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Proposals on Adapting AIS Binary Information to VDE-ASM

# Summary

Driven by IALA, the Technical Characteristics Recommendation ITU-R M.2092-1 for VDES was released by ITU, and IMO is currently discussing the VDES performance standards and the amendment of Chapter Ⅳ and Chapter Ⅴof the SOLAS Convention. In the VDES component, ASM technology is relatively mature and has a certain application foundation. However, the current ASM data applications are mainly concentrated in the AIS channel, and the data standards and application guidance are mainly formulated for AIS-ASM, resulting in the failure of current AIS-ASM applications’ direct migration into VDES.

Based on the purpose of promoting the application of ASM within VDES, this proposal analyzes the elements of ASM adaptation messages, proposes the overall principles of adaptation, and clarifies the next steps of work.

## Purpose of the document

It is recommended that IALA consider the principles and mechanisms for ASM application adaptation proposed in this document.

## Related documents

1. ITU-R M.2092-1, *Technical characteristics for a VHF data exchange system in the VHF maritime mobile band, February 2022*
2. ITU-R M.1371-5, *Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band*, *February 2014*
3. IMO SN.1/Circ.289, *GUIDANCE ON THE USE OF AIS APPLICATION-SPECIFIC MESSAGES, June 2010*
4. IALA G1117, *VHF Data Exchange System(VDES) Overview, December 2022*

# Background

IMO is formulating an amendment to SOLAS Convention to introduce VDES, and is writing a VDES performance standard to discuss the application of VDES, which involves the data application format of ASM.

The ITU has currently released ITU-R M. 2092-1, which clearly defines the seven message structures of ASM. In the future, some AIS applications will gradually adapt and migrate to ASM.

The G1117 VDES Overview released by IALA at the end of 2022 also defines some VDES data application formats.

The ASM application data format is as defined in IMO SN.1/Circ.289, IALA official website and some competent authorities. The data format definition is adapted according to AIS message characteristics. If used directly in VDE-ASM, it will not be adapted to ASM’s new features (Scheduled) and will lower transmission efficiency.

# Discussion

## ASM message adaptation elements

To promote ASM applications, the ASM message format needs to be further clarified. Since the broadcasting methods and formats of ASM and AIS messages are quite different, the following factors need to be considered:

1. ASM message type

AIS-ASM only has four types of messages: No. 6 addressing binary message, No. 8 broadcast binary message, No. 25 single slot binary message and No. 26 multi-slot binary message with communication status bits. VDE-ASM has added regional geographic multicast, scheduled addressing and broadcast information, and recurring addressing and broadcast information. At the same time, VDE-ASM also supports ship-to-satellite information broadcast. Due to the large differences in message types, the above factors need to be considered when apply VDE-ASM messages.

1. ASM message length

Since AIS-ASM and VDE-ASM adopt different encoding methods and data access methods, according to ITU-R M.1371-5, the maximum data lengths of AIS No. 6 and No. 8 are 920 bits and 952 bits respectively (FATDMA mode). According to ITU-R M.2092, the minimum and maximum data lengths supported by VDE-ASM are 880 bits and 17936 bits respectively. In order to ensure the transmission efficiency of VDE-ASM, the data application format of VDE-ASM needs to be adapted according to the message length.

1. Link ID (number of time slots, FEC, SAT)

According to ITU-R M.2092-1, VDE-ASM includes 7 types of Link IDs. The time slot numbers and FEC rates under each Link ID are different, resulting in differences in the maximum length of the message carried and the transmission success rate. When applying VDE-ASM data, it should be based on the length and importance of the transmitted content, and VDL link status to select the appropriate Link IDs.

* 1. **General principles of adaptation**

1. Select the appropriate message type

According to the application type, select the appropriate carried message type. For example, onboard meteorological information collection messages are suitable for selecting the addressing type of message. For navigation warning information, it is suitable to select broadcast or geographical multicast type messages. When messages can be carried by three or fewer time slots, avoid broadcasting scheduled message to ensure the transmission success rate and reduce the VDL overhead.

1. Use flexible message length

Considering that VDE-ASM has many different message types and the existence of FEC, there are many combinations of message lengths. At the same time, the application field compatible with AIS-ASM needs to be considered. Therefore, when drafting the ASM binary information standard, a flexible message mechanism should be introduced as much as possible so that it can achieve better load utilization under various circumstances.

1. Reasonable selection of Link ID

The Link ID type should be reasonably selected based on the broadcast content and physical channels. The broadcast method (broadcasting, addressing, geographical multicast), data length and importance should also be considered, and the appropriate Link ID should be selected to achieve a balance between resource occupation and transmission success rate. For example, for the broadcast of important information such as navigation warnings, messages with FEC should be used as much as possible. For some applications, although of low importance, when using FEC does not bring additional time slot overhead, messages with FEC can also be used for broadcast.

* 1. **Recommendations for ASM data application standards**

1. Recommend to revise the IMO SN.1/Circ.289

IMO SN.1/Circ.289 defines the international functional message of AIS binary information. The current version was released in June 2010. Considering the large difference between the VDE-ASM message type and length and that of AIS-ASM, the application data format defined by the circular is not suitable for being carried on VDES applications. It is recommended that IALA initiate the amendment to the draft of SN.1/Circ.289 and submit it to IMO through a liaison letter.

1. Add references to the basic ASM data format in the revision of ITU-R M. 2092-1

The basic AIS-ASM application data formats, including 6-bit ASCII based short messages, capability queries, capability replies and ACK are defined in Annex 5 of ITU-R M.1371-5. These basic AIS-ASM application data formats can be used in VDE-ASM, and references to these formats should be added in ITU-R M.2092-1, along with adaptation to Text string field lengths.

c. Recommend countries to adapt their regional binary information standards

According to the ITU-R M.1371-5, DAC 10-999 can be used for regional broadcasting. Some countries have developed regional AIS-ASM binary information standards. In order to adapt these information formats to VDE-ASM, the regional standards also need to be revised.

d. Recommend to update the IALA ASM website information

In order to promote the use of ASM information by various stakeholders, the IALA website: https://www.iala-aism.org/asm/ provides a list of regional binary information to facilitate countries to upload their regional ASM binary information standards.

Considering that the current website still lacks some elements of VDE-ASM, such as: VDE-ASM message number, whether to use FEC, etc., it is recommended that IALA improve the web page to support the display of VDE-ASM data formats.

# References

1. ITU-R M.2092-1, *Technical characteristics for a VHF data exchange system in the VHF maritime mobile band, February 2022*
2. ITU-R M.1371-5, *Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band*, *February 2014*
3. IMO SN.1/Circ.289, *GUIDANCE ON THE USE OF AIS APPLICATION-SPECIFIC MESSAGES, June 2010*
4. IALA G1117, *VHF Data Exchange System(VDES) Overview, December 2022*

# Action requested of the Committee

The Committee is requested to consider this document's proposals and take appropriate actions.

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