

## Meeting: 18<sup>th</sup> Mediterranean AIS Expert Working Group

**Place and date: Videoconference, 10 December 2021**

**Agenda Item: Integration of AIS information collected by the ICG patrol vessels**

**Document number: MAREΣ 18/10/1**

**Submitted by Italy**

Summary	The document provides the outcome of the tests, conducted by ICG, on integration of the AIS information collected by the patrol vessels and delivered to the national AIS network through long-range connections.
Action to be taken	As per paragraph 5.
Related documents	N/A

## Introduction

To perform a more effective management of own operational tasks, the ICG has fitted its main patrol vessels with long-range communication systems such as HF transceivers, LTE mobile communication standard and VSAT aimed at improving of the communication and data exchange of the ship-to-shore and shore-to-ship connections.

Moreover, a customised AIS Data Link system (AIS D-Link) allows to extend the traceability range of the patrol vessel, by interfacing the on-board AIS transponder with the above-mentioned long-range communication systems and performing the automatic transmission, to the national AIS network, of the data collected by the transponder. Furthermore, the AIS D-Link allows the vessel to receive, using the same connections, any AIS information, as filtered by the national AIS network, and permitting a significant increase of the own maritime picture.

## AIS D-Link architecture

The on-board D-Link AIS system consists of a W-AIS transponder interfaced, through an embedded controller (acting as PSS Control Unit), to an AIS Gateway (AGW) module for the managing of the data flow using VDL or satellite channels/LTE mobile communication standard as well as using the HF transceiver (potential, not yet implemented) according to the following architectures:

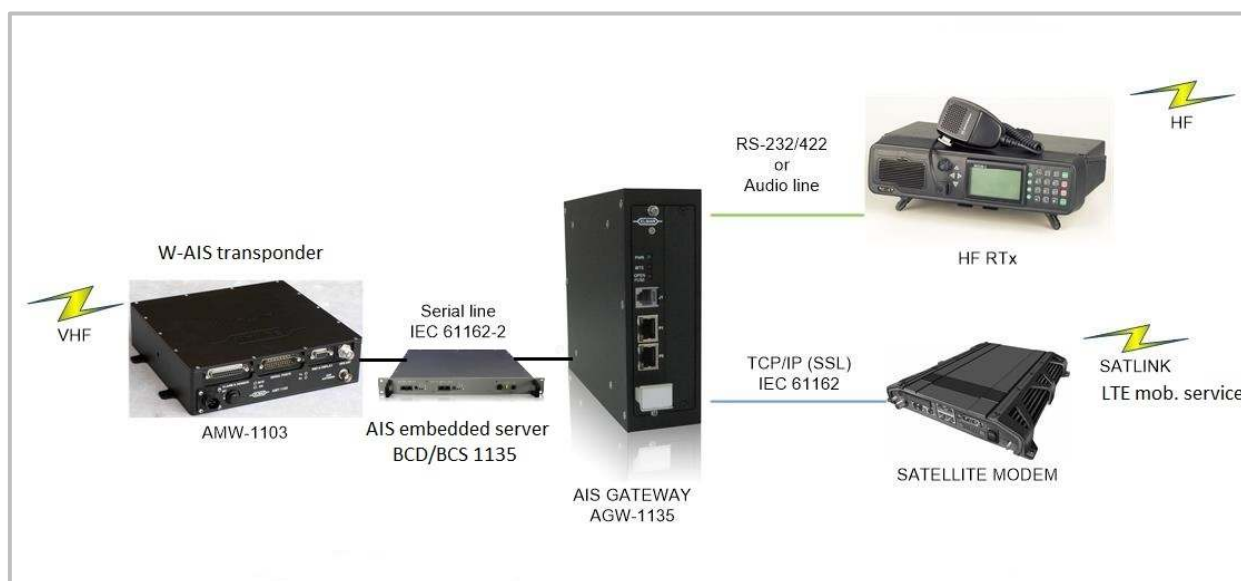


Figure 1 – On-board AIS D-Link architecture

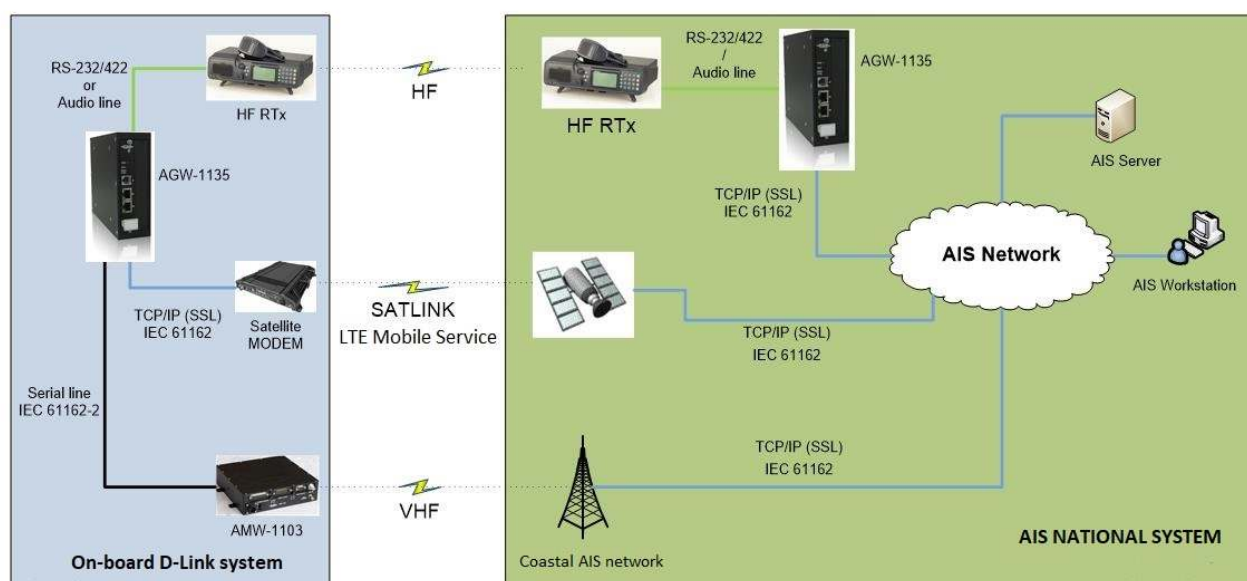


Figure 2 – Complete D-Link architecture

## AIS D-Link functionalities

The AIS Gateway is the specific device that allows to extend the traceability range of the vessel, by interfacing the on-board AIS transponder with the long-range communication systems available on board.

The AIS Gateway is able to determine if the vessel on which it is installed is outside of the AIS national network coverage: in this case the AIS Gateway is able to transmit AIS data flow, normally sustained by VDL, via LTE

mobile communication standard or via satellite channels by means of a VSAT system operating in the Ku band, alternatively and depending on the best link availability at any time. The AIS Gateway is able to deliver the information through the on-board HF transceiver also but, this option, has not yet been implemented in the AIS national system side.

Figure 3 shows the architecture of the on-board satellite and LTE communication systems.

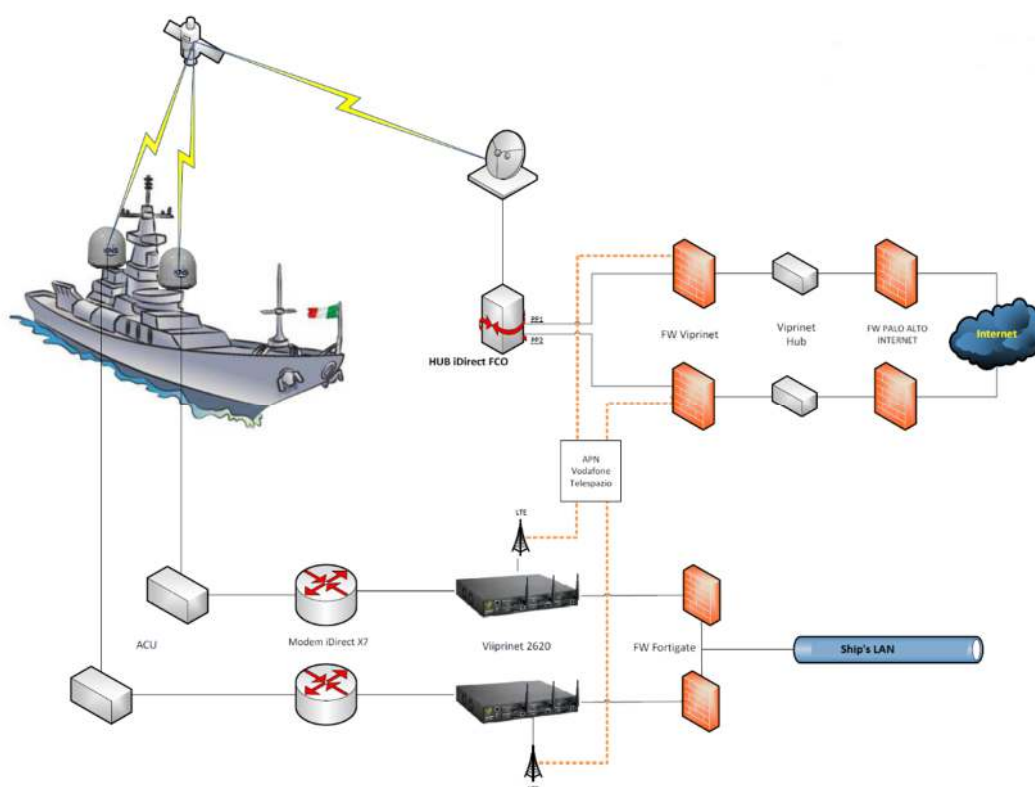


Figure 3 – VSAT/LTE architecture

The on-board AIS Gateway has been configured in repeater mode to transmit, in addition to the AIS data of its own vessel, also those data received from other vessels on the same channels. On board the OPV, fitted with Warship AIS (W-AIS), the AIS Gateway is able to use this as a repeater for data received from other vessels, optionally in secure mode through encryption using a dedicated frequency.

In this way, all information collected by such patrol vessels in the areas under its AIS coverage could be retransmitted to the national system providing the augmentation of the maritime picture also in the operation areas not covered by the AIS shore-based Stations. In the same way, the use of the AIS D-link could allow the patrol vessels to improve their operational capacity by the receiving, from the national system, of the AIS data flow related to those maritime areas outside of its AIS coverage.

## 1.1 Retransmission of AIS information using VDL

When the patrol vessels are operating under the Italian AIS Network coverage, the on-board AIS D-Links continuously receive (through the on-board W-AIS) the AIS message 4 (Base Station Report) transmitted by Italian shore-based Stations and continuously performing a polling of them. If the retransmission is possible, the AIS D-Link delivers, after the injunction of the comment blocks, all the AIS data collected through the on-

board W-AIS transponder to the national network which will carry-out the encapsulation of them in VDM sentences complying with the IEC 61162-2 and their integration in the national system.

## 1.2 Retransmission of AIS information using LTE/VSAT

When the patrol vessels are operating outside of the Italian AIS Network coverage, the retransmission of the AIS information (both their own and those collected by the on-board W-AIS transponder) is managed by the embedded controller which establishes, through the Viprinet router, a secure TCP/IP (SSL) with the national system main server using the best connection between LTE mobile communication standard and satellite channel by means of a VSAT system operating in the Ku band. The format of data delivered through such connection consists of encapsulated VDM/VDO sentences complying with the IEC 61162-2 and fitted with the comment blocks.

## Amount of AIS data provided to MAREΣ by the ICG OPVs

Since March 2021, ICG has being provided MAREΣ with AIS data collected and retransmitted by its 5 OPVs fitted with the AIS D-Link system. The AIS information are being delivered using the on-board VSAT communication system or the LTE mobile communication standard when the vessels are operating outside of the Italian AIS Network coverage. The trend and the amount of the AIS data flow, received by MAREΣ from the ICG OPVs via the national system, are reported, respectively, in the Figure 4 and Table 1.

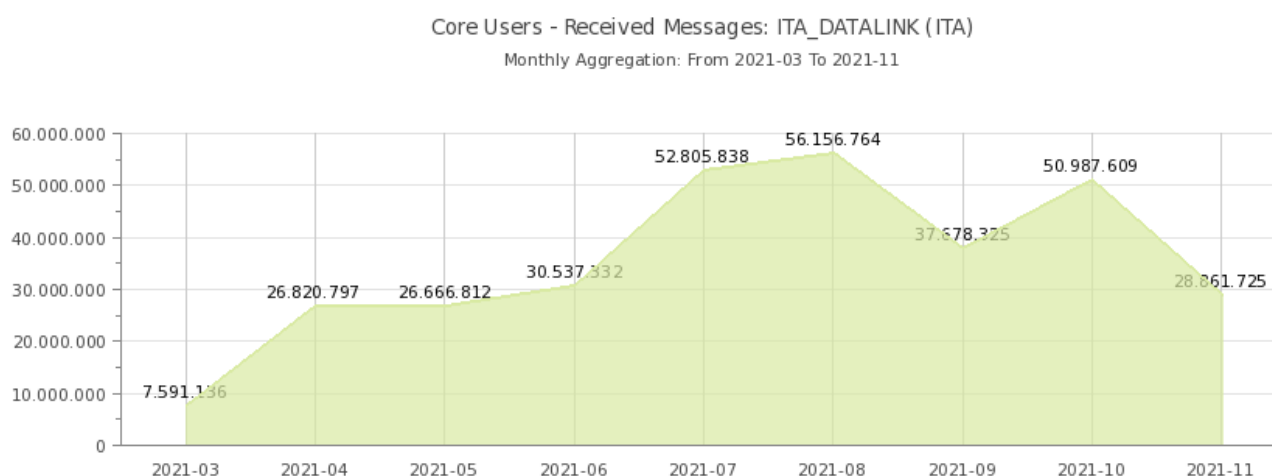


Figure 4 – Trend of AIS messages received by MAREΣ from the ICG OPVs

ICG Patrol Vessels	AIS messages received by MAREΣ from ICG OPVs during 01 March – 22 November 2021								
	March	April	May	June	July	August	September	October	November
ICG OPVs	7.591.136	26.820.797	26.666.812	30.537.332	52.805.838	56.156.764	37.678.325	50.987.609	28.861.725

Table 1 – Amount of AIS messages received by MAREΣ from the ICG OPVs

### 1.3 AIS data provided by the ICG patrol vessel “Bruno Gregoretti” (Case study)

Figure 5 represents the huge data flow provided to MAREΣ (with a full data rate) by the ICG OPV named “Bruno Gregoretti” during the operation “Levant Sea” conducted to support EFCA services, in the last month of November in the sea south of Crete Island.

The trend and the amount of the AIS data flow, received by MAREΣ from such ICG OPV via the national system, are reported, respectively, in the Figure 5 and Table 2.



Figure 5 – Trend of AIS messages received by MAREΣ from the ICG OPV “B. Gregoretti”

ICG Patrol Vessel	AIS messages received by MAREΣ from the ICG OPV during the Operation “Levant Sea” (November 2021)						
	04 Nov. 21	05 Nov. 21	06 Nov. 21	07 Nov. 21	08 Nov. 21	09 Nov. 21	10 Nov. 21
ICG OPV “B. Gregoretti”	50.937	513.264	567.555	46.821	57.654	92.022	15.697
	11 Nov. 21	12 Nov. 21	13 Nov. 21	14 Nov. 21	15 Nov. 21	16 Nov. 21	17 Nov. 21
	20.102	33.278	38.311	36.408	28.921	21.430	31.416
	18 Nov. 21	19 Nov. 21	20 Nov. 21	21 Nov. 21	22 Nov. 21		
	64.127	63.318	88.961	77.637	76.848		

Table 2 – Amount of AIS messages received by MAREΣ from the ICG OPV “B. Gregoretti”

### Action required

Participating Countries are invited to **note** the submitted information.