200 – 2 290 MHz and 2 290 – 2 300 MHz bands are adjacent to the frequency bands identified for study as part of agenda item 1.13 (**WRC-27**) and are used extensively by the SRS and EESS for links in the (space-to-Earth) and (space-to-space) directions.

The Annex to this document provides information on the technical and operational characteristics of SRS and EESS systems operating in these frequency bands. These characteristics should be used for compatibility studies performed in association with agenda item 1.13 **(WRC-27)**.

WP 7B appreciates being kept informed of the status of all sharing studies relating to agenda item 1.13 (**WRC-27**).

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| **Status:** For information and action |
| **Deadline:** For next ITU-R 7B meeting (31 March 2025) |  |
| **Contact:**  TBD | **E-mail:** TBD |

Annex

Technical and operational characteristics of the space research service and Earth exploration-satellite service systems in the 2 200-2 290 MHz and 2 290 – 2 300 MHz bands for use in sharing and compatibility studies

The frequency band 2 200 - 2 290 MHz is allocated to the SRS and EESS (space-to-Earth) and (space-to-space), and the frequency band 2 290 - 2 300 MHz is allocated to the SRS (deep space) (space-to-Earth).

Typical characteristics for systems in these frequency bands are listed below in Tables 1 through 6.

# 1 Space-to-Earth links, 2 200-2 290 MHz band

Tables 1 and 2 list the transmit and receive parameters, respectively, for space-to-Earth (s-E) links in the 2 200-2 290 MHz band for SRS and EESS systems.

TABLE 1

Spacecraft transmit parameters for (space-to-Earth) links in the 2 200 – 2 290 MHz band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | System A | System B | System C |
| Altitude | km | 35 786 (GSO) | 705 | 384400 |
| Orbit Position | deg | ITU-R SA.1275 | N/A | N/A |
| Eccentricity |  | 0.0 | 0.0 | 0.0 |
| Inclination  | deg | 0.0 | 98.2 | 23.45 |
| Sun Synchronous? (Y/N) |  | N | Y | N |
| Transmit antenna gain | dBi | 0 | 3.5 | 21.0 |
| Transmit antenna pattern |  | ND-SPACE | ITU-R S.672 | ITU-R S.672 |
| Transmit power | dBW | 0.5 | 7 | 4.63 |
| Max pwr spectral density | dBW/Hz | -35.5 | -61.1 | -36,5 |
| Transmit bandwidth | MHz | 2.048 | 4.0 | 3.4 |
| Modulation type |  | PCM/PSK/PM | PSK | PCM/PSK/PM |
| Subcarrier | kHz | 1024 | N/A | 1700 |
| Range tone | kHz | 500 | N/A | 500 |
| Applicable Protection Criteria |  | ITU-R SA.609 | ITU-R SA.1027 | ITU-R SA.609 |

Table 2

Earth station receive parameters for (space-to-Earth) links in the 2 200 – 2 290 MHz band

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | System A | System B |
| Earth station location | deg. | USA |
| Receive antenna gain | dBi | 43.8 | 45.8 |
| Receive antenna temperature | k | 302.6 | 190 |
| Receive antenna pattern |  | RR Appendix **8**, Annex III | ITU-R 465-5 |
| Minimum elevation angle | deg | 5 | 5 |

# 2 Space-to-space links, 2 200 - 2 290 MHz band

Tables 3 and 4 list the transmit and receive parameters, respectively, for space-to-space (s-s) links in the 2 200 - 2 290 MHz band for EESS and SRS systems.

TABLE 3

Spacecraft transmit parameters for (space-to-space) links in the 2 200 – 2 290 MHz band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | System A | System B | System C |
| Altitude | km | 705 | 350 | 400 |
| Eccentricity |  | 0.0 | 0.0 | 0.0 |
| Inclination  | deg | 98.2 | 51.6 | 51.6 |
| Sun Synchronous? (Y/N) |  | Y | N | N |
| Transmit antenna gain | dBi | 0 | 12.9 | 22.5 |
| Transmit antenna pattern |  | ITU-R S.672 | ITU-R S.672 | ITU-R S.672 |
| Transmit power | dBW | 3.42 | 13.2 | 7.0 |
| Max pwr spectral density | dBW/Hz | -39.8 | -54.6 | -60.8 |
| Transmit bandwidth | MHz | 2.048 | 6.0 | 6.0 |
| Modulation type |  | PCM/PSK/PM | SQPN | SQPN |
| Subcarrier | kHz | 1024 | N/A | N/A |
| Range tone | kHz | 500 | N/A | N/A |
| Applicable Protection Criteria |  | ITU-R SA.1155 |

Table 4

Space station receive parameters for (space-to-space) links in the 2 200 – 2 290 MHz band

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | System A |
| Receiving space station location | deg. | See ITU-R SA.1275 |
| Receive antenna gain | dBi | 30.0 |
| Receive antenna temperature | k | 478 |
| Receive antenna pattern |  | ITU-R S.672 |

# 3 Space-to-Earth links, 2 290 - 2 300 MHz band

Tables 5 and 6 list the transmit and receive parameters, respectively for space-to-Earth (s-E) links in the 2 290 - 2 300 MHz band for SRS (deep space) systems.

TABLE 5

Spacecraft transmit parameters for (space-to-Earth) links in the 2 290 – 2 300 MHz band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | System DS-A | System DS-B | System DS-C |
| Minimum distance from Earth(Launch & early cruise, Earth flybys) | km | 200 | 3000 | 264 |
| Maximum distance from Earth | km | 4.01 × 108 | 1.52 × 109 | 4.01 × 108 |
| Transmit antenna gain | dBi | 29.5 | 37 | 30 |
| Transmit antenna pattern |  | Rec. ITU-R S.672 |
| Transmit power | dBW | 7 | 13 | 18 |
| Max pwr spectral density | dBW/Hz | -29 | -23 | -27 |
| Transmit bandwidth | MHz | 2.5 | 2.5 | 2.5 |
| Modulation type |  | PCM/PSK/PM | PCM/PSK/PM | PCM/PSK/PM |
| Subcarrier | kHz | 16 | 16 | 32 |
| Range tone | kHz | 1 033 | 1 033 | 1 033 |
| Applicable Protection Criteria |  | ITU-R SA.1157 |

Table 6

Earth station receive parameters for (space-to-Earth) links in the 2 290 – 2 300 MHz band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | System DS-A | System DS-B | System DS-C |
| Receive antenna gain | dBi | 62.3 | 63 | 53.8 |
| Receive antenna temperature | deg K | 33 | 16 | 60 |
| Receive antenna pattern |  | Rec. ITU-R SA.509-3 | Rec. ITU-R S.580-6 |
| Minimum elevation angle | deg | 10 | 10 | 10 |