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| **The 5th Meeting of the APT Conference Preparatory**  **Group for WRC-19 (APG19-5)** | **APG19-5/OUT-40**  **(Rev.1)** |
| 31 July – 6 August 2019, Tokyo, Japan | 6 August 2019 |

Working Party 5

**APT VIEW AND PRELIMINARY APT COMMON PROPOSAL**

**on WRC-19 agenda item 1.9.2**

**Agenda Item 1.9.2:**

*1.9 to consider, based on the results of ITU-R studies:*

*1.9.2 modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix* ***18****, to enable a new VHF data exchange system (VDES) satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, applications specific messages (ASM) and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in recognizing d) and e) of Resolution* ***360 (Rev.WRC-15)****;*

Resolution **360 (Rev.WRC‑15)** – *Consideration of regulatory provisions and spectrum allocations to the maritime mobile-satellite service to enable the satellite component of the VHF Data Exchange System and enhanced maritime radiocommunication*

**1. Background**

**1.1 Introduction**

The studies associated with WRC-15 AI 1.16 resulted in elaboration of a concept for the VHF data exchange system (VDES) reflected in Recommendation ITU-R M.2092-0. The system combines the current Automatic Identification System (AIS), applications specific messages (ASM) as well as data exchange terrestrial and satellite components.

During WRC-15 no allocations were made to VDES satellite component since the compatibility studies with the incumbent services in the frequency bands assumed for operation of VDES satellite component and in the adjacent frequency bands were incomplete.

For the preparation for WRC-19, ITU-R WP 5B was invited to conduct studies to identify the spectrum need of VDES satellite components (VDE-SAT), and also the sharing and compatibility studies between VDE-SAT and incumbent services in the same and adjacent frequency bands specified in *recognizing d)* and *e)* of ITU-R Resolution **360 (Rev. WRC-15)**.

Some incumbent services should be considered in the sharing studies, including land mobile service and maritime mobile service, which are widely used in global basis. It was also recognized that the radiolocation service and space operation service operated in the frequency bands 154-156 MHz and 163-167 MHz within the territory of a number of countries, including some APT countries, in accordance with RR Nos. **5. 225A** and **5.230**. The nearest frequency bands allocated to the radio astronomy service (RAS) should also be protected.

**1.2 Study progress in ITU-R**

**1.2.1 Studies on the CPM Report**

Following six methods were developed and incorporated in the CPM Report to address the agenda item 1.9.2.

**Method A**

NOC to the Radio Regulations except suppression of Resolution **360 (Rev.WRC-15)**. As a result there will be no frequency allocations to the satellite component of VDES (VDE-SAT).

**Method B**

This method proposes new primary allocations to the maritime mobile-satellite service (MMSS) (Earth-to-space) and (space-to-Earth) using frequency plan alternative 2 as described in section 5/1.9.2/3.2.2 of CPM Report. The coordination mechanism with respect to terrestrial services under RR No. **9.14** is introduced with two options for the pfd-mask, as detailed in section 5/1.9.2/5.2 of CPM Report.

**Method C**

This method uses the same frequency plan as Method B but with new secondary allocations for the MMSS (Earth‑to-space) and (space-to-Earth).

Due to the proposed secondary status of the allocation to the MMSS, there is no coordination required between the MMSS and terrestrial services and therefore there is no need to make any modifications to Appendix **5** of the RR.

**Method D**

This method is the same as Method C except with the addition of a pfd limit in RR Article **5** in order to protect the terrestrial services. This method includes two options, and the description of the pfd masks, as detailed in section 5/1.9.2/5.3 of CPM Report.

**Method E**

This method proposes new secondary allocations for the MMSS (Earth‑to-space) and (space-to-Earth) subject to agreement in accordance with No. **9.21** of the RR to be limited to the use of the VDES satellite component to ensure compatibility with existing services.

**Method F**

This method proposes new primary allocations to the MMSS (Earth-to-space) and (space-to-Earth) using frequency plan based on alternative 3 as described in section 5/1.9.2/3.2.3 of CPM Report. Details on the pfd mask for coordination of MMSS (space-to-Earth) with respect to terrestrial services are provided in the section 5/1.9.2/5.5 of CPM Report.

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| Methods in CPM Report | Options | Frequency plan | Frequency allocation for MMSS | Measure to protect incumbent services |
| A | - | No change | None | - |
| B | 1 | Alternative 2 | Primary | pfd mask 1[[1]](#footnote-1) |
| 2 | Alternative 2 | Primary | pfd mask 2[[2]](#footnote-2) |
| C | - | Alternative 2 | Secondary | - |
| D | 1 | Alternative 2 | Secondary | pfd mask 3[[3]](#footnote-3) |
| 2 | Alternative 2 | Secondary | pfd mask 4[[4]](#footnote-4) |
| E | - | Alternative 2 | Secondary | RR No **9.21** |
| F | - | Alternative 3 rev | Primary | pfd mask 11 |

**1.2.2 Studies on the supporting material**

Report ITU-R M.2435-0 was issued in November 2018, which provides technical description of the VDE-SAT and the compilation of results of the sharing and compatibility studies. During the WP 5B and SG 5 meeting, the Administration of Russian Federation indicate the views that the pfd mask derived from Recommendation ITU-R M.2092-0 does not protect land mobile and fixed service systems operating in accordance with existing allocations because it is based on an arithmetical mistake and objected to approve it. According to Resolution ITU-R 1-7 of Radio Assembly, one statement provided by Russian Federation was added to the Report.

In the Report ITU-R M.2435-0, four different pfd masks of VDE-SAT downlink were developed based on studies from administrations, who had different interpretation of protection criteria to land mobile service contained in the Recommendation ITU-R M.1808-0.

In the Report ITU-R M.2435-0, three alternative frequency utilization plans were developed based on studies from administrations.

**1.3 List of relevant ITU-R Reports/Recommendations**

- Recommendation ITU-R M.2092-0: Technical characteristics for a VHF data exchange system in the VHF maritime mobile band

- Report ITU-R M.2435-0: Technical studies on the satellite component of the VHF data exchange system

**2. Documents**

* Input Documents APG19-5/INP-20 (NZL), APG19-5/INP-46 (AUS), APG19-5/INP-53 (INS), APG19-5/INP-69 (CHN), APG19-5/INP-96 (J and THA), APG19-5/INP-131 (KOR)
* Information Documents APG19-5/INF-18 (CEPT), APG19-5/INF-19 (ATU), APG19-5/INF-20 (CITEL), APG19-5/INF-22 (RCC), APG19-5/INF-02 (ICAO)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 New Zealand** - **Document APG19-5/INP-20**

New Zealand supports the studies undertaken in accordance with Resolution **360 (Rev. WRC-15)** to identify possible new allocations to the maritime mobile-satellite service for VDES satellite component.

New Zealand is of the view that the candidate band for this possible new allocation to the maritime mobile-satellite service should be within the existing frequency range already assigned to VHF maritime mobile channels in accordance with RR Appendix **18**. Therefore, New Zealand supports Method F as outlined in the CPM Report. New Zealand is also open to consider Method B (Option 1) for VDES satellite downlink to operate outside of current channelization in RR Appendix **18** as long as such satellite downlink would ensure compatibility with affected terrestrial services by meeting an appropriate pfd mask.

**3.1.2 Australia** - **Document APG19-5/INP-46**

Australia supports facilitating the introduction of the satellite component of the VHF data exchange system (VDES) in accordance with Resolution **360 (Rev.WRC-15)**.

Any maritime-mobile satellite service allocation should coexist and be compatible with services allocated in the same and adjacent frequency bands without imposing additional constraints on those services.

**3.1.3 Indonesia (Republic of)** - **Document APG19-5/INP-53**

Indonesia supports introduction of regulatory provisions and spectrum allocations to the maritime mobile-satellite service to enable the satellite component of the VHF Data Exchange System and enhanced maritime radiocommunication.

Indonesia supports Methods E in the CPM Report.

**3.1.4 China** - **Document APG19-5/INP-69**

(1) This Administration support to protect the existing allocations and systems in the same and adjacent bands with introduction of pfd mask 4 to downlink of VDE-SAT, as described in the Report ITU-R M. 2435-0.

Reasons: pfd mask 1 and 2 is the coordination thresholds for sharing between MSS (space-to-Earth) and terrestrial services in the same frequency band and can not provide enough protection to land more service, in the same frequency band.

(2) This administration supports to consider primary frequency allocation to MMSS (space-to-Earth), subject to appropriate provisions were formed to ensure no interference was caused or constrain the development and future use of the terrestrial service on a primary basis. The alternative option is secondary allocation to MMSS (space-to-Earth) if pfd mask could not provide enough protection.

Reasons: it was recognized that VDES could provide broadband communications to shore and ship stations in maritime environment to meet the demand of the maritime community, and VDE-SAT could provide communication capability in the sea area not available for VDE-TER, therefore, spectrum allocation was proposed. Meanwhile, we supported the APT preliminary view that MMSS do not cause harmful interference to incumbent service on a primary basis in the same and adjacent frequency bands.

(3) It is proposed to give secondary allocation to MMSS (Earth-to-space) or primary allocation with appropriate provisions to demonstrate that space station of VDE-SAT can’t require protection from terrestrial service, as APT preliminary view already stated “VDES satellite components should not claim protection from harmful interference caused by stations of a land mobile service to which frequencies are already assigned”.

Reasons: Some studies in the Report ITU-R M.2435-0 shows that the aggregate interference from terrestrial stations may cause interference to VDE-SAT space station. And some other studies show aggregate interference could be resolved with mitigation measures. No consensus was reached on this issue.

(4) The application of frequency plan 3 will affect the VDE-TER implementation in the channels identified in WRC-15. As showed in method F utilizing frequency plan 3, the upper leg (channels 2024, 2084, 2025, 2085) could only be used by shore-to-ship and ship-to-ship VDE when satellite downlink is not available, and the lower legs (channels 1024, 1084, 1025, 1085) will be shared by ship-to-shore, shore-to-ship and ship-to-ship VDE. It is not in comply with *resolve* part of Resolution **360**, and also the APT preliminary views that “…the current terrestrial VDES components, ASM and AIS operations, should be protected, not be degraded or subject to additional constraints...”.

Reasons: WRC-15 identified channels 24, 84, 25, 85, 26 and 86 for the utilization of the VDES in Region 1 and 3 (see note *w)* in Appendix **18**). The lower leg channels (1024, 1084, 1025 and 1085) will be used for ship-to-shore communications and the upper leg channels will be used for shore-to-ship and ship-to-ship communications.

**3.1.5 Thailand and Japan** - **Document APG19-5/INP-96**

Japan and Thailand support the introduction of VDES satellite component. Japan and Thailand are of the view that the pfd limits and frequencies for the satellite component of the VDES should be considered to ensure that existing services are properly protected. Therefore, Japan and Thailand support Method F in the CPM Report, in the view that the satellite component of the VDES in the frequency bands should be channelized in RR Appendix **18** which is already identified for VHF maritime mobile.

**3.1.6 Republic of Korea - Document APG19-5/INP-131**

The Republic of Korea supports the ITU-R studies undertaken in accordance with Resolution **360 (Rev. WRC-15)** to identify possible new allocations to the maritime mobile-satellite service for VDE satellite component.

The Republic of Korea is of the view that:

* VDE satellite component should not impose any additional constrains on AIS;
* VDE satellite component should not degrade the VDE terrestrial components (AIS, ASM, VDE-TER);
* new possible spectrum allocations to the MMSS (Earth-to-space and space-to-Earth) for VDE satellite component should not cause harmful interference to the incumbent services allocated on a primary basis in the same and adjacent frequency bands.

With the view above, the Republic of Korea supports the Method B in the CPM Report.

While not opposing the introduction of the VDE satellite component, the Republic of Korea is also of the view that since administration may or may not introduce the satellite component, the VDE-SAT needs to be an optional for the VDES implementation.

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

Some Administrations were concerned that frequency plan alternative 3 for VDE-SAT would impose additional constraints on VDE-TER and thus it does not comply with the *resolves* part of Resolution **360 (Rev.WRC-15)**.

However, some Administrations have stated that the introduction of VDE-SAT using frequency plan alternative 3 does not result in any additional constraints on VDE-TER, because the frequency plan alternative 3 arrangements are already defined in Recommendation ITU-R M.2092-0.

Following offline discussions, APT Members propose to add allocation to the maritime-mobile satellite service on a secondary basis for VDE-SAT without pfd mask, using frequency plan alternative 3 with modification of regulatory provisions.

APT Members support to modify RR Nos. **5.208A** and **5.208B** and Annex 1 to Resolution **739 (Rev.WRC-15)** in order to ensure the protection of the RAS in the frequency bands 150.05-153 MHz and 322-328.6 MHz.

Some Administrations have proposed that VDES satellite component (VDE-SAT) should be an optional component for VDES implementation, however this is not directly related to the work for developing APT views and Preliminary APT common proposals.

**4. APT View(s)**

APT Members support the ITU-R studies undertaken in accordance with Resolution **360 (Rev. WRC-15)** to identify possible new allocations to the maritime mobile-satellite service for VDES satellite component (VDE-SAT).

In regards to the possible modification of the Radio Regulations under WRC-19 Agenda Item 1.9.2, APT Members are of the view that:

- Existing allocations and systems in the same and adjacent bands, especially the current terrestrial VDES components, ASM and AIS operations, should be protected, not be degraded or subject to additional constraints, which include but are not limited to, any modification requested to existing AIS equipment;

- Search and rescue aircraft systems operating in maritime frequencies must be protected;

- VDES satellite components should not claim protection from harmful interference caused by stations of a land mobile service to which frequencies are already assigned;

- A new spectrum allocation should be allocate to the maritime mobile-satellite service (MMSS) (Earth-to-space and space-to-Earth) in Appendix **18**, with the provision they do not cause harmful interference, and have no claim of protection from incumbent services on a primary basis in the same and adjacent frequency bands; and

- In order to protect the RAS, Annex 1 to Resolution **739 (Rev.WRC-15)** should be revised.

APT Members propose to add allocation to the maritime-mobile satellite service on a secondary basis for VDE-SAT without pfd mask, using frequency plan alternative 3 with modification of regulatory provisions.

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



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1. pfd mask 1 is described in Recommendation ITU-R M.2092-0. [↑](#footnote-ref-1)
2. pfd mask 2 is described in Annex 2 of Report ITU-R M.2435-0. [↑](#footnote-ref-2)
3. pfd mask 3 is described in section 6.1.2.2.3.2 of Report ITU-R M.2435-0 [↑](#footnote-ref-3)
4. pfd mask 4 is described in section 6.1.2.2.2 of Report ITU-R M.2435-0 [↑](#footnote-ref-4)