Input paper: ENAV24-6.1.20[[1]](#footnote-1)

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

**□** ARM **□** ENG **□** PAP X Input

**X** ENAV **□** VTS **□** Information

Agenda item [[2]](#footnote-2) (from agenda) 6

Workplan Task Number / Technical Domain 2 …………………………………

Working Group WG 2

Author(s) / Submitter(s) WTI(Wen Jie)

DNSA（Zhou Xuyao, Lv Xuwei）

Initial Assessment of LTE by china

# Introduction

At the ENAV 22nd meeting , WG2 began an initial assessment of various new technologies and provided an assessment template.

At the ENAV 23nd meeting, KRISO from the Republic of Korea submitted a report on the construction and application of the LTE technology in Korea, and the working group improved the assessment template based on the materials submitted by Korea.

Since both China and South Korea have carried out some projects in the construction and application of LTE networks, the working group hopes that China and South Korea will submit LTE assessment reports at the ENAV24 meeting respectively, so as to conduct a complete assessment of LTE technology.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Question** | **Technology Candidate Response** | | **Working Group Response** | |  |  |  | | --- | --- | --- | | **Green** | **Amber** | **Red** | |
| **Infrastructure** | **User** |  | **Status** |
|  | Where has the referral come from? | The LTE standard was developed by the 3GPP organization. China has carried out nearly 20 LTE private network projects in the field of port management and maritime supervision. | |  |  |
|  | Name of technology and product name | LTE, LTE private network | LTE, CPE(Customer Premises Equipment) is required to connect to shore base stations. |  |  |
|  | Functional description | 1. LTE mainly implements mobile data access. When the system bandwidth is 20M, the theoretical peak rate of LTE single cell uplink is 50Mbit/s, and the downlink theoretical peak rate is 100Mbit/s, and QoS provisions permitting a transfer latency of less than 50 ms in the radio access network.  2. LTE has the ability to manage fast-moving mobiles and supports multi-cast and broadcast streams. LTE supports scalable carrier bandwidths, from 1.4 MHz to 20 MH. It supports both frequency division duplexing (FDD) and time-division duplexing (TDD), We're using TD-LTE technology. | 1. Realize mobile data access in the sea through CPE;  2. By carrying a dedicated cluster terminal, it realizes cluster scheduling such as digital voice and video. |  |  |
|  | Proposed user group | 1.The LTE public network is mainly for the consumer market; the LTE private network is mainly for industry customers;  2.The main construction units of the LTE private network in the maritime field include the port management department and the Maritime Safety Administration. | 1.The LTE public network has been widely used around the world.  2. The main users of LTE private network in the maritime field include ships and terminal operators. |  |  |
|  | What are its Key limitations | 1. The application of LTE technology in the maritime field requires a long coverage distance, but the coverage distance is affected by the height of the base station antenna.  2. Radio waves are transmitted close to the sea, and weather is one of the factors that affect transmission.  3. The system bandwidth of the LTE network can be selected from 1.4M\3M\5M\10M\15M\20M, and the rate that the system can reach is limited by the system bandwidth. The LTE private network needs to apply for frequency from the radio management committee of the country where it is constructed.  4. The actual transmission rate of the user is limited by the distance from the location of the station. The closer the distance is, the higher the transmission rate is. As the distance increases, the transmission rate decreases.  5. The theoretical coverage of LTE can reach 100km, but it has not been applied in actual projects in China. | 1.Ships need a new CPE, increasing the burden of shipowners. |  |  |
|  | Where is it currently used (geographic and/or industry)? | The LTE public network has been widely used in the world; The LTE private network is also widely used in public security, emergency protection, traffic supervision, and energy. | The number of Chinese access users on the LTE public network has reached 1.08 billion; |  |  |
|  | How is it currently used? | 1.The LTE public network has been widely used in the world; The LTE private network is also widely used in public security, emergency protection, traffic supervision, and energy.  2.The LTE private network including LTE base station, LTE core network , etc., and various types of LTE terminals have been installed on ships. |  |  |  |
|  | How could it be used within the maritime sector? | 1.China has built about 20 LTE private network projects in the fields of port terminals and maritime safety supervision; | 1. The system can provide users with mobile data access, data voice, video transmission, ship positioning, mobile office, and so on; |  |  |
|  | Who developed it? | 1.The LTE standard is developed by the 3GPP, and major LTE equipment manufacturers develop equipment based on the 3GPP standard. |  |  |  |
|  | Is it commercial, non-commercial or military? | 1.LTE public network: commercial;  2.LTE private network: non-commercial; | 1.LTE public network: commercial;  2.LTE private network: non-commercial, The ship needs to be configured with the terminal and approved by the management department before it can access the network. |  |  |
|  | Is there an existing technology that meets the same requirements?  If so, what make this different? | 1. There is currently no similar technology in the maritime field; |  |  |  |
|  | Ease of implementation? | 1. LTE has mature technology and mature manufacturers support; | 1. Users only need to configure CPE to access to the network; |  |  |
|  | What are the constraints for implementation? | 1. The LTE private network needs to apply for frequency to the radio management committees of various countries, and it is impossible to achieve global unification. | 1.Ships need a new CPE(Customer Premises Equipment), increasing the burden of shipowners. |  |  |
|  | what is the capability of the technology? | 1. LTE mainly implements mobile data access. When the system bandwidth is 20M, the theoretical peak rate of LTE single cell uplink is 50Mbit/s, and the downlink theoretical peak rate is 100Mbit/s, and QoS provisions permitting a transfer latency of less than 50 ms in the radio access network.  2.LTE can generally cover a distance of 30 nautical miles, and the edge can upload video. |  |  |  |
|  | What is the scalability of the technology? | 1.The network side and the terminal side device can perform parameter configuration and adjustment according to user requirements, and implement wireless signal coverage in multiple scenarios. |  |  |  |
|  | Is the technology backward compatible? | 1.Actually, LTE was designed to operate only in 4G standards. But has backward compatibility in a view of 3GPP Release version. But LTE cannot be compatible with 2G, 3G, 5G. |  |  |  |
|  | Is the technology dependant on another technology? | NO |  |  |  |
|  | Can the technology be demonstrated? | 1. Already，China has carried out nearly 20 LTE private network projects in the field of port management and maritime supervision. |  |  |  |
| 17 | Are there any results and test bed? Please List | 1.Shanghai Port  2. Qingdao Port;  3. Ningbo Port;  4. Taicang section and Nanjing section of the Yangtze River, Nanjing section;  5. Yangtze River Estuary E Navigation Construction Project |  |  |  |
| 18 | Is there a compliance summary? | 1. Comply with the standard 3GPP protocol and perform appropriate network optimization for specific projects. |  |  |  |
| 19 | Are there legal issues associated with the implementation of the technology? | 1.LTE technology itself is a global technology, but LTE private network needs to apply for frequency in the radio management committee of each country. |  |  |  |
| 20 | Are there any intellectual property rights (essential patents) associated with the technology? | 1.We adopt TD-LTE technology, and TD-LTE adopts wireless communication technology with China's independent intellectual property rights. |  |  |  |
| 21 | Is the technology safe to use | 1. very safe, Both LTE uplink and downlink data are encrypted and transmitted, and the network terminals authenticate each other. |  |  |  |
| 22 | Does the use of the technology require extra training? | 1. After the completion of the construction of the LTE private network, special training is required for operation and maintenance; | NO |  |  |
| 23 | Are there environmental considerations with the technology? | 1.No pollution to the environment, |  |  |  |
| 24 | What are the financial considerations for implementation and use? | 1. LTE private network needs to make one-time construction investment | 1. Users need to purchase CPE and cluster intercom terminal |  |  |
| 25 | Is the technology secure (i.e. protected against hacking; privacy of data)? | 1.LTE is secured system itself on cyber-attack based on 3GPP standards  2.The LTE private network is isolated from other networks, further enhancing network security. |  |  |  |
| 27 | Readiness (EU Technology Readiness level - TRL) (level of maturity of technology) | 1.TRL 9 |  |  |  |
| 28 | Can you provide independent References | We submitted an introduction to the construction of the LTE private network for the E-Navigation project in the Yangtze River estuary. |  |  |  |

# Action requested of the Committee

The Committee is requested to assign this document as a work paper of WG2(emerging digital technology) and consider the response of working group and finally decide the further work plan for LTE as appropriate.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Input papers should be assigned to a work task as listed in the Committee work plan which is available in input papers. Leave open if uncertain but consider how the paper is to be processed if not relevant to a work task [↑](#footnote-ref-2)