VESSEL TRAFFIC MONITORING AND INFORMATION SYSTEM; REASONS OF ESTABLISHING AND PRINCIPLES OF OPERATION

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ABSTRACT

In this paper, an attempt has been made to present and discuss the main issues of the Vessel Traffic, Monitoring and Information System (VTMIS). The VTMIS is the regional system being now developed by the European Union for its maritime areas. The main objective of this System is to ensure the proper level of maritime safety and antiterrorist security.

KEY WORDS

1. Vessel Traffic Monitoring and Information System (VTMIS), 2. Maritime safety and security, 3. Shipping.

INTRODUCTION

Below, there are made the assumptions and given the definitions of the basic terms regarding the subject of this paper.

The term "ship" means: "any vessel of considerable size navigating deep water, especially, one powered by the engine and larger than boat" [9].
The term "vessel" means: "boat or ship, especially relatively large one" [9].

The term "shipping", according to, means "the ships collectively, as of nation, ports, etc., especially with reference to the tonnage". In this paper, it has been assumed that term "shipping" is expressed by the following kinds of activities:

- **transporting the goods and person at sea,**
- **serving the whole maritime transport and related activities by ports,**
- **sea tourism,**
- **sea sports',**
- **activities at sea for ensuring and maintaining the maritime safety for all the ships, and for all maritime activities.**

Below, there are presented the following issues:

- **the substance of the VTMIS and reasons for its establishing,**
- **national VTMIS, its components systems and their features and characteristics.**

1. THE SUBSTANCE OF THE VESSEL TRAFFIC MONITORING AND INFORMATION SYSTEM

The establishing the European Union's VTMIS has been begun in 2002 on the ground of the Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002. There were many reasons for setting up the VTMIS. However, the most important and immediate reason was the catastrophe of tanker Erica that took place 40 miles off coast Brittany on 12 December 1999. In that day, the above mentioned tanker has been broken in two parts and 10 000 tons of heavy fuel oil were spilt.

As the result of investigation, many proposals were formulated, that are know as the "Erika 1 and Erica 2 safety packages". The most important of these proposals recommended to establish the VTMIS for EU's maritime waters. On that basis the above mentioned Directive has been passed. According to this Directive, the main function of the VTMIS has been formulated as follows:

- **setting up a Community Vessel Traffic Monitoring and Information System should help to prevent accidents and pollution of sea and to minimize their impact on the marine and coastal environment, and on the economy and health of the local communities.**

However, it should be emphasized that VTMIS, almost since the beginning of its setting up, began also to realize the second, very important function that can be expressed as follows:

- **to facilitate the antiterrorist security of shipping on the EU's maritime areas and prevent the using the ships for terrorist needs.**

2. NATIONAL VTMIS, ITS COMPONENT SYSTEMS AND THEIR FEATURES AND CHARACTERISTICS

The VTMIS is one of the most important system among other component systems constituting the maritime safety system. However, the VTMIS is not also a homogeneous system but is composed of six component systems constituting the VTMIS system; these are:

- **VTS system, i.e. Vessel Traffic Services system,**
- **AIS system, i.e. Automatic Identification System,**
- **SRS, i.e. Ships Reporting System,**
- **SafeSeaNet, i. e. Safe Sea Net System,**
- **Maritime Assistance Services (MAS) system, and,**
- **Long Range Identification and Tracking (LRIT) system being now established.**

The operational environment for VTMIS constitutes two global systems, these are:

- **Global Navigation Satellite System (GNSS),**
- **Global Maritime Distress and Safety System (GMDSS).**

In the Fig.1 there is shown the VTMIS, its three component system (VTS, AIS, SRS) and the VTMIS assistance systems (GNSS, GMDSS).

The VTS system, as shown in Fig.1, is the local autonomous system. It means that this system has not to be assisted by the GNSS and GMDSS.

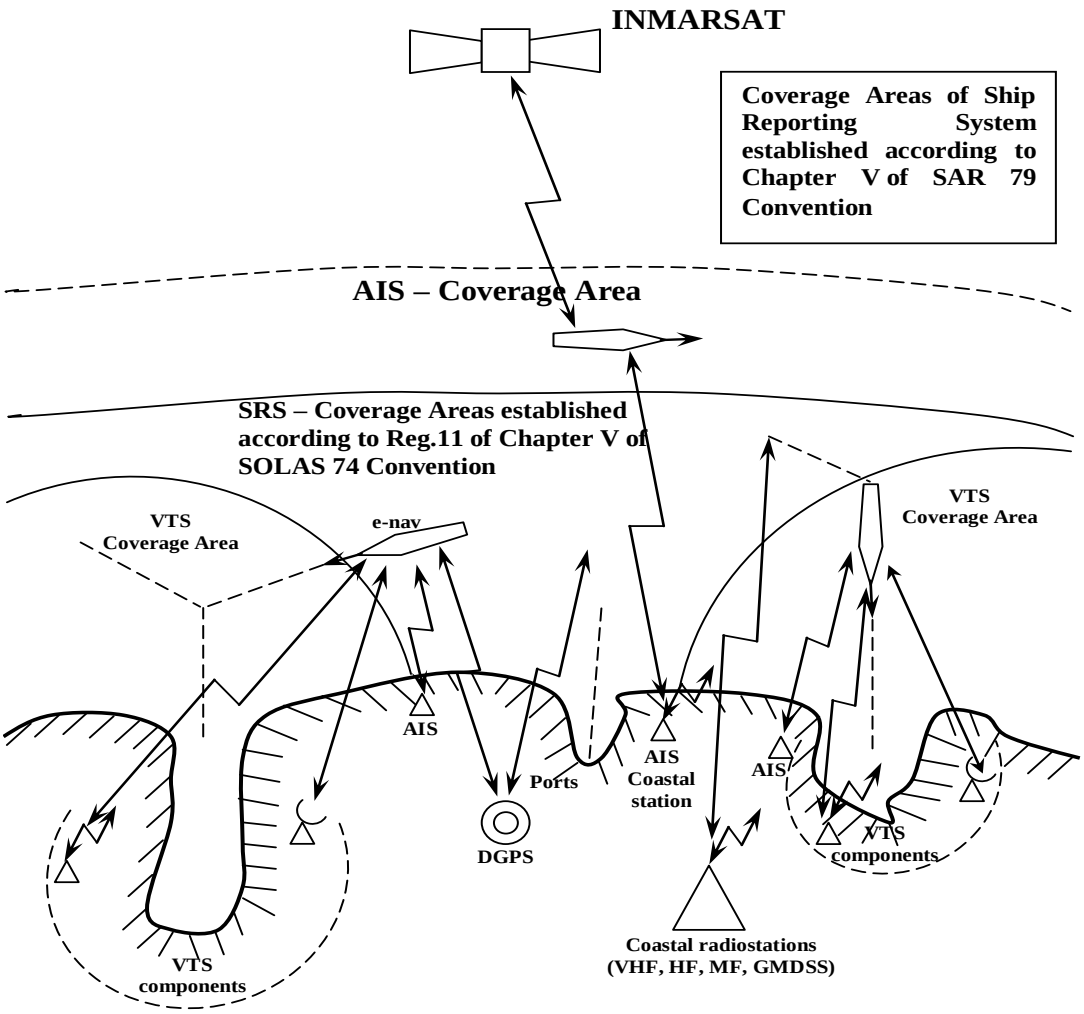

Fig. 1. VTMIS, its component systems (VTS, AIS, SRS) and its assistance systems (DGPS, INMARSAT and Coastal radiostations VHF, HF, MF).

2.1 The Tasks and Performance Characteristics of the VTS System

This system has been begun to be developed immediately after the World War II. However, only in the middle of 1980s the VTS has achieved today's stage of development and only then IMO has passed the proper resolution (Resolution A.578(14) on Guidelines for Vessel Traffic Services (1985)).

In the Fig. 2, there are shown the main components of the VTS system. They are the following components:

- **set of the maritime radars creating the VTS-Coverage Area,**
- **radiocommunication VHF coastal station (or stations),**
- **VTS-Management Control Center (VTS MCC),**
- **ships approaching, entering and leaving ports.**

The radars are connected with VTS MCC by the means of radio links or light pipes.
The main objective of the VTS system can be expressed as follows:

- **to increase traffic capacities in the restricted areas,**
- **to decrease the danger of collisions, and grounding in restricted waters,**

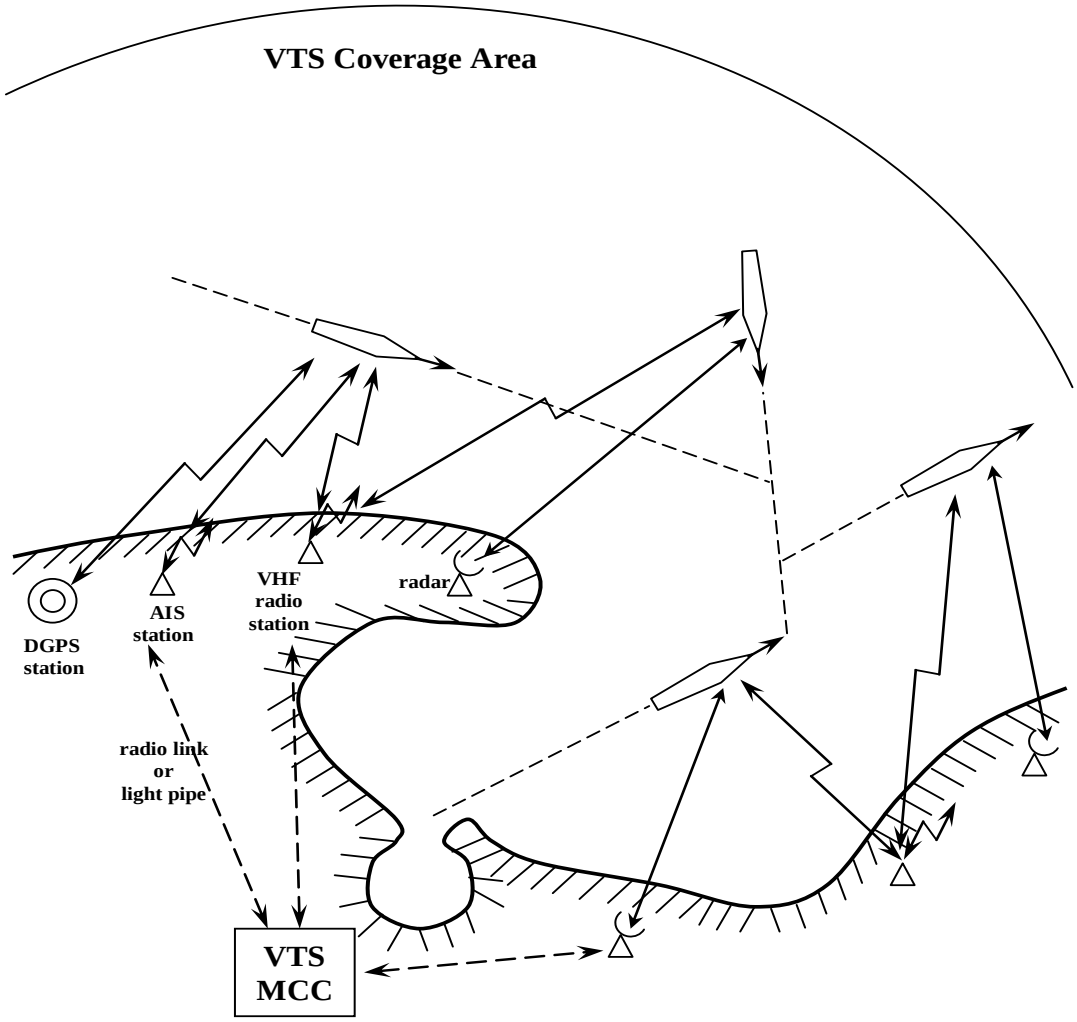

Fig. 2. The main components of the VTS System.

- **to increase the protection of marine environment from pollution,**
- **to increase the economical efficiency of the port's activities.**

The VTS System provides, as a rule, the following services:

- **information service,**
- **navigational assistance service,**
- **traffic organization service**
- **co-operation with allied services and adjacent VTS**

2.2 The Tasks and Performance Characteristics of the Automatic Identification System (AIS)

The Automatic Identification System (AIS), as shown in Fig.2, is the area system. This system is being assisted by the GNSS (DGPS) and GMDSS.

According to the provision 19.2.4 of Chapter V Safety of Navigation of the International Convention SOLAS 74, entered into force on 1 July 2002, all ships of 300 gross tonnages and over shall be fitted with the automatic identification system, i.e. with shipborne AIS.

In Fig. 3, there are shown the main components of the AIS system; these are:

- **AIS shore based stations,**
- **AIS shipborne stations,**
- **AIS Management Control Center (AIS MCC),**
- **AIS assistance systems (GNSS, GMDSS).**

According to the above mentioned provision 19.2.4, the shipborne AIS station shall:

- **provide automatically to appropriate equipped shore stations, other ships and aircraft, information, including ship's identify, her type, position, course, speed, navigational status and other safety related information,**
- **receive automatically such information from similar fitted ships,**
- **monitor and track ships, and**
- **exchange data with shore based facilities.**

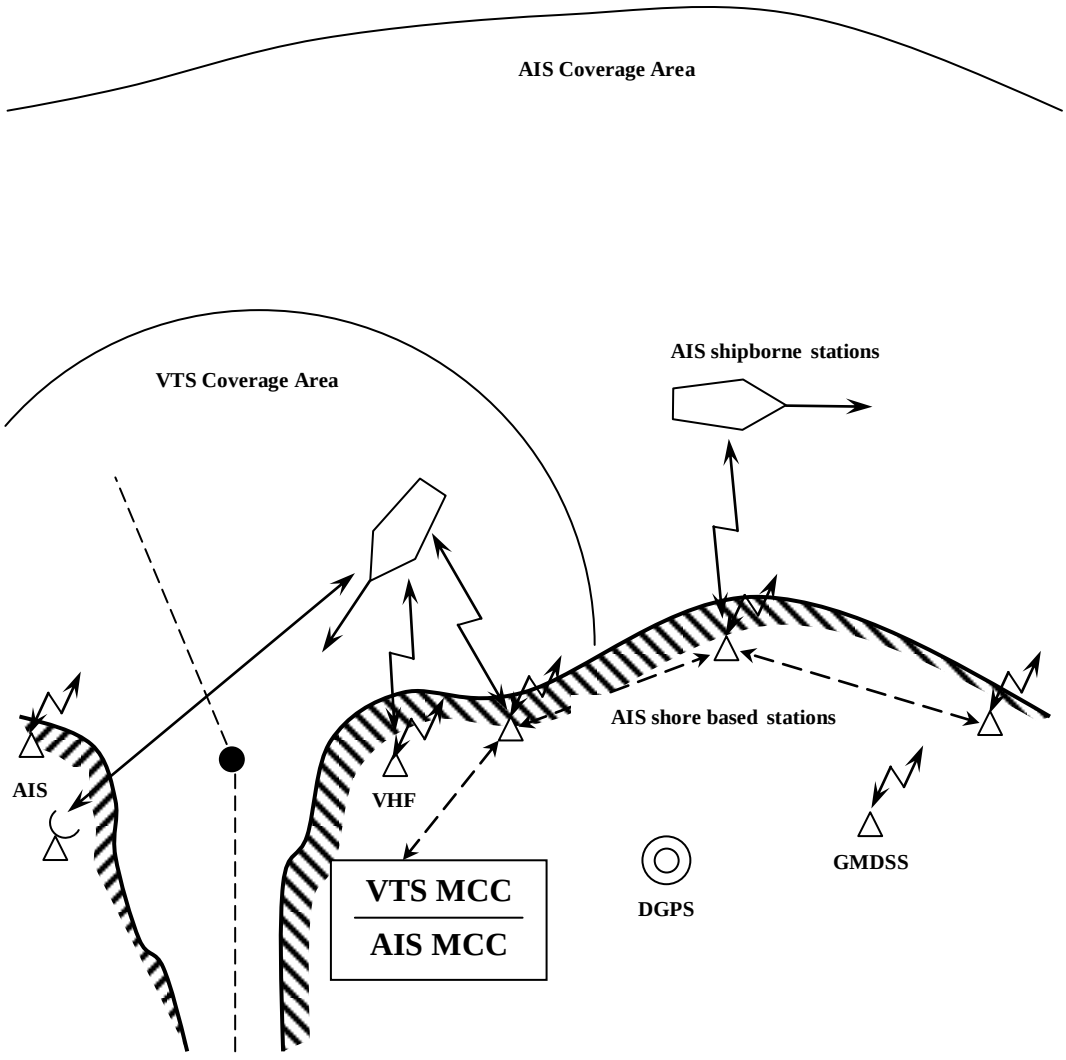

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Fig. 3. The main components of the Automatic Identification System (AIS).

The emission rate of the shiporne AIS station is very high. Time interval between the following emissions constitute from 2 second, to 10 seconds, in accordance with the requirements regarding particular kinds of ships.

2.3 The Tasks and Performance Characteristics of the Ship Reporting System (SRS) and of the Safe Sea Net (SafeSeaNet) System

The Ship Reporting System (SRS) is not the system like VTS or AIS that is composed of the technical equipment such as transponders, etc. The SRS is the "procedures" system, i.e. system defined only by processes and procedures, as well as regulations regarding the situations and ways how the prescribed processes and procedures should be realized.

The provisions of Chapter V of the International Convention on Search and Rescue (SAR 79) demand the contracting government to establish the Ship Reporting Systems to improve the efficiency of search and rescue operations (cf. Fig.1).

The second reasons of development the SRS are demands to ensure the protection of marine environment from pollution. The other very important reason for developing the SRS, were the VTS systems that besides their own Reporting Systems, close cooperate with the Ports and Harbours Reporting Systems.

In 1983 the IMO adopted first resolution (A.531(13)) on General Principles for Ship Reporting System. This resolution established a standard reporting format of letter which refer to specific information.

In following years, the Guidelines on Ship Reporting System were amended some times.

Until the mid-1990 Ship Reporting System had been voluntary, but in 1994 IMO adopted an amendment to SOLAS 74 convention, i.e. the Regulation 11 of Chapter V, that has made possible to establish also the mandatory ship reporting systems.

The Safe Sea Net (SafeSeaNet) system is now (2006) being established system. According to the dimension of maritime areas, there will be three main kinds of SafeSeaNet systems; these are:

- **national,**
- **regional,**
- **European (EU).**

The SafeSeaNet system system is the electronic reporting and information system, of mandatory use for ships arriving and departing State's Regional, European ports [3]. This system will be mandatory for the following kind of ships:

- **ships over 300 gross tonnage,**
- **fishing vessels, traditional ships and recreational craft with the length 45 m and over,**
- **all ships carrying hazardous or polluting goods, regardless of size.**

The data sources of the SafeSeaNet Management Control Center are all the Ports and Harbours Authorities, more precisely, all the ports' reporting systems.

2.4 The Tasks and Performance Characteristics of the Maritime Assistance Services (MAS) System

The Maritime Assistance Services (MAS) system is now being established on the ground of the IMO's Resolution A.950(23) adopted on 5 December 2005.

The circumstances of a ship's operation that involve a MAS are not those requiring rescue of persons.
The following situations can arise the need of the MAS involvement:

- **ship is involved in incident but this accident does not impair seakeeping ability but this incident should be reported,**
- **the ship is in distress situation but persons on board have already been rescued.**

The establishing of MAS does not necessarily entail a setting a new organization. The MAS functions can be allocated to the Maritime Rescue Coordination Center (MRCC).
The duties of MAS are the following:

- **to receive the reports regarding consultations and notifications being provided by the relevant IMO instruments,**
- **to monitor ship's situation,**
- **to serve as a point of contact between the master and coastal State if the ship's situation requires exchange of information.**

It should be stressed that the MAS system remains in close connection with the other IMO's resolution, i.e. Resolution A.949(23) on establishing the maritime safety place of refuge. The reasons for both resolutions, i.e. on MAS system and on maritime safety place of refuge, was the catastrophe of oil tanker PRESTIGE on 14th November 2002 when 77 000 tonns of oil had been spilt.

2.5 The Tasks and Performance Characteristics of the Long Range Identification and Tracking (LRIT) System

The Long Range Identification and Tracking (LRIT) system is now (2007) being established.

Proposals for long-range identification and tracking of ships, as a means of enhancing maritime security were discussed during the development of the special measures to enhance maritime security which were adopted by the SOLAS Conference held in London in December 2002. This matter constitutes one of very important issues of the whole "Security Package" developed in the aftermath of the September 11 2001 events.

After many discussions the agreement has been reached that the LRIT will be used not only for the security purposes but also for safety and environmental reasons especially for search and rescue purposes. The LRIT is close to be a world wide system since there is no limit for flag States and port States to track ships. The limit for coastal States has been fixed at 1000 nautical miles from coasts.

The Maritime Safety Committee (MSC) at its 81st session in May 2006 adopted new regulation for Chapter V Safety of Navigation of the SOLAS 74 Convention, i.e. Regulation 19-1 – Long-range identification and tracking of ships. This regulation has been introduced the LRIT as a mandatory requirement for the following ships on international voyages: passenger ships, including high-speed craft of 300 gross tonnage

and upwards; and mobile offshore drilling units. This regulation is expected to enter into force on 1 January 2008.

CONCLUSIONS

The European Vessel Traffic Monitoring and Information System (VTMIS) constitutes one of the very important system for ensuring the safety of life and property, marine environment protection, and antiterrorist security of shipping on the EU's maritime areas.

It should be also emphasized that Poland, being the Member State of EU, fulfils all its commitments regarding the establishing the national Vessel Traffic Monitoring and Information System (VTMIS) even before the appointed time.

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