Input paper: [[1]](#footnote-2) ARM20-6.2.5

Input paper for the following Committee(s): check as appropriate Purpose of paper:

**X**  ARM **□** ENG **□** PAP **□** Input

**□** ENAV **□** VTS **□** Information

Agenda item [[2]](#footnote-3) 6.2

Author(s) / Submitter(s) WWA

The development of a Model Course on AIS Data Management and Applicability for Safety of Navigation

# Summary

The Automatic Identification System (AIS) plays a crucial role in maritime navigation by enhancing situational awareness, facilitating vessel tracking, and improving maritime safety. However, with the increasing volume, usability and complexity of AIS data, there is a growing need for structured training on AIS data management and its applicability in ensuring safe maritime operations. This paper introduces the necessity for a model course that comprehensively covers AIS data management and applicability while addressing the potential division into separate courses focusing on data management and processing versus data utilization.

## Purpose of the document

The primary aim of this model course is to provide a standardized framework for maritime professionals, AtoN technicians and providers, VTS integrator and providers, data analysts, and decision-makers to understand, process, and effectively utilize AIS data. The course seeks to bridge the knowledge gap in data handling while ensuring that maritime safety remains a top priority. By offering structured training, the course will enable professionals to make informed decisions, mitigate risks, and optimize navigation efficiency.

## Related documents

IALA Recommendations and Guidelines on AIS Data Management :

IALA has published several guidelines and recommendations on AIS data management, focusing on its technical implementation, operational use, and integration with other maritime services. Some key documents include:

* IALA Recommendation R0124: Provides technical guidelines for AIS as a maritime safety information system.
* IALA Guideline 1082 on AIS Data Handling and Exchange: Offers best practices for managing AIS data, including collection, storage, validation, and sharing.
* IALA e-Navigation Strategy: Promotes the use of AIS as part of a harmonized digital maritime environment, ensuring seamless data exchange between ships and shore-based authorities.

Further references are listed in section 5 of the present paper. An annex to the paper is provided for easy comprehension of the model course content, ARM20-6.2.5.1 Overview AIS model course\_v1.0.

# Background

AIS was developed primarily as a vessel tracking system to enhance maritime safety, collision avoidance, and maritime domain awareness. Mandated by the International Maritime Organization (IMO) under the SOLAS (Safety of Life at Sea) Convention, AIS has evolved into a critical component of modern maritime navigation and vessel traffic management.

IALA has been instrumental in harmonizing the use of AIS worldwide by providing guidelines, recommendations, and technical standards. The organization's work ensures that AIS data is properly collected, processed, and utilized to support maritime safety and operational efficiency.

Key contributions from IALA include:

1. Standardization of AIS Data Use – IALA works alongside the International Maritime Organization (IMO) and the International Telecommunication Union (ITU) to develop global AIS standards.
2. Integration with e-Navigation – AIS data is a core component of IALA’s e-Navigation strategy, which aims to enhance maritime safety through digital information exchange.
3. Guidance for Vessel Traffic Services (VTS) – AIS is essential for VTS operations, and IALA provides recommendations on how AIS data should be managed to support real-time vessel monitoring and decision-making.
4. AIS Data Exchange and Security – IALA provides best practices for ensuring AIS data integrity, accuracy, and cybersecurity, addressing risks such as data spoofing and manipulation.

# Discussion

Despite its benefits, AIS data management faces several challenges that IALA actively addresses:

* Data Quality and Reliability: Ensuring that AIS transmissions are accurate and free from errors.
* Overload and Filtering: Managing the increasing volume of AIS messages from high-traffic areas.
* Cybersecurity Threats: Protecting AIS data from manipulation, spoofing, or unauthorized access.
* Regulatory Compliance: Ensuring AIS data use aligns with IMO, ITU, and national regulations.
* Lack of harmonised training for the shore side AIS data manager or user.

**Scope of the Model Course**

To covers these matters, IALA WWA in close collaboration with the committee participants, would like to propose the dedicated model courses designed to cover the comprehensive aspects of AIS data, including but not limited to:

* The fundamentals of AIS technology, data transmission, and reception.
* AIS data management, including data collection, validation, storage, and processing.
* The application of AIS data in maritime safety, navigation, traffic monitoring, and search and rescue operations.
* Legal and regulatory aspects of AIS data handling and usage.
* The role of technologies as AI and big data analytics in AIS data interpretation and communication infrastructure in development and use.
* Other considerations and data security concerns associated with AIS data.

**Receiver training needs**

The current sessions in the ARM TG to develop the model course, have highlighted the possibility of providing different trainings depending on the background, roles and responsibilities of the training receiver. To accommodate varying needs, the course can be structured into two complementary modules:

1. AIS Data Management and Processing: Focused on data acquisition, validation, storage, and analysis.
2. AIS Data Utilization for Maritime Navigation and Safety: Concentrated on the practical application of AIS data in navigation, risk assessment, and decision-making processes.

**Objectives of the Model Course**

In any case, the key objectives of the model course are:

* To equip maritime professionals with essential knowledge of AIS data structure, transmission, and reception.
* To develop competencies in AIS data management, including data validation, error detection, and integration with other navigation systems.
* To enhance the ability of maritime stakeholders to interpret and utilize AIS data for route planning, collision avoidance, and situational awareness.
* To provide insights into emerging technologies and methodologies for AIS data analysis, such as machine learning and predictive analytics.
* To ensure compliance with international regulations and ethical standards related to AIS data usage.

# Action requested of the Committee

The Committee is requested to support the development and implementation of the Model Course on AIS Data Management and Applicability, the participant is encouraged to take the following actions:

1. Review and Provide Feedback – Assess the proposed structure, scope, and objectives of the model course and provide constructive feedback on its relevance, comprehensiveness, and potential improvements.
2. Support Course Development – Contribute expertise, case studies, or best practices to enhance the course material, ensuring it aligns with industry needs and regulatory requirements.
3. Advocate for Standardization – Engage with relevant maritime authorities, training institutions, and regulatory bodies to support the adoption of a standardized AIS data management curriculum in the scope of IALA.
4. Facilitate Industry Collaboration – Encourage partnerships between maritime training institutions, research organizations, and stakeholders to ensure the course reflects real-world challenges and advancements in AIS data applications.
5. Promote Training and Capacity Building – Identify opportunities to integrate the model course into existing maritime training programs, ensuring widespread accessibility and adoption by maritime professionals.
6. Participate in Future Discussions – Engage in industry forums, working groups, and regulatory meetings to contribute to the ongoing refinement and evolution of AIS data management education.

# References

**ITU**

* ITU-R M.1371-5 Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band (AIS)
* ITU-R M.585-8 Assignment and use of identities in the maritime mobile service (MMSI)
* ITU-R M.1842-1 Characteristics of VHF radio systems and equipment for the exchange of data and electronic mail in the maritime mobile service RR Appendix 18 channels
* ITU Radio Regulations Appendix 18
* ITU Table of Maritime Identification Digits (MID)

**IALA:**

* R0143 Provision of Virtual Aids to Navigation
* R0126 The Use of the Automatic Identification System (AIS) in Marine Aid to Navigation Services
* G1081 Virtual Aids to Navigation
* G1062 The establishment of AIS as an Aid to Navigation
* G1084 Authorisation of AIS AtoN
* G1050 The Management and Monitoring of AIS Information
* R0123 The Provision of Shore Based Automatic Identification System (AIS)
* R0144 Harmonised Implementation of Application-Specific Messages (ASM)
* R0124 The AIS Service
* R0124 App 0 References, Glossary of terms and Abbreviations
* R0124 App 1 Basic AIS Services, AIS Data Model and AIS Service specific MDEF sentences
* R0124 App 3 Distribution model of the AIS Service
* R0124 App 4 Interaction and Data Flow Model of the AIS service
* R0124 App 5 Interfacing model of the AIS Service
* R0124 App 9, 10, 11 Functional Description of the AIS Service components (AIS-PCU, AIS-LSS & AIS-SM))
* R0124 App 12 Co-location issues at AIS Physical Shore Stations (AIS-PSS) and on-site infrastructure considerations
* R0124 App 14 FATDMA Planning and Operation of an AIS Service
* R0124 App 16 DGNSS Broadcasts from an AIS Service
* R0124 App 17 Channel Management by an AIS Service
* R0124 App 18 VDL Load Management
* R0124 App 19 Satellite AIS Considerations
* G1095 Harmonised Implementation of Application-Specific Messages (ASM)
* G1098 The Application of AIS - AtoN on Buoys

**IMO**

* MSC-MEPC.2/Circ.15/Rev.2 Guidelines for the development, review and validation of model courses
* Resolution A.1106 (29), Revised Guidelines for the onboard operational use of shipborne Automatic Identification systems (AIS)
* Resolution MSC.74 (69), Annex 3, Recommendations on performance standards for a universal Shipborne Automatic Identification System (AIS)
* SN/Circ. 289, Guidance on the Use of AIS Application-Specific Messages
* Resolution MSC.191 (79), Performance Standards for the presentation of Navigation Related Information on Shipborne Navigational Displays
* SOLAS Chapter V, as amended
* SN/Circ. 245, Amendments to the guidelines for the installation of a shipborne Automatic Identification System (AIS)

**RTCM**

* Automatic Identification System (AIS) Mobile Aids to Navigation (MAtoN) Stations standard RTCM 12110.

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