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| **Radiocommunication Study Groups** |  |
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| **29 November 2017** |
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| Annex 1 to the Working Party 5B Chairman’s Report | |
| WORKING DOCUMENT TOWARDS DRAFT CPM TEXT ON WRC-19 AGENDA ITEM 1.8 | |
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*1.8 to consider possible regulatory actions to support Global Maritime Distress Safety System (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution* ***359******(Rev.WRC-15)****;*

Resolution **359 (Rev.WRC‑15)** – *Consideration of regulatory provisions for updating and modernization of the Global Maritime Distress and Safety System*

# 5/1.8/1 Executive summary

*[TBD based on result of sections 3, 4, and 5 below]*

# 5/1.8/2 Background

Agenda item 1.8 (Resolution **359 (Rev.WRC-15)**), concerns global maritime distress and safety system (GMDSS). *Resolves* 1 addresses the modernization of the GMDSS while *resolves* 2 addresses the introduction of additional satellite providers into the GMDSS*.*

**Issue A Global maritime distress and safety system modernisation**

The GMDSS was adopted as part of the 1988 amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS). It was fully implemented in 1999. It has served the mariner and the maritime industry well since its inception, but some of the GMDSS technologies used have not reached their full potential, and some GMDSS functions could be performed by more modern technologies.

IMO has adopted a modernization plan for the GMDSS containing a high level review and a detailed review. The detailed review and the plan show that the use of some existing services is declining. Meanwhile, some new technologies are considered to be possibly introduced in the modernized GMDSS, such as VHF data exchange system (VDES) and the navigation data (NAVDAT) system. The VDES has been already covered by WRC-15 for the terrestrial component and AI 1.9.2 covers the satellite component, therefore no action is requested for the VDES under agenda item 1.8.

Navigational text (NAVTEX) was incorporated into the regulations for the GMDSS for disseminating maritime safety information, which was introduced in a transitional phase from 1992 to 1999, after which it became mandatory under Chapter V of the SOLAS regulations.

In March 2012, ITU-R released Recommendation ITU-R M.2010 *“Characteristics of a digital system, named Navigational Data for broadcasting maritime safety and security related information from shore-to-ship in the 500 kHz band”*. Later on, in April 2014, the other Recommendation ITU-R M.2058 *“****Characteristics of a digital system, named navigational data for broadcasting maritime safety and security related information from shore-to-ship in the maritime HF frequency band*” was also approved**. NAVDAT is counted as an enhancement of existing NAVTEX and could be considered as a potential entity in next generation of GMDSS.

WRC-12 addressed the allocation of 495-505 kHz frequency band for the maritime mobile service. This band is regarded as the most suitable for MF NAVDAT application. However, regulatory provisions are still needed for both MF and HF NAVDAT applications.

Issue B Additional satellite providers for the global maritime distress and safety system

In addition to GMDSS modernization (*resolves* 1), the IMO is considering incorporation of additional satellite systems into the GMDSS (resolves 2). To date, only one satellite system has been recognized by IMO for use in the GMDSS “system of systems”. Advances in communications technology, the maturity of commercial satellite operations, the introduction of competition into the satellite sector, and the deployment of non-geostationary satellite constellations have lead the IMO to identify recognition of additional satellite systems to the GMDSS as an urgent work item.

*[Chairman’s note: The background should be less than half a page so perhaps look at shortening it]*

# 5/1.8/3 Summary and Analysis of the results of ITU-R studies

Existing relevant Recommendations and Reports for Issue A

i) Recommendation [ITU-R M.2010-0](http://www.itu.int/rec/R-REC-M.2010/en): Characteristics of a digital system, named Navigational Data for broadcasting maritime safety and security related information from shore-to-ship in the 500 kHz frequency band; or the revised version;

ii) Recommendation [ITU-R M.2058-0](http://www.itu.int/rec/R-REC-M.2058/en): Characteristics of a digital system, named navigational data for broadcasting maritime safety and security related information from shore-to-ship in the maritime HF frequency band; or the revised version;

iii) Report [ITU-R M.2201](http://www.itu.int/rec/R-REP-M.2201/en): Utilization of the frequency band 495-505 kHz by the maritime mobile service for the digital broadcasting of safety and security related information from shore-to-ships.

Existing relevant Recommendations and Reports for Issue B:

1. Recommendation [ITU-R M.1184-2](http://www.itu.int/rec/R-REC-M.1184/en): Technical characteristics of mobile satellite systems in the frequency bands below 3 GHz for use in developing criteria for sharing between the mobile-satellite service (MSS) and other services

ii) Recommendation [ITU-R M.1188-1](http://www.itu.int/rec/R-REC-M.1188/en): Impact of propagation on the design of non‑GSO mobile-satellite systems not employing satellite diversity which provide service to handheld equipment

iii) Recommendation [ITU-R M.1583-1](http://www.itu.int/rec/R-REC-M.1583/en): Interference calculations between non-geostationary mobile-satellite service or radionavigation-satellite service systems and radio astronomy telescope sites

iv) Report [ITU-R M.2369-0](http://www.itu.int/pub/R-REP-M.2369): Use of non-geostationary orbit mobile satellite systems to enhance maritime safety

## 5/1.8/3.1 Global maritime distress and safety system modernisation (Issue A)

IMO will approve the revision of SOLAS chapter III and IV in 2022. For this reason it will be important to keep on the agenda for WRC-23 the modernisation of the GMDSS. However, some actions could be considered and taken for the WRC-19. The regulatory recognition of the frequencies for the MF and HF NAVDAT could facilitate the work during the WRC-23. It will also help the administration given sufficient time to make available those frequencies for the MF and HF NAVDAT.

NAVDAT is a kind of digital system for broadcasting maritime safety and security related information from shore-to-ship. NAVDAT uses a time-slot allocation similar to the NAVTEX system which could be coordinated by IMO in the same manner. NAVDAT could operate in both MF and HF frequency bands. A 10 kHz channel is the necessary bandwidth for each system. The system uses OFDM which is a modulation technology for digital transmissions, and every subcarrier is modulated either in 64-QAM, 16-QAM or 4-QAM.

As the 500 kHz frequency band provides good coverage as shown in Recommendation ITU-R P.368-9, the frequency band 415-526.5 kHz of maritime mobile service would be used for MF NAVDAT as described in Recommendation ITU-R M.2010-0.

The detailed review of GMDSS shows that the uses of HF narrow band direct printing (NBDP) for follow-up communications is declining greatly, and HF MSI could also be accomplished by means other than NBDP, such as HF NAVDAT. Six channels respectively in 4 MHz, 6 MHz, 8 MHz, 12 MHz, 16 MHz and 22 MHz frequency bands listed in RR Appendix **17** would be used for HF NAVDAT, as described in Recommendation ITU-R M.2058-0.

NAVDAT has the function of broadcasting message of safety of navigation, security, piracy, search and rescue, meteorological messages and piloting or harbour messages etc. There are needs to establish international harmonized standard, including technical and operational characteristics in detail, such as priority identification, protocol, message classification and data structure, etc. and necessary coordination schemes by IMO, and harmonized frequency band explicitly assigned by ITU-R Radio Regulation. This will ensure the implementation of global NAVDAT application. This is very similar to the implementation of international NAVTEX service transmitting English language messages operating on 518 kHz.

On the other hand, as the high affectivity and efficiency, NAVDAT system could also be used by national authority for transmitting safety and security related information in national language or for some specific functions. This kind of national NAVDAT application might not operate in globally harmonized standard, for example, in different data structures, or in different frequency bands. The national NAVDAT systems will or need not meet the coordination schemes by IMO, depending on the frequency bands they use. This is very similar to NAVTEX transmitting local language messages operating on 490 kHz or other frequency bands assigned by national authority in accordance with NAVTEX Manual.

Analyses on medium frequency band

So far, NAVDAT is one of the most important potential elements involved both in GMDSS modernization and E-navigation. However, there is not any frequency band assigned for the application in regulatory status. As respect to the frequency band 415-526.5 kHz, only the 495‑505 kHz band is exclusively allocated in maritime mobile service globally. Thus, this band would be the best choice for the international NAVDAT broadcasting.

Technically, the other parts of the frequency band 415-526.5 kHz are also suitable for NAVDAT application. However, the use of these bands by maritime mobile service is restricted for only radiotelegraphy according to RR No. **5.79**. Practically, except the NAVTEX services, radiotelegraphy has been greatly declined to disuse in many countries. Allowing national NAVDAT systems using these bands for maritime mobile service might be feasible. Some appropriate regulatory approach would give administrations opportunity to promote the development and deployment of this kind of new advanced technology.

The further protection approaches will be considered during the implementation of GMDSS modernization as NAVDAT recognized in GMDSS, and the coordination scheme developed. This is planned to be done in study cycle of WRC-23, according to the progress of activities of IMO.

Analyses on high frequency band

WRC-12 designed some frequency bands in RR Appendix **17** for digitally modulated emissions in the maritime mobile service (e.g. as described in the most recent version of Recommendation ITU‑R M.1798) from 1st January, 2017 by footnote *p)*. ITU-R issued Recommendation ITU-R M.2058-0 in February, 2014. Six channels respectively within 4 MHz, 6 MHz, 8 MHz, 12 MHz, 16 MHz and 22 MHz frequency bands with footnote *p)* are recommended to be used for HF NAVDAT. It is feasible technically. However, there are needs to take appropriate actions to give NAVDAT application regulatory status to operate in these bands. Furthermore, just as the same as the MF NAVDAT, the further protection approaches on HF bands need to be considered during the implementation of GMDSS modernization depending on the situation related to NAVDAT recognized in GMDSS, and the related coordination scheme developed. This is also planned to be done in study cycle of WRC-23, according to the progress of activities of IMO.

Analysis of the Master International Frequency Register showed that the frequency bands suggested for implementation of HF NAVDAT system were used by a large number of transmitting coastal stations in the maritime mobile service subject to existing spectrum allocations. Those stations could cause harmful interference to operation of HF NAVDAT system ship receivers on a significant portion of the World Ocean. Therefore, effective implementation of HF NAVDAT systems would require appropriate development of regulatory and technical measures providing its compatibility with currently existing maritime mobile stations. Currently the NAVDAT system does not refer to internationally coordinated systems, adopted by IMO. Therefore, incorporation of HF NAVDAT system frequency bands into RR Appendix **15** seems inappropriate.

## 5.1.8/3.2 Additional satellite systems (Issue B)

*[Editor’s note: This section should contain a summary of the frequency allocation(s), the current characteristics of systems using those allocations, any changes likely to be required and the potential impact of the changes. No new allocations are anticipated to satisfy this agenda item.*

*WP 4C to provide appropriate CPM text including characteristics of mobile-satellite and aeronautical mobile-satellite (R) service systems operating in the identified frequency bands identified by WP 5B, and any applicable Reports and Recommendations.]*

*[Editor’s note: at its 19# meeting, WP 5B noted the liaison statement from WP 4C that bring into attention of progress of the AI 1.8 ISSUE B.]*

# 5/1.8/4 Methods to satisfy the agenda item

## 5/1.8/4.1 Issue A: Modernisation of the global maritime distress and safety system (*Resolves* 1)

### 5/1.8/4.1.1 Method A

MF NAVDAT

The frequency band 495-505 kHz should be assigned for the use of international MF NAVDAT.

The limitation on the use of the bands 415-495 kHz and 505-526.5 kHz (505-510 kHz in Region 2) in the maritime mobile service only by radiotelegraphy should be removed. And the possibility of using these bands by national MF NAVDAT could be given.

HF NAVDAT

It is needed to modify RR Appendix **17** to allow the frequency bands described in most recent version of Recommendation ITU-R M.2058 to be used for HF NAVDAT system. Therewith proper regulatory provisions should be developed to ensure compatibility of HF NAVDAT systems with digital maritime mobile systems operating the frequency bands concerned subject to relevant existing allocations.

WRC-23 will consider the modernisation of the GMDSS after IMO has concluded its work on this topic. Therefore at that time it will be possible to consider a possible revision of the Appendix **15**

## 5/1.8/4.2 Issue B: Introduction of additional satellite systems into global maritime distress and safety system (*Resolves* 2)

### 5/1.8/4.2.1 Method B1

*[****Editor’s note:*** *Revise Appendix* ***15*** *of the Radio Regulation to add the relevant frequencies; revise Recommendation ITU-R M.585 to update the identification of ship stations with earth stations],*

Advantages

– Satisfies the agenda item and supports the introduction of additional satellite systems.

– Complements the satellite component of the GMDSS to further support distress and safety communications on a global basis.

– No changes to Article **5** of RR are required.

Disadvantages

– *[TBD, if any]*.

### 5/1.8/4.2.2 Method B2

### 5/1.8/4.2.3 Method B3

# 5/1.8/5 Regulatory and procedural considerations

## 5/1.8/5.1 For Issue A

### 5/1.8/5.1.1 For Method A

MF NAVDAT

The possible modifications to the provisions of RR are considered as following:

MOD

5.79 The bands 415-495 kHz and 505-526.5 kHz (505-510 kHz in Region 2) by the maritime mobile service are used for radiotelegraphy. In addition to but not in place of the 495-505 kHz, these bands may also be used for NAVDAT system as described in the most recent version of Recommendation ITU-R M.2010, subject to special arrangements between interested and affected administrations.

*[****Chairman’s note:*** *The first sentence does not make any sense. I would suggest it should read “The use of the allocations to the maritime mobile service in the frequency bands 415-495 kHz and 505-526.5 kHz (505-510 kHz in Region 2) is limited to radiotelegraphy. Also what are the special arrangements referred too. ]*

MOD

495-1 800 kHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 495-505 MARITIME MOBILE | | |

ADD

5.xx The band 495-505 kHz is exclusively used for the international NAVDAT system as described in the most recent version of Recommendation ITU-R M.2010.

HF NAVDAT

The possible modifications to the provisions of RR are considered as following:

MOD

APPENDIX 17 (REV.WRC‑15)

Frequency and channelling arrangements in the high-frequency   
bands for the maritime mobile service, which   
enter into force on 1 January 2017     (WRC‑19)

PART A  –  Table of subdivided bands     (WRC‑19)

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz  
allocated exclusively to the maritime mobile service (*end*)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Band (MHz) | 4 | 6 | 8 | 12 | 16 | 18/19 | 22 | 25/26 |
| Limits (kHz) | 4 221 | 6 332.5 | 8 438 | 12 658.5 | 16 904.5 | 19 705 | 22 445.5 | 26 122.5 |
| Frequencies assignable for wide‑band systems, facsimile, special and data transmission systems and direct-printing telegraphy systems  *m) p) pp) s)* |  |  |  |  |  |  |  |  |
| Limits (kHz) | 4 351 | 6 501 | 8 707 | 13 077 | 17 242 | 19 755 | 22 696 | 26 145 |
| … | … | … | … | … | … | … | … | … |

ADD

*pp)* These sub-bands are also designated for NAVDAT system as described in the most recent version of Recommendation ITU‑R M.2058.

## 5/1.8/5.2 For Issue B

### 5/1.8/5.2.1 For Method B1

*[No changes to the allocations are required, and so no regulatory impact is foreseen on existing services or allocations.]*

### 5/1.8/5.2.2 For Method B2

### 5/1.8/5.2.3 For Method B3