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Use of Appendix 18 to the Radio Regulations for the maritime mobile service

M Series

Mobile, radiodetermination, amateur and related satellite services

International Telecommunication Union

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REPORT ITU-R M.2231

Use of Appendix 18 to the Radio Regulations for the maritime mobile service

(2011)

1 Introduction – A brief history of VHF maritime

The use of radio communications, for maritime purposes, has been an important part of ship safety and port operations, for many years. Some of the history even dates back to the early part of the 20th century. At that time, maritime communications were mainly (if not exclusively) in the LF frequency band. Around the 1930s, a paper discussed the use of frequency modulation as a technical solution to interference issues that were experienced in the HF frequency band (Edwin Howard Armstrong (1890-1954): *"A method of reducing disturbances in radio signalling by a system of frequency modulation"*). Subsequent to that, at the 1938 Radio Regulations Conference (Cairo), this note acknowledged this in the then: Table of Frequency Allocations:

> *"The frequency bands necessary for the various types of transmission, at the present state of technical development, are indicated below. This table is based solely on amplitude modulation. For frequency or phase modulation, the band-widths necessary for the various transmissions are many times greater."*

Whilst, there were service allocations in the VHF range at that time: 157-162 MHz mobile regional, 162-170 MHz stations of low power regional, these were not specifically identified for the maritime service. Use of the VHF frequency band, as indicated, for the use by maritime was facilitated through a number of Decisions of ITU Conferences which are included for information only:

– **1947**: Here specific maritime allocations were made in the frequency band 152-162 MHz. In addition, the identification of 156.8 MHz: for worldwide use for safety, calling, and inter-ship and harbour control communications in the maritime mobile service, was made.

– **1959**: Introduction of RR Appendix 18, which identified the channels 1-28, as we currently recognize, with a 50 kHz channel or channel spacing. Also at this time the now deleted RR Appendix 19, reflected that phase modulation had to be used.

– **1974**: World Maritime Administrative Radio Conference transition plans are announced to move from a channel spacing of 50 kHz to that of 25 kHz by modifying transmitters to a maximum deviation of ±5 kHz from 1 January 1972. Modifications for all existing equipment, was to be completed by 1 January 1973 and all new equipment to conform to 25 kHz standards from 1 January 1973. Finally, all equipment was to conform to the 25 kHz standards from 1 January 1983.

– **1979**: RR saw the introduction of the additional channels; 60-88, which was possible via the earlier recognition of the 25 kHz channelling. Here, it was reflected, that the extra channels derived from the 1967 RRs and was in accordance with Resolution No. Mar 2-14. That Resolution was derived from the World Maritime Administrative Radio Conference in 1974 and gave a plan for the transition from 50 kHz to 25 kHz.

– **1983**: 1 January 1983 was the date by which all maritime radio equipment, that operate in RR Appendix 18, were required to conform to the 25 kHz standards (Resolution 308 (WRC-79)).

– **1987**: Since that time the next major global change to RR Appendix 18 was the identification of channel 70 for the use of the global maritime distress and safety system (GMDSS). This was done at WRC-87 (MOB-87), but whilst 70 was identified for the sole use by GMDSS, in RR Appendix 18, it was not until WRC-03 where the frequency was identified as exclusively maritime mobile via an identification in Article 5 (of the RR). This is an example of where it should not be inferred that identification in RR Appendix 18 means that the frequency is recognized, formally, as exclusive to the maritime mobile service.

– **1997**: Next, and probably the most recent change in RR Appendix 18, was the creation and identification of the two channels for the use of the system referred to as; automatic identification system (AIS). Channels AIS 1 and AIS 2, were formally identified at WRC-97. That saw the splitting of the VHF channels 87 and 88 into four single frequencies with the "high" frequencies being used for AIS and the lower two frequencies retained for simplex operation. This change has facilitated the use of AIS which has proved to be a useful and valuable system that assists the management of shipping fleets by companies and those who interact with them around the world. As a consequence of the AIS channel changes, at WRC-97, two additional single frequencies were identified in RR Appendix 18.

– **2000**: WRC-00 modified RR Appendix 18, to include the addition of note *o)* against a number of the channels. This note *o)* permits the possible use, on a national basis, of various channels or frequency bands created by conversion of some duplex channels into simplex channels, for uses such as initial testing and the possible future introduction of new technologies.

  WRC-00 also updated Resolution 342 for the introduction of new technologies to provide improved efficiency in the use of the frequency band 156-174 MHz by stations in the maritime mobile service.

– **2007**: WRC-07 modified the following notes:

  e) to permit administrations to apply 12.5 kHz channel interleaving via coordination with affected administrations.

  f) to permit aircraft stations to use, in addition to channel 06, channels 70, 16, AIS 1 and AIS 2 for search and rescue operations and additionally, other safety-related communication.

  l) to acknowledge the worldwide usage of AIS 1 and AIS 2.

  m) to permit certain two frequency channels to be operated as single frequency channels, subject to coordination with affected administrations.

  o) to permit these two frequency channels to be used for new technologies, instead of only testing, providing that such systems do not interfere with the detection of AIS signals on 161.975 MHz or 162.025 MHz.

  WRC-07 also added the following notes:

  p) to permit the use of AIS 1 and AIS 2 by the mobile-satellite service (Earth-to-space) to receive AIS transmissions from ships.

  q) requiring precautions when using channels 10 and 11, so as to avoid harmful interference to channel 70.

Additionally, over the period from the mid-1980s until the present, there have been minor changes to the frequency arrangements in RR Appendix 18. These predominately permit national flexibility which do not require global changes and, consequently, these arrangements do not affect or influence the global maritime environment.

2 Maritime frequency arrangements – RR Appendix 18

All shipborne equipment is designed to access all the frequencies identified in Appendix 18 which ensures global compatibility.

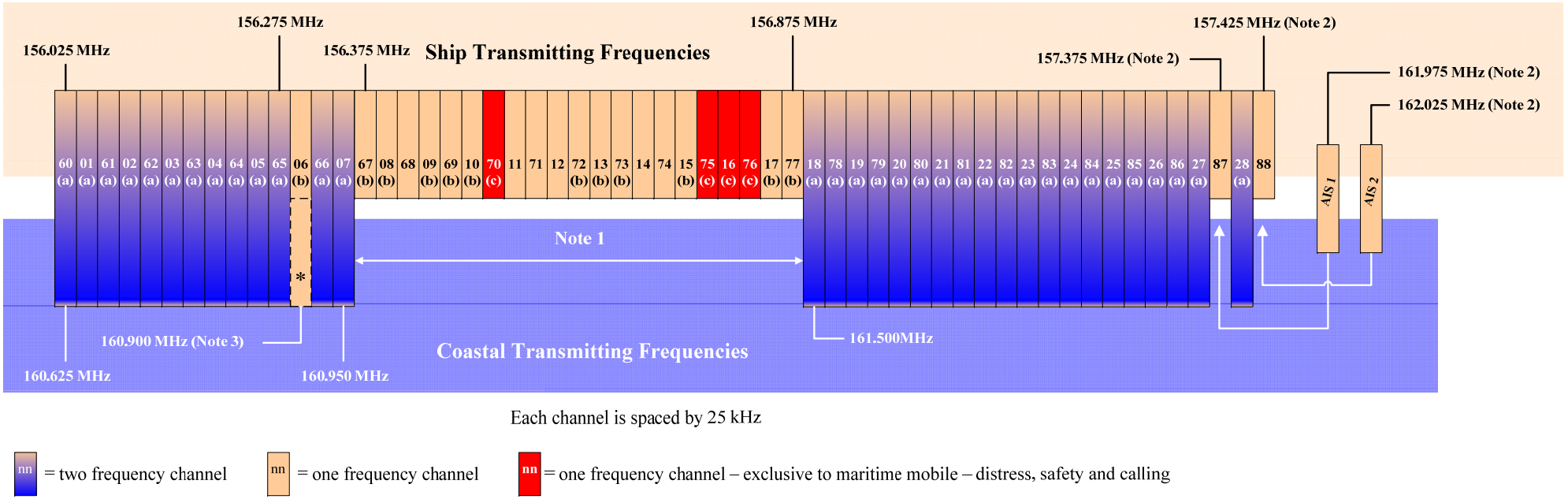
The frequency arrangements for maritime mobile use are detailed in general terms in the allocations in Article 5 of the Radio Regulations, and in more detail in RR Appendix 18 of the same. Here, there is an important point to recognize when considering what constitutes maritime allocations. With reference to the Article 5 allocations, it is only in fact the RR Appendix 18 channels; 70, 16, 75 and 76, which are exclusive to the maritime mobile service, globally. Channels 70 and 16 are also recognized for GMDSS, distress, safety/and calling, Channels 75 and 76 are retained as guard bands around channel 16.

The remaining frequencies, reflected in RR Appendix 18, are not exclusively allocated to the maritime mobile service and administrations are not obligated to allocate those remaining RR Appendix 18 frequencies for use in the maritime service. Various footnotes imply that priority be given to the maritime mobile service, but these footnotes do not carry the same weight as the Article 5 identification.

The following diagram illustrates the configuration of RR Appendix 18.

FIGURE 1

Frequency arrangements for RR Appendix 18



Each channel is spaced by 25 kHz

nn = two frequency channel nn = one frequency channel nn = one frequency channel – exclusive to maritime mobile – distress, safety and calling

Channels: 06, 08, 09, 10, 13, 15, 17, 67, 69, 72, 73 and 77 are identified for inter-ship use (indicated by (b) in the above diagram).

Channel: 01-07 (inclusive), 18-28 (inclusive) and 78-86 (inclusive) are identified for public correspondence (indicated by (a) in the above diagram).

NOTE 1 – Whilst the frequency range/channels appears to be within the scope of RR Appendix 18, it should be noted that the “gaps” as indicated are general mobile allocations with no footnote priority to maritime use.

NOTE 2 – At WRC-97, the original channels 87 and 88, were split into four single frequency channels. The “high” frequencies were identified for AIS, with the remaining “low” single frequencies now designated as channels 87 and 88 (i.e. now no longer two frequency, duplex channels, but single frequency simplex channels).

NOTE 3 – This channel, whilst not explicitly referenced in Appendix 18, falls with the frequency bands identified within RR No. 5.226 and is the upper frequency, (i.e. +4.6 MHz) related to channel 6.

3 Maritime use in RR Appendix 18

Use of the channels 16, 70, 75 and 76 form the core safety elements within RR Appendix 18. This is reflected by the use of the channels by GMDSS, retained voice communications and the guard channels around channel 16. In addition to this, RR Appendix 15 notes GMDSS use on channels 6 and 13, although these channels do not carry the same regulatory status as 16, 70, 75 and 76. This primary safety requirement is well recognized and accommodated by the global maritime community. The use of local national variations, apart from the recognized difference between identified sea areas[1], is not normally implemented as it would compromise these requirements.

Outside the core safety elements, there are variation of other uses, these are:

– use of dedicated channels for the control of, mainly local, incidents such as oil spills;

– use of dedicated channels for on-board use;

– use of the automatic identification system, to aid those who manage shipping, locally and globally;

– use of channels for port control and ship movement;

– use of channels for communication between ships;

– use of channels for public correspondence (“link calls” via the PSTN);

– other national/regional variations that encompass different frequency arrangement (e.g. split channels, interleaved channel spacing[2] and data/digital systems).

Whilst the above have links to the safe movement of shipping the status of those channels are not reflected in the same way as channels; 16, 70, 75 and 76[3].

Use of dedicated channels for the control of, mainly local, incidents

The VHF channel 6 (156.300 MHz) may be used in coordinated search and rescue operations. This covers incidents such as: coordinated exercises, search and rescue, broadcast of safety information. As such incidents cannot be anticipated, these channels are reserved for this safety related use. In certain identified sea areas, the channels: 10 (156.500 MHz), 67 (156.375 MHz) and 73 (156.675 MHz) are additionally identified for this use.

Use of dedicated channels for on-board use

Channels 15 and 17 (156.750 MHz and 156.850 MHz) are reserved for on-board communications. They are restricted to low power to assist in ensuring that the use of these channels does not cause interference with the ships’ own on-board communications use. These allocations are in addition to a number of UHF frequencies that are also identified for on-board ship use, although this UHF allocation is via a footnote to Article 5 (i.e. are not reflected in RR Appendix 18) and to some extent subject to national arrangement and agreement but in conformance with Recommendation ITU-R M.1174 series.

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[1] Because the various radio systems used in the GMDSS have different limitations with regard to range and services provided, GMDSS operation divides the world's oceans into 4 areas. In some of those areas, the range capabilities of VHF is not sufficient for reliable communications and other alternative systems (e.g. MF radio, Inmarsat) are the recognized primary GMDSS system.

[2] Interleaved channels at spacing of 12.5 kHz, 6.25 kHz and 5 kHz are reflected in Recommendation ITU-R M.1084-4.

[3] Figure 1 refers.

Use of the automatic identification system, to aid those who manage shipping, locally and globally

The AIS use is current reflected in RR Appendix 18 in two VHF channels (Fig. 1 refers). AIS is now used extensively throughout the maritime sector. AIS is backwards compatible with elements of the digital selective calling system. AIS has the ability to provide immediate and accurate contact between vessels. To help with the coordination of vessel identity, ships fitted with AIS use the same MMSI numbers assigned to the vessel for GMDSS purposes.

Use of channels for port control and ship movement including vessel traffic services

Currently, management of ship movement is through a number of systems. In a number of regions shared database systems record ships routes and anticipated calling points[4]. Additionally, where deployed, the use of AIS allows ports to record and monitor ships within their responsible area. However, even where these systems exist, it appears that ports retain the need for standard voice communications. Part of the reason here is that commercial ports not only observe (safety-of-life at sea) SOLAS vessels, but they also observe vessels that are not subject to the SOLAS requirements and these ships may not be fitted with AIS. Therefore, voice communications is not regarded as a back-up to AIS but as a valuable and necessary ship management tool.

Use of channels for coastal vessel traffic services

There is a category of vessel traffic services (VTS) known as "coastal VTS" established in various parts of the world. These VTS systems require VHF communications harmonized along coastlines. An example is the great barrier reef and torres strait vessel traffic service (REEFVTS) in Australia which extends over 2 000 km. As of 1 July 2011, a new communications plan for this coastal VTS was implemented using simplex Channels 11 and 14 (which replaced the previous system of duplex channels 5, 18 and 19) in an effort to simplify reporting arrangements for ships.

Use of channels for communication between ships

Channels 8, 72 and 77 are used as inter-ship channels. Because these channels are recognized, globally, for inter-ship working, it is accepted practice by most administrations that they are retained, in the main, purely for this use. Channel 6 is identified for inter-ship work, but this channel is subject to an additional footnote that indicates that it may also be used for search and rescue and other safety-related purposes.

Use of channels for public correspondence ("link calls" via the PSTN[5])

Referring to Fig. 1, there is a large number of channels formally identified for VHF public correspondence (VPC). This identification was originally required to accommodate the service that enabled shipping to make telephone calls via local coastal radio stations. This was a valuable aid to mariners at a time when mobile cellular communications and satellite systems were not in wide spread use. There were originally 35 channels identified for this use but through the changes at WRC-97 which identified channels for AIS, that number was reduced to 33. However, today, the public correspondence service has been largely superseded by mobile cellular and mobile satellite systems. As a result, the number of coastal stations, able to offer this service has greatly reduced to the point where many countries no longer offer such a service. As a result, many of the channels, originally identified for public correspondence, now lay dormant. In some areas, port operations and VTS costal stations are allocated those VPC channels, presumably because the other available channels (i.e. not safety frequencies, inter-ship, etc.) are insufficient to meet demand.

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4 For example the "SafeSeaNet" system, in Europe.

5 Public switched telephone network.

Other national/regional variations that encompass different frequency arrangement (e.g. split channels, interleaved channels, data/digital systems and supplementary national search and rescue arrangements)

In previous WRCs, regulatory footnotes have been added, to RR Appendix 18, which have permitted administrations to use channels in a manner that offers flexibility. This flexibility has seen a number of national or regional variations to the RR Appendix 18 "plan". The detail of these potential flexibilities, are in Recommendation ITU-R M.1084-4 – Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service.

In addition, 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 details the technical characteristics of a number of national and regional digital/data systems. In all of these cases of flexible operations, the use is subject to RR Appendix 18 and associated footnotes. This means agreements with potentially affected administrations should be arranged, along with consideration of the global shipping environment.

Split channels: In some administrations, some of the, presumably under used, public correspondence channels have been split from their two frequency channel configuration into single frequency channels. Here the splitting has not necessarily been done to offer flexibility for the maritime mobile service, but clearly the maritime use has been able to make use of the single frequency channel. However, not all shipping is likely to be able to take advantage of this channel splitting without re-configuration of channels on-board vessels. One administration indicated having actively encouraged new port and ship movement stations to use the split channels. The attitude of license applicants has been negative. The license holders clearly want to use traditional maritime VHF-channels because that ensures interoperability with international shipping. The split channels have been accepted by users only in a few cases where a port uses the channel solely for its internal PMR-type communication.

Interleaved channels: Here the national/regional flexibility permits the interleaving of channels between the established 25 kHz spacing in RR Appendix 18 frequency table. Varying interleaving options are detailed in the above-referenced Recommendation, such as: 12.5, 6.25 and 5 kHz. Interleaving dramatically increases the channels available, although to take advantage of the potential extra channels, both coastal stations and ships would need to upgrade their radios in a similar manner to that undertaken when 25 kHz (changing from 50 kHz) was introduced into the RR Appendix 18 frequency band. This would be a significant change and is likely to be harder to implement than the splitting of two frequency channels. This is probably due to the conversion or replacement of existing equipment and information that recognizes this fact is reflected in Report ITU-R M.2010 – Improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service. One administration indicated that they have been prepared to issue licenses for 12.5 kHz channels. No applicants have emerged as all users want to use 25 kHz spaced channels for full international compatibility reasons. No administrations have indicated use of 6.25 and 5 kHz interleaving channels.

Data/Digital systems: A number of the channels in RR Appendix 18 can be used (subject to administration agreement) by digital/data systems. Some of these national/regional systems that can be used under the footnote to RR Appendix 18 are detailed in 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. These systems, based on the characteristics in the above Recommendation, generally fall into two types. One is a system that aggregates the 25 kHz channels thereby facilitating the use of electronic data (e.g. email, file transfer etc.). Another is a system based upon a recognized digital system, where mainly voice traffic is used (although slow speed data can also be used). As most of these systems require duplex channel arrangements,

they tend to operate on VPC channels. This is because the VPC channels are, in many areas, either under-utilized or vacant.

Supplementary national search and rescue (SAR) arrangements*:* A number of administrations have implemented SAR arrangements where channels other than 16 and 70 are used for the management of logistics during such incidents. Whilst these channels are not those safety and distress channels recognized globally, they are recognized at a national level for this use.

4 Current operational environment for channels in RR Appendix 18

Survey undertaken by one administration

Purely as a general snap-shot of use, United Kingdom (UK) undertook a brief survey of users who make use of maritime mobile radio, in the VHF frequency band. This included both ports and shipping. The survey did not include the core safety systems used in the VHF frequency band, but focused on general questions on the use made in the non-core safety parts of the VHF frequency band.

Ports

The survey ranged from the major ports, i.e. those that are mainly used for international shipping, through to the minor ports (mainly those used by leisure vessels). Ports generally operate voice-based communications in conjunction with AIS systems. In addition some of the larger ports have access to database systems, at both a national and regional level, that record ship routes and thereby give information relating to vessels the ports are expected to manage. Approximately 26 ports, throughout the UK, responded to the survey.

In response to a question: "*Where you make use of VHF standard voice communication, do you feel that this is still an important part of the overall port to ship communication (where "4" is critical and "1" is for back up to other systems)?*"

The majority said that this was a critical requirement and two felt it was important. None of the responders felt it was either "useful" or only a backup system. This seemed to indicate that ports, still regard voice communications as a valuable part of the systems used to manage ship movements. Also all, apart from three of the ports surveyed, operate their communications on simplex frequencies, with some of those who use a duplex channel, use this as an additional supplementary channel. This supplementary channel is sometimes referred to as a "private" channel. This is because on a duplex channel, whilst ports radio traffic can be heard by all ships, the return traffic (from ship to coastal station) can only be heard by the port with which it is communicating. Whilst this might give some implied "privacy", this does not mean that the traffic is encrypted or encoded. Whilst other ships might not be able to hear other ships, where duplex channels are used, this is only because of the RR Appendix 18 frequency band plan used and monitoring of the frequency can be done with other devices.

None of the responses indicated that there would be a time when voice communications would not be required. This, they say, is because their radio communications requirements will be dictated by the commonality across all vessels that might come into contact with a port.

Ships

The survey responses, for ships, were broadly similar that for ports. The UK shipping survey included passenger ferries, cargo vessels and tugs. Around 50 responses were received.

Again here, when asked: "*Where you make use of VHF standard voice communication, do you feel that this is still an important part of the overall port to ship communication (where "]" is critical and '1" is for back up to other systems)?*", around 80% felt that "voice" remained a critical

requirement, with just under 20% stating it was important, with a single response stating it was "useful".

On the need for port operations being on simplex frequencies, responses were broadly split between critical and important, only four felt it was "useful". Around 35% of responses stated that they communicated with ports on duplex channels, although of these none indicted that contact with duplex channelled ports made more than 50% of overall ports related communication. None of the responses indicated that they currently used public correspondence systems. On the question of a potential of removal of all voice communications from vessels, 94% felt this was unlikely particularly where vessels remained manned. Some felt that supplementary systems ran the risk of complicating the bridge of a vessel and that the instant and immediacy of voice had benefits and this leads to a degree of confidence.

Considerations for the maritime use of RR Appendix 18 in the United States

In the United States (US), the VHF maritime mobile frequency band (RR Appendix 18) is shared with other services. Since the Administration has exclusively assigned many of these frequencies to other services, they are unavailable for maritime use. Two examples of this are:

– The upper legs of the duplex channels 1, 2, 3, 4, 5, 6, 7, 18, 19, 60, 61, 62, 63, 64, 65, 66, 78 and 79 have been assigned exclusively to the land mobile service and are not available for maritime service in the US.

– The upper legs of the duplex channels 21, 22, 23, 80, 81, 82 and 83 have been assigned exclusively for "broadcast auxiliary remote pickup" and are not available for maritime service in the US.

In addition, the Administration assigned the only remaining VPC channels 24-28 and 84-88 to one operator. The Administration exclusively designated AIS 1 and AIS 2, channels 87B and 88B, nationwide to the maritime mobile service for the AIS. The VPC channelling plan was separated into maritime service areas and non-maritime service areas, and one organization was awarded all of the maritime service areas. Since then, the Administration has proceeded with further rulemaking to further specify the use of the VPC channels in the maritime service areas. At present, only the VPC channels 24, 25, 26, 27, 28, 84, 85, 86 and 87 are still available for maritime use.

Report ITU-R M.2122 – EMC assessment of shore-based electronic navigation (eNAV) infrastructure and new draft Standards for data exchange in the VHF maritime mobile band (156-174 MHz) provides an EMC (electromagnetic compatibility) analysis between these VPC channels and the AIS, and this Report is considered in Recommendation ITU-R M.1842-1 for the exchange of data by VHF. This Report shows that the AIS channels are most susceptible to interference from channels 27 and 28 which are interleaved adjacent to AIS 1 and AIS 2. Thus, it is prudent to consider that the VHF data exchange service envisioned in Recommendation ITU-R M.1842-1 should be addressed primarily to the contiguous set of frequencies contained in the six remaining VPC channels 24, 84, 25, 85, 26 and 86.

Table 1 provides a view of the maritime availability of RR Appendix 18 in the United States.

TABLE 1

Availability of RR Appendix 18 for maritime service in the United States

A = available for maritime service in the US

M = available only to one operator for maritime service in the US

R = assigned to railroads, not available for maritime service in the US

B = assigned for broadcast auxiliary remote pickup, not available for maritime service in US

L = assigned to land-mobile radio services, not available for maritime service in the US

Rx/Tx = assigned for coast-to-ship environmental broadcasts only

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), o)*	156.025**L**	160.625**R**			x	x
01	*m), o)*	156.050**A**	160.650**R**			x	x
61	*m), o)*	156.075**L**	160.675**R**		x	x	x
02	*m), o)*	156.100**L**	160.700**R**		x	x	x
62	*m), o)*	156.125**L**	160.725**R**		x	x	x
03	*m), o)*	156.150**L**	160.750**R**		x	x	x
63	*m), o)*	156.175**A**	160.775**R**		x	x	x
04	*m), o)*	156.200**L**	160.800**R**		x	x	x
64	*m), o)*	156.225**L**	160.825**R**		x	x	x
05	*m), o)*	156.250**A**	160.850**R**		x	x	x
65	*m), o)*	156.275**A**	160.875**R**		x	x	x
06	*f)*	156.300**A**		x			
66	*m), o)*	156.325**A**	160.925**R**			x	x
07	*m), o)*	156.350**A**	160.950**R**			x	x
67	*h)*	156.375**A**	156.375**A**	x	x		
08		156.400**A**		x			
68		156.425**A**	156.425**A**		x		
09	*i)*	156.450**A**	156.450**A**	x	x		
69		156.475**A**	156.475**A**	x	x		
10	*h), q)*	156.500**A**	156.500**A**	x	x		
70	*f), j)*	156.525**A**	156.525**A**	Digital selective calling for distress, safety and calling			
11	*q)*	156.550**A**	156.550**A**		x		
71		156.575**A**	156.575**A**		x		
12		156.600**A**	156.600**A**		x		
72	*i)*	156.625**A**		x			
13	*k)*	156.650**A**	156.650**A**	x	x		
73	*h), i)*	156.675**A**	156.675**A**	x	x		
14		156.700**A**	156.700**A**		x		
74		156.725**A**	156.725**A**		x		
15	*g)*	156.750**Rx**	156.750**Tx**	x	x		
75	*n)*	156.775**A**	156.775**A**		x		

Table 1 *(continued)*

Availability of RR Appendix 18 for maritime service in the United States

A = available for maritime service in the US

M = available only to one operator for maritime service in the US

R = assigned to railroads, not available for maritime service in the US

B = assigned for Broadcast Auxiliary Remote Pickup, not available for maritime service in US

L = assigned to land-mobile radio services, not available for maritime service in the US

Rx/Tx = assigned for coast-to-ship environmental broadcasts only

Channel designator	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movement		Public correspondence
		From ship stations	From coast stations		Single frequency	Two frequency	
16	*f)*	156.800**A**	156.800**A**	DISTRESS, SAFETY AND CALLING			
76	*n)*	156.825**A**	156.825**A**		x		
17	*g)*	156.850**A**	156.850**A**	x	x		
77		156.875**A**		x			
18	*m)*	156.900**A**	161.500**R**		x	x	x
78	*m)*	156.925**A**	161.525**R**			x	x
19	*m)*	156.950**A**	161.550**R**			x	x
79	*m)*	156.975**A**	161.575**R**			x	x
20	*m)*	157.000**A**	161.600**A**			x	x
80	*m)*	157.025**A**	161.625**B**			x	x
21	*m)*	157.050**A**	161.650**B**			x	x
81	*m)*	157.075**A**	161.675**B**			x	x
22	*m)*	157.100**A**	161.700**B**		x	x	x
82	*m), o)*	157.125**A**	161.725**B**		x	x	x
23	*m), o)*	157.150**A**	161.750**B**		x	x	x
83	*m), o)*	157.175**A**	161.775**B**		x	x	x
24	*m), o)*	157.200**M**	161.800**M**		x	x	x
84	*m), o)*	157.225**M**	161.825**M**		x	x	x
25	*m), o)*	157.250**M**	161.850**M**		x	x	x
85	*m), o)*	157.275**M**	161.875**M**		x	x	x
26	*m), o)*	157.300**M**	161.900**M**		x	x	x
86	*m), o)*	157.325**M**	161.925**M**		x	x	x
27		157.350**M**	161.950**M**			x	x
87		157.375**M**	157.375**M**		x		
28		157.400**M**	162.000**M**			x	x
88		157.425**A**	157.425**A**		x		
AIS 1	*f), l), p)*	161.975**A**	161.975**A**				
AIS 2	*f), l), p)*	162.025**A**	162.025**A**				

5 Observations including access to simplex channels

In general, the use in RR Appendix 18 can currently be split into three broad groups; core safety use (including the use of AIS), port operations and national/regional variations. It seems that when reviewing the frequency band and taking account of this actual use, the numbers of channels currently identified for VPC do not reflect the actual need for these uses. This is because, the VPC usage is now so limited around the world that the channels currently designated for that purpose now exceed those actually required.

Another point, borne out from the survey is the potential use of channels 87 and 88 post WRC-97 Decisions. WRC-97 implemented changes to RR Appendix 18 where two, originally VPC channels, were split to facilitate the establishment and use of AIS. The modification of RR Appendix 18 that allowed for the identification of two frequencies for AIS had the result that channels 87 and 88 were designated as single frequency channels. These two single frequency channels have remained within RR Appendix 18. However, a recent trial by a port in the UK illustrated that only around 38% of vessels surveyed could actually make use of channels 87 and 88 in simplex configuration. It is understood, that, post WRC-97 no specific instructions were issued that required the VHF radio sets to be modified to accommodate the "new" configuration for channels 87 and 88.

The above case illustrates that channels 87 and 88, post WRC-97 changes, have had limited practical use. This is due to the lack of vessels which have had their VHF radios modified to accommodate these changes. IMO requires that radio equipment, for SOLAS vessels, operates in accordance with Appendix 18 of the Radio Regulations. This requirement is met through IMO Resolution A.803(19), although that compliance is via the requirements to meet relevant technical specifications, rather than the ITU Radio Regulations directly. This illustrates the existing disconnect between some IMO performance standards and, for instance IEC or ETSI, equipment standards and ITU channelling arrangements (as revised). This might go some way to explain why some radios, under the UK survey, were unable to meet the post WRC-97 RR Appendix 18 arrangements for channels 87 and 88.

It is important to recognize that IMO Resolution A.803(19) does not require equipment installed before 23 November 1996 to be updated. As a result, this means that, in some cases the pre-WRC-97 duplex channels 87 and 88() are retained in radio equipment installed before that 1996 date.

This is an area where greater liaison between ITU, IMO and Standardization bodies would help to ensure that the implications and consequences of RR Appendix 18 changes are better understood.

Finally, any potential changes to RR Appendix 18 should balance the needs across the entire maritime industry. That balance should also recognize that, to a certain extent, the VPC originally accommodated in RR Appendix 18 no longer warrants the amount of spectrum reserved for it, particularly where other systems (e.g. mobile satellite and mobile cellular systems) offer substitutable communication alternatives.

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