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|  | ASIA-PACIFIC TELECOMMUNITY | **Document No:** |
| **The 5th Meeting of the APT Conference Preparatory**  **Group for WRC-19 (APG19-5)** | **APG19-5/OUT-33** |
| 31 July – 6 August 2019, Tokyo, Japan | 5 August 2019 |

Working Party 4

**APT VIEW AND PRELIMINARY APT COMMON PROPOSAL**

**on WRC-19 agenda item 1.7**

**Agenda Item 1.7:**

*to study the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with Resolution* ***659 (WRC-15)****;*

**1. Background**

Resolution **659 (WRC-15)** calls to study the spectrum needs for telemetry, tracking and command in the space operation service for NGSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations. Typical short duration missions are understood in this context to have a maximum lifetime of three years.

WRC-19 agenda item 1.7 invites studies to accommodate spectrum requirements for TT&C in the SOS for the growing number of non-GSO satellites with short duration missions, taking into account RR No. 1.23 and assessment of the suitability of existing allocations to the space operation service in the frequency range below 1 GHz, and taking into account current use. It is also indicated that the existing allocations to the space operation service below 1 GHz, where RR No. 9.21 applies, are not suitable for non-GSO satellites with short duration missions.

The two frequency bands below 1 GHz under consideration for new or upgraded allocation (150.05‑174 MHz and 400.15-420 MHz) are used for a wide variety of terrestrial and space applications, and some are heavily used on a consistent basis. All studies conducted in the frequency ranges 150.05-174 MHz/400.15-403 MHz/406-420 MHz show that sharing between non-GSO SD systems (Earth-to-space and space-to-Earth) and the existing incumbent services in this frequency band is not feasible.

An examination of the telemetry downlink (space-to-Earth) summary shows that currently there are three frequency bands below 1 GHz that are allocated to the SOS on a primary basis: 137-138 MHz, 272-273 MHz and 401-402 MHz. However, the frequency bands 272-273 MHz and 401-402 MHz are heavily used by existing systems. The 137-138 MHz SOS (space-to-Earth) allocation could accommodate the spectrum needs for short duration missions, however consideration of this band for short duration missions needs further regulatory and technical studies.

**The CPM Methods**

Four methods and associated regulatory texts were developed to satisfy this agenda item. Methods B1 and B2 propose a new allocation and Method C proposes to use existing allocations:

* Method A proposes no change to the Radio Regulations;
* Method B1 proposes a new SOS (Earth-to-space) allocation for non-GSO SD systems in the frequency range 403-404 MHz;
* Method B2 proposes a new SOS (Earth-to-space) allocation for non-GSO SD systems in the frequency range 404-405 MHz;
* Method C proposes to use the SOS allocation in the frequency band 137-138 MHz for downlink and the band 148-149.9 MHz for uplink and to provide appropriate associated regulatory provisions in the Radio Regulations for telecommand links of non-GSO SD missions.

**2. Documents**

* Input Documents: APG19-5/INP-19 (NZL), APG19-5/INP-38 (IRN), APG19-5/INP-45 (AUS), APG19-5/INP-52 (INS), APG19-5/INP-59 (SNG), APG19-5/INP-68 (CHN), APG19-5/INP-83 (J), APG19-5/INP-109 (MLA-THA), APG19-5/INP-120 (VTN), APG19-5/INP-130 (KOR), APG19-5/INP-135 (IND).
* Information Documents: APG19-4-OUT-31, APG19-5/INF-01 (WMO), APG19-5/INF-02 (ICAO), APG19-5/INF-03 Rev-1 (IARU), APG19-5/INF-18 (CEPT), APG19-5/INF-19 (ATU), APG19-5/INF-20 (CITEL), APG19-5/INF-22 (RCC).

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 New Zealand - Document APG19-5/INP-19**

New Zealand supports a new allocation to space operation (Earth-to-space) service in the frequency range 403-404 MHz (i.e. Method B1). New Zealand also supports the proposed changes to use the existing space operation service allocation in the frequency bands 137-138 MHz and 148-149.9 MHz for telecommand links of non-GSO short duration missions (i.e. Method C).

New Zealand is also of the view that the following frequency ranges should not be considered:

* maritime mobile VHF radiocommunication in the frequency ranges 156-157.45 MHz, 160.6-160.975 MHz and 161.475-162.05 MHz, in accordance with RR No. **5.226** and Appendix **18 (Rev. WRC-15)**; and
* mobile-satellite service in the frequency range 406-406.1 MHz that is dedicated for satellite emergency position-indicating radio beacons, in accordance with Resolution **205 (Rev. WRC-15)**.

**3.1.2 Islamic Republic of Iran - Document APG19-5/38**

Regarding the above diverse conclusions for the sharing studies in CPM report, it seems that Method B could not satisfy this agenda item.

In method C, it seems that there are some benefits and drawbacks. The benefits of this Method in the frequency band 137-138 MHz are as follows:

1. In Method C, the frequency band 137-138 MHz which has already been allocated to space operation service (space-to-Earth) would be identified for the application of telemetry, tracking and command links of non-GSO satellites with short duration missions through addition of a new footnote *(refer to No.* ***5.C17*** *and considering d) in draft new Resolution [A17-Method-C] in section 4/1.7/5.4)*.
2. In Method C, in the draft new Resolution [A17-method-C], a pfd value of −140 dB(W/(m2. 4 kHz)) has been included for ensuring the protection of terrestrial services in the frequency band 137-138 MHz. This pfd value is the same as the coordination threshold that has already been taken in the same frequency band for space stations of MSS (space-to-Earth) with respect to terrestrial services (see sections 1.1.1 and 1.1.2 of Annex 1 of Appendix 5 of RR). If this level is exceeded, RR No. **9.11A** applies for networks or systems within the SOS in this band (refer to *resolves 2* in the draft new Resolution [A17-method-C]).

The drawback of the Method C in the frequency band 137-138 MHz is the following:

* The applicability of the above coordination threshold for non-GSO application in SOS has not yet been demonstrated, nor whether it would be sufficient to ensure protection of in-band and adjacent-band incumbent systems from the short-duration SOS application (refer to section 4/1.7/4.3). Pursuant to this issue, it is outlined in disadvantage part of Method C in section 4/1.7/4.3 that :

“Consideration of the 137-138 MHz frequency band for non-GSO SD may need further regulatory and technical studies. “

In Method C, for the frequency band 148-149.9 MHz, the following drawbacks are observed:

1. The frequency band 148-149.9 MHz has already been allocated to space operation service (Earth-to-space) in the RR No. **5.218**, subject to agreement obtained under RR No. **9.21**. In method C, space operation service (Earth-to-space) is add directly as a primary service in the 148-149 MHz frequency band in the table of frequency allocation, and with modification of RR No. **5.218**, the reference to RR No **9.21** is removed from this footnote without inspecting or assessing the effects.

Considering the above, it is outlined in the disadvantage part of Method C in section 4/1.7/4.3 that:

“The impact of removal of RR No. **9.21** in the frequency band 148-149.9 (in particular for non-GSO SD missions) is still to be investigated. “

1. As outlined in *resolves* 3 in the draft new Resolution [A17-Method-C] in section 4/1.7/5.4:

“In the frequency band 148-149.9 MHz (Earth-to-space), No. **9.11A** does not apply to space operation service (SOS) (Earth-to-space) networks “

Considering the above, it seems that the protection of the heavily used primary terrestrial services is not ensured in this frequency band.

1. Modifying RR No. **5.218** RR by removing RR No. **9.21** from the conditions for the use of SOS frequency band 148−149.9 MHz (Earth-to-space), is out of the scope of Resolution **659 (WRC-15)**.

Regarding the above, our preferred choice in this agenda item is Method A (No Change). However , we may consider Method C, if only those parts of this method that are related to the frequency band 137-138 MHz, not the frequency band 148-149.9 MHz, are retained and if only the protection of the heavily used terrestrial services in the 137-138 MHz frequency band is ensured. (The applicability and sufficiency of the above coordination threshold for the protection of terrestrial services are demonstrated.)

**3.1.3 Australia - Document APG19-5/INP-45**

Australia notes that current allocations below 1 GHz have been found to not fully meet requirements for the space operation service (SOS) for telemetry, tracking and command for non-GSO satellites with short duration missions.

Australia supports Method C of the CPM Report subject to the condition that satisfactory measures are agreed to ensure protection of AM(R)S systems below 137 MHz.

Australia does not propose a Preliminary APT Common Proposal for this issue.

**3.1.4 Indonesia (Republic of) - Document APG19-5/INP-52**

Indonesia is of the view to support Method C which proposes to use the existing SOS allocation in the frequency bands 137-138 MHz for downlink and 148-149.9 MHz for uplink and to provide appropriate associated regulatory provisions in the Radio Regulations for telecommand links of non-GSO SD satellites.

**3.1.5 Singapore - Document APG19-5/INP-59**

Singapore is of the view that the studies within ITU-R Working Party 7B at its final meeting in June have not concluded or reached consensus on ensuring compatibility between AM(R)S aeronautical safety systems operating on a global basis below 137 MHz and SOS systems in accordance with Resolution 659 (WRC-15). Therefore, Singapore supports Method A (No Change) to the Radio Regulations in light of incomplete study actions that cannot ensure compatibility.

Supportive of APT Preliminary views in APG19-4, Singapore is also of the view that the following frequency ranges should not be considered:

* Maritime mobile VHF radiocommunication in the frequency ranges 156-157.45 MHz, 160.6-160.975 MHz and 161.475-162.05 MHz, in accordance with RR No. **5.226** and Appendix **18** (**Rev. WRC-15**)**.**
* The frequency range 406-406.1 MHz that is dedicated for satellite emergency position-indicating radio beacons, in accordance with Resolution **205** (**Rev. WRC-15**); and

Frequency bands used by Global Maritime Distress and Safety System (GMDSS) included in Appendix **15** of RR.

**3.1.6 China (People’s Republic of) - Document APG19-5/INP-68**

Taking into account three methods above, China prefers to support the method C which proposes to use the existing SOS allocation in the frequency bands 137-138 MHz for downlink and 148-149.9 MHz for uplink and to provide appropriate associated regulatory provisions in the Radio Regulations for telecommand links of non-GSO SD satellites, if the studies show that sharing and compatibility both in-band and out-of-band is feasible with existing services and systems.

**3.1.7 Japan - Document APG19-5/INP-83**

Japan does not support Method B1 and Method B2, since studies of ITU-R Report SA. 2427-0 indicate that it is possible for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions to share the existing meteorological aids service, only under the limited condition.

With regard to Method C, sharing and compatibility studies between the telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions and incumbent services has not been completed. In addition, working document towards a preliminary draft new Report ITU-R SA.[NGSO SD VHF COMPATIBILITY] about compatibility with aeronautical mobile (route) service including VDL (VHF Digital Link) system using adjacent band is under development in the frequency band 137-138 MHz. Furthermore, many radio stations of land mobile service have been operated in the frequency band 148-149.9 MHz in Japan.

Consequently, since there are concerns on sharing between tracking and command in the space operation service for non-GSO satellites with short duration missions and incumbent services, Japan supports Method A.

**3.1.8 Malaysia and Thailand - Document APG19-5/INP-109**

Malaysia and Thailand are of the view that protection of existing services is necessary and any new allocations or upgrades of existing allocations to the space operation service should be applied without any constraint to the incumbent services including their current and planned use, both in-band as well as adjacent bands.

Therefore, Malaysia and Thailand support an allocation of 1 MHz to the SOS in the Earth-space direction, limited to non-GSO SD satellite systems in 404-405 MHz as indicated in section 4/1.7/3.3.3.2 of the CPM Report as per Method B2 of the CPM Report.

In addition, Malaysia and Thailand do not support Method C of the CPM Report.

**3.1.9 Viet Nam - Document APG19-5/INP-120**

Based on the amount of spectrum required for non-GSO SD systems indicated by the study, Vietnam supports a new allocation in the methods B1/B2.

**3.1.10 Republic of Korea - Document APG19-5/INP-130**

Since ITU-R studies have not ensured compatibility with existing services, the Republic of Korea does not support additional allocations or upgrades of existing allocations to the space operation service for short duration mission satellites. Therefore, the Republic of Korea supports Method A described in the CPM Report.

**3.1.11 India (Republic of) - Document APG19-5/INP-135**

The frequency bands proposed in the CPM report for accommodating SOS (Space-to-Earth) are used in India with heavy assignments. Keeping this in view, preliminary view proposed is as below.

Method A NOC

**3.2 Summary of issues raised during the meeting**

* The frequency bands proposed in the CPM report for accommodating SOS (Space-to-Earth) are used with heavy assignments.
* Sharing and compatibility studies between the telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions and incumbent services has been completed with the exception of the issue of adjacent band compatibility.
* There are diverse conclusions for the sharing studies in CPM report on the band 403-406MHz
* Protection of existing services is necessary and any new allocations or upgrades of existing allocations to the space operation service should protect the incumbent services including their existing and planned use, both in-band as well as adjacent bands

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| Admin | Method A - NoC | Method B1 –  403-404 UP | Method B2 –  404-405 UP | Method C –  137-138 DN  148-149.9 UP | Comments |
| **INPUT DOCUMENTS** | | | | | |
| New Zealand (INP19) |  | Yes |  | Yes |  |
| Iran (INP38) | Yes |  |  | Maybe (137-138 MHz only) | Impact of removing 9.21 from 148 MHz not investigated. Removing 9.21 out of scope. |
| Australia (INP45) |  |  |  | Yes | subject AM(R)S protection |
| Indonesia (INP52) |  |  |  | Yes |  |
| Singapore (INP59) | Yes |  |  |  | AM(R)S protection not ensured. |
| China (INP68) |  |  |  | Yes | if the studies show that sharing and compatibility both in-band and out-of-band is feasible with existing services and systems |
| Japan (INP83) | Yes | No | No |  | Due concerns with Method C, AM(R)S & LMS |
| Malaysia (INP109 + ACP) |  |  | Yes | No |  |
| Thailand (INP109 + ACP) |  |  | Yes | No |  |
| Vietnam (INP120) |  | Yes | Yes |  | Support B1 and B2 |
| Korea (INP130) | Yes |  |  |  | Studies haven’t assured compatibility. |
| India (INP135) | Yes |  |  |  | As bands heavily used |
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**4. APT View(s)**

APT Members do not support allocations for non-GSO Short Duration systems in the following frequency ranges:

* Maritime mobile VHF radiocommunication in the frequency ranges 156-157.45 MHz, 160.6-160.975 MHz and 161.475-162.05 MHz, in accordance with RR No. **5.226** and Appendix **18** (**Rev. WRC-15**)**.**
* The frequency range 406-406.1 MHz that is dedicated for satellite emergency position-indicating radio beacons, in accordance with Resolution **205** (**Rev. WRC-15**); and
* Frequency bands used by Global Maritime Distress and Safety System (GMDSS) included in Appendix 15 of RR.

The main support from APT members is for Method A and Method C, with a preference for Method C if the protection can be ensured for AM(R)S below the 137-138 MHz frequency band and the FS and MS in the 148-149.9 MHz frequency band.

Some APT members do not support Method C.

**5. Preliminary APT Common Proposal(s)**

PACP will be developed under General Matters based on the APT views.

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