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Technical Domain / Task Number 2 Radionavigation services /3.2.6.

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Introduction to Korean R-Mode Testbed Project (TRACE)

# Background

To remedy the shortcomings of GNSS, the Republic of Korea (R.O.K) is striving to establish a backup navigation system to stably provide PNT (Position, Navigation and Timing) information to maritime users even in case of GNSS emergency. The eLoran testbed project, launched by Korea Research Institute of Ships and Ocean engineering (KRISO) in 2016 with the support of the Ministry of Oceans and Fisheries (MOF), aims to provide positioning services within 20 m accuracy (95%, Horizontal) of the two major ports (Incheon Port and Pyeongtaek Port) in the central and northern regions of the West Sea by 2020.

The MOF plans to promote the R-Mode service along with the eLoran service to expand the backup PNT system to all waters in Korea and serve the IMO and IALA requirements for backup navigation in port approaches (10 m) for maritime users. With KRISO as the project leader, the Terrestrial Ranging-Augmented, Complementary and Enhanced (TRACE) project, a Korean R-Mode testbed project was launched in April 2020 and plans to develop the core technologies and verify the performance in test ports.

# tRACE project

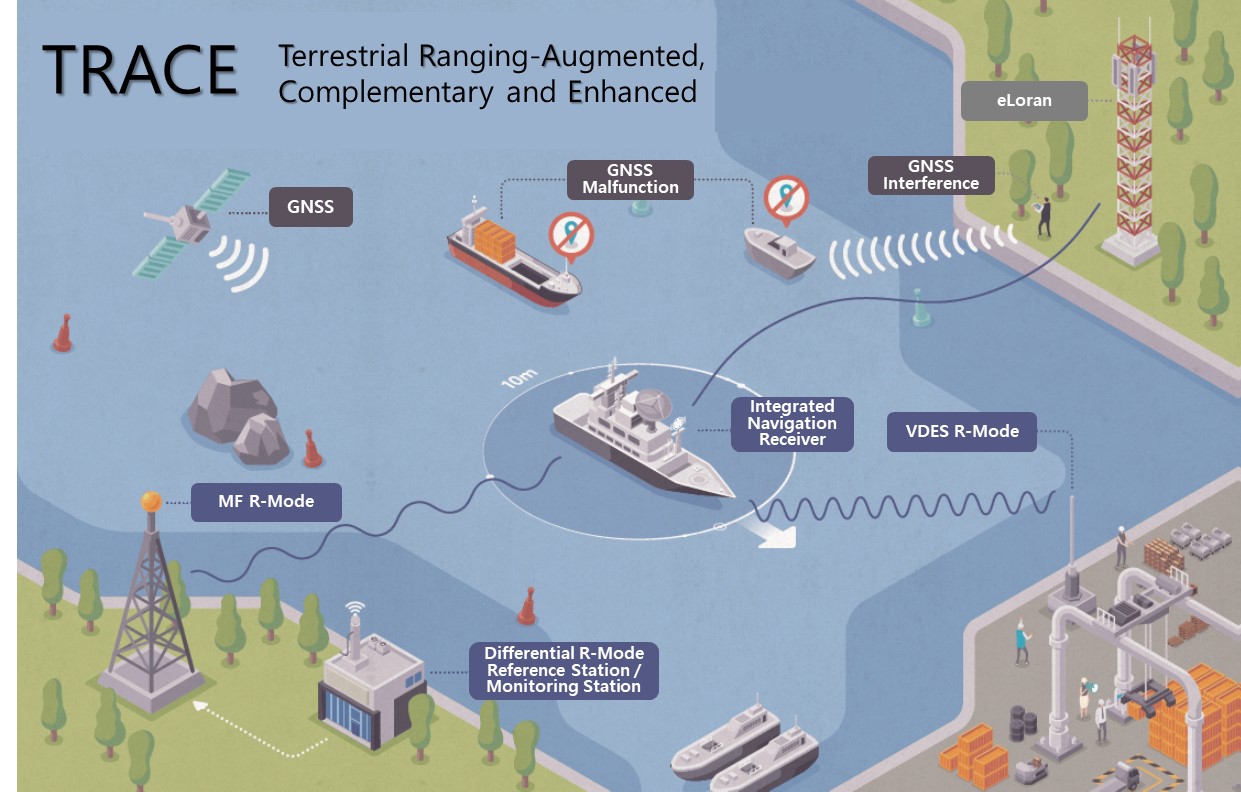
Technological development of the TRACE project is divided into an R-Mode signal transmission section, a performance enhancement and integrity monitoring section, and an integrated navigation receiver section. The R-Mode signal transmission section consists of developing a time synchronization system between transmitters and developing systems for generating and transmitting signals of MF R-Mode and VDES R-Mode. The performance enhancement section develop a technology that generates error correction information by developing a system to improve the accuracy of MF R-Mode signals. The integrity monitoring section involves developing a system for checking corrections to ensure user confidence in the provided service. The integrated navigation receiver section develops a prototype device that receives both R-Mode signals and eLoran signals to perform integrated navigation. Throughout the TRACE project, eLoran (or UTC synchronized Loran-C) signals were used alongside MF and VDES R-Mode signal sources for positioning. Therefore, the insufficient geometry of R-Mode transmitters can be improved by using the eLoran transmitters.

The application of TRACE project accomplishments in public PNT service infrastructure for maritime safety is expected to contribute towards prevention of economic losses and reduction in maritime accidents caused by GNSS malfunction.

# tRACE PROJECT Timeline

The TRACE project which will be carried out from 2020 to 2022, consists of three steps. In the first year (2020), the system will be designed, and a port will be selected as a testbed for the sea environment performance verification. In the second year (2021), the designed system will be implemented, and its unit systems will be evaluated. In the last year, the system will be integrated, and its performance will be verified at the test port.

MOF of R.O.K is paying special attention to the performance verification at a test port of the TRACE project, which is the first milestone towards expansion of reliable and safe offshore PNT services to all waters in Korea.



1. TRACE Project System Configurations

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Leave open if uncertain [↑](#footnote-ref-2)