Journal of Digital Contents Society Vol. 16 No. 6 Dec. 2015(pp. 871-882)
http://dx.doi.org/10.9728/dcs.2015.16.6.871

차세대 해상디지털통신기술 ASM2.0을 이용한 여객선 MSP서비스 시스템 설계 및 구현

김길용*, 김도연**, 이서정***

요 약

AIS-ASM은 AIS의 고유 기능인 선박의 위치 정보 외에 다양한 해양안전정보를 제공하기 위한 연구 중 하나로, 2004년부터 관련 규정을 정비하여 진행 중이다. 하지만 AIS 메시지 사용량 증가에 따라 기존 AIS 채널에서 ASM을 사용하는 것은 기존의 선박위치정보 전송 등의 안전메시지 처리 부분에 영향을 줄 것으로 보고된 바 있고, 기존 AIS의 낮은 통신속도로는 원활한 MSP 서비스가 어렵기 때문에 ITU-R은 VHF 대역을 이용하는 해상디지털 무선통신 권고서를 제정하고 개정작업을 진행하였다. 본 연구는 차세대 해상디지털 통신 기술인 ASM2.0을 활용하여 여객선의 출항에서 입항까지 안전항해를 위해 필요한 국내 여객선 선장의 의무보고 내용을 조사하고 업무 부하를 줄이기 위해 자동화 할 수 있는 부분을 자동화하는데 목적이 있으며, 국내 여객선 운항 관련 법규를 조사하여 상호 교환해야 하는 정보를 도출하고 국제적으로 사용하고 있는 AIS-ASM 메시지 분석을 통해 ASM2.0에서 활용하기 위한 신규 프로토콜을 설계하고 프로토타입을 구현하였다.

키워드 : 이내비게이션, 선박자동식별장치, ASM(Application Specific Message), VDES(VHF Data Exchange System), 여객선 운항

Design and realization of the passenger ship’s MSP service system using ASM2.0 : focusing on captain’s mandatory reporting items

Kilyong Kim*, Do-yeon Kim**, Seojeong Lee***

Abstract

AIS-ASM is one of the studies to provide a variety of maritime safety information as well as the information on a ship’s position that is their own function, and AIS-ASM has been implemented with adjustment of the relevant regulations since 2004. However, it was reported that the increased use of ASM message on the existing AIS channel affects the part of the existing AIS own function such as the transmission of the ship’s position and safe-related information. Also, seamless MSP service is difficult to provide at a low transmission rate of the existing AIS channel. This study aims to reduce the marine officer’s workload through automating captain’s mandatory reporting items using the one of the next maritime digital communication technology (ASM2.0). For this purpose, we designed and realized the ASM2.0 protocol through analyzing domestic regulations about passenger flight and AIS-ASM message.

Keywords : e-Navigation, AIS, ASM(Application Specific Message), VDES(VHF Data Exchange System), Passenger ship

※ Corresponding Author : Seojeong Lee
Received : December 01, 2015
Revised : December 24, 2015
Accepted : December 28, 2015
*, ** GMT Co., Ltd. Research Planning & Development Team
*** Korea Maritime and Ocean University, Division of Maritime IT Engineering
Tel: +82-51-405-4888
email: kmousqa@gmail.com
▣ This study was financially supported by “Development of digital communication and service technologies for safe marine navigation” project of

1. Introduction

Recently, as every country operates command and control centers to prevent and monitor an occurrence of marine accidents, these accidents have significantly decreased domestically and overseas. However, the scale of accidents are becoming larger and larger. In particular, marine accidents cause severe damage in terms of economy, environment and loss of human lives because of the peculiarities of marine environment, compared to general land accidents (Lee, 2013; Shin, 2014).

To tackle these problems, the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) under International Maritime Organization (IMO) and International Association of Lighthouse Authorities (IALA) are trying to develop an e-Navigation strategy to secure safe navigation for vessels and protect the marine environment (IMO, 2013a). Also, they continue to define the service of Maritime Service Portfolio (MSP) to secure safer navigation for vessels by providing information from the land to the vessels. They have, recently, defined a method for exchanging information between vessel and vessel and land and vessel, as Application-Specific Message (ASM) by providing the guidelines for sending and receiving information related to safety and environment using the binary messages of Automatic Identification System (AIS) as communication method for providing MSP services (Kim, 2012; IMO, 2010).

However, concrete services and messages applicable to jobs in terms of users are not yet defined. Thus it is necessary to develop methods for verifying it. With increasing use of AIS messages, the use of ASM by the existing AIS channel will reportedly affect the existing methods of treating the safety messages such as transmitting vessel tracking information. To tackle the relevant problems, ITU-R and IALA tentatively determined a measure of allocating VHF frequencies and channels for the exclusive use of ASM considering communication load caused by ASM service (IMO, 2013b; IMO, 2013c).

Besides, since MPS service cannot be smoothly provided at a low communication speed (9.6kbps) of the existing AIS, ITU-R has promulgated and amended recommendations on marine digital radio communication using VHF band (ITU-R, 2009). To play a leading role in responding to e-Navigation, Electronics and Telecommunications Research Institute attempted to develop marine digital VHP radio communication system AHM2.0 (Ahn, 2013).

The contents of this paper are as follows: Chapter 2 introduces MSP service and ASM; Chapter 3 reviews domestic laws and regulations on passenger ship operation and management and compares the information to be exchanged between ships and the land systems with the items defined by the existing ASM messages; Chapter 4 introduces the contents of newly designed and embodied ASM2.0 protocol, and Chapter 5 summarizes the experiment results.

2. Trend of Related Studies

2.1 MSP(Maritime Service Portfolio)

MSP is to define different kinds of marine IT services being continuously developed by NCSR under IMO and IALA to secure safe navigation for vessels and to protect marine environment. MSP is an important item that must be referred to in defining the services to

---

National Information Society Agency.

▣ This study was financially supported by 'Base Study of Marine Accident Prevention System (Phase 2)' project sponsored by the Korean Ministry of Ocean and Fisheries.

provide for vessels and the relevant inland authorities using next-generation marine digital communication technologies (IMO, 2014; IMO, 2010).

<Table 1> shows the detailed contents of MSP services, and the scope of this study is about MSP5, MSP8 and MSP14, among 16 services, that can mitigate job loads by automatizing the matters about safe navigation of domestics passenger ships and compulsory report of the captains using ASM2.0 system.

<Table 1> Summary of MSP Services

No	Service Name
1	VTS Information Service (IS)
2	Navigational Assistance Service (NAS)
3	Traffic Organization Service (TOS)
4	Local port Service (LPS)
5	**Maritime Safety Information Service (MSI)**
6	Pilotage Service
7	Tug Service
8	**Vessel Shore Reporting**
9	Telemedical Assistance Service (TMAS)
10	Maritime Assistance Service (MAS)
11	Nautical Chart Service
12	Nautical Publications Service
13	Ice Navigation Service
14	**Meteorological information service**
15	Real time hydrographic and environmental information Service
16	Search and Rescue Service

2.2 AIS-ASM(Application Specific Message)

In an attempt to provide maritime safety information, the mandatory equipment of Automatic Identification System (AIS) is being implemented according to International Convention for the Safety of Life At Sea (IMO SOLAS). This targets all passenger ships, vessels weighing 500 tons or more engaged in international navigation and domestic cargo carriers weighing 500 tons or more not engaged in international navigation, and was implemented by vessel annually from July 1, 2002 to July 1, 2008 (IMO, 2002). As AIS is more widely disseminated, vessel-monitoring service for safe marine navigation is in high demand on shore as well (Lee, 2011).

As part of studies to provide different maritime safety information other than vessel tracking information, which is an intrinsic function of AIS, AIS-ASM has been implemented with adjustment of the relevant regulations since 2004 (Kim, 2013).

The detailed contents of ASM message defined in the international standards are described in SN/Circ.289 "Guidance on the Use of AIS Application-Specific Messages". As shown in <Table 2>, it is defined that a total of 15 materials such as meteorological and hydrographic data, dangerous cargo indication, tidal window, number of person on board, VTS-generated synthetic targets, clearance time to enter port, berthing data, area notice, environmental information, route information and text description can be exchanged.

<Table 2> Summary of ASM recommended for international use

Msg ID	FI	Message Name
6	18	Clearance time to enter port
	20	Berthing data
	23	Area notice - addressed
	25	Dangerous cargo indication
	28	Route information - addressed
	30	Text description - addressed
	32	Tidal window
8	19	Marine traffic signal
	21	Weather observation report from ship
	22	Area notice - broadcast
	24	Extended ship static and voyage-related data
	26	Environmental
	27	Route information - broadcast
	29	Text description - broadcast
	31	Meteorological and Hydrographic data

2.3 Status of domestic and foreign use of AIS-ASM

Apart from ASM messages defined in the international standards, each country uses separate ASM messages to strengthen the

safety of vessels and to improve port efficiency (e-Navigation Netherlands, 2015). Danish Port Authority has defined and is testing ASM for a navigational intention and route recommendation and an reply to route recommendation between vessels and control centers. As shown in <Table 3>, vessels navigating on inland waters in Europe are using Designated Area Code (DAC) defined as DAC 200 to exchange the information about water levels, ETA at lock/bridge/terminal, weather and number of person on board necessary for traffic control in consideration of the characteristics of inland waterway without using it at sea (Lee, 2013).

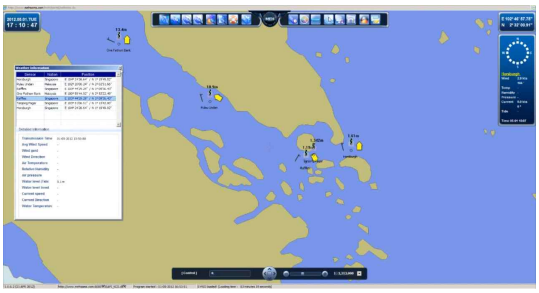
<Table 3> Summary of AIS-ASM for inland waterway

Msg ID	FI	Message Name
6	55	Number of person on board
	22	RTA at lock/bridge/terminal
	21	ETA at lock/bridge/terminal
8	40	Signal status
	24	Water levels
	23	EMMA warning
	10	Inland ship static and voyage related data

Marine Electronic Highway (MEH) demonstration project of IMO test-ran and provided weather information service on tidal current, wind speed and direction, humidity, temperature, atmospheric pressure and wave height collected using buoys installed at major points in the Malacca Strait through ASM message for FI31 weather information until 2012.

Domestic DAC, which targets the reference to the condition of AtoN equipment and the control of reset, transmission period and power, is defined as DAC 440 and is used with allocation of FI 51 to 54.

(Figure 1) ASM portrayal in MEH project



3. Review of Domestic Regulations and ASM

3.1 Reporting Standards for Passenger Ship Navigation

The items for captains to compulsorily report to ship operation managers are described in Reporting Standards for Passenger Ship Navigation and Inspection Report Before Departure on Paragraph 1, Article 6 of Guidelines for Passenger Ship Safety Management. Starting with Vessel Departure Report, a captain shall report weather and conditions on route and position at major points defined in navigation-related regulations, the position and cause under the situation which makes navigation impossible, and the estimated time of arrival 10 minutes before port entry and the port of entry directly after completion of entry to a ship operation manager. For passenger ship safety inspections before departure, a captain shall fill out Inspection Report Before Departure placed in a steering house and obtain confirmation thereof in writing from a ship operation manager. In the case of departure in the absence of a ship operation manager, a captain shall fill out Inspection Report and report it to passenger ship management office using communication networks (Ministry of Oceans and Fisheries, 2014). <Table 4> shows Inspection Report Before Departure and an actual example for a passenger ship.

These captain's mandatory reporting items are reported in writing or verbally using VHP communication, but there is an increasing need for report automation using digital communication because of captain's workloads and the ambiguity in verbal communication for information transfer.

<Table 4> Captain's mandatory reporting items

Classification	Item
Basic information	Ship operation manager
	Name of captain
	Name of ship
Operation information	Departure time
	Section of route
	Estimated time en route
Information on people on board	Prescribed maximum number of people on board
	Passenger
	Crew
	Temporary boarding
	Total persons
	Passenger
	Crew
	Temporary boarding
Information on cargo	Gross weight of cargo
	Number of vehicles
	Weight of vehicles
	General cargo
	Number of containers
Items to be inspected	State of ship's hull
	State of vessel draft
	State of cargo loading in cabin
	Extinguishment facility
	Check of meteorological and hydrographic conditions
	Engine condition
	State of cargo loading
	Dangerous cargo
	Communication state
	Passenger list
	State of fuel loading
	Cargo loading on board
	Life-saving appliance
	Navigation equipments
	Information on cabin cleaning

3.2 Comparative analysis of ASM1.0 service

To design ASM2.0 protocol for the automation of domestic passenger ship navigation report, the items to be reported by Reporting Standards for Passenger Ship Navigation and Inspection Report Before Departure were analyzed with an comparison with ASM1.0 items defined by the existing international standards. According to the result of the analysis, as shown in <T,able 5>, ASM messages including clearance time to enter port, meteorological and hydrographic data, dangerous cargo indication, number of persons on board, berthing data and route information are partly defined as international standards, but information used domestically such as cargo tonnage, safety inspection result, departure time and departure port were not defined. Also, already defined ASM messages needed to be amended and supplemented according to detailed contents specified in domestic regulations.

<Table 5> ASM messages for captain's mandatory reporting items

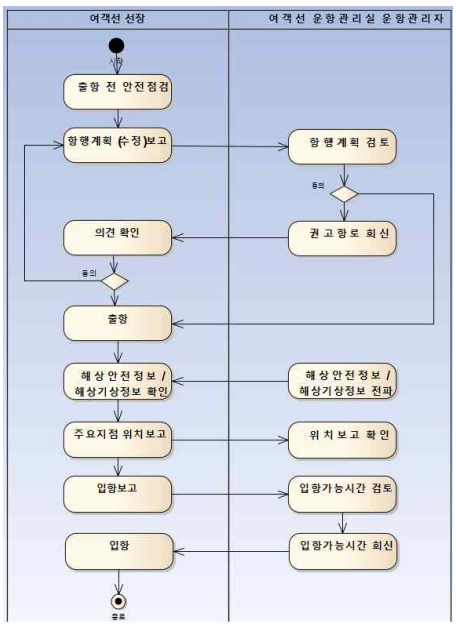
Type	Content of report	ASM
Report of port departure	● Time of departure and departure port	x
	● Number of crew and whether crew is on board or not	FI16
	● Number of people on board and disembarked people (passenger)	FI16
	● Amount of cargo (overloaded or not)	x
	● Type and amount of dangerous cargo	FI25
Report of port entry	● Estimated time of port entry ● State of port of entry	F20 F29
Report of position	● Time and position ● Weather of local route ● State of route	AIS123 F21 x
Suspension of navigation	● Time and position ● Cause for suspension	AIS123 AIS14
Others	● Time, position and the contents	AIS14

4. Protocol Design

4.1 Definition of ASM2.0 service scenario and screen design

As shown in (Figure 2), demo scenario including 5 major services such as report before departure, report of navigation plan, dissemination of maritime safety information, dissemination of marine weather data, Korean-alphabet single-character service were defined based on an analysis of similar systems. The scenario of this study referred to the scenario of route exchange handled mainly by MONALISA project and additionally created the remaining service scenario (MONALISA project, 2012).

(Figure 2) Process of scenario



4.2 Design of ASM2.0 protocol

The relevant messages of the existing ASM1.0 protocol were reviewed with respect to the information represented on the screen defined based on scenarios and the items in need of input by users, and the items in need of amendment and supplementation other than defined items were defined as 9 messages as shown in <Table 6>.

<Table 6> Summary of ASM2.0

FI	ASM	Message Name
0	1	Korean text description - addressed
	2	Korean text description - broadcast
	3	Area notice - addressed
	4	Area notice - broadcast
	5	Route information - addressed
	6	Route information - broadcast
	7	Typhoon alert - broadcast
	8	Departure report - addressed

The requirements to be considered for the definition of ASM2.0 protocol are as follows:

(1) The items that a captain should compulsorily report in domestic passenger ship navigation regulations are included.

(2) Additional description of routes, danger zones and typhoon warnings can be represented using English and Korean-alphabet single-character based on unicode.

(3) A maximum of 40 Way Points (WP) can be exchanged in considering around 30 WPs on the route of Mokpo to Jeju.

(4) Korean-alphabet single-character can send and receive more than the number of SMS letters used on shore.

As shown in <Table 4>, report items on inspection report before departure were sequentially arranged for messages about report before departure, and the size and scope of each parameter was designed based on ASM1.0 international standards and the parameters specifications about similar items of AIS messages. Also, in the case of the results of safety inspection before departure, the results of inspection of 14 inspection items was made to be transmitted with 1bit; considering a future extendability, a maximum of 70 items to be transmitted.

The messages about route information (FI 27 and 28) defined in ASM1.0 were referred to for route planning service of ASM2.0, and the

messages about area notice (FI 22 and 23) were referred to for the dissemination of danger zones. The messages about the dissemination of typhoon warnings can contain some parts of information through designation of the area among the messages about area notice as polyline, but, as there were limitations to the transmission of additional information including the radios of strong wind, central pressure and maximum wind speed, new messages were defined. Also, for each message, the message about text description (FI 29 and 30) were supplemented so that additional description could be transmitted through Korean-alphabet single-character (IMO, 2010).

<Table 7> The define protocol message of departure report

Parameter	bits	Detail
DAC	10	Designated area code; always 440.
FI	0	Function identifier; always 0
ASM	8	Application Service Message; always 8.
Multi Sentence Sequence	3	0: 1 message = default Serial number of VDM sentences received by receiver
Multi Sentence Total Count	3	0: 1 message = default Total number of VDM sentences received by receiver.
Message Linkage ID	10	Used when data of route or area is disseminated and extra explanation thereof is sent 1 - 1,023
Sender Classification	1	0: vessel = default 1: inland center
Name of Ship	120	Name of ship, 6 bit ASCII
NPD	120	Port of departure, 6 bit ASCII
ATD	20	Time of departure
NPA	120	Port of arrival, 6 bit ASCII
ETA	20	Estimated time of arrival, MMDDHHMM UTC
ETS	18	Estimate time period of navigation, 262,142minutes (182.04days)
MPB	13	Maximum people on board(passenger), 1-8,190 person
MCB	13	Maximum people on board(crew), 1-8,190 person
MTB	13	Maximum people on board(temporary boarding), 1-8,190 person
Number of adult	13	Passenger on board actually(adult), 1-8,190person
Number of children	13	Passenger on board actually(child), 1-8,190person
Number of babies	13	Passenger on board actually(baby), 1-8,190person
Number of crew	13	Crew, 1-8,190person
Number of temporary boarding	13	Temporary boarding, 1-8,190person
Person Limited	1	Exceeding capacity or not, 1: exceeded
Total Amount of cars	13	Vehicle weight, 1-8,190 M/T
Total Amount of cargo	13	Weight of general cargo(including container), 1-8,190 M/T
Total number of cars	13	Number of vehicles, 1-8,190 unit
Total number of containers	13	Number of containers, 1-8,190 unit
Cargo limited	1	Overloaded or not, 1: overloaded
Unit of Quantity DangerousCargo	2	Weight of dangerous cargo 0 = not available = default 1=inkg 2=intonnes(10E3kg) 3=in1,000tonnes(10E6kg)
Total Amount of Dangerous Cargo	10	Amount of dangerous cargo, 1-1,023 unit
Cargo type	7	Type of dangerous cargo, IMDG class or division
Position	120	Position of dangerous cargo Maximum 20 characters 6 bits ASCII.
Safety Inspection Results	70	Results of safety inspection before departure
Total	892	

Comparing ASM1.0 protocol with ASM2.0 protocol, in the case of the messages of route information, a maximum of 16 WP data set (55bit) composed of only the existing position information can be transmitted using 5 slots, but, in the case of supplemented ASM2.0 protocol, a maximum of 40 WP data set (81bit) containing not only position information

but also the information about standard speed, the left and right safe navigation distances can be transmitted using multi messages. <Table 8> shows the detailed WP protocol and <Table 9> shows the protocol design contents about the information of the overall route information (designation).

<Table 8> Structure of way point

Parameter	bits	Detail
Latitude	28	91: N/A = default - 1/10000 min
Longitude	27	181: N/A = default - 1/10000 min
SOG	10	1023: N/A - 1/10 knot
XTDs	8	0: N/A = default - Unit 10/1 (m), 2550m
XTDp	8	0: N/A = default - Unit 10/1 (m), 2550m
Total	81	

<Table 9> The define protocol message of route information

Parameter	bits	Detail
DAC	10	Designated area code; always 440.
FI	6	Function identifier; always 0
ASM	6	Application Service Message; always 5.
Multi Sentence Sequence	3	0: default(only one Msg) Sentence number of receiving Msg
Multi Sentence Total Count	3	0: default (only one Msg) The total number of sentence
Message Linkage ID	10	used when sending a explanation of area, route 1 - 1,023 0=not available=default
Sender Classification	3	0: Ship Side = default 1: Shore Side
Route Type	5	0: N/A = default 1: Duty Passage 2: Recommended routes 3: Alternate Route 5: Navigation plans of the ship 31: Cancel
Valid Start Time	20	Valid Start Time, MMDDHHMM UTC
Duration	18	Valid duration (min) 0: MSI Cancel 262,143 = undefined = default Maximum about 6 months (182.04 day)
Number of Waypoints	6	Full route point number 1-40, 0: no waypoint = default
Waypoints	810	Route Point table reference 81bits x 10 set
Spare	36	Disable, to zero fill
Total	1008	

4.3 Design and experiment of ASM2.0 SW for vessels

The major functions of ASM2.0-applied SW for vessels were defined based on the defined detailed scenario and users and system requirements, as shown in <Table 9>.

In the case of the development of applied S/W was, main DLL was developed using Visual Studio 2010 tool in the control of electronic navigation charts and ASM2.0 message encoding and decoding modules, and upper modules such as the remaining object rendering and socket communications used Embacadero DelphiXE tool.

<Table 10> The function of Ship ASM application S/W

Contents	Function
ENC	ENC : IHO S-57, S-52 Standard SENC Analysis And Display
Ship Display	AIS Msg Process Ship Information Query
Automatic reporting	Dangerous cargo indication Number of persons on board
Route Plan	Route Plan Transmission Recommendation Routes Respond Real-time Closet Point WP Display Route deviation analysis
Position Of Interest	Display the POI POI reporting and propagation
Message using Korean	Send and receive short korean text Attach Korean Description
Typhoon Notice	View and Display a typhoon warning Typhoon propagation

As shown in (Figure 3), the function of report before departure was realized to create popup windows that a captain could receive the input of minimum mandatory items from a captain before departure, to create ASM2.0

message about the report before departure defined newly in selecting a menu, to transmit the message to an inland center through ASM2.0-sending and receiving equipment and to receive a reply to that.

(Figure 4) shows the contents of UI design according to the procedures for reporting a route plan. As shown in (Figure 5), the state of a route was classified into 7 categories to provide information through intuitive UI, and UI consistent with each situation and the relevant context menus were defined.

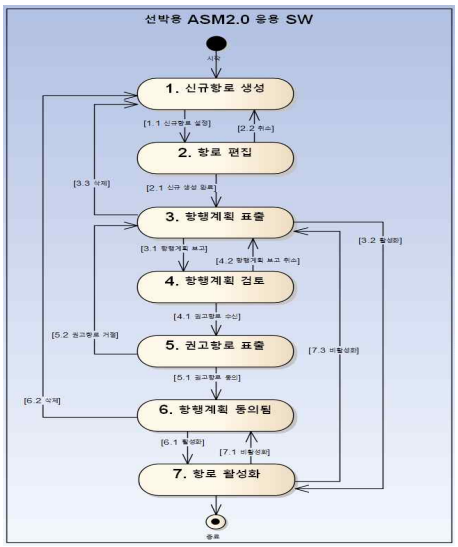
(Figure 3) A screenshot of departure report

(Figure 4) An UI design by route state

상태	표출화면	상태	표출화면
2	항로편집	5	권고항로 수신
3	항로생성 완료	6	항행계획 동의됨
4	항행계획 검토 대기	7	항로 활성화

(Figure 6) shows a screen represented when the service of reporting route plan is provided by passenger ship MSP service system. The detailed route information or weather information were represented on the bottom of a screen for user convenience, and the basic information is provided by representing the present time, the position of the vessel, the speed of ground, the course of ground and heading on the right top of a screen.

(Figure 5) Route planning state diagram



A captain's decision-making is assisted by representing the estimated time of arrival, the entire navigation distance, the remaining distance and the distance to the next WP on the right middle of a screen, and weather information provided from an inland center and collected on a real-time basis are represented on the right bottom.

(Figure 6) A service system screenshot when reporting route plan

The function for dissemination of danger zone is a function of reporting the position information to neighboring ships or specific entities in cases where a vessel on a voyage finds marine danger zones such as areas of waste fishing net-floating, traffic congestion

and fishing concentration or where inland control centers need to disseminate danger zone because of bombing exercises in jurisdictional sea area, etc. As shown in (Figure 6), the overall positions designated by users including danger zones are indicated with a mark of Point Of Interest (POI) and are embodied that the overall detailed information can be confirmed with double-clicks.

The detailed explanation of danger zones are realized so that the side of receiver can match and represent danger zones and detailed explanation by concurrently transmitting Korean-alphabet single-character messages defined by ASM2.0 in transmitting the messages about danger zones and, in this case, configuring Linkage ID and MMSI on the side of a sender in a sequential order.

5. System Test

To test the suggested passenger ship MSP service system, tests under actual marine environment were conducted on two occasions in December 2014 and March 2015. To secure the validity of a test, a test case was prepared in advance and the test of function by stage was conducted. For tests on a real vessel, the same conditions were set on both of two times and tests by stage was conducted.

The test of ship station - land station was conducted with the cooperations of Mokpo National Maritime University, which is task verification authority, and Sea Star Cruise Ship, which is a passenger ship navigating between Mokpo and Jeju, and was successfully completed in the presence of stake-holders from Ministry of Oceans and Fisheries and National Information Society Agency including the captain of the relevant ship.

(Figure 7) shows the scene of the installation of MPS service system on the bridge of real Sea Star Cruise Ship, and (Figure 8) shows the scene of VHF antenna installation on the rooftop of the main building of Mokpo National Maritime University and pre-test of distance range.

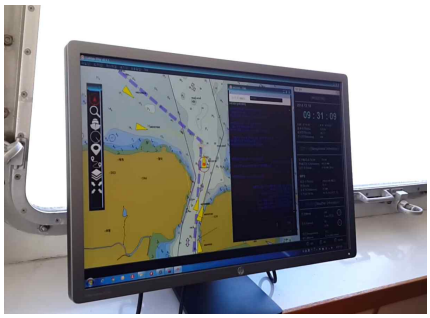
(Figure 7) The MSP service system installation to real-ship

As the results of the test of distance range, it was found that communication is available between the rooftop of the main building of Mokpo National Maritime University and Gasado Island in the neighborhood of Jindo Island. In the case of a test of marine environment betwee n Mokpo and Jeju, two places such as the rooftop of the main building of Mokpo National Maritime University and Geupchisan Mountain observatory in Jindo Island were selected as inland base stations and a test on a real ship was conducted.

(Figure 8) The VHF distance range pre-test in shore station

(Figure 9) shows ASM2.0 system screen installed at the time of testing the function of reporting a plan for the route between real inland and ship and the function of real-time chatting with Korean-alphabet single-character.

(Figure 9) A route planning report demonstration - ship side



The results of this test verified the validity of the passenger ship MSP service system suggested through a test in real environment, tests under actual marine environment. A captain and stake-holders expressed positive opinions that the items to be reported by a captain can be systematically and automatically be reported and Korean-alphabet single-characters can be exchanged between inland and ship.

6. Conclusion

This study derived MSP service that can be automatized using next-generation marine digital communication technology ASM2.0 with pre-reviews of next-generation marine digital communication and domestic passenger ship navigation laws and regulations, and designed and embodied protocol centered on the report before departure of passenger ship, the report of route plan, the service for exchanging the information about weather and safety. Also, the validity of the outcomes of a study was verified by successfully realizing the over system through a test in real marine environment.

This study has a meaning as a study on ASM2.0 applications that provide and represent MSP services to vessels on a voyage in connection with VDES technology being discussed as next-generation international standards, and suggests a new method of providing MSP service using marine digital communication which is the most central technology of e-Navigation. Next-generation control system and next-generation safe navigation support system are expected to be developed using this MPS service in the future.

References

[1] Lee, S. R and Park, S(2013), "Marine disasters prediction system model using marine environment monitoring," JKIECS, vol. 38, no. 3, pp. 263-270.

[2] Shin, H. S(2014), "A study on the operating direction in korea ship communication," JKIECS, vol. 9, no. 6, pp. 633-640.

[3] IMO(2013a), "A roadmap and key dates for e-navigation," e-NAV13/output/13.

[4] IMO(2014), "Development of an e-navigation strategy implementation plan," NCSR 1/9.

[5] Kim, D. Y, Kim, G. U, and Park, G. K(2012), "Deployment process for msi service using ais-asm," KIIS Spring Conference, vol. 22, no. 1, pp. 53-54, Mokpo-si, Korea

[6] IMO(2010), "Guidance on the use of ais application-specific messages," SN.1/Circ.289.

[7] IMO(2013b), "Plan for future VHF data communications," e-NAV13/output/6A

[8] IMO(2013c), "Working document towards a preliminary draft new report on AIS VHF Data Link (VDL) loading," e-NAV13/output/ 6B.

[9] ITU-R(2009), "Characteristics of VHF radio systems and equipment for the exchange of data and electronic mail in the maritime mobile service RR Appendix 18 channels," Recommendation M.1842-1.

[10] Ahn, J. M, Kim, D. H, and Park, O. S(2013), "A Study on the digital wireless transmission scheme in the maritime VHF band," in Proc. KICS Int. Conf. Commun. 2013 (KICS ICC 2013), pp. 830-831.

[11] IMO(2002), SOLAS CHAPTER V, Regulation 19 Carriage requirements for shipborne navigational systems and equipment

[12] Lee, S, J, and Lee J, W(2011), "A Development of AIS Vessel Monitoring System on online map using HTML5" Journal of Navigation and Port Research, vol. 35, no. 6, pp. 463-467.

[13] Kim, B, O(2014), "Study on application plan for VDES " KINPR Spring Conference, pp. 276-278.

[14] MONALISA project(2012), MONALISA progress report(2012), Retrieved(July, 21, 2014) from http://monalisaproject.eu.

[15] Ministry of Oceans and Fisheries(2014), Passenger Ship Safety Management Guidelines No.2014-123

[16] Kim, G, U, and Park, G, K(2013), "Preliminary Researches for the Deployment of New AIS-ASM Services" JKIICE, vol. 17, no. 7, pp. 1515-1521.

[17] Lee, J, H(2013), A Study on the Vessel Monitoring and Search and Rescue System for Inland Waterways, pp. 46.

[18] e-Navigation Netherlands(2015), IALA-AISM, http://www.e-navigation.nl/asm

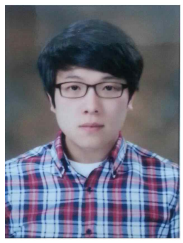
김 길 용

2009년 : 한국해양대학교 컴퓨터정보공학과 공학사

2009년～현 재: ㈜지엠티 기술연구소 책임연구원

관심분야 : e-Navigation, AIS, SQA

김 도 연



2009년 : 목포해양대학교 소프트웨어과 공학사

2011년 : 목포해양대학교 전자통신전공 공학석사

2014년 : 목포해양대학교 해상운송시스템 해양정보시스템학전공 공학박사

2014년～현 재: (주)지엠티 기술연구소 선임연구원

관심분야 : Maritime Information System, e-Navigation, A.I

이 서 정

1998~2003 : 동덕여자대학교 강의교수

2005~현재 : 한국해양대학교 해사IT공학부 부교수

2010~현재 : 한국IT서비스학회 이사

2008~현재 : 국토해양부 IMO 항해안전 전문위원회 및 항해통신·수색구조 전문위원회 정부대표단

관심분야 : 소프트웨어 개발 방법론, 소프트웨어 통합, e-Navigation 소프트웨어 품질