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| TYPE IMO ORGAN NAME HERE  [...] session  Agenda item 1 | Document Symbol  Document date, i.e. 1 January 2023  Language: i.e. Original: ENGLISH  Pre-session public release: |

**Agenda item title**

**Proposal for a new output to develop a Performance Standard for VDES R-Mode**

**[Submitted by] [Note by]**

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| **SUMMARY** | |
| *Executive summary:* |  |
| *Strategic direction, if applicable:* |  |
| *Output:* |  |
| *Action to be taken:* |  |
| *Related documents:* |  |

**Introduction**

This document is submitted in accordance with MSC-MEPC.1/Circ.5 on the Guidelines on the organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies on the submission of proposals for new outputs. It takes into account the High-level Action Plan for the Organization and priorities for the 2018-2023 period (IMO Resolution A.1110(30)).

This document proposes the establishment of a new performance standard for VDES R-Mode.

The proposed alternative position, navigation and timing system VDES R-Mode is envisaged to be used shore-ship in the voyage execution phase.

**Background (Main motivation, Projects, Measurements, Publications, IALA events, IALA guideline)**

Satellite navigation systems are being used by the international maritime community to fulfil carriage requirements for determining position, navigation and time (PNT) according to SOLAS Chapter V. IMO is carrying out the necessary tasks required for due recognition of the Global and Regional Navigation Satellite Systems (GNSS/RNSS) as components of World-Wide Radionavigation System (WWRNS). IMO also develops performance standards for shipborne receiver equipment, for individual GNSS and for multi-system receivers (MSC.401(95)), which includes augmentation systems and RAIM, and defines procedures for possible failures. However, a contingency system is yet not in place to mitigate the impact of failures.

**What is VDES R-Mode**

The VDES R-Mode System shall operate as a contingency Positioning, Navigation and Timing (PNT) system for maritime shipping. The operational concept is that, when there is a disruption to Global Navigation Satellite System (GNSS) services on-board a ship, the VDES R-Mode system (possibly together with other terrestrial PNT systems such as MF R-Mode and eLoran) provides ranging measurements to an on-board navigation system so that the impact of the GNSS service outage on the ship’s ability to navigate safely is minimised.

The VDES R-Mode System will send accurately timed VHF transmissions from a network of land-based and, possibly, offshore Base Stations (BSs). A shipborne VDES R-Mode Sensor (VRMS) will measure the timing (and other) parameters of the received signals and output the signal observables to an external PNT processor, such as the Multi-system Shipborne Radionavigation Receiver (MSR) described in reference (IMO-*MSC.401(95)*). The PNT processor will then use the observables to determine the user’s position, speed over ground and other navigation parameters.

VDES R-Mode should, as far as possible, use pre-existing shore side infrastructure, including shore stations and Monitoring and Control Centres (MCC’), and pre-existing AIS/VDES shipborne installations. Monitoring and control data is likely to be carried between the Base Stations, Far-field Monitoring Stations (FMS’) and one or more Monitoring and Control Stations (MCS’) via pre-existing Wide Area Networks.

VDES R-Mode will be synchronised to an external time source traceable to a common time scale in order to facilitate interoperability with other PNT systems.

VDES R-Mode utilizes, the successor of AIS, VDES that is expected to be widely

used worldwide.

**Test standard missing for VDES and VDES R-Mode:**

At the present stage, Industry does not have the means to test the VDES R-Mode functionality of shipborne GNSS receivers against any approved standard. The lack of a VDES R-Mode test standard to assess correctness and validity of the position solutions offered by the equipment, also limits the possibility to promote reliance on the provided VDES R-Mode information in maritime domain.

**Lack of performance standards**

To date, IMO has recognised several Global and Regional Navigation Satellite Systems (GNSS and RNSS) as components of World-Wide Radio Navigation System (WWRNS). IMO has also developed performance standards for shipborne receiver equipment, for individual GNSS, RNSS and for multi-system shipborne radionavigation receivers (MSC.401(95)). However, there is, as yet, no performance standard for receivers that support VDES R-Mode.

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) describes the elements of an VDES R-Mode relevant to maritime administrations in their Guidelines G1158 (VDES R-Mode).

**Is the subject of the proposal within the scope of IMO's objectives?**

The proposal aims to enhance maritime safety, addressing the failure of multiconstellation GNSS by a contingency system VDES R-Mode.

The cosponsors of this proposal, … outline arguments …

**How is the proposed item related to the scope of the Strategic Plan for the Organization and how does it fit into the High-level Action Plan?**

IMO's Strategic Plan (2018-2023) has a key Strategic Direction (SD 2) to "Integrate new and advancing technologies in the regulatory framework". SD 2 urges the Organization to review existing instruments, to ensure that the application of new technologies to international shipping are conducted in a manner which continues to ensure the highest practicable standards for maritime safety, efficiency of navigation and prevention, and control of marine pollution from ships. The proposed work item will enhance technical, operational and safety management standards contributing to the Performance Indicator 2.1: proposals submitted to IMO to incorporate new and advancing technologies into the regulatory framework.

**Need or compelling need – MORE DETAILS AND EXAMPLES**

The proposal aims to enhance maritime safety, addressing the failure of GNSS by a contingency system of GNSS, such VDES R-Mode.

Tbc: As examples of evidence of the need, multiple countries in the Baltic area (Finland, Sweden, Germany, Poland, Denmark, Estonia), the United States, the Republic of Korea, have experienced failure of the GNSS service.

Noting the urgency to provide authorities and manufacturers technical guidance, the Radio Technical Commission for Maritime Services (RTCM), has addressed the work in order by initiating Special Committee on 138 Ranging Mode (R-Mode) Application for VHF Data Exchange System (VDES).

**Analysis of the issues and implications involved, having regard to both the costs to the maritime Industry, as well as the associated legislative and administrative burden, at global level, including an assessment of its practicability, feasibility and proportionality**

Work: Consider to address and add to the Annex 1:

A completed checklist for "identifying administrative requirements and burdens" in accordance with MSC-MEPC.1/Circ.5 is provided in annex 1.

**Benefits which would accrue from the proposal**

The combined use of GNSS and VDES R-Mode will result in improved resilience in terms of accuracy, availability, and integrity, and provide resilience of the Position Velocity and Timing (PVT) solution compared to using a standalone GNSS based navigation system.

**Do adequate industry standards exist?**

No IMO performance standards exist for shipborne receiver equipment that supports VDES R-Mode.

**Scope of the proposal and output**

The scope of the proposal and requested output is the development of minimum performance standards for shipborne receivers that support VDES R-Mode.

The output proposed is specific, focused on the development of a standard for receivers.

1. The output is measurable, in the sense that once the standard is in place the output is achieved.
2. The fact that some member states are developing these new technologies make the output achievable and realistic.
3. The output is expected to be done in one biannual period (post-biennal).

**Human element**

The proposal is consistent with IMO's objectives and takes into consideration the human element guidelines and principles contained within IMO Res. A.947(23), in an effort to minimize the impact on the role and workload of Officer of the Watch. The completed human factors checklist from MSC-MEPC.1/Circ.5/ is set out in annex 3.

**Urgency, Priority and target completion date**

VDES R-Mode are expected to be operational regionally starting in 2029(?). To ensure there is an RTCM and IEC test standard in place by then, the following timeline is foreseen. An IMO performance standard should be finalized by 2027, following which work on an IEC standard can commence, to be completed by 2029.

Based on the compelling need, the development of this performance standard is proposed as a high-priority work and should be addressed as soon as practicable within the working arrangements of the Organization. Taking into consideration the timeline for service provision explained above, the work is then proposed to be executed in post-biennial period.

**Committee and/or subsidiary body(ies) essential to complete the work**

The work should be assigned to the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR).

**Estimation of the number of sessions needed to complete the work**

It is estimated to complete the work in 2 sessions of the NCSR Sub-Committee.

**Action requested to the Committee**

The Committee is invited to consider this proposal and include it in the post-biennial agenda of the NCSR Sub-Committee, with the aim to conduct the work in the 2024-2025 biennium.

# **ANNEX 1**

To be discussed

# APPENDIX 1

# REFERENCE DOCUMENTS

**\*Publications**

# **ANNEX 2**

**CHECKLIST FOR IDENTIFYING ADMINISTRATIVE REQUIREMENTS**

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# **ANNEX 3**

**CHECKLIST FOR CONSIDERING HUMAN ELEMENT ISSUES BY IMO BODIES**

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