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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 24 to Document 50-E** |
|  | **7 October 2019** |
|  | **Original: English** |
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| Singapore (Republic of) | |
| Proposals for the work of the conference | |
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| 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.

Proposal to consider an allocation to the mobile-satellite service (space-to-space) in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz

Background

Many low-Earth orbit (LEO) satellites operate today and are planned to operate in the near future, providing a broad range of Earth observation and communication applications; for governments, the scientific community and commercial customers. LEO satellites typically operate with limited and non-real-time connectivity through a number of earth stations located around the globe. The low-Earth orbit means that an earth station has visibility of the LEO spacecraft for only a short period of time, and satellites must spend much of their orbit outside of the visibility of any earth station and hence without connectivity to the ground. Aside from the limited time for which connectivity is available, the cost of the ground infrastructure can be prohibitive for new low-cost space applications such as “cubesats”. A more effective and economic means of communication can be provided between existing GSO MSS satellites and LEO satellites within the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz. By using specially modified mobile earth station equipment installed on the LEO spacecraft, communications can be provided and maintained between the LEO satellite and the GSO MSS satellites. The GSO satellites have permanent connectivity to the ground via their feeder links and gateway earth stations, which relay the data to and from the LEO spacecraft. Three or more GSO satellites can provide connectivity to LEO satellites for almost 100% of a typical LEO orbit. These communications links would therefore provide an effective means for continuous monitoring and control of such LEO satellites.

Discussions with LEO satellite operators have revealed that the addition of space-to-space communications within the MSS will enable a near real-time, on-demand and uninterrupted means for monitoring and control of such LEO satellites. This will not only enhance security and efficiency of operations for the LEO satellites but also enable new use cases for LEO satellite missions, thereby greatly liberating the use of LEO satellites for many innovative and important applications and level the playing field for new players from countries around the world.

Size and power are important design considerations for many LEO spacecraft and the use of the bands around 1.5/1.6 GHz allows for the use of small terminals on the LEO spacecraft, with low power requirements. Such operations between GSO MSS satellite and LEO satellites are technically feasible today and some trial systems have been operated, However the current allocations in these frequency bands do not support space-to-space links, and hence today any such use can only operate under provision No. **4.4** of the RR. The use of No. **4.4** to accommodate such use has been referred to by the Director, BR, in the preliminary draft Report of the Director to WRC-19 on the Activities of the Radiocommunication Sector (see section 3.1.3.2 of Document CPM19-2/17[[1]](#footnote-1)\*).

ITU-R Working Party 4C has conducted preliminary studies of this issue and has developed a preliminary draft new ITU-R Report on this topic (see Annex 8 to Document 4C/417[[2]](#footnote-2)\*\*).

The use of radiocommunication links between MSS space stations falls within the definition of the MSS in accordance with No. **1.25** of the Radio Regulations and could be applied to any given frequency band with an allocation to the MSS (space-to-space). However the current allocations in the bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz are for MSS (space-to-Earth) or MSS (Earth-to-space), and so do not accommodate MSS (space-to-space) applications.

Proposal

An agenda item for WRC-23 is proposed below by Singapore with a draft of the WRC Resolution for the allocation of the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz. Using the template provided in Annex 2 of Resolution **804** (**Rev.WRC-12**), the proposal is appended as follows*.*

ADD SNG/50A24/1

Draft New Resolution [SNG/A10/MSS SPACE-TO-SPACE L-BAND] (WRC-19)

Allocations to the mobile-satellite service (space-to-space) in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz

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

considering

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

*b)* that many non-GSO satellites operate with limited and non-real-time connectivity to earth stations;

*c)* that space-to-space communication between such non-GSO satellites and geostationary (GSO) MSS satellites would enhance the security and efficiency of operations;

*d)* that GSO MSS satellites operating in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz can support these types of operation;

*e)* that the above frequency bands are currently allocated to MSS (space-to-Earth) or MSS (Earth-to-space) but not to MSS (space-to-space);

*f)* that the ITU-R has begun preliminary studies on the technical and operational issues associated with the operation of space-to-space links between non-GSO satellites and GSO MSS satellites in the above frequency bands,

recognizing

that it is necessary to study the potential operation of MSS (space-to-space) in the above frequency bands to ensure compatibility with all allocated services in these bands and avoid harmful interference,

noting

*a)* that Section 3.1.3.2 of the Director’s Report to WRC-19 on the activities of the Radiocommunication Sector highlights that the Bureau has received an increased number of Advanced Publication Information (API) for non-geostationary satellite networks in frequency bands which are not allocated by Article **5** of the Radio Regulations for the type of foreseen service, including satellite network filings for inter-satellite applications in bands allocated only in the Earth-to-space or space-to-Earth directions;

*b)* that the same Director’s Report concludes that in view of recent technical developments and the increasing number of submissions of inter-satellite links in frequency bands not allocated to the inter-satellite service or to a space service in the space-to-space direction, the Conference may wish to consider means to give recognition to these uses based on the conditions derived from studies by ITU-R Working Parties 4A and 4C in order to avoid interfering with existing systems operating in the same frequency bands,

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 space stations in the above frequency bands and current and planned stations of existing services allocated in the same frequency bands to ensure technical compatibility;

3 to develop technical conditions and regulatory provisions for operation of space-to-space links in these bands, including new or revised allocations as appropriate, taking into account the results of the studies called for in *resolves to invite ITU-R* 1and 2 *above,*

further resolves

to invite WRC-23 to consider the results of the above studies and take appropriate action,

invites administrations

to participate in the studies by submitting contributions to ITU-R.

**Reasons:** To supplement the inclusion of this new agenda item for WRC-23.

ANNEX

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| Subject:  Allocations to the mobile-satellite service (space-to-space) in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz, in accordance with draft new Resolution **[SNG/A10/MSS SPACE-TO-SPACE L-BAND] (WRC-19)** | |
| Origin: Singapore | |
| *Proposal*:  To consider an allocation to the mobile-satellite service (space-to-space) in the frequency bands 1 518-1 559 MHz, 1 626.5-1 660.5 MHz and 1 668-1 675 MHz, in accordance with draft new Resolution **[SNG/A10/MSS SPACE-TO-SPACE L-BAND] (WRC-19)** | |
| *Background/reason:*  Many LEO satellites operate with limited non-real-time support through a network of earth stations. The addition of space-to-space communications within the MSS would provide an effective means for continuous monitoring and control of such LEO satellites, which would enhance security and efficiency of operations. The links could also be used to provide real-time download of data from the LEO satellite. | |
| ***Radiocommunication services concerned*:**  MSS, SOS, FS, MS, RAS, SRS (passive), MetAids, MetSat (space-to-Earth) | |
| ***Indication of possible difficulties*:**  There is use of some parts of the bands by terrestrial services and radio astronomy services. Sharing between these services with LEO spacecrafts is generally more favourable than sharing with mobile earth stations (land, maritime or aeronautical) and so is not expected to be a significant issue.  Sharing with existing services, including MSS applications (space-to-Earth and Earth-to-space) needs to be studied. | |
| ***Previous/ongoing studies on the issue*:**  WP4C has developed a preliminary draft new ITU-R Report to describe this application. | |
| ***Studies to be carried out by*:**  Administrations and Sector members of the ITU-R | ***with the participation of*:**  Satellite operators, ICAO, IMO |
| ***ITU‑R Study Groups concerned*:**  Study Group 4 | |
| ***ITU resource implications, including financial implications (refer to CV126)*:**  This proposed agenda item will be studied as part of the regular ITU-R procedures and planned budget. | |
| ***Common regional proposal*:** No | ***Multicountry proposal*:** No  ***Number of countries*:** |
| ***Remarks*** | |

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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)
2. \*\* Note by the Secretariat: the latest version of this document is available in Annex 6 to Doc. 4C/472. [↑](#footnote-ref-2)