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| **World Radiocommunication Conference (WRC-19) Sharm el-Sheikh, Egypt, 28 October – 22 November 2019** |  |
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| PLENARY MEETING | **Addendum 23 to Document 57-E** |
|  | **7 October 2019** |
|  | **Original: English** |
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| Brazil (Federative Republic of) | |
| Proposals for the work of the conference | |
|  | |
| Agenda item 10 | |

10 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention.

Introduction

No. **1.21** of the Radio Regulations defines *fixed-satellite service* (FSS) as follows:

A *radiocommunication service* between *earth stations* at given positions, when one or more *satellites* are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases this service includes satellite-to-satellite links, which may also be operated in the *inter-satellite service*; the fixed-satellite service may also include *feeder links* for other *space radiocommunication services*.

The “some cases” in which satellite-to-satellite links are included in the FSS are not elaborated in either the Radio Regulations (RR) or associated ITU publications. Nevertheless, the possibility for satellite-to-satellite links within the FSS exists.

Similarly, No. **1.25** of the RR defines the mobile-satellite service (MSS) to include the possible use of links between space stations as follows:

*A radiocommunication service:*

– *between mobile earth stations and one or more space stations, or between space stations used by this service; or*

– *between mobile earth stations by means of one or more space stations.*

*This service may also include feeder links necessary for its operation.*

While the definition of the MSS allows for communication between MSS space stations, most allocations to the MSS in Article **5** are limited to the MSS in the Earth-to-space and space-to-Earth direction, and hence cannot be use for satellite-to-satellite links.

As reported by the Director of the Radiocommunication Bureau to the final CPM for WRC-19, since 2014, there have been 27 submissions of advance publication information for non-GSO satellite systems under No. **4.4** of the Radio Regulations specifying use by a non-allocated space service of frequency bands allocated to another space service. *See* Document CPM19-2/17, at Section 3.1.3.2 (preliminary draft Report of the Director to WRC-19 on Activities of the Radiocommunication Sector)[[1]](#footnote-1)\*. Notification information was subsequently filed for frequency assignments to 3 of these systems. The Director’s draft report states that “[n]one of these frequency assignments was reported to the BR as causing harmful interference to any service of another administration.” Document CPM19-2/17, Section 3.1.3.2\*.

The challenge comes, as the Director of the Radiocommunication Bureau has acknowledged, in finding a path to recognition in the Radio Regulations for such uses, where possible, based on the technical conditions derived from ITU-R studies. Because frequency bands allocated to the fixed-satellite service and mobile-satellite service are used for links between space stations and earth stations, it is necessary to analyse the use of the same bands for satellite-to-satellite links to ensure compatibility and avoid harmful interference. The sharing scenario is likely to differ compared to the current use of these bands for space-to-Earth and Earth-to-space transmissions.

Preliminary ITU-R studies conducted in Working Party 4A have identified factors to be considered in assessing the compatibility of non-GSO satellite-to-GSO satellite links, in the Earth-to-space direction in the 27-30 GHz frequency band and space-to-Earth in frequency bands 17.7-20.2 GHz, with other FSS operations and other services. Further, at least one satellite operator has sought to operate non-GSO satellite-to-GSO satellite links in the 47.2-50.2 GHz and 50.4-51.4 GHz frequency bands. Preliminary ITU-R studies conducted in Working Party 4C have identified factors to be considered in assessing the compatibility of non-geostationary satellites operating space-to-space links in MSS allocations in the 1-3 GHz range, with other MSS operations and other services. Continued development and completion of these studies to include non-GSO satellite-to-satellite links will permit the development of appropriate ITU-R regulatory text to define the cases in which such transmissions may be provided, and allow for a determination of whether the recognition of compatible links can be made via appropriate modifications to the studied FSS and MSS allocations in Article **5**.

Proposal

MOD B/57A23/1

RESOLUTION 810 (WRC‑19)

Preliminary agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (, Sharm el-Sheikh, 2019),

…

resolves to give the view

that the following items should be included in the preliminary agenda for WRC‑23:

…

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC‑19, to consider and take appropriate action in respect of the following items:

…

2.[xx]to identify the cases and conditions under which transmissions between non-geostationary orbit space stations and geostationary-orbit space stations in the MSS in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz, and between non-geostationary orbit space stations and geostationary-orbit space stations and other non-geostationary-orbit space stations in the FSS in the frequency bands 17.7-20.2 GHz and 27.5-30 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz may be accommodated on a basis other than under No. **4.4** of the Radio Regulations, taking into account the necessary protection of existing services, in accordance with Resolution **[B/A10/SAT-TO-SAT] (WRC-19)**;

…

ADD B/57A23/2

Draft New Resolution [B/A10/SAT-TO-SAT] (WRC‑19)

Study of technical, operational issues, and regulatory provisions for transmissions between non-geostationary satellites and geostationary satellites in the mobile-satellite service in the bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz, and between non-geostationary satellites and other satellites in the fixed-satellite service in the frequency bands 17.7-20.2 GHz and 27.5-30 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

*a)* that the definition of fixed-satellite service (FSS) in No. **1.21** of the Radio Regulations includes the possibility, in some cases, of satellite-to-satellite links, which may also be operated in the inter-satellite service;

*b)* that the definition of mobile-satellite service (MSS) in No. **1.25** of the Radio Regulations includes communication between space stations;

*c)* that there have been expressions of interest by some administrations of using the 27.5-30 GHz FSS Earth-to-space and space-to-Earth in frequency bands 17.7-20.2 GHz for transmissions between non-geostationary orbit (non-GSO) satellites and other FSS satellites;

*d)* that there have been expressions of interest by some administrations of using the bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz, for transmissions between non-GSO MSS satellites and GSO MSS satellites;

*e)* that frequency bands allocated to the fixed-satellite service are used for links between earth stations and space stations, and that such links may not be operated in the inter-satellite service;

*f)* that frequency bands allocated to the mobile-satellite service are used for links between mobile earth stations and space stations, and that such links may not be operated in the inter-satellite service;

*g)* that the ITU-R has begun preliminary studies on the technical and operational issues associated with the use of non-GSO satellites transmitting toward the GSO in the 27.5-30 GHz FSS band, and that such studies are expected to continue in this band and other bands after WRC-19;

*h)* that the ITU-R has begun preliminary studies on the technical and operational issues associated with the use of non-GSO satellites communicating with GSO MSS satellites in the bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz, and that such studies are expected to continue in this band and other bands after WRC-19;

*i)* that all allocations to the fixed-satellite in the bands 17.7-20.2 GHz and 27.5-30 GHz are limited to Earth-to-space or space-to-Earth and hence may not be used for space-to-space links;

*j)* that the allocations to the MSS in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz are limited to Earth-to-space or space-to-Earth and hence may not be used for space-to-space links,

recognizing

*a)* that it is necessary to analyse the use of the bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz by non-GSO satellites and GSO MSS satellites to ensure compatibility with all allocated services in this band and avoid harmful interference;

*b)* that it is necessary to analyse the use of the FSS (Earth-to-space) band in the 27.5-30 GHz frequency band and space-to-Earth in frequency bands 17.7-20.2 GHz between FSS non‑GSO satellites and GSO satellites to ensure compatibility with all allocated services in this band and avoid harmful interference;

*c)* that the sharing scenarios should take account of the varying orbital characteristics of the non-GSO satellites;

*d)* that the use of the above frequency bands for satellite-to-satellite links is being made today under No. **4.4** of the Radio Regulations, without recognition and on a non-harmful interference/non-protected basis,

recognizing further

*a)* that the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz are allocated to the mobile-satellite service in all three Regions and that parts of these bands are allocated to other services;

*b)* that the use of the frequency bands 27.5-28.6 GHz and 29.5-30 GHz by non-geostationary fixed-satellite service systems is subject to the application of the provisions of Nos. **5.484A**, **22.5C** and **22.5I**;

*c)* that use of the frequency band 28.6-29.1 GHz by geostationary and non-geostationary fixed-satellite service networks is subject to the application of the provisions of No. **9.11A**, and No. **22.2** does not apply (No. **5.523A**);

*d)* that use of the frequency band 29.1-29.5 GHz (Earth-to-space) by the fixed-satellite service is limited to geostationary-satellite systems and feeder links to non-geostationary satellite systems in the mobile-satellite service, and that such use is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**, except as indicated in Nos. **5.523C** and **5.523E**, where such use is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.535A**);

*e)* that the frequency band 27.5-30 GHz may be used by the fixed-satellite service (Earth-to-space) for the provision of feeder links for the broadcasting-satellite service (No. **5.539**);

*f)* that feeder links of non-geostationary networks in the mobile-satellite service and geostationary networks in the fixed-satellite service operating in the frequency band 29.1-29.5 GHz (Earth-to-space) shall employ uplink adaptive power control or other methods of fade compensation, such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between both networks (No. **5.541A**);

*g)* that the fixed and mobile services are allocated on a primary basis in the frequency bands 17.7-17.8 GHz, 18.1-19.7 GHz and 27.5-29.5 GHz frequency bands on a global basis and fixed service is also primary within 17.8-18.1GHz;

*h)* that the frequency band 28.5-29.5 GHz (Earth-to-space) is also allocated to the Earth exploration-satellite service on a secondary basis, and no additional constraints should be imposed on the EESS and the conditions of fixed-satellite service operation are described in Resolution **750** **(Rev.** **WRC-15)**;

*i)* that the frequency band 29.5-30 GHz (Earth-to-space) is also allocated to the mobile-satellite service on a primary basis in 29.5-30 GHz in Region 2, on a primary basis in 29.9-30 GHz in Regions 1 and 3, and on a secondary basis in Regions 1 and 3 in 29.5-29.9 GHz;

*j)* that the frequency bands 47.2-47.5 and 47.9-48.2 GHz are allocated on a primary basis to the fixed service and designated for use by high altitude platform stations, subject to the provisions of Resolution **122 (Rev. WRC-07)**;

*k)* that the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz are also allocated on a primary basis to the fixed and mobile services;

*l)* that all allocated services in these frequency bands should be taken into account;

*m)* that parts of the frequency band 17.7-18.1 GHz are used by feeder links for the broadcasting-satellite service, subject to Appendix **30A** (No. **5.516**);

*n)* that use of the frequency band 18.1-18.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links of geostationary-satellite systems in the broadcasting-satellite service (No. **5.520**);

*o)* that the frequency band 18.6-18.8 GHz is used by the Earth exploration-satellite service (EESS) (passive) in remote sensing by Earth exploration and meteorological satellites, and protection from interference is essential for passive sensing measurements and applications, especially for measurements of known spectral lines, which are of particular importance,

resolves to invite ITU-R

1 to study the technical and operational characteristics of different types of non-GSO space stations that operate or plan to operate space-to-space links with GSO MSS networks in the bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz;

2 to study sharing and compatibility between space-to-space links between non-GSO and GSO MSS space stations and current and planned stations of existing services allocated in the in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz to ensure technical compatibility;

3 to study the technical and operational characteristics and user requirements of different types of non-GSO space stations that plan transmissions in the general Earth-to-space direction in the frequency bands 27.5-30 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz and space-to-Earth in frequency bands 17.7-20.2 GHz to GSO and non-GSO FSS space stations;

4 to study sharing and compatibility between non-GSO space stations transmitting in the general Earth-to-space direction in the 27.5-30 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz frequency bands and space-to-Earth in frequency bands 17.7-20.2 GHz to GSO and non-GSO FSS space stations and current and planned stations of the FSS and other existing services allocated in same frequency bands, to ensure protection of, and not impose undue constraints on, other FSS operations and other services allocated in those frequency bands and taking into account *recognizing further* *a)* to *p)*;

5 to develop, for different types of non-GSO space stations and different portions of the frequency bands studied, technical conditions and regulatory provisions for their operation, including new or revised allocations as appropriate, taking into account the results of the studies above;

6 to complete these studies by the 2023 World Radiocommunication Conference,

invites administrations

to participate in the studies and to provide input contributions,

resolves to invite the 2023 World Radiocommunication Conference

to consider the results of the above studies and take necessary regulatory actions, as appropriate.

**Reasons:** To provide a means for recognizing in the Radio Regulations space-to-space transmissions in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz, 1 668-1 675 MHz, 17.7-20.2 GHz and 27.5-30 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz from non-GSO space stations to other space stations while avoiding interference with existing systems.

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1. \* Note by the Secretariat: same section 3.1.3.2 in WRC-19 Document 4(Add.2). [↑](#footnote-ref-1)