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Working Group WG3 Radionavigation service

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Maritime Precise Positioning and Integrity Monitoring R&D Project Status in the Republic of Korea

# Background

Maritime precise positioning requirements for future Global Navigation Satellite System (GNSS) in International Maritime Organization (IMO) are 10cm horizontal and vertical accuracy, respectively. However, DGPS, which guarantees meter-level service, is only satellite-based augmentation system in Korea’s maritime environments. Thus, the development of maritime precise positioning and navigation services is necessary, because DGPS service could not satisfy maritime precise positioning requirements.

Moreover, maritime autonomous surface ship (MASS) which represents the maritime fourth industrial revolution, and a variety of maritime applications such as hydrographical surveys, automatic docking, docking support, and smart ports require maritime precise positioning and navigation services. To provide users with resilient and accurate PNT information and guarantee safety, Republic of Korea (R. O. K) has decided to the maritime augmentation advanced service.

Maritime precise positioning and navigation services in R. O. K will provide users with generated centimetre level augmentation information, through the use of the current DGNSS and additional GNSS reference station information and GPS carrier phase measurement.

# POint project

In the R. O. K, planning research on precise positioning services was conducted in 2015, and confirming the demand as well as the need for maritime augmentation advanced service. Based on this research, R. O. K initiated Precise Positioning and INTegrity monitoring(POINT) project in April 2020. POINT project aims to develop an infrastructure that provides users with precise positioning and integrity monitoring information in the maritime and to achieve an improved location accuracy and integrity of 5cm (95%, horizontal) within 100km of the Korean coastline. In POINT R&D project, GPS raw measurements acquired from reference stations and monitoring stations will be provided as central processing station to provide centimetre-level augmentation information (precise positioning and integrity monitoring information). The augmentation information thus generated by a central processing station is broadcasted through a ground-based communication media, such that users within service coverage area could receive positions with a centimetre accuracy and guaranteed integrity. In addition, prototype receiver will also be developed to avail the centimetre level accuracy services afforded by POINT project; this prototype receiver will also be used to verify the performance of POINT in testbed and real sea environments.

# POint project development schedule and FUture plan

POINT project will be carried out from 2020 to 2024, and consist of two phases. The first phase, to be completed by 2021, will comprised the completion of the critical design review the reference station, central processing station, and receiving platform for precise positioning services. Thereafter, production is scheduled to be completed by 2022, along with the verification of the pilot service performance through testbed. In the second phase, the critical design of the reference station, monitoring station, central processing station and receiving platform for navigation service will be completed by 2023, aiming for Korea maritime service in 2024.

Currently, Korea is promoting the MASS development R&D project; results of this POINT project will be associated with the MASS R&D project. In addition, after completing the verification of service performance through testbed, a pilot service covering all coasts, including the ports, is expected to be released in 2024.

Efforts are also being undertaken to expand maritime precise related technologies by periodically sharing the status of POINT R&D project with IALA member countries through the IALA ENG Committee.



Fig 1. Maritime Precise Positioning and Integrity Monitoring R&D project

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