

JOINT IMO/ITU EXPERTS GROUP ON
MARITIME RADIOCOMMUNICATION
MATTERS
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Agenda item 8

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ANY OTHER BUSINESS

International Mobile Telecommunications in the Maritime Domain

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

SUMMARY

Executive summary: This document provides an update on the considerations made by IALA with respect to the developments of International Mobile Telecommunications (IMT), previously updated as 3GPP in the Maritime Domain.

Action to be taken: Paragraph 9

Related documents: NCSR 7/12; NCSR 7/INF.6

Introduction

1 At the fifteenth meeting of the joint IMO/ITU Experts Group on Maritime radiocommunication matters, the technical standardization for a public mobile network in the context of maritime safety was reviewed.

2 Paragraph 8.9 of document NCSR 7/12 identified that 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 IMO informed of future developments.

3 IALA continues to follow the developments of 3GPP, recognising the work on mobile technologies at the ITU on International Mobile Telecommunications (IMT). IALA has moved to adopt the more generic terminology of IMT.

Update on 3GPP developments

4 3GPP has provided IALA with information on developments in 5G, including those 5G enabling technologies specified in the 3GPP release 16 technical specification which could be applicable in the maritime domain. The following points are noted:

- .1 Release 16 has been completed¹. Release 16 brings IMT-2020 submission for an initial full 3GPP 5G system to completion.
- .2 5G enabling technologies specified in Release 16 specifications can be applicable in maritime domain though they may need additional further work to provide more optimized performance and better user experience of maritime communication services over 5G system.
- .3 3GPP TR 21.916 "Release description; Release 16" provides the summary of Release 16 work items including MARCOM².

5 Ongoing standardization works in 3GPP is continuing, with enhancements to follow Release 17. The Release 17 completion date is March 2022³, which is later than originally planned due to the impact of COVID-19.

Development of IMT

6 IALA continues to review the opportunities for integration and use of IMT to support marine aids to navigation. This has included a clarification of the major system milestones for IMT, as well as the common terminology used for referencing the technologies. The result of the current work at IALA regarding the developments of the technology from 1G in the 1980's to current day is provided in Table below.

Generation	Major Systems Milestones
1G	<p>Analogue technology, from the 1980s onwards. Various technologies were deployed, Nationally or Regionally, including:</p> <ol style="list-style-type: none"> 1. NMT (Nordic Mobile Telephone), 2. AMPS (Advanced Mobile Phone System), 3. TACS (Total Access Communications System), 4. A-Netz to E-Netz, 5. Radiocom 2000, 6. RTMI (Radio Telefono Mobile Integrato), 7. JTACS (Japan Total Access Communications System) and 8. TZ-80n (Source:wikipedia)
2G	<p>First digital systems, deployed in the 1990s introducing voice, SMS and data services. The Primary 2G technologies are:</p> <ol style="list-style-type: none"> 1. GSM/GPRS & EDGE, 2. CDMAOne, 3. PDC, 4. iDEN, 5. IS-136 or D-AMPS.

¹ For a summary of Release 16 visit <https://www.3gpp.org/release-16>.

² See or download 3GPP TR 21.916 at <https://www.3gpp.org/DynaReport/21916.htm>.

³ For further information visit <https://www.3gpp.org/release-17>.

Generation	Major Systems Milestones
<p>3G</p> <p>IMT-2000</p>	<p>IMT-2000 (International Mobile Telecommunications-2000) is the ITU's name for a family of 3G cellular networks that are required to provide peak data rate of at least 144 kbit/s.</p> <p>Among the terrestrial systems of the IMT-2000 family, the most successful of the 3rd generation mobile cellular technologies was the one developed by 3GPP under the name Universal Mobile Telecommunications System (UMTS). This was first offered to markets in 2001. HSPA (High Speed Packet Access) is an amalgamation of several upgrades to the original W-CDMA (Wideband Code Division Multiple Access) radio access technology of the UMTS standard and offers speeds of 14.4 Mbit/s on the downlink and 5.76 Mbit/s on the uplink. HSPA+, a further upgrade of HSPA, can provide theoretical peak data rates up to 168 Mbit/s on the downlink and 22 Mbit/s on the uplink.</p>
<p>4G</p> <p>IMT-Advanced</p>	<p>IMT-Advanced (International Mobile Telecommunications-Advanced) is the ITU's name for a family of 4G cellular networks. The key features for IMT-Advanced are summarized as follows:</p> <ul style="list-style-type: none"> • a high degree of commonality of functionality worldwide while retaining the flexibility to support a wide range of services and applications in a cost-efficient manner • compatibility of services within IMT and with fixed networks • capability of interworking with other radio access systems • high-quality mobile services • user equipment suitable for worldwide use • user-friendly applications, services and equipment • worldwide roaming capability • enhanced peak data rates to support advanced services and applications (100 Mbit/s for high and 1 Gbit/s for low mobility were established as targets for research) <p>LTE Release 10 and beyond (LTE-Advanced), developed by 3GPP and branded as 4G cellular technology, was called IMT-Advanced as it meets the requirements defined by ITU-R.</p> <p>By offering a full suite of integrated 3G and 4G ecosystems for IMT-2000 and now IMT-Advanced, the 3GPP technology family supports the evolving and expanding needs of the broad international base of mobile operators and allows the users of wireless mobile broadband to experience, on a global basis, a rich and innovative range of service and capabilities that is unparalleled by any other technology.</p>

Generation	Major Systems Milestones
5G IMT-2020	<p>The latest member of the IMT family is IMT-2020 which calls for support for enhanced mobile broadband (eMBB) and for new ‘use cases’ that require massive machine-type communications (mMTC) and ultra-reliable and low latency communications (URLLC).</p> <p>The minimum requirements of mobile communication networks for IMT-2020 are as follows.</p> <ul style="list-style-type: none"> • for peak data rate: Downlink: 20 Gbit/s, Uplink: 10 Gbit/s • for peak spectral efficiencies: Downlink: 30 bit/s/Hz, Uplink: 15 bit/s/Hz • user plane latency (single user, small packets): 4 ms for eMBB, 1 ms for URLLC • control plane latency (idle => active): 10-20ms <p>Other requirements for IMT-2020 are as follows.</p> <ul style="list-style-type: none"> • maximum aggregated system bandwidth: at least 100 MHz, up to 1GHz in higher frequency bands (above 6GHz) • mobility: up to 500km/h in rural eMBB <p>The 3GPP “5G” approved by ITU as IMT-2020 technology includes two separate and independent submissions, defined as the single Radio Interface Technology (RIT) and the combined Sets of Radio Interface Technologies (SRIT).</p> <p>Although the focus of Recommendation ITU-R M.[IMT-2020.SPECS] is on radio interfaces fulfilling IMT-2020 radio requirements, information on backhauling, core network and service aspects is referenced in the 3GPP submissions. In addition, a link to the 3GPP specifications web page is provided to give a complete system perspective.</p> <p>In the future, following the ITU-R process, 3GPP will provide updates containing details of new features specified in Release 17 and beyond to be included in revisions of the Recommendation.</p>

Possible use of IMT to support the provision of aids to navigation, including VTS

- 7 IALA has identified typical uses of IMT, including:
- .1 Monitoring of marine aids to navigation (AtoN) – where IMT provides a communications channel for remote Internet of Things (IoT) devices for monitoring a wide range of peripheral AtoN and their supporting sub-systems.
 - .2 Collection and dissemination of meteorological and hydrographic sensor data.
 - .3 Connection of multiple, remote, high bandwidth and low latency sensors, such as remote CCTV cameras, VHF voice coast stations, AIS AtoN and base stations.
 - .4 Dissemination of S-100 Series of services.
- 8 IALA will continue to liaise with 3GPP and monitor the development of IMT, noting the ongoing activity on the inclusion of the vertical domain at 3GPP and the continuing work of IMT at ITU, including IMT-2020 and the work at ITU-R WP 5D ‘IMT towards 2030 and beyond’.

Action Requested of the Experts Group

- 9 The Experts Group is invited to note the information provided.