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| **The 4th Meeting of the APT Conference Preparatory Group for WRC-15 (APG15-4)** | **Document****APG15-4/OUT-12** |
| 09 – 14 February 2015, Bangkok, Thailand | **13 February 2015** |

**Working Party 3**

**preliminary views on WRC-15 agenda item 1.15**

**Agenda item 1.15:**

*to consider spectrum demands for on-board communication stations in the maritime mobile service in accordance with Resolution* ***358******(WRC-12)***

1. Background

Resolution **358 (WRC-12)** invites WRC-15 to consider, based on the results of ITU‑R studies, the need to possibly identify additional UHF channels within the bands already allocated to the maritime mobile service for on‑board communication stations; invites ITU-R to conduct, in time for WRC‑15, studies to determine the spectrum requirements and potential frequency bands for on-board communication stations, taking into account the protection of services to which the frequency band is currently allocated.

Some UHF frequencies, in frequency range 450-470 MHz, are currently identified in
Radio Regulation for on-board communication stations. Fixed and mobile services are allocated in frequency range 450-470 MHz on a primary basis.

There are two footnotes in the Radio Regulations Article **5** related to the use of UHF on-board communication frequencies:

* RR No. **5.287**

In the maritime mobile service, the frequencies 457.525 MHz, 457.550 MHz, 457.575 MHz, 467.525 MHz, 467.550 MHz and 467.575 MHz may be used by on-board communication stations. Where needed, equipment designed for 12.5 kHz channel spacing using also the additional frequencies 457.5375 MHz, 457.5625 MHz, 467.5375 MHz and 467.5625 MHz may be introduced for on-board communications. The use of these frequencies in territorial waters may be subject to the national regulations of the administration concerned. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174-2.

* RR No. **5.288**

In the territorial waters of the US and the Philippines, the preferred frequencies for use by on-board communication stations shall be 457.525 MHz, 457.550 MHz, 457.575 MHz and 457.600 MHz paired, respectively, with 467.750 MHz, 467.775 MHz, 467.800 MHz, and 467.825 MHz. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174-2.

It should be noted that administrations actively use this frequency band for land mobile communications, such as conventional and trunked land mobile systems. In accordance with RR No. **5.286AA** the bands 450-470 MHz is identified for use by administrations wishing to implement International Mobile Telecommunication (IMT). In Annex 1 of Recommendation ITU-R M.1036-4, some of the IMT frequency arrangements have frequency overlapping with RR No. **5.287**. It is also noted that sharing and compatibility studies between on-board ship frequencies and IMT need to be conducted if new frequencies are required.

* RR No. **5.286AA**

The band 450-470 MHz is identified for use by administrations wishing to implement International Mobile Telecommunications. See Resolution **224** **(Rev.WRC-07)**. This identification does not preclude the use of this band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. (WRC-07)

The use of UHF frequencies for on-board communications is considered very important, without these, critical functions of the ship in restricted waters could not effectively take place. These functions include anchoring, berthing, control of fire-fighting/damage control parties, security patrols, terrorism threats etc., those communications are intended to be used for internal on board a ship, or between a ship and its lifeboats and life-rafts during lifeboat drills or operations, or for communication within a group of vessels being towed or pushed, as well as for line handling and mooring instructions. Whilst these are of significant concern to those operating the ship the consequences of failure affect not only the seafarer but have significant implication for the immediate environment the ship is operating in.

Some administrations, through survey, pointed out some cases of interference or frequency congestion in big harbors, probably due to the fact that the frequencies are subject to national regulations. However, there is no confirmation of the lack of frequencies for on-board communications. Some other administrations will conduct similar surveys to gather data on UHF on-board communications usage.

A rough survey shows that there is an extensive using of UHF handheld stations for on board communications in China, especially in almost all oil tanks, and for many safety operations. The UHF equipment could operate in either 25 kHz or 12.5 kHz frequency bandwidth mode. It is noted that the protection of using the above mentioned frequency bands for maritime mobile services need to be considered.

New Zealand has adopted the decision from WRC-07 and recognized the use of the frequencies identified in No. **5.287** of the Radio Regulations under General User Radio Licence for Maritime UHF On-board Communications. The frequency band in 450-470 MHz and its adjacent bands below 450 MHz and above 470 MHz are heavily used for land mobile in New Zealand. It is important to note that New Zealand is in the process of phasing out legacy 25 kHz analogue land mobile radio in both VHF and UHF land mobile bands by 1 November 2015. Very few exceptions may apply and strictly considered on a case by case basis.

In Australian ports, no shortcomings have been brought to the attention of authorities. However, in Europe there is a mixed picture where, land mobile, maritime mobile and in several CEPT countries, railways and government communications are encountered on these frequencies.

It is noted that recently Australia transitioned from a 25 kHz UHF citizen band channel plan (40 channels) to a 12.5 kHz channel plan (80 channels), with no reported problems, other than the predicted effect of low received audio level when monitoring transmissions using ± 2.5 kHz peak deviation (80 channel radios) on a ± 5 kHz peak deviation (40 channel radios), and adjustment of the audio level control on the receiver is generally sufficient to overcome this effect.

During the APG 15-3 meeting held in Brisbane, Australia in June 2014, Drafting Group on Agenda item 1.15 agreed to develop an APT Preliminary View (Document: [APG15-3/OUT-29](http://www.apt.int/sites/default/files/2014/06/APG15-3-OUT-29_PV_AI1.15.docx)) based on seven input contributions submitted by administrations in APT region.

At its 13th meeting in May 2014, ITU-R Working Party 5B has finalized draft CPM text for Agenda item 1.15 with a single method (Document R12-CPM15.02-C-0001!!MSW-E.docx).

The draft revision of Recommendation ITU-R M.1174-2 - Technical characteristics of equipment used for on-board vessel communications in the bands between 450 and 470 MHz, which in conjunction with Agenda item 1.15, was agreed by SG 5 in November 2014 and included in Administrative Circular [CACE/698](https://www.itu.int/md/dologin_md.asp?lang=en&id=R00-CACE-CIR-0698!!MSW-E) for adoption.

**1.1 Method to satisfy the Agenda item:**

The identification of new spectrum for on-board communications in UHF is not justified and therefore not necessary.

However the importance of on-board communications to safe ship operations is fully recognized, together with the congestion in some geographical area.

A more efficient usage of the existing frequencies could be achieved with the systematic utilization of 12.5 kHz and 6.25 kHz channel spacing for all the channels identified for on-board communications. The numbering of these channels should be clearly harmonized worldwide.

The implementation of digital technology will open the possibility for additional operational features and a number of different standards are available.

For analogue technology the use of CTCSS and DCS could be used as a way to mitigate the impression of congestion to the user.

For digital technology the use of DCS or an operational equivalent system could be used as a way to mitigate the impression of congestion to the user. The LBT technology should be used.

To achieve this, amendments to provision RR **No. 5.287** are necessary, in accordance with the Recommendation ITU-R M.1174 which has been revised. Provision is made for 25 kHz, 12.5 kHz and 6.25 kHz channel spacing.

To achieve a higher degree of flexibility for the use of systems, it is proposed to indicate the frequencies in RR **No. 5.287** as two frequency bands.

1. Documents
	1. ***Input documents***

APG15-4/INP-25 (NZL), 33 (INS), 38 (IRN), 43 (CHN), 57 (AUS), 67 (MLA & THA), 79 (JPN), 93 (VTN)

* 1. ***Information documents***

APG15-4/INF-14 (RCC), 18 (BR), 19 (CEPT), 20 (CITEL)

1. **Summary of Discussion**

All input and information documents were briefly introduced. All input documents from administrations supported consideration of spectrum demands for on-board communication stations in the maritime mobile service in accordance with Resolution **358 (WRC-12)**.

Administrations consider there is no requirement for additional spectrum for on-board communications in the band 450-470 MHz. The adoption of digital technology for this existing spectrum could improve performance as well as the provision of additional channels.

A more efficient usage of the existing on-board frequencies could be achieved with the systematic utilisation of 12.5 kHz and 6.25 kHz channel bandwidth for spectrum identified in the Radio Regulations for on-board communications.

Conventional analogue and digital two-way radio operates in the UHF range which include spectrum for on-board communications. Studies on analogue and digital two-way radio systems show that:

* Repeaters using UHF on-board communication systems are seen in large vessels. The implementation of repeater stations together with distributed antennas could help to utilise digital systems without propagation issue.
* With the same infrastructure, digital technology can work as robustly and stable as analogue systems but provides additional useful features as well as better communication quality.
* Interference between analogue systems is a similar situation as between analogue and digital systems.
* For example, dPMR and DMR are two digital technologies for two-way voice/data radio, DMR system is a two-slot TDMA while dPMR is a FDMA system. Both standards use 4-FSK modulation variants (DMR using 9 600 bps in 12.5 kHz channels and dPMR uses 4 800 bps in 6.25 kHz channels) and voice digitally coded with error correction at 3 600 bps.
* For analogue technology the use of CTCSS and DCS could be used as a way to mitigate the impression of congestion to the user.
* For digital technology the use of DCS or an operational equivalent system could be used as a way to mitigate the impression of congestion to the user. The LBT technology should be used.

Modifications to Radio Regulation provision No. **5.287** and Recommendation ITU-R M.1174-2 are needed to introduce additional channel arrangement with channel numbering as well as digital technology for on-board communication stations in the maritime mobile service.

Mariners should be informed about the usage of these frequencies. This information should be delivered by the member states having contiguous sea areas under their jurisdiction.

Administrations support the single Method to address this Agenda item in the draft CPM Report and the draft revision of Recommendation ITU-R M.1174-2.

By summing up the specific comments, the group agreed the APT Preliminary View as described in the following section.

1. APT Preliminary Views

APT supports ITU-R studies on the spectrum demands for on-board communication stations in the maritime mobile service in accordance with Resolution **358 (WRC-12**).

APT supports the single Method to address this Agenda item in the Draft CPM Report to WRC-15 and the draft revision of Recommendation ITU-R M.1174-2.

APT members agree the following:

* The identification of new frequencies for on-board communications in UHF is not justified and therefore not necessary.
* However the importance of on-board communications for ship safety operations is fully recognized, together with the congestion in some geographical areas.
* A more efficient usage of the existing frequencies could be achieved with the systematic utilization of both 12.5 kHz and 6.25 kHz channel spacing for all the channels identified for on-board communications. The numbering of these channels should be clearly harmonized worldwide.
* The implementation of digital technology will open the possibility for additional operational features and a number of different standards are available.
* For analogue technology the use of Continuous Tone Coded Squelch Systems (CTCSS) and Digital Coded Squelch (DCS) constitute an effective means to mitigate the impression of congestion to the user.
* For digital technology the use of DCS or a similar operational system could be used as a way to mitigate the impression of congestion to the user. The Listen Before Talk (LBT) technology should be used.
* To achieve this, amendments to provision RR No. **5.287** and Recommendation ITU-R M.1174 are necessary. Provision is made for 25 kHz, 12.5 kHz and 6.25 kHz channel spacing.
* To achieve a higher degree of flexibility for the use of systems, it is proposed to indicate two frequency bands in RR No.**5.287**.
* No constraints should be placed on the existing 25 kHz analogue on-board communication systems with the least modification to existing equipment being preferable.
* That digital systems may impact analogue communication especially when operating on lower channels.
1. Issues for Consideration at APG15-5 Meeting

APT Members to develop the draft PACP on WRC-15 Agenda item 1.15.

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