Input paper: [[1]](#footnote-1) ENAV18-11.16.1

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Technical Domain / Task Number 2 TD 2 - e-Navigation communications

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VDES Waveform Technical Requirements Study

# Summary

This report presents the results of a VDES Waveform Technical Requirements study conducted by the General Lighthouse Authorities of the United Kingdom and Ireland (GLA) and the Institute for Telecommunications Research (ITR) at the University of South Australia (UniSA). The technical requirements study is a component of Phase 2 of a VDES Waveform Design study, as follows:

* Phase 1 – Scoping [1];
* Phase 2 – Initial Candidate Shortlisting;
* Phase 3 – Reference Model Implementation and Simulation Study;
* Phase 4 – Testbed Implementation and Laboratory Performance Evaluation;
* Phase 5 – Field Trials.

The VDES waveform study aims to contribute to the development of Application-Specific Message (ASM) and terrestrial VHF Data Exchange (VDE-TER) waveforms and access schemes via mathematical analysis, simulation and testing.

This report maps the existing base of user requirements for e-navigation onto the ASM and VDE-TER waveform descriptions from the current ITU-R Recommendation on VDES and identifies any gaps for future consideration. It also uses results from a recent maritime channel sounding study [2] to derive a terrestrial maritime channel model. The model is then used to analyse waveform operating requirements and expected performance.

Results from the performance analyses show that all modulation and coding schemes currently proposed in the VDES Recommendation provide reliable communication (Packet Error Rate ≤ 10-2) for almost all scenarios examined in the channel sounding study. Equivalent link layer performance has also been modelled assuming the use of transmission retries. By allowing a single transmission retry, a significant performance improvement was observed when compared to the physical layer PER. The technique was also combined with existing models for average power prediction in order to predict performance at increased range.

## Purpose of the document

The Committee is requested to note the contents of this document and consider the results of the technical requirements study in the VDES waveform selection process.

## Related documents

GLA & ITR, ‘VDES Waveform Technical Requirements’, Technical report no. RPT-02-JSa-16, January 2016. ENAV18-11.16.2.

# References

[1] J. Safar, D. Haley, L. Davis, A. Grant, and N. Ward, ‘VDES Waveform Scoping Study’, IALA ENAV Committee WG 3, ENAV 16, St Germain, France, Input Document ENAV16-11.25.2, Apr. 2015.

[2] ITU, ‘VHF Data Exchange System Channel Sounding Campaign’, ITU-R M.2317-0, Nov. 2014.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Leave open if uncertain [↑](#footnote-ref-2)