Advanced Maritime Information and Communication System
(GMDSS Modernization Plan)
The first International Radiotelegraph Conference (1906)
Ships in distress shall use the following signal:

```
•••••••••••• = SOS
```

(15 Apr. 1912)
CQD CQD CQD DE MGY ...
SOS SOS SOS DE MGY CQD
REQUIRE ASSISTANCE ...

GMDSS Modernization

GMDSS
1992-1999

Modernization
What’s our Future?  

**More SAFETY**  
**More COMFORTABLE**

**Innovation of Maritime Communication by ICT**

- GMDSS Modernization Plan
  - NAVTEX ➔ NAVDAT
  - MF/HF Digital Voice
  - VHF Data Exchange System (VDES)

- High-Speed Internet Network
  - FBB/ESV ➔ Inmarsat GX

- Intelligent Traffic Management
  - VTS ➔ VTMIS
  - New Radar
  - AIS Aids to Navigation

- Efficient Navigation
  - Advanced Navigation System
  - HF Oceanographic Radar

- Integrated Solution
  - Next-Generation Coast Station (GMDSS)

Analogue ➔ Digital Broadband ➔ Network
NAVDAT (Navigational Data): 500 kHz, 4/6/8/12/16/22 MHz
[around 10-30 kbps]
200/300 NM or more

NAVTTEX (Navigational Telex): 490, 518, 4209.5 kHz
100 bps (100 baud)
200/300 NM
MF/HF Digital Voice

By the control signal and the digital voice signal controls the coastal station automatically and connects to the public telephone. And vice versa. HF band radio communication expects especially in the Northern Sea Route.
# VHF Data Exchange System (VDES)

VDES Communications including AIS, ASM and VDE

<table>
<thead>
<tr>
<th>Sub-group</th>
<th>Data communications for ASM</th>
<th>Data communications for VDE</th>
<th>AIS for safety of navigation</th>
<th>AIS long range</th>
</tr>
</thead>
</table>
| Functionality | • Marine safety information  
• Marine security information  
• Short safety related messages  
• General purpose information communication | • General purpose data exchange  
• Robust high speed data exchange  
• VDE satellite communications | • Safety of navigation  
• Maritime locating devices | • Satellite detection of AIS  
• Locating during SAR |
VHF Data Exchange System (VDES)

Examples of Application
- Vessel info (Onboard state, Position, Speed)
- Environment (Weather, Stream, Geography)
- Communications (Web, Email, Electronic payment)

For example...
- Weather information service
- Information sharing among shipline and vessels
- Monitoring and managing onboard state of ships

Expansion of communication area by using buoys & ships/coast stations network

Satellite
Buoy
Coast station
Internet connection
Ship Owner or Port Authority, Administrator and other third party
Inmarsat Global Xpress (GX)

- Reliable, Secure, high-speed connectivity on a seamless, end-to-end global basis
- Broadband options for any vessel, any where

- High-speed broadband service on Ka-band
  - GX: 5M / 50Mbps
  - ESV(VSAT): 512k / 2Mbps
  - FBB: 432kbps
- Flat-rate-system including FBB communication charge
- Provide for multiple audio lines
- BGAN type as the ideal backup
Solid-state RADAR

**The feature**

- The solid state amplifier replaces the magnetron
- The pulse compression system
- The signal processing with a phase information

<table>
<thead>
<tr>
<th>Specification (S-band) (for vessel onboard)</th>
<th>Specification (X-band) (for VTS onshore)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmitter</strong></td>
<td>Solid State Amplifier</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>3GHz</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>250W</td>
</tr>
<tr>
<td><strong>Antenna length</strong></td>
<td>8ft, 12ft</td>
</tr>
<tr>
<td><strong>Warm up time</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Tuning control</strong></td>
<td>Not require</td>
</tr>
</tbody>
</table>
Solid-state RADAR

The trends of domestic regulation
- Still under review at MIC
  - Interference from the other solid state radar
  - SART characteristic for X-band radar

The benefit
- Reduced the maintenance cost (24 hours continuously operation without replacing transmission tube)
- No tuning required
- No warm-up period (preheat time)
- High reliability without high voltage control (12-48VDC)
- Thoroughly reduction of spurious emission by pulse reformation technique
- Maintenance free due to the solid state device instead of magnetron
- Detection performance matches the existing magnetron radars
- Clutter suppression improved by pulse compression and Doppler processing
HF Oceanographic Radar

Oceanographic Radar can be used on Disaster prevention on Monitoring Sea-states on Supporting maritime activates on Coastal management on Research.

Sea states observation during Typhoon Nari [T0116]

9.2 MHz band
According to the Guidelines of IMO Resolution A.857(20), the VTS (Vessel Traffic Service) has the following major functions defined as follows:

- To improve the safety and efficiency of navigation
- To improve safety of life at sea
- To improve the protection of the marine environment
The Advanced Navigation System (ANS) based on the digital network provides proper solutions to various oceanographic problems using advanced ICT and GIS technology which is capable of superimposing on a chart with various types of information such as:

- AIS information;
- Radar information;
- Meteorological information;
- Fishery Environment Information (market, harvest, weather etc.)

Various types of ship-to-shore communications:
- Satellite Communications
  - Inmarsat FB
  - ESV (V-Sat)
  - Inmarsat Fleet
- Wireless LAN (for berthing)
- GSM/3GSM
Next-Generation Coast Station

**Key Word**

- Networking on IP bases
- Improvement of Expandability, Availability, Reliability, Interoperability and Harmonization
- Simple Connection

<table>
<thead>
<tr>
<th>Key</th>
<th>Existing</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote Control</td>
<td>Modem, RS-485, RS-232</td>
<td>IP Switcher (Software base)</td>
</tr>
<tr>
<td>Audio Exchanger</td>
<td>Audio Matrix (PCM, Hardware base)</td>
<td>IP</td>
</tr>
</tbody>
</table>
Networking on IP Bases

Improvement of Remote Control

- Control detail item of the Radio Station
- Get a supervisory information from the Radio Station
- Promote a short response time with the High Speed Line

Remote Maintenance

When the engineer can connect the remote PC terminal with software to the IP Network, the engineer can monitor the system status and condition required anywhere in the world.
Improvement of Remote Control
Respond flexibly to future extension

A High Level Redundancy
The main control device is operating on a redundant configuration, wherein one of the control device is the main, another is back-up. Correspond to Redundancy-Route of the IP Network
Simple Connection

Before

Control & Supervise System

Radio

AF Cable, Control Cable

MDF

AF Cable, Control Cable

MDF

Control & Supervise System

Radio

IP Simple Connection

AF Cable, Control Cable

MDF

AF Cable, Control Cable

MDF

IP Network

LAN Cable

Router

LAN Cable

Router
The Advanced Maritime Communication System has a lot of possibilities of enhancing aspects of mandatory works for mariners, maritime administration and fishery industries, based on various IC technologies, such as digital radio communication, high speed network, intelligent traffic management, efficient navigation and next-generation coastal station.

Facilitate the Broadband Radio Communication

The various information on broadband communication for onshore to offshore and onshore to onshore has provided by the facility applying fully digital radio technology to achieve the broadband communication as same as a land network facility. The various maritime information will contribute reducing workloads of mariner and improving security and safety navigation.

Next-generation Coastal Station in Future

The Advanced Maritime Communication will be also expected enhancing capability of rescue operation and DSC communication based on digital networking which improves their Expandability, Availability, Reliability, Interoperability and Harmonization.

We could share one of common goals that is to save people’s life and properties at sea through Maritime Communication Activities applying advanced Information and Communication Technology (ICT).
Thank you for your Attention!

Presented by Mr. Shuichi INOUE
General Manager
Solution Business Division
Japan Radio Co., Ltd
Tel: +81-422-45-9767
Fax: +81-422-45-9396
E-mail: inoue.shuichi@jrc.co.jp