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JCG JAPAN COAST GUARD

VHF DATA EXCHANGE SYSTEM SEMINAR
First General Assembly
17 February - Singapore

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1ST GENERAL ASSEMBLY OF THE INTERNATIONAL ORGANIZATION FOR MARINE AIDS TO NAVIGATION

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SINGAPORE

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Report of the IALA Seminar on VHF Data Exchange System (VDES)

Executive Summary

Under the auspices of the First General Assembly of IALA held in Singapore, the Singapore Maritime Port Authority and the Japan Coast Guard hosted a seminar on VHF Data Exchange System the 17 February 2025.

The seminar was attended by 187 delegates, representing 50 countries and 2 sister organizations. It featured presentations on relevant topics, with conclusions agreed upon on the same day.

The seminar resulted in the following remarks:

VDES Overview and Functionality

- VDES is a next-generation maritime digital radio communication system designed to overcome the limitations of AIS and enhance data exchange capabilities for e-Navigation.
- It includes AIS functionality without degrading its performance and provides additional channels for Application-Specific Messages (ASM) and higher-capacity VHF Data Exchange (VDE).
- VDES integrates both terrestrial and satellite components to provide global coverage. It is ready for use, with successful testbeds demonstrating both terrestrial and satellite operations.
- VDES is one of several digital communication technologies supporting maritime data transfer.
- VDES can enhance AIS security by providing authentication, as referenced in G1117 and upcoming guidelines.

VDES and GMDSS

- VDES is not currently classified as GMDSS equipment.
- While GMDSS modernization has been completed, full digitalization remains outstanding.
- Future amendments to SOLAS and the Radio Regulations (RR) will be required to achieve full maritime radiocommunication digitalization.

Integration and Regulatory Considerations

- VDES is a publicly controlled system based on open standards, ensuring free access to public services without reliance on commercial providers.
- The role of VDES within emerging IP-based maritime communication needs to be clearly defined.
- Discussions are required on whether VDES communication equipment should be certified for shore infrastructure.
- The designation of a service platform operator and coordination of satellite data sharing among nations need to be determined.

Development and Implementation

- Timely reviews and decisions are necessary to finalize VDES guidelines.
- Increased participation is needed to develop VDES shore infrastructure guidelines.
- Administrations are encouraged to support inputs on VDES and SECOM/MMS at NCSR12

Attendees enjoyed an ice breaker reception on the first day.

Contents

IALA Seminar on VDES

1. INTRODUCTION

First General Assembly of IALA held in Singapore, the Singapore Maritime Port Authority and the Japan Coast Guard hosted a seminar on VHF Data Exchange System the 17 February 2025.

The purpose of the Seminar for IALA members which provide maritime services worldwide was to exchange information and develop views on:

- To share the progress and best practice, to encourage the investment and development of future maritime radionavigation and radio communication systems;
- to contribute to discussions on the operational requirements of VDES services for future maritime radionavigation and radiocommunication systems, and;
- to identify and facilitate discussion on the technical and operational challenges for the use of VDES for current and future maritime operations.

2. OVERALL PROGRAMME

The overall programme is shown in the following table:

Time	Activity	
08:30 – 09:00	Coffee and registration	
08:30 – 09:00	Steering Committee Meet - Session Chairs & Rapporteurs	
09:00 – 10:00	**Session 1 – Welcome and introductions**	**Chair – Carmel Cheng**
09:00 – 09:05	Opening remarks	Captain M. Segar - MPA
09:05 – 09:10	Welcome from IALA	Omar Erikson - IALA
09:10 – 09:30	Overview of VDES (Terrestrial and satellite)	Jan Safar - GRAD
09:30 – 09:50	VDES from IMO perspective	Hideki Noguchi - JCG
09:50 – 10:50	**Session 2 – Uses cases for VDES – Regional & International Perspectives**	**Chair – Jaime Alvarez**
09:50 – 10:05	VDES: Paving the Way for Smarter, Safer Maritime Navigation	Vince Tan - MPA
10:05 – 10:20	Use of VDES for safe maritime traffic	Koichi Yoshida - Sasakawa Peace Foundation
10:20 – 10:35	International perspective of VDES	Jillian Carson-Jackson - JCJ Consulting
10:35– 10:45	Session 2 Q&A	
10:45 – 11:00	**Break**	
11:00 - 12:30	**Session 3 – Communication and navigation operational requirements**	**Chair – Mayumi Arita**
11:00 – 11:15	Industry view	Stefan Pielmeier – Albatros-Tech ApS
11:15 – 11:30	Evolution of the space segment	Magnus Nyberg - SAAB
11:30 – 11:45	Shore infrastructure for terrestrial VDES	Claire Na - All4Land
11:45 – 12:00	Demonstration of Satellite VDES for Maritime Search and Rescue	Terence See Shie Ping - A*Star
12:00 – 12:05	Session 3 Q&A	
12:05 – 12:15	Closing remarks	Rear Admiral Tsugo Awai - JCG
12:15 – 13:30	**Lunch**	

3. TECHNICAL DISCUSSIONS

3.1 Session 1 – Welcome and introductions

The session was chaired by Carmel Cheng and addressed the following topics:

3.1.1 Opening remarks / Captain M. Segar – MPA

Captain Segar, Chief Marine Officer and Assistant Chief Executive to the MPA, welcomed all participants to the VDES Seminar and Singapore. The maritime sector is transforming, demanding technological innovation for safety and efficiency. VDES, with enhanced communication, offers better situational awareness and optimized routing. The Maritime and Port Authority of Singapore is actively trialing VDES, collaborating with partners from the industry and academia and contributing to discussions at IMO and IALA, to understand and implement its potential.

3.1.2 Welcome from IALA / Omar Erikson – IALA

Omar Erikson, Vice-Secretary General of IALA, welcomed all participants. He recognized the meeting gathered a number of distinguished maritime professionals and IALA members from around the world. Appreciation were made for the co-hosting by the Maritime and Port Authority of Singapore (MPA), the Japan Coast Guard (JCG), and the IALA World-Wide Academy, reflecting a collaborative effort to advance maritime communication technologies.

The primary objective of the seminar was to promote the adoption and implementation of VDES by sharing progress updates, best practices, and regional use cases while demonstrating its capabilities. Participants explored the role of VDES and other IP-based technologies in transforming maritime communication and digitalization.

VDES represents a significant advancement over the Automatic Identification System (AIS) by offering a high-capacity data exchange platform capable of seamless information transfer across both coastal and open ocean environments. The development of VDES has been driven by extensive research, international collaboration, and a shared vision for a safer and more efficient maritime sector. Its integration into maritime infrastructure is expected to address the increasing demand for data exchange, particularly in modern operations and autonomous vessel development.

The seminar agenda was designed to provide participants with a comprehensive understanding of VDES. Sessions covered technical foundations, practical applications through regional case studies, and live demonstrations showcasing its potential. These discussions aimed to equip attendees with the necessary knowledge and tools to effectively integrate VDES into their respective domains.

Beyond technical discussions, the seminar served as a platform for collaboration and dialogue, allowing participants to exchange insights and experiences. Such engagements are essential in navigating the challenges and opportunities associated with this emerging technology.

Special recognition was given to MPA and JCG for their unwavering support and leadership in advancing maritime safety and communication, which played a crucial role in organizing the event.

In conclusion, attendees were encouraged to actively participate, engage in discussions, and collaborate in shaping the future of maritime communication. The seminar underscored the collective responsibility to ensure that maritime communication systems remain resilient, efficient, and adaptable to the evolving needs of the global maritime community.

The event concluded with an anticipation of insightful presentations and continued collaboration in the field of maritime communication.

3.1.3 Overview of VDES (Terrestrial and satellite) / Jan Safar – GRAD

Speaker
Jan Safar is a Research & Innovation Engineer with the General Lighthouse Authorities of the UK & Ireland.
Abstract 1: VDES Overview
Jan's presentation introduced the VHF Data Exchange System (VDES) as a next-generation maritime communication system designed to overcome the limitations of AIS and enhance data exchange capabilities for e-Navigation. He outlined the system's context and architecture, detailing its terrestrial and satellite components, and highlighted key features such as increased data capacity, improved reliability and enhanced cybersecurity. The presentation emphasized VDES as a resilient and globally interoperable communication system, essential for the future of efficient, secure and sustainable maritime operations.
Abstract 2: Realising a Secure AIS and VDES
This presentation examined the vulnerabilities of AIS, highlighting real-world spoofing threats and their potential impact on maritime operations. It introduced an authentication framework based on Public Key Cryptography (PKC) and the Elliptic Curve Digital Signature Algorithm (ECDSA) to enhance the security of AIS and VDES messages. On-air authentication trials had been conducted, demonstrating the effectiveness of the proposed approach. The presentation also discussed ongoing efforts to integrate authentication techniques into international standards via IALA. As secure data exchange remains crucial for the future of maritime communications, this presentation provided insights into practical solutions for achieving that goal.

3.1.4 VDES from IMO perspective / Hideki Noguchi - JCG

Speaker
Hideki Noguchi is a Japan Coast Guard officer.
Abstract
The presentation describes the history and future issues on VDES from IMO viewpoint. The IMO considered VDES as communication component of e-navigation and is now considering the amendments to SOLAS for introduction of VDES under NCSR Sub-Committee. During the consideration of the amendments to SOLAS, it became obvious that VDES was not GMDSS equipment, but e-navigation contained MSI service. In parallel with VDES consideration, there is also similar issue emerging. Therefore, it is necessary to consider the digitalization of GMDSS and the role of VDES in future.

3.2 Session 2 – Uses cases for VDES – Regional & International Perspectives

The session was chaired by Jaime Alvarez and addressed the following topics:

3.2.1 VDES: Paving the Way for Smarter, Safer Maritime Navigation / Vince Tan – MPA

Speaker

Vince Tan, Director of Operations Transformation and Planning at MPA.

Abstract

Digitalisation is critical in tackling the challenges facing port authorities. Maritime Communications is a key enabler in the Maritime's sector pursuit of digitalisation. This presentation will outline how VDES can support maritime communications to allow ships, businesses, and authorities to realise the benefits of digitalisation.

3.2.2 Use of VDES for safe maritime traffic / Koichi Yoshida - Sasakawa Peace Foundation

Speaker

Koichi Yoshida research fellow at the Ocean Policy Research Institute (OPRI) of the Sasakawa Peace Foundation (SPF).

Abstract

While IALA was in the process of revising G1117, the VDES Overview, Japan (OPRI) proposed several new use cases for VDES, including disaster management, vessel monitoring systems, autonomous collision avoidance, and maritime domain awareness. Furthermore, Japan (OPRI) proposed new guidelines for VDES resource sharing. This presentation introduces these activities within IALA and explores potential applications of VDES for enhancing maritime safety. Additionally, it provides an overview of recent VDES-related activities in Japan.

3.2.3 International perspective of VDES / Jillian Carson-Jackson - JCJ Consulting

Speaker

Jillian Carson-Jackson, owner of the JCJ Consulting and former president of the NI.

Abstract

The VDES is an advanced maritime communication system aimed at enhancing vessel safety and operational efficiency. The International perspectives of VDES include a focus on improving safety at sea, ensuring integration with existing and developing systems, the need for cooperation and collaboration, international standardization, all while ensuring a usable system to support human-machine interaction. The vision, opportunities and challenges will be highlighted in the presentation.

3.2.4 Questions raised

Q1: Turkey asked how many satellites are needed?

Answer: Provided Japan as an example of a state developing its own satellite system and informed about private organizations or private providers working with IALA in this regard.

Q2: What is a coastal station? What is the difference between a radio communication station and a coastal station?

Answer (Hideki): Gave an example of coastal stations used for Aids to Navigation (AtoN) and lighthouses in Japan. Japan currently has around 94 AIS coastal stations, with plans for future expansion.

Q3: Can VDES be used for environmental protection monitoring?

General Answer: Yes.

- Jillian: VDES could be used for environmental protection, such as sharing weather data, which can help save lives.
- Additional Answer: Suggested consulting IALA members and the G1117 Overview of VDES, as they have experience in system architecture, consultancies, and industry support for implementing environmental monitoring systems.
- It was also mentioned a trial to establish a tsunami warning system using VDES.

Q4: A participant asked about the transition between AIS and VDES. Will AIS disappear?

Answer:

- AIS is an integrated part of VDES.
- Some issues exist with functionalities and security.
- Efforts are being made to enhance AIS security.
- AIS is evolving and progressing.
- VDES is not replacing AIS.
- Lack of authentication in AIS was highlighted as a concern.

Q5: What about the density of time slots in VDES?

Answer: There is no overlap between frequencies. A slide was displayed to illustrate the extra capacity of VDES.

Q6: Iana TH asked how much consensus exists on VDES use cases.

Answer (Jillian): There is ongoing development of use cases, but no single technological process can address all needs. Multiple approaches are necessary, and there is no agreement within IALA on specific use cases.

Q7: Cap Segar commented on the correspondence with IMO regarding AIS and VDES.

Answer:

- AIS and VDES are not mandatory equipment under IMO regulations.
- To make VDES mandatory, it requires better understanding and acceptance by seafarers.

3.3 Session 3 – Communication and navigation operational requirements

The session was chaired by Mayumi Arita and addressed the following topics:

3.3.1 Industry view / Stefan Pielmeier - Albatros-Tech ApS

Speaker
Stefan Pielmeier is the owner of Albatros-Tech ApS.
Abstract
This presentation covered:

1. An introduction to the VDES Alliance and its objectives.
2. The involvement of numerous companies, both within and outside the alliance.
3. The engagement of multiple national administrations.
4. The anticipated availability of IEC specifications by 2026, paving the way for commercial products.
5. IMO's endorsement of VDES.
6. The urgency to begin implementing VDES.
7. A possible introduction to the broader context of MMS, depending on feedback from the steering committee.

A concluding industry perspective: urging administrations to invest in VDES equipment so that the 10–15-year efforts of both public and private sectors can benefit mariners worldwide.

3.3.2 Evolution of the space segment / Magnus Nyberg - SAAB

Speaker
Magnus Nyberg holds the position of Head of Maritime Programs and Markets at Saab AB, TransponderTech.
Abstract
The presentation discusses the evolution of space segment, focusing on VDES components like testbeds and geolocation/authentication of VDES signals. It covers YMIR-1, a VDES In-Orbit-Demonstrator, and related test campaigns. It details experiments and results on VDES signal geolocation/authentication, includes data from Norsat-TD5 reception, and concludes with future directions for VDES in integrity checks and ship reporting.

3.3.3 Shore infrastructure for terrestrial VDES / Claire Na - All4Land

Speaker
Hwa-Jin 'Claire' Na is the Managing Director of the Smart Maritime R&D Lab at ALLFORLAND.
Abstract
The IALA DTEC Committee commenced the drafting work on the shore VDES infrastructure guideline, as global preparation for the next-generation maritime communication, VDES, now looks ahead to ubiquitous implementation of VDES in the near future. And we, the global VDES community, have a lot to discuss about how we will approach the matter of defining and implementing the shore VDES infrastructure, as well as utilizing the pre-existing AIS infrastructure. As the leader of the shore VDES infrastructure guideline correspondence group, Claire Na presents the current progress of drafting the guideline, and what are the matters that the VDES community needs to cooperate in order to efficiently actualize the most integral parts of VDES operation and maritime services.

3.3.4 Demonstration of Satellite VDES for Maritime Search and Rescue / Terence See Shie Ping - A*Star

Speaker
Terence See is a Principal Scientist and Deputy Head of Satellite Communications and Sensing Division at the Institute for Infocomm Research (I2R).
Abstract
In this talk, the use of VDES communication for maritime search and rescue will be demonstrated using the ship terminal and satellite communication payload developed by I2R. The distress call will be relayed from a vessel located in the open ocean to the nearest shore station via the VDES satellite. Upon receiving the distress call, the shore station will verify the identity of the vessel and send an acknowledgement to the distressed vessel. At the same time, the shore station will alert the nearby ships, which will acknowledge the call and proceed to render aid to the distressed vessel.

4. SUGGESTIONS, REMARKS AND OBSERVATIONS

During the Seminar suggestions, remarks and observations were made by participants:

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4.1 Seminar Report

Jaime Alvarez, technical officer for the Seminar, noted that the seminar presentations, documents, and photographs would be available on the page of the seminar file-sharing. The seminar report will be posted on the file-sharing server within one week and will be permanently available on the IALA website. It will be forwarded to the IALA Council and all IALA Committees.

4.2 Closing of the seminar

The IALA Counsellor for Japan, RA Tsugo Awai, thanked everyone for attending the seminar and the good discussions and the host country for the arrangements.

He wished everyone a safe journey home and declared the seminar closed.