



30TH WORLD RADIOCOMMUNICATION SEMINAR

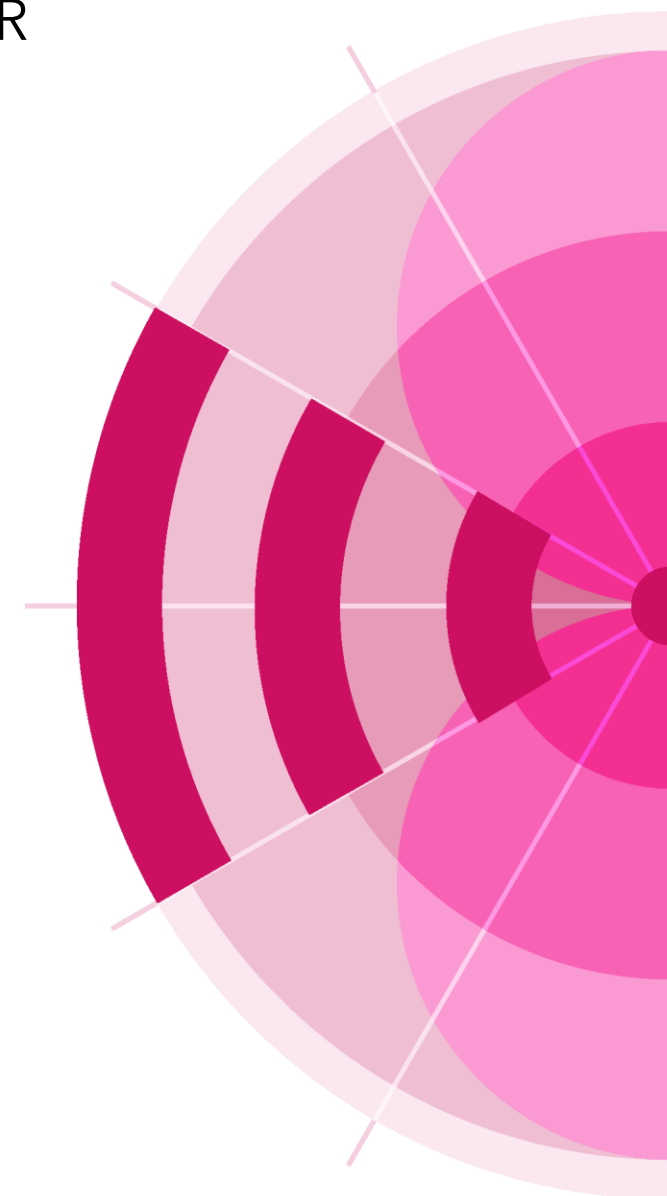
24 - 28 October 2022

Geneva, Switzerland

Modern Maritime communications

www.itu.int/go/wrs-22

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Introduction

What are maritime communications for?

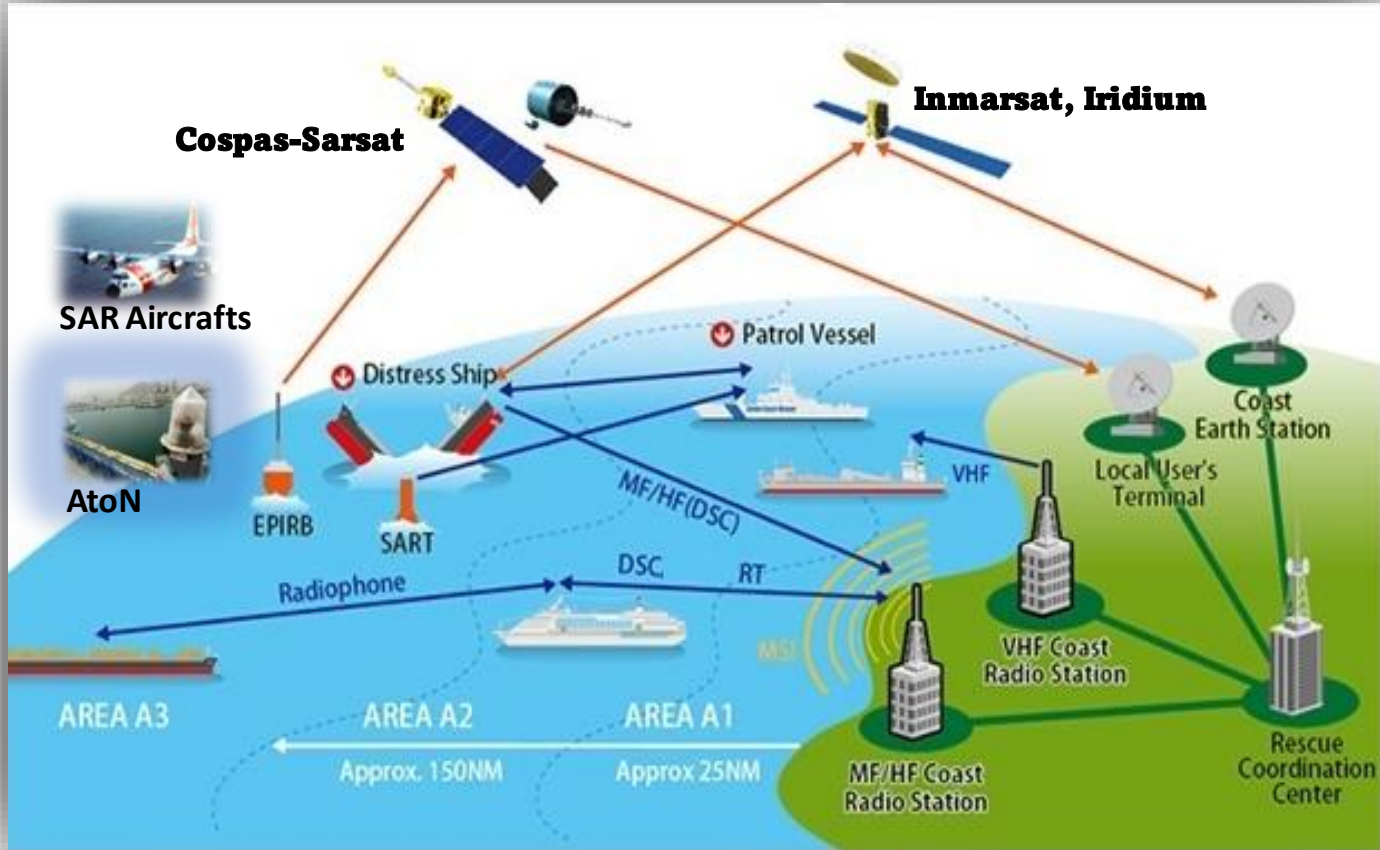


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Introduction

Maritime Communications



- **Ship Stations;**
- **Coast Stations;**
- Search and Rescue Aircrafts;
- Automatic Identification system (AIS) Aids to Navigation;
- Satellite Service Providers
- International Organisations providing services in the maritime environment

Introduction

**Distress, Safety, Urgency and Security
Communications**

and

General Communications



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Distress, Safety, Urgency and Security communications

Global maritime distress and safety system (GMDSS)

- Terrestrial communications in VHF, MF and HF. .
Digital selective calling (DSC) and radiotelephony;
- Satellite communication systems using geostationary and non-geostationary satellites and 406 MHz (Cospas-Sarsat) emergency position-indicating radio beacons (EPIRBs));
- Maritime safety information (MSI): NAVTEX system (518 kHz international, 490 kHz and 4 209.5 kHz national), MF/HF NBDP, enhanced group call services (EGC): Inmarsat Safety Net and Iridium Safety Cast;
- Locating (radar search and rescue transponder (9 200-9 500 MHz SART), VHF automatic identification system transmitter (AIS-SART)).



Distress, Safety, Urgency and Security communications

Global maritime distress and safety system (GMDSS)

Changes to be applied in a short term

- **Satellite Service Providers:** An existing geostationary-satellite system operating at 1 610-1 626.5 MHz (Earth-to-space) and 2 483.5-2 500 MHz (space to-Earth) is under consideration by IMO in order to become a new GMDSS satellite provider;
- **Satellite EPIRBs operating on 1.6 GHz and EPIRBs using VHF (DSC):** These beacons will no longer be part of the GMDSS;
- **Radiotelegraphy:** Narrow band direct printing (NBDP) will no longer be part of the Distress, Safety and Urgency communications;
- **MSI:** the modernization of the GMDSS open the door to new technologies.

Distress, Safety, Urgency and Security communications

Global maritime distress and safety system (GMDSS)

Digital selective calling (DSC) technology

DSC enables a radio station to establish contact with, and transfer information to, another station or group of stations with standard Distress, Safety or Urgency messages. However, it may also be used for Public correspondence.



Automatic Connection System (ACS) (new system)

Recommendations ITU-R M.493 and ITU-R M.541 have been revised in order to allow the introduction of the ACS.

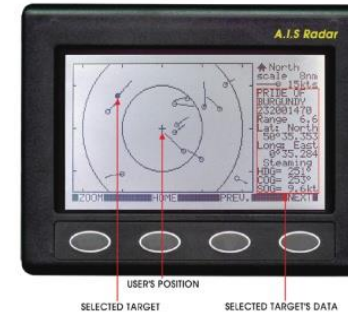
- *It is based on DSC technology (MF and HF bands);*
- *To ensure reliable access to an optimal working frequency, considering: distance, season, geographical location, etc.*

Distress, Safety, Urgency and Security communications

Systems other than GMDSS

Automatic identification system (AIS)

Aid safety of navigation in general, by providing identification, tracking and other information, ship to ship and ship to shore



Various AIS technology applications continue to be developed very actively, e.g., AIS-Search and Rescue Transmitters (AIS-SARTs), satellite distress beacons EPIRB-AIS (emergency position-indicating radio beacon with an Automatic Identification System transmitter), AIS aids to navigation (AIS-AtoN), “man overboard” (MOB-AIS), autonomous maritime radio devices (AMRD-AIS).

Long-Range Identification and Tracking (LRIT): global identification and tracking of ships up to 1000 nautical miles from coast. Ships report to LRIT Data Centre every six hours as a minimum. Satcom technologies are mainly used to support LRIT.



Ship Security Alert System (SSAS) is one of the measures to strengthen ship's security against acts of terrorism and piracy. It provides covert alert «ship-to-shore» which indicates to competent authorities ashore that security of the ship was jeopardized. Satcom technologies are mainly used to support SSAS.

General communications

The range of possibilities is very diverse



Terrestrial

- VHF/MF/HF radiotelephony, data and e-mail;
- Public mobile communication technologies like IMT-Advanced (4G) are widely and actively used by ships during coastal navigation where cellular networks are available. To date, this usage mostly limited to commercial purposes and personal communications. IMT-2020 (5G) and cloud technologies may provide additional advantages primarily in ports and inland waters.

Possible use of public broadband communication and technical standardization for public mobile networks for the future maritime needs are being considered within IMO.



Satellite

Satellite communications: systems operating via geostationary or non-geostationary satellites are being increasingly used on board ships for general and safety/security related communications;

- Hybrid solutions, e.g., onboard passenger ships: very small aperture terminal (VSAT) combined with onboard cellular dedicated networks;
- Global monitoring and tracking functions of ships, containers, control devices and other floating objects are widely offered on the market of the various satellite service providers using different technologies and applications.

General communications

On-board communications



On-board communications are intended for use by the ship's crew for operational purposes, e.g., in ship's maneuvers, berthing, cargo operations, etc.

RR allows the use of the frequency bands 457.5125-457.5875 MHz and 467.5125-467.5875 MHz, being limited to on-board communications.

[Recommendation ITU-R M.1174](#)).

The use of the frequency bands for on-board communications in territorial waters is subject to the national regulations of the concerned administration.

Trends in maritime communications

New developments in supporting of e-navigation concept

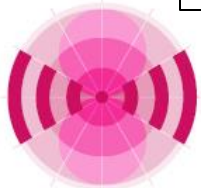
IMO's E-navigation: *“the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment.”*

It is expected to provide digital infrastructure and interconnection of ships and shore facilities with high-speed broad band data, to update information on bridge displays **in real time**.

VHF data Exchange System (VDES) integrates the functions of VHF data exchange (VDE), application specific messages (ASM) and AIS in the VHF maritime band

NAVDAT (Navigational Data) for broadcasting of maritime safety and security information (MSI in MF/HF, as a complement or, replacement in future, of current NAVTEX (Navigational Telex) system.

VHF voice digitalization



Trends in maritime communications

Satellite service for search and rescue on 406 MHz (Cospas-Sarsat)



Source: The MEOSAR System Concept (www.cospas-sarsat.int)



Cospas-Sarsat is currently developing **second generation beacons (SGBs)**

Medium Earth Orbiting Search and Rescue System (MEOSAR)

(SAR) repeaters are placed on the satellites of the Global Navigation Satellite Systems (GNSS). This system complements the existing low-altitude Earth orbit (LEOSAR) and geostationary Earth orbit (GEOSAR) systems and will eventually replace the LEOSAR system.

MEOSAR will offer:

- advantages by providing transmission of the distress message and independent location of the beacon with **near-real-time global coverage**;
- new capability to provide “**Return-Link-Service**” (RLS) transmission to a distress beacon that will provide the user with a confirmation that the distress message has been received.

Expectations concerning maritime communications

“Transport efficiency - Improvement of safety at sea - Environment protection”

ITU-R studies, Recommendations and Reports are supporting all the work in these areas.

Digital technologies in all bands including voice communications and MSI

Higher data transmission rates

New satellite systems and hybrid dedicated networks

Combination of multiple standards of wireless communications (close to shore areas)



Expectations concerning maritime communications

“Transport efficiency - Improvement of safety at sea - Environment protection”

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Implementation
of e-navigation

More
developments
related to AIS
technology

More flexibility
in the reception
of MSI



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Expectations concerning maritime communications

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Source: <https://kassproject.org/en/main.php>

Maritime Autonomous Surface Ship (MASS), defined by IMO as:

“a ship which, to a varying degree, can operate independently of human interaction”.

Currently, there is no any requirement for spectrum. However, In April 2022, IMO commenced works on a goal-based instrument to regulate the operation of these ships. It may trigger discussions on spectrum needs.

Thank you!

ITU – Radiocommunication Bureau

Questions to brmail@itu.int

