**SSN/VMS synergies pilot project**

**Kick off meeting Rome 11 October 2011**

**Agenda item 3**

**Lisbon, 21 September 2011**

**Status of the Central system**

|  |  |
| --- | --- |
| *Executive summary* | This document presents the technical specification concerning the software implemented at the SSN Central system for the purposes of the pilot project. |
| *Action to be taken* | As per paragraph 4. |
| *Related documents* | 1. Minutes of Directors meeting (FR, IT, SP) on maritime surveillance pilot projects (Lisbon, 10 March 2010) 2. Minutes of SSN High Level Steering Group 5 on “SSN/VMS pilot project” |

**1. INTRODUCTION**

This document summarizes the operational concept of the SSN/VMS synergies pilot project and introduces the technical specifications. Annex 1 presents the core operational and technical requirements as defined by EMSA in consultation with the Community Fisheries Control Agency (CFCA)[[1]](#footnote-1) and the Fisheries Monitoring Centres (FMCs) that participated in the first phase of the pilot project (Italy, France and Spain).

Annex 2 provides additional information on the messages to be exchanged according to the Commission Regulation N. 2244/2003/EC.

**2. GENERAL OPERATIONAL CONCEPT**

The operational concept is as follows:

* Vessel Monitoring System (VMS) data from participating FMCs is provided to SSN using an interface which is only accessible to the pilot project participants. Correlation of Automatic Identification System (AIS) with VMS is carried out and displayed on a graphic, web-based interface made available to FMCs and SSN National Competent Authorities (NCAs) via the SSN web-based Graphical Interface (SSN GI). This interface is provided as an alternative to the national systems for the purposes of the pilot project.
* AIS messages collected by SSN are distributed to participating FMCs after conversion to North Atlantic Format (NAF) to minimise the impact on existing FMC systems.

**3. DATA PROVISION / DISTRIBUTION FROM VMS TO SSN AND VICEVERSA**

The VMS data of the participating FMCs are provided to EMSA SSN using the NAF format. The interface with EMSA is similar to the one already used among the FMCs when they communicate between themselves. The VMS data is considered as an additional source of ship positioning information. Specific software has been developed to present the VMS data as a separate layer of information using the existing GIS tools and chart display.

The fishing vessel AIS positions are presented on the same layer with the objective of developing an integrated traffic image (consisting of VMS and AIS data). VMS information is provided from the FMCs to EMSA only for the specific fishing vessels participating in the pilot project.

FMCs receive from SSN the AIS information concerning the fishing vessels carrying their respective flag and operating in their area of responsibility. The AIS data is in a NAF format, similar to the VMS messages; there is therefore no impact on the FMC applications at Member State level. The same information is also made available to the FMCs through the EMSA web interface.

The combined VMS/SSN AIS traffic image created in the central SSN level could be made available to CFCA in future (see footnote n. 1).

**4. ACTIONS REQUIRED**

Participating Countries are invited to take note of the above mentioned information.

**ANNEX 1**

**VMS/ SSN SYNERGIES PILOT PROJECT TECHNICAL SPECIFICATIONS**

**1. Interoperability operational requirements**

The following operational requirements are applied for the pilot project.

1. The FMC systems and SSN are interoperable. This allows position information both derived from VMS or AIS to be shared between EMSA and participating FMCs.
2. In order to create an environment for sharing information, users of VMS system will be able to access AIS data (for the selected fishing vessels) collected and processed by SSN. EMSA access to VMS data collected and processed by the participating FMCs for the same fishing vessels (once the systems are interconnected).
3. The composite traffic image, combining VMS and AIS fishing vessel tracking information is made available in a single web-based graphical interface.

* This interface was implemented at SSN level, to minimize impacts to the existing Member States systems.
* It is accessible to all the designated users (participating FMCs, SSN NCAs and EMSA) via the internet.
* The sharing of information is based on existing access rights for VMS and SSN data exchange:

- AIS data for all ships are accessible to all EU SSN users;

- VMS and related AIS data are received by FMCs for those vessels flying their flag and of vessels in their coastal fishing zones.

1. The FMC have the possibility to choose how to access data: by using the utilities provided in their own application and/or by using the web-based graphical interface made available in SSN. Interoperability allows users to access the information they need using the interface they want, enabling them to build up a situational picture meeting their particular operational needs.
2. As a consequence, relay and exchange of data is possible via:

* An appropriate system-to-system (VMS-to-SSN) interface
* The SSN dedicated web-based graphical interface providing the combined VMS-AIS traffic image for the vessels selected for the pilot project (SSN GI)

1. The technical implementation guarantees information and network security in line with the requirements in the applicable legal documents.

**2. Business functions**

The following business functions are applied:

1. To enable the creation of composite traffic image, the information from the two sources (VMS and AIS position reports), which is not time-synchronized, needs to be correlated.
2. The fishing vessels providing the position reports are selected by FMCs.
3. To ensure that incoming data to each interconnected system is provided in format/ protocols already applicable in each of the systems to be interconnected. As a consequence:

* AIS position data are provided to FMCs by SSN encapsulated in messages following the NAF protocol.
* Back-up processes were implemented to allow position data correlation and verification/validation of fishing vessel particulars. To ensure minimum impact on Member States systems, following the current SSN practices, the required functions were implemented in the SSN system utilizing the SSN reference registry which was upgraded to include fishing vessel data. Updated information on fishing vessel particulars (e.g. the national registration numbers, MMSI, Call Sign) were provided to EMSA by the participating FMCs.

1. System to system interfaces, services and database design allows independent processing of information at FMC and SSN system level. The impact from a temporary loss of connection between the inter-connected systems is expected to be kept to a minimum

**3. Technical specifications**

The technical specifications of the SSN/VMS synergies pilot project are:

**3.1 VMS2SSN system-to-system interface (VMS data transmitted from FMCs to SSN)**

1. To avoid changes in the existing systems installed at FMCs, the data transmitted from FMCs to SSN are provided in NAF based messages (“position” type message format is provided in the Annex 2). That is, in terms of VMS system business logic, the SSN is regarded as another FMC.
2. To ensure a design open to future changes and introduction of additional messages and given that the SSN transport layer is based on XML, a “NAF/XML converter” application was implemented in SSN to ensure, among other functionalities, that each incoming connection from FMCs is correctly parsed / processed.
3. Following receipt of a VMS position report, the message content is initially checked in light of the NAF specification. If the received message is considered as having a valid format and if the LAT/LONG position information corresponds to an actual geographic position it is accepted for registration into the SSN database. In case of invalid format the incoming notification is disregarded (message is only to be inserted in the a logs table of the “NAF/XML converter” application).
4. The incoming data from a VMS message with a valid format are stored in a temporary registry in the “NAF/XML converter” and then are converted into an XML based notification that is forwarded to the SSN index server application for further processing. The temporary storage is applied in order to avoid any loss of information (due to a failure in the XML conversion process).
5. Following the XML conversion and registration of the message in the notifications database of SSN, a verification/validation process for the vessel particulars is initiated (to accurately identify the ship).
6. Following the proper verification of the vessel the data is transformed into an IEC format-based pseudo-AIS position report message that is made available for visualisation to the SSN web-based graphical interface (see below). The user is able to query the SSN database to receive the whole set of information available to SSN for a fishing vessel displayed in the web-based graphical interface.

**3.2 SSN2VMS interface (outgoing AIS data from SSN to FMCs/CFCA)**

1. The outgoing AIS data (those filling the “time gap” between two consecutive VMS reports) are transformed into NAF format (as a position type report) and provided back to FMCs. The SSN application is modified to replicate the business logic of VMS applications.
2. To ensure that FMCs correctly identify SSN as the originator of the AIS reports converted into NAF format, the FR (from) field value in the NAF message includes a value that uniquely identifies SSN.
3. The outgoing AIS data (pseudo-NAF messages) include the information related to the selected pilot project vessels, for which incoming VMS reports were previously received by SSN (i.e is only for the vessels included in the pilot project). Any other AIS information concerning vessels not participating in the pilot is filtered out.
4. The outgoing AIS data is provided to the FMCs at the maximum refresh rate available (e.g. 6 min) according to the down-sampling rate of AIS data coming from the regional or national proxy providing the AIS raw information to SSN.

**3.3 SSN web-based graphical interface**

1. A web-based graphical interface was implemented in SSN to allow the visualisation of the composite traffic image for the vessels selected for the pilot project by the participating FMCs.
2. To ensure proper access rights management (in line with the agreements of the participants in the pilot project and the applicable legal documents), a new distinct roles has been created in SSN for FMCs.
3. The main tools available in the web-based graphical interface (e.g. search, zoom-in zoom out, plotting past positions, passage lines and areas, reports and statistics) are made available to the FMCs[[2]](#footnote-2).
4. This interface provides visual warnings to the operator in case:

* of non-receipt of a VMS report after two hours from the successful reception of a previous report
* of non-receipt of AIS data concerning the participating vessels for a time period exceeding a configurable, by the operator, interval (i.e. 30 minutes)

1. The symbols used to identify a VMS position report are clearly distinguishable from those used to identify an AIS report.

**3.4 Access management, information handling and network security**

To ensure high information security and data confidentiality the following rules are applied:

1. The communication links for system-to-system interface implementation is based on https/2way SSL protocols.
2. The web-users are connected to SSN GI over https.
3. The digital certificates are issued by EMSA following the procedure currently applicable in SSN.
4. Each system participating in the pilot must support Transport Layer Security protocol (TLS version 1.0 or later). SSL (preferably v3) is exceptionally allowed for compatibility reasons with external peers which are not TLS v1.0 compliant. In all cases renegotiation support must be disabled in order to prevent the ‘SSL/TLS renegotiation bug’.
5. Only secure cypher suites of 128 bit or more are supported.
6. SSN security is compliant with OWASP Application Security Verification Standards (minimum level ‘2A’) (http://www.owasp.org/index.php/ASVS )
7. Apart from adding a new distinct role in SSN for FMCs a number of new tasks were added in the SSN access management to allow the configuration of the access to VMS data. Furthermore the SSN Database was modified to allow the introduction of a new type of notification (the “VMS” notification).

**ANNEX 2**

**Electronic data exchange format between SSN and VMS applications**

**(According to Commission Regulation n. 2244/2003/EC)**

1. **Content of position reports**

| **Data element** | **Field code** | **Manda-tory/ optional** | **Remarks** |
| --- | --- | --- | --- |
| Start record | SR | M | System detail; indicates start of record |
| Address | AD | M | Message detail; destination; Coastal Member State Alpha-3 ISO country code |
| From | FR | M | Message detail; originator of the report |
| Type of message | TM | M | Message detail; message type, ‘POS’ |
| Radio call sign | RC | M | Vessel registration detail |
| Trip No | TN | O | Activity detail; fishing trip serial number in current year |
| Vessel name | NA | O | Vessel registration detail |
| Internal reference No | IR | O(1) | Vessel registration detail. Unique vessel number as flag state Alpha-3 ISO country code followed by number |
| External registration No | XR | O | Vessel registration detail; the side number of the vessel |
| Latitude (decimal) | LT | M | Activity detail; position at time of transmission |
| Longitude (decimal) | LG | M | Activity detail; position at time of transmission |
| Speed | SP | M(2) | Vessel speed in tenths of knots |
| Course | CO | M(2) | Vessel course 360° scale |
| Free text | MS | O | Message detail; comments included by the originator |
| Date | DA | M | Message detail; date of transmission |
| Time | TI | M | Message detail; date of transmission |
| End of record | ER | M | System detail; indicates end of record |

(1) Mandatory for Community fishing vessels.

(2) Optional until 31 December 2005.

Each data transmission is structured as follows:

* double slash (//) and the characters ‘SR’ indicate the start of a message,
* a double slash (//) and field code indicate the start of a data element,
* a single slash (/) separates the field code and the data,
* pairs of data are separated by space,
* the characters ‘ER’ and a double slash (//) indicate the end of a record

1. The participation of CFCA in the second phase is pending the approval of the Commission services [↑](#footnote-ref-1)
2. A document outlining the most used functionalities in the SSN Graphical Interface is available on the EMSA website (<https://extranet.emsa.europa.eu>) [↑](#footnote-ref-2)