Input paper: [[1]](#footnote-1) ENG9.10.7

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Agenda item [[2]](#footnote-2) (from agenda) 10

Workplan Task Number / Technical Domain 2 Radio Navigation Services Task 3.2.3

Working Group WG3-PNT

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Covering Note to R-Mode Baltic – Baseline and Priority Report

# Summary

## Purpose of the document

This covering note aims to provide brief information on the R-Mode Baltic – Baseline and Priority report as attached [1]. The main target of the report is to define service requirements and perform an analysis in order to develop specifications for the new R-Mode positioning system necessary when GNSS is corrupted or unavailable.

## Related documents

* R-Mode roadmap (ENAV18-14.2.18)
* Proposal for R-Mode workshop 2019 (ENG8-12.1.23)
* IALA Recommendation R-129 on GNSS Vulnerability and Mitigation Measures, Ed 1, December 2004

# Background

The concept of R-Mode, or ranging mode, was first introduced to the IALA ENAV Committee many years ago. It is an idea of using timing information on existing maritime radio systems to provide GNSS independent PNT. Most promising candidates in this respect are the marine radio beacons using MF transmissions and AIS/VDES networks using VHF transmissions.

An initial feasibility study on basic R-Mode performance was evaluated within the EU INTERREG project ACCSEAS from 2012-2015, demonstrating the calculation of range information derived from MF radio beacon and AIS shore networks.

R-Mode Baltic is another INTERREG Project (2017-2020) which aims to implement a large test bed in the western Baltic to demonstrate the performance of R-Mode based on MF and AIS/VDES transmissions. Initial work within the project was the development of a baseline and priorities report which contains service requirements and perform an analysis in order to develop specifications for the new R-Mode positioning system.

# Discussion

The general target of the R-Mode Baltic baseline and priority report, as attached [1], is to define service requirements and perform an analysis in order to develop specifications for the new R-Mode positioning system. The availability of an R-Mode system independent of GNSS can minimise risks and improve safety of navigation. The baseline and priority report provides an analysis and evaluation of the current international legal documents treating about maritime radionavigation systems in the light of possible back-up to GNSS and global perspectives to solve that problem.

Special attention has been paid to show the interoperability of the R-Mode service for use in international waters as well as the ability to exploit existing infrastructure of MF radio beacons and/or AIS reference base stations or VDES working within VHF band. It is also indented to demonstrate that the R-Mode technology does not interfere or degrade legacy systems and signals currently in use. There is no intention to change any existing frequency distribution, available bandwidths or modulation schemes assigned to existing services defined by the ITU-R or other regulatory bodies.

The report delivers a review of regulatory documents in maritime navigation provided by IMO, IALA, ITU-R, EMRF. Further the document provides an overview of existing resolutions of NAV-Committee including PNT development and e-Navigation strategy. The review of IALA documents shows the GNSS vulnerability and mitigation measures, like alternative means of navigation provided at various levels; fully redundant, backup and contingency.

An important part of the document are the considerations on R-Mode general user applications and resulted requirements. Several factors are considered in determining the set of required parameters to be provided by potential backup to GNSS as a component of PNT system. These factors should include operational, technical, economical, radio frequency spectrum allocation or geographical limitations. Certain parameters like anti-jamming immunity, can also affect civil PNT service availability. Finally, basic requirements for a terrestrial GNSS backup system were extracted based on appropriate documents of IMO and IALA. Relevant parameters are presented in tables for the R-Mode system requirements.

# References

[1] R-Mode Baltic - Baseline and Priorities, Final report, 11.March 2019

# Action requested of the Committee

The ENAV/ENG Committees are requested to:

1. To consider the baseline and priority report as background information for the development of the intended R-Mode guidelines.
2. Note the report, especially section on R-Mode general user applications and resulted requirements in the context of the development of R-Mode using VDES transmissions
3. Note the report for further discussions concerning requirements for a GNSS backup system.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Input papers should be assigned to a work task as listed in the Committee work plan which is available in input papers. Leave open if uncertain but consider how the paper is to be processed if not relevant to a work task [↑](#footnote-ref-2)