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Agenda item [[2]](#footnote-3) n.n

Technical Domain / Task Number 2 …………………………………

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# A Standard Compatible Forward Error Correction Extension for the Automatic Identification System

# Summary

## The Automatic Identification System (AIS) is important for collision avoidance in maritime traffic but does not provide error correction mechanisms for erroneous transmissions. In this document we propose and study a standard compatible forward error correction (FEC) extension for the AIS. The AIS standard defines Gaussian minimum shift keying (GMSK) modulation, an easy to implement modulation scheme with constant envelope, which carries information solely in its phase. We propose to extend GMSK to multi-amplitude Gaussian minimum shift keying (MA-GMSK) modulation. MA-GMSK can be processed by off-the-shelf AIS receivers, thus ensuring standard compatibility. Additionally, with MA-GMSK we transmit additional bits via amplitude modulation, which we use to transmit redundancy bits for FEC. We evaluate the AIS packet error rate (PER) performance when modifying the AIS by FEC. We examine the AIS PERs when applying appropriate demodulation and decoding at an advanced AIS receiver. In order to verify standard compatibility, we investigate the PER performance of off-the-shelf AIS receivers, which are fed with an MA-GMSK signal. Based on simulation and measurement results, we propose an MA-GMSK amplitude modulation coefficient of ∆A = 0:4. With this choice, common off-the-shelf AIS receivers provide a PER performance close to the standard reference, i.e., GMSK modulation. At the same time performance improvements between 1:3 and 3 dB provided by an advanced receiver, applying FEC as proposed in this document, are preserved.

## Purpose of the document

The purpose of the document is to propose a standard compliant change to the AIS standard to improve the reception quality for advanced receivers while preserving the performance for existing receivers.

## Related documents

Please find the proposed document: 

# Action requested of the Committee

We would like to present the idea and would appreciate fruitful discussions.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-2)
2. Leave open if uncertain [↑](#footnote-ref-3)