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From: Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director

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To: Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union

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Subject: COMMISSION STAFF WORKING DOCUMENT Union submission to the 13th session of the International Maritime Organization's Sub-Committee on Navigation, Communications and Search and Rescue proposing draft performance standards for shipborne ranging mode receiver equipment (R-Mode)

Delegations will find attached document SWD(2026) 98 final.

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COMMISSION STAFF WORKING DOCUMENT

Union submission to the 13th session of the International Maritime Organization's Sub-Committee on Navigation, Communications and Search and Rescue proposing draft performance standards for shipborne ranging mode receiver equipment (R-Mode)

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PURPOSE

This Staff Working Document contains a draft submission to the International Maritime Organization's (IMO) 13th session of the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR 13). The IMO has scheduled NCSR 13 from 22 to 26 June 2026.

This document proposes draft performance standards for shipborne ranging mode receiver equipment (R-Mode). R-Mode is a terrestrial radio-navigation system providing positioning, navigation, and timing information independent from GNSS.

The document follows the Union submission to MSC 109 (MSC 109/19/2) proposing a new output to develop performance standards for Ranging mode (R-mode) in radionavigation receivers.

EU RELEVANCE

Navigation equipment, including marine Global Navigation Satellite System (GNSS) receivers, is listed in Section 4 of Commission Implementing Regulation (EU) 2025/1533¹. The Implementing Regulation contains design, construction and performance requirements and testing standards for marine equipment. It is based on the empowerment of the Commission to indicate, through implementing acts, the design, construction and performance requirements as well as the testing standards for marine equipment falling within the scope of Directive 2014/90/EU on marine equipment², in accordance with Article 35(2) thereof.

In light of all of the above, the present draft Union submission falls under EU exclusive competence pursuant to article 3(2) TFEU, as the performance standards, once adopted, risks affecting or altering Union legislation and in particular Directive 2014/90/EU.³ This Staff Working Document is presented to establish an EU position on the matter and to transmit the document to the IMO prior to the required deadline of 17 April 2026.

¹ Commission Implementing Regulation (EU) 2025/1533 of 23 July 2025 laying down rules for the application of Directive 2014/90/EU of the European Parliament and of the Council as regards design, construction and performance requirements and testing standards for marine equipment and repealing Commission Implementing Regulation (EU) 2024/1975. OJ L, 2025/1533, 14.8.2025. http://data.europa.eu/eli/reg_impl/2025/1533/oj

² Directive 2014/90/EU of the European Parliament and of the Council of 23 July 2014 on marine equipment and repealing Council Directive 96/98/EC. OJ L 257, 28.8.2014, p. 146. <http://data.europa.eu/eli/dir/2014/90/oj>

³ An EU position under Article 218(9) TFEU is to be established in due time should the IMO Maritime Safety Committee eventually be called upon to adopt an act having legal effects as regards the subject matter of the said draft Union submission. The concept of '*acts having legal effects*' includes acts that have legal effects by virtue of the rules of international law governing the body in question. It also includes instruments that do not have a binding effect under international law, but that are '*capable of decisively influencing the content of the legislation adopted by the EU legislature*' (Case C-399/12 Germany v Council (OIV), ECLI:EU:C:2014:2258, paragraphs 61-64). The present submission, however, does not produce legal effects and thus the procedure for Article 218(9) TFEU is not applied.

DEVELOPMENT OF PERFORMANCE STANDARDS FOR RANGING MODE (R-MODE) IN RADIONAVIGATION RECEIVERS

Draft performance standards for shipborne ranging mode receiver equipment (R- Mode)

Submitted by Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands (Kingdom of the), Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the European Commission, acting jointly in the interest of the European Union

SUMMARY

Executive summary: This document proposes draft performance standards for shipborne ranging mode receiver equipment (R-Mode). R-Mode is a terrestrial radio-navigation system providing positioning, navigation, and timing information independent from GNSS.

Strategic direction, if applicable: 2

Output: 2.17

Action to be taken: Paragraph 9

Related documents: Resolution A.1046(27), Resolution A.694(17), Resolution MSC.191(79), Resolution MSC.302(87), MSC 110/21

Introduction

1 This document is submitted in accordance with the Guidelines on the Organization and Methods of Work of the MSC and MEPC Committee and their subsidiary bodies (MSC-MEPC.1/Circ.5/Rev.6).

2 The Maritime Safety Committee, at its 110th meeting, agreed to include in the biennial agenda of the NCSR Sub-Committee for the 2026-2027 biennium and the provisional agenda for NCSR 13 an output on "Development of performance standards for Ranging mode (R-mode) in radionavigation receivers".

Discussion

3 The co-sponsors note that the Organization has developed Resolution A.694(17) on general requirements for electronic navigational aids and Resolution MSC.191(79) on performance standards for the presentation of navigation related information on shipborne navigational displays to ensure that all navigational displays adopt a consistent human machine interface philosophy and implementation.

4 R-Mode provides a robust and reliable terrestrial radio navigation system that operates independently of Global Navigation Satellite System (GNSS). Currently, no uniform technical and functional performance requirements for shipborne R-Mode radio navigation receivers are in place.

5 The use of R-Mode radio navigation enables vessels within the coverage area to receive autarkic positioning, navigation and time data as a supplement to GNSS to improve the overall safety and accuracy of navigation.

6 Committed to ensure a worldwide uniform implementation as well as a harmonized safety level for the use of electronic navigational equipment including R-Mode, the Co-Sponsors proposed to develop performance standards for R-mode in radionavigation receivers. MSC 110 approved the proposed output and appointed the NCSR Sub-Committee as coordinating organ. In order to further progress the work, the Co-Sponsors have prepared a draft set of performance standards for consideration by the Sub-Committee.

7 The proposed draft performance standards were developed taking into account the general requirements defined by the Organization for comparable radio navigation systems, considering the system-specific characteristics.

Proposal

8 The proposal for a set of draft performance standards for R-Mode in radionavigation receivers is set out in the annex.

Action Requested

9 The Sub-Committee is invited to consider the proposed draft performance standards for R-Mode and take action, as appropriate.

ANNEX

RESOLUTION MSC.XYZ(NM)

(adopted on XXX)

**ADOPTION OF THE PERFORMANCE STANDARDS FOR SHIPBORNE
R-MODE RECEIVER EQUIPMENT**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO Resolution A.886(21), by which the Assembly resolved that the function of adopting performance standards and technical specifications, as well as amendments thereto shall be performed by the Maritime Safety Committee and/or the Marine Environment Protection Committee, as appropriate, on behalf of the Organization,

RECALLING FURTHER the Organization's strategy to implement e-navigation and the need to develop and implement resilient Positioning, Navigation, and Timing systems to enhance the safety and security of navigation, particularly in light of the vulnerability of Global Navigation Satellite Systems to interference, jamming, and spoofing,

NOTING the development of terrestrial radionavigation systems, such as the Ranging Mode of the VHF Data Exchange System and Medium Frequency broadcast services, as a viable alternative and complementary system to Global Navigation Satellite Systems,

RECOGNIZING the need to develop performance standards for shipborne Ranging Mode receiver equipment to ensure its operational reliability of such equipment and to promote a harmonized international approach to resilient position, navigation and time information,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue, at its [session number] session,

1. **ADOPTS** the performance standards for Shipborne Ranging Mode receiver equipment, set out in the Annex to the present resolution;
2. **RECOMMENDS** Governments ensure that Ranging Mode receiver equipment installed on or after XX-YY-ZZZZ conform to performance standards not inferior to those specified in the Annex to the present resolution.

ANNEX

PERFORMANCE STANDARDS FOR SHIPBORNE R-MODE RECEIVER EQUIPMENT

1 INTRODUCTION

1.1 R-Mode is a terrestrial radio-navigation system that provides positioning, navigation, and timing (PNT) data by calculating ranges from fixed shore-based broadcast stations. It operates on assigned maritime frequency bands and is designed to provide a resilient PNT service independent of GNSS or other navigational information sources.

1.2 R-Mode signals can be transmitted using Medium Frequency (MF) and Very High Frequency (VHF) bands. The system is designed to provide robust performance in coastal and port approach areas.

* MF R-Mode signals are typically broadcast in the 283.5-325 kHz frequency band.

* VHF R-Mode signals are transmitted as part of the VHF Data Exchange System (VDES) on its specific channels.

1.3 The R-Mode receiver equipment is intended for navigation purposes on ships, providing PNT information either parallel or redundant to GNSS.

1.4 The equipment, in addition to the general requirements specified in resolutions A.694(17), MSC.191(79), and MSC.302(87), should comply with the following minimum performance requirements.

1.5 These standards cover the basic functional requirements of position fixing, determination of course over ground (COG), speed over ground (SOG) and timing. They do not cover other computational facilities or systems that may take input from the R-Mode receiver.

2 R-MODE RECEIVER EQUIPMENT

2.1 The term "R-Mode receiver equipment", as used in these performance standards, includes all the components and units necessary for the system to properly perform its intended functions. The R-Mode receiver equipment should include the following minimum facilities:

- .1 antenna(s) capable of receiving MF and/or VHF R-Mode signals;
- .2 R-Mode receiver and processor;
- .3 means of accessing the computed latitude/longitude position;
- .4 data control and interface; and
- .5 position display and, if required, other forms of output.

2.2 The antenna should be designed to be fitted with the aim of achieving the best possible signal reception, taking into consideration the ship's structure and other antennas.

3 PERFORMANCE STANDARDS FOR R-MODE RECEIVER EQUIPMENT

The R-Mode receiver equipment should:

- .1 be capable of receiving and processing MF and/or VHF R-Mode signals.

- .2 provide position information in latitude and longitude based on the WGS 84 datum in degrees, minutes and thousandths of minutes;
- .3 provide time information referenced to Coordinated Universal Time (UTC). [The receiver shall derive UTC from the broadcast R-Mode System Time (RMST) and the associated conversion parameters provided in the navigation message.]
- .4 be provided with at least two outputs from which position information, UTC, course over ground (COG), speed over ground (SOG) and alerts can be supplied to other equipment in accordance with international standards;
- .5 have static horizontal accuracy such that the position of the antenna is determined within 100 meters (95%) when within the declared service area of the R-Mode system;
- .6 have dynamic accuracy equivalent to the static accuracy specified in .5 above;
- .7 have position resolution equal to or better than 0.001 minutes of latitude and longitude;
- .8 have timing accuracy such that time is determined within 100ns of UTC;
- .9 be capable of manually and automatically selecting appropriate R-Mode shore stations (MF, VHF, or MF and VHF) to determine the ship's position;
- .10 be capable of acquiring position to the required accuracy within 5 minutes from a cold start;
- .11 be capable of re-acquiring position to the required accuracy within 30 seconds after a temporary loss of signal;
- .12 generate and output a position solution at a rate of at least 1 Hz;
- .13 provide at least one normally closed contact, which should indicate failure of the R-Mode receiver equipment;
- .14 have a bidirectional interface to facilitate communication so that alerts can be transferred to external systems (e.g., an Integrated Navigation System or alert management system).

4 INTEGRITY CHECKING, FAILURE WARNINGS AND STATUS INDICATIONS

- 4.1 The R-Mode receiver equipment should also indicate whether the performance of the system is within the bounds of requirements for the current phase of navigation.
- 4.2. The R-Mode receiver equipment should, as a minimum:
 - .1 provide a warning within 5 seconds of loss of position or if a new position has not been calculated for more than 2 seconds. The last known position and the time of the fix should be indicated as invalid;

- .2 process system integrity information provided in the R-Mode navigation message to ensure the validity of the signals used for position calculation. This shall include, as a minimum:
 - .1 continuously monitoring the health, status, and data validity flags for each transmitting station, as provided in the navigation message;
 - .2 rejecting signals from any station that is flagged as unhealthy, unmonitored, or otherwise not usable; and
 - .3 checking for inconsistencies between station ranges, where sufficient redundant signals are available.
- .3 provide a self-test function;
- .4 provide a clear indication to the user in which positioning mode (MF- or VHF R-Mode or combined with or without GNSS augmentation) it is operating.

5 PROTECTION

Precautions should be taken to ensure that no permanent damage can result from an accidental short circuit or grounding of the antenna or any of its input or output connections or any of the R-Mode receiver equipment inputs or outputs for a duration of 5 minutes or less.
