



Wireless Communication Channels: the Backbone of the Global Maritime Distress and Safety System

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ABSTRACT

Safety of life at sea is the prime concern in the maritime transport sector. It is the ultimate goal of the International Maritime Organization (IMO), the United Nation's specialized entity that lays down the standards and regulations governing the navigation at seas and oceans all over the world. However, the key capability of enhancing safety of life at sea is the proper utilization of wireless communication channels and relevant equipment. For this reason, the IMO has introduced the Global Maritime Distress and Safety System (GMDSS), in order to ensure proper handling of the signals that carry information related to safe journeys of sailing vessels. The GMDSS has a number of specific functions, namely: alerting, locating, search and rescue coordinating communications, on-scene communications, promulgation of maritime safety information, general radio communications and bridge-to-bridge communications. These functions are achieved through the use of a number of sub-systems that utilize terrestrial wireless as well as satellite communication channels. The digital selective calling (DSC) is the core component of the terrestrial sub-systems, in which the message is formatted in a frame, that contains specific slots allocated to data carrying information about transmitting station, receiving destination, position and time. DSC operates in the MF, HF and VHF bands with one frequency (or more) designated to communicate distress alerts. In addition, an analog sub-system is also used in the same bands but with different frequencies to assist the transfer of information. In order to broadcast warning signals to sailing vessels in specific sea areas, a sub-system called Navtex is used. In this sub-system, a number of stations transmit the necessary warning signals, on the same frequency (on time sharing basis) in the MF band (518 KHz). On the other hand, the satellite communication channels are made use of through two distinct sub-systems, namely: the Inmarsat (GEO satellites) and the Cospas-Sarsat (LEO satellites). In the former, the signals are formatted in a manner similar to that of the DSC but on satellite channels operating in the C- band (6/4 GHz) for earth stations, and L-band (1.6/1.5 GHz) for ship stations. For sea areas not covered by Navtex, a similar service is provided through the Inmarsat. The Cospas-Sarsat is a locating system operating on specific frequencies in the UHF band (121 MHz/406 MHz). On board the ship, a relevant transmitter called the Emergency Position Indicating Beacon (EPIRB) is fitted. In case of disaster, the EPIRB transmits a signal that is pre-formatted in a frame, to the satellite, which relays it to dedicated earth stations. This signal is then processed to determine the exact position of the ship. In addition to the above mentioned facilities, the ship in disaster can notify nearby ships by sending an alert signal on the X-band (9GHz) from a transmitter called the Search And Rescue Radar Transponder (SART). The signal is received by the radar and appears distinctly on its screen. Last but not least, since its inauguration, the GMDSS has significantly helped in enhancing safety of life at sea.