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MARITIME RADIOCOMMUNICATION  
MATTERS  
15 session  
Agenda item 3

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**CONSIDERATION OF MATTERS RELATED TO WORLD RADIOCOMMUNICATION  
CONFERENCE 2019 (WRC-19), TAKING INTO ACCOUNT THE OUTCOME OF CPM 19-2**

**VDES R-Mode and VHF digital voice communication**

**Submitted by the International Association of Lighthouse Authorities and Marine Aids  
to Navigation (IALA)**

**SUMMARY**

*Executive summary:* This document provides an update in the considerations made by IALA with respect to the digitization of voice service on the maritime VHF band as well as with respect to the development of Ranging Mode (R-Mode) as a candidate regional back-up for the global navigation satellite system.

*Strategic direction, if applicable:*

*Output:*

*Action to be taken:* Paragraph 14

*Related documents:* A.915(22), MSC.401(95), MSC.1/Circ.1575, MSC.1/Circ. 1595, NCSR 6/12/4, NCSR 6/WP.5

**Introduction**

1 IALA submitted a liaison note to the IMO Secretariat that proposed the following items to be considered as the agenda item for WRC-23 with a view to providing:

- .1 a means to accommodate digital systems in the VHF maritime mobile band, which would include digital voice; and
- .2 a radio navigation allocation for VDES R-Mode to support to resilient position, navigation and timing.

2 At the sixth session of the NCSR Sub-Committee, the Secretariat provided the IALA liaison note to NCSR 6 as input paper, NCSR 6/12/4. The Sub-Committee considered the proposal from IALA and decided that the aforementioned items were not yet mature enough for inclusion of agenda for WRC-23. IALA was requested to keep the IMO informed of the progress made.

### **Digital voice communication**

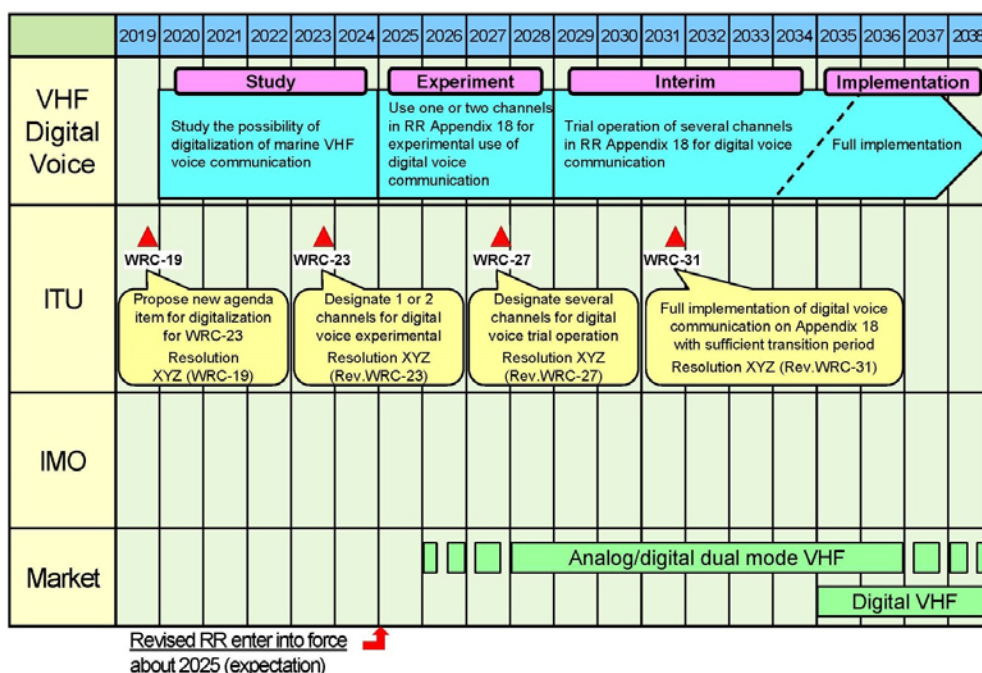
3 Studies on the digitization of the maritime voice service on the maritime VHF band have been already initiated by several authorities such as the Electronic Communications Committee and some candidate technologies have been identified for evaluation such as digital Private Mobile Radio (dPMR).

4 One of the advantages of the digitization process is channel efficiency. IALA estimates that the channel efficiency could be up to four (4) digital voice channels for each 25Khz maritime VHF voice channel.

5 IALA considers that the following should be included in the consideration of the studies related to the digitization of the maritime voice service on the maritime VHF band:

- .1 that any evaluated technologies have a clear migration path both from the current analogue voice systems to the new digital voice systems by allowing both the digital and analogue systems to co-exist in the same transceiver for the duration of the entire migration period. This could extend to using the same antenna and other existing physical installation hardware;
- .2 the digital service includes the capability of transmitting the location of the radio for the entire duration of the digital voice conversation;
- .3 the digital service allows a short message service (SMS) without the need to set up a digital or other voice call; and
- .4 that the digital voice quality be similar to, or better than the analogue voice service especially when using weaker radio signals at the extremity of the radio coverage.

6 However, in order to study the points described above, the allocation of experimental channels is essential. Figure 1 shows a proposed roadmap for the implementation of the digitization of maritime digital voice service on maritime VHF bands.



**Figure 1 - Proposed roadmap for implementation**

## VDES R-Mode

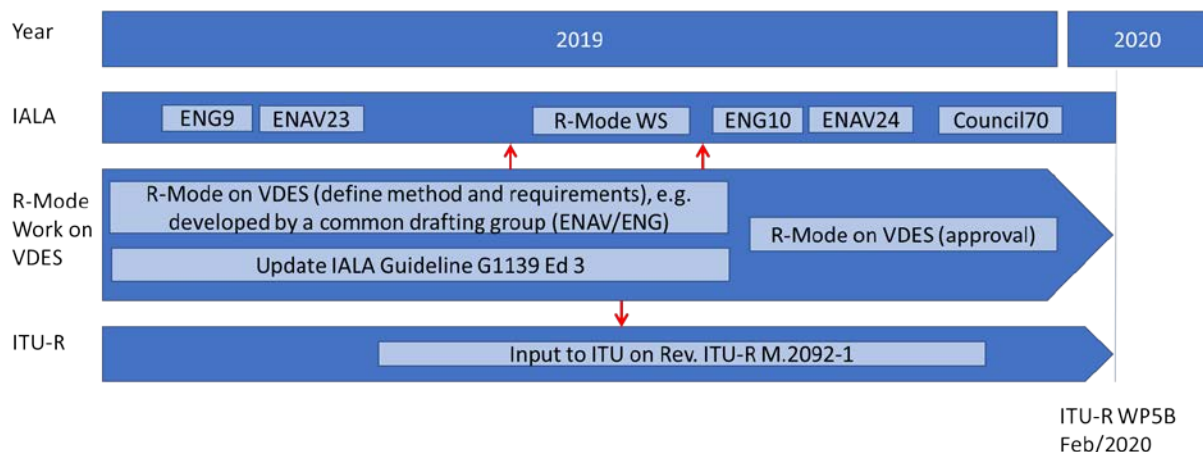
7 Ranging-Mode (R-Mode) is a concept of a new terrestrial radio navigation system using timing information on existing maritime radio systems to provide GNSS independent positioning, navigation and timing (PNT). It is therefore considered as a possible candidate to be a regional backup of global navigation satellite systems (GNSS). There are currently two carriers considered for providing timing information, MF using existing differential GNSS radio beacon frequencies and VHF using existing AIS or VHF data exchange (VDES) frequencies.

8 MSC.1/Circ.1595 on the *E-navigation strategy implementation plan – update 1* identified the description of sub-solution S3.4 “improved reliability and resilience of onboard PNT information and other critical navigation data by integration with and backup of, external and internal systems”. Further, it is noted in part of the associated task action that, MSC.1/Circ. 1575 on *Guidelines for shipborne position, navigation and timing*, was approved by the Maritime Safety Committee at its ninety eighth session (7 to 16 June 2017) which included reference to data processing that may enable R-Mode as a future source for provision of PNT data.

9 The Maritime Safety Committee, at its ninety-fifth session (3 to 12 June 2015), adopted resolution MSC.401(95) on *Performance standards for multi-system shipborne radio navigation receivers* (MSR). The MSR is appropriate to facilitate the combined use of world-wide radio navigation system (WWRNS), using satellite and terrestrial radio navigation systems to improve the provision of position, velocity and time (PVT) data and related integrity data. It is anticipated that R-Mode could become a suitable candidate to be incorporated in the MSR.

10 VDES R-Mode is designed to provide timing information for positioning and navigation within VHF coverage, i.e. within a coastal area with backup requirements based on IMO resolution A.915(22) on *Revised maritime policy and requirements for a future global navigation satellite system* (GNSS) and IALA recommendation R-129 on *GNSS Vulnerability and mitigation measures*. In order to fix a position for maritime navigation, R-Mode requires three or more transmitting stations with precise timing.

11 IALA is now working to revise its guideline G1139 ed.2 on *The technical specification of VDES* in order to accommodate R-Mode in the VDES standard. A workshop on R-Mode will be held between the 9 and 12 September 2019 at IALA Headquarters. Figure 2 shows a possible roadmap for R-Mode development on VDES.



**Figure 2 - Possible Roadmap for R-Mode Development on VDES**

12 There are several projects and studies on the VDES R-Mode which have been conducted in countries including the United Kingdom, the Republic of Korea and China. A further international project is the R-Mode Baltic project, its baseline and priority report that provides more detailed information on VDES R-Mode is available for download on the project website [www.r-mode-baltic.eu](http://www.r-mode-baltic.eu).

## Conclusion

13 IALA considers that both items proposed will become sufficiently mature to enable possible inclusion as agenda items prior to WRC-23 and will keep the IMO and ITU informed of the progress made.

## Action requested

14 The Joint Experts Group is requested to note the information provided and act as appropriate.