



Yangtze Estuary of E-NAV Testbed in China

Oct.2018
China MSA

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Introduction

1. Introduction

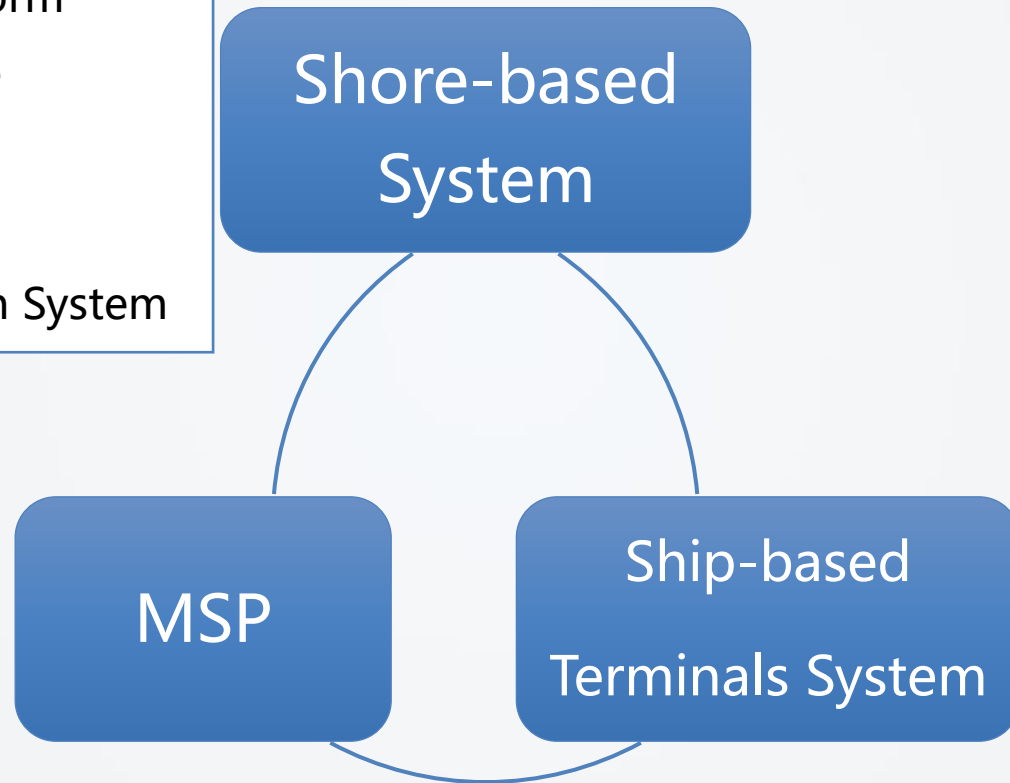


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Composition

2. Composition

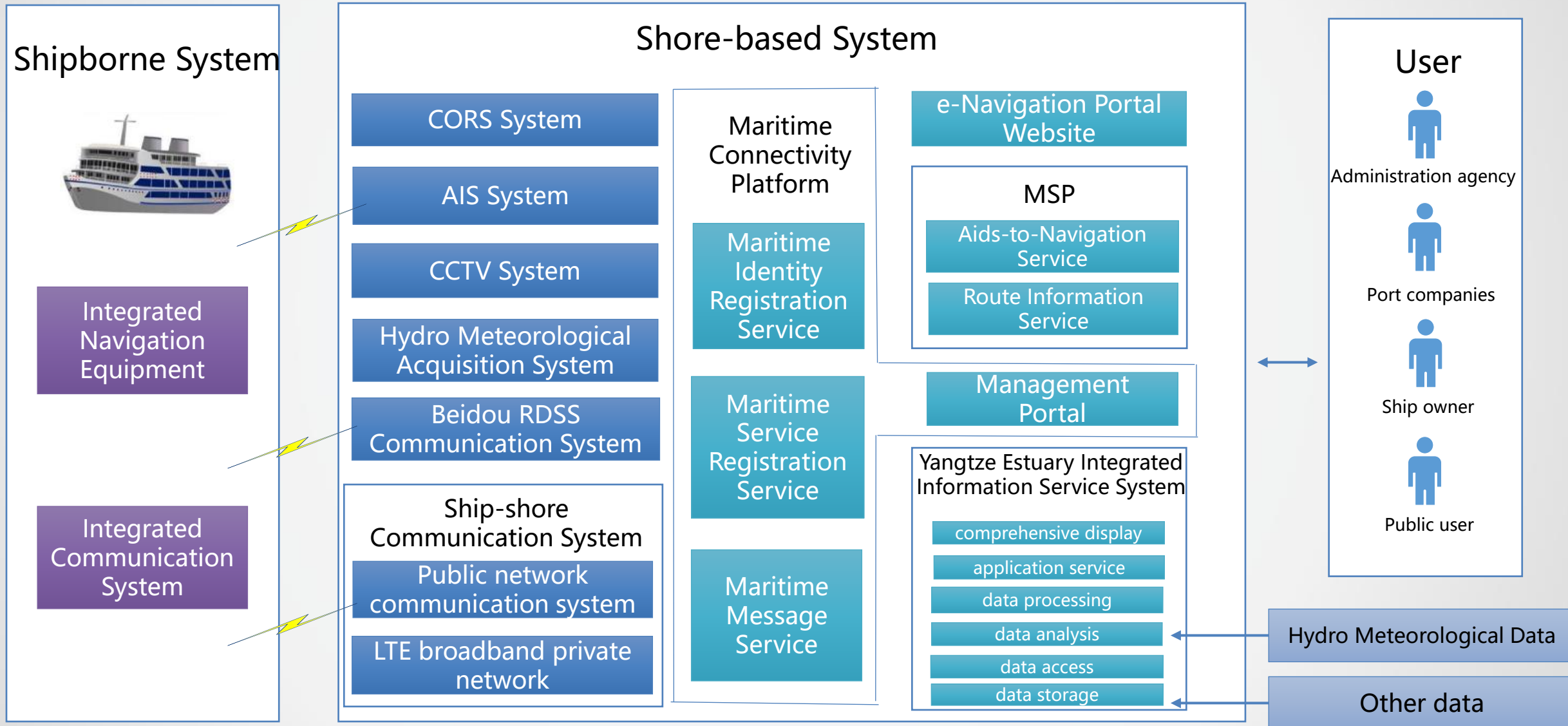
- Ship-shore Communication System
- Maritime Connectivity Platform
- e-Navigation Portal Website
- Yangtze Estuary Integrated Information Service System
- Shore-based Data Collection System



- Route Information Service
- Aids-to-Navigation Service

- ICS Ship Integrated Communication System
- Shipborne Integrated Navigation Equipment

2. Composition-system architecture



2. Composition-System Function

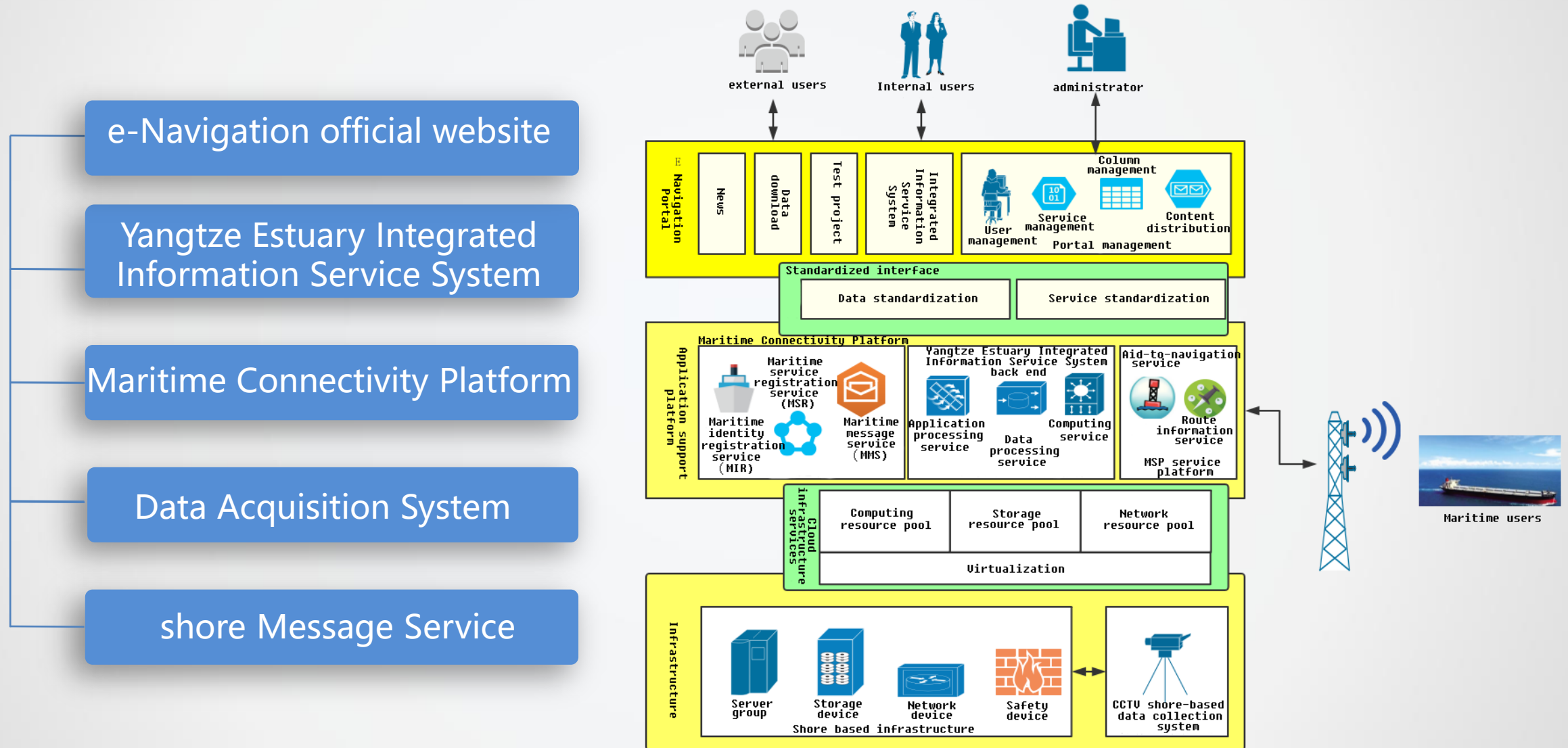
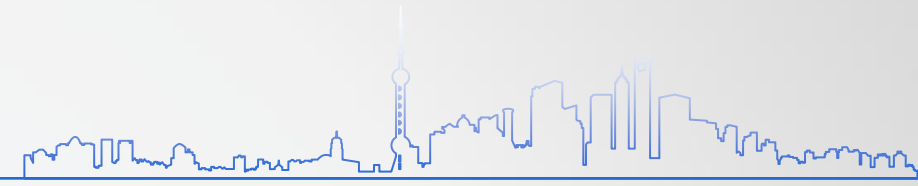


- 1) Virtual AIS Aids and Entity Atoll Marking Channel Boundary and Slope Limits;
- 2) The ship intelligent navigation terminal can obtain high-precision position correction data of the shore-based CORS system through the LTE communication link to improve the positioning accuracy of the ship;
- 3) Drivers can obtain ship recommended route information and hydro-meteorological information through LTE links;
- 4) The shore-based supervision center obtains the channel ship traffic status through AIS, LTE and Beidou short message links;
- 5) Support user registration and service registration, and send comprehensive service information to users on demand.

3

Shore-based System

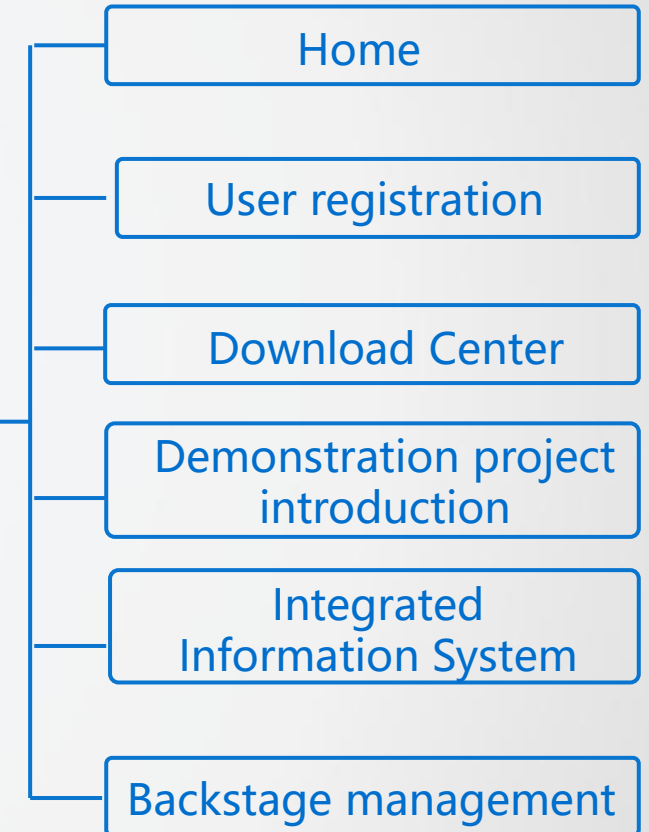
3. Shore-based System-Composition



3. Shore-based System-e-Navigation Official Website

e-Navigation Official Website is a comprehensive e-Navigation service portal that integrates **demonstration project demonstration, leading-edge information release, and technical program research** after integrating existing domestic e-Navigation portals.

It's used to released the e-Navigation construction results and demonstrated the e-Navigation demonstration project in China, and further improved e-Navigation service awareness.



3 Shore-based System-Yangtze Estuary Integrated Information Service System



Basic display application



Regulatory assistance



Big data analysis

- AIS information
- VTS dynamic information
- CCTV video information
- Ship registration static information
- LRIT information
- Ship reporting information
- Cargo information
- Ships arriving and leaving at port information
- Ship pilotage information

Marine department
existing data



New data

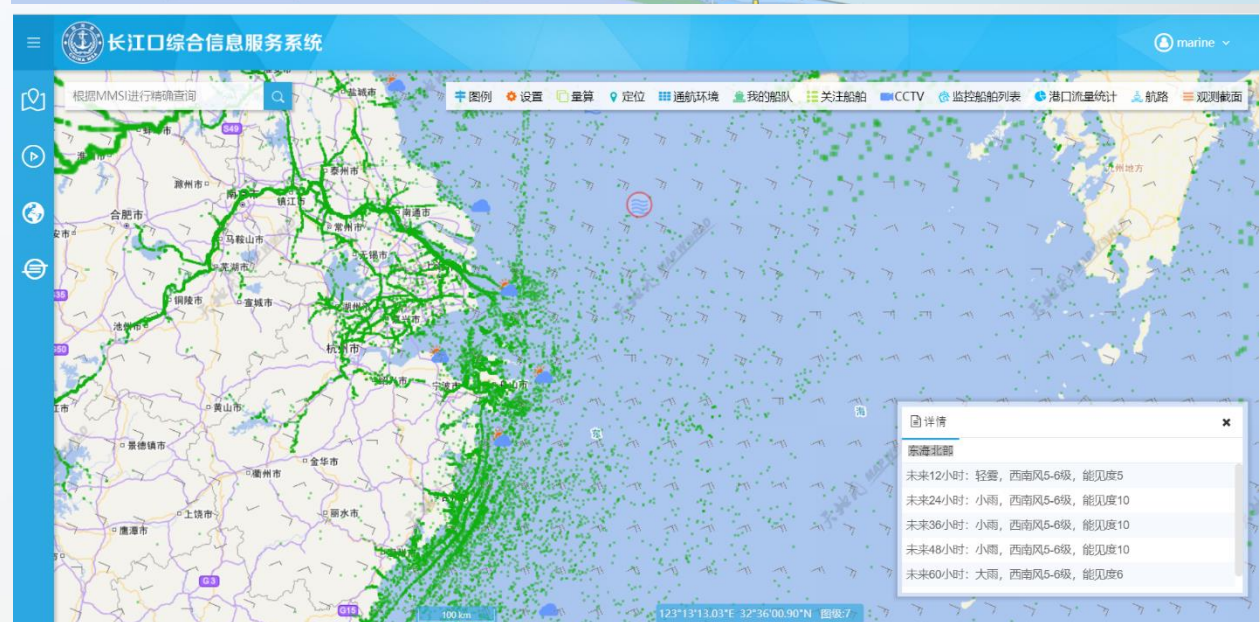
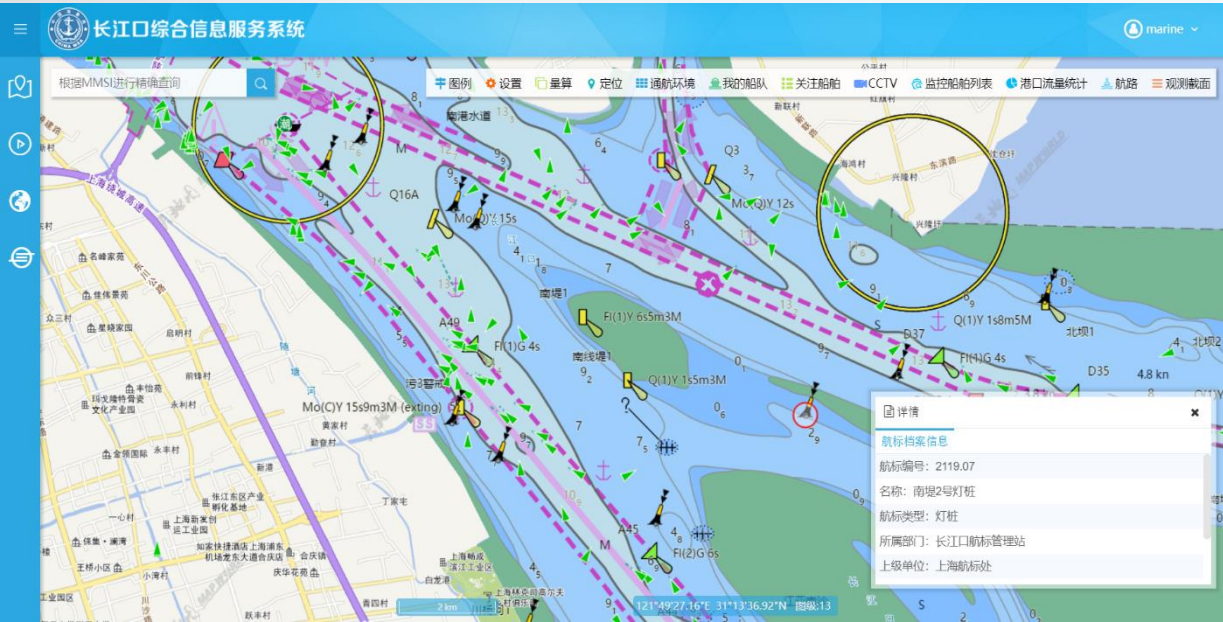
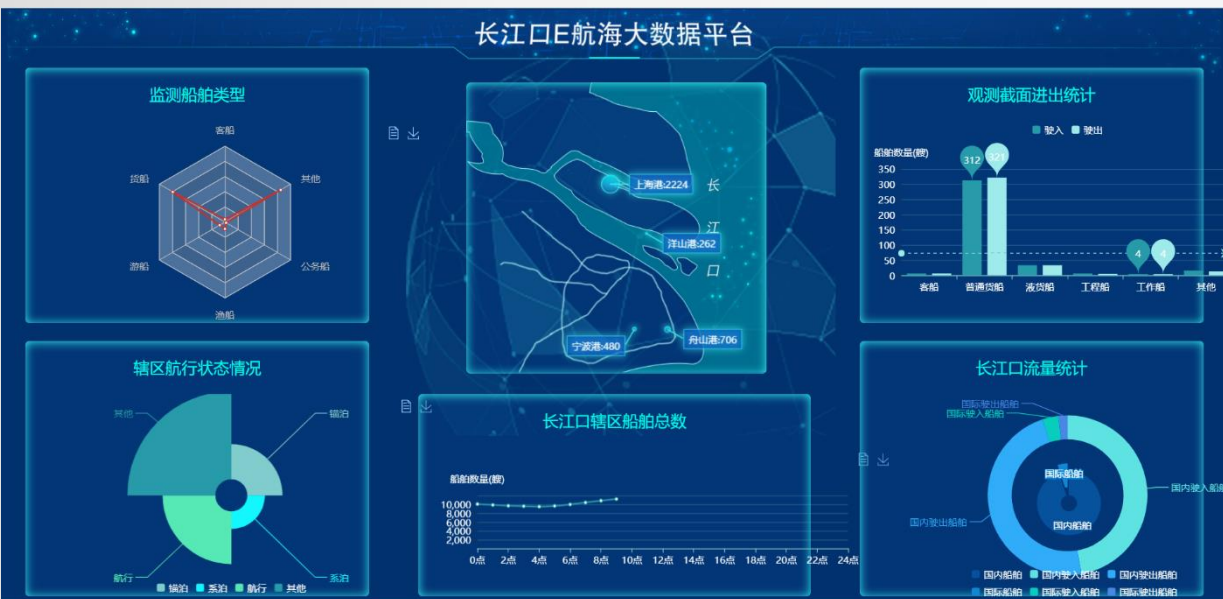


- Beidou Ship-based Terminal Positioning and Short Message Information
- Beidou indication information
- Beidou Individual Soldier Information
- Yangtze Estuary Waterway hydro meteorological information
- Crew information
- Shipping company information
- Ship agency company information
- Pier information
- Berth information

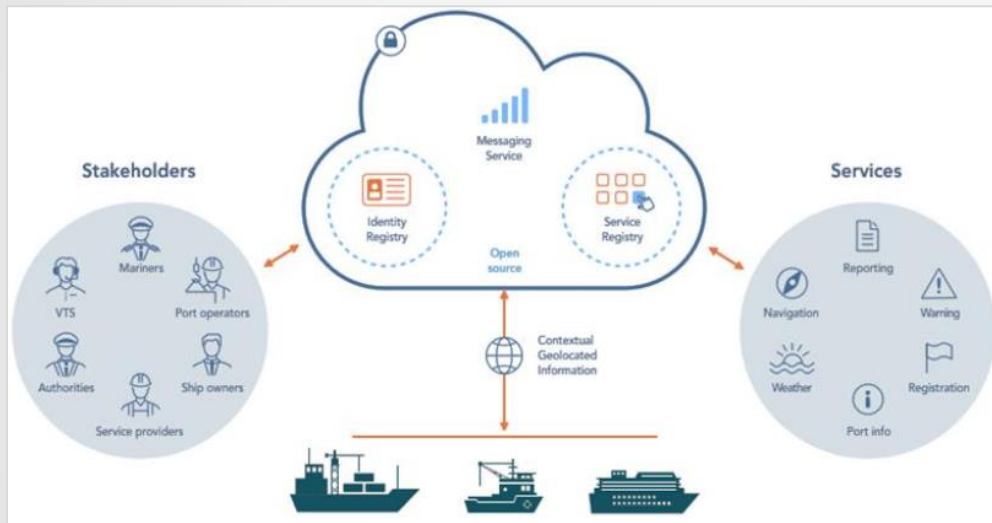
Maritime Connectivity Platform Service

Integrated Guided Navigation System Service

3 Shore-based System-Yangtze Estuary Integrated Information Service System



3 Shore-based System-Maritime Connectivity Platform



Maritime Connectivity Platform provides authorized channels and enables efficient, safe, reliable and seamless exchange of all types of maritime information for all authorized maritime stakeholders through all available communication systems . It is the information transmission pipeline and information transmission route executor of the Yangtze Estuary e-Navigation construction project.

- Top-level design follows IMO's e-Navigation implementation strategy
- The specific framework follows CSSA architecture proposed by IALA
- The data model follows S100 data model proposed by IHO

3 Shore-based System-Maritime Connectivity Platform



Functions

WEB user registration and audit

WEB user identity registration, auditing and MIR identification

WEB static identity registration, auditing, and MIR static object identification

MIR dynamic object registration, verification and identification

WEB service registration, auditing and MSR service discovery

MMS standardized data model access and business information modeling

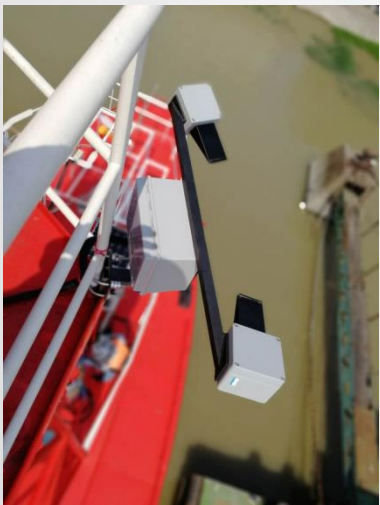
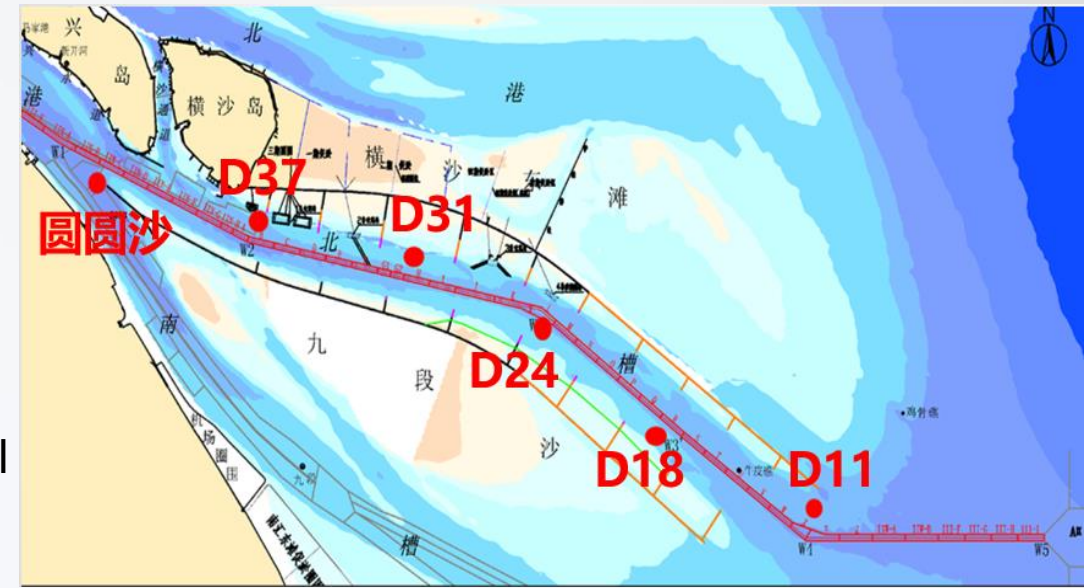
MMS information transmission intelligent addressing and routing

Yangtze Estuary e-Navigation Support

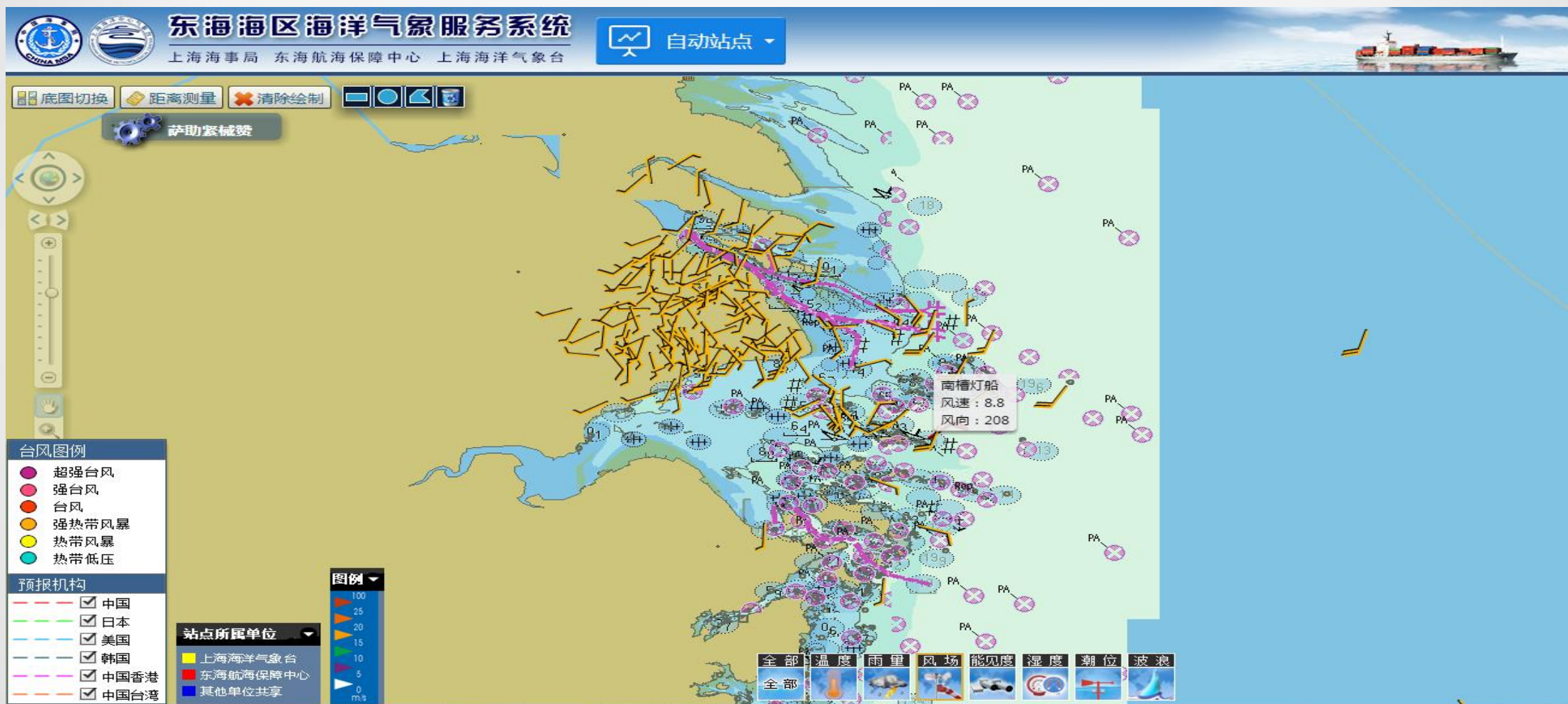
3 Shore-based System—Data Acquisition System

Hydro Meteorological Acquisition System

Six hydro-meteorological data collection points are established on the six beacons near the channel of the North Cascade, and the meteorological elements such as **wind speed, wind direction, temperature, relative humidity, pressure, visibility, rainfall**, etc., as well as the hydrographic parameters such as **section velocity and profile flow** are collected.



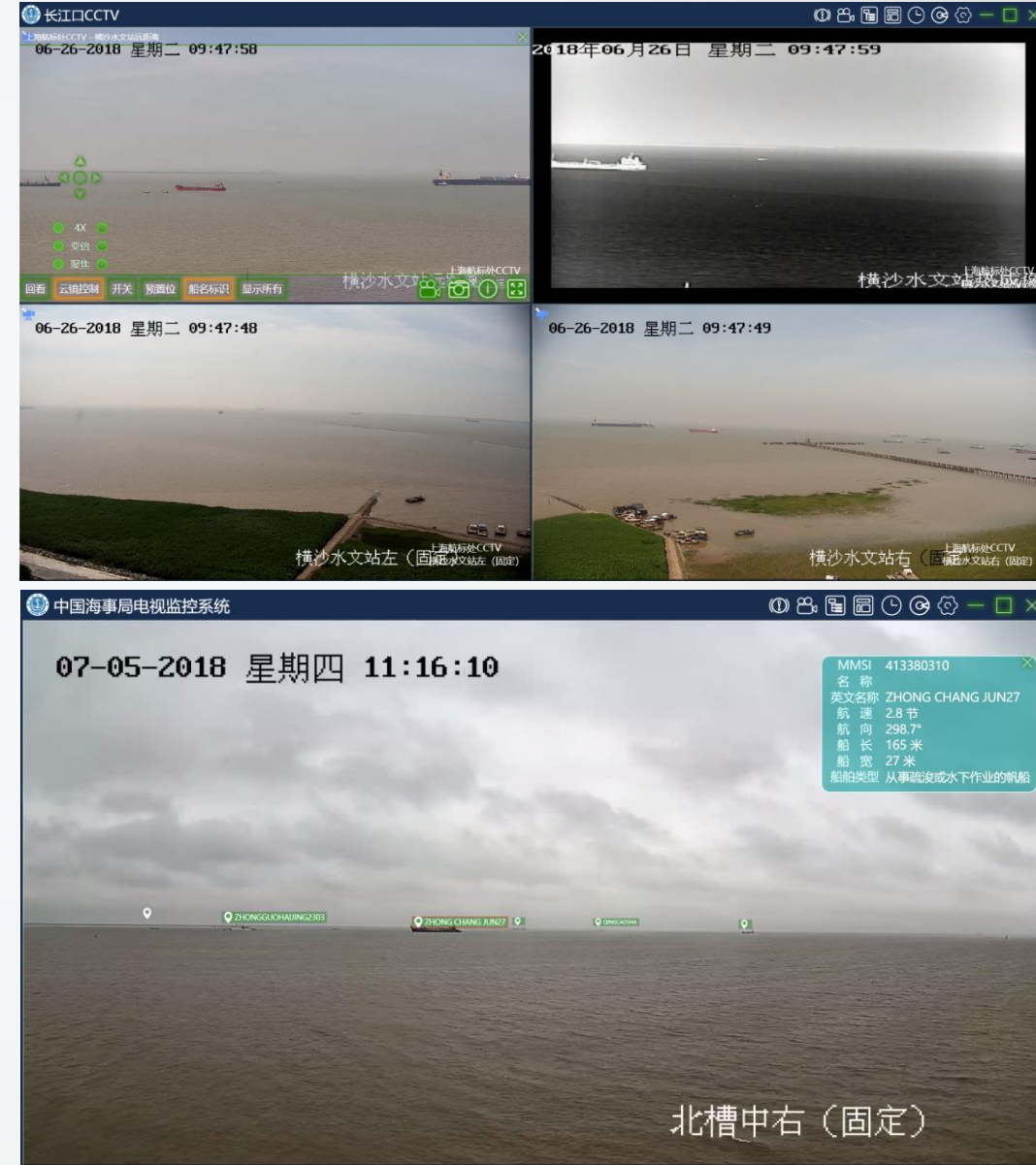
3 Shore-based System—Data Acquisition System



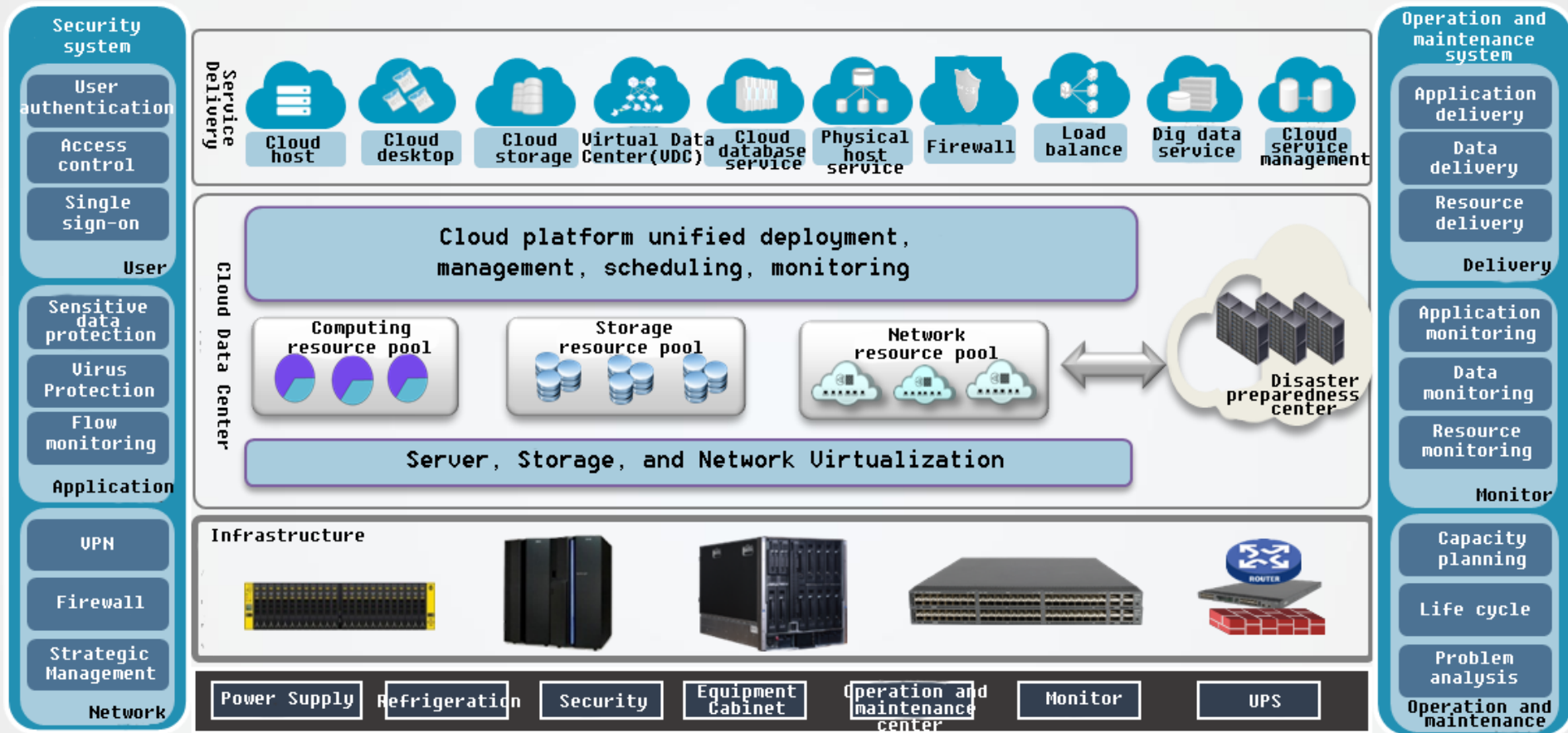
3 Shore-based System—Data Acquisition System

CCTV

The CCTV points are set on three fixed buildings such as the Cockroach Reef Hydrological Station Warning beacon, the Northern Channel Water Station Warning beacon, and the Hengsha Hydrometric Station Tower to form a CCTV video surveillance chain covering the entire deep water channel. The 24-hour monitoring and video recording of the monitored waters enables the automatic superposition, linkage and automatic tracking of ship information (ship names) for key ships.



3 Shore-based System-Shore-based Infrastructure



Navigation Safety Administration of east chinase of MOT will be one of the three branch nodes of the entire security business internal cloud platform. The storage virtualization transformation of the Shanghai AtoN Department's computer room will construct a Shore Message Service platform to meet future business development needs , support the public-facing Maritime Connectivity Platform and serve the construction of the Yangtze Estuary e-Navigation.

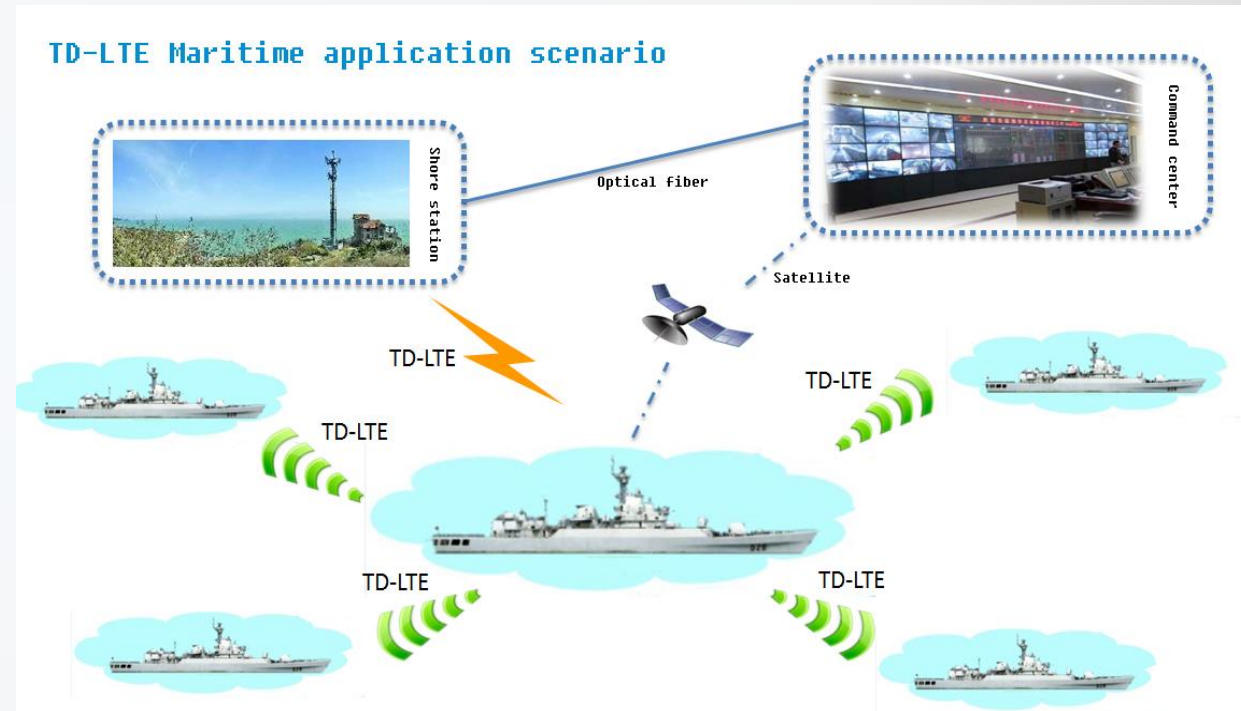
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Ship-shore Communication

4. Ship-shore Communication

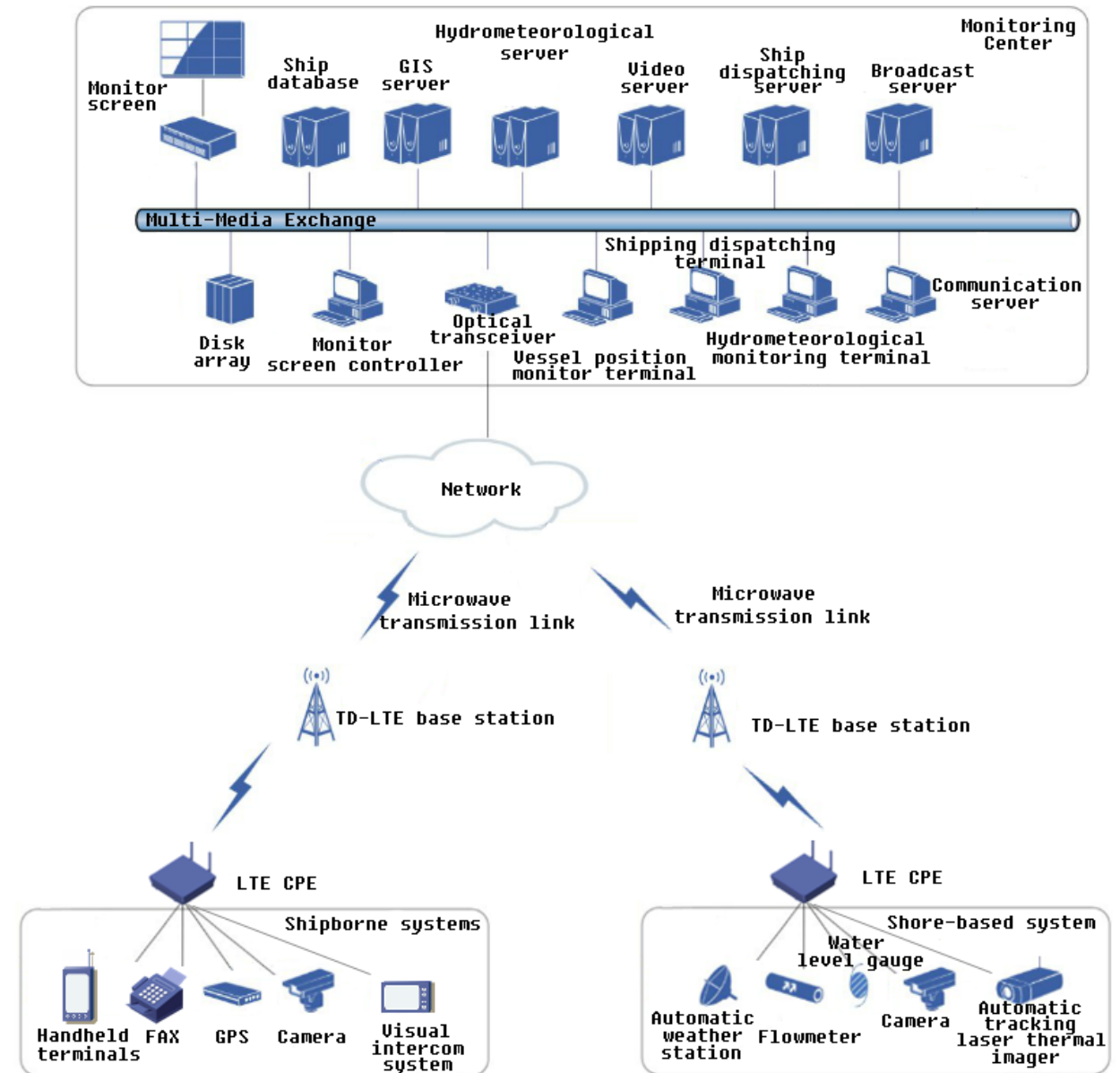
In order to solve the problem that the ship information in the shore and the fairway can't be shared, the project monitors the navigable condition of the fairway and the ocean surface in real time, and establishes a high-speed wireless data transmission Shore-based System in the offshore waters of the port to provide a wireless data high-speed transmission within 50 km of the coast. Combined AIS/LRIT, VTS, CCTV with Beidou satellite navigation, LTE broadband wireless communication and other integrated technologies, the project will create ship shore sea WiFi Internet to realize the application of the smart port navigation and e-Navigation.

Through the microwave link, each LTE station access network and the shore-based core network can communicate with each other, complete program-controlled switching to achieve network route protection.

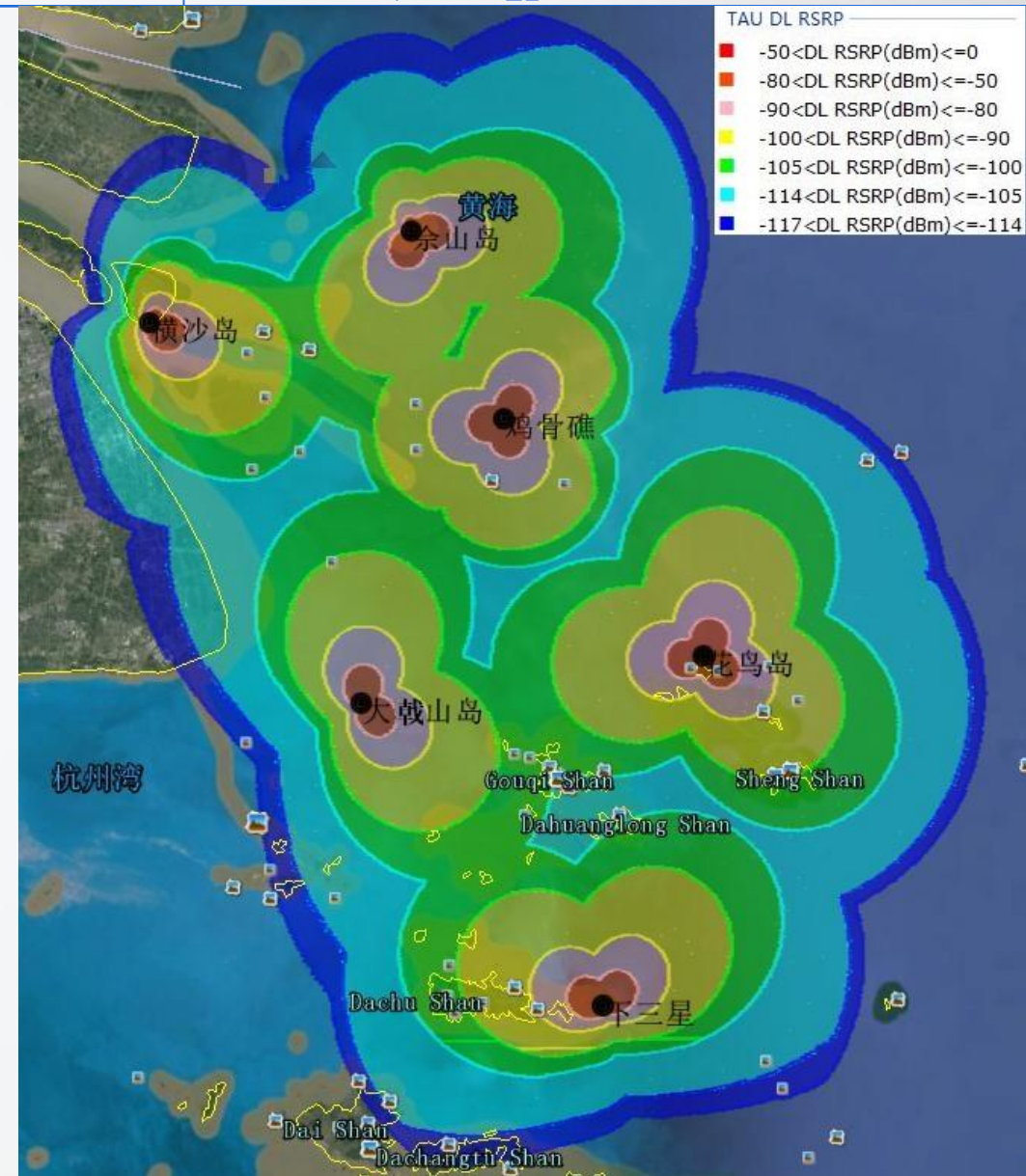
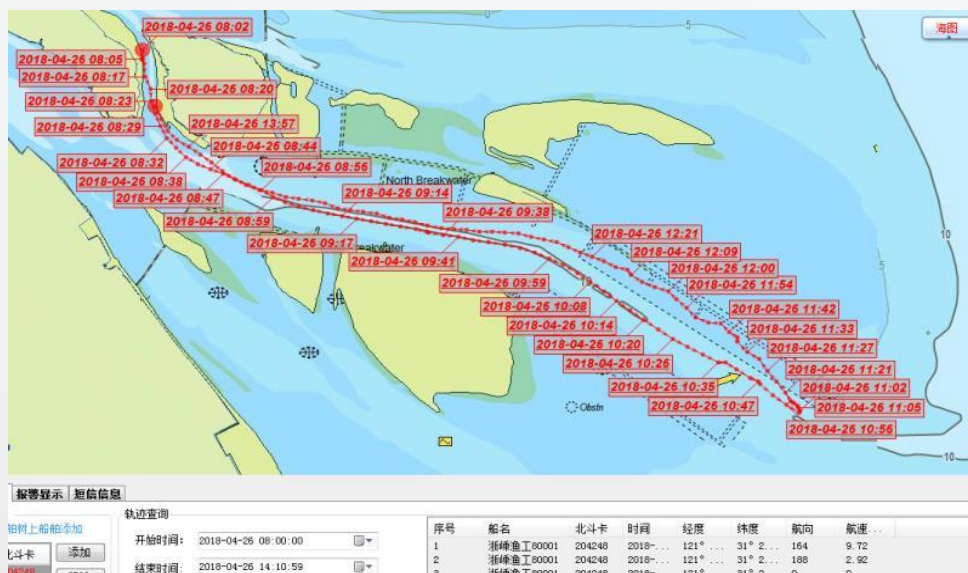
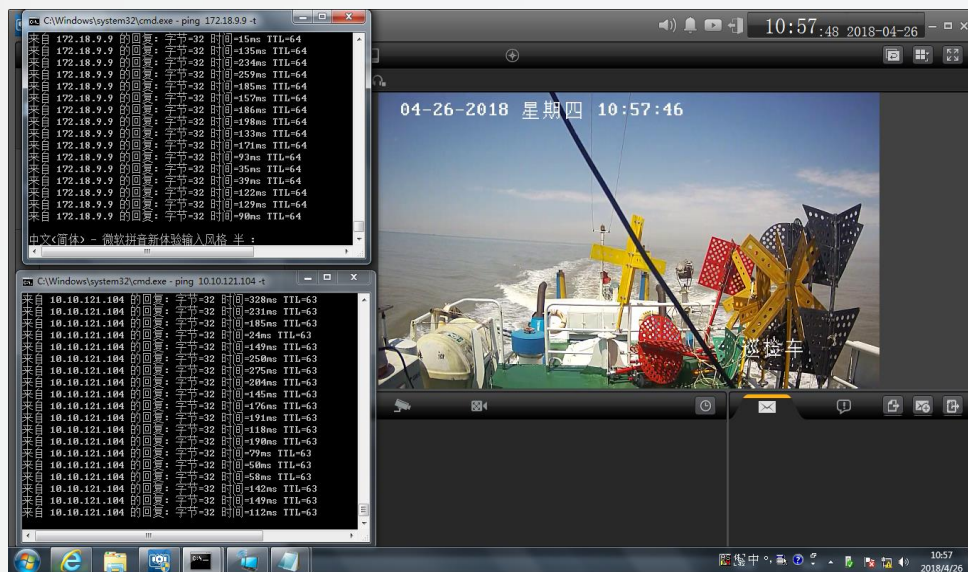


4. Ship-shore Communication

- Real-time monitoring of traffic conditions at ports and fairways
 - Real-time monitoring
 - Traffic analysis
 - Navigation warning
- Acquisition, exchange and share of real-time ship communication information
 - HD video data
 - Voice data
 - Hydro-meteorological data
 - Location data
 - Navigation safety data



Ship-shore Communication

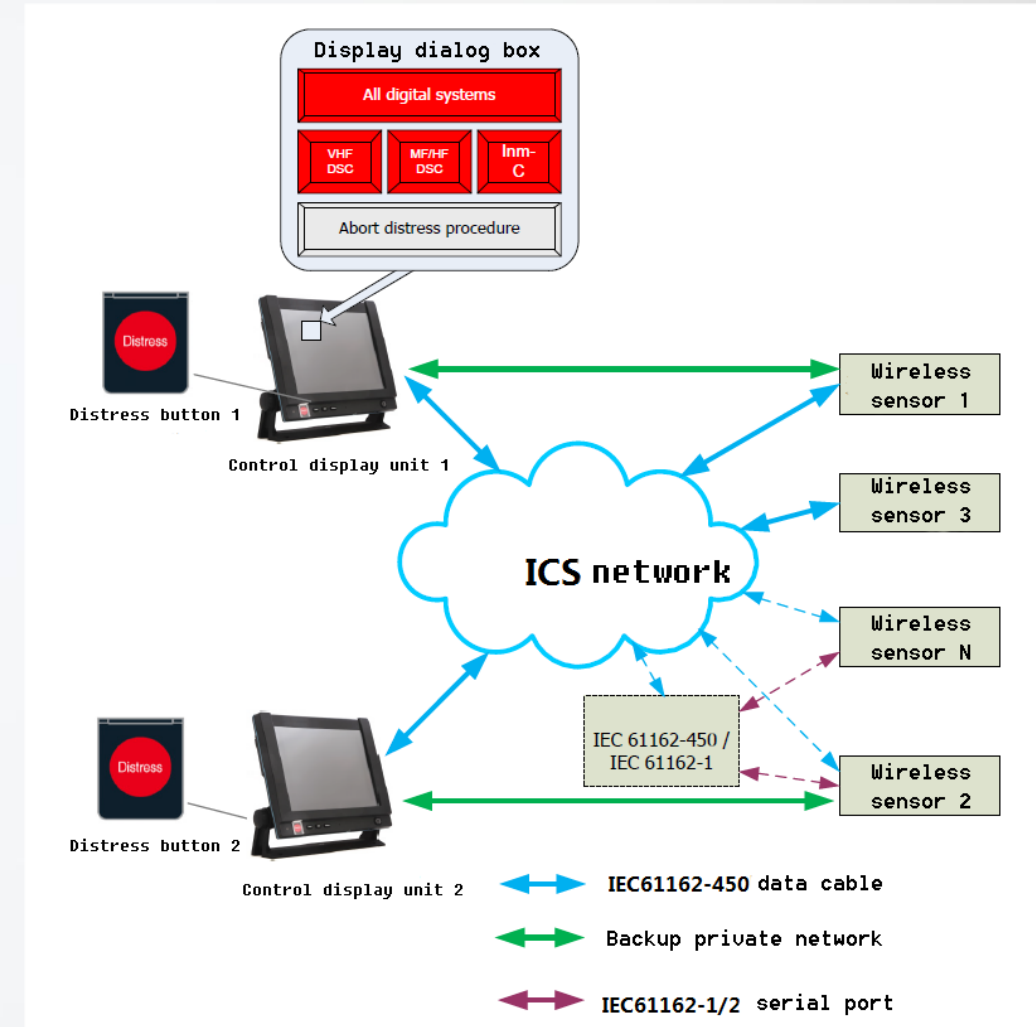


5

Shipborne System

5. Shipborne System-ICS integrated communication system

- Full network structure of IEC-61162-450 protocol
- Integrated control display unit
- Integrated voice communication unit
- Alarm unit
- Data voice switching unit
- Radio communication unit



5. Shipborne System- Smart Navigator

■ High-precision positioning

Using Beidou CORS (or DGPS) to obtain high-precision real-time ship positions, the terminal displays real-time calculations of its own ship's heading, attitude, relative distance to the dock, and close-up speed, and combined with electronic nautical charts and shore-based navigation aids, it can fully assist ship navigation and berthing.

■ MSP service

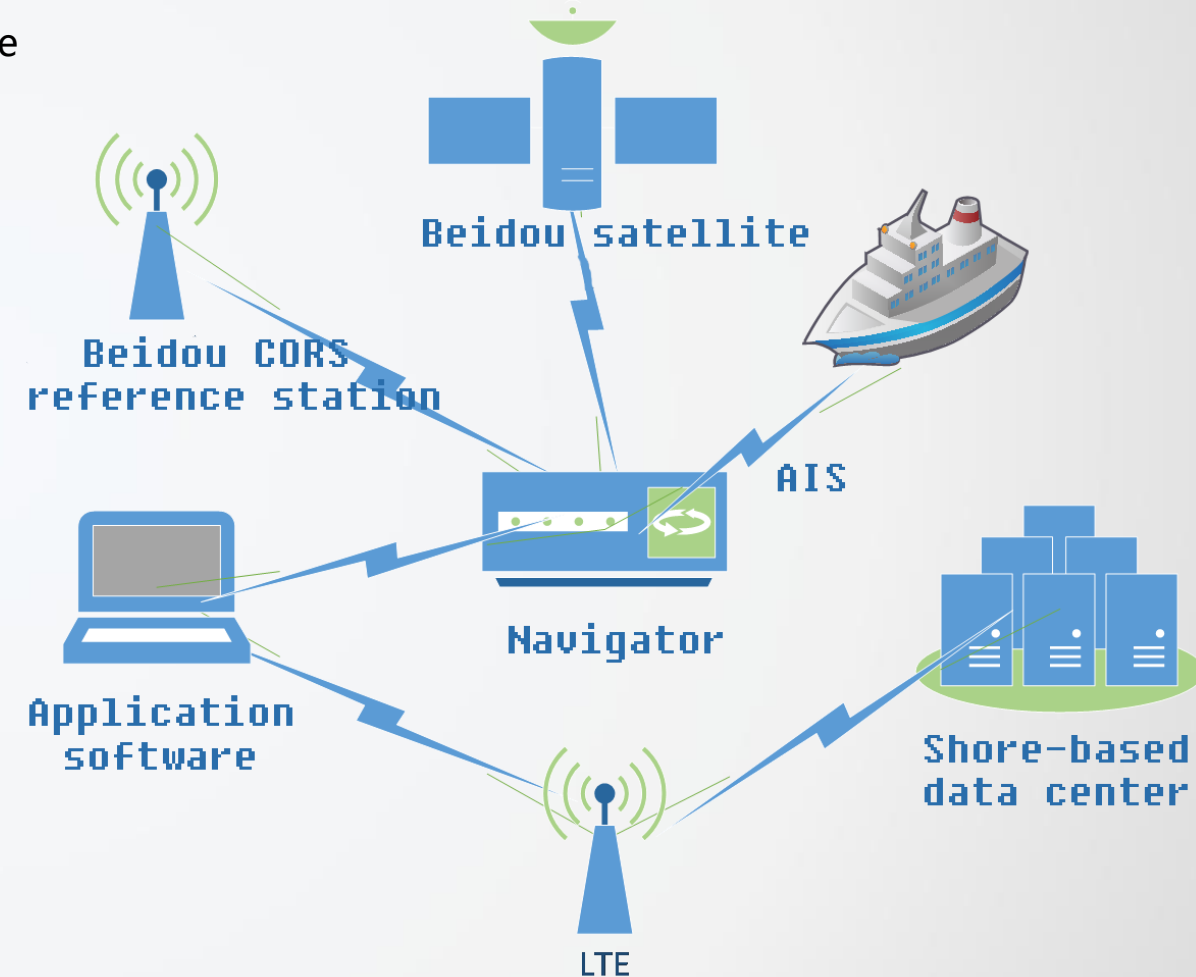
Getting the route information and navigation services in real-time through Maritime Connectivity Platform. And also the self-selection services and comprehensive display according to the location of the ship

■ Assist navigation information

Receive navigation information broadcasted by the Yangtze Estuary Maritime Connectivity Platform in the form of radio data link (3G/4G/LTE, WIFI, AIS, VHF), such as: hydrometeorology data, navigation mark dynamics, navigational safety warning, navigation notification, recommended route and other information.

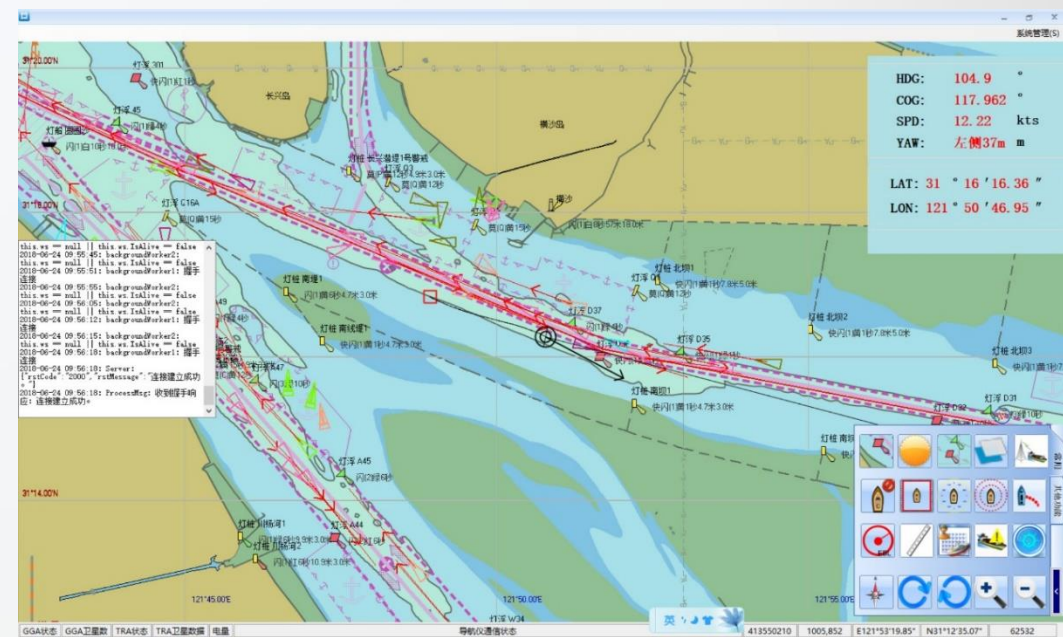
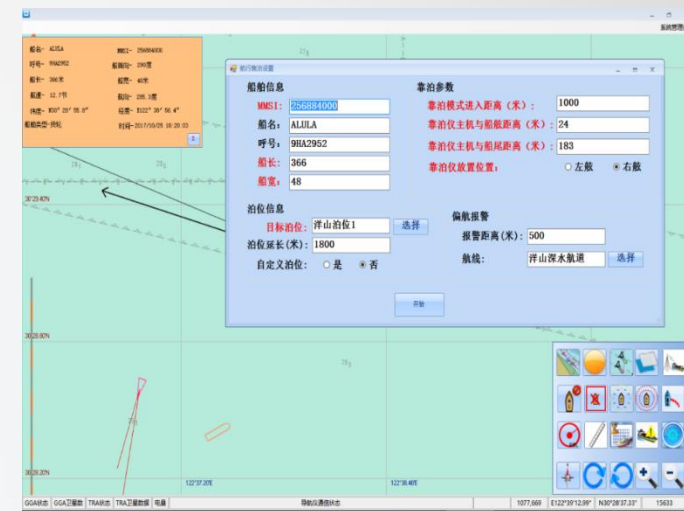
■ Upload information

Upload own ship information in the form of radio data link (3G/4G, WIFI, AIS, VHF).



5. Shipborne System- Smart Navigator

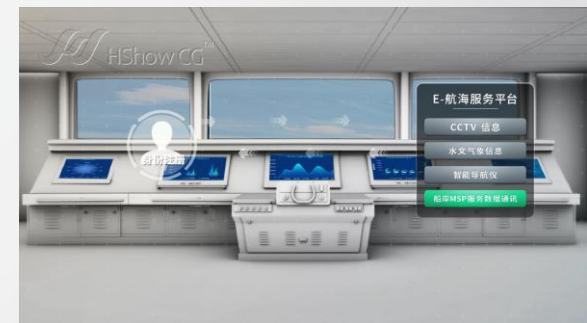
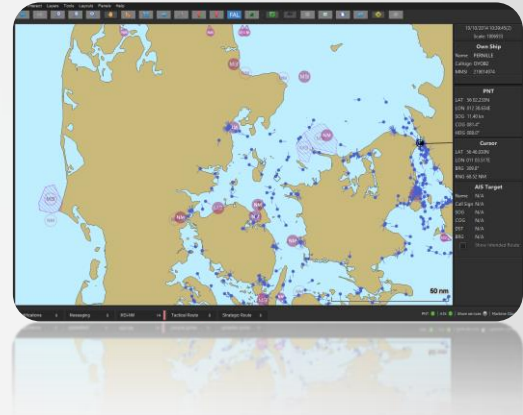
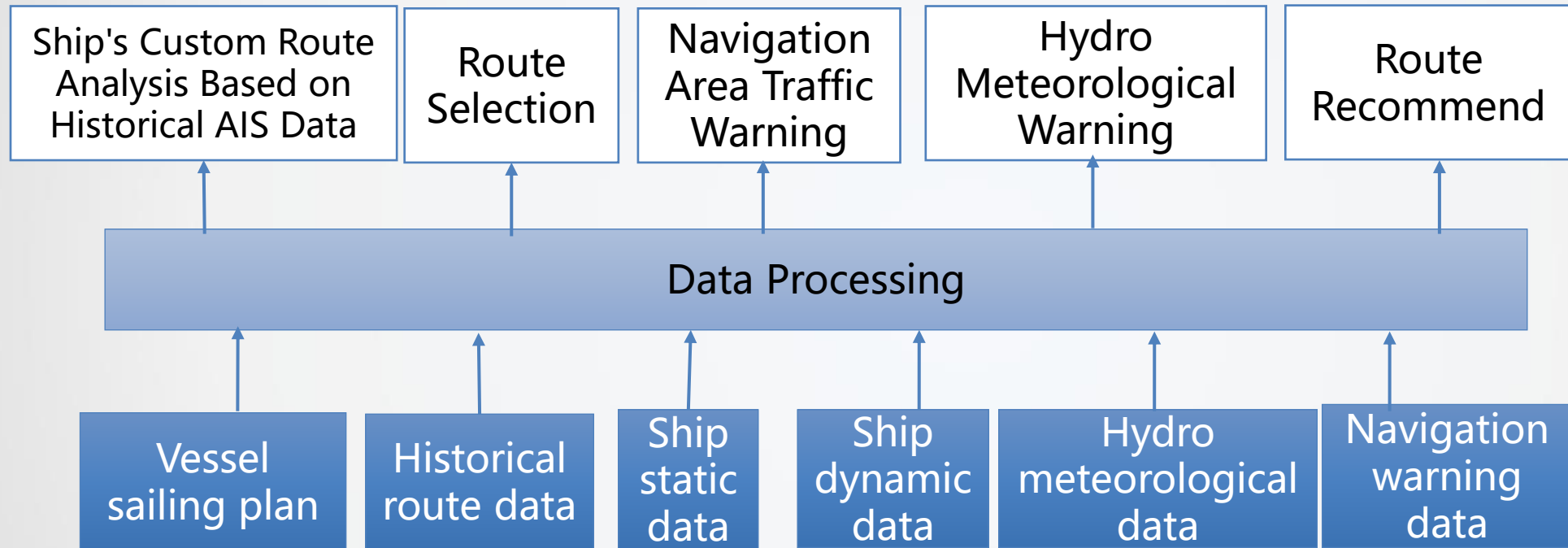
- Navigation mode
- Ship display position control
- Compass ring
- Fixed distance
- Mooring mode
- EBL
- Ranging, measuring area
- Two-way communication
- Chart management and display mode switching
- Navigation berthing parameter setting



6

MSP

6. MSP: Route Information Service



6. MSP: Route Information Service

The best route recommended

The optimal route recommendations based on customary routes and their safety index.



Rounding the shortest path calculation

Combined navigation, construction and other areas of navigational warnings, address the bypass route based on the shortest path algorithm, and implement splicing corrections for the currently recommended route.



Voyage estimation

Estimation of navigation distance and sailing time based on real-time ship speed and recommended routes.

6. MSP: Aids-to-Navigation Service

Effectively identify lane boundaries and slope limits

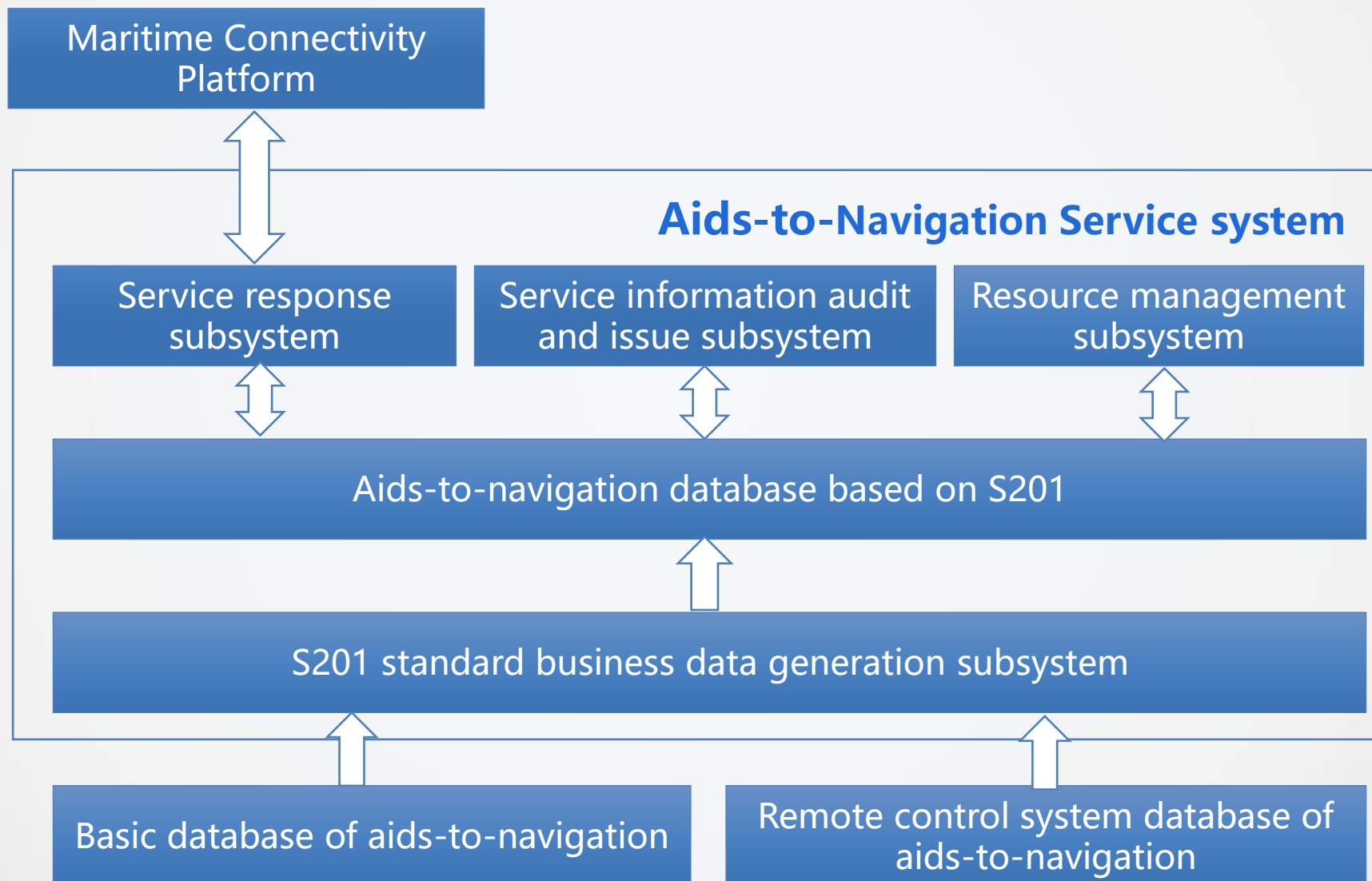


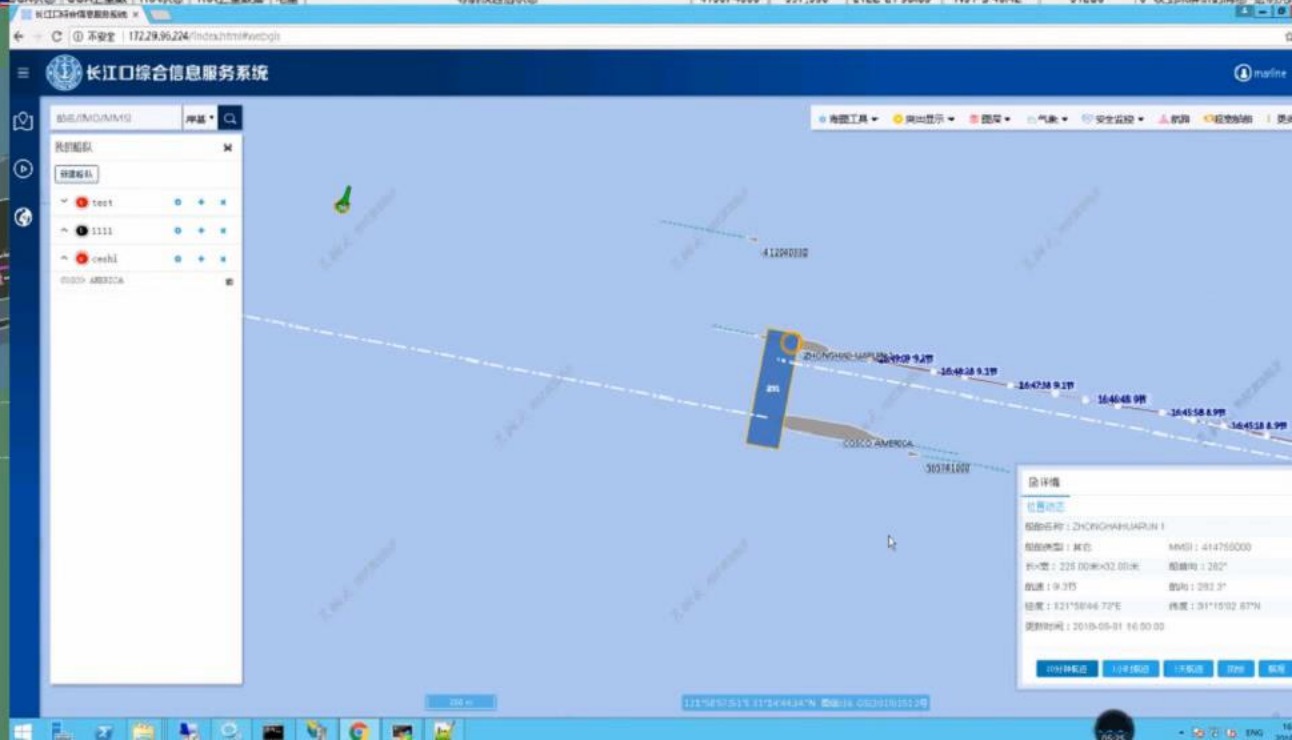
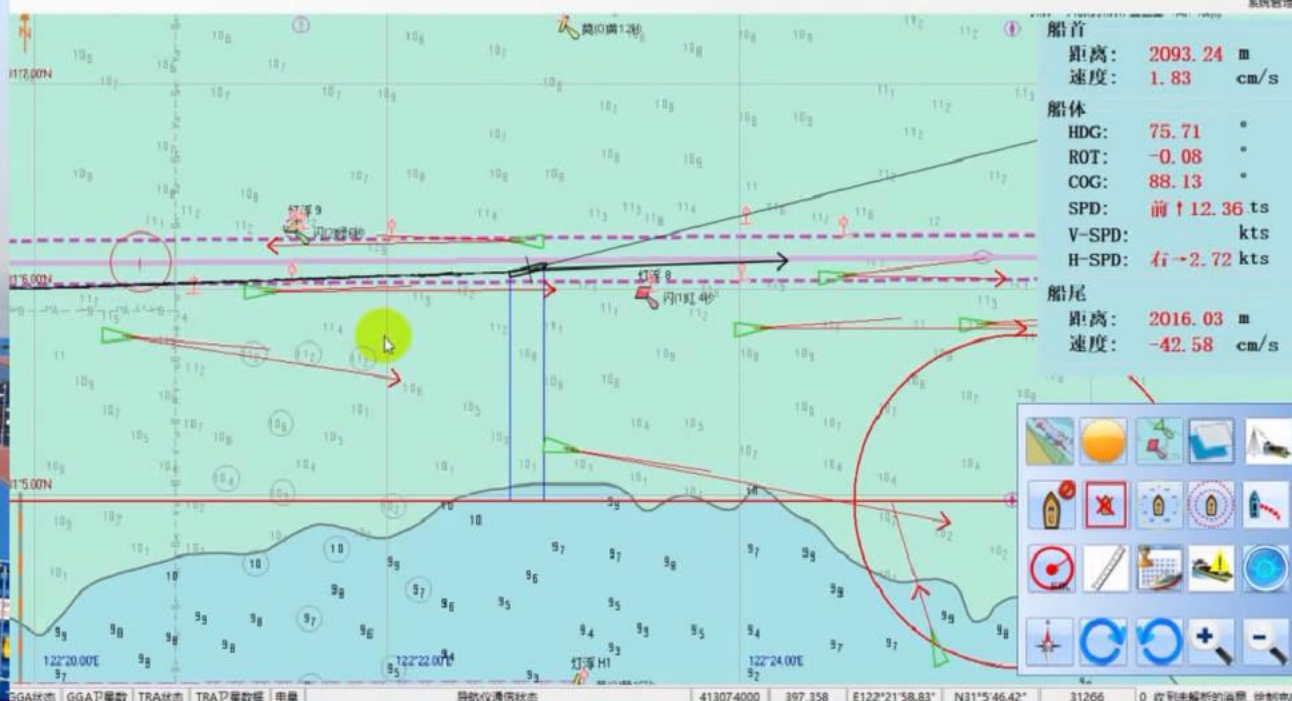
Using a combination of virtual navigation mark and physical navigation mark, a new virtual navigation mark is added to mark the edge of the channel.

The Navigation Service is released to develop distinctive services for the Yangtze Estuary Deepwater Navigation Channel and timely release of the navigation mark change information.



6. MSP: Aids-to-Navigation Service





Thanks!