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**RESPONSE TO MATTERS RELATED TO THE RADIOCOMMUNICATION ITU R STUDY
GROUP AND ITU WORLD RADIOCOMMUNICATION CONFERENCE**

3GPP in the maritime domain

**Submitted by the International Association of Lighthouse Authorities and Marine Aids
to Navigation (IALA)**

SUMMARY

Executive summary: This document provides an update in the considerations made by IALA with respect to the developments within 3GPP that may support the maritime domain.

Strategic direction, if applicable:

Output: Not applicable

Action to be taken: 18

Related documents: Not applicable

Introduction

1 At the fifteenth meeting of the joint IMO/ITU Experts Group the technical standardization for public mobile network in the context of maritime safety were reviewed.

2 Paragraph 8.9 of IMO NCSR7/12 identified that the IMO should be more proactive and get involved in the work of the 3rd Generation Partnership Project (3GPP). Noting that IALA had been approached already by 3GPP, the Group invited IALA to keep the IMO informed of future developments.

3 3GPP¹ unites telecommunications standard development organizations, known as “organizational partners” and provides their members with a stable environment to produce the reports and specifications that define 3GPP technologies.²

4 The project covers cellular telecommunications technologies, including radio access, core network and service capabilities, which provide a complete system description for mobile telecommunications.

5 The three Technical Specification Groups in 3GPP are:

- .1 Radio Access Networks;
- .2 Services and Systems Aspects; and
- .3 Core Network and Terminals.

6 The maritime related work in 3GPP started in September 2016 with a feasibility study on maritime communication services over 3GPP systems and resulted in approval of the 3GPP *Stage 1 Release 16* document in December 2018 at the Technical Specification Groups Services and Systems Aspects plenary meeting in Sorrento, Italy.³

7 The maritime sector has been working to close the “information gap” at sea. Examples of 3GPP systems in the maritime domain include the use of long-term evolution (LTE) in projects including the Republic of Korea smart navigation project (LTE-maritime) and the deployment of LTE systems in China.

8 The 3GPP addresses different requirements within sectors including maritime, vehicle, rail and aviation. The work undertaken within the respective sectors are referred to as “vertical domains”. The work of 3GPP is bringing together use cases for these vertical domains, including 5G maritime services.

9 The 3GPP activities on maritime communication have been presented at various maritime events including the European Telecommunications Standards Institute workshop on *The future evolution of marine communication* in 2017⁴ as well as at the 19th IALA Conference in 2018 on *A new era for marine aids to navigation in a connected world* and is continuing to be discussed in the IALA technical committees.

3GPP data services

10 3GPP systems are intended to be a secure wireless system and offer the maritime community the following features:

- .1 Shore to ship and ship to shore. A secure, broadband, internet protocol (IP) digital link capable of carrying voice, data and video.

¹ <https://www.3gpp.org>

² Including the Association of Radio Industries and Business, The Alliance for Telecommunications Industry Solutions, Communications Standards Association, European Telecommunications Standards Institute, Telecommunications Standards Development Society and the Telecommunications Technology Association.

³ <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3134>

⁴ https://docbox.etsi.org/Workshop/2017/20171107_FUTURE_EVOL_MARINE_COM

- .2 Ship to ship (device to device). A secure, broadband, IP digital link capable of carrying voice, data and video which does not require a base station (from 3GPP release 14 onwards).

11 The sample data speed of the 3GPP systems network is shown below⁵.

| 3GPP Version | Standard | Download | Upload |
|--------------|--------------|----------|---------|
| 2.5G | GRPS | 114Kb/s | 20Kb/s |
| 2.75G | EDGE | 384Kb/s | 60Kb/s |
| 3G | UMTS | 384Kb/s | 64Kb/s |
| | W-CDMA | 2Mb/s | 153Kb/s |
| | HSPA 3.6 | 3.6Mb/s | 348Kb/s |
| | HSPA 7.2 | 7.2Mb/s | 2Mb/s |
| Pre 4G | HSPA 14 | 14Mb/s | 5.7Mb/s |
| | HSPA+ | 56Mb/s | 22Mb/s |
| | WIMAX | 6Mb/s | 1Mb/s |
| 4G | LTE | 100Mb/s | 50Mb/s |
| | WIMAX 2 | 1Gb/s | 500Mb/s |
| | LTE Advanced | 1Gb/s | 500Mb/s |

Table 1: sample data service speed of 3GPP systems

12 The services within the 3GPP system data services include:

- .1 broadband data services (3GPP as shown in the Table 1);
- .2 mission critical services; and
- .3 internet of things.

13 With the advance to 5G there will be additional features available including low latency services.

Trials and implementation

14 IALA has reviewed presentations and information provided on the tests and implementation of the LTE 3GPP technology referenced in paragraphs 6. The following outcomes are noted:

- .1 the existing 4G services can be used within the maritime domain.
- .2 the coverage for shore to ship with an optimised installation has been tested up to 100Km and can be predicted using standard coverage prediction tools.
- .3 ship to ship performance and range has not yet been tested.
- .4 trials have shown that at long ranges (>30km) data rates from shore to any one vessel exceeds 1Mb/s.

⁵ <https://www.ict-pulse.com>

- .5 multiple LTE shore stations allow the ship to transparently roam between the shore stations.
- .6 the high bandwidth LTE data channel allows a range of innovative services to be implemented.
- .7 the 5G services are an enhancement to what exists and is planned to include satellite access.

Use cases in 3GPP documentation

15 The existing 3GPP maritime services document *Stage 1 Release 16* includes examples that cover:

- .1 Coastal and local warning service (paragraph 7.3). This use case describes the use of maritime safety information service provides navigational warnings, meteorological information and other urgent safety-related information.
- .2 Public warning system (PWS) (paragraph 7.6). This use case describes a scenario where PWS notification is delivered to shipboard users by the direct network connection or by the indirect network connection. Language-independent content is also included in a PWS message delivered to them.
- .3 Urgent alarm service (paragraph 7.7) This use case describes a scenario where ships avoid accident using warning message.

Developments

16 The demand for bandwidth is expected to grow as more maritime data services are defined, and new requirements are documented. It is expected that commercial, global LTE roaming solutions with ship borne equipment for ship to shore and shore to ship communication will continue to be implemented to satisfy the needs for high bandwidth connectivity to ships.

17 IALA will continue to monitor the development of the maritime vertical within 3GPP.

Action requested

18 The NCSR Sub-Committee is requested to note the information provided.