국외출장 결과보고서

<table>
<tr><th>구 분</th><th colspan="6">내 역</th></tr>
<tr><td>출장자</td><td>소속</td><td>물류해사산업연구본부</td><td>성명</td><td>박상원</td><td>직급</td><td>전문연구원</td></tr>
<tr><td>출장목적
(중복선택 가능)</td><td colspan="6">□ 현지조사(현장, 전문가 회의) □ 국제행사 주최 □ 국제행사 참가
■ 국제회의(정부대표단) 참석 □ 세미나, 교육, 훈련 □ 기타 ( )</td></tr>
<tr><td>관련사업
(예산항목)</td><td colspan="6">❍ 출장목적 : 제 54차 국제항로표지협회(IALA) VTS 위원회 참석 및 발표
❍ 관련사업
- 「클라우드 기반 차세대 VTS 통합 플랫폼 개발」(수탁)
(사업기간 : 2021.04.01. ~ 2023.12.31.)</td></tr>
<tr><td>출장기간</td><td colspan="3">2023.9.16(토) ~ 2023.9.24(일)
(7박 9일)</td><td>출장지</td><td colspan="2">프랑스 (파리)</td></tr>
<tr><td rowspan="9">출장일정</td><td colspan="2">일자</td><td colspan="2">방문지</td><td colspan="2">주요업무*</td><td>항공편</td></tr>
<tr><td colspan="2">9.16(토)</td><td colspan="2">인천(09:05) → 파리(16:10)</td><td colspan="2">항공 이동</td><td>AF0267</td></tr>
<tr><td colspan="2">9.17(일)</td><td colspan="2">현지숙소 인근 회의실</td><td colspan="2">사전 대책 회의</td><td>대중교통 이용</td></tr>
<tr><td colspan="2">9.18(월)</td><td colspan="2">IALA 본부</td><td colspan="2">IALA VTS 위원회참석</td><td>대중교통 이용</td></tr>
<tr><td colspan="2">9.19(화)</td><td colspan="2">IALA 본부</td><td colspan="2">IALA VTS 위원회참석</td><td>대중교통 이용</td></tr>
<tr><td colspan="2">9.20(수)</td><td colspan="2">IALA 본부</td><td colspan="2">IALA VTS 위원회참석</td><td>대중교통 이용</td></tr>
<tr><td colspan="2">9.21(목)</td><td colspan="2">IALA 본부</td><td colspan="2">IALA VTS 위원회참석</td><td>대중교통 이용</td></tr>
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<tr><td colspan="2">9.23(토)</td><td colspan="2">파리(11:50) → 인천(24일 7:05)</td><td colspan="2">항공 이동</td><td>AF0264</td></tr>
<tr><td>출장성과</td><td colspan="6">○ 출장목적 달성 정도
- (달성) S-210 작성 시에 대한민국에서 제시한 의견 반영
○ 주요 성과
- VTS 정보 공유에 관한 표준 S-210 작성을 위한 Position paper에 한국에서 제안한 내용 (센서 데이터) 포함</td></tr>
<tr><td>향후계획</td><td colspan="6">○ 출장 성과 공유 계획
- 10.17(화) 해양경찰 주관 IALA VTS 54 참석 결과보고회 참석
○ 정책화 등 활용 계획
- Position paper 반영 후 이를 바탕으로 지속적으로 표준화(S-210 개발) 작업 진행</td></tr>
<tr><td>참고 등 특이사항
(건의사항)</td><td colspan="6"></td></tr>
</table>

* 주요업무 수행 결과 별지 작성 후 첨부

주요 업무내용 (계획( ), 결과(√))

업무유형	□ *현지조사(현장, 전문가 회의)* □ 국제행사 주최 □ 국제행사 참가 ■ *국제회의(정부대표단) 참석* □ 세미나, 교육, 훈련 □ 기타 ( )
업무①	**9.17.(일) 사전대책 회의**
수행계획	□ **해양경찰 주관 사전 대책회의** - **참 석 자 : 박상원 전문연구원**, 해양경찰 대표단 등 10명 - **대응 과제 설명 및 대응방안 논의**
수행결과	□ **대응 과제 설명** - KMI는 해양경찰 주관의 '클라우드 기반 차세대 VTS 통합 플랫폼 연구개발'을 통해 개발된 내용 중 관제정보 교환 데이터 표준 의제를 제안함 - (내용) VTS에 의해 수집된 정보의 공유를 통해 VTS 운영의 효율성을 향상시키고 미래 VTS 운영변화에 유기적으로 대응할 수 있도록 기존 VTS 센터 간 정보교환 방식인 IVEF 문서를 개정하여 S-210으로 확장 도모 - 연구개발 중인 클라우드 VTS 과제 설명 및 제안내용 설명 - KMI는 작업반 2 (IVEF 그룹)에 참석하여 의제 설명 및 대응 결정
업무②	**9.18.(월) IALA VTS 54 위원회 참석**
수행계획	□ **IALA VTS 위원회 개회식 참석 및 작업반 2 참석** - **참 석 자 : 박상원 전문연구원**, 해양경찰 대표단 등 10명 - **논의 주제** · 개회식 참여 · 발표 세션 참여 · 작업반 참여
수행결과	□ **개회식 참여** - IALA 54차 위원회는 2023~2027년 작업프로그램의 첫 번째 회의로, 49개의 제안문서를 검토·논의하여 33개의 결과문서를 도출. - 선임 관제사 교육훈련 모델코스 개정 작업을 완료하여 이사회 승인 요청 - VTS 품질관리시스템, 사이버 보안 지침서 등의 초안문서 검토 요청을 위해 ARM, DTEC 위원회 연락문서 작성하여 전달 □ **발표세션 참여** - 발표세션에서 총 4개의 발표가 진행됨 • (Gerardine Delanoye, IALA) IALA 전세계 아카데미(WWA)의 최근 활동 소개 • (Minsu Jeon, IALA) S-200 시리즈 PS data 모델 개발 경과 • (Mayumi Arita, JCG) 일본 VTS의 자연재해 대응 방법 소개 • (이지연, 해양경찰청) 미래 VTS를 위한 한국의 준비사항

주요 업무내용 (계획( ), 결과(√))

□ **작업반 배정 및 참석**

- WG2 IVEF 그룹에 참석하여, 프로젝트 소개 및 제안내용 설명
  - (소개) Radar sited의 다양한 데이터를 클라우드 운영센터로 수집하고 데이터 처리 후 VTS 센터 및 승인된 외부 플랫폼에 데이터를 공유하는 새로운 VTS 체계 개발 프로젝트
  - (진행상황) ①관제사 대상 사용자 요구사항 분석, ②레이더 정합 기능 개발, ③CCTV와 위성을 활용한 물표 식별 기능 개발, ④실시간 관제 시스템 개발, ⑤빅데이터 기반 관제 가이던스 개발, ⑥테스트베드 구축 및 시험운영
  - (결과) 국가 및 산업회원 설득을 통해 클라우드VTS 연구개발에서 다루는 센서 수준의 데이터가 필요하다는 공감대를 형성하여 문서틀 (Position paper)에 내용 포함

VTS Information Exchange
Technical Aspects

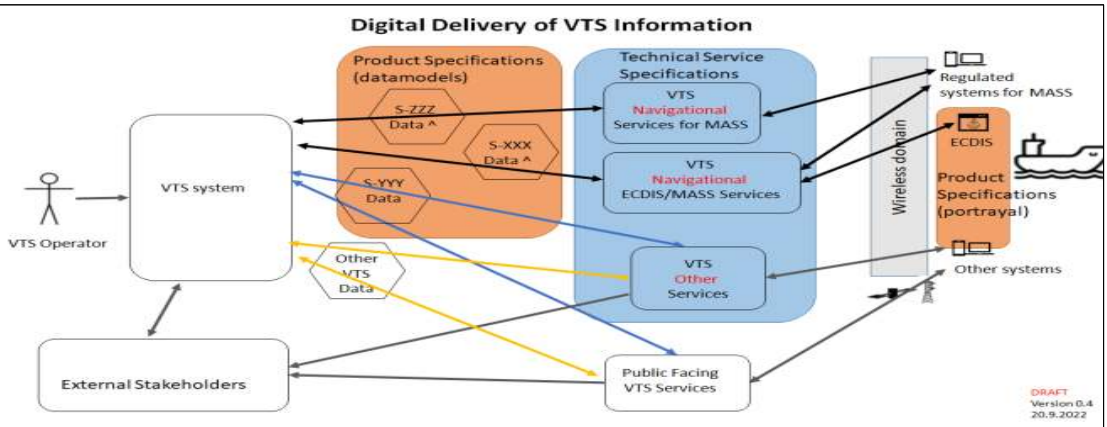
The exchange of data is intended to increase the efficiency of VTS operations by sharing relevant data beyond the scope of a single VTS. This may, for instance, be the case for VTSs in adjacent areas, exchanging data about the traffic situation.

- Multiple Layers of information
  - Locally collected sensor data that is exchanged between VTS systems and other entities to enhance performance:
    - **Radar video, plots (제안)**
    - **EOS data streaming (제안)**
    - AIS/VDES
    - **Weather / Hydrological data (제안)**
    - RDF
  - VTS Traffic Image. Note that there may be different definitions of the "traffic image" depending on the intended use (e.g. law enforcement may have different requirements for the image). The VTS Traffic Image contains all information about the vessels and their voyages to enable

주요 업무내용 (계획( ), 결과(√))

<table>
<tr><td></td><td>VTS operations i.e.
▪ Vessel static data
▪ Voyage data
▪ Vessel track data
○ Route Exchange. This concerns the intended vessel path with estimated ETAs at waypoints which is communicated by the vessel’s controlling entity
○ Navigational warnings?</td></tr>
<tr><td>업무③</td><td>9.19.(화) IALA VTS 54 위원회 참석</td></tr>
<tr><td>수행계획</td><td>□ IALA VTS 위원회 작업반 2 참석
- 참 석 자 : 박상원 전문연구원, 해양경찰 대표단 등 10명
- 논의 주제
· S-210을 위한 용어 정리</td></tr>
<tr><td>수행결과</td><td>□ S-210을 위한 용어 정리
- S-210에 적용하기 위해서 IVEF 문서에 있는 용어들을 IHO geospatial information registry와 비교하는 작업 수행
<table>
<tr><td>16</td><td>VoyageData</td><td></td><td></td><td></td><td></td></tr>
<tr><td>17</td><td>VoyageData</td><td>Id</td><td>required</td><td>The unique identification of this vessel voyage data item.</td><td>not present. Suggest to add and rephrase "VesselVoyageDataID".</td></tr>
<tr><td>18</td><td>VoyageData</td><td>ATA</td><td>optional</td><td>Date and time in (subset of ISO 8601) UTC format (YYYY-MMDDThh:mm:ss.sssZ) of the Actual Time Of Arrival of the target</td><td>not present. Suggest to add as "ATA".</td></tr>
<tr><td>19</td><td>VoyageData</td><td>ATD</td><td>optional</td><td>Date and time in (subset of ISO 8601) UTC format (YYYY-MMDDThh:mm:ss.sssZ) of the Actual Time Of Departure of the target</td><td>not present. Suggest to add "ATD"</td></tr>
<tr><td>20</td><td>VoyageData</td><td>ContactIdentity</td><td>optional</td><td>reference to the identity associated with this objects voyage</td><td>not present. Suggest to rephrase as "Point of Contact"</td></tr>
<tr><td>21</td><td>VoyageData</td><td>DepartCode</td><td>optional</td><td>Departure of the target (UN/LOCODE) optionally addended with local location code (e.g. BEANR0170100497 = Antwerp, HANSADOK 497)</td><td>not present. "Route Info Departure PortID1" may fit when it is not Route Info specific. "Primary identifier for departure port given by UN/LOCODE"</td></tr>
<tr><td>22</td><td>VoyageData</td><td>DepartName</td><td>optional</td><td>Departure name of the target e.g. local code for berth/lock/bridge/terminal</td><td>not present. "Route Info Departure PortID2" may fit when it is not Route Info specific. "Secondary identifier for departure port given by free text string"</td></tr>
<tr><td>23</td><td>VoyageData</td><td>DestCode</td><td>optional</td><td>Destination of the target (UN/LOCODE) optionally addended with local location code (e.g. BEANR0170100497 = Antwerp, HANSADOK 497)</td><td>not present. Suggest to rephrase and add "DestinationPort ID1"</td></tr>
</table></td></tr>
<tr><td>업무④</td><td>9.20.(수) IALA VTS 54 위원회 참석</td></tr>
<tr><td>수행계획</td><td>□ IALA VTS 위원회 작업반 2 참석
- 참 석 자 : 박상원 전문연구원, 해양경찰 대표단 등 10명
- 논의 주제
· S-212 기반 VTS 및 외부 디지털 정보 서비스 개발</td></tr>
<tr><td>수행결과</td><td>□ S-212 기반 VTS 및 외부 디지털 정보 서비스 개발 세션 참여
- 제품 사양을 공식화하는 절차에 따라, IHO와 IALA의 요구사항을 VTS 및 외부와의 디지털 정보교환이 충족하는지 확인
- 다년간 논의 후 도출된 서비스 개념도 제시</td></tr>
</table>

주요 업무내용 (계획( ), 결과(√))

<table>
<tr><td></td><td>


- 외부 디지털 정보교환을 위한 서비스의 한 종류로 VTS 선박교통 허가 서비스 (VTS Traffic Clearance)를 위한 서비스 사양 문서 초안 개발
</td></tr>
<tr><td>업무⑤</td><td>9.21.(목) IALA VTS 54 위원회 참석</td></tr>
<tr><td>수행계획</td><td>□ IALA VTS 위원회 작업반 2 참석
- 참 석 자 : 박상원 전문연구원, 해양경찰 대표단 등 10명
- 논의 주제
· S-210을 위한 용어 정리 (계속)
· WG2 보고서 정리</td></tr>
<tr><td>수행결과</td><td>□ S-210을 위한 용어 정리
- S-210에 적용하기 위해서 IVEF 문서에 있는 용어들을 IHO geospatial information registry와 비교하는 작업 수행
<table>
<tr><td colspan="2">VoyageData/EstablishedRouteData/Waypoints</td><td></td><td></td><td>Suggest VoyageData / Waypoint to "Route/Waypoint"</td></tr>
<tr><td>VoyageData/Establisl</td><td>ATA</td><td>optional</td><td>Date and time in UTC format (YYYY-MM-DDThh:mmZ) (subset of ISO 8601) of the Actual Time Of Arrival of the target.</td><td>not present. Suggest to add "ATA"</td></tr>
<tr><td>VoyageData/Establisl</td><td>ETA</td><td>optional</td><td>Date and time in UTC format (YYYY-MM-DDThh:mmZ) (subset of ISO 8601) of the Expected Time Of Arrival of the target.</td><td>present as "Estimated Time of Arrival".
Perhaps to include a reference like UTC format.</td></tr>
<tr><td>VoyageData/Establisl</td><td>UN Location Code</td><td>optional</td><td>Waypoint name in UN/LOCODE optionally addended with local location code (e.g. BEANR0170100497 = Antwerp, HANSADOK 497)</td><td>present and suggest to change as "UN Location Code"</td></tr>
<tr><td>VoyageData/Establisl</td><td>Name</td><td>required</td><td>Name~~ of the waypoint~~</td><td>present as "Name"</td></tr>
<tr><td>VoyageData/Establisl</td><td>RTA</td><td>optional</td><td>Date and time in UTC format (YYYY-MM-DDThh:mmZ) (subset of ISO 8601) of the Requested Time Of Arrival of the target.</td><td>not present. Suggest to add "RTA"</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>VoyageData/EstablishedRouteData/Waypoints</td><td></td><td></td><td></td><td></td></tr>
</table>
□ WG2 보고서 정리
- S-210 작업을 위해 대한민국에서 제출한 의제문서를 고려함을 포함</td></tr>
</table>

주요 업무내용 (계획( ), 결과(√))

	10.3 Task 2.8.2 Review and update Recommendation R0145 (V-145) on the Inter-VTS Exchange Format (IVEF) Service This task has been carried over from the previous work programme and also has a new task number allocated. Work started inter-sessionally in March 2023. An intersessional meeting is proposed to be held in Quebec in Dec 2023 and this session will also assist in progressing Tasks 2.5.2 and 2.8.1. Additionally, Input Paper VTS54-9.3.1 Proposal For update on the IVEF service Korea Coast Guard case study was referred to this task group. *Action item(s):* That the Secretariat forwards WP *VTS Position Paper on Information Exchange Shore to Shore v0.1 (VTS54-12.5.2.9) and IVEF DD working copy v0.5 (VTS54-12.5.2.10) as* working papers to VTS55 for further development. *Committee participants are invited to join the intersessional task group to be held in Quebec, in December 2023, working on Task 2.5.2 Develop technical service description for digital data exchange between VTS and other entities – primarily ships and Task 2.8.2 Review and update Recommendation R0145 (V-145) on the Inter-VTS Exchange Format (IVEF) Service and to express their interest to Richard Aase (richard.aase@kystverket.no) by 21 October 2023, noting the dates and times of the intersessional meetings will be published on the IALA VTS Committee Dashboard.* *The Intersessional Task Group Leader to provide input on the intersessional work on task 2.5.2 and 2.8.2 to VTS55.* - 지속적인 작업을 위한 회기간작업반회의 (2023년 12월) 참여 요청
업무⑥	**9.22.(금) IALA VTS 54 위원회 참석**
수행계획	□ **IALA VTS 위원회 폐회식 참석** - **참 석 자 : 박상원 전문연구원**, 해양경찰 대표단 등 10명 - **논의 주제** · 작업반 1,2,3 논의 결과 보고서 검토 및 확정
수행결과	□ **작업반 1,2,3 논의 결과 보고서 검토 및 확정** - **(WG1)** ❶ '자율운항선박 및 현존선에 대한 VTS 제공 지침' 목적 정의 및 IMO 비강제 MASS Code 개발(~'24년) 지속 관찰, ❷디지털 항로 교환 서비스의 필요성 및 표준화된 데이터 모델·기술 서비스 사용 등에 동의, 문구 수정 등 계속 진행 - **(WG2)** ❶ VTS간 정보교환 지침서에 통합연계망 레이더 영상·추적 및 CCTV 데이터 표준을 포함하여 작성 합의 및 문서 반영, ❷서비스 규격이 S-212(Ed.1)으로 구현되는지 시험하기 위해 IALA 홈페이지에 기술 서비스 규격 게시 추진 - **(WG3)** ❶ 영어구술 능력 평가에 중점을 둔 지침 개발 및 G1132의 부록으로 지침 내용 포함 등 논의, ❷교육훈련 프로그램에 적합한 시간 전체 문서의 검토를 통해 금 회차 선임자 교육 초안 완성, 이사회 승인 요청

첨부: 의제문서

Input paper: [1] XXXX-n.n.n

Input paper for the following Committee(s):
(Select as appropriate)

☐ ARM ☐ ENG ☐ PAP
☐ ENAV ☒ VTS

Purpose of paper:

☒ Input
☐ Information

Agenda item [2] n.n

Technical domain/ Task number [2] .....

Author(s)/Submitter(s) Korea Coast Guard

PROPOSAL FOR UPDATE ON THE IVEF SERVICE: KOREA COAST GUARD CASE STUDY

1. SUMMARY

This document serves as an introduction to the operational case of the Cloud VTS development project, led by the Korea Coast Guard. Additionally, it proposes enhancements for the IVEF Service. The importance of inter VTS data exchange is underscored through an analysis of the current state of VTS operations in Korea. The document outlines the operational status of the Cloud VTS testbed in Korea, elucidates data exchange configurations, and recommends revisions to the IVEF Service based on testbed outcomes.

1.1. PURPOSE OF DOCUMENT

The purpose of this document is to introduce the VTS operational environment in Korea and to present the testbed operation case of the Cloud VTS development project being conducted by the Korea Coast Guard. Through the testbed operation case, we aim to propose an improvement direction for the IVEF service.

1.2. RELATED DOCUMENTS

IALA RECOMMENDATION R0145(V-145) THE INTER-VTS EXCHANGE FORMAT (IVEF) SERVICE

2. BACKGROUND

Following the successful completion of the IALA Recommendation R0145–Inter-VTS Exchange Format (IVEF) Service, the next important step is to apply it in the actual service. Discussions related to the IALA Recommendation R0145, which had not been held since 2011, were resumed by the 51st VTS committee. The Korean Coast Guard introduced the Cloud VTS concept to VTS 53, exemplifying the IVEF service. The Korea Maritime Institute conducted a survey of VTS operators regarding the IVEF service and proposed an IVEF recommendation update that includes the need for information exchanging between Radar and VHF.

1 Input document number, to be assigned by the Committee Secretary
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오류! 여기에 표시할 텍스트에 Title 을(를) 적용하려면 홈 탭을 사용하세요. P 1

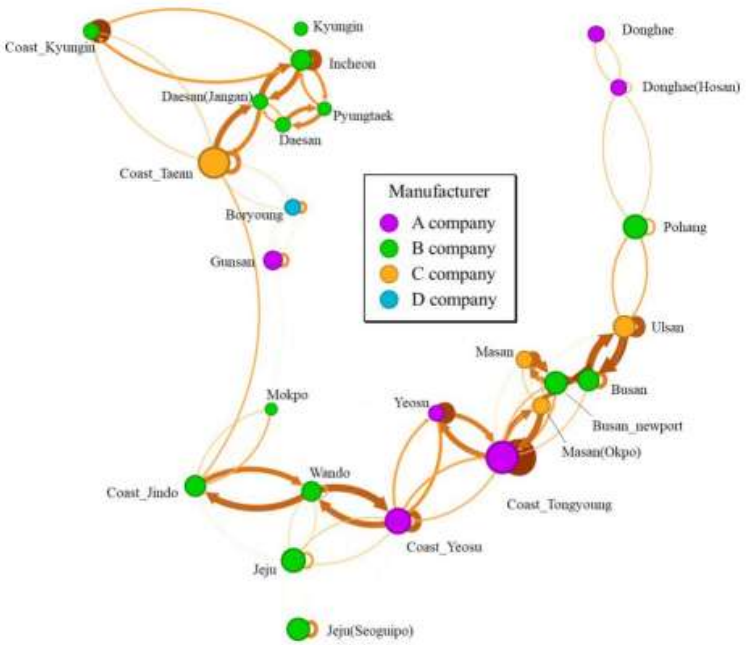
This document aims to share the testbed operation results of the Cloud VTS project introduced at the 53rd IALA VTS Committee and to propose directions for improving the IVEF service.

3. DISCUSSION

3.1. SOUTH KOREA VTS OPERATIONAL STATUS

Presently, South Korea operates two metropolitan VTS centers, thirteen port VTS centers, and four coastal VTS centers. Notably, the two metropolitan VTS centers, in trial operation since June 2023, facilitate continuous maritime traffic management from ports to the coastline. Given the interconnections between major ports and coastal regions in Korea, the exchange of data between VTS centers has become even more crucial.

Four VTS systems from distinct manufacturers are operational in South Korea. However, limitations exist in exchanging VTS data beyond Track, Vessel, Voyage data, and Tagged item data as defined in IVEF. This is due to differing protocols employed by each manufacturer. The following figure depicts vessel tracks passing through VTS areas along the South Korean coast, categorized by manufacturer.



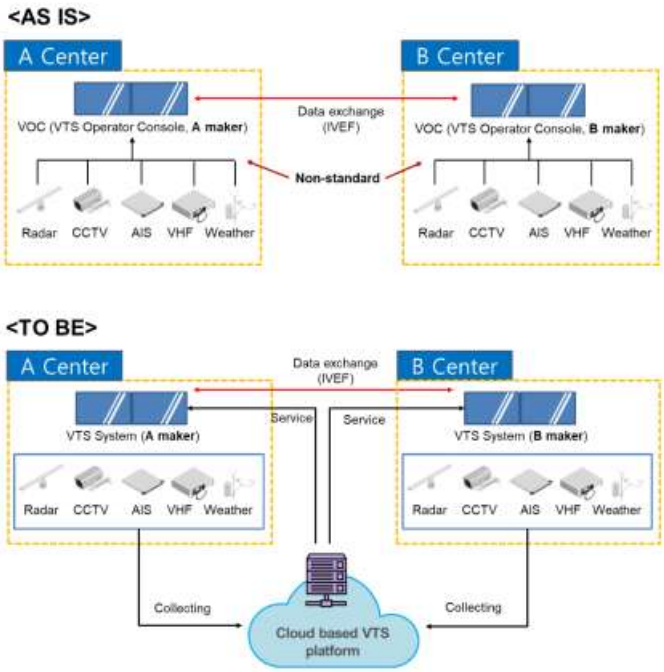
All VTS areas in South Korea are interconnected. For instance, a vessel navigating the western direction of the Gyeongin coastal VTS area can proceed to Boryeong Port via the Taean coastal VTS area, or alternatively, enter Mokpo Port. Nevertheless, due to differences in manufacturers between the Gyeongin Port VTS center and the Taean and Boryeong Port VTS centers, seamless VTS information linkage might be hindered, except for data conforming to the IVEF format.

3.2. INTRODUCTION OF CLOUD VTS

To overcome the difficulty of information linkage between different VTS manufacturers, South Korea started the Cloud VTS project. The project started in 2020 and is scheduled to be completed in 2023.

So far, VTS operators have been able to exchange limited data with nearby VTS centers through IVEF. However, while there is a data exchange standard (IVEF), the standard for collecting data into the VTS system differs between manufacturers. Therefore, the collection device and VTS system can only be influenced by the manufacturer. In addition, to respond to emergency situations such as VTS center closures due to COVID-19, the VTS system used when performing control in other areas can also be influenced by the manufacturer of the Radar site. As VTS areas gradually expand for safe and efficient vessel operation and more data is expected to be generated in the maritime industry with the emergence of MASS(Maritime Autonomous Surface Ship), various data exchanges are necessary for prompt and accurate decision-making by VTS operators, and it is necessary to examine the entire national VTS status.

The following figure compares the current VTS system with the Cloud VTS system.



VTS operators can access information from local radar sites or the Cloud platform. In addition to data exchange through IVEF, data from Radar screens, VHF, CCTV, and other sources can also be exchanged, making it possible to utilize them for control support in emergency situations. The Cloud platform enables monitoring of VTS data nationwide in South Korea, and South Korea plans to expand it to a National VTS using the Cloud platform.

3.3. TESTBED OPERATION

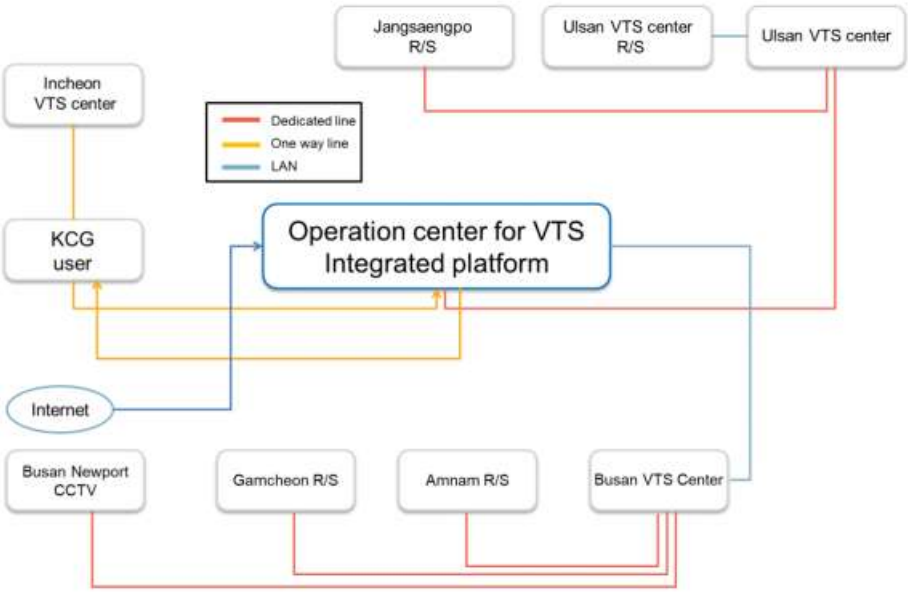
The concept of Cloud VTS is to collect VTS information acquired by other centers or external agencies through a cloud server and provide services by accessing it from VTS centers or other agencies. To achieve this goal, a testbed has been set up.

The testbed is composed of the following: Information from Busan Port, Ulsan Port, and Incheon Port is collected on the integrated platform, and the information is displayed on the cloud monitor. The integrated

platform can collect and display Radar screen, chart, VHF information, CCTV, and weather information from three VTS centers.

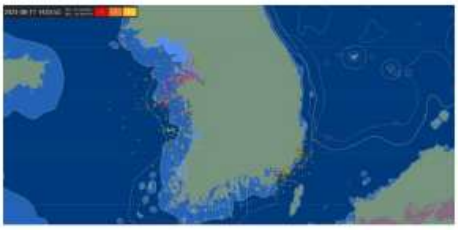
(a) VTS operation system in test-bed

(b) Cloud server



Through the integrated platform, it is possible to track Radar screens, radar, and AIS charts of Busan Port, Ulsan Port, and Incheon Port that are connected via the platform. In addition, VHF data transmission and reception are possible for control purposes. The integrated platform also enables sharing of information such as Radar screens, CCTV, and VHF in addition to chart information.

In the testbed, VTS data exchanged includes Radar video, Radar track, CCTV (video), CCTV (object), AIS, VHF, and weather information. According to the IVEF standard, Track, Vessel, Voyage data, and Tagged item information can be exchanged.



(a) Total screen

(b) Busan VTS area radar screen & target data

(c) Ulsan VTS area radar screen & target data

(d) Incheon VTS area radar screen & target data

3.4. UPDATING OF IVEF SERVICE

In this paper, we propose an update to the IVEF Service to enable the exchange of Radar video, CCTV, VHF, and weather information for control purposes. Radar video can increase the accuracy of target tracking, and CCTV data integration enables the consolidation of traffic data from diverse areas into the the integrated platform. VHF communication enables communication even in areas where the frequency does not reach in an emergency, and weather information can be easily checked remotely for local weather. Detailed specification on each data format is attached in the Appendix 1.

[1] IALA RECOMMENDATION R0145(V-145) INTER-VTS EXCHANGE FORMAT (IVEF) SERVICE

[2] IALA VTS MANUAL 2021 - EDITION 8

4. ACTION REQUESTED OF THE COMMITTEE

VTS committee is invited to note the application of this technology and approve to update "IALA Recommendation R0145(V-145) The inter-VTS exchange format (IVEF) service."