CEPT ECC
Electronic Communications Committee

ECC Report 379

Regulatory framework for use of PLB-AIS equipment within CEPT

approved 5 June 2026

0 EXECUTIVE SUMMARY

This Report on the regulatory framework for use of Personal Locator Beacon - Automatic Identification System (PLB-AIS) devices within CEPT summarises how administrations have licensed, authorised or made other arrangements or procedures for the use of PLB-AIS equipment to date. How they foresee the use of PLB-AIS will progress in the future and to promote a harmonised regulatory approach within CEPT.

A Personal Locator Beacon (PLB) is a 406 MHz emergency distress alerting beacon designed to be carried by a person. PLBs operate through the satellite-based International Cospas-Sarsat programme (Cospas-Sarsat). They can be used on land or on-board aircraft, vessels at sea, and on inland waterways. The use of PLBs is subject to national regulations that vary from administration to administration within CEPT. Therefore, users should consult the regulations of the administrations to seek permission to use PLB-AIS. This information can usually be found by contacting the national communications regulator or maritime administration. A list of maritime contacts for CEPT administrations is available on the CEPT webpages. The importance of PLB and PLB-AIS for Search and Rescue (SAR) authorities and the need for information to be available via national or international databases to them is also emphasised in this Report.

Emergency Position Indicating Radio Beacons (EPIRBs) differ significantly from PLBs in terms of their physical design. While PLBs are personal devices, EPIRBs are designed specifically for use in harsh maritime environments and must meet robust international standards, such as those provided by the International Maritime Organisation (IMO) and the Marine Equipment Directive (MED). Some administrations have mandatory carriage requirements for EPIRBs on ships and fishing vessels. The IMO Safety of Life at Sea (SOLAS) convention requires the carriage of an EPIRB on certain specified ships. Some administrations also mandate EPIRB carriage for other specified vessels such as fishing vessels. All vessels may voluntarily install an EPIRB with appropriate national authorisation, such as a Ship Station Licence, national authorisation or registration.

Automatic Identification System (AIS) transceivers are designed to automatically provide position, identification, and other safety of navigation information about a ship to other ships and coastal authorities. AIS operates on Very High Frequency (VHF) channels AIS 1 (161.975 MHz) and AIS 2 (162.025 MHz), as described in International Telecommunication Union (ITU) Radio Regulations (RR) Appendix 18 [1] and defined in the latest version of Recommendation ITU-R M.1371 [2].

Historically, 406 MHz EPIRBs and PLBs used 121.5 or 243 MHz homing signals to aid in locating the beacons during search and rescue operations when in close proximity to the casualty. With the introduction of AIS and its application for radio location, using an AIS transmitter to provide the terrestrial EPIRB location function became practical. This became internationally recognised as Emergency Position Indicating Radio Beacon - Automatic Identification System (EPIRB-AIS) in 2022. EPIRB-AIS were a new device combining an EPIRB with an AIS locator and were accepted by Cospas-Sarsat and the IMO (IMO Resolution MSC.471(101) [3]). After the introduction of the EPIRB-AIS with the increased availability of AIS locators, industry noticed an opportunity to combine PLB devices with a maritime AIS locator, creating the new PLB-AIS device.

With the introduction of PLB-AIS devices to the market in 2022, some CEPT administrations expressed concerns about how to regulate these previously unknown devices. After some consideration, CEPT decided to provide CEPT administrations with technical and regulatory information on the issue and in addition to also consider if any additional regulatory instruments are needed.

This Report provides guidance information and possible solutions on how to harmonise the regulatory framework for the use of PLB-AIS equipment and the CEPT administrations can consider possible solutions for harmonising the regulatory framework for PLB-AIS equipment use within CEPT:

1 PLB in general should be licensed or licence exempt but with the requirement that the PLB device is only licence exempt if it is authorised and registered on an administration approved database. This information needs, as a minimum, to be available to national SAR authorities. In addition, PLB-AIS devices need to be designated for use only in the maritime environment and additionally within some administrations on inland waterways.

2 Additional regulatory instruments for PLB-AIS are considered not needed at this time. It is deemed sufficient that this Report provides guidance and information for CEPT administrations on this issue.

3 A one-page circular letter guidance type web-page post at the Project Team FM58 homepage that also refers to this PLB-AIS report could be useful to CEPT administrations.

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
AIS	Automatic Identification System
AMRD	Autonomous Maritime Radio Devices
ASM	Application Specific Messages
CEPT	European Conference of Postal and Telecommunications Administrations
Cospas-Sarsat	International Cospas-Sarsat programme
ECC	Electronic Communications Committee
EPIRB	Emergency Position Indicating Radio Beacon
EPIRB-AIS	Emergency Position Indicating Radio Beacon having an integral AIS locator
EU	European Union
GMDSS	Global Maritime Distress and Safety System
HF	High Frequency
IALA	The International Organisation for Marine Aids to Navigation
IBRD	International Beacon Registration Database (of Cospas-Sarsat)
ICAO	International Civil Aviation Organisation
IMO	International Maritime Organisation
ITU	International Telecommunication Union
MARS	Maritime mobile Access and Retrieval System
MED	Maritime Equipment Directive
MF	Medium Frequency
MMSI	Maritime Mobile Service Identity
MSC	Maritime Safety Committee
PLB	Personal Locator Beacon
PLB-AIS	Personal Locator Beacon - Automatic Identification System
RED	Radio Equipment Directive
RR	Radio Regulations
SAR	Search and Rescue
SART	AIS Search and Rescue Transmitter (AIS-SART)
SOLAS	Safety of Life at Sea
VDES	VHF Data Exchange System
VHF	Very High Frequency
WRC	World Radiocommunication Conferences

1 INTRODUCTION

Personal Locator Beacon - Automatic Identification System (PLB-AIS) share some technologies or applications with the devices described in the following sub-sections. The purpose of this Report is to detail and summarise:

- the regulatory framework for use of PLB-AIS radio equipment within CEPT;
- how administrations have licensed or made other arrangements for the use of PLB-AIS equipment to date within their jurisdiction or how they envisage to do this in the future.

Based on this information, this Report provides conclusions and guidance on how to improve harmonisation of the regulatory framework for use of PLB-AIS equipment within CEPT.

1.1 PLB FOR SEARCH AND RESCUE (SAR)

A Personal Locator Beacon (PLB) is a 406 MHz emergency beacon designed to be carried by a person. It is a distress alerting device, operating through the satellite-based Cospas-Sarsat system. They can be used on land, carried on board aircraft and on-board vessels at sea or on inland waterways. The use of PLBs is subject to national regulations that vary from administration to administration. Therefore, users of PLBs should consult the national administrations to seek permission to use PLB. Normally this information may be located by contacting the national communications regulator or maritime administration. CEPT webpages have carried this information for over a decade [4].

1.2 EPIRB

Emergency Position Indicating Radio Beacons (EPIRBs) differ significantly from PLBs in terms of their physical design. While PLBs are personal devices which may be used in air, land and sea, with appropriate authorisation from an administration, EPIRBs are specifically designed to be used in the harsh marine environment and must meet additional robust international standards such as those prescribed by IMO and MED [5]. IMO and MED performance standards significantly improve the survivability of the EPIRB in a harsh marine environment.

Some administrations have mandatory national carriage requirements for EPIRB on board ships and fishing vessels. The IMO SOLAS Convention has a requirement for the carriage of EPIRB on board certain specified Convention ships. All vessels may voluntarily fit an EPIRB with the appropriate national authorisation such as a Ship Station Licence, national authorisation or registration.

EPIRBs are uniquely linked to a specific vessel through licensing (Ship Station Licence), appropriate authorisation or registration by CEPT administrations. This facilitates the identification of EPIRBs in the event of a distress situation at sea and means that vital Search and Rescue (SAR) information such as name, callsign, radio communication equipment and shore contact details can be available and will be relied upon during distress and safety situations at sea by SAR authorities. The availability of this beacon registration information also allows administrations to monitor (ITU World Radiocommunication Conference Resolution 205 (REV.WRC-19) [6]) and quickly have a resolution to 406 MHz interferences cases, and false alerts, that have the potential to interfere with or delay a real Cospas-Sarsat distress alert response.

In terms of their physical design, construction and survivability, EPIRBs are required to conform with, international standards such as those issued by IMO, ITU, Cospas-Sarsat and MED. This holds the EPIRB to a higher standard, than the PLB, and the EPIRB is designed to survive and operate for longer and without sustaining damage. EPIRB can be automatically activated when submerged, carried manually into a lifesaving craft or operated manually.

1.3 AIS

Automatic Identification System (AIS) transceivers are designed to be capable of providing position, identification and other information about the vessel to other ships and to coastal authorities automatically (IMO Resolution A.1106(29) [7]). AIS operates on VHF channels AIS 1 and AIS 2 as described in ITU Radio Regulations Appendix 18 [1] and defined in the latest version of Recommendation ITU-R M.1371 [2]. IMO

provides Resolutions, Performance Standards and Circulars IMO SN/Circ.227 [8] and IMO SN.1/Circ.289 [9] on AIS. IMO performance standards for AIS [10] focus on the operational element whereas ITU Recommendations focus on the radio-link technical characteristics.

1.4 EPIRB-AIS AND PLB-AIS

Historically, the 406 MHz EPIRB used terrestrial 121.5 or 243 MHz homing signals to aid the locating of the beacons during search and rescue operations when in close proximity to the casualty. With the introduction of AIS and its possible application for radio location, the option to use an AIS transmitter to provide the terrestrial EPIRB location function became practical. This became internationally recognised as EPIRB-AIS. EPIRB-AIS were a new device combining an EPIRB with an AIS locator and were accepted by Cospas-Sarsat and IMO and implemented from 2022, refer to IMO Resolution MSC.471(101) [3], EPIRB performance standard.

After the introduction of the EPIRB-AIS with the increased use of AIS locators, industry noticed an opportunity to combine PLB devices with a maritime AIS locator [11]. Some manufacturers took an initiative to include the use of terrestrial AIS for location purposes in PLB devices creating the new device the PLB-AIS [12].

The EPIRB-AIS and PLB-AIS locators operates in a similar manner to an AIS Search and Rescue Transmitter (SART) device allowing nearby vessels with an AIS receiver to locate the EPIRB-AIS or PLB-AIS at sea. PLBs also use the 406 MHz frequency band for long range location (using doppler technique) and to transmit the GNSS (Global Navigation Satellite System) position.

1.5 REGULATORY CONSIDERATIONS

A Ship Station Licence is a requirement for any vessel intending to use radio equipment, such as VHF, MF (Medium Frequency) and HF (High Frequency) radios, satellite communication systems, EPIRBs, AIS transponders, and other maritime devices operating in the maritime mobile and maritime mobile-satellite service. This allows the spectrum used by vessels on national and international voyages and coast stations to be managed by a regulator through the issue of a national ship station or coast station licence.

Given the use of traditional PLB devices in air and on sea and land, some CEPT administrations opted to not licence these devices, but to make them either; licence exempt subject to certain conditions such as registration in a national database, or to require national authorisations for these devices used within their national territory. As the frequencies used by PLB-AIS are all within ITU RR Appendix 15 [1], they are specified frequencies for distress and safety communications for the Global Maritime Distress and Safety System (GMDSS). A vessel having a Ship Station Licence (refer to Article 18 and Recommendation 7 of the ITU Radio Regulations [1]) may be already licensed to use these frequencies.

With the introduction of PLB-AIS on the market from 2022 onwards CEPT administrations had concerns as to how to regulate these heretofore unknown devices. CEPT having considered these devices developed a report to provide CEPT administrations with information, conclusions and guidance on the issue.

2 CURRENT REGULATORY FRAMEWORK RELATED TO PLB-AIS EQUIPMENT WITHIN CEPT

2.1 AIS

Automatic Identification System (AIS) is designed to be capable of providing position, identification and other information about the ship to other ships and to coastal authorities automatically. AIS operates on VHF channels AIS 1 and 2, as described in Recommendation ITU-R M.1371 [2] and ITU RR Appendix 18 [1]. Relevant CEPT harmonisation is ECC Decision (19)03 [13]. AIS technical characteristics are defined in the latest version of Recommendation ITU-R M.1371 [2].

The International Organisation for Marine Aids to Navigation (IALA) also provides guidelines on the use of AIS [14].

2.2 EPIRB-AIS IDENTIFICATION

Emergency Position Indicating Radio Beacon (EPIRB) if carried on board an IMO Convention ship is identified by the Maritime Mobile Service Identity (MMSI) or Callsign of the vessel as defined in Recommendation ITU-R M.585 [15]. The AIS locator of the EPIRB-AIS is identified by a maritime identity commencing with 974XXXXXX (this is presently not a unique identity) refer to Recommendation ITU-R M.585 [15].

2.3 PLB-AIS IDENTIFICATION

PLB-AIS locators are presently coded by manufacturers with the freeform identity 972XXXXXX, however manufacturers are moving to use the freeform identity 974XXXXXX to avoid confusion with class-M Man Over Board (MOB) devices that use 972XXXXXX but are not PLBs.

2.4 RELEVANT STANDARDS

Some administrations consider that PLB-AIS are similar to an Autonomous Maritime Radio Devices (AMRD) Group A (having a safety of navigation context) refer to ECC Decision 22(02) [17] on AMRD. Refer also to Recommendation ITU-R M.2135 [18] and Report ITU-R M.2285 [19].

The relevant standards for EPIRB are Recommendation ITU-R M.633 [20] and Recommendation ITU-R M.690-3 [21].

The relevant standard for AIS is Recommendation ITU-R M.1371 [2].

Device requirements for PLB (Personal Locator Beacon) are described in ETSI EN 302 152 [22].

Device requirements for EPIRBs are described in IEC 61097-2 [23]. ETSI EN 304 113 [22] will also apply to non-SOLAS EPIRBs once it is approved.

The International Organisation for Marine Aids to Navigation (IALA) also provides guidelines on the use of AIS [14].

The International Cospas-Sarsat programme provides technical standards on devices using its system [24].

EPIRB and PLB are covered under the Maritime Equipment Directive (MED) [5] and Radio Equipment Directives (RED) [25].

2.5 REGULATORY CONSIDERATIONS

Notwithstanding the potential safety benefits of the PLB-AIS devices, their availability on the market within CEPT has created licensing and registration concerns for some CEPT administrations. It would be beneficial

if a clear harmonised regulatory framework is adopted by CEPT administrations. It is important to note that AIS is a maritime system and should not be used outside the maritime environment. In some administrations this authorisation includes designated inland waterways. Some administrations may have allocated ITU RR Appendix 18 [1] frequencies only to maritime within their coastal area, and these frequencies may have been allocated inland to other uses. The use of PLB-AIS devices inland may cause unintended and unacceptable radio interference issues or false alerts.

It is important for users to recognise the need to confirm authorisation to operate a PLB or PLB-AIS within any CEPT country and what are the requirements, if taking the PLB or PLB-AIS licensed, authorised or registered in one CEPT country into a neighbouring administration.

2.6 NATIONAL REGULATIONS

To get an overview of national regulations within CEPT, the Project Team FM58 collected examples from contributing administrations. In total 16 administrations responded to this survey. The administrations were asked to cover the following aspects:

Q1: How does your administration currently regulate the use of PLB-AIS (locator) equipment?
- 8 administrations regulate PLB-AIS;
- 2 administrations do not allow PLB-AIS;
- 6 administrations have no specific regulation.

Q2: Have any PLB-AIS (locator) test and demonstration activities been carried out within the jurisdiction of your administration?
- No tests were reported by administrations.

Q3: Has your administration experience with regulating the use of PLB-AIS (locator) equipment?
- 5 administrations already had experience with regulating PLB-AIS;
- 11 administrations had no experience with regulating PLB-AIS.

Q4: How does your administration expect or intend to regulate the use of PLB-AIS (locator) equipment in the future?
- 3 administrations apply national regulation;
- 5 administrations are considering possible national regulation;
- 8 administrations answered N/A.

Q5: How are these PLB-AIS (locator) devices registered or identified within your administration?
- 9 administrations apply a national registration procedure;
- 8 administrations answered N/A.

Various administrations use alternative national regulatory terms for Ship Station Licence such as Ship Radio Licence or radio licence due to the various legal and linguistic approaches within each administration. The ITU RR term Ship Station Licence is understood by all administrations, refer to ITU RR Recommendation 7 [1]. In many administrations the Ship Station Licence is issued nationally with a set of terms and conditions, the licence holder is required to comply with these terms and conditions such as the secrecy of correspondence requirement, under which the licence is issued, and if not complied with the licence may cease to be valid.

One of the purposes of the Ship Station Licence is to indicate all maritime band transmitting frequencies used on board the vessel for frequency management. The Ship Station (radio) Licence may license the spectrum usage for 406 MHz band, AIS frequencies, AIS 1 and 2 and 121.5 MHz and 243 MHz on board a vessel. Noting that all these frequencies are within the ITU Radio Regulations Appendix 15 [1] and are designated Global Maritime Distress and Safety System (GMDSS) frequencies.

Some CEPT administrations require that a PLB is associated with a Ship Station Licence (as defined in the ITU RR Article 18 [1]), other administrations provide an exemption to Ship Station Licence within their national territory if the PLB-AIS is registered with a national database. Some administrations require no licensing or

national approval, and registration with the International Beacon Registration Database (IBRD) of Cospas-Sarsat is voluntary.

The registration of PLB-AIS devices with a maritime database information retrieval system, either nationally or internationally is recommended. International databases such as Cospas-Sarsat via IBRD and ITU Maritime mobile Access and Retrieval System (MARS), (ITU World Radiocommunication Conference Resolution 356 (REV.WRC-19) [27]), provides useful information for Search and Rescue (SAR) authorities. They can determine on a 24/7/365 basis vital information on the ownership, associated vessel, emergency contact and background information related to the individual PLB-AIS device for SAR authorities. Not registering PLB or PLB-AIS devices with a national or international database can result in issues in determining beacon holder identity. In a SAR or interference case this can lead to delay in emergency response.

PLB devices have been available for decades, various CEPT administrations have taken different approaches to the regulation (for frequency allocations see ITU RR Article 5 [1]), administration and registration of PLB devices. Some administrations consider that PLB-AIS devices are only to be used in the maritime environment or in inland waterways. The use of AIS (frequencies and technology) in inland areas may lead to interference as some administrations may allocate maritime mobile frequencies to other services away from the coast. The impact of harmonics of these frequencies may also need to be taken account of.

PLB users need to be aware that an authorisation to operate a PLB in one administration may not authorise its use within the jurisdiction of another CEPT country and national requirements should be confirmed before moving a PLB device from the territory of one administration to another. The communication regulatory authority of the entered administration should be contacted to determine the regulatory status of such a foreign radio device within its national territory. Only if the PLB or PLB-AIS is covered by a Ship Station Licence may this requirement be overlooked.

The international maritime radio regulatory framework is provided by the ITU Radio Regulations [1] and the IMO SOLAS Convention, this provides enhanced freedom of movement of vessels on international voyages provided that the vessel complies with the ITU Radio Regulations and IMO Conventions subject to flag and port state inspections to ensure compliance. "The ITU manual of the maritime mobile and maritime mobile satellite service", provides a condensed version of the ITU Radio Regulations which includes all articles, appendices, resolutions, recommendations and reports relating to maritime radiocommunications and the GMDSS. The IMO provides a similar manual (The GMDSS manual).

2.7 PLB OR PLB-AIS CARRIED BY PERSONS ON BOARD VESSELS

PLB or PLB-AIS are mainly used in a marine environment and being carried on board a vessel at sea. Other possible use may include crew exchange or SAR operations from aircraft. PLB and PLB-AIS carried on board a vessel having a Ship Station Licence may be encoded with an MMSI (Maritime Mobile Service Identity), Maritime User Protocol or callsign (Radio Callsign User Protocol) at the discretion of the flag state. Alternately a manufacturer serialised identity (Serial User Protocol) related to a personal holder may be referenced via a national database or an international database or the International Beacon Registration Database (IBRD) of Cospas-Sarsat [26].

Most administrations have moved to issuing MMSI's to all vessels, but some administrations still issue only a callsign for small vessels, then the beacon should be coded MID callsign or serial number (serial user protocol). The hexadecimal code and the AIS maritime identity (Recommendation ITU-R M.585 [15]) will be useful information for SAR authorities. The PLB-AIS homing and location function is a benefit to SAR authorities in responding effectively to SAR situations.

PLB carried on board SOLAS ships and non-SOLAS vessels, fishing vessels or recreational craft participating in the GMDSS, should be encoded with the vessel MMSI, Callsign or a serialised manufacturer issued identity (Recommendation ITU-R M.585 [15]).

Immediate identification of the PLB that has activated a distress alert is important for SAR authorities in coordinating and planning of a SAR incident response.

Some administrations indicated that PLB-AIS are approved for use in land, sea and air. Other administrations indicate that AIS is only applicable in the maritime environment. The PLB-AIS may be transported by air or on land but can only be used in a marine environment.

2.8 AIS - PREVENTION OF INTERFERENCE AND FALSE ALERTS

AIS frequencies as defined in the ITU Radio Regulations Appendix 18 [1] are exclusive to the maritime environment and are used exclusively for ship to ship, ship to shore and earth to space and space to earth communications. AIS (frequencies and technology) should not be used for air to air or ground to ground applications. The purpose of the AIS component of EPIRB-AIS and PLB-AIS is homing and locating.

AIS is a safety of navigation and radio location system, not a distress alerting system, no GMDSS distress alert may be initiated using an AIS transmission (Recommendation ITU-R M.1371 [2]).

The prevention of false distress alerts from PLB devices is very important, therefore the contact details of the owner, emergency contact and other relevant information should be available to SAR authorities (ITU RR Article 31 and Appendix 15[1]).

It is to be noted that many specialised aircraft (SAR and offshore unit servicing) are fitted with AIS transceivers to locate SAR targets. The EPIRB-AIS or PLB-AIS beacon is also fitted with 121.5 MHz which is integral to the aircraft. PLB devices should not be operated onboard an aircraft while an aircraft is in flight.

Some CEPT administrations consider that it is very important to have a database available to national SAR authorities with detailed information available on all national PLB-AIS devices with information capture equivalent to an EPIRB registration. This may aid in detection of interference incidents.

Some administrations may notify PLB-AIS devices to the ITU MARS database (ITU Radio Regulations Article 20 provision 20.16 [1]) in a similar manner to the notification of EPIRB devices.

If the regulation of a device such as PLB-AIS is regulated by an administration, but this regulation is not in compliance with the international regulations as provided by ITU, IMO, International Civil Aviation Organization (ICAO) and Cospas-Sarsat and any other appropriate international regulatory body, then an issue of concern may arise between administrations. Should an issue of interference or false alert arise, ITU Radio Regulations Article 34, provision 34.1 [1] applies. Noting that false alerts of 406 MHz devices are of particular concern as they may initiate a distress operation and lead to the dispatch of SAR resources, such as vessels and aircraft into hazardous conditions to carry out the rescue, when no such operation was required.

3 CONCLUSIONS

Personal Locator Beacon - Automatic Identification System (PLB-AIS) in general should be licensed or licence exempt but with the requirement that the PLB device is only licence exempt if it is authorised and registered on an administration approved database. This information needs, as a minimum, to be available to national SAR authorities. In addition, PLB-AIS devices need to be designated for use only in the maritime environment and additionally within some administrations on inland waterways.

Additional regulatory instruments for PLB-AIS are considered not needed at this time. It is deemed sufficient that this Report provides guidance and information for CEPT administrations on this issue.

A one-page circular letter guidance type web-page post at the Project Team FM58 homepage that also refers to the final PLB-AIS Report could be useful to CEPT administrations.

ANNEX 1: 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] IMO Resolution MSC.471(101): “Performance Standards for Float-Free Emergency Position-Indicating Radio Beacons (EPIRBs) operating on 406 MHz”, adopted on 14 June 2019

[4] Personal Locator Beacons (PLBs) usage in CEPT

[5] Directive 2014/90/EU of the European Parliament and of the Council of 23 July 2014 on marine equipment MED. Updated implementing regulation (EU) 2024/1975 amending the MED in force from 4 September 2024

[6] World Radiocommunication Conference Resolution 205 (REV.WRC-19): “Protection of systems operating in the mobile satellite service in the frequency band 406-406.1 MHz”

[7] IMO Resolution A.1106(29): “Guidelines for the onboard operational use of shipborne automatic identification systems (AIS)”

[8] IMO SN/Circ.227: “Guidelines for the installation of a Shipborne Automatic Identification System (AIS)”

[9] IMO SN.1/Circ.289 defines international Application-Specific Messages (ASMs) for the exchange of data within Automatic Identification System (AIS) and VHF Data Exchange System (VDES).

[10] Resolution MSC.74(69) includes Recommendation on Performance Standards for Universal Automatic Identification System (AIS)

[11] COMSAR 16/7/2: “Developments in Maritime Radiocommunication systems and technology - Promoting study on AIS-PLB”

[12] IMO/ITU EG 14/6: “Consideration of relevant work in ITU-R - Reporting of Personal Locator Beacons (PLB) with (AIS) in the AIS Messages”

[13] 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

[14] IALA Guideline G1082: “An Overview of AIS”

[15] Recommendation ITU-R M.585: “Assignment and use of identities in the maritime mobile service”

[16] ECC Decision (22)02: “Regulation to operate Autonomous Maritime Radio Devices (AMRD) in CEPT”, approved July 2022

[17] Recommendation ITU-R M.2135-1: “Technical and operational characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz”

[18] Report ITU-R. M.2285-0: “Maritime survivor locating systems and devices (man overboard systems) - an overview of systems and their mode of operation”

[19] Recommendation ITU-R M.633: “EPIRB Transmission characteristics of a satellite emergency position-indicating radio beacon (satellite EPIRB) system operating through a satellite system in the 406 MHz band”

[20] Recommendation ITU-R M.690-3: “Technical characteristics of emergency position-indicating radio beacons operating on the carrier frequencies of 121.5 MHz and 243 MHz”

[21] ETSI EN 302 152: “Electromagnetic compatibility and Radio spectrum Matters (ERM); Satellite Personal Locators Beacons (PLBs) operating in the 406,0 MHz to 406,1 MHz frequency band; Part 1: Technical characteristics and methods of measurements”

[22] ETSI EN 304 113: “Maritime satellite Emergency Position Indicating Radio Beacons (EPIRBs) for non-SOLAS vessels; Technical characteristics and methods of measurement”

[23] IEC 61097-2: "Global maritime distress and safety system (GMDSS) - Part 2: Cospas-Sarsat EPIRB - Emergency position indicating radio beacon operating on 406 MHz - Operational and performance requirements, methods of testing and required test results"

[24] International Cospas-Sarsat programme, technical specifications T,001, T.018 (Further standards and guidance are available on the Cospas-Sarsat homepage)

[25] 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

[26] MSC.1/Circ. 1210/Rev.1: “Guidance on the Cospas-Sarsat international 406 MHz Beacon Registration Data of 21 November 2014”

[27] World Radiocommunication Conference Resolution 356 (REV.WRC-19): “ITU maritime service information registration”