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Input paper for the following Committee(s): check as appropriate Purpose of paper:

**□** ARM **□** ENG **□** PAP **□** Input

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Agenda item

Technical Domain / Task Number

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China Waterborne Transport Research Institute

Maritime Cloud and China e-Navigation implementation plan

# Summary

This paper mainly describes three parts:

1. The paper describes China's test work on the Maritime Cloud after ENAV20, and China has registered two test service cases on the Maritime Cloud Portal.

2. The paper describes the 2017-2020 China e-Navigation implementation plans; China will increase investment in e-Navigation, and willing to cooperate with other countries and organizations.

3．The paper describes a testbed Yangtze River Estuary e-Navigation Project will construct in 2018 and 2019. In this project, we will focus on the characteristics of the Yangtze River estuary waters, based on the concept of Marine Cloud, to build a Marine Cloud system, and focus on Aids to Navigation services (AtoN) and Navigational Assistance Service (NAS) research.

# Background

At ENAV 20, an input paper on the Maritime Cloud conceptual model [1] was presented by the Maritime Cloud Development Forum (MCDF). The basic model of the Maritime Cloud was introduced and the available demonstration website and open source code were released [3].

The definition of maritime cloud is as follows:” a communication framework enabling efficient, secure, reliable and seamless electronic information exchange between all authorized maritime stakeholders across available communication systems” (Maritime Cloud Development Forum, 2016).

Maritime Cloud consists of Maritime Identity Registry (MIR), Maritime Service Registry (MSR) and Maritime Messaging Service (MMS).

* Maritime Identity Registry (MIR): ensure identification and authorisation
* Maritime Service Registry (MSR): find services and information to address and to use them
* Maritime Messaging Service (MMS): provide extra services for multi- and broadcasting of messages and offers support to existing and future non IP based communication channels.

The Maritime Cloud has evolved in the context of the projects EfficienSea2, Sea Traffic Management (STM) and SMART-Navigation project. China has a general understanding of the structure of the Maritime Cloud on the basis of the analysis and research of relevant information, and believes that the Maritime Cloud has a very important role for the comprehensive utilization of various types of data. China is willing to work with relevant organizations to promote the development of Maritime Cloud.

# Discussion

Through the preliminary study of Maritime Cloud, we intend to carry out the following work in the future:

## Test Maritime Cloud Portal

After ENAV20, China has carried on the test to the MIR and MSR, especially the preparation of the service specification, the technical design, the service instance description and the use method of the service in the Maritime Cloud.

At present, China has registered two test service cases in the Maritime Cloud Portal for testing the functional modules. Next, we will focus on the relevant technological progress and carry out the Maritime Cloud testing and development continually.

During the test, we found that the Maritime Cloud management portal is in beta version, a lot of features need to be added and improved. On this basis, China has formulated an e-Navigation implementation plan, and will build a Maritime Cloud experimental system that meets China's needs based on existing conceptual models and open source codes in future projects.

## e-Navigation Implementation Plan

In order to promote the research process of e-Navigation effectively, China has developed a 2017-2020 e-navigation implementation plan. China Plans to increase e-Navigation research funds and develop the China e-Navigation service system in the next few years. We will pay attention to the research and construction of the Maritime Cloud, ship shore communication system, resilient PNT, MSP, and S-100.

| **No** | **Category** | **Task** | **Timing** | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **2017** | **2018** | **2019** | **2020** |
| 1 | Resilient PNT | AIS-R Mode | X | X |  |  |
| 2 | e-Loran |  | X | X | X |
| 3 | Resilient PNT services and systems | X | X | X | X |
| 4 | Shipborne | Integrated communication system | X | X | X |  |
| 5 | Unified and coordinated information display |  | X | X | X |
| 6 | Shipborne terminal |  |  | X | X |
| 7 | Shore-Ship communication | VDES | X | X | X | X |
| 8 | NAVDAT | X | X | X |  |
| 9 | BeiDou RDSS | X | X |  |  |
| 10 | Maritime Cloud | China e-Navigation Portal | X | X |  |  |
| 11 | Based on the Maritime Cloud , build a maritime cloud system for China |  |  | X | X |
| 12 | MSP | MSP17 Aids to Navigation services (AtoN) | X | X | X |  |
| 13 | MSP5 Maritime Safety Information service (MSI) |  | X | X |  |
| 14 | MSP2 Navigational Assistance Service (NAS) |  | X | X | X |
| 15 | MSP15 Real-time hydrographic and environmental information services | X | X | X |  |
| 16 | MSP12 Nautical publications service |  | X | X | X |
| 17 | S100 |  | X | X | X | X |

## Testbed

According to China e-Navigation implementation plan, the Yangtze River Estuary E navigation project will be launch in 2018-2019

At present, on the Yangtze River, because of increased ship traffic and more larger-scale ships, more ships waste many times on waiting for scheduling, and these even affecting the efficiency of Shanghai and Yangtze River Delta regions. So, China intends to carry out e-Navigation project on the Yangtze River to improve the navigation efficiency of the Yangtze River estuary.

Based on the above problems, the project mainly carries out the following works:

1. Shore borne system

Firstly, the project will build a private cloud data centre which will consolidate servers, improve application availability and achieve a unified storage and management of various types of data

Secondly, the project will be based on the existing open source codes of the Maritime Cloud and provide support for the open source projects on GitHub. China plans invest resources to build the maritime cloud experimental systems based on the Yangtze River estuary waters.

1. Ship borne system

Develop a portable intelligent navigation terminal for pilots. The system based on integrated communication system to receive the high-precision positioning information needed for ship navigation, high-precision electronic chart information, hydro meteorological information, beacon dynamic information, navigation safety alarm information, and superimposed on the electronic chart, will give pilots comprehensive, complete and reliable information.

1. Ship shore communication

Construct LTE communication links in Yangtze River estuary waters. The system can meet the requirements of low-speed transmission of on-site information collection, such as ship dynamic and static information, environmental hydrology and meteorology, and the high-speed real-time transmission requirements of voice and video.

1. Maritime Service Portfolios(MSP)

The project will conduct a comprehensive analysis of the navigation environment in the waters of the Yangtze River estuary, recommend the optimal route to the ship, and provide the corresponding intelligent navigation information service according to ships’ routes.

At the same time, using visual Aids and virtual Aids, the system can mark the different water depth range and send the Aids dynamic information to the shipborne, so as to assist the sailing to ensure the safety of navigation.

# References

[1] ENAV20-9.19 “Input paper - Maritime Cloud conceptual model,” ENAV20, IALA , 2017.

[2] ENAV20-9.21 “Maritime Messaging Service,” ENAV20 , IALA , 2017.

[3] <https://management.maritimecloud.net/>

[4] <http://maritimecloud.net>

[5] Maritime Cloud Management Portal - User Guide

# Action requested of the Committee

1. This paper is for information only and requires no action by the Committee.