|  |  |  |
| --- | --- | --- |
|  | IMO-logo-rgb | ***E*** |

|  |  |
| --- | --- |
| sub-committee on navigation, communication and search and rescue  9th session  Agenda item 12 | NCSR 9/INF. X  DD March 2022  Language: ENGLISH  Pre-session public release: |

**response to matters related to the ITU-R study groups and ITU world radiocommunication conference**

**VDES Ranging mode (R-Mode)**

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

|  |  |
| --- | --- |
| **SUMMARY** | |
| *Executive summary:* | This document contains in the annex the IALA Guideline 1158 “VDES R-Mode” developed and published by IALA. |
| *Strategic direction, if applicable:* | 2 |
| *Output:* | 2.1 |
| *Action to be taken:* | Paragraph 6 |
| *Related documents:* | NCSR 6/12/4, NCSR 5/22/1 |

**Introduction**

1 This document contains in the annex the IALA Guideline 1158 “VDES R-Mode” developed and published by IALA.

**Summary**

2 Ranging mode (R-Mode) is a terrestrial positioning system under development. It uses the frequency bands of existing maritime radio infrastructure for the provision of timing signals that enables GNSS independent position and time estimation. At present, the MF band of the IALA radio beacon system and the VHF bands AIS, ASM and VDE-TER of the VDES are being used in R-Mode testbeds in Europe, Asia and North America.

3 Three transmitters must be received to perform R-Mode based positioning at sea. Due to the different range of the transmitter of about 250 km for MF and several tens of km for VHF, which strongly depends on the antenna tower height, the coverage of MF and VHF R-Mode service can differ noticeably. Both signals are subject to different effects of signal attenuation, interference and distortion which decreases the performance. The combination of MF and VHF R-Mode signals can noticeably increase the R-Mode positioning performance.

4 All R-Mode transmitters are synchronized to an R-Mode system time. Depending on the synchronization source and technology to perform synchronization, the system time refers to a time scale which is traceable to UTC. Usually, GNSS is used for synchronisation today within the testbeds. To reduce the dependence or to be completely independent from GNSS, R-Mode stations would need to have atomic clocks, or another means for synchronization.

5 IALA supports (NCSR 5/22/1, Annex, S3.4, T12) and considers R-Mode to be one of the resilient terrestrial PNT systems that could become indispensable when there is a disruption of GNSS or other satellite PNT systems in order to provide E-navigation Maritime Services and ensure the safety of navigation; and has developed a guideline for the IALA members intend to establish VDES R-Mode system. The guideline was finalized and published as IALA Guideline G1158 “VDES R-Mode” in 2020 that is attached as the annex of this document. The IALA Guideline G1158 is also freely available to public from IALA homepage at [G1158 - VDES R-Mode - IALA AISM](https://www.iala-aism.org/product/g1158-vdes-r-mode/).

**Action requested of the Sub-Committee**

6 The Sub-Committee is invited to note the information provided.

\*\*\*