European Maritime Safety Agency

Med AIS Workshop no 4
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STIRES 4/MED/4
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STIRES study Outcome

Submitted by EMSA

Executive summary	As an update for the information of the participants, the paper provides in: Annex I, a copy of the Executive Summary of the STIRES Final Report; and Annex II, the Draft Outcome of the 2nd Experts' Review (SSN 7).
Action to be taken	As per paragraph 2
Related documents	STIRES final draft report (for 2nd Review) available at: http://www.emsa.eu.int/Docs/privssn/stiresreport.pdf

1. INTRODUCTION & GENERAL

This paper provides an update for the information of the participants, in:

Annex I, a copy of the Executive Summary of the STIRES Final Report; and

Annex II, the Draft Outcome of the 2nd Experts' Review (SSN 7).

An earlier version of the STIRES Report Executive Summary was previously circulated for the MED AIS Workshop No.3.

At this time, the extract of the draft outcome from the 2nd Experts' Review is available only in draft form.

2. ACTION REQUESTED

The participants are requested to note the contents of the attached annexes during development of the Mediterranean AIS Regional Server.

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Annex I

EXECUTIVE SUMMARY

1. Introduction

EMSA contracted a study to develop a methodology and guidelines for enhancement of the SafeSeaNet (SSN) system. This would focus upon exchange of vessel traffic AIS data based on the current and planned situation in the Member States (MS). The objective of the study was to enhance the efficiency of vessel traffic and help prevent accidents and incidents at sea. This would be achieved by facilitating the exchange of AIS tracking data and better utilisation of the monitoring potentials provided by combining this data with data from SSN and other systems.

According to the contractual terms, specific extracts of the study relating to the proposed concept and architecture were presented to MS' experts, in order to receive their feedback during workshops organised by EMSA. This feedback was used to adjust the proposals contained in the final report.

2. Legal basis - the Directive's 2002/59 requirements

The study is legally based on Article 9 of the Directive 2002/59 which requires MS to implement their shore-based installations for receiving and utilising the AIS information by the end of 2007 and to ensure the relay and exchange of information between the national systems of MS one year thereafter.

Paragraph 2 of the Article sets down requirements, but does not indicate any technical solution. A further objective of the study is to indicate potential alternative technical solutions for complying with the Directive's requirements.

A basic principle is that any of the potential alternative solutions posed will not be independent of the existing SSN; which is and will remain the only system for exchanging maritime data between Administrations. To this end, the proposed technical solutions are considered to be within the framework of a SSN module given the acronym STIRES (**SSN Traffic Information Relay & Exchange System)**. This acronym shows that the module is part of SSN, aimed at facilitating the relay and exchange of traffic (image-based) information between the MS maritime Administrations.

3. Regional servers

The exchange and relay of information between the traffic monitoring infrastructures is already an operational reality in the Baltic Sea region where MS and Russia have implemented the HELCOM AIS system. A similar system is under development for the North Sea (funded by the Interreg III programme) and discussions are in progress between the Mediterranean MS for developing a similar system within that region.

As a broad principle, a higher demand for information exchange (data rate and message content) can be expected between neighbouring MS and between MS belonging to the same region as compared to MS whose coastal shipping lanes are more distantly connected. Some MS already have bilateral agreement for exchanging information.

The study considered the regional initiatives and examined possible ways on how these regional developments and initiatives can be further expanded and integrated under STIRES.

The regional servers should be integrated into STIRES without changing the message content, data formats and update intervals that are already defined at regional level.

4. Central EU server

To enable the "exchange and relay" of information as required by Article 9 of the Directive 2002/59, one technical solution is to create an EU server that would collect "shore-based installations' information" at a low rate of data receipt (every one or two hours). One benefit from this is that this data can be correlated with other data already stored at EU level. The information will be exchanged in real time[1] mode and distributed to the authorised maritime Administrations of the MS in accordance with a predefined table of "access rights".

The information that would be relayed to and stored at the EU server should be reduced to the necessary minimum (ship name, IMO number, position and time stamp). Considering that the information in the EU server is based on the existing short range traffic monitoring infrastructures of the MS (AIS), the term SRIT (Short Range Identification and Tracking) is the proposed acronym, striking an analogy with LRIT (Long Range Identification and Tracking), the detailed implementation of which is currently being discussed.

5. Structure of the EU regional servers (regional systems and/or national systems connected to the EU server)

The architecture and applications that an EU server would support should reflect the demand for information (rate and content) anticipated for that level. The study suggests that each MS, depending on its geographic characteristics, should be given flexibility to participate in more than one regional server or by being given the option of connected only through the EU server.

The AIS data formats at regional and EU level should follow the existing IEC formats (IEC 61993-2 and 61162-1 sentences) and there would be no need to convert them into another format for exchange purposes within STIRES module. The messages to be transferred from the MS to the regional server will be static, dynamic and voyage related data, covering messages 1, 2, 3 and 5 (as defined in the ITU-R Recommendation M.1371-1). Additional messages may also exchange based on regional agreements.

AIS information shall be transferred from the MS national systems to the regional server with an update rate of six minutes. The update rate of the information flows from the regional to the EU server should be one hour. The AIS information relayed and stored at the EU server should be minimised to ship name, IMO number, position and time stamp. MS who would be connected only to the EU server will comply with the update rate on one hour and relay the minimum set of data.

[1] "Real time" exchange should be understood in the context of data delivered end-to-end, non-stop, one vessel report after another. The data originated by the on board AIS, is picked up by the MS shore based AIS network and is relayed to the regional or EU network, at a sampled rate, continuously, without any delay.

The following diagram shows the general layout of proposed architecture of the STIRES module:

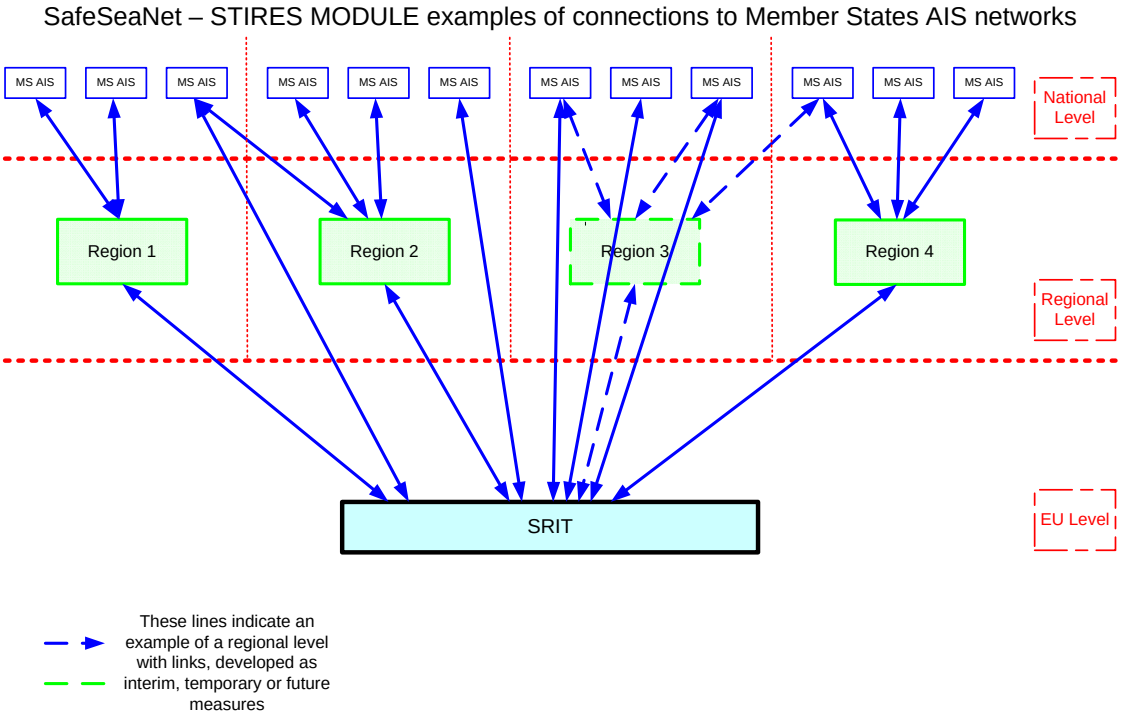

Figure 1: Examples of connections between national AIS networks, regional systems and the SRIT module

The study could not define the geographical regions that may be developed in EU waters; however current indications are for the development of four regional servers (Baltic Sea, North EU Atlantic (North Sea), South EU Atlantic and Mediterranean) and possibly a Black Sea regional server sometime in the future. Within these areas, additional servers may be developed while some of them have already been implemented.

6. Identification of applications

Paragraph 2 of Article 9 of Directive 2002/59 sets down requirements without defining potential uses and applications. By definition, such applications are the exclusive responsibility of the MS. However, the study has identified enhanced and improved user benefits arising out of the extended AIS coverage, especially in the coverage boundaries between neighbouring national AIS networks and applications arising out of data correlation in the STIRES module.

a) Early warning

By implementing a look-ahead function where vessel approaching a coastal zone or a VTS area can be identified at an early state. This would enable better anticipation and prediction of vessel movements to encourage better management of coastal/port-based safety, counter pollution and security resources. Ports could validate that vessels are arriving according to schedule and more importantly, if they are delayed. Through relay

and exchange the range of situation awareness can be extended (e.g. the national authority dealing with SAR could have extended range of their own monitoring system or share a traffic image with other authorities).

b) Target tracking

Target tracking and target handover between adjacent VTS centres, e.g. track ships with hazardous cargo (HAZMAT) and Single Hull Tankers (SHT).

c) Redundancy potential

In the sea areas where there is AIS coverage overlapping, between neighbouring MS there will a redundancy potential in the monitoring equipment. Therefore the traffic image will still be available in case of the equipment failure of a MS.

d) Semi-automatic ship reporting

It should be sufficient for the ship agents or masters to send a ship report once, to one of the MS. The report should then within an integrated network, automatically, be distributed to other MS that are affected by the report, within limits prescribed by access rights.

e) Statistical analysis and risk assessment

A large set of standardised and time synchronous real-time data at regional- and EU-level will be available, leading to the potential improved statistical data analysis and risk assessment for the traffic planning in accordance with Article 23(c) of the Directive. Authorities can establish a picture of the vessel traffic, the routes they are using, and the density of the traffic and much more they can initiate preventive measures to increase safety.

f) Accident and incident investigation

Having access to enhanced high resolution logged vessel traffic data makes it possible to replay a specific traffic situation, which improves investigations of traffic situations as collision, grounding, pollution (including detection of unreported incidents) and near-miss incidents.

g) Benefits from combining data at central level

AIS data can be correlated with data indexed in SSN, which includes more information regarding e.g. destination and cargo, in order to obtain a more complete vessel traffic image. This implies that an extension (following an appropriate review) of the SSN EIS is required, to actually host more data of direct interest. A further product of data correlation would see the generation and promulgation of warnings in a proactive mode as required by the Article 16 of the Directive 2002/59. Authorities can obtain warnings in case suspicious vessels are entering particular zones or areas.

7. Integration of the SRIT into SSN

One of the basic messages of SSN is the ship notification, consisting of AIS messages. The information they contain is provided to authorised users on request by addressing the SSN core. Ship notification messages presently comprise the majority of SSN information flows (nearly 90% of the total number of SSN messages). If the SRIT is implemented, the SSN ship notifications would be collected through the SRIT module

instead of (as they are today), through SSN channels.

The change would relieve MS of the obligation to provide the majority of ship notification (AIS) messages to the SSN core through the XML interface, since this data would be transferred at EU level through a single interface between the SSN core and the SRIT. This change would also improve control over the rate of the ship notifications received, because duplicates (or near duplicates) could be filtered out at regional and EU levels before being entered into the SSN core.

The following figure shows the general architecture and links between the existing SSN and the proposed SRIT modules:

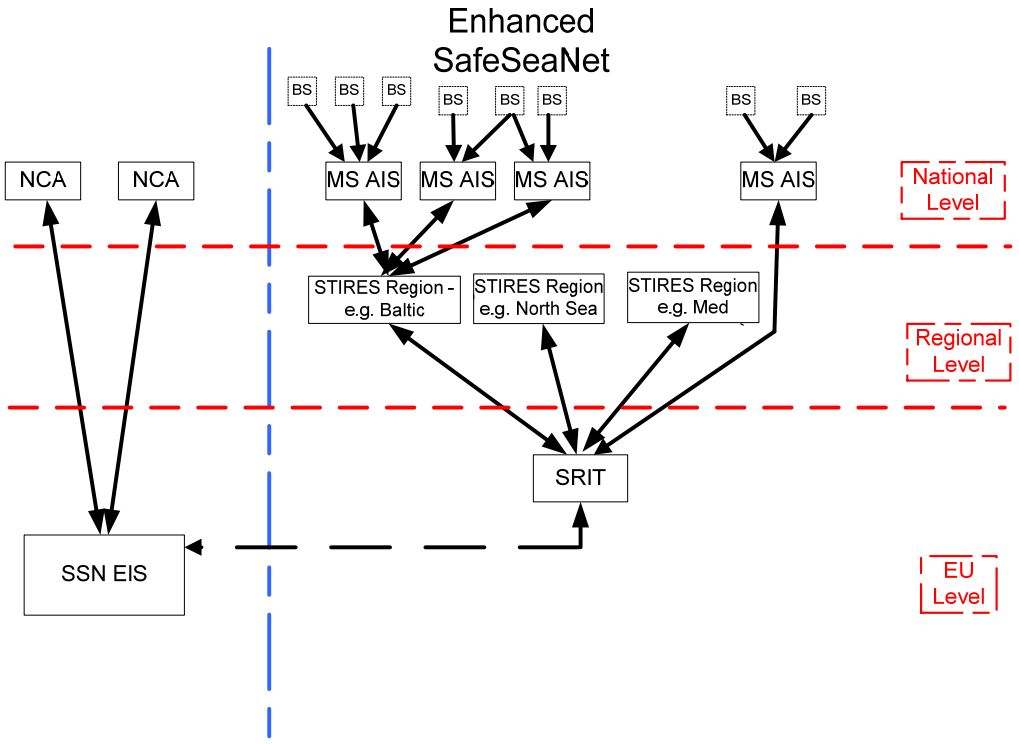

Figure 2: General architecture of the existing and enhanced SSN

This architecture allows the rely and exchange of the AIS data image between the MS belonging to the same region at a rate of 6 minutes and one hour between the MS of different regions. Moreover it allows MS to request AIS data for a specific vessel through the SSN EIS. AIS data may also be linked with specific SSN information (e.g. alters linked with a specific vessel, HAZMAT information etc) and would be made available to the MS (through STIRES) by being displayed in a highlighted or distinguished colour code.

8. A further possibility (S&LRIT)

Discussion are ongoing in the EU and between MS regarding at the prospect of implementing a European LRIT data centre, charged with collecting, sharing and on request, distributing information received from ships to MS flying their flag, bound for their ports or navigating within a distance not exceeding 1000 nautical miles from their coasts. The information that would be collected by the LRIT data centre and SRIT is

complementary and could potentially be combined at EU level to form a composite image (S&LRIT). Moreover the composite S&LRIT message could be interfaced with the SSN core and distributed to authorised users according to a predefined table of access rights. Furthermore the S&LRIT will create a platform for additional services to be provided for superimposing satellite pictures with the vessel traffic image and a GIS background.

The following figure shows the general architecture and links between the existing SSN and the proposed SRIT and LRIT modules, (the lines of distribution to MS are shown separately):

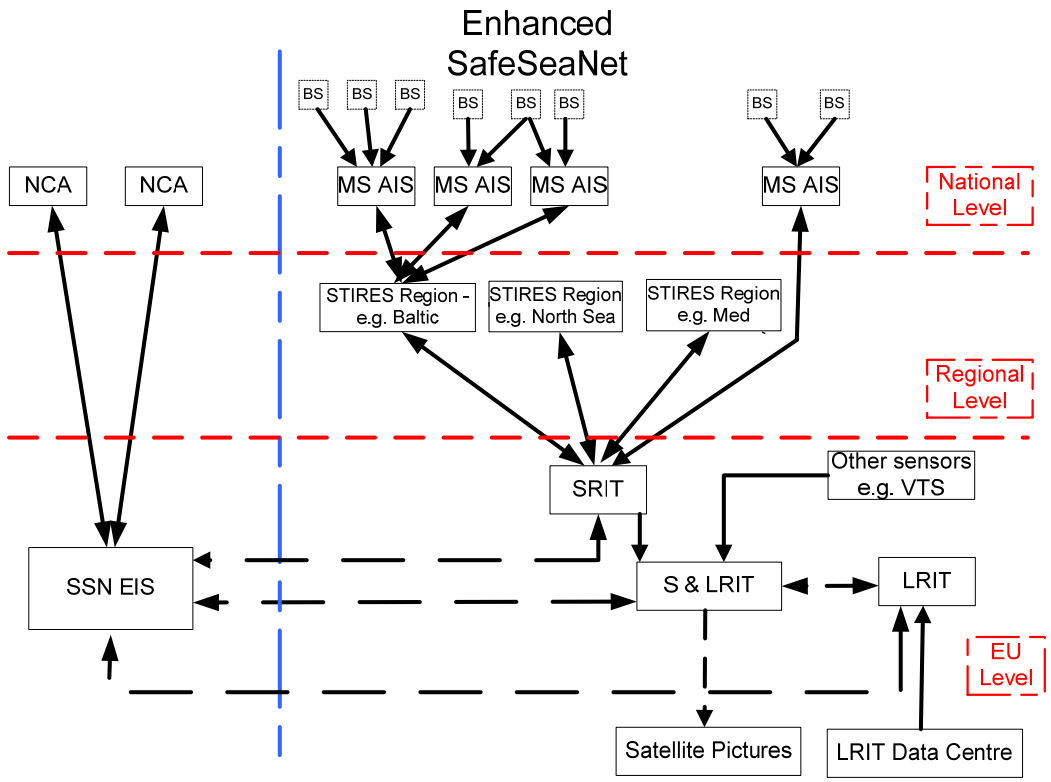

Figure 3: General architecture of the existing and enhanced SSN with additional function at central EU level

9. Additional users

The enhanced SSN system may also be exploited as the core for future surveillance, covering the coastal zones (using the AIS and VTS networks of the MS) developed in the framework of Directive 2002/59: and for the high seas (using the EMSA satellite imaging service that will shortly be offered to the MS and LRIT that may also be implemented). Existing and additional radars sensors may be required at various EU strategic locations (traffic gateways or pinch points) acting to reinforce surveillance capabilities through target verification. These could also be considered as extensions to the sensors of the SSN network.

Other EU services having a degree of responsibility for traffic monitoring, e.g. EDA or FRONTEX should access to the traffic data under a predefined matrix of access rights that has yet to be agreed.

10. Way ahead

The study defines a series of possibilities to be implemented such as the connection of various modules (such SRIT, LRIT, satellite pictures) the development of applications (such as early warning, target tracking, semi-automatic ship reporting, statistical analysis, risk assessment) and possible additional users (such as EDA and FRONTEX).

The first step to be taken along a roadmap this study suggests is to implement the SRIT node by connecting it to the existing regional servers of the Helcom and North Sea and to the SSN EIS. This step will allow the sharing and exchange of the AIS information between the MS and will be the phase for the gaining of experience. Other applications will come as following steps in a roadmap towards implementing all of the recommendations of this study.

The creation of the composite S&LRIT traffic image and the correlation of the satellite picture with the SRIT should be follow-up steps based on the platform implemented in the first step. It is imperative to be aware of all possible applications, in order to understand the added values that implementation of the first step could facilitate.

Annex II

Draft Outcome of the 2nd Experts' Review (SSN 7)

III SSN 7/8/3 – STIRES: Executive Summary

Following a presentation summarising the outcomes of the study and bearing in mind the previous paper, there were no clear objections to draft plans for a future EMSA SRIT pilot project. On the whole, the presentations were well received with a number of positive comments and suggestions made by the MS. The main issues raised were:

- Differences of opinion were expressed over whether the EU system structure should be based upon use of the regional EU networks or upon the creation of an EU server without regions. EMSA proposed allowing the flexibility to include connection with regions and individual MS in any future project to develop the SRIT node.

- The importance of correlating the AIS data with data received by other sensors (such as radar) and its integration within VTS/MRS systems.

- Some MS challenged the proposed update rate at the EU server of one hour. EMSA agreed that further flexibility was required; subject to further review in view of the possibility of AIS data being agreed as complementary/interchangeable with LRIT satellite data.

- Recognition of AIS data equivalency with LRIT if agreed would have important impacts upon AIS network development.

It was not possible to reach a total consensus on the above; but it was affirmed necessary that in any future SRIT pilot project for the data distributed to reflect those messages already used by MS in their existing regional networks thereby using their valuable experience and in order for them to incorporate, use and display the data relayed to them in the most effective way possible. The rates for data storage/replay at the SRIT or EU node could be different from that distributed or streamed in real-time to the MS and there would need to be flexible. This would depend upon the practical storage capacity and replay efficiencies. AIS/LRIT complementarities though a separate issue and once evaluated, would inevitably impact upon the system requirements. From this perspective a data rate of up to 15 minutes was indicated for the purposes of providing an LRIT-like polling functionality.

Once the results and experience of the pilot project could be assessed, it would be necessary to reconsider the above issues including related costs and benefits in the context of strategies for the future development of the EU-wide network. For example, economically and for several other reasons it would be better to have one central point for the collection of AIS data, but with a division (logically) into separate regions.

Given a future decision by EMSA to proceed with an SRIT Pilot Project, the opportunity would be provided to the MS to comment on the specifications during SSN 8, before the project's commencement.