V4
Marine Communication System
Overview
V4 Marine Communication System

Key features

- Proven system - worldwide customer base
- 4th generation system - continuous development philosophy
- Windows XP® platform
- Windows compliant Graphical User Interface
- Automated call handling
- Integrated control of MF, HF and VHF
- Client/Server Model
- Scalable System Architecture
- Dual Servers and Multiple Workstations
- Integration with 3rd party systems
- Established Training and Technical Support Schemes

General

The V4 Marine communication system provides facilities to receive and transmit DSC, NBDP and RT Distress, Urgency, Safety and Routine traffic, compliant with the appropriate IMO and ITU requirements.

The system is based on a client/server model comprising dual Servers, operator Workstations and equipment sub-racks containing DSC, NBDP and NAVTEX modems and radio control interfaces. The DSC, NBDP and NAVTEX modems provide standard audio and transmitter keying signals for direct connection to receivers and transmitters. For higher availability and reliability the V4 system may be configured using networked dual servers in hot standby mode.

The modems include radio control interfacing capability using RS232, RS422 or isolated i/o type signalling and are connected using a standard TCP/IP network.

Throughout the system emphasis has been put on reliability and ease of use and maintenance.

A description of the key items and sub-systems is given below.
**V4 Server**

The V4 Servers provide all of the functions necessary to handle DSC and NBDP calls in a multitasking environment from multiple DSC and NBDP modems. The Server software provides call storage and a duplication facility that provides redundancy in case one of the PC’s fails. A BITE function that continuously checks for malfunctions that might occur is incorporated. The server also controls the remote control interfaces used to automatically set the transmitters and receivers to the required frequency prior to transmission.

**V4 Operator Workstations**

The workstations connect to the servers and provide a user interface to the system and present the operator with client applications to operate the DSC, RT, NAVTEX and NBDP facilities.

**DSC reception**

DSC watchkeeping on VHF channel 70 is accomplished using one of the remote VHF transceivers connected to the VHF DSC modem. For MF/HF DSC watchkeeping a set of dedicated remote receivers are connected directly to an associated set of MF/HF DSC modems. The DSC modem decodes the audio FSK and converts it to a short message for transmission over the network to the servers.

DSC messages will be received by the servers and automatically entered into the server database. The primary server will broadcast the message, including the received quality indication, to all workstations. An alarm will then sound at the workstation. The alarm type may be set using a .wav file according to the call category.

**DSC transmission**

The DSC modems located either at the Control Centre or at the remote site are used to generate the transmit output consisting of a balanced audio FSK signal and closing contact keying signal. The transmit output is routed to the appropriate VHF transceivers and MF/HF transmitters.

The server processes outgoing calls, and forwards them to the DSC modem via the DSC network. The encoding of the call, generation of the audio frequency shift keying signals and call timing are handled by the modem.

Throughout the complete call process closed loop control and error checking is used where possible to verify an event has been completed successfully. e.g. transmitter has responded to frequency command.
The modems provide balanced transformer isolated audio input and output signals with nominal impedance of 600 ohms, together with an isolated volt-free dry contact transmit keying signal. These signals are made available at a connector on the rear of the equipment sub-rack for connection to their associated transceiver via an audio and control link. The modems are compliant with the provisions of ITU-R Recommendations M.493, and M.541.

**NBDP operation**

The NBDP modem functions in a similar manner to the DSC modems.

Radio Telex services are provided through the use of the V4 Telex Terminal application, which connects to the V4 Server. ARQ, FEC and SELFEC modes are supported. Facilities include message editing, filing and retrieval. NBDP traffic may also be entered live from the workstation.

**NAVTEX operation**

The V4 supports automated NAVTEX broadcasting and NAVTEX reception facilities. Please refer to the V4 NAVTEX Overview document for further information.

**On line Status Monitoring**

Each server continually monitors the status of the other server and connected workstations, generating audible and visual alarms for failure conditions. In normal operation one of the servers will assume primary status, if this server should fail the secondary server will take over and a warning will be posted to the operator workstations. All modules on the network are interrogated regularly by the V4 Server and their status responses monitored to provide on line system fault advice.

**System Database and Archiving**

The servers maintain a database containing comprehensive call data and system event data. The server supports backup of the database, automatic purging of records by a predetermined age limit and replication in systems utilising a dual server fault tolerant configuration. The default database used is Microsoft SQL Desktop Engine (MSDE), external databases may also be used.

**Printing**

Network printers may be used for printing of calls and events.
DSC Workstation Client

Simplicity and ease of operation is a major feature of the Workstation design, which presents a Windows compliant graphical user interface offering clear, simple and intuitive operation.

♦ **Windows Graphical User Interface**
  - Extensive use of mouse commands to speed up and simplify operation
  - Tool bars and tool tips
  - Copy and paste call details
  - Customization: columns, colours, call windows

♦ **Quick and clear call handling**
  - Multiple workstations
  - Filter unwanted categories of calls
  - Acknowledge or relay incoming Distress Alerts quickly and simply
  - Send Urgency, Safety and Routine DSC messages
  - Address messages to all ships, geographical area, group or an individual MMSI
  - Create and send Distress Relays
  - Receive Distress, Urgency, Safety and Routine DSC messages
  - Repeat function for re-sending calls
  - Independent audible alarm sound for each call category

♦ **Logging and Monitoring**
  - Call printing
  - Call archiving
  - Online status display of servers and outstations
Typical V4 DSC Workstation displays

**Main window**

- Up to 10 configurable call windows
  
  Viewing of all calls and events in database using scroll bars

- Sizeable call windows

- Advanced call filtering and sorting capability

- Configurable colours for each call category

- Automatic voting of best received call with indication of the number of duplicate calls

- Independent aural alarm sounds for each call category
A Typical Attention Window

New calls, requiring operator action, are displayed in summary form in this window.

Call Window Filter

- Configurable on an individual workstation basis
- Workstations can be set to handle specific types of call
- Once set this feature may be locked
Attention Sort Window

- Up to 3 sort keys
- Column Header sort function option
- Once set this feature may be locked

Call Colour Settings

Foreground and background settings may be set for each type of call
Call Window Settings

- Each call window's settings are independently configurable

**Workstation Options**

- Independent control of operator capability
- Window for automatically acknowledged calls
- This window has been user configured to show all test calls
- Dedicated 'Find' results window

**Example 'Find' filter set to find distress, urgency and safety calls to or from MMSI 219060000**
**Call Details**

- Clear layout
- Duplicate calls showing station name, quality and signal strength\(^1\)
- Symbol level display option

\(^1\) Applicable to VHF only and not available for all system configurations
The call details identify the stations the call has been received by with their associated Received Quality Indication, RQI and Received Signal Strength, RSSI values. The station with the best RQI and RSSI values will be used as the default station when sending an acknowledgement.

**Sending calls - from the file menu**

Click on the ‘Compose’ menu option to pull down the call options. Follow a few simple steps to transmit the call.

Most of the call detail is preset to commonly used defaults allowing very quick selection and eliminating incorrect entries.

Selections such as working channel may be customized to reflect the station’s capabilities and to aid operation.
Sending calls - direct from Station name on status tree

Right-clicking on the on a station name pulls up the Compose menu and automatically sets the station name to that clicked on.

Geographic area entry

- The geographic area may be specified as a circular area with centre point and range in nautical miles or as a conventional rectangular area.

The circular area is automatically converted to a rectangular area.

Circular area entry
Acknowledging a Call

To acknowledge an incoming call, select **Acknowledge** from the Call details window or from the attention call pop-up menu. A **Compose call** dialog box will be displayed with most details of the call filled in automatically. Where multiple stations received the original call, the station with the best RQI and RSSI values will be used as the default station.

![Distress Acknowledgement Call](image)

Usually there is no need to change any of the default settings.

Click **Send** to transmit the call.

Repeating a Call

On some occasions it may be desirable to repeat a previously sent call.

To do this, highlight the call in the call window and select **Repeat**, from the pop-up, menu, toolbar or file menu.

![Repeat Call](image)

The **Compose call** dialog box will be displayed with the information from the previously sent call already filled in. Make any changes required such as a different station then click **Send** to transmit the call.
System Log Window
This window displays system events including call handling.

<table>
<thead>
<tr>
<th>Received</th>
<th>Sent</th>
<th>Auto</th>
<th>Test</th>
<th>Find</th>
<th>System Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/04/2002 15:45:38</td>
<td>LYRA_S1</td>
<td>000015 Area Urgency from 219060000 to 520800115°S10°E checked off by PC2145:Marc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/04/2002 15:09:31</td>
<td>LYRA_S1</td>
<td>All Ships Safety from 066650000 sent by PC2145:Marc as ID 000024 at HF site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/04/2002 14:51:40</td>
<td>LYRA_S1</td>
<td>MF/HF Tx ready fault: 0032750 at HF Site is OK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/04/2002 14:51:34</td>
<td>LYRA_S1</td>
<td>MF/HF DSC Transmitter: 0032750 at HF Site is OK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/04/2002 14:50:21</td>
<td>LYRA_S1</td>
<td>MF/HF Tx ready fault: 0032750 at HF Site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/04/2002 14:50:21</td>
<td>LYRA_S1</td>
<td>MF/HF DSC Transmitter: 0032750 at HF Site not responding or faulty</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Events are colour coded according to their type:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Text colour</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td>Red</td>
<td>An outstanding alarm condition</td>
</tr>
<tr>
<td>☑</td>
<td>Black</td>
<td>A warning e.g. an alarm condition that has been cleared</td>
</tr>
<tr>
<td>☑</td>
<td>Green</td>
<td>Information detailing clearance of an alarm condition</td>
</tr>
<tr>
<td>☑</td>
<td>Grey</td>
<td>General system information including call handling summary</td>
</tr>
</tbody>
</table>

The System Log Filter may be used to restrict the display of entries based on the filter criteria.
V4 Radio Controller Client

The V4 MCS may include control and switching of the radiotelephony assets by controlling a third party switching system. Operator workstations will be equipped with audio consoles provide control of the system.

Each workstation has the V4 Radio Controller client, which allows simple selection and status indication of the physical radio equipment and channels in use. Where the switching system allows mixed outputs a speaker output, controlled by a V4 Radio Controller client, may be used to provide a speaker watch on ch16 or other channels.

The system supports single or multi-site installations with VHF and MF/HF assets. Typical screen shots and examples of operation taken from a single site MF/HF only system are shown below.

General Operation

![V4 Radio Controller Client](image)

These panels represent the actual transmitters and receivers in the system. The system is highly configurable. In this example two groups have been created; Distress and Routine. Rx1, Rx2 and Rx3 are dedicated to Distress whereas Rx4 and Rx5 are allocated for Routine traffic.

Tx1 and Tx2 are included in both groups and are therefore available for either use.

These are the distress group selection buttons, allowing the operator to quickly select a channel for monitoring or transmission. In this example no distress channels are selected.

These are the routine group selection buttons, allowing the operator to quickly select a channel for monitoring or transmission. In this example the operator has selected 4146.0kHz. The system has automatically allocated Tx1 and Rx4, set then to the required frequency and patched the operator’s audio console to the radio equipment.

Status indicators on the panels show the current frequency setting and the login name of the operator, in this case 4146.0kHz and VPC326S.
Distress Monitoring

The operator has selected to monitor the three distress frequencies. The system will patch the receive audio from the three receivers Rx1, Rx2 and Rx3 to the operator position. This configuration shown would also at used for the distress speaker watch output.

If transmission is required the operator clicks on the selection button and changes the control to Tx, which will then allocate and set up Tx1 and route the operator transmit path to the transmitter.
Simultaneous Transmission

The operator has selected both 4146.0 and 6227.0 for transmission.

The system has allocated Tx1 and Rx4 to 4146.0kHz and Tx2 and Rx5 to 6227.0kHz.

The audio from the operator is routed to both transmitters simultaneously.
V4 Telex Terminal Client

Radio Telex services are provided through the use of the V4 Telex Terminal application, which connects to the V4 Server. ARQ, FEC and SELFEC modes are supported. Facilities include message editing, filing and retrieval. NBDP traffic may also be entered live from the workstation.
A selection of examples of screens is shown below.

**Main screen**

![Main Screen](image)

The Editor window allows messages to be created and stored prior to transmission.

**Editor Window**

![Editor Window](image)
**Frequency Selection**

Standard frequencies are available via a drop down list. Alternatively frequencies may be entered directly.

**Scanning**

On systems supporting remote radio control the Telex system may be set to scan a set of frequencies from a pre-defined scan table. The frequencies to be scanned and the scan delay time are configurable.
Traffic Logging and printing options
All telex traffic may be logged to file and/or a printer via serial port.

Status Bar
This status bar contains different panes, displaying important information about the current status of the Telex terminal, NBDP modem and DSC2 server.
V4 Print Manager Client

- Configurable online printing of calls and events
- Multiple Print Manager Clients supported
- Remote Server connection
- 80 or 132 columns selection
V4 Administration Utility

The V4 Administration Utility is used to configure and maintain the V4 system. The V4 Administration Utility connects to the V4 Server and may be run locally on the server PC or may be run remotely via a PC on the LAN, WAN or VPN.

The following list is a summary of the V4 Administration Utility facilities:

- System Configuration - Add/Delete/Configure stations.
- Module Configuration - Add/Delete/Configure/ modules
- Module Diagnostics - Reset/Upgrade/Status/Test
- Show Status of V4 client resources and licence usage.
- Configure automatic acknowledgement and check off of received DSC calls.
- Configure MID country information.
- Show the system log for fault finding and auditing.
- Show the system alarms.
- Start/Stop/Restart the primary and backup V4 servers.
- Purge/Backup/Resynchronise the call database.
The systems stations’ and module properties are configured using the Admin Utility.
Configuration of the V4 Server includes settings for DSC handling, automated database management facilities and control of alarm conditions and actions.
Detailed online status information is available.
System Event logging and Diagnostics

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Resources</th>
<th>Auto Action</th>
<th>PWD</th>
<th>System Log</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VHF DSC at Bevbjerg Test

Modulator
- Transmit Output: OFF
- Dotting Burst: 20

Demodulator
- RSSI: Scaled 1, A/D 1, Level 0.04 V
- Mark: 1233422100, 68.364%
- Space: 555901683, 31.036%
- Transitions: 718125177, 40.152%
- Dotting Burst: 25
- Channel Busy: 0

Inputs
- Squelch In
- Reservation In
- TX Ready
- Antenna Alarm

Outputs
- PTT
- Reservation Out
- Channel: Ch0, Ch1, Ch2, Ch3, Ch4, Ch5, Ch6, Ch7

Stop | Reset Counts