INTEGRATED MARITIME POLICY FOR THE EU

WORKING DOCUMENT III

ON

MARITIME SURVEILLANCE SYSTEMS

European Commission / Joint Research Centre Ispra, Italy

Date: 14 June 2008

Distribution: Public

Executive summary

One of the elements of the integrated Maritime Policy for the European Union[1] that the Commission is pursuing is enhanced interoperability and integration between existing maritime surveillance and monitoring systems, across the different maritime sectors. As a first step it is necessary to have better awareness of the present situation. This report tries to summarise some information on existing maritime surveillance systems that has recently been gathered at a European level, and aims to focus on data sharing aspects. Information from four main sources is analysed: on fisheries monitoring from Directorate General for Fisheries and Maritime Affairs; on vessel traffic management from EMSA; on southern maritime border security from Frontex based on the BORTEC study; and on vessel reporting systems mandated by IMO. This does certainly not give a complete picture of the maritime surveillance data sharing practices in the EU, but it provides a basis from which to formulate further questions that can in particular be directed to the Member States.

The individual systems discussed include VMS, AIS, VTS, LRIT, several special reporting regimes, GMDSS and SSAS. For each it is discussed what information is transmitted, when and to whom.

Considering integration, it is concluded that VMS is relatively far advanced in operational data sharing between countries, but at the same time quite restricted in any sharing outside the fisheries sector. National and regional sharing of AIS data is developing fast, and Europe-wide sharing of vessel traffic data is progressing under SafeSeaNet based on the Community vessel traffic monitoring and information system directive of 2002[2]. Concerning integration and cooperation between surveillance systems and authorities in the southern EU countries in the framework of border security, the picture varies widely between almost non-existent cooperation in some countries, via different authorities using the same surveillance system, to relatively advanced integrated systems to which several authorities contribute. All countries have plans to start or further develop the integration.

The annexes summarise detailed information on the maritime surveillance systems in use for vessel traffic management in the entire EEA, and for maritime border control in the southern EU countries.

[1] COM(2007) 575 final, 10 Oct 2007, “An Integrated Maritime Policy for the European Union”

[2] Directive 2002/59/EC of European Parliament and Council, 27 June 2002, establishing a Community vessel traffic monitoring and information system (OJ L 208, 5 Aug 2002)

Contents

Acronyms

AIS	Automatic Identification System
ARES	Automazione Ricerca E Soccorso (Automated Search and Rescue System)
a/c	Aircraft
CA	Competent Authority
CC	Coordination Centre
CFR	Community Fishing Fleet Register
CG	Coast Guard
CROSS	MRCC in French
C4I	Command, Control, Communication, Coordination & Intelligence
C&C	Command & Control
DB	Data Base
DG	Directorate General
DSC	Digital Selective Calling
DWT	Dead weight
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIS	European Index Server
EMSA	European Maritime Safety Agency
ENC	Electronic Navigational Chart
EPIRB	Emergency Position Indicating Radio Beacon
ETA	Estimated Time of Arrival
EU	European Union
FMC	Fisheries Management Centre
Frontex	European Agency for the Management of Operational Cooperation at the External Borders
GIS	Geographic Information System
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
GT	Gross Ton
HAZMAT	hazardous materials
HF	High Frequency
HQ	Head Quarters
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IDE	International LRIT Data Exchange
IEC	International Electrotechnical Commission
IMO	International Maritime Organisation
IR	Infrared
ITU	International Telecommunication Union
JRCC	Joint Rescue Coordination Centre
LBR	Low Bit Rate
LRIT	Long Range Identification and Tracking
MCCIS	Maritime Command, Control and Information System
MCTS	Marine Communications and Traffic Services
MDA	Maritime Domain Awareness
MF	Medium Frequency
MMSI	Maritime Mobile Service Identity
MRCC	Maritime Rescue Coordination Centre
MRS	Mandatory Reporting System *or* Maritime Reporting System
MRSC	Maritime Rescue Sub-Centres
MS	Member State
MSCC	Maritime Sub-Coordination Centre
MSI	Maritime Safety Information
nm	Nautical mile
No	North

OC	Operations Centre (also used here when some countries mention “Operations Room”, “Control Room” or “Command and Control Centre)
Ops	Operations
PSSA	Particularly Sensitive Sea Area
RCC	Rescue Coordination Centre
RDF	Radio Direction Finder
RFMO	Regional Fisheries Management Organisations
RT	Real Time
SAR	Search And Rescue
So	South
SOLAS	Safety Of Life At Sea
SOTDMA	Self Organising Time Division Multiple Access
SRIT	Short Range Identification and Tracking
SRR	Search & Rescue Region
SSAS	Ship Security Alert System
SSN	SafeSeaNet
STMID	Shore-based Traffic Monitoring and Information Database
TIR	Thermal Infrared
TSS	Traffic Separation Scheme
UN	United Nations
UNCLOS	UN Convention on the Law of the Sea
VHF	Very High Frequency
VMS	Vessel Monitoring System
V-RMTC	Virtual Regional Maritime Traffic Centre
VTMIS	Vessel Traffic Management and Information Services
VTMS	Vessel Traffic Management System
VTS	Vessel Traffic Services
w/o	without

1. Introduction

In the 2006 Green Paper for a new Maritime Policy of the Union[3], and especially in its background document 4b[4], the general desirability for further integration of maritime surveillance systems was signalled. In the recent communication on an integrated maritime policy for the European Union[1], the Commission follows this up by expressing its intent to take steps towards a more interoperable surveillance system to bring together existing monitoring and tracking systems used for maritime safety and security, protection of the marine environment, fisheries control, control of external borders and other law enforcement activities. Such an integration of the existing or future maritime surveillance systems is considered as an essential tool towards the improvement of services provided by authorities at sea in all the aforesaid areas. However, this should not be conceived as dealing with the actual offshore operations conducted by the responsible national bodies, the costs and efficiency of which is separately addressed in the framework of the integrated Maritime Policy.

As a first step in understanding how integration of the maritime surveillance systems can be achieved, there is a need for a more quantified description of the present status of maritime surveillance systems and practices in the EU Member States. This report attempts to make a limited first contribution in that direction, with a special focus on existing mechanisms and practices for cross-sectoral and inter-MS information exchange. It summarises some information about maritime surveillance systems that has been gathered at a European level for separate sectors: fisheries control in the EU, vessel traffic management in the EEA, and maritime border security at the southern borders of the EU. In addition, a few globally used systems are discussed.

This report is not intended as a complete summary of existing surveillance systems, but rather as a basis for further thoughts toward data integration. In the interest of brevity and to keep the focus, descriptions of the various systems and regulations in this report are far from exhaustive. In some cases, where full correctness would necessitate more extensive texts, this regrettably but unavoidably introduces some approximations in the descriptions.

Information on monitoring systems aimed at fisheries control was obtained from DG FISH; falling under the Common Fisheries Policy, this applies across the whole of the EU. Information on vessel traffic management was obtained from EMSA, who are currently in the process of collecting this information themselves in the framework of implementing directive 2002/59/EC[2]. This effort covers all coastal EU Member States plus Norway and Iceland. It is ongoing, and this report reflects the status as of October 2007. The third main contribution is a summary of the information contained in the BORTEC report[5]. This concerns the maritime surveillance situation in the MS that border the Mediterranean and the South Atlantic. The BORTEC report is classified, and therefore not readily accessible. There is a public excerpt, but that mostly covers recommendations of a way forward, rather than the (for the present purpose more pertinent) analysis of the existing situation which is contained in the main report. Here, a summary is made of the latter extracting non-classified information.

This compilation still leaves much ground uncovered concerning basic questions about systems and practices in individual countries in the Northern half of the EU, and detailed questions in all countries. However, on the basis of the insight gained here, dedicated requests for information can be directed to individual Member States, avoiding the risk to ask MS for information that they have already provided to EU bodies or put in the public domain earlier.

[3] Green paper “Towards a future Maritime Policy for the Union: A European vision for the oceans and seas”, SEC(2006) 689, 7 June 2006

[4] Background paper no. 4b on “Improving European integration in maritime reporting, monitoring and surveillance”, Annex to the above (http://ec.europa.eu/maritimeaffairs/suppdoc_en.html)

[5] “BORTEC, Study on technical feasibility of establishing a surveillance system”, Frontex, Warsaw, Dec 2006 (Confidential)

2. Systems for fisheries monitoring

EU legislation[6] mandates the use of the Vessel Monitoring System (VMS) on fishing vessels longer than 15 m, for monitoring and control of fishing vessel operations. The VMS reports the ship's whereabouts to the authorities at regular intervals. The fishing ship carries a transponder linked to a GPS receiver, sometimes called 'blue box'. Its operation is fully automatic. The legislation mandates that the transponder be able to send a short message containing vessel identification, time, geographic position, course and speed. Such a message should be sent every hour. In case the vessel can be 'polled' by the authorities, this may be every two hours. Polling means that a VMS message is sent on request. The message is sent via satellite communication to the vessel's Flag State authorities; often INMARSAT-C is used, sometimes EUTELSAT or ARGOS – the last one does not presently allow polling. The Flag State will forward the VMS message to the Coastal State in which waters (EEZ) the ship is. The operational authority that handles the VMS is the Fisheries Management Centre (FMC); there is one on each MS. In this way, the national FMC is continuously aware of all its national VMS-carrying fishing vessels wherever they are on the globe, and of all VMS-carrying fishing vessels in the waters under its jurisdiction (i.e. in most cases its own EEZ which extends out to 200 nm).

Data on the status of VMS implementation relating to end 2006 sent by the MS to the Commission, and forwarded to this study in May 2007, show that there are 10,697 fishing vessels longer than 15 m in the Community Fishing Fleet Register (CFR) declared by 20 MS. Of these, 9,950 actually have VMS fitted, while 23 are declared exempted and the other 747 do not have VMS (as of 1 Jan 2007). The total number of fishing vessels in the CFR is 87,426. So essentially only the longest 11% of these carry VMS. (These are responsible for most of the catch).

These data also mention that the VMS reporting frequency used by EU MS is not always the same – it can be increased in special areas, for particular ships and for particular periods of interest. Sometimes geo-fencing methods are used: a report is sent when a certain boundary is crossed, e.g. EEZ or protection area. Polling is used by some MS as regular checks, reacting to problems or for special checks.

The EU regulation requires that VMS data are stored for a period of 3 years (although it does not indicate whether the complete data or a subset needs to be stored).

A recent report on the state of VMS implementation concludes that in general the FMC infrastructure is in place in every MS. However, in most MS the data are not used effectively enough and mostly through operator-driven rather than automated procedures. Follow-up on incompliant non-reporting could also be improved.

Integration and data exchange aspects are discussed in section 5.

[6] Commission Regulation (EC) No 2244/2003, 18 Dec 2003, laying down detailed provisions regarding satellite-based Vessel Monitoring Systems. Introductory periods for partial implementation have now passed.

3. Systems for vessel traffic monitoring

3.1 AIS

The Automatic Identification System (AIS) is a ship-borne transponder system designed in the first instance for maritime safety and in particular collision avoidance. It consists of a transponder unit including GPS, VHF transmitter / receiver and display / terminal. The unit broadcasts a message at regular intervals containing its identification, position, speed, course plus a number of detailed items about the ship and its cargo such as ship length, draft, cargo type, ports of providence and destination. The ship identification (MMSI number) is hardwired into the device and some static data about the ship are also fixed; geographic position is taken automatically from the GPS receiver; but all other data has to be manually entered (and are thereby not so reliable). The broadcast carries VHF range which is basically line of sight (except under certain atmospheric conditions it sometimes can curve some distance over the horizon). Via a clever automatic protocol called SOTDMA, no two transmitters within range of each other transmit at the same time. The transmission frequency increases with speed.

The carriage of AIS is mandatory on the basis of IMO's SOLAS convention[7]; it was introduced in its Chapter V by an amendment in the year 2000. After the July 2007 completion of the phase-in schedule, the carriage requirements are for (a) ships of 300 gross tonnage and up on international voyages, (b) passenger ships (any size / voyage), (c) tankers (any size) on international voyages, and (d) cargo ships of 500 gross tonnage and up (any voyage). EU regulation[2] requires AIS carriage by ship of 300 GT and up, except for (a) warships and state-operated vessels in public service, (b) fishing vessels, traditional ships and recreational craft shorter than 45 m, and (c) bunkers below 5,000 tons.

AIS messages from ships also reach coastal receivers. In this way, authorities can obtain a continuous, real-time overview of the ship traffic in front of the coast. The range of coastal AIS receivers is typically 40 nm, but can be considerable longer if the receiver is installed on an elevated position, and also during particular atmospheric conditions that are favourable to VHF propagation. Ranges of over 100 nm may be reached, for example in summer in the Mediterranean. In addition, AIS messages that are received by a ship can be re-transmitted; this relaying function can also extend the range, especially when ship traffic is not too dense.

Directive 2002/59/EC[2] (Art. 9) stipulates that MS should by end 2007 have the equipment and shore-based installations for receiving and utilising the AIS information. This means that MS will cover the entire coastline with AIS (to cover sea area A1, see GMDSS in section 4.1). One year later the systems should be able to exchange the information between MS.

Many maritime patrol aircraft are now being equipped with AIS receivers. Also AIS reception from satellite is seen as an attractive option. There are already some experimental systems in space. However, the SOTDMA system for ensuring that vessels do not transmit at the same time only applies to vessels within ground range of each other: not those seen from space at the same time. So it can be difficult to distinguish individual ships if more than one is transmitting at the same time. If this and other current technical problems with satellite AIS can be overcome, the availability of AIS data can be extended from only coastal seas to the entire globe.

For vessels not covered by the IMO requirement, Class B AIS is proposed: a watered-down AIS standard, with shorter and fewer messages to save airtime, intended for voluntary use. As for the mandatory (Class A) AIS, several international organisations have been involved in defining performance and equipment standards. Apart from the IMO (in resolution MSC 74(69) annex 3) these are the International Electrotechnical Commission (IEC) and the International Telecommunication Union (ITU), with coordination from the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA).

3.2 VTS

Vessel Traffic Services (VTS) are systems intended to establish maritime safety in particular areas of dense shipping. IMO and IALA are instrumental in their global standardisation. The official IMO definition is: a service implemented by a competent authority, designed to improve the safety and efficiency of vessel traffic and to protect the environment. They are primarily operated in ports, and in

[7] International Convention for the Safety of Life at Sea (SOLAS), IMO, 1974

coastal regions where there is an increased risk, the latter often in association with Traffic Separation Schemes. The VTS infrastructure typically consists of a station onshore where the staff maintains a picture of the local maritime traffic. To that end, it uses primarily radar and communications links with the passing ships by VHF radio, fax or phone. In general also visual observations are made, sometimes aided by optical or infrared cameras. Auxiliary sensors may be available, such as Radio Direction Finder (RDF) to locate the bearing of a radio transmission. In most cases the control centre and the sensors (radar, cameras) are co-located, but sometimes, for the larger VTS systems, the sensors can be located away from the control centre to enlarge the coverage.

AIS has become an important tool of VTS. At present, AIS signals received at the location of the VTS are being integrated in VTS; as AIS is a more recent addition to the existing VTS infrastructure, the AIS data are often still displayed on a separate screen from the radar data. As systems get upgraded, AIS and radar positions of ships are displayed more and more in a fused way on the same screen.

VTS primarily interact with the larger ships; its sensors are not designed to detect smaller vessels. On the ship-board side, the necessary equipment is no more than what basic safe navigation requires – a maritime radio and maybe, for smaller vessels, a passive radar reflector.

A list of ports and coastal sites worldwide where VTS is available is maintained by a group of five international maritime organisations amongst which the IALA. The list is accessible via the web (on http://www.worldvtsguide.org/). It gives the kind of information about the VTS that is needed by mariners that want to enter the control region. An example of the graphic part of the information is shown in Fig. 1. The list is updated by the contracting Governments and in most cases it contains a small portion of the operational VTSs. In fact there are more VTS stations in operation, but only the ones that satisfy certain international standards are included in the list.

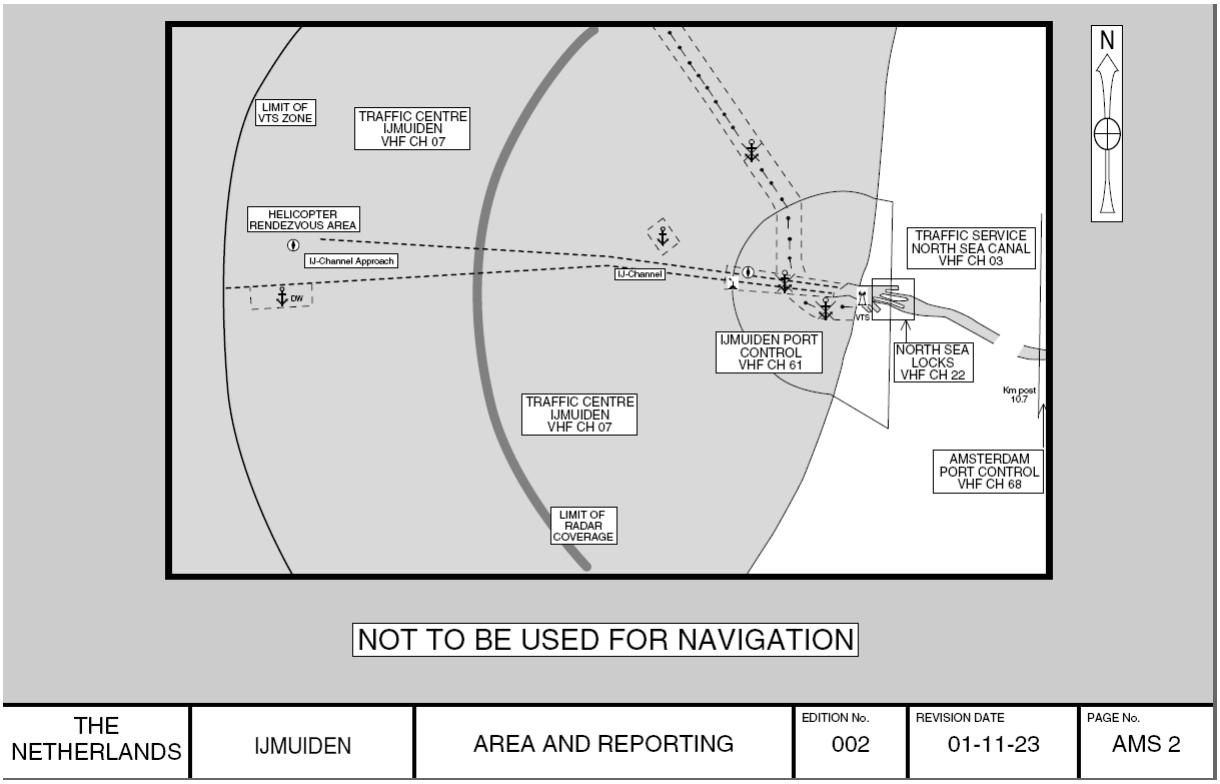


Figure 1. Example of the information from the World VTS Guide showing a.o. VTS radar coverage.

3.3 Reporting regimes

3.3.1 Port notifications

Directive 2002/59/EC[2] (Art. 4) stipulates that vessels should report to the destination port authorities 24 hours before arrival into an EU port (or as early as possible if less than 24 hours before): ship

identification, port of destination*, estimated time of arrival, estimated time of departure, and total number of persons on board.

3.3.2 HAZMAT reporting

The Competent Authority of the MS needs to be notified by a ship carrying hazardous materials (HAZMAT) in case it sets out from an MS port, or plans to go to an MS port. The information to be provided encompasses (Directive 2002/59/EC[2] Art. 13): ship identification; port and estimated time of arrival; port and estimated time of departure if this concerns an MS port; number of passengers; details about the hazardous goods. This reporting may be done via the Port Authority.

Shipping companies may be exempt from this reporting if (a) it concerns scheduled services, (b) they keep the relevant information on file, ready to be given immediately in electronic form to the authorities on request, and (c) all MS authorities of the port and coastal states involved in the voyage agree to such exemption.

3.3.3 WETREP

The West European Tanker Reporting System (WETREP) [8] is a mandatory ship reporting system for all oil tankers over 600 tonnes DWT carrying heavy types of oils and entering the Western European Particularly Sensitive Sea Area (PSSA). (Government / military vessels are exempt.) It entered into force on 1 July 2005 and is part of the IMO SOLAS convention[7]. WETREP reports must be sent when:

- Entering the PSSA;
- Leaving a port within the PSSA;
- Deviate from declared route;
- Exiting the PSSA.

The objective of the system is to provide advance information to authorities responsible for pollution prevention and search & rescue, in order that they can react quickly in case of an accident.

The report must include: the ship's name, call sign, IMO number, MMSI number, date, time, position, course, speed, last and next port of call with ETA, type and quantity of oil or other hazardous substances, number of persons on board, and information on defects, damage, deficiencies etc.

The report must be sent to the nearest co-ordination centre of a responsible authority of the Coastal State participating in the system, which can be a Vessel Traffic Service, RCC, or coast radio station. There is a list of these authorities, all MRCC or MRSC: 3 in IR, 9 in UK, 1 in BE, 2 in FR, 3 in SP, 1 in PT. Reports may be sent by any modern communication form, including Inmarsat-C, fax and e-mail as appropriate.

WETREP is for the exchange of information only and does not provide any additional authority for mandating changes in the vessel's operations. According to the IMO Resolution, this reporting system will be implemented consistent with UNCLOS[9], SOLAS[7] and other relevant international instruments so that the reporting system will not provide the basis to impinge on a transiting vessel's passage through the reporting area. Proprietary information obtained as a requirement of the mandatory ship reporting system WETREP will be protected under this system consistent with the Guidelines and Criteria for Ship Reporting Systems, as amended (IMO resolution A.851(20)).

Failure to submit a report will result in information being passed to the flag State Authorities for investigation and possible prosecution.

3.3.4 Other systems reporting to authorities

WETREP is only one of a number of Mandatory Reporting Systems (MRS) with SOLAS Chapter V Regulation 11 as its basis under international law. As such, they also fall under Article 5 of Directive 2002/59/EC and SafeSeaNet.

While WETREP is multinational, other reporting systems are single state or bilateral and sometimes cover international straits, e.g. CALDOVREP for the Dover Strait and GOFREP for the

* Small ports may depend on larger ports to collect the notifications for them

[8] Mandatory ship reporting systems in the Western European Particularly Sensitive Sea Area, IMO, Resolution MSC.190(79) (adopted on 6 Dec 2004), ref. T2-OSS/2.7.1, SN/Circ.242, 13 Dec 2004

[9] UN Convention on the Law of the Sea, done at Montego Bay, Jamaica, 10 Dec 1982, entered into force 16 Nov 1994

Gulf of Finland. Some of these are obligatory for particular classes of vessels but welcome joining by other vessels, e.g. the Italian ARES (Automated Search and Rescue System) or the US AMVER. The different reporting systems are not mutually exclusive: e.g., WETREP has a number of other mandatory reporting systems geographically within it.

3.3.5 Reporting to company

Amendments to SOLAS regulation V/28 on Records of navigational activities add a new paragraph on daily reporting (in force since July 2006). The amendment will require all ships of 500 gross tonnage and above, engaged on international voyages exceeding 48 hours, to submit a daily report to their company, to include the ship's position, course and speed, and details of any external or internal conditions that are affecting the ship's voyage or its normal safe operation. This measure is aimed to facilitate SAR operations.

3.4 LRIT

Long Range Identification and Tracking (LRIT) is a messaging system for security and SAR purposes that is regulated by IMO through an amendment of SOLAS Chapter V (V/19-1). It is mandatory for the following vessels on international voyages: (a) passenger ships, (b) cargo ships of 300 gross tonnage and up, and (c) mobile offshore drilling units. Ships operating exclusively in sea area A1 (see GMDSS, section 4.1) are exempt – their coastal AIS coverage is deemed sufficient. The messages will include the ship's identity, location and date and time of the position. Coastal (SOLAS contracting) states will have access to LRIT information of ships within 1,000 nm off their shore; otherwise Flag States maintain the right to protect the information of their ships. The LRIT regulation bears no prejudice to existing international maritime law, in particular UNCLOS.

The main components of the LRIT system are: (a) shipborne transmitting equipment, (b) satellite communication links, (c) LRIT Data Centres, and (d) the International LRIT Data Exchange (IDE). The LRIT Data Centres communicate with each other and exchange information and data though the IDE. The IDE will be temporarily hosted by the US awaiting a final location.

The SOLAS amended regulation will enter into force on 1 Jan 2008, but the LRIT system is intended to be operational with respect to the transmission of LRIT information by ships from 30 Dec 2008, while for ships constructed before 31 Dec 2008 there will be a phase-in implementation.

According to the Council resolution of 2 October 2007[10], Member States agreed on setting-up of a European Union Long Range Identification and Tracking Data Centre (EU LRIT DC), to be managed by the Commission, in cooperation with Member States, through the European Maritime Safety Agency (EMSA).

The two main distinctions between AIS and LRIT are first that AIS is line of sight while LRIT is global, and second that AIS is broadcast whereas LRIT is only sent to specific recipients for confidential treatment. Furthermore, as mentioned in section 3.1, the AIS message contains much more information, while the possibility for receiving AIS data from satellites provides an attractive option that needs to be further explored also in the EU.

[10] Establishment of a European Union Long Range Identification and Tracking (LRIT) Data Centre - *Council Resolution* (13736/07 MAR 76, ENV 510, ECOFIN 392)

4. Emergency reporting systems

4.1 GMDSS and COSPAS-SARSAT

GMDSS (Global Maritime Distress and Safety System) is a system intended to enable communications to/from ships in relation to emergencies. Using ship-mounted equipment and protocols, ships can alert authorities on shore as well as other ships in the vicinity in case of an emergency. Ships can also receive such alert messages, plus SAR information and navigational and weather warning messages. These broadcasts are collectively called Maritime Safety Information (MSI) broadcasts. Depending on the areas where vessels navigate, the GMDSS equipment concerns:

(1) Radio at VHF and MF bands with DSC facility. (A DSC receiver obviates the need for continuous aural listening watch. It will only respond to the vessel's unique MMSI number, similar to a telephone number, or to an "All Ships" DSC call within range. Once contact has been made by DSC, follow-up communications take place by voice on another frequency.)
(2) NAVTEX receivers for reception within 300 nm of the coast,
(3) HF Narrow Band Direct Printing (NBDP) receivers (where service is available),
(4) Satellite communications via Inmarsat (A, B or C terminals; on C terminals: Enhanced Group Call - SafetyNET (EGC) broadcasts) and
(5) EPIRBs (Emergency Position Indicating Radio Beacons) which can issue a distress alert at 406 MHz that is received by the COSPAS-SARSAT satellite system anywhere in the world (see below).

GMDSS is mandatory for SOLAS ships but intended for use on any radio-carrying ship.
The global full implementation of GMDSS services became effective on 1 February 1999.
Internationally, there are four "Sea Areas" defined in GMDSS:

- Sea area A1, within range of shore-based VHF DSC coast station (around 40 nautical miles);
- Sea area A2, within range of shore-based MF DSC coast station (excluding sea areas A1) (around 150 nautical miles);
- Sea area A3, within the coverage of an Inmarsat geostationary satellite (approximately 70°N to 70°S) (excluding sea areas A1 & A2);
- Sea area A4, the remaining areas outside sea areas A1, A2 & A3 (polar regions).

Nationally, these areas may be redefined.

The COSPAS-SARSAT program, developed by Canada, France, the US and the former USSR, is an international satellite system intended to react to distress calls – from land, sea and air. COSPAS is operated by Russia, and SARSAT (Search And Rescue Satellite-Aided Tracking) is operated by Canada, France and the US, but they work as one system. The system has four parts: emergency radio beacons, which call for help; satellites, which are like ears in space; ground stations, which receive the message; and control centres, which sound the alarm. The beacon transmits on 406 MHz and the message can include identification of the beacon and its country of registration. Beacons can be registered and their information held in a national database. There are different kinds of radio beacons for land, sea and air. At sea, a vessel should have the EPIRB mentioned above. So COSPAS-SARSAT is in that way part of GMDSS. As EPIRBs are small and function stand-alone, they can be carried on small ships including life boats. The polar orbiting satellites (100 min period) are able to receive the signals from the beacons and relay them to ground stations. It may take some hours before a satellite passes over a beacon after it has been activated. If a ground station is in sight, a message received by a satellite is downlinked immediately, otherwise it is stored and downlinked later. The ground stations, in turn, process the signals to determine where the beacon is located within a radius of 2 km. The ground stations then relay this information to search and rescue authorities.

4.3 SSAS

IMO's SOLAS regulation XI-2/5 requires all ships to be provided with a Ship Security Alert System (SSAS). When activated, the SSAS shall initiate and transmit a ship-to-shore security alert to a competent authority designated by the administration, identifying the ship, its location and indicating that the security of the ship is under threat or it has been compromised. Who is the competent authority is decided per country; in several EU MS it is e.g. the Coast Guard. For SSAS, typically also the ship owner receives the alert. The system will not raise any alarm on-board the ship. The SSAS

shall be capable of being activated from the navigation bridge and in at least one other location. By July 2007 implementation should be complete and should cover: (a) all ships built after 1 July 2004; and for the older ships: (b) passenger ships, (c) ships of 500 GT and up, and (d) mobile offshore drilling units. This IMO regulation is transposed in EU law by Regulation (EC) No 725/2004[11], restricting the above implementation to international shipping and domestic Class A[12] passenger ships with a due date of July 2005, and a decision to extend to other domestic ship categories by July 2007.

The procedures for the security alert are agreed with the ship's administration as part of the ship security plan and ideally should be individual to the ship. It is not intended that the ship security alert procedures should be to an internationally agreed standard or conform to any particular format for all ships. Suggested implementations include the use of dedicated GMDSS messages, or voice calls using previously agreed code words. Commercial providers offer solutions employing e.g. INMARSAT-C or Iridium.

[11] Regulation (EC) No 725/2004 of European Parliament and Council, 31 Mar 2004, on enhancing ship and port facility security, Art. 3.1 and 2.1

[12] Essentially, domestic passenger ships that venture more than 20 nm from the coast or operate in high sea state, as defined in Council Directive 98/18/EC, 17 Mar 1998, on safety rules and standards for passenger ships

5. Exchange of data and integration of systems

5.1 VMS

VMS data of a fishing vessel that is in the waters of another country are sent to that (Coastal State) FMC. There seems to be a small loss of accuracy in the data so transferred (fewer digits in the geographic position). These transmissions occur between FMCs via X.25 link, currently migrating to https, and are routine and automatic. VMS data are also forwarded to Regional Fisheries Management Organisations (RFMOs) by Flag States whose vessels are active in the waters controlled by the RFMO. This typically happens at longer intervals, e.g. 6-hourly.

The regulation[6] states that the Commission has access to VMS data on specific request, and that received data are to be treated as confidential.

In practice, VMS data are jealously guarded and generally not exchanged with other national authorities – customs, police, navigation – as a matter of routine. However there do not appear to be any insurmountable barriers to their using it for the execution of their responsibilities in specific cases.

5.2 Regional AIS networks

Many national authorities, no doubt in part motivated by the directive 2002/59/EC[2], have recognised the value of combining the data of all local AIS receiving stations on their coast into a centralised national network. Moreover, in several regions, neighbouring countries are collaborating to maintain a regional AIS network, in which the AIS data are in real time combined. This is the case for the Baltic Sea where the regional network is managed by HELCOM and for the North Sea where the network is managed by the North Sea Safety at Sea Working Group. There is a similar initiative in the Mediterranean whereby 10 Member States (Portugal, Spain, France, Slovenia, Italy, Malta, Greece, Cyprus, Bulgaria and Romania) work together, led by EMSA, to set up a common AIS Mediterranean network by the end of 2008. Finally, there are a number of military initiatives for AIS networks, mostly in the state of being built up. NATO operates MSSIS (Maritime Safety & Security Information System); the Italian Navy hosts the Regional Virtual Maritime Traffic Centre (V-RMTC) that covers the Mediterranean; and the Turkish Defence manage the Black Sea Harmony network.

5.3 Community vessel traffic monitoring and information system

Directive 2002/59/EC[2] on a Community vessel traffic monitoring and information system has been mentioned already as the driver to implement reporting systems on vessels and in the MS. It also specifically calls for integration across MS and on an EU level.

Concerning hazardous materials (HAZMAT), Art. 14 says that MS shall cooperate to ensure interconnection of the national HAZMAT systems with electronic data exchange that can handle all HAZMAT message information and that is operational 24 hours a day. It does not give timescales for implementation.

In a wider sense, Art. 23 asks that MS should develop appropriate telematic links between coastal stations and Port Authorities and between MS coastal stations, with a view to exchanging ship traffic data, improving the monitoring of ships in transit and streamlining the reports required from ships en route. MS and the Commission should cooperate to improve the Community vessel traffic monitoring and information system with a view to enhanced identification and monitoring of ships.

On this legal basis, EMSA is developing a functionality with the following elements:

- SafeSeaNet (SSN) Version 1,
- Short Range Identification and Tracking (SRIT),
- Shore-based Traffic Monitoring and Information Database (STMID).

These systems are described below.

5.3.1 SafeSeaNet V1

SSN V1 is a system to exchange information between MS maritime authorities to help prevent pollution and accidents at sea. Norway and Iceland also cooperate. It should use telematics, be 24/7 available and respect confidentiality. It handles messages with static info (on ships) and dynamic info (on ship traffic). The way it works is that all data about vessels and traffic are stored in MS databases,

with index information stored in the European Index Server (EIS). The EIS is hosted on a platform of the Commission's Informatics Directorate in Luxemburg. Any data request from a MS is directed to the EIS, who forwards the request based on the index to the MS where the data is actually stored; there the data is retrieved and sent back, via the EIS, to the requestor. Access to the EIS is only from one national system in each MS; individual users in the MS have to go via that "National Competent Authority". Any user has to be registered before he can get access.

The SSN ship data base contains ships' IMO numbers, MMSI numbers, names and call signs. It is being built up, and by October 2007 it contained 30,000 records, while during the last year some 6,000 records were being updated or added each month.

The dynamic data that have to be accessible via SSN include: Port notifications, HAZMAT notifications, AIS reports, MRS reports, Alert notifications, Security notifications[13] and Waste notifications. The inclusion of the latter two into SSN is still under discussion and no final decision has been made yet. AIS reports and MRS reports constitute ship notifications. Alert notifications refer to warning messages concerning special ships that have been identified as posing an extra risk, e.g. because of previous infringements. As the AIS messages have a very high frequency, up to several per minute for moving ships, not all received AIS messages are retained for access via SSN but only a subset.

SSN V1 is now being introduced in all the 22 maritime MS of the EU plus Norway and Iceland; by October 2007, 17 of the 24 states were on-line, with a total of 224 users registered. Most MS have not yet introduced SSN with all their foreseen users. The notifications are exchanged either by web interface (manual) or by XML (automatic); in October 2007, in 50 % of the cases the XML interface was available. During that month, SSN had received 1.5 million notifications; 91 % of these were AIS, 3 % MRS, 4 % Port notifications, 1 % HAZMAT, and very small numbers of Security and Alert messages[14].On the request side, 67,000 requests were received in October 2007, still mostly for testing purposes.

The present SSN version will not be changed until 2009 to guarantee stability.

5.3.2 SRIT

SRIT stands for Short Range Identification and Tracking and is a system to collect AIS data at a central EU level in real time from regional AIS hubs. AIS messages that are received by a MS coastal station are in real-time, but sub-sampled, forwarded to a regional AIS centre, and from there in real-time sub-sampled to a central server of EMSA. A pilot is to be set up soon at EMSA; it encompasses the regional AIS hubs of the Baltic Sea, the North Sea and the Mediterranean, and possibly others when available, and should be completed by end 2008. This pilot project will be a stimulus for the further evolution of traffic monitoring in the EU because it will create an EU AIS-based real time traffic image (with an update rate of 6 minutes) integrated into SSN.

In the future it is expected that LRIT data will be available to authorised users through SSN.

5.3.3 STMID

STMID, Shore-based Traffic Monitoring and Information Database, is an initiative to collect at a central level descriptive information on the shore-based vessel monitoring and reporting infrastructure from the MS. EMSA is compiling this information from two surveys carried out by them (in 2004 and 2006) and from other documents such as obtained from HELCOM or EEA and ENC maps. The information comprises AIS stations, servers and centres; boundaries of territorial waters, EEZs and SRRs; ports, VTS locations, and SSN-related contact points. The information can be visualised on maps in a GIS environment; see Fig. 2.

The processing of the STMID information supplied by the MS was still ongoing at EMSA at the time this report was written. Annex I contains a summary of some relevant STMID data content as was supplied for this study by EMSA in July 2007. In this stage, it seems there is still some clarification needed with the MS-supplied data. For example, it seems that the categories AIS station, server and centre are used in a different way by different countries. Also the number of national contact points varies between zero and many. These issues should be resolved in due course.

[13] Article 4 of Regulation 725/2004, see footnote 11

[14] From EMSA's SafeSeaNet monthly report, October 2007 (restricted)

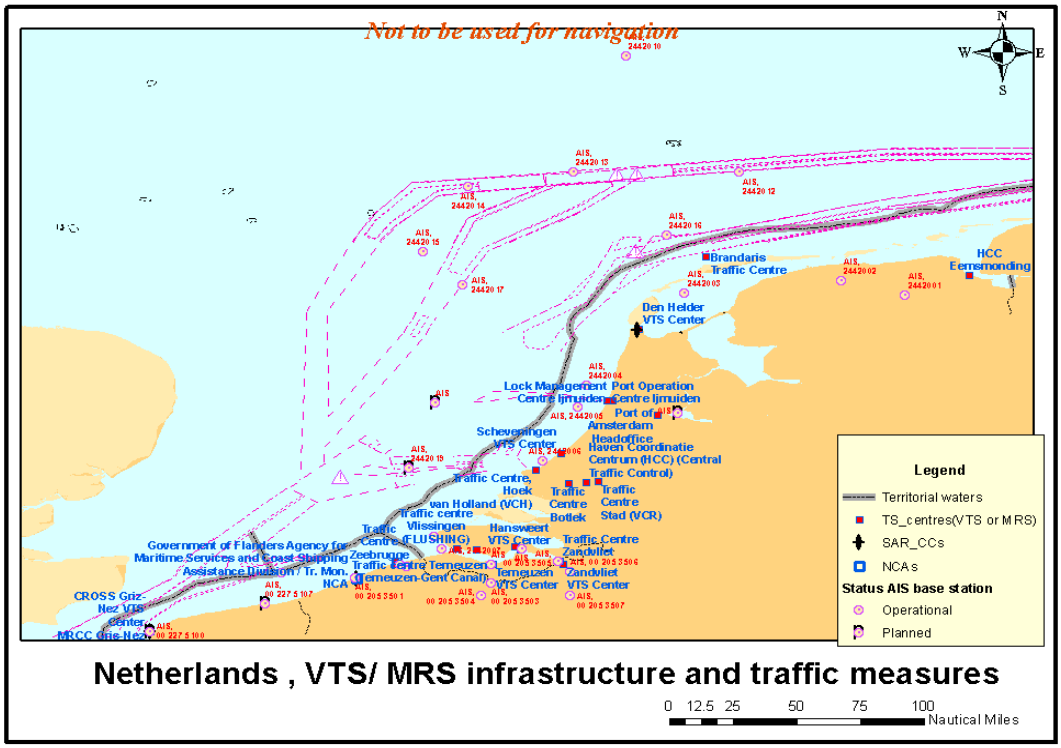
5.4 LRIT

IMO in their description of LRIT mention: “There will be no interface between LRIT and AIS”. Considering the different nature of the two systems, as was laid out in section 3.4, this is not illogical. On the other hand, the LRIT message information seems to be[15] a subset of the AIS message information, so having a single on-board system that integrates both functionalities could be efficient. On the receiving side, the LRIT exemption for ships operating only in sea area A1 creates the impression that any required LRIT information of those ships is supposed to be extracted from the received AIS data.

Although included in SOLAS under Chapter V (the chapter on safety of navigation), LRIT is intended to “meet the maritime security needs and other concerns” of the SOLAS contracting governments. A recent (Oct 2007) resolution of IMO’s Maritime Safety Committee states that SOLAS contracting governments may request, receive and use LRIT information for safety and environmental protection purposes. The Council, in its Oct 2007 resolution on the EU LRIT Data Centre (section 3.4)[10], stressed that its objective should include maritime security, Search and Rescue (SAR), maritime safety and protection of the marine environment, taking into consideration respective developments within the IMO context.

The Council resolution also foresees that, subject to the completion of necessary technical work, the EU LRIT DC should make use of the existing SafeSeaNet system communication platform in order to facilitate the sharing of LRIT information between Member States. Moreover, it encourages the integration of AIS reports into the data managed by the EU LRIT DC in order to enable savings of costs and avoid unnecessary fitting of equipment on board ships sailing in maritime areas within the coverage of AIS monitoring stations.

[15] ‘Seems to be’, because the IMO formulation is “The LRIT information ships will be required to transmit includes...”, leaving room for more information than contained in AIS but not making that explicit.



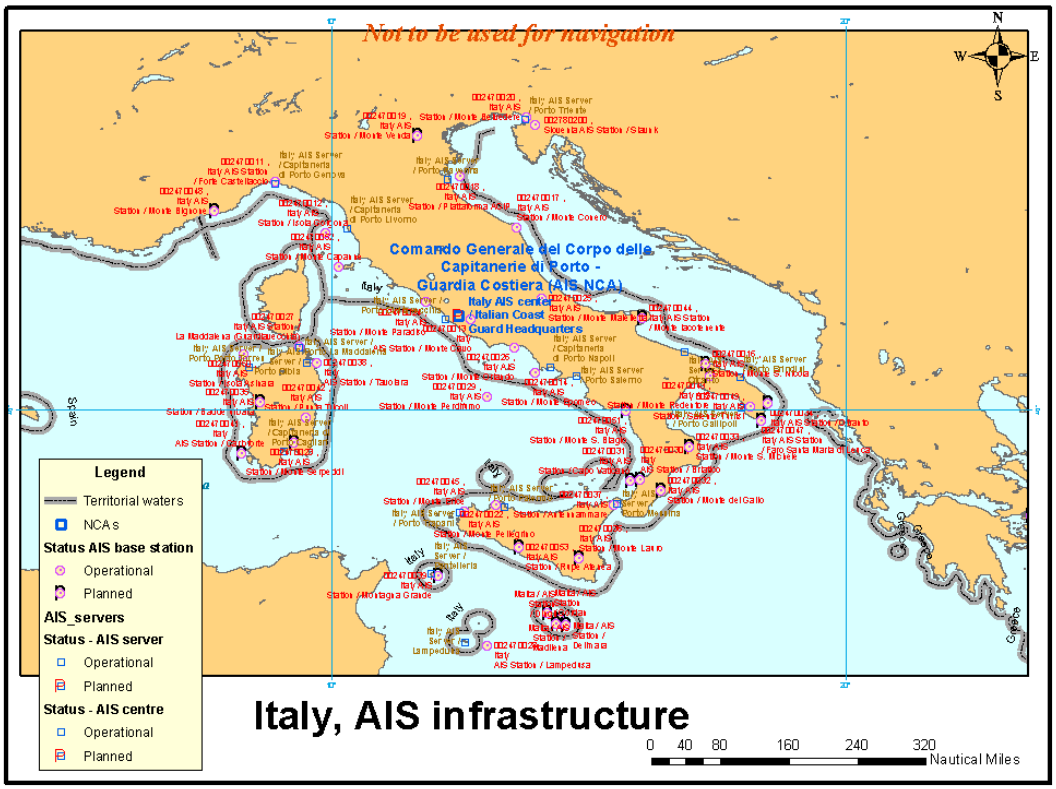


Figure 2. Examples of the GIS map display of EMSA's STMID.

6. Discussion and conclusions

6.1 Surveillance concepts and purpose of integration

Maritime surveillance is carried out by (and on behalf) of national authorities mainly to identify and deter (a) infringements to regulations and (b) security and safety threats. (These categories overlap and include law enforcement and compliance monitoring.) Surveillance carried out for the different domains, such as fisheries protection, environmental protection, maritime transport safety, border control, etc., in most cases falls under (a) because it is done on the basis of laws and regulations that govern these domains. Surveillance is a key element to exercise national sovereignty at sea. The surveillance systems include reporting / messaging systems, which rely on the ships to provide information, such as VMS, AIS and the many non-automatic reporting systems and regimes; and sensor systems such as radars and cameras that collect information about ships without their cooperation. The former can be termed cooperative systems and the latter non-cooperative systems. The infringements and threats that the surveillance is supposed to identify can be intentional or non-intentional. In the first case, it can hardly be expected that the cooperative information, if any, provided by the ship is correct. The non-cooperative sensors are therefore an essential element in the surveillance. At the same time, it is impractical to submit all of the ship traffic to non-cooperative inspection, and the cooperative systems are needed to manage the bulk of the compliant vessels.

As it is necessary to take action when infringements or threats are found, means (or assets) are deployed for interception – naval, aerial or, for intervention at the shore, land. However, these means have a dual role because they also serve as forward observation / communication platforms. The surveillance systems infrastructure encompasses sensors and communication systems which can be based on the shore, and partly in space, but also on the means (patrol vessels and aircraft). The information that can be gathered by shore- (and space-) based systems is often not detailed enough to positively identify threats or infringements, necessitating close-up inspection. In that role, the means are an integral part of the entire surveillance system.

Particular government bodies are given the remit to enforce the regulations in a certain domain, and carry out the surveillance to that purpose. In order to perform their operational task as effective and efficient as possible, they have made choices about what surveillance systems to use, and how to deploy them. This leads to the disparity of the different surveillance systems used: the VMS with its 2-hourly reporting, the VTS radars that only detect large vessels, etc. No single system has the complete overview of all vessels within a certain area; rather, the different existing systems cover different sub-sets of the maritime traffic according to their needs. Still, in order to find all relevant threats and infringements, the availability of a maritime picture that is as complete as possible is instrumental. An obvious way to improve the maritime picture is to combine the information gathered from the different surveillance systems in use by the different authorities: the combination of the different sub-sets of the maritime traffic gathered by each will result in a more complete picture.

Concerning the contribution to the maritime picture from the non-cooperative sensors, it is a given that sensor performance is limited and not all ships can be detected during all conditions. This is especially true for small vessels, as may be used for e.g. drug smuggling, illegal immigration and terrorism. When different sensor systems cover the same area, combining their data will lead to fewer targets being missed. But the more complete the sensor picture becomes, the more targets it includes, and the more difficult it is to know which of those pose a risk or behave illegitimately. Therefore, cooperative data from reporting systems is needed to help recognise the known and compliant ships. Combining data from different reporting systems extends the fraction of known ships, leaving fewer unknown ships in the picture, and reducing the amount of potential risk targets that need closer attention. Therefore, when several authorities perform surveillance in the same area with different systems, integration of their data leads to a more complete and better manageable maritime traffic picture, to the benefit of all.

On the other hand, it should be noted that sometimes it is a deliberate choice not to merge data from surveillance systems, based on cost/benefit and efficiency considerations. The Spanish SIVE system, designed to detect small incoming vessels, is not coupled with the VTS systems that cover some of the same area. This is, presumably, because the large ships that the VTS sees do not give any addition to the much more sensitive picture of SIVE, and the small ships that SIVE sees are not of interest to the VTS operators. These are probably legitimate considerations. (Note, however, that there

is a plan to integrate AIS data in SIVE – this is again justified because the AIS data can be used to identify the harmless ships in the sensor picture.) During the BORTEC study some operators remarked that combining more information together would lead to such a cluttered picture that it becomes unmanageable. This is probably *not* a legitimate reason against integration; rather, technologies have to be developed to automatically manage a more congested maritime picture and support the operators.

Also confidentiality issues can throw up barriers against integration of surveillance data. Imposition of confidentiality can be justifiable on commercial, political, military, crime-fighting or privacy grounds. It is actually implemented to a very variable extent in Member States and EU law.

6.2 Integration of VMS

Integration of VMS data with other maritime surveillance information, in order to obtain a more complete and correct maritime picture, is a difficult issue for several reasons. From the technical point of view, the VMS position reports are infrequent: typically every 2 hours. For some ships, areas or time periods more frequent: every 1 hour, 30 minutes or 15 minutes. But in other circumstances the frequency can even be lower: e.g. 4- or 6-hourly in the NEAFC fisheries convention region. This low update rate means that vessel positions at intermediate times need to be interpolated, and positions after the most recent VMS report need to be extrapolated. Although course and speed are available to constrain the inter- and extrapolations, this is of limited value because, unlike merchant ships, the fishing ships tend to change course and speed frequently. Uncertainties in VMS vessel positions due to this inter- or extrapolation make it difficult to associate these with vessel positions from other sources such as satellite or airborne radar.

The other difficulty is from the administrative side. VMS data are subject to confidentiality, and usually only the authorities appointed for fisheries monitoring are allowed to routinely access these data. The BORTEC report contains some information about the sharing of VMS data between authorities; this is included in Annex II and can be summarised as follows:

Country	**Sharing of VMS data**
Portugal	VMS data are available to three other authorities
Spain	BORTEC report: no information. Private communication: VMS data are available to other authorities on request in cases where they are needed
France	VMS data are displayed on a separate screen at the MRCC
Italy	VMS data are combined with VTMIS
Slovenia	Planned: VMS data are integrated with VTS
Malta	Planned: VMS data are integrated with radar picture of patrol means of Armed Forces
Greece	(no information)
Cyprus	VMS data are accessible by the Police on a different screen

It can be seen that (a) There is some cross-use of VMS data but it is quite limited, certainly not fully integrated or accessible by a wide variety of authorities; (b) There are some plans for deeper integration; (c) The information provided in the BORTEC report about the sharing practices of VMS data is actually quite limited: the contents of the above table essentially reflect all that is said. Many detailed questions remain unanswered, e.g. as to the reasons for the lack of integration (technical, legal, operational, cost, interest, ...) and the conditions for access. It should also be noted that the shared data only refers to those VMS reports that a country has access to in the first place, namely those of its flag and its coastal waters. Italian authorities, for example, would not have access to VMS reports of French vessels fishing in international waters.

The VMS evaluation report of 2006 mentioned in section 2 notes that while most MS have the infrastructure in place to gather VMS data, the use of VMS as monitoring, control and surveillance tool is very sporadic and manual. So, given that this surveillance system rarely is used to its full potential, it will be a challenge to extend its use even further to support also other authorities. At the same time, however, the infrastructure for routine cross-MS data exchange (when a vessel is in waters of another country) is very far developed in comparison to the other surveillance systems.

6.3 Integration of AIS and VTS

On the basis of the Community vessel traffic monitoring and information system directive, EU-wide integration of AIS and VTS is rapidly proceeding under the aegis of EMSA, with SafeSeaNet and SRIT that have been discussed. In addition, neighbouring countries have and are setting up regional AIS networks, and also commercial providers offer networked AIS data[16]. It is interesting to note that authorities are rather reluctant to share AIS data to third parties, quite contrary to the commercial networks. Considering the broadcast nature of AIS, this might seem somewhat surprising; the legal aspects of broadcast information need to be clarified.

6.4 Summary of integration mentioned in the BORTEC report

Annex II gives all the cross-links between surveillance systems and authorities involved that are mentioned in the BORTEC report. It can be of interest to make a short overview of that.

State of integration	Countries	Details
No or little cooperation	Portugal, Spain, Italy	
Different authorities are involved with the same system	Cyprus	Dept. of merchant shipping, Police and Navy use the same radar
	Malta	Maritime authority and Armed Forces use the same VTS
	Slovenia	Police and Maritime administration use the same radar
Integrated systems are in use	France	SPATIONAV combining many sub-systems and authorities
Integrated systems are planned	Portugal	Maritime Operations Centre to integrate data from different authorities. New Border police system to be interoperable with other authorities
	Spain	Integrate AIS into SIVE
	Italy	System of Border police to integrate data from other authorities
	Slovenia	Integrate VMS into VTS
	Malta	Integrate VMS into radar
	Greece	Expansion of VTS to serve both shipping and border control

Taken together with the table on VMS above, this table is intended to be a near-complete summary of all information in the BORTEC report about integrated systems and data exchange between authorities. The BORTEC report is based on information that was gathered from the MS in question during the period October-November 2006, so in the one year since some developments will have taken place.

[16] E.g., www.aislive.com

Annex I. Summary of STMID data

This annex gives a brief listing of the information in the Shore-based Traffic Monitoring Infrastructure Database (STMID) that EMSA compiles based on Member States inputs.

The main categories and sub-categories of data contained in STMID are:

AIS:
- AIS Stations – Coastal AIS receivers
- AIS Servers – Network nodes where AIS data is collected and routed
- AIS Centres – National centres where AIS data is brought together

SSN:
- SSN National Contact Points – One per MS
- SSN Alerts Centres – For SSN alert messages
- SSN Local Competent Authorities
- SSN Users

Search & rescue and assistance:
- SAR Centres
- Maritime Assistance Service (MAS) – A service provided by the SAR centres

VTS:
- Traffic services
- Traffic Separation Schemes
- Calling-in Points – Boundaries of VTS control areas

As most of this information has a geographical attribute (physical location), the data is suited for storing, handling and displaying in a GIS. As an example, some more details are given here on AIS Centres and Stations.

The following table lists information on AIS: the authority or location of the AIS Centre, and the number of AIS Stations.

	AIS Centre: authority or location	**# AIS Stations**
IS	Icelandic Maritime Administration	15 (covering coast)
NO	Kystverket Vest	44 (some on cont. shelf, controlled by companies but w gov't access)
SE		37 (some inland)
FI	5: Bothnia NMR, Westcoast NMR, Archipelago NMR, Helsinki NMR, Saimaa NMR	31 (some inland)
EE		13* (covering coast & islands)
LV	Riga MRCC	8 (covering coast)
LT		3 (covering coast)
PL	2: VTS Gulf of Gdansk, VTMS Szczecin Swinoujscie	13 (covering coast)
DE		36 (covering coast)
DK	AIS DK	18 (covering coast)
NL	NL Coast Guard	26* (covering coast and all cont. shelf)
BE	6 VTS centres: Zandvliet, Hansweert, Vlissingen, Terneuzen, Zeebrugge; MRCC Oostende	8 (covering coast and along rivers)
FR	3 CROSS: Griz-Nez, Jobourg, CORSEN	65
UK		52
IE		16
ES		35
PT	7 VTS: Leixoes, Lisboa, Setubal, Sines; Aveiro, Paco de Arcos, Ferragudo	16 (covering coast)
IT	Coast Guard HQ	41 (along coast and islands, not fully covering)
SI	MRCC Koper	1 (Mt Slavnik)
MT		5 (covering)
EL		60 (distributed on coast and islands)

CY	VTMIS Cyprus Centre	8 (covering coast)
BG		6
RO	Constanta	3 (covering coast)

* data not updated in 2007

A map of AIS Stations based on data processed until July 2007. The maritime boundaries on this map are for orientation purpose only. They are boundaries submitted by the MS, but of mixed types: EEZ, Search & Rescue Region, Environmental or Fisheries Protection Zone, etc.

Annex II. Summary of BORTEC report (unclassified)

The BORTEC study on technical feasibility for a surveillance system for the southern European maritime border was carried out by Frontex in the second half of 2006. The study made a thorough analysis of existing maritime surveillance systems and operators in Portugal, Spain, France, Italy, Slovenia, Malta, Greece and Cyprus. It has resulted in a report classified as confidential[5] and a public summary. This annex gives an (unclassified) overview of the surveillance systems and organisations from the classified BORTEC report (which is not included in the public excerpt). All information considered confidential or restricted has been excluded.

In the following, for each of the countries (that appear in alphabetic order) all information is summarised in two tables. The first table lists the authorities involved in maritime surveillance and their responsibilities. The second table lists the systems for maritime surveillance, specifying the national authority that owns / operates them, their purpose, other authorities that use the information, and cross-links with other systems and users.

Information in the BORTEC report that is relevant but not included here because it is classified, relates to the components of the systems (types of sensors), how the systems operate, and information about their range and geographical coverage. Concerning means, with which is meant patrol boats, aircraft or vehicles, the BORTEC report gives exact numbers and types. Also this quantitative information is not included here. It is only mentioned which authorities are deploying means, and whether they are naval, aerial of land-based.

Items with an asterisk * are planned for the future (i.e., from 2007 onward).

The BORTEC report is based on information that was gathered from the MS in question during the period October-November 2006; in the one year since, developments have already taken place, but they are not reflected in this summary.

Cyprus

Local acronyms
ACRS Advance Coastal Radar for Surveillance

Authority	**Responsibility**
Police	Patrol Territorial waters and adjacent High seas. Radars.
Port authority	VTS
Dept. merchant shipping	AIS
Fisheries department	VMS

System	**Owner authority**	**Purpose**	**Other authority**	**Cross-links**
Coastal radar: ACRS plus AIS*	Radar: Navy ? AIS*: Dept. merchant shipping.	Law enforcement.	Police (user).	Involvement of 3 authorities: Navy, Police, Dept. merchant shipping.
VTS	Local port authorities. Dept. Merchant Shipping (AIS receivers)*.	Traffic monitoring.		Involvement of 2 authorities: Port authorities, Dept. merchant shipping.
VMS	Fisheries Dept / FMC Nicosia.	Monitor 28 fishing vessels under Cyprus flag.		Police can see VMS on different screen beside ACRS.
VTMIS*	Dept. merchant shipping. *	Traffic monitoring, collecting info, disseminating to concerned authorities. *		Combine ACRS and VTS. Provide the picture to Police OC, to SSN, to JRCC, other authorities as needed. *
Patrol means	Police.	Patrol.		

*: planned

France

Authority	Responsibility
Navy [$]	Patrol beyond 24 nm (and also inside for sovereignty purposes)
Gendarmerie maritime [$]	
Customs [$]	Patrol inside 24 nm
Maritime affairs [$]	
Gendarmerie nationale	Land patrolling and off shore to 5 nm.
Civil security	
3 Maritime prefects [$]	(East channel / North sea, West channel / Atlantic, Med.) Manage deployment and coordination of naval and air means.
$	Inter-agency cooperation for surveillance of maritime approaches.

System	Owner authority	Purpose	Other authority (role)	Cross-links
SPATIONAV	Navy	Integrated surveillance of maritime approaches for quick response, common RT picture.	Customs, Maritime affairs, Gendarmerie maritime, Port authorities, MRCC (users).	Inter-agency cooperation of: Navy, Customs, Maritime affairs, Gendarmerie maritime. Common picture is provided to: Customs HQ (Marseille), MRCC (Maritime affairs, near Toulon), OpsHQ Gendarmerie maritime (Toulon), Inter-ministerial CC at Navy (Paris).
SPATIONAV V1*	Common architecture between Maritime affairs and Navy. *		Share picture with Customs. *	Web access via "SpatioWeb". *
SPATIONAV V2*			Open to other users incl. EU. *	
VTS / MRCC	Maritime affairs	A.o., control TSS in Channel and Atlantic approach.		
VTS / Signal station	Maritime affairs.			
V-RMTC	Navy.	Exchange unclassified info on merchant vessel traffic. Enhance Med Sea Navies cooperation.	Gendarmerie maritime?	
VMS	Maritime affairs	Monitor French flagged fishing vessels and foreign ones in French EEZ.		All MRCC have access to VMS.
TRAFIC 2000	Maritime affairs.	Maritime safety; support port facilities & port state control.	Used at MRCCs, ports, Customs OC Rouen and at the 3 Maritime prefects (Cherbourg – East Channel / North Sea, Brest – West Channel / Atlantic, Toulon – Med).	Connect with SafeSeaNet and other DB systems.
Patrol means	Navy	Forward surveillance.		3 Maritime prefects manage deployments. Some aircraft to be RT-2-way-linked to SPATIONAV V1.
Patrol means	Customs			3 Maritime prefects manage deployments
Patrol means	Gendarmerie nationale			3 Maritime prefects manage deployments
Patrol means	Gendarmerie maritime			
Patrol means	Maritime affairs			
Patrol means	Civil security			

*: planned

Greece

Authority	Responsibility
Ministry of Mercantile Marine	Administrate patrolling of (mainly) High Seas
Coast Guard (resorts under Ministry of Mercantile Marine)	VTMIS, VMS, AIS, means (air/naval/land)
Port Authorities (under Coast Guard supervision)	Administrate patrolling of local Territorial waters
Navy	Patrolling for military purpose over High Seas and, secondarily, Territorial waters. Radars, AIS, observation posts, means (air/naval).
Army	Observation posts and Land.
Police	Land

System	Owner authority	Purpose	Other authority	Cross-links
VTS / VTMIS	Coast Guard.	Facilitate vessel traffic, prevent accidents and pollution, support SAR, support combat illegal activities.	Data sent to Port authorities and other CAs.	
VTS/VTMIS expansion*	Coast Guard *	Importance to fight of illegal activities at sea. *		ATICS study on the use of VTMIS for surveillance (now).
AIS	1. Those by Coast Guard part of VTS / VTMIS. 2. Some by Navy.			CG and Navy AIS stations will be complementary to form a network that covers all Greece.
VMS	Coast Guard or Ministry of Mercantile Marine?	Monitor (24h) 650 Greek flag fishing ships in territorial waters and 25 near West Africa.		
Navy radars	Navy			
Observation posts	Navy. Army.			
Patrol means	Ministry of Mercantile Marine	Mainly high seas		
Patrol means	Coast Guard and Port Authorities.			Coast Guard C2 centre* will cooperate with JRCC and Armed Forces centres.
Patrol means	Navy.	Military purpose, NATO, EU. Support CG.		
Shoreline patrol	Coast Guard, Police, Army.			

*: planned

Italy

Authority	Responsibility
Guardia di Finanza	Coordinating activities of all national means patrolling against illegal immigration <= 24 nm off coast.
Navy	Coordinating activities of all national means patrolling against illegal immigration > 24 nm off coast (international waters).
Coast Guard	Coordinating SAR at sea.
Min. Interior – Immigration and Border Police Directorate	Illegal immigration over sea – overall coordination of all activities and analysis of all information from the other authorities.
Min. Interior – Prefect (local authority)	Coordination of regional patrol plans (incl. continuity land - sea).

System	Owner authority	Purpose	Other authority	Cross-links
C4I	Guardia di Finanza	Coordinate the surveillance activities of the Guardia di Finanza at sea, which are aimed at combating illegal activities. Strategic management (planning etc.). Tactical C&C. Assignment of C&C to local OC.		
Coastal radar GF*	Guardia di Finanza *	Integrated advanced police system for coastal surveillance. *		
MCCIS	Navy	C4I for maritime assets. A.o. used for control of illegal immigration.		
Coastal radar Navy	Navy			Future: connect Coastal Surveillance OC with other CAs. *
V-RMTC	Navy	Exchange unclassified info on merchant vessel traffic. Enhance Med Sea Navies cooperation.		Integrates vessel traffic data (AIS?) of various countries
VTMIS	Coast Guard	Enhancing safety and efficiency of maritime traffic, improve emergency response.		Interoperable with SSN. Web access. Integration with SAR / GMDSS. Future objective: support coordinated actions of various CAs. *
ARES	Coast Guard	Automated reporting system for Italian-flag merchant vessels >1600 GT anywhere in the world.		
ADRIREP	Coast Guard	Adriatic Sea International Reporting System		Feeds into VTMIS
SSAS	Coast Guard	Ship Security Alert System		
VMS	Coast Guard			Integration of VMS and VTMIS allows CG to find fishing vessels w/o blue box.
New integrating system of Min. Interior*	Min. Interior – Immigration and Border Police Directorate *	Integrate data from all surveillance systems, for combating illegal immigration. *		Combines various systems *
Patrol means	Guardia di Finanza	1. Surveillance of major routes from High Seas to Territorial waters. 2. Surveillance of Territorial waters, sometimes out in Contiguous zone.		
Patrol means	Navy	Navy's means under CINCNAV have combating illegal immigration as secondary mission.		
Patrol means	Coast Guard			

*: planned

Malta

Authority	Responsibility
Armed Forces	Coastal VTS, patrols (air/naval).
Maritime Authority	Port VTS

System	Owner authority	Purpose	Other authorities	Cross-links
VTS	1. Maritime authority. 2. Armed Forces Malta.	Vessel traffic safety. Secondary, surveillance of Territorial waters to 12 nm.		
VMS		15-17 Maltese vessels are equipped.		
Patrol means AFM	Armed Forces Malta	Patrol mainly Territorial waters and Contiguous zone (to 24 nm) for SAR and immigration.		Future plan to integrate VMS with radar picture*.

*: planned

Portugal

Local acronyms
LAOS Long Arm Operational System
GNR Guarda Nacional Republicana

Authority	Responsibility
Guarda Nacional Republicana – Brigada Fiscal	Patrol to 12 (or 24?) nm. LAOS system. Land means.
Frontier and Aliens Service SEF	Patrol.
Ports and Maritime Transport Institute IPTM	VTS, AIS.
Maritime Police (branch of Navy)	Land and naval means. Jurisdiction between 50 m inland to 200 nm out.
Navy	Naval means
Air Force	Aircraft.

System	Owner authority	Purpose	Other authorities	Cross-links
LAOS	Guarda Nacional Republicana (GNR)	Systematic coverage of coastline against smuggling, environmental protection, illegal immigration and internal security.		
SIVICC*		To replace LAOS by 2007. Detect illegal activities, surveillance and tracking of suspect vessels, systematic data collection to build database of maritime traffic and illegal activities, support daily operational activity with RT links. *		Designed for interoperability with external entities. *
Maritime Operations Centre*	National Maritime Authority*	Fully integrated recognised maritime picture*	Relevant national and foreign authorities.*	Integrates data from other authorities. *
VTS	Ports and Maritime Transport Institute			
VMS	Fisheries Directorate General	Monitoring fishing vessels.		Available to Navy, Maritime authority and GNR
MCCIS	Navy	Collect shipping data for MDA.		
V-RMTC	Navy			
MRCC				There seems to be a link to MCCIS.
Patrol means	Maritime Police	Enforce the law at sea.		
Patrol means	GNR			
Patrol means	Air Force	Fisheries control, pollution, SAR.		
Navy				

*: planned

Slovenia

Authority	Responsibility
Police	not explicitly mentioned
Maritime administration	not explicitly mentioned
MRCC	not specified at all
Civil protection	not specified at all
Military (430. naval division)	not specified at all

System	Owner authority	Purpose	Other authorities	Cross-links
Police system	Police		Both Police and Maritime administration can set radar range w/o mutual interference (this seems to imply that only the display is adjusted, not the actual sensor parameters).	
VHF ship reporting system	Maritime administration	For vessels carrying hazardous or polluting material in Adriatic (MoU 19/5/2000 Slovenia, Croatia, Italy).		
VTS	Maritime administration	Monitor vessel traffic.	The Police radar is used by the Maritime administration for VTS.	Full integration with VMS* and SSN*.
EPIS maritime information system *	Maritime administration – Maritime operative cooperation group *	Coordination of services at sea.		
VMS	FMC			
Maritime operative centre	430. naval division			
Patrol means	Police	Surveillance		
Patrol means	Maritime administration	Maritime surveillance		

*: planned

Spain

Authority	Responsibility
Guardia Civil	In charge of all police tasks at sea (elsewhere: in territorial waters). SIVE; air, sea and naval means
SASEMAR (under Directorate of Mercantile Marine)	VTS, AIS. Search & Rescue and pollution.
Navy and Air Force	Surveillance of whole sea territory for sovereignty.
Regional Coordination Centre Las Palmas	Coordination of all surveillance activities with all authorities involved.

System	Owner authority	Purpose	Other authorities	Cross-links
SIVE	Guardia Civil	Surveillance and interception of illegal activities, especially immigration and drug trafficking. Detect and identify targets aiming at illegal activities with enough time to allow interception, within a defined sea area.		
VTS	SASEMAR	Traffic management		Communication between SASEMAR and SIVE in case of alert or incident.
AIS	SASEMAR		Navy will be user. *	SIVE OCs will receive the AIS data. *
Patrol means	Guardia Civil			
Patrol means	SASEMAR			
Patrol means	Navy			
Patrol means	Air Force Search & Rescue unit			

*: planned