CEPT ECC
Electronic Communications Committee

ECC Report 380

Report on regulatory framework for use of VDES equipment within CEPT

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0 EXECUTIVE SUMMARY

This Report collects and summarises how administrations have licensed or otherwise authorised the use of Automatic Identification System (AIS) and Very High Frequency (VHF) Data Exchange System (VDES) equipment to date and how they foresee VDES equipment to be authorised in the future. Based on the information collected, key elements to facilitate a harmonised regulatory framework for use of VDES equipment within CEPT have been developed and are presented in this Report.

The information gathered from administrations as part of the development of this Report indicate that there is some degree of harmonisation of the expected regulatory framework for the use of VDES equipment within CEPT. The elements identified in this respect, are the inclusion of VDES use in the Ship Station Licence (Ship Radio Licence) and alignment with the regulatory framework for AIS equipment.

Considering that VDES includes both a terrestrial component and a satellite component, the VDES equipment should be included in the Ship Station Licence (Ship Radio Licence) in a manner that allows all communication elements of VDES to be used, including data exchange between ship and shore, ship and satellite, and ship to ship.

The operation of VDES shore stations requires a licensing scheme with a defined mandate and national management solution. This licensing scheme should facilitate compatibility between the operation of coastal and inland waterways VDES systems.

Potential use cases for VDES include broadcasting of information that may improve navigational safety, such as navigational warnings, meteorological warnings and forecasts, preferred sailing routes, and other safety related information. VDES also has the potential to include a Ranging Mode (R-mode) capability able to provide a resilient Position, Navigation and Timing (PNT) service to mariners, through broadcasted signals. This information and these services provided via VDES equipment can be used by mariners without transmitting from their onboard VDES equipment. Thus, it could be beneficial for maritime safety that VDES equipment in receive only mode, may be allowed to operate without a licence requirement.

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
AIS	Automatic Identification System
ASM	Application Specific Messages
AtoN	Aid to Navigation
CEPT	European Conference of Postal and Telecommunications Administrations
ECC	Electronic Communications Committee
EMSA	European Maritime Safety Agency
EU	European Union
IALA	International Organisation for Marine Aids to Navigation
IEC	International Electrotechnical Commission
IMO	International Maritime Organisation
ITU	International Telecommunication Union
MED	Maritime Equipment Directive
MMSI	Maritime Mobile Service Identity
MSC	Maritime Safety Committee
RED	Radio Equipment Directive
RR	Radio Regulations
VDE	VHF Data Exchange
VDES	VHF Data Exchange System
VHF	Very High Frequency
WRC	World Radiocommunication Conference

1 INTRODUCTION

VHF Data Exchange System (VDES) is a communication technology for maritime data exchange. VDES consists of three components, Automatic Identification System (AIS), Application Specific Messages (ASM) and VHF Data Exchange (VDE). All three components have both a terrestrial and a satellite element. Frequencies, in the form of two channels within Appendix 18 of the International Telecommunication Union (ITU) Radio Regulations (RR) [1], were allocated and identified for terrestrial AIS at WRC-97. WRC-07 allocated and identified those AIS frequencies also for satellite AIS as well as two additional channels within Appendix 18 of the ITU Radio Regulations [1]. AIS operates in accordance with the Recommendation ITU - R M.1371 [2]. WRC-15 allocated and identified frequencies for ASM and terrestrial VDE, while WRC-19 allocated and identified frequencies for satellite VDE. ASM and VDE operate in accordance with the Recommendation ITU-R M.2092 [3].

ECC Decision (19)03 [4] stipulates an implementation plan for the VDES frequencies within CEPT. The International Organisation for Marine Aids to Navigation (IALA) has developed guidelines for the implementation of VDES. The International Electrotechnical Commission (IEC) is expected to conclude their work on a test standard for VDES ship equipment by end of 2026. The Maritime Safety Committee (MSC) of the International Maritime Organisation (IMO) approved during their 110th meeting in June 2025 the MSC Resolution on Introduction of VHF Data Exchange System (VDES) into the IMO regulatory framework [5]. The resolution is expected to be adopted by MSC 111 in May 2026, with an entry into force on 1 January 2028. Thus, it is expected that type approved VDES equipment may start to be installed on vessels operating within CEPT towards the end of 2026. A harmonised regulatory framework for use of VDES equipment within CEPT is therefore needed.

Some administrations have already carried out test and demonstrations on vessels with VDES equipment for some time, and through that gained valuable experience on how to regulate and licence VDES equipment. These, and other, administrations may also have started planning how they intend to regulate and licence VDES equipment in the future when it becomes a carriage requirement on board vessels. As VDES has been developed to complement AIS, existing regulatory frameworks for AIS equipment could also provide valuable background information, on a VDES regulatory framework implementation.

This Report collects information on the experiences and plans of CEPT administrations regarding regulatory frameworks for AIS and VDES equipment. Based on the information collected, key elements to facilitate a harmonised regulatory framework for the use of VDES equipment within CEPT have been developed and are presented in this Report:

- Section 2 provides a list with documentation of demonstration activities reported by CEPT administrations;
- Section 3 presents brief descriptions of how some CEPT administrations currently regulate AIS equipment;
- Section 4 summarises key elements found to be relevant to consider when developing a regulatory framework for VDES equipment that ensures efficient operation and use of the VDES frequencies;
- Section 5 concludes with a summary of key elements needed for a harmonised regulatory framework for VDES equipment at a conceptual level;
- Annex 1 presents a summary of the responses to a survey of CEPT administrations active in Project Team FM58 during 2024;
- Annex 2 lists relevant references.

2 SUMMARY OF VDES TEST AND DEMONSTRATION ACTIVITIES

CEPT administrations were asked to provide information on VHF Data Exchange System (VDES) test and demonstration activities. Table 1 provide a summary of the information provided.

Table 1: Summary of information VDES test and demonstration activities provided by CEPT administrations

Demonstration activity description	Reference	Responsible
VDES channel sounding campaign performed	International Telecommunication Union (ITU), 'VHF Data Exchange System Channel Sounding Campaign', Geneva, Switzerland, Report ITU-R M.2317-0, Nov. 2014. [Online]. Available: https://www.itu.int/pub/R-REP-M.2317-2014 (the GLA report is available as an embedded document in the Annex).	General Lighthouse Authorities of the UK and Ireland (GLA) Research and Development Department (GRAD), United Kingdom
Investigations into VDES satellite performance including sea trial	J. Šafář, B. Van Osch, A. Macikunas, A. Peerupalli, S. Kavanagh, and A. Grant, 'The VDES Transmitting Satellite System (VESTA): Initial Sea Trial Results', presented at the IALA ENAV23, Singapore, April 2019.	General Lighthouse Authorities of the UK and Ireland (GLA) Research and Development Department (GRAD), United Kingdom
'Over the air' VDES trials	J. Šafář, 'VHF Data Exchange System - UK's First On-air Trials', in Proc. 20th IALA Conference, Rio de Janeiro, Brazil: International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), June 2023, pp. 291-305.	General Lighthouse Authorities of the UK and Ireland (GLA) Research and Development Department (GRAD), United Kingdom
'Over the air' demonstration authenticating VDES broadcasts (including authenticating AIS Aid to Navigation (AIS AtoN))	G. Wimpenny, N. Vastardis and J. Šafář, 'Authentication in Maritime Communications' in Proc. 20th IALA Conference, Rio de Janeiro, Brazil: International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), June 2023.	General Lighthouse Authorities of the UK and Ireland (GLA) Research and Development Department (GRAD), United Kingdom
Study of VDES Ranging Mode (R-Mode) to support resilient Position Navigation and Timing (PNT)	J. Šafář, 'VDES R-Mode', in Proc. 20th IALA Conference, Rio de Janeiro, Brazil: International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), June 2023.	General Lighthouse Authorities of the UK and Ireland (GLA) Research and Development Department (GRAD), United Kingdom
VDES trials conducted in conjunction with KV Svalbard voyage to the North Pole	J. Hauge, ' Report describing the concept of use of the VDES satellite', STM BALT SAFE project report, https://stm-stmvalidation.s3.eu-west-1.amazonaws.com/uploads/20220114093011/BS_WP5.4-VDES-Information-transfer-to-remote-sea-areas.pdf	Norwegian Coastal Administration, Space Norway and Kongsberg Discovery Seatex, Norway
Satellite VDES Service Demonstrations	L. Løge, C.G. Eliassen, A. Bjørnevik, H.C. Haugli, M.H. Lieng, 'Recent Satellite VDES Service Demonstrations in Norway', presented at the IALA DTEC1, Paris, Sept. 2023.	Space Norway and Kongsberg Discovery Seatex, Norway

Demonstration activity description	Reference	Responsible
VHF Data Exchange System - Satellite (VDE-SAT) Precision Time Service test results Independent Critical Navigation (ICING)	Ø. Pettersen, A. Bjørnevik, S.I. Rasmussen, H.C. Haugli, L. Løge, 'VDE-SAT Precision Time Service test results ICING', presented at the IALA DTEC2, Paris, February 2024.	Space Norway and Kongsberg Discovery Seatex, Norway
Right-Hand Circular Polarization (RHCP) ship antenna for improved VDES and AIS performance	A. Bjørnevik, C.E. Hellenes, H.C. Haugli, L. Løge, 'RHCP ship antenna for improved VDES and AIS performance', presented at the IALA DTEC3, Paris, September 2024.	Space Norway, Comrod and Kongsberg Discovery Seatex, Norway
Channel modelling for VHF data exchange system via satellite	L. E. Bråten, V. Arneson, K. Svenes, T. Eriksen and Ø. Olsen, "Channel modelling for VHF data exchange system via satellite," 12th European Conference on Antennas and Propagation (EuCAP 2018), London, UK, 2018, pp. 1-5.	Norwegian Defence Research Establishment (FFI), Space Norway, Kongsberg Discovery Seatex
On the VHF radio channel for the data exchange system via satellite (VDE-SAT); experimental results from the NorSat-2 satellite experiment	L. E. Bråten, T. Eriksen, A. N. Skauen, A. Bjernevik, H. C. Haugli and L. Lege, "On the VHF radio channel for the data exchange system via satellite (VDE-SAT); experimental results from the NorSat-2 satellite experiment," 36th International Communications Satellite Systems Conference (ICSSC 2018), Niagara Falls, ON, Canada, 2018, pp. 1-8.	Norwegian Defence Research Establishment (FFI), Space Norway, Kongsberg Discovery Seatex
In-orbit Interference Measurements and Analysis in the VDES-band with the NorSat-2 Satellite	G. Quintana–Diaz, R. Birkeland, L. Løge, E. Andersen, A. Bolstad and T. Ekman, "In-orbit Interference Measurements and Analysis in the VDES-band with the NorSat-2 Satellite," 2022 IEEE Aerospace Conference (AERO), Big Sky, MT, USA, 2022, pp. 1-8.	Norwegian University of Science and Technology (NTNU), Space Norway
MaSSha - Maritime Secure Digital Services over Shared VDE-SAT Network	https://business.esa.int/projects/massha	Sternula, Space Norway
VASP - VDE-SAT Applications and Services Platform	https://business.esa.int/projects/vasp	Space Norway, Kongsberg Discovery Seatex, Norwegian Coastal Administration, European Maritime Safety Agency
VDE-SAT Downlink Verification	https://connectivity.esa.int/projects/vdesat-downlink-verification	Norwegian Defence Research Establishment (FFI), Space Norway, Kongsberg Discovery Seatex
VDE-SAT Validation Platform	https://connectivity.esa.int/projects/vdesat-validation-platform	Norwegian Defence Research Establishment (FFI), Space Norway, Kongsberg Discovery Seatex

3 REVIEW OF CURRENT REGULATORY FRAMEWORKS FOR AIS EQUIPMENT

The various CEPT administrations regulate the use of Automatic Identification System (AIS) equipment in different ways, as a common regulatory framework for all CEPT administrations has not been developed. This section presents various concepts for regulations used by various CEPT administrations.

The use of AIS equipment within many CEPT countries is regulated through a licensing framework, typically through a Ship Station Licence (Ship Radio Licence) or similar. In some CEPT countries, the use of AIS equipment is subject to a general authorisation, but each AIS ship and coastal station must be issued with a valid Maritime Mobile Service Identity (MMSI).

Several administrations base their regulatory frameworks for AIS equipment on a national or international regulatory requirement to have AIS equipment installed for certain types of vessels, for example:

- Passenger ships visiting European ports and all ships with a gross tonnage of 300 GT or more, which are not passenger ships, must be equipped with a Class A AIS device;
- Fishing Vessels: Fishing vessels over 15 meters in length flying the flag of an EU member state or operating in territorial or internal waters, or unloading catch in a European port, must have a Class A AIS device.

Administrations may have exemptions from these requirements for vessels operating within their jurisdiction. Within the European Union (EU) the Directive - 2002/59 of the European Union [6] applies.

Examples and details on how some CEPT administrations regulate and licence the use of AIS equipment are available from the following resources:

- AIS licensing information for United Kingdom (Ofcom): https://www.ofcom.org.uk/spectrum/radio-equipment/maritime-radio/;
- AIS licensing information for Ireland (ComReg): https://www.comreg.ie/industry/radio-spectrum/licensing/search-licence-type/automatic-identification-system-ais/;
- EU Maritime Equipment Directive (MED) Directive 2014/90/EU [7] and Commission Implementing Regulation (EU) 2025/1533 [8] information provided by European Maritime Safety Agency (EMSA): https://www.emsa.europa.eu/med-directive-mared.html;
- EU Radio Equipment Directive (RED) Directive [8] information provided by EU: https://single-market-economy.ec.europa.eu/sectors/electrical-and-electronic-engineering-industries-eei/radio-equipment-directive-red_en.

AIS Class A devices are mentioned above. AIS Class B devices also exist, and they are primarily used by smaller vessels and leisure craft. Although there exist both AIS Class A devices and AIS Class B devices available for installation on vessels, their use is not regulated differently.

4 KEY ELEMENTS IN A REGULATORY FRAMEWORK FOR VDES EQUIPMENT

The following key elements have been identified as relevant to consider when developing a regulatory framework for VHF Data Exchange System (VDES) equipment:

- The VDES frequencies must be protected, and their use described through the relevant national radio spectrum utilisation plan;
- The prescribed use must be in line with the ITU and CEPT framework;
- VDES is an evolution of Automatic Identification System (AIS), and includes AIS, and as such VDES should have regulatory framework aligned with that of AIS;
- VDES includes both a terrestrial component and a satellite component;
- VDES equipment onboard vessels includes the functions of AIS and may therefore be included as part of the Ship Station Licence (Ship Radio Licence);
- Licensing and mandate for VDES shore station operators should be defined and managed;
- Coastal and inland waterway VDES systems and operations should be compatible;
- VDES has the potential to include a Ranging Mode (R-mode) capability able to provide a resilient Position, Navigation and Timing (PNT) service to mariners, and as such a regulatory framework for VDES may need to consider that VDES equipment also may have a radionavigation application;
- For AIS devices there are two classes: AIS Class A devices and AIS Class B devices. AIS Class B devices are primarily used by smaller vessels and leisure crafts. For VDES there exist no such Class A and B distinction, but smaller vessels and leisure crafts that today use AIS Class B devices may desire to install VDES onboard;
- While potentially not having a direct impact on the regulatory framework for VDES, authentication has been identified as essential for VDES to be used safely. Authentication is becoming necessary for AIS given the growing prevalence of cyberattacks on this important and heavily used VDES subsystem. However, the AIS subsystem alone lacks the capacity to support an authentication system. Consequently, the higher-capacity VDE subsystem is needed to provide enough bandwidth to support the authentication of AIS. The digital signatures of AIS messages can be exchanged on a VDE channel to enable AIS to be safely used in the future.

5 CONCLUSIONS

The information gathered from administrations as part of the development of this Report indicates that there is already some degree of harmonisation of the expected regulatory framework for the use of VDES equipment. The elements identified in this Report, tend towards inclusion of VDES use in the Ship Station Licence (Ship Radio Licence) and alignment with the regulatory framework for AIS equipment.

Considering that VDES includes both a terrestrial component and a satellite component, the VDES equipment should be included in the Ship Station Licence (Ship Radio Licence) in a manner that allows all communication elements of VDES to be used, including data exchange between ship and shore, ship and satellite, as well as ship to ship.

Operation of VDES shore stations requires a licensing scheme with a defined mandate and a management solution. The licensing scheme should facilitate compatibility between the operation of coastal and inland waterways VDES systems.

Potential use cases for VDES include broadcasting of information that may improve navigational safety, such as navigational warnings, meteorological warnings and forecasts, preferred sailing routes, and other safety related information. VDES also has the potential to include a Ranging Mode (R-mode) capability able to provide a resilient Position, Navigation and Timing (PNT) service to mariners through broadcasted signals. The information and services provided by VDES equipment can be taken advantage of by mariners without transmitting them from their onboard VDES equipment. Thus, it could be beneficial for maritime safety that VDES equipment in receive-only mode may be allowed to operate without a licence requirement.

ANNEX 1: SUMMARY OF INFORMATION PROVIDED BY ADMINISTRATIONS

A1.1 INTRODUCTION

To gather the information required to help better understand the issues involved and the approach of different administrations with respect to VDES, Project Team FM58 developed an internal survey to CEPT administrations on VDES.

The survey was sent by email to CEPT administrations active in Project Team FM58 during 2024.

A1.2 INTERNAL PROJECT TEAM FM58 SURVEY ON VDES

The survey included the following questions for administrations, to assist in developing a report on a harmonised regulatory framework for VDES equipment:

1 How does your administration currently regulate the use of AIS equipment?

(Describe the regulatory framework on the level of overall concept for use of the equipment, and how it is implemented within your jurisdiction).

2 Have any VDES test and demonstration activities been carried out within the jurisdiction of your administration?

(Briefly describe the activity (if carried out) and relevant reference documentation, if available).

3 Has your administration experience with regulating the use of VDES equipment?

(Describe the regulatory framework on the level of overall concept for use of the equipment, and how it is implemented within your jurisdiction).

4 Which key elements does your administration consider, should be taken into account, when developing a regulatory framework for VDES that ensures efficient operation and use of the VDES frequencies?

(This could be considerations on the need to restrict use, commonality with similar systems/equipment (such as AIS), how to implement and administrate it (both from the regulator side, ship and shore side, impact on delivery of services over VDES etc)).

5 How does your administration expect or intend to regulate the use of VDES equipment in the future?

(Describe the regulatory framework on the level of overall concept for use of the equipment, and how it is implemented within your jurisdiction).

6 Do you have any additional relevant information to share on the implementation of VDES?

(In case you are not able to answer one or more of the questions at this stage, indicate this and answer the other questions).

A1.3 SUMMARY OF RESPONSES

16 CEPT administrations responded to the information request.

The responses from administrations were collected by ECO, and the following summary of responses to the internal Project Team FM58 survey was prepared as part of the development of this Report:

1 How does your administration currently regulate the use of AIS equipment?

12 administrations responded that AIS is regulated as part of the Ship Station Licence.

2 Have any VDES test and demonstration activities been carried out within the jurisdiction of your administration?

4 administrations responded that VDES test and demonstration activities have been carried out within the jurisdiction of their administration.

3 Has your administration experience with regulating the use of VDES equipment?

2 administrations responded that they have some form of experience with regulating the use of VDES equipment. Their regulatory experience is however, limited to the issue of test licences.

4 Which key elements does your administration consider, should be taken into account, when developing a regulatory framework for VDES that ensures efficient operation and use of the VDES frequencies?

9 administrations highlighted elements they consider important when developing a regulatory framework for VDES. Most of the responses included an element of VDES to be listed in the Ship Station Licence and that the VDES frequencies must be protected through national regulations in line with ITU and CEPT framework. The need to ensure a defined and managed licencing and mandate for VDES shore station operators and compatibility between coastal and inland waterway VDES systems was also highlighted.

5 How does your administration expect or intend to regulate the use of VDES equipment in the future?

9 administrations provided their expectations/intentions towards future regulation for the use of VDES equipment. The overall theme of the responses could be summarised along the line that as VDES is an evolution of AIS and includes AIS, it should follow the same regulatory framework.

6 Do you have any additional relevant information to share on the implementation of VDES?

3 administrations provided additional relevant information on the topic. This information was incorporated into the report where appropriate.

ANNEX 2: LIST OF REFERENCES

[1] ITU Radio Regulations, edition of 2024

[2] Recommendation ITU-R M.1371: “Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band”

[3] Recommendation ITU-R M.2092: “Technical characteristics for a VHF data exchange system in the VHF maritime mobile band”

[4] ECC Decision (19)03: “Harmonised usage of the channels of the Radio Regulations Appendix 18 (transmitting frequencies in the VHF maritime mobile band)”, approved March 2019, amended June 2024

[5] MSC Resolution on performance standards for shipborne VHF data exchange system (VDES), expected to be adopted by MSC 111 in May 2026, available here

[6] Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC,

[7] Directive 2014/90/EU of the European Parliament and of the Council of 23 July 2014 on marine equipment and repealing Council Directive 96/98/EC (MED)

[8] Commission Implementing Regulation (EU) 2025/1533 of 23 July 2025 laying down rules for the application of Directive 2014/90/EU of the European Parliament and of the Council as regards design, construction and performance requirements and testing standards for marine equipment and repealing Commission Implementing Regulation (EU) 2024/1975 in force from 14 August 2025

[9] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (RED)