Input paper: [[1]](#footnote-1) ENAV23-9.3

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

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

**▣** ENAV **□** VTS **□** Information

Agenda item [[2]](#footnote-2) (from agenda) 9

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

Working Group WG 2

Author(s) / Submitter(s) KRISO(Woo-Seong Shim, Sung-Woong Jo)

Initial Assessment of LTE-Maritime

# Introduction

The working group of IALA ENAV 22nd committee has developed a staged process to conduct an initial assessment of new candidate technologies. As a project leader of developing LTE-Maritime along the coastline of the Republic of Korea, we prepared the below response for high level understanding and initial assessment of LTE-Maritime in the working group.

# Discussion

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Question** | **Technology Candidate Response** | **Working Group Response** | |  |  |  | | --- | --- | --- | | **Green** | **Amber** | **Red** | |
|  | **Status** |
| 1 | Where has the referral come from? | e-Navigation project to develop the new maritime communication system based on LTE technology in the Korean coastal area within 100km.  The Republic of Korea, SMART-Navigation project based on 3GPP standards |  |  |
| 2 | Name of technology and product name | LTE-Maritime  \* LTE-M generally means IoT solution. |  |  |
| 3 | Functional description | Mariner can use the LTE communication within 100km from the coastline in general using the Router with high-gain antenna installed onboard. Generally, it can provide Mbps capability on the edge of coverage |  |  |
| 4 | What are its Key limitations | The altitude of base stations should be as much as high to assure the line of sight (LoS) |  |  |
| 5 | Where is it currently used? | The Republic of Korea has installed test network with 16 BS along the coastline and got successful result in 2017-18. |  |  |
| 6 | How is it currently used? | LTE-Maritime Network(Core and Base station) and user router onboard  We are developing the main network of LTE-Maritime from April 2019 to Dec. 2020. |  |  |
| 7 | How could it be used within the maritime sector? | Korean e-Navigation services of SMART-Navigation project and maritime safety activity in public for domestic vessels in primary. |  |  |
| 8 | Who developed it? | Republic of Korea based on 3GPP LTE standards |  |  |
| 9 | Is it commercial, non-commercial or military? | LTE-Maritime technology itself is commercial one but depends on its frequency allocation policy used in its own country |  |  |
| 10 | Are there similar products / services and what make this different? | LTE(4G) is same technology with small and overlapping cell to serve many users.  LTE-Maritime has been designed to provide the maximum coverage of 3GPP LTE standards with high data rate over Mbps. |  |  |
| 11 | Ease of adaptation? | Everyone know the LTE and mariner can use the wired and/or wireless data service onboard like in their house  Works with any TCP/IP data service |  |  |
| 12 | Capability? | In theory, 75 Mbps per cell site  We had test result over Mbps from 0 to 100km depends on real environments. Even in the edge of 100km, we could do Face talk. |  |  |
| 13 | Scalability? | Network(core and base station) and Router of user equipment can be adjusted freely for required scale. |  |  |
| 14 | Backward compatibility? | Actually, LTE-Maritime was designed to operate only in 4G standards. But has backward compatibility in a view of 3GPP Release version. |  |  |
| 15 | Can it be demonstrated? | Yes. We already installed test-bed network and had a lot of experiment results. It is possible to see LTE data service in all Korean coastal area in 2nd half of 2020. |  |  |
| 16 | What stage it’s at (how mature)? | We are developing the main network for all Korean coastal area within 100km until 2020. |  |  |
| 17 | Are there any results and test bed? Please List | Along the Korean coastline, We have built test-bed base stations. |  |  |
| 18 | Compliance summary? | For the standards, LTE of 3GPP is a primary standard and LTE-Maritime have several special feature to make wide coverage |  |  |
| 19 | Legal | LTE-Maritime is not regulated by global organization but may have a legal issue by its regional law. |  |  |
| 20 | Safety | Everyone using LTE technology have proven the safety of it. |  |  |
| 21 | Environmental | Eco-friendly communication |  |  |
| 22 | Ease of implementation | LTE is so widely used technology to easily implement and use with several operational experience to design cell coverage depending on its natural condition.  Widely used LTE technology can be easily implemented and used with several operational experience to design cell coverage depending on its natural condition. |  |  |
| 23 | Financial | Absolutely, higher than existing terrestrial communication because of necessity of base station on high altitude and core system on land centre but its operation cost will be not expensive with many users and value-added services. |  |  |
| 24 | Security | LTE is secured system itself on cyber-attack based on 3GPP standards |  |  |
| 25 | Privacy | LTE can protect the privacy of users based on 3GPP standards |  |  |
| 26 | Readiness (EU Technology Readiness level) | TRL 7 in 2017-2018  TRL 8 in 2019-2020  TRL 9 from 2021 as a goal |  |  |
| 27 | Can you provide independent References | Yes. We submitted the document for LTE-Maritime |  |  |

# 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-Maritime 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)