Editor's Note

The recently completed ITU's World Radio Conference-2019 is considered to have been by far the most successful in decades for maritime interests; it's actions will have far reaching consequences for our community. We are fortunate to have this report about it authored by Mr. Joseph Hersey who frequently contributes to our MEJ and played a key role in preparations for the conference and Ross Norsworthy. Ross with his exceptional technical skills and experiences worked for years creating our positions and tirelessly promoted them for three years of preparations during countless meetings with many national and international organizations. He attended the conference and played a major role in its success. We are profoundly grateful for both who deserve exceptional credit for these accomplishments.

What new Maritime Technology did the 2019 World Radio Conference bring us?

RTCM since its founding in 1947 has been instrumental in preparing for what has been called World Administrative Radio Conferences (WARCs), and since 1993 called World Radio Conferences (WRCs, pronounced the same), meeting every three to four years. Decisions by these WRCs have treaty status in the U.S. Most WRCs have included maritime communications. For example, the 1959 WARC established VHF maritime radio channels, instituting a revolution in maritime communications. The primary purpose of the 1983 Mobile WARC was to plan, develop and establish what became the Global Maritime Distress and Safety System. RADM Frederick P. Schubert lead the US delegation to that conference, the only WARC whose US delegation was ever headed by a US Coast Guard admiral. The 1997 WRC established the shipborne automatic identification system (AIS). RTCM members have attended every one of these world radio conferences and RTCM helped develop the US maritime position for most of them. WRC-19, which met in Sharm el-Sheikh, Egypt from 28 October to 22 November 2019, was no exception.

So what new maritime technology did the WRC-19 bring us?

GMDSS Modernization (Agenda 1.8A)

Will NAVDAT succeed NAVTEX?

WRC-19 allocated 500 kHz exclusively to NAVDAT, a digital broadcasting service using Orthogonal Frequency Division Multiplexing (OFDM) with Quadrature Amplitude Modulation (QAM) technology. It is capable of broadcasting at a rate as high as 28.76 kbs, 287 times greater than that of NAVTEX. Because WRC-19 also allowed NAVDAT

access to up 11 times more spectrum in the 500 kHz band, even higher data rates are possible. NAVDAT was designed to allow graphical as well as textual information to be broadcast to ships capable of being displayed on ECDIS or other ship displays, and to be internationally interoperable and standardized in the same way that NAVTEX currently is standardized. Like NAVTEX, WRC-19 also allocated spectrum for NAVDAT use in maritime HF bands.

Two-year tests reported by China have shown that broadcasts of data files can be completely and stably received at a distance of 293 nm, and at distances of 196 nm and 103 nm respectively at increasingly higher transmission rates. Similar tests by France confirmed this result.

China and France together are seeking the views of the International Maritime Organization's Navigation, Search and Rescue Subcommittee meeting in January 2020 on developing an IMO performance standard on NAVDAT. They additionally are seeking views on amending the Safety of Life at Sea Convention to allow ships use NAVDAT in place of, or in addition to NAVTEX, where the service is available.

In September 2019, the US Coast Guard sought comments on the possible termination of NAVTEX service in the US, replaced by satellite broadcasts such as those by Inmarsat's SafetyNET service, for reasons of cost and sustainability. Many expressed concerns, and as of this writing no decision has been made. Because implementation of NAVDAT would likely use the same shore infrastructure as NAVTEX, termination of NAVTEX in the US could hinder NAVDAT from being implemented in the US.

In addition to NAVDAT, WRC-19 also made minor updates to resolutions on managing the MMSI resource, on operational procedures for cancelling false distress alerts, on maritime publications, and on the use of maritime satellite terminals in ports and harbors.

Introduction of additional satellite systems into the GMDSS (Agenda 1.8B)

Despite the IMO's adoption of Iridium into the GMDSS, Iridium's satellite downlink spectrum used for maritime communications has suffered from a secondary allocation status. The ITU Radio Regulations state that *"Stations of a secondary service … shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date (and) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date"*. Although Iridium's secondary status in practice would not affect its operation, it would be inappropriate for a system used for distress and safety communications to have its spectrum made vulnerable to other systems competing for the spectrum, especially systems whose frequencies "may be assigned at a later date".

The WRC-19 proposal to upgrade the allocation status of Iridium's spectrum was not without controversy. There were assertions Iridium's first-generation satellites interfered with certain radio astronomy observatories, despite earlier assurances that it wouldn't. Nevertheless, WRC-19 did decide to upgrade 5 MHz of Iridium's downlink allocation status in the maritime mobile satellite service to primary, but with certain constraints including emission limits necessary to protect radio astronomy.

Iridium has, one-by-one, overcome each obstacle to implementing GMDSS, opening a path to other future satellite providers. Iridium will begin GMDSS services early in 2020.

VHF Autonomous Maritime Radio Devices (AMRDs) (Agenda 1.9.1)

The growing need for and popularity of rogue AIS devices such as fishnet markers led to WRC-19's decision to address what they termed Autonomous Maritime Radio Devices (AMRDs). AMRDs have been classified into two groups:

- Group A AMRDs that enhance the safety of navigation,

- Group B AMRDs that do not enhance the safety of navigation (i.e. AMRDs which deliver signals or information which do not concern the navigation of the vessel or do not complement vessel traffic safety in waterways).

IMO is the responsible organization for the designation of Group A AMRDs. Devices include man overboard AIS such as RTCM-specified Maritime Survivor Locating Devices (MSLDs) and yet-to-be-specified mobile aids to navigation. The Recommendation ITU-R M.1371 (series) AIS standard will define AIS Group A AMRDs, which operate on channels AIS 1 and AIS 2. AIS devices intended for any other purpose are classified as Group B AMRDs and operate on channel 2006 (160.9 MHz).

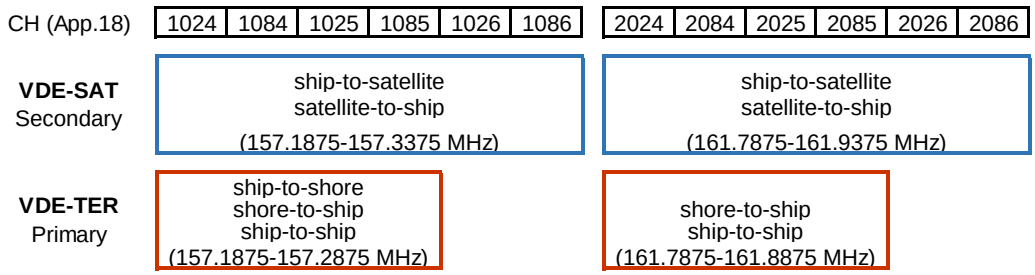
WRC-19 allocated 160.9 MHz for AIS Group B AMRDs, limiting transmitter power to 100 mW and antenna height not exceeding 1 m. Consequently, AIS Group B AMRDs won't be compatible with existing shipborne AIS equipment, unless AIS manufacturers begin adding an additional receive channel tuned to 160.9 MHz.

Given the lack of compatibility with existing AIS equipment, it's unclear what market demand will exist for such devices. RTCM stands ready to seek FCC allocation of 160.9 MHz, currently used by railroads in the US, and to develop a Group B AMRD equipment standard if there is interest.

VHF Data Exchange (VDES) maritime mobile satellite spectrum (Agenda 1.9.2)

After a decade of planning, studies, tests and negotiations, WRC-19 successfully completed allocation of spectrum necessary for VDES, including terrestrial and satellite links. In the US, affected channels are licensed by MariTEL, which would affect coast

station buildout. Because satellite links were designed to be compatible with land mobile users of the spectrum, satellite operation may prove simpler.



VDES frequency plan adopted by WRC-19, courtesy IALA

Consequently, IEC has begun developing an equipment standard for VDES which would enable manufacturers to begin building compatible systems. VDES will turbocharge the next generation of AIS devices, enabling such new capabilities as anti-spoofing and dissemination of graphically-enhance maritime safety information into ocean areas where shore infrastructure may not exist.

What's next?

ITU-R World Radio Conference decisions are years in the making. A topic cannot even be considered unless it is approved by the previous WRC. Consequently, WRC-23 will consider "possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System and the implementation of e-navigation", and WRC-27 may consider " implementation of R-Mode as a new maritime radionavigation service" in the maritime VHF band. RTCM will continue representing maritime interests at future WRCs.