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| **Radiocommunication Study Groups** |  |
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| Source: Annex 5 to Document 5B/475  Subject: WRC-15 agenda item 1.16 Resolution **360 (WRC-12)** | **Document 5B/XXX-E** |
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| **English**  **only** |

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| [Name of the country……..]  MODIFICATION TO WORKING DOCUMENT TOWARDS DRAFT CPM TEXT |
| 1 Introduction This document provides the results of studies which took place since the last WP 5B meeting among various Administration and manufacturers which support the development of the VHF Data Exchange System (VDES).  The concept of VDES comprising the following functionality:  – Effective exchange of data between ships, shore, and satellite  In the considerations the following concerns are taken:  − Efficient use of the spectrum for communications (vs. Navigation).  − Improved communications capacity.  − Increased visibility (capability to see more ships on the AIS VDL on high loading).  − Protection of the integrity of the AIS VDL  − Protection of the existing AIS frequencies (AIS1 and AIS2) 2 Proposal The frequencies currently identified in Table 1 of the draft CPM text contained in Annex 7 to Document 5B/475 have been initially proposed by the maritime community to be the most appropriate to operate the VDES. At the last WP 5B meeting the Annex 37 to Document 5B/475 proposes three different channels plans in order to solve the AI 1.16.  This administration proposes modification to the CPM text in order to support and introduce the channel plan A in the CPM text as a solution for the AI 1.16.  Note: the deadline for submission to ITU WP 5B is Monday, 12 May 2014, 1600 hours UTC |

ENAV17-11.7

Formerly ENAV16-14.2.23

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| Annex |
| WORKING DOCUMENT TOWARDS DRAFT CPM TEXT |
| CHAPTER 3 |
| Aeronautical, maritime and radiolocation issues  (Agenda items 1.5, 1.15, 1.16, 1.17, 1.18) |

AGENDA ITEM 1.16

(WP 5B / WP 5A, WP 6A, (WP 3K), (WP 4A), (WP 4C), (WP 7B), (WP 7C), (WP 7D))

*1.16* *to consider regulatory provisions and spectrum allocations to enable possible new Automatic Identification System (AIS) technology applications and possible new applications to improve maritime radiocommunication in accordance with Resolution****360 (WRC‑12)****;*

Resolution **360 (WRC‑12)**: Consideration of regulatory provisions and spectrum allocations for enhanced Automatic Identification System technology applications and for enhanced maritime radiocommunication

# 3/1.16/1 Executive summary

#### 3/1.16/1.1 In regards to *resolves* 1 of Resolution 360 (WRC-12)

New terrestrial and satellite applications using AIS technology are under development. These are intended to improve the safety of navigation and applications depending on information that are to be exchanged between ships, ship and land. Due to the importance of AIS it has to be ensured that these applications will not degrade the current AIS operations and other existing services.

#### 3/1.16/1.2 In regards to *resolves* 2 of Resolution 360 (WRC-12)

New applications for improved maritime data exchange are envisioned within existing maritime mobile and maritime mobile-satellite service allocations.

# 3/1.16/2 Background

**3/1.16/2.1** In regards to *resolves* 1 of Resolution **360 (WRC-12)**

The shipborne automatic identification system (AIS) mandated under Chapter V of the international convention for the safety of life at sea (SOLAS) has become well accepted by the maritime community and is also being used by thousands of ships not subject to the SOLAS Convention. This safety of navigation system operates in the VHF band and is used for vessel collision avoidance as well as the delivery of information about specific details of a vessel.

AIS is supported by a large shore based VHF infrastructure as well as being able to be detected by satellite. AIS is routinely used by ships for navigation and crew familiarity is a positive factor. AIS messages can be sent with a priority #1 (highest) through #4 (lowest).

The AIS VHF data link (VDL) is designed mainly for navigation, with top priority on vessel collision avoidance. The ships positions are continuously transmitted on the VDL and the closer ships have the highest probability of reception. This ensures that, even during high VDL loading, ships will receive all position reports from the closest ships but fewer position reports from the more distant ships.

When the AIS VDL is used for data communications, it cannot in the same way tolerate loss of AIS messages. Higher load on the VDL results in higher loss of AIS messages, which results in higher number of retransmissions. This will eventually result in the breakdown of data communications on the AIS VDL.

An increasing number of application specific messages (ASM) will reduce the available time slots for the intended AIS messages. With increasing demand for maritime VHF data communications, AIS will become more heavily used which will lead to an overloading of the existing AIS1 and AIS2 channels.

**3/1.16/2.2** In regards to *resolves* 2 of Resolution **360 (WRC-12)**

“Increased traffic, the need to adapt to technological changes in the maritime sector (e.g. professional mariners demanding greater access to electronic navigation information), climate change impacts such as fluctuating water levels and the extension of shipping seasons, are expected to place increasing demands on Coast Guard programs.[[1]](#footnote-1)”

Traditional communication methods (i.e. voice) have shown to be inadequate for the transfer of the information required to improve the safety of navigation in adverse conditions. More information (such as weather, ice charts, status of aids to navigation, water levels and rapidly changes of port status) are required in real-time to improve operational decisions on land and on ship that will lead to safer and more efficient voyages.

In 2009-2010, and as part of an international survey initiative, one Administration consulted mariners and other Departments/Organizations in order to develop a profile of user requirements. Three main topics were addressed: maritime communications, human-machine interface, and technical/operational enhancements. The information collected was used to design an implementation plan adapted to user needs. Results of this survey were shared both nationally and internationally and became the basis for the development of an Administration’s e-Navigation User‑Needs Matrix. This matrix prioritizes the services that are expected to be provided by shore authorities to mariners. It is sub-divided into navigational areas in order to provide the applicable information to the appropriate area without overloading mariners with unnecessary data.

Shore authorities have also demonstrated interest in increasing the quantity of information retrieved from ships in real-time (such as voyage information, passenger manifest and pre-arrival reports) in a more efficient way to transmit and process these information as digital information. Similar projects with similar requirements have been initiated around the world such as the Mona Lisa and Mona Lisa2 projects[[2]](#footnote-2) and the EfficienSea project[[3]](#footnote-3). As a result of these additional requirements on maritime communications, the channels identified by WRC-12 would be used by maritime authorities across the world to respond to increased data transfer and improve maritime safety and efficiency in the growing maritime environment.

# 3/1.16/3 Summary of technical and operational studies, including a list of relevant ITU‑R Recommendations

## 3/1.16/3.1 VHF data link loading

Draft new Report ITU-R M.[AIS VDL Loading] includes studies by Administrations on AIS VDL loading which indicates that increased loading in high traffic areas is nearing or has already exceeded the critical limiting factor of 50%. For example (three examples):

A 2008 study in the area of Tokyo bay showed that 27.4% of AIS slots were used. In 2012 the loads of 38% were reached. This 10% increase within 4 years shows that in Japan the limiting factor of 50% as noted in IALA Recommendation A-124 RR Appendix **18** “VDL Loading Management” could be reached quite soon.

A December 2012 study by the United States indicates that AIS VDL loading already exceeds the 50% critical limit on some of its Nationwide AIS sites and is as high as 133% in the Northern Gulf of Mexico.

A January 2013 study by Korea for the port of Busan indicates that AIS VDL loading already exceeds 40%, is growing, and is expected to reach the critical limit of 50% in the foreseeable future. This report on this study proposes as a solution that two additional channels be designated for AIS ASM messages, recommending the upper legs of RR Appendix **18** duplex channels 27 and 28.

A May 2013 liaison statement from IALA on AIS VDL loading reports that loading is already dangerously high in high traffic areas around the world and that the proposed solution to the problem of AIS VDL loading is to move all non-navigation AIS messages to two additional channels specifically designated as ASM1 and ASM2 and that these channels be the upper legs of the Appendix 18 duplex channels 27 and 28.

A preliminary study conducted in China in the middle of 2012 showed the occupancy rate of AIS 1 and AIS 2 frequencies was in average about 30% in some of the high traffic area such as Shanghai port and Bohai Bay. In rush hours, the occupancy might reach up to 40%. These data indicates the necessity of additional channels for the AIS.

## 3/1.16/3.2 Background of the VHF data exchange concept

This concept addresses both the terrestrial and satellite component. The main ideas that drive the VHF data exchange (VDE) concept are:

– Protection of the integrity of the AIS VDL

AIS 1 and AIS 2 should be reserved for “Navigation Safety/Collision Avoidance” purposes (as a SOLAS requirement) and therefore the ASM and other “non-critical communications” should be moved to new channels of RR Appendix **18** to avoid deleterious loading of the AIS VDL. This problem increases as more different types of equipment using AIS technology are developed, more vessels are equipped and more AIS applications are developed and implemented. Among the channels identified by WRC-12 the channels 2027 and 2028 which are the upper legs of the duplex channels 27 and 28, are the suitable candidates for these new applications using AIS technology. Another option for candidate ASM channels is simplex channels 87 and 88 which were also identified at the WRC-12.

– Increased visibility (capability to see more ships on the AIS VDL on high loading).

AIS 1 and AIS 2 can support more load (future expansion) without a reduction in range if “non-critical communications” are moved to the new channels.

– Improved communications capacity.

The new channels provide opportunity for more capacity, efficiency and a more robust communications system to support new application.

– Efficient use of the spectrum for communications (vs. Navigation).

9.6 kbps GMSK modulation and a special network protocol were chosen for AIS as a “safety of navigation system”. But for “communications” purposes, Recommendation ITU-R M.1842-1 provides more efficient system options; for example, where a multi-slot AIS binary message can be reduced to 1-slot. In addition, the network protocol can be designed specifically for communications so that an AIS ASM can be transmitted with much better confidence of reception.

As this agenda item addresses both the terrestrial and satellite components, some channels have been identified for communications between the satellite and the ship. These channels are part of RR Appendix **18.**

## 3/1.16/3.3 VHF data exchange system integrates functions of automatic identification system, application specific messages and VHF data exchange

*(Editor’s note: In November 2013 the frequency/channel arrangement is under discussion and has to be reedited after agreement.)*

VHF data exchange system (VDES) considers both WRC-15 agenda item 1.16 and WRC-12 revisions to RR Appendix **18**, including both terrestrial and satellite components, which address the need to protect the integrity of the AIS VDL by moving AIS applications and ASM to other channels and the designation of some of the duplex channels previously designated for VHF public correspondence (VPC) for digitally modulated emissions in accordance with Recommendation ITU‑R M.1842 (which describes various VHF data systems which could be used for terrestrial VDE). The VDES integrates the functions of AIS, ASM and VDE and includes the channels used for these functions. An arrangement of the globally available channels and usage is shown in Table 1.

Table 1

Appendix 18 channels and frequencies for the VHF data exchange system (AIS, ASM and VDE)

|  |  |  |  |
| --- | --- | --- | --- |
| Channel number in RR Appendix 18 | Transmitting frequencies (MHz) for ship and coast stations | | |
| Ship stations (ship-to-shore) Ship stations (long range AIS) Ship stations  (ship-to-satellite) | Coast stations Ship stations (ship-to-ship) (Satellite-to-ship) |
| AIS 1 | 161.975 | 161.975 |
| AIS 2 | 162.025 | 162.025 |
| 75 (long range AIS) | 156.775 (ships are Tx only) | N/A |
| 76 (long range AIS) | 156.825 (ships are Tx only) | N/A |
| 2027 (ASM 1) | 161.950 (2027) | 161.950 (2027) |
| 2028 (ASM 2) | 162.000 (2028) | 162.000 (2028) |
|  |  |  |
|  |  |
| 24 | 157.200 (1024) | 161.800 (2024) |
| 84 | 157.225 (1084) | 161.825 (2084) |
| 25  85  26  86 | 157.250 (1025) | 161.850 (2025) |
| 157.275 (1085) | 161.875 (2085) |
| 157.300 (1026) | 161.900 (2026) |
| 157.325 (1086) | 161.925 (2086) |
|  |  |

**Table 2 “VDES Communications including AIS, ASM and VDE” provides a summary of the technical assignment of various VHF channels for communication including protocol and types of messages to meet the functionalities required by user needs.**

**table 2**

**VHF data exchange system communications including AIS, ASM, and VDE**

|  | *VHF Data Communications (including ASM and VDE)* | | *AIS* | |
| --- | --- | --- | --- | --- |
| **Sub-group** | ***Data communications for ASM*** | ***Data communications for VDE*** | ***AIS for safety of navigation*** | ***AIS long range*** |
| **Radio channels** | * *Channels 27 and 28* * *World-wide dedicated channels  (WRC-15 target)* | * See table 1 below | * *AIS-1 & AIS-2 (simplex)* | * *Channels 75 and 76 (simplex)* |
| **Functionality** | * *Marine safety information* * *Marine security information* * *Short Safety related Messages (SSRMs)* * *General purpose information communication* | * *General purpose data exchange* * *Robust high speed data exchange* * *VDE satellite communications* | * *Safety of navigation* * *Maritime locating devices* | * *Satellite detection of AIS* * *Possible support of future SAR* |
| **Message types**  **for AIS protocol** | * *IMO SN.1/ Circ.289 international application specific messages* * *Regional application specific messages* * *Base Station* |  | * *Vessel identification* * *Vessel dynamic data* * *Vessel static data* * *Voyage related data* * *Aids to Navigation* * *Base Station* | * *Satellite detection of AIS* * *Possible support of future SAR* |
| **Sub functionality** | * *Area warnings and advice* * *Meteorological and hydrographic data* * *Traffic management* * *Ship-shore data exchange* * *Channel management* | * *High message payload* * *Satellite communications* | * *Ship to ship collision avoidance* * *VTS* * *Tracking of ships* * *Locating in SAR* * *VDL control (by Base Station)* | * *Detection of vessels by coastal states beyond range of coastal AIS base stations* |

Additionally it is noted that more channels are available in some Regions, see RR Appendix **18** footnotes w, x, y. An example of the possible utilization of these channels is given in Table 3.

Table 3

VHF data exchange – table of regional frequencies (MHz)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Regional VDE (Regions 1 and 3) | | | | | | |
| Ship transmit | 1080  157.025 | 1021  157.050 | 1081  157.075 | 1022  157.100 | 1082  157.125 | 1023  157.150 | 1083  157.175 |
| Ship received | 2080  161.625 | 2021  161.650 | 2081  161.675 | 2022  161.700 | 2082  161.725 | 2023  161.750 | 2083  161.775 |
|  | Can be used separately and/or as 50 kHz channel(s) or as one 100 kHz channel | | | |  | Can be used separately or as one 50 kHz channel | |
| NOTE – The VHF channels shown above are a contiguous set in RR Appendix **18**. They comprise a contiguous frequency block, and thus are amenable to protection by a single selective filter in the receiver. | | | | | | |

## 3/1.16/3.4 VHF data exchange system – terrestrial component

The terrestrial component is summarized as follows:

– Protection of the integrity of the VDL for AIS through the identification of the channels 2027 and 2028 called ASM1 and ASM2. By moving the Application-Specific Messages (ASM) and other “non-critical communications”, not necessary for “Navigation Safety/Collision Avoidance” purposes (as a SOLAS requirement), To the channels ASM1 and ASM2 will reduce the VDL loading on AIS 1 and AIS 2.

– AIS 1 and AIS 2 will remain unchanged and therefore the AIS capability as a SOLAS requirement is maintained.

## 3/1.16/3.5 VHF data exchange system – satellite component

The satellite component of VDES includes:

– Satellite detection of the AIS VDL on AIS1 and AIS2 which includes all AIS equipment classes and AIS-equipped devices

– Long range detection of AIS on channels 75 and 76 in accordance with WRC-12 designations.

– Reception of ASM1 (SAT Up1) and ASM2 (SAT Up2) for reception of AIS ASM.

– Reception of SAT Up3 (which is in the lower legs of channels 24, 84, 25, 85, 26 and 86) which is the uplink from ships to satellite.

– Transmission of SAT downlink which is the downlink from satellite to ships in the upper legs of channels 24, 84, 25, 85, 26 and 86.

## 3/1.16/3.6 Relevant ITU-R Recommendations

Recommendation ITU-R **M.1084 –** Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service.

Recommendation ITU-R **M.1371 –** Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band.

Recommendation ITU-R M.1842 – Characteristics of VHF radio systems and equipment for the exchange of data and electronic mail in the maritime mobile service RR Appendix **18** channels.

Recommendation OR Report ITU-R M.[VDES].

# 3/1.16/4 Analysis of the results of studies

Results of studies are as follows:

– AIS VDL loading studies have concluded (see Report ITU-R M.2287-0) that loading levels in some high traffic areas have already exceeded the critical level of 50% and many more are expected to exceed this level in the foreseeable future. The proposed solution to this problem is the designation of RR Appendix **18** channels for ASM (Application Specific Messages – AIS non-navigation messages).

–

– Studies for sharing the RR Appendix **18** channels proposed for the VDES satellite component between satellite and terrestrial services have indicated that coordination levels that are currently in use are sufficient to permit sharing by the services.

# 3/1.16/5 Method(s) to satisfy the agenda item

However the method developed a transition period needed to be determine [TBD at least 2 or 3 years]

## 3/1.16/5.1 VDES global solution

### 3/1.16/5.1.1 METHOD A:

[Name of your country] proposes the introduction of the VHF Data Exchange System (VDES) inside the Radio Regulation. The main ideas that drive the VDES are:

– Protection of the integrity of the AIS VDL

AIS 1 and AIS 2 should be reserved for “Navigation Safety/Collision Avoidance” purposes (as a SOLAS requirement) and therefore the Application-Specific Messages (ASM) and other “non-critical communications” should be moved to new channels of RR Appendix 18 to avoid deleterious loading of the AIS VDL. This problem increases as more different types of equipment using AIS technology are developed, more vessels are equipped and more AIS applications are developed and implemented. The channels 2027 and 2028 which are the upper legs of the duplex channels 27 and 28, are the suitable candidates for these new applications using AIS technology.

– Increased visibility (capability to see more ships on the AIS VDL on high loading).

AIS 1 and AIS 2 can support more load (future expansion) without a reduction in range if “non-critical communications” are moved to the new channels.

– Improved communications capacity and coverage, through terrestrial and satellite component taking into account the channelling plan propose above (see section 3/1.16/3.3 table 1 and 2).

The new channels provide opportunity for more capacity, efficiency and a more robust communications system to support new application.

– Efficient use of the spectrum for communications (vs. Navigation).

The VDES is described in the Recommendation ITU-R M.[VDES].

## 3/1.16/5.2 VDES regional solution [If your country does not support the regional solution this section should be deleted]

### 3/1.16/5.2.1 METHOD B:

CHs 80, 21, 81, 22, 82, 23 and 83 are available in some Regions as follows (see Table 3 in section 3/1.16/3.3):

* CHs 80, 21, 81 and 22 can be used using multiple 25 kHz contiguous channels for both ship and coast station transmission as regional use.
* CH 82 can be used for both ship and coast station transmission as regional use.
* CHs 23 and 83 can be used using multiple 25 kHz contiguous channels for both ship and coast station transmission as regional use

# 3/1.16/6 Regulatory and procedural considerations

## 3/1.16/6.1 VDES global solution

### 3/1.16/6.1.1 Example for METHOD A:



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ARTICLE 5

Frequency allocations

148-223 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  Mobile-satellite (Earth-to-space) | 157.1875-157.3375  FIXED  MOBILE  Mobile-satellite (Earth-to-space) | |
| 5.226 | 5.226 | |
| 157.3375-161.7875  FIXED  MOBILE except aeronautical mobile | 156.3375-161.7875  FIXED  MOBILE | |
| 5.226 | 5.226 | |
| 161.7875-161.9375  FIXED  MOBILE except aeronautical mobile  Mobile-satellite (space-to-Earth) | 161.7875-161.9375  FIXED  MOBILE  Mobile-satellite (space-to-Earth) | |
| 5.226 | 5.226 | |
| 161.9375-161.9625  FIXED  MOBILE except aeronautical mobile  Mobile-satellite (Earth-to-space) | 161.9375-161.9625  FIXED  MOBILE  Mobile-satellite (Earth-to-space) | |
| 5.226 | 5.226 | |
| 161.9625-161.9875  FIXED  MOBILE except aeronautical mobile  Mobile-satellite (Earth-to-space) 5.228F | 161.9625-161.9875  AERONAUTICAL MOBILE (OR)  MARITIME MOBILE  MOBILE-SATELITE (Earth-to-space) | 161.9625-161.9875  MARITIME MOBILE  Aeronautical mobile (OR) 5.228E  Mobile-satellite (Earth-to-space) 5.228F |
| 5.226 5.228A 5.228B | 5.228C 5.228D | 5.226 |

148-223 MHz (end)

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 161.9875-162.0125  FIXED  MOBILE except aeronautical mobile  Mobile-satellite (Earth-to-space) | 161.9875-162.0125  FIXED  MOBILE  Mobile-satellite (Earth-to-space) | |
| 5.226 5.229 | 5.226 | |
| 162.0125-162.0375  FIXED  MOBILE except aeronautical mobile  Mobile-satellite (Earth-to-space) 5.228F | 162.0125-162.0375  AERONAUTICAL MOBILE (OR)  MARITIME MOBILE  MOBILE-SATELITE (Earth-to-space) | 162.0125-162.0375  MARITIME MOBILE  Aeronautical mobile (OR) 5.228E  Mobile-satellite (Earth-to-space) 5.228F |
| 5.226 5.228A  5.228B 5.229 | 5.228C 5.228D | 5.226 |
| …/… | | |

Reasons: The above modifications of Article 5 identify a MSS allocation uplink and downlink for the VHF Data Exchange System which is described in the Recommendation ITU-R M.[VDES]

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APPENDIX 5 (Rev.WRC‑15)

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

ANNEX 1

1 Coordination thresholds for sharing between MSS (space-to-Earth) and terrestrial services in the same frequency bands and between non‑GSO MSS feeder links (space-to-Earth) and terrestrial services in the same frequency bands and between RDSS (space-to-Earth) and terrestrial services in the same frequency bands    (WRC-15)

## 1.1 Below 1 GHz[[4]](#footnote-5)\*

1.1.1 In the bands 137-138 MHz**,** 161.7875-161.9375 MHz[[5]](#footnote-6) and 400.15-401 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to terrestrial services (except aeronautical mobile (OR) service networks operated by the administrations listed in Nos. 5.204 and 5.206 as of 1 November 1996) is required only if the pfd produced by this space station exceeds −125 dB(W/(m2 . 4 kHz)) at the Earth’s surface.

Reasons: It is proposed to extend the coordination threshold defined in Annex 1 of Appendix 5 for the VDES using the frequency band 161.7875-161.9375 MHz

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APPENDIX 18 (Rev.WRC‑15)

Table of transmitting frequencies in the  
VHF maritime mobile band

(See Article 52)

NOTE A – For assistance in understanding the Table, see Notes a) to z) below.    (WRC‑12)

NOTE B – The Table below defines the channel numbering for maritime VHF communications based on 25 kHz channel spacing and use of several duplex channels. The channel numbering and the conversion of two-frequency channels for single-frequency operation shall be in accordance with Recommendation ITU‑R M.1084‑4 Annex 4, Tables 1 and 3. The Table below also describes the harmonized channels where the digital technologies defined in the most recent version of Recommendation ITU‑R M.1842 could be deployed.    (WRC‑12)

| 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 |
| 60 | m) | 156.025 | 160.625 |  | x | x | x |
| 01 | m) | 156.050 | 160.650 |  | x | x | x |
| 61 | m) | 156.075 | 160.675 |  | x | x | x |
| 02 | m) | 156.100 | 160.700 |  | x | x | x |
| 62 | m) | 156.125 | 160.725 |  | x | x | x |
| 03 | m) | 156.150 | 160.750 |  | x | x | x |
| 63 | m) | 156.175 | 160.775 |  | x | x | x |
| 04 | m) | 156.200 | 160.800 |  | x | x | x |
| 64 | m) | 156.225 | 160.825 |  | x | x | x |
| 05 | m) | 156.250 | 160.850 |  | x | x | x |
| 65 | m) | 156.275 | 160.875 |  | x | x | x |
| 06 | f) | 156.300 |  | x |  |  |  |
| 2006 | r) | 160.900 | 160.900 |  |  |  |  |
| 66 | m) | 156.325 | 160.925 |  | x | x | x |
| 07 | m) | 156.350 | 160.950 |  | x | x | x |
| 67 | h) | 156.375 | 156.375 | x | x |  |  |
| 08 |  | 156.400 |  | x |  |  |  |
| 68 |  | 156.425 | 156.425 |  | x |  |  |
| 09 | i) | 156.450 | 156.450 | x | x |  |  |
| 69 |  | 156.475 | 156.475 | x | x |  |  |
| 10 | h), q) | 156.500 | 156.500 | x | x |  |  |
| 70 | f), j) | 156.525 | 156.525 | Digital selective calling for distress, safety and calling | | | |
| 11 | q) | 156.550 | 156.550 |  | x |  |  |
| 71 |  | 156.575 | 156.575 |  | x |  |  |
| 12 |  | 156.600 | 156.600 |  | x |  |  |
| 72 | i) | 156.625 |  | x |  |  |  |
| 13 | k) | 156.650 | 156.650 | x | x |  |  |
| 73 | h), i) | 156.675 | 156.675 | x | x |  |  |
| 14 |  | 156.700 | 156.700 |  | x |  |  |
| 74 |  | 156.725 | 156.725 |  | x |  |  |

| 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 |
| 15 | g) | 156.750 | 156.750 | x | x |  |  |
| 75 | n), s) | 156.775 | 156.775 |  | x |  |  |
| 16 | f) | 156.800 | 156.800 | DISTRESS, SAFETY AND CALLING | | | |
| 76 | n), s) | 156.825 | 156.825 |  | x |  |  |
| 17 | g) | 156.850 | 156.850 | x | x |  |  |
| 77 |  | 156.875 |  | x |  |  |  |
| 18 | m) | 156.900 | 161.500 |  | x | x | x |
| 78 | t), u), v) | 156.925 | 161.525 |  | x | x | x |
| 1078 |  | 156.925 | 156.925 |  | x |  |  |
| 2078 | t), u), v) |  | 161.525 |  | x |  |  |
| 19 | t), u), v) | 156.950 | 161.550 |  | x | x | x |
| 1019 |  | 156.950 | 156.950 |  | x |  |  |
| 2019 | t), u), v) |  | 161.550 |  | x |  |  |
| 79 | t), u), v) | 156.975 | 161.575 |  | x | x | x |
| 1079 |  | 156.975 | 156.975 |  | x |  |  |
| 2079 | t), u), v) |  | 161.575 |  | x |  |  |
| 20 | t), u), v) | 157.000 | 161.600 |  | x | x | x |
| 1020 |  | 157.000 | 157.000 |  | x |  |  |
| 2020 | t), u), v) |  | 161.600 |  | x |  |  |
| 80 | w), y) | 157.025 | 161.625 |  | x | x | x |
| 21 | w), y) | 157.050 | 161.650 |  | x | x | x |
| 81 | w), y) | 157.075 | 161.675 |  | x | x | x |
| 22 | w), y) | 157.100 | 161.700 |  | x | x | x |
| 82 | w), x), y) | 157.125 | 161.725 |  | x | x | x |
| 23 | w), x), y) | 157.150 | 161.750 |  | x | x | x |
| 83 | w), x), y) | 157.175 | 161.775 |  | x | x | x |
| 24 | w), ww), x),  AAA) | 157.200 | 161.800 |  | x | x | x |
| 1024 | BBB) | 157.200 |  |  |  |  |  |
| 2024 | CCC) | 161.800 | 161.800 | x |  |  |  |
| 84 | w), ww), x), AAA) | 157.225 | 161.825 |  | x | x | x |
| 1084 | BBB) | 157.225 |  |  |  |  |  |
| 2084 | CCC) | 161.825 | 161.825 | x |  |  |  |
| 25 | w), ww), x), AAA) | 157.250 | 161.850 |  | x | x | x |
| 1025 | BBB) | 157.250 |  |  |  |  |  |
| 2025 | CCC) | 161.850 | 161.850 | x |  |  |  |
| 85 | w), ww), x), AAA) | 157.275 | 161.875 |  | x | x | x |
| 1085 | BBB) | 157.275 |  |  |  |  |  |
| 2085 | CCC) | 161.875 | 161.875 | x |  |  |  |
| 26 | w), ww), x), | 157.300 | 161.900 |  | x | x | x |
| 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 |
| 1026 | BBB) | 157.300 |  |  |  |  |  |
| 2026 | CCC) | 161.900 | 161.900 | x |  |  |  |
| 86 | w), ww), x), | 157.325 | 161.925 |  | x | x | x |
| 1086 | BBB) | 157.325 |  |  |  |  |  |
| 2086 | CCC) | 161.925 | 161.925 | x |  |  |  |
| 27 | z) | 157.350 | 161.950 |  |  | x | x |
| 1027 | z) | 157.350 |  |  |  |  |  |
| 2027 | z) | 161.950 | 161.950 |  |  |  |  |
| 87 |  | 157.375 | 157.375 |  | x |  |  |
| 28 | z) | 157.400 | 162.000 |  |  | x | x |
| 1028 | z) | 157.400 |  |  |  |  |  |
| 2028 | z) | 161.950 | 162.000 |  |  |  |  |
| 88 |  | 157.425 | 157.425 |  | x |  |  |
| AIS 1 | f), l), p) | 161.975 | 161.975 |  |  |  |  |
| AIS 2 | f), l), p) | 162.025 | 162.025 |  |  |  |  |

Legend:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AIS1/AIS2 | ASM1/ASM2 | Sat uplink | Sat downlink | VDES |
|  |  |  |  |  |

Editor's Note: The colors used in the Appendix 18 are in compliance with the channel plan presented in WP 5B, they are here in order to make the proposal more readable, they will disappear at a later stage when the CPM Report will be finalised.

Reasons:

Introduction of the VDES in the Appendix 18 as follow:

ASM 1 (161.950) and ASM 2 (162.000) are non-navigation ASM (application specific messages)

VDE 1 lower legs (channels 1024… 1085) are ship-shore VDE (VHF data exchange)

VDE 1 upper legs (channels 2024… 2085) are shore-ship and ship-ship VDE (VHF data exchange)

SAT up1 (161.950) and SAT up 2 (162.000) are used for receiving ASM by satellite

SAT up3 (channels 1024… 1086) is a ship-satellite VDE (VHF data exchange) uplink

SAT Downlink (channels 2024… 2086) is the satellite-ship VDE (VHF data exchange) downlink

Notes referring to the Table

General notes

NOC …/XX/4

Notes a) to e)

Specific notes

NOC …/XX/5

Notes f) to s)

MOD …/XX/5

t) Until 1 January 2017, in Regions 1 and 3, the existing duplex channels 78, 19, 79 and 20 can continue to be assigned. These channels may be operated as single-frequency channels, subject to coordination with affected administrations. From that date, these channels shall only be assigned as single-frequency channels. However, existing duplex channel assignments may be preserved for coast stations and retained for vessels, subject to coordination with affected administrations.  Channels 2078, 2019, 2079 and 2020 are not available for transmitting from ships.  (WRC‑15)

u) In Region 2, these channels may be operated as single-frequency channels, subject to coordination with affected administrations.   Channels 2078, 2019, 2079 and 2020 are not available for transmitting from ships. (WRC‑15)

v) After 1 January 2017, in the Netherlands, these channels may continue to be operated as duplex frequency channels, subject to coordination with affected administrations.   Channels 2078, 2019, 2079 and 2020 are not available for transmitting from ships. (WRC‑15)

w) In Regions 1 and 3:

Until 1 January 2017, the frequency bands 157.025-157.325 MHz and 161.625-161.925 MHz (corresponding to channels: 80, 21, 81, 22, 82, 23, 83, 24, 84, 25, 85, 26, 86) may be used for new technologies, subject to coordination with affected administrations. Stations using these channels or frequency bands for new technologies shall not cause harmful interference to, or claim protection from, other stations operating in accordance with Article 5.

From 1 January 2017, the frequency bands 157.025‑157.175 MHz and 161.625-161.775 MHz (corresponding to channels: 80, 21, 81, 22, 82, 23, 83) are identified for the utilization of the digital systems described in the most recent version of Recommendation ITU‑R M.1842. These frequency bands could 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.

The frequency bands 157.200‑157.325 MHz and 161.800-161.925 MHz (corresponding to channels: 24, 84, 25, 85, 26, 86) are identified for the utilization of the VHF Data Exchange System (VDES) described in the most recent version of Recommendation ITU‑R M.[VDES]. (WRC-15)

NOC …/XX/6

Notes ww)

ADD …/XX/7

AAA) From 1 January 2019 the channels 24, 84, 25 and 85 may be merged in order to form a unique duplex channel with a bandwidth of 100 kHz in order to operate the VDES describe in the most recent version of the Recommendation ITU-R M.[VDES] in which this combination is denominated as VDE 1. (WRC‑15)

Reasons: The merge of these channels authorized a better data rate for the VDE terrestrial

ADD …/XX/8

BBB) From 1 January 2019 the combination of the channels 1024, 1084, 1025, 1085, 1026 and 1086, which are also allocated to the mobile-satellite service (Earth-to-space) after 27 November 2015, shall be used for the reception of VDE messages from ships as described in the most recent version of the Recommendation ITU-R M.[VDES] in which this combination is denominated as SAT up 3. (WRC‑15)

Reasons: The channels are identified for the satellite uplink of the VDES

ADD …/XX/9

CCC) From 1 January 2019 the combination of the channels 2024, 2084, 2025, 2085, 2026 and 2086, which are also allocated to the mobile-satellite service (space-to-Earth) after 27 November 2015, shall be used for the reception of VDE messages from satellites as described in the most recent version of the Recommendation ITU-R M.[VDES] in which this combination is denominated as SAT downlink. (WRC‑15)

Reasons: The channels are identified for the satellite downlink of the VDES

NOC …/XX/10

Notes x) and y)

MOD …/XX/11

z) Until 1 January 2019, these channels may be used forpossible testing of future AIS applications without causing harmful interference to, or claiming protection from, existing applications and stations operating in the fixed and mobile services.

From 1 January 2019, these channels are split into two simplex channels. The upper legs, 2027 and 2028 respectively designated as ASM 1 and ASM 2 are used for non-navigation ASM (application specific messages) as described in the most recent version of the Recommendation ITU-R M.[VDES].

The channels 2027 and 2028 are also allocated to the mobile-satellite service (Earth-to-space) for the reception of ASM messages from ships as describe in the most recent version of the Recommendation ITU-R M.[VDES] in which they are denominated respectively as SAT up1 and SAT up2. (WRC‑15)

Reasons: [Name of your country] proposes the identification of two channels dedicated to the ASM applications non necessary for the security of the navigation in order to secure the VDL of the channels AIS1 and AIS2.

SUP …/XX/12

RESOLUTION 360 (WRC‑12)

Consideration of regulatory provisions and spectrum allocations for   
enhanced Automatic Identification System technology applications   
and for enhanced maritime radiocommunication

**3/1.16/6.2 VDES regional solution [Deletion if not supporting by your administration]**

### 3/1.16/6.2.1 Example for METHOD B:

TBD

1. [Canadian Coast Guard Business Plan 2011-2014](http://www.ccg-gcc.gc.ca/eng/CCG/Publications/Business-Plan-2011-2014/table-of-contents). [↑](#footnote-ref-1)
2. <http://www.sjofartsverket.se/en/MONALISA/> [↑](#footnote-ref-2)
3. <http://www.efficiensea.org/> [↑](#footnote-ref-3)
4. \* These provisions apply only to the MSS. [↑](#footnote-ref-5)
5. For this frequency range the mask is defined in Recommendation ITU-R M.[VDES] [↑](#footnote-ref-6)