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**UNITED STATES OF AMERICA**

**DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE**

**Agenda Item 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)****;*

**BACKGROUND**

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 radiocommunications”,* invites ITU-R to conduct, as a matter of urgency, and in time for WRC-19, sharing and compatibility studies between VDES satellite components and incumbent services in the same and adjacent frequency bands specified in *recognizing d) and e)* to determine potential regulatory actions, including spectrum allocations to the MMSS (Earth-to-space and space-to-Earth) for VDES applications. To this end, the ITU-R has initiated sharing studies between the proposed VDES satellite (VDE-SAT) frequencies and the incumbent services in the same and adjacent bands so that this component does 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). The satellite component of the VDES could be beneficial towards enhancing maritime navigation and safety related applications on a global basis.

Under **5.225A,** the adjacent frequency band 154-156 MHz includes a primary allocation to the radiolocation service in some countries.

Studies within ITU-R Working party 5B (WP 5B) concluded that compatibility between the radiolocation service and the maritime mobile satellite service (Earth-to-space) is feasible without imposing any additional constraints on the radiolocation service. Application of the radiolocation service in the frequency band 154-156 MHz is limited to the space surveillance radars.

Furthermore, WP5B completed a report, now published, Report ITU-R M.2435-2018 “Technical studies on the satellite component of the VHF data exchange system”, on the technical characteristics and feasibility assessment of the VDES satellite component.

# EXECUTIVE SUMMARY

In accordance with Resolution **360 (Rev.WRC-15)**, the ITU-R has undertaken studies for possible new allocations to the maritime mobile-satellite service (MMSS) (Earth-to-space) and (space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of RR Appendix **18**, to support the digital evolution of maritime radio communications.

The results of the sharing and compatibility studies are contained in Recommendation ITU-R M.2092-0 which was developed in the WRC-15 study cycle, and Report ITU-R M.2435-0, which has been developed in this study cycle.

Based on the results of these studies, six methods have been developed to satisfy WRC-19 agenda item 1.9.2. The main differences between the methods are the frequency plan and pfd-mask to be imposed on the MMSS (space-to-Earth) emissions, which are further described in Report ITU-R M.2435-0.

**THIS PROPOSAL**

This proposal entails new primary allocations to the maritime mobile-satellite service (MMSS) (Earth-to-space) and (space-to-Earth), based on alternative frequency plan 2, with provisions for the optional use of the Appendix 18 duplex channels in simplex mode (in accordance with alternative frequency plan 3), as described in Report ITU-R M.2435-0. The coordination mechanism with respect to terrestrial services under RR No. **9.14** is proposed, with the pdf mask, for the satellite downlink.

**REGULATORY PROCEDURES**

**ARTICLE 5**

**Frequency Allocations**

**Section IV – Frequency Allocation Table**(See number 2.1)

**MOD**

148-161.9375 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 156.8375-157.1875  FIXED  MOBILE except aeronautical mobile | 156.8375-157.1875  FIXED  MOBILE | |
| 5.226 | 5.226 | |
| 157.1875-157.3375  FIXED  MOBILE except aeronautical mobile  MARITIME MOBILE-SATELLITE (Earth-to-space)  MOD 5.228AA | 157.1875-157.3375  FIXED  MOBILE  MARITIME MOBILE-SATELLITE (Earth-to-space)  MOD 5.228AA | |
| 5.226 | 5.226 | |
| 157.3375-160.9625  FIXED  MOBILE except aeronautical mobile | 157.3375-160.9625  FIXED  MOBILE | |
| 5.226 | 5.226 | |
| **160.9625**- **161.4875**  FIXED  MOBILE except aeronautical mobile  MARITIME MOBILE-SATELLITE (space-to-Earth) MOD 5.208A MOD 5.208B  ADD 5.A192 | 160.9625-161.4875  FIXED  MOBILE  MARITIME MOBILE-SATELLITE (space-to-Earth) MOD 5.208A MOD 5.208B  ADD 5.A192 | |
| 5.226 | 5.226 | |
| 161.4875-161.7875  FIXED  MOBILE except aeronautical mobile | 161.4875-161.7875  FIXED  MOBILE | |
| 5.226 | 5.226 | |
| 161.7875-161.9375  FIXED  MOBILE except aeronautical mobile  MARITIME MOBILE-SATELLITE (Earth-to-space)  MOD 5.228AA | 161.7875-161.9375  FIXED  MOBILE  MARITIME MOBILE-SATELLITE (Earth-to-space)  MOD 5.228AA | |
| 5.226 | 5.226 | |

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5.228AA The use of the frequency bands 157.1875-157.3375 MHz, 161.7875-161.9375 MHz, 161.9375-161.9625 MHz and 161.9875-162.0125 MHz by the maritime mobile-satellite (Earth-to-space) service is limited to the systems which operate in accordance with Appendix **18**.     (WRC‑19)

ADD

5.A192 The use of the frequency band 160.9625-161.4875 MHz by the maritime mobile-satellite (space-to-Earth) service is limited to non-GSO satellite systems operating in accordance with the most recent version of Recommendation ITU-R M.2092. Such use is subject to the application of the provisions of No. **9.14**.     (WRC‑19)

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5.208A In making assignments to space stations in the mobile-satellite service in the bands 137-138 MHz, 387‑390 MHz, 400.15-401 MHz and in the maritime-mobile satellite service (space-to-Earth) in the band 160.9625-161.4875 MHz, administrations shall take all practicable steps to protect the radio astronomy service in the bands 150.05-153 MHz, 322-328.6 MHz, 406.1-410 MHz and 608-614 MHz from harmful interference from unwanted emissions as shown in the relevant ITU‑R Recommendation.     (WRC‑19)

MOD

5.208B[[1]](#footnote-1)\* In the frequency bands:

137-138 MHz,  
 160.9625-161.4875 MHz,  
 387-390 MHz,  
 400.15-401 MHz,  
 1 452-1 492 MHz,  
 1 525-1 610 MHz,  
 1 613.8-1 626.5 MHz,  
 2 655-2 690 MHz,  
 21.4-22 GHz,

Resolution **739** **(Rev.WRC‑19)** applies.     (WRC‑19)

MOD

APPENDIX 18 (REV.WRC‑19)

Table of transmitting frequencies in the  
VHF maritime mobile band

(See Article 52)

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| Channel designator | Notes | Transmitting frequencies  (MHz) | | Inter-ship | Port operations  and ship movement | | Public corres-pondence |
| --- | --- | --- | --- | --- | --- | --- | --- |
| From ship stations | From coast stations | Single frequency | Two frequency |
| …/… | …/… | …/… | …/… | …/… | …/… | …/… | …/… |
| 24 | *w), x), xx)* | 157.200 | 161.800 |  | x | x | x |
| 1024 | *w), x), xx), AAA)* | 157.200 |  |  |  |  |  |
| 2024 | *w), x), xx), AAA)* | 161.800 | 161.800 | x  (digital only) |  |  |  |
| 84 | *w), x), xx)* | 157.225 | 161.825 |  | x | x | x |
| 1084 | *w), x), xx), AAA)* | 157.225 |  |  |  |  |  |
| 2084 | *w), ww), x), xx), AAA)* | 161.825 | 161.825 | x  (digital only) |  |  |  |
| 25 | *w), x), xx)* | 157.250 | 161.850 |  | x | x | x |
| 1025 | *w), ww), x), xx), AAA)* | 157.250 |  |  |  |  |  |
| 2025 | *w), x), xx), AAA)* | 161.850 | 161.850 | x  (digital only) |  |  |  |
| 85 | *w), x), xx)* | 157.275 | 161.875 |  | x | x | x |
| 1085 | *w), x), xx), AAA)* | 157.275 |  |  |  |  |  |
| 2085 | *w), x), xx), AAA)* | 161.875 | 161.875 | x  (digital only) |  |  |  |
| 26 | *w), x)* | 157.300 | 161.900 |  | x | x | x |
| 1026 | *w), x), AAA)* | 157.300 |  |  |  |  |  |
| 2026 | *w), x), AAA)* |  | 161.900 |  |  |  |  |
| 86 | *w), x)* | 157.325 | 161.925 |  | x | x | x |
| 1086 | *w), x), AAA)* | 157.325 |  |  |  |  |  |
| 2086 | *w), x), AAA)* |  | 161.925 |  |  |  |  |
| 27 | *z)* | 157.350 | 161.950 |  |  | x | x |
| 1027 | *zz)* | 157.350 | 157.350 |  | x |  |  |
| 2027*\** | *z)* | 161.950 | 161.950 |  |  |  |  |
| 87 | *zz)* | 157.375 | 157.375 |  | x |  |  |
| 28 | *z)* | 157.400 | 162.000 |  |  | x | x |
| 1028 | *zz)* | 157.400 | 157.400 |  | x |  |  |
| 2028*\** | *z)* | 162.000 | 162.000 |  |  |  |  |
| 88 | *zz)* | 157.425 | 157.425 |  | x |  |  |
| AIS 1 | *f), l), p)* | 161.975 | 161.975 |  |  |  |  |
| AIS 2 | *f), l), p)* | 162.025 | 162.025 |  |  |  |  |
| \*   From 1 January 2019, channel 2027 will be designated ASM 1 and channel 2028 will be designated ASM 2. | | | | | | | |

**Notes referring to the Table**

*...*

*Specific notes*

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*w)*

The frequency bands 157.1875-157.3375  MHz and 161.7875-161.9375  MHz (corresponding to channels: 24, 84, 25, 85, 26 and 86) are identified for the utilization of the VHF Data Exchange System (VDES) described in the most recent version of Recommendation ITU‑R M.2092. These frequency bands may also be used for analogue modulation described in the most recent version of Recommendation ITU‑R M.1084 by an administration that wishes to do so, subject to not causing harmful interference to, or claiming protection from other stations in the maritime mobile service using digitally modulated emissions and subject to coordination with affected administrations.     (WRC‑19)

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*wa)*

The frequency bands 157.0125-157.1125  MHz and 161.6125-161.7125 MHz (corresponding to channels: 80, 21, 81 and 22) are identified for utilization of the digital systems described in the most recent version of Recommendation ITU‑R M.1842 using multiple 25 kHz contiguous channels.

The frequency bands 157.1375-157.1875  MHz and 161.7375-161.7875  MHz (corresponding to channels: 23 and 83) are identified for utilization of the digital systems described in the most recent version of Recommendation ITU‑R M.1842 using two 25 kHz contiguous channels. The frequencies 157.125 MHz and 161.725 MHz (corresponding to channel: 82) are identified for the utilization of the digital systems described in the most recent version of Recommendation ITU‑R M.1842.

The frequency bands 157.0125-157.1875 MHz and 161.6125-161.7875  MHz (corresponding to channels: 80, 21, 81, 22, 82, 23 and 83) can also be used for analogue modulation described in the most recent version of Recommendation ITU‑R M.1084 by an administration that wishes to do so, subject to not claiming protection from other stations in the maritime mobile service using digitally modulated emissions and subject to coordination with affected administrations.     (WRC‑19)

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*x)* In Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Democratic Republic of the Congo, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe, the frequency bands 157.1125-157.3375 and 161.7125-161.9375 MHz (corresponding to channels: 82, 23, 83, 24, 84, 25, 85, 26 and 86) are designated for digitally modulated emissions.

In China, the frequency bands 157.1375-157.3375 and 161.7375-161.9375 MHz (corresponding to channels: 23, 83, 24, 84, 25, 85, 26 and 86) are designated for digitally modulated emissions.     (WRC‑19)

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*xx)* The channels 24, 84, 25 and 85 may be merged in order to form unique channels with a bandwidth of 100 kHz in order to operate, in either duplex or simplex mode, the VDES terrestrial component described in the most recent version of Recommendation ITU‑R M.2092.     (WRC‑19)

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*z)* The channels 27 and 28 are each split into two simplex channels. The channels ASM 1 and ASM 2 are used for application specific messages (ASM) as described in the most recent version of Recommendation ITU‑R M.2092.     (WRC‑19)

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*zz)* The channels 1027, 1028, 87 and 88 are used as single-frequency analogue channels for port operation and ship movement.     (WRC‑19)

**ADD**

*AAA)* These channels shall be used for the maritime mobile-satellite service (Earth-to-space) by the VDES satellite component (VDE-SAT) as described in the most recent version of Recommendation ITU‑R M.2092 in the following way:

– The channels 1024, 1084, 1025 and 1085 are identified for ship-to-shore, shore-to-ship and ship-to-ship communications, but ship-to-satellite (VDE-SAT uplink) communications may be possible without imposing constraints on ship-to-shore communications.

– The channels 2024, 2084, 2025 and 2085 are identified for shore-to-ship and ship-to-ship communications, but ship-to-satellite (VDE-SAT uplink) communications may be possible without imposing constraints on shore-to-ship and ship-to-ship communications.

– The channels 1026, 1086, 2026 and 2086 are identified for ship-to-satellite (VDE-SAT uplink) communications and are not used by the terrestrial component of VDES.     (WRC‑19)

**Reasons:** Notes *a)* to *l)*, *n)* to *v)* and *y)*: No change as the notes are not relevant to this agenda item

Notes *w)*, *wa)*, *ww),* *x),* *xx)*, *z), zx)* and *zz)*: Changes are to update the Radio Regulations and correction on the frequency bands.

Note *AAA)*: Introduces the satellite component of VDES (VDE-SAT) into Appendix **18** on both lower leg and upper leg of channels 24, 84, 25, 85, 26 and 86 for ship-to-satellite (VDE-SAT uplink) according to the most recent version of the Recommendation ITU-R M.2092

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RESOLUTION 739 (Rev.WRC-19)

Compatibility between the radio astronomy service and the active   
space services in certain adjacent and nearby frequency bands

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

ANNEX 1 TO RESOLUTION 739 (Rev.WRC-19)

Unwanted emission threshold levels

TABLE 1-2

epfd thresholds(1) for unwanted emissions from all space stations of a non-GSO satellite system   
at a radio astronomy station

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Space service | Space service band | Radio astronomy band | Single dish, continuum observations | | Single dish, spectral line observations | | VLBI | | Condition of application: the API is received by the Bureau following the entry into force of the Final Acts of: |
| epfd(2) | Reference bandwidth | epfd(2) | Reference bandwidth | epfd(2) | Reference bandwidth |
| **(MHz)** | **(MHz)** | **(dB(W/m2))** | **(MHz)** | **(dB(W/m2))** | **(kHz)** | **(dB(W/m2))** | **(kHz)** |
| MSS (space-to-Earth) | 137-138 | 150.05-153 | −238 | 2.95 | NA | NA | NA | NA | WRC-07 |
| MMSS (space-to-Earth) | 160.9625-161.4875 | 150.05-153 | −238 | 2.95 | NA | NA | NA | NA | WRC-19 |
| MMSS (space-to-Earth) | 160.9625-161.4875 | 322-328.6 | −240 | 6.6 | −255 | 10 | −228 | 10 | WRC-19 |
| MSS (space-to-Earth) | 387-390 | 322-328.6 | −240 | 6.6 | −255 | 10 | −228 | 10 | WRC-07 |
| MSS (space-to-Earth) | 400.15-401 | 406.1-410 | −242 | 3.9 | NA | NA | NA | NA | WRC-07 |
| MSS (space-to-Earth) | 1 525-1 559 | 1 400-1 427 | −243 | 27 | −259 | 20 | −229 | 20 | WRC-07 |
| RNSS (space-to-Earth)(3) | 1 559-1 610 | 1 610.6-1 613.8 | NA | NA | −258 | 20 | −230 | 20 | WRC‑07 |
| MSS (space-to-Earth) | 1 525-1 559 | 1 610.6-1 613.8 | NA | NA | −258 | 20 | −230 | 20 | WRC-07 |
| MSS (space-to-Earth) | 1 613.8-1 626.5 | 1 610.6-1 613.8 | NA | NA | −258 | 20 | −230 | 20 | WRC-03 |

SUP

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

**Reasons:** Resolution **360 (WRC-15)** is proposed to be suppressed as it will not be needed when the regulatory provisions and spectrum allocations to the maritime mobile-satellite service required to enable the VDES satellite component (VDE-SAT) have been approved by WRC-19.

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APPENDIX 5 (REV.WRC‑19)

Identification of administrations with which coordination is to be effected or  
agreement sought under the provisions of Article 9

MOD

TABLE 5-1 (*continued*)     (Rev.WRC‑19)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reference of Article 9 | Case | Frequency bands  (and Region) of the service  for which coordination  is sought | Threshold/condition | Calculation  method | Remarks |
| No. **9.14** Non-GSO/ terrestrial, GSO/ terrestrial | A space station in a satellite network in the frequency bands for which a footnote refers to No. **9.11A** or to No. **9.14**, in respect of stations of terrestrial services where threshold(s) is (are) exceeded | 1) Frequency bands for which a footnote refers to No. **9.11A**; or  2) 11.7-12.2 GHz (Region 2 GSO FSS)  3) 5 030-5 091 MHz  4) 160.9625‑161.4875 MHz (non-GSO maritime mobile-satellite service) | 1) See § 1 of Annex 1 to this Appendix; In the bands specified in No. **5.414A**, the detailed conditions for the application of No. **9.14** are provided in No. **5.414A** for MSS networks or  2) In the band 11.7-12.2 GHz (Region 2 GSO FSS): −124 dB(W/(m2 · MHz)) for 0° ≤ θ ≤ 5° −124 + 0.5 (θ – 5) dB(W/(m2 · MHz)) for 5° < θ ≤ 25° −114 dB(W/(m2 · MHz)) for θ > 25° where θ is the angle of arrival of the incident wave above the horizontal plane (degrees)  3) Bandwidth overlap  4) In the band 160.9625‑161.4875 MHz (non-GSO maritime mobile-satellite service):  –141.72–8.15+12\*(θ°/16.47)2 dB(W/(m2 · 4 kHz)) for 0° ≤ θ < 8.5° –149 + 0.16·θ° dB(W/(m2 · 4 kHz)) for 8.5° ≤ θ < 45° –142 + 0.53·(θ° – 45°) dB(W/(m2 · 4 kHz)) for 45° ≤ θ < 58.5° –141.72 + 6.85–10log10((θ°/16.47)-1.5 +0.7) dB(W/(m2 · 4 kHz)) for 58.5° ≤ θ ≤ 90° where θ is the angle of arrival of the incident wave above the horizontal plane (degrees). | 1) See § 1 of Annex 1 to this Appendix |  |

**Reasons:** The above modification defines a coordination threshold in Table 5-1 for references of RR No. **9.14** for the VDE-SAT downlink to ensure compatibility with terrestrial services. The coordination threshold mask is defined in Annex 2 of Report ITU-R M.2435-0.

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1. \* This provision was previously numbered as No. **5.347A**. It was renumbered to preserve the sequential order. [↑](#footnote-ref-1)