

**Saab AB (publ.)  
TransponderTech**

# R60 Station

## User Manual



**SAAB**



# SAAB

## R60 Station

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The R60 has been designed for compliance with applicable standards and conformity has been approved according to Ref [9].

The user is responsible for operating the R60 Station in compliance with national legislation, such as for example transmission permits or licences for the usage of frequencies. The R60 Station uses the maritime VHF band. Further information about VHF transmitter characteristics can be found in Ref [1].

**iii VALIDITY OF THIS DOCUMENT**

This manual is valid for the web based remote control and monitoring interface of the R60 Station, with following part numbers:

- 7000 120-203, R60 Receiving Station
- 7000 120-204, R60 AtoN Station
- 7000 120-200, R60 VDES Base Station – Standard
- 7000 120-201, R60 VDES Base Station – Full

Above products are based on the same hardware, 7000 120-100 R60 VDES Base Station HW, and common software, with different extent of licence-controlled functionality that looked to the R60 units' serial number.



### V UNAUTHORISED CHANGES

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### VI RF EXPOSURE

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment.

The antenna should be installed and operated with minimum distance of 100 cm between the radiator and your body. Antenna gain must be below:

7 dBi

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet appareil est conforme aux limites d'exposition aux rayonnements de la IC pour un environnement non contrôlé.

L'antenne doit être installée de façon à garder une distance minimale de 100 centimètres entre la source de rayonnements et votre corps. Gain de l'antenne doit être ci-dessous:

7 dBi

L'émetteur ne doit pas être colocalisé ni fonctionner conjointement avec à autre antenne ou autre émetteur.



# SAAB

## R60 Station

### vii CONTACT INFORMATION

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## CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>11</b>
1.1	DOCUMENT ORIENTATION .....	11
1.2	REFERENCES .....	12
<b>2</b>	<b>FRONT PANEL .....</b>	<b>14</b>
2.1	POWER BUTTON .....	14
2.1.1	Operation .....	14
2.1.2	LED Indications .....	14
2.2	FRONT DISPLAY .....	14
2.2.1	Introduction .....	14
2.2.2	Main Menu .....	15
2.2.3	Status .....	16
2.2.4	Statistics .....	17
2.2.5	Alarms .....	18
2.2.6	Base Station, AtoN and Receiving Station .....	19
2.2.7	VDL .....	19
2.2.8	Settings .....	20
<b>3</b>	<b>GETTING STARTED .....</b>	<b>21</b>
3.1	R60 STATION VARIANTS AND LICENSES .....	21
3.2	INSTALLATION AND COMPATIBILITY .....	21
3.3	CONNECTING TO THE R60 WEB INTERFACE .....	22
3.4	CONNECTING TO THE R60 SUPERVISOR .....	22
3.5	INTRODUCTION TO THE R60 WEB INTERFACE .....	23
3.6	NAVIGATING THE WEB INTERFACE .....	25
3.7	VISUAL APPEARANCE OF THE WEB INTERFACE .....	27
3.8	SAVING PARAMETER CHANGES IN THE WEB INTERFACE .....	27
3.9	INTRODUCTION TO MAIN CATEGORIES .....	27
3.9.1	HW/SW Info .....	28
3.9.2	Monitor .....	28
3.9.3	Configure .....	28
3.9.4	Maintenance .....	28
3.10	QUICK INTRODUCTION TO SET-UP OF A NEW R60 STATION .....	29
3.10.1	General set-up procedure .....	29
3.10.2	Set-up procedure for a redundant configuration .....	37
<b>4</b>	<b>HW/SW INFO .....</b>	<b>39</b>
4.1	INTRODUCTION .....	39
4.2	LICENSE INFO .....	39
4.3	VERSION FUNCTIONALITY .....	39
4.4	UNAVAILABLE FUNCTIONS .....	40
4.5	UPDATE LICENSE .....	40
<b>5</b>	<b>MONITOR .....</b>	<b>41</b>
5.1	INTRODUCTION .....	41
5.2	MONITOR > ALARMS .....	41
5.3	MONITOR > STATUS .....	42
5.4	MONITOR > POSITION REPORTS .....	43
5.5	MONITOR > DATA LOG .....	45
5.5.1	Log panel .....	45
5.5.2	Clipboard panel .....	45
5.6	MONITOR > VDL LINK MAP .....	46



5.6.1	Information Panel .....	46
5.6.2	Legend panel .....	47
5.6.3	Channels panel .....	47
5.6.4	Freeze/Unfreeze button .....	47
5.6.5	Channel grid panels .....	47
<b>6</b>	<b>CONFIGURE .....</b>	<b>49</b>
6.1	INTRODUCTION .....	49
6.2	EDITING AND STORING CHANGES .....	49
6.3	CONFIGURE > GENERAL .....	50
6.4	CONFIGURE > NETWORK .....	52
6.5	CONFIGURE > INTERFACES .....	54
6.6	CONFIGURE > GNSS .....	55
6.6.1	Position .....	55
6.6.2	DGNSS .....	55
6.6.3	Self-surveyed position .....	56
6.6.4	Viewing self-surveyed position .....	56
6.6.5	GNSS parameters .....	56
6.7	CONFIGURE > REPORTING RATES (BASE STATION ONLY) .....	58
6.8	CONFIGURE > DATA LINK MANAGEMENT (BASE STATION ONLY) .....	58
6.9	CONFIGURE > CHANNEL MANAGEMENT (BASE STATION ONLY) .....	60
6.10	CONFIGURE > GROUP ASSIGNMENT (BASE STATION ONLY) .....	62
6.11	CONFIGURE > VSI & FSR SENTENCES .....	64
6.12	CONFIGURE > THIRD AIS CHANNEL (FULL BASE STATION ONLY) .....	66
6.13	CONFIGURE > HOT STANDBY .....	67
6.14	CONFIGURE > REPEATER (FULL BASE STATION ONLY) .....	70
6.14.1	Process used to repeat a message .....	70
6.14.2	Configure > Repeater > General .....	71
6.14.3	Configure > Repeater > Reservations .....	72
6.14.4	Configure > Repeater > MMSI filter .....	73
6.14.5	Configure > Repeater > Area filter .....	74
6.15	CONFIGURE > AIDS TO NAVIGATION (ATON STATION AND FULL BASE STATION) .....	77
6.16	CONFIGURE > ATON MESSAGE REPEATER (ATON STATION AND FULL BASE STATION) .....	79
6.17	CONFIGURE > SPECIAL AIDS TO NAVIGATION FUNCTIONS .....	80
6.18	CONFIGURE > VDL STATUS/REBOOT .....	82
6.19	CONFIGURE > PASSWORD .....	84
<b>7</b>	<b>MAINTENANCE .....</b>	<b>85</b>
7.1	CONFIGURATION .....	85
7.2	RESTART R60 STATION .....	85
7.3	UPGRADE FIRMWARE/SOFTWARE .....	85
7.4	SNMP MIB .....	86
<b>8</b>	<b>SUPERVISOR WEB .....</b>	<b>87</b>
<b>9</b>	<b>SNMP MONITORING .....</b>	<b>89</b>
<b>10</b>	<b>NMEA SENTENCES .....</b>	<b>90</b>
10.1	CHANNEL MANAGEMENT .....	90
10.2	MULTIPLE GROUP ASSIGNMENT AREAS .....	90
10.3	DATA LINK MESSAGES .....	90
10.3.1	DGNSS message 17 .....	91
<b>11</b>	<b>TECHNICAL DATA .....</b>	<b>92</b>
<b>12</b>	<b>DECLARATIONS, APPROVALS AND CERTIFICATES .....</b>	<b>94</b>



12.1	AIS BASE STATION STATEMENT OF CONFORMITY .....	94
12.2	MODULE B CERTIFICATE .....	96
12.3	REACH AND ROHS DECLARATION .....	97
<b>13</b>	<b>ACRONYMS .....</b>	<b>98</b>



## LIST OF TABLES

TABLE 2-1 – FRONT DISPLAY CONFIGURATION PARAMETERS	20
TABLE 4-1 – LICENSED FEATURES IN THE R60 BASE STATION	40
TABLE 5-1 – DESCRIPTION OF FEATURES MONITORED IN THE ALARMS SUB-CATEGORY	42
TABLE 5-2 – DESCRIPTION OF ALARM INDICATOR ICONS	42
TABLE 5-3 – FEATURED DISPLAY OF THE R60 UNIT STATUS	43
TABLE 6: VDL LINK MAP INFORMATION PANEL FIELDS	46
TABLE 6-1 – <i>GENERAL</i> PARAMETERS	51
TABLE 6-2 – <i>NETWORK</i> PARAMETERS	53
TABLE 6-3 – PARAMETERS FOR <i>INTERFACES</i>	54
TABLE 6-4 – PARAMETERS ON THE <i>GNSS</i> PAGE	57
TABLE 6-5 – PARAMETERS FOR <i>REPORTING RATES</i>	58
TABLE 6-6 – PARAMETERS FOR <i>DATA LINK MANAGEMENT</i>	59
TABLE 6-7 – PARAMETERS FOR <i>CHANNEL MANAGEMENT</i>	60
TABLE 6-8 – PARAMETERS FOR <i>GROUP ASSIGNMENT</i>	63
TABLE 6-9 – PARAMETERS FOR <i>VSI/FSR</i> CATEGORY PAGE	65
TABLE 6-10 – PARAMETERS FOR <i>THIRD AIS CHANNEL</i> CATEGORY PAGE	66
TABLE 6-11 – PARAMETERS FOR THE <i>HOT STANDBY</i> REDUNDANCY CATEGORY PAGE	69
TABLE 6-12 – PARAMETERS FOR THE <i>REPEATER – GENERAL</i> CATEGORY PAGE	72
TABLE 6-13 – PARAMETERS FOR THE <i>REPEATER – RESERVATIONS</i> CATEGORY PAGE	73
TABLE 6-14 – PARAMETERS FOR THE <i>REPEATER – MMSI FILTER</i> CATEGORY PAGE	74
TABLE 6-15 – PARAMETERS FOR THE <i>REPEATER – AREA FILTER</i> CATEGORY PAGE	76
TABLE 6-16 – PARAMETERS FOR THE <i>AIDS TO NAVIGATION</i> CATEGORY PAGE	78
TABLE 6-17 – PARAMETERS FOR THE <i>ATON MESSAGE REPEATER</i>	79
TABLE 6-18 – PARAMETERS FOR THE <i>SPECIAL ATON FUNCTIONS</i>	81
TABLE 6-19 – PARAMETERS FOR <i>VDL STATUS/REBOOT</i>	82
TABLE 6-20 – R60 STATUS INFORMATION MESSAGES	83
TABLE 6-21 – <i>PASSWORD</i> PARAMETERS	84
TABLE 8-1 PARAMETER INFORMATION PROVIDED VIA SUPERVISOR GUI	88

## LIST OF FIGURES

FIGURE 2-1:	FRONT DISPLAY MAIN MENU.....	15
FIGURE 2-2:	STATISTICS VIEW .....	18
FIGURE 2-3:	R60 STATION STATUS VIEW.....	19
FIGURE 3-1:	WEB GUI START PAGE, SHOWING THE FOUR MAIN CATEGORIES .....	24
FIGURE 3-2:	HOW TO COME BACK TO THE WEB GUI START PAGE .....	24
FIGURE 3-3:	THE NAVIGATOR LINE SHOWS SELECTED CATEGORY AND IF APPLICABLE ALSO SUB-CATEGORY .....	25
FIGURE 3-4:	SHORTCUTS TO THE TOP LEVEL OF THE PRESENT MAIN CATEGORY, OR DIRECTLY TO THE TOP LEVEL OF ANOTHER MAIN CATEGORY.....	26
FIGURE 3-5:	SHORTCUTS TO TOP LEVEL OF THE PRESENT SUB-CATEGORY, OR DIRECTLY TO OTHER SUB-CATEGORIES .....	26
FIGURE 3-6:	MAKE SURE TO USE THE <i>SAVE CHANGES</i> BUTTON TO STORE CHANGED SETTINGS .....	27
FIGURE 3-7:	TOP MENU OF THE CONFIGURE CATEGORY .....	30
FIGURE 3-8:	<i>GENERAL</i> , SUB-PAGE OF THE <i>CONFIGURE</i> CATEGORY .....	31
FIGURE 3-9:	CHANGING FROM THE <i>GENERAL</i> SUB CATEGORY DIRECTLY TO THE <i>GNSS</i> SUB CATEGORY .....	32
FIGURE 3-10:	<i>GNSS</i> SUB CATEGORY .....	32
FIGURE 3-11:	<i>REPORTING RATES</i> PAGE (APPLIES FOR BASE STATIONS ONLY) .....	34
FIGURE 3-12:	<i>DATA LINK MANAGEMENT</i> PAGE (APPLIES FOR BASE STATIONS ONLY) .....	35
FIGURE 3-13:	<i>NETWORK</i> PAGE.....	36
FIGURE 3-14:	<i>HOT STANDBY</i> CATEGORY PAGE. THE SETTINGS IN THE PICTURE SPECIFIES THE R60 OPERATION WHEN USED IN A CONFIGURATION WITHOUT REDUNDANCY.....	37
FIGURE 5-1:	<i>MONITORING POSITION REPORTS</i> PAGE. CLICKING ON (SELECTING) AN OBJECT IN THE PLOT AREA OR IN THE LIST MAKES IT HIGHLIGHTED IN RED, BOTH IN THE LIST AND IN THE PLOT AREA.....	44
FIGURE 5-2:	<i>MONITORING DATA LOG</i> PAGE. ....	46
FIGURE 5-3:	<i>MONITORING VDL LINK MAP</i> PAGE .....	48
FIGURE 6-1:	PASSWORD IS REQUIRED TO ENTER THE <i>CONFIGURE</i> CATEGORY .....	49
FIGURE 6-2:	R60 IN A REDUNDANT PAIR CONFIGURATION .....	67
FIGURE 8-1:	SUPERVISOR INFO.....	87

## 1 INTRODUCTION

This manual describes the web-based remote control graphical user interfaces (GUI) for an R60 Station unit.

The R60 Station is equipped with two different Ethernet based service interfaces.

- Configuration and Monitoring Web Interface (Provides VDES monitoring and configuration functionality see section 3.3)
- R60 Supervisor Web Interface (Provides R60 supervision and configuration functionality see section 3.4)

The usage of this interface is intended for personnel with knowledge about the VDES system (including AIS) and how a AIS/VDES station handles the VHF data link (VDL).

Note that the parameters set in a AtoN/Base station must be coordinated with other nearby AtoN/Base stations. Uncoordinated base stations and improper parameters may cause problems on the VDL link. Base station settings might also be subject to national legislation or international treaties.

General information about VDES base stations can be found in references Ref [2] - Ref [8].

Besides the web page GUI there is also a limited graphical user interface available on the front of the R60, for convenient configuration of IP communication ports etc.

For detailed information about physical capabilities of the R60 unit, the reader of this manual should also have access to the *SAAB R60 VDES Base Station Installation Manual* (Ref [1]).

The Saab Group homepage [www.saab.com](http://www.saab.com) provides more information about Saab, the coastal surveillance system MARITIMECONTROL/CoastWatch as well as other AIS/VDES-related products from Saab.

### 1.1 Document orientation

This user manual is divided into the following sections:

**Section 1, Introduction**, generally describes the R60 Station from SAAB. This section also presents references.

**Section 2, Front Panel**, general information of how to use the front panel.

**Section 3, Getting started**, contains further introduction of R60 variants, instructions for how to connect to and access a R60 station via the web GUI and also how to navigate the web GUI.

A step-by-step procedure how to set up a R60 Station is also provided.

**Section 4, HW/SW Info**, contains information about the versions of unit components and also licensing and licensed features.



**Section 5, Monitor**, contains information about the alarm and status monitoring functions that are built into the web GUI.

**Section 6, Configure**, contains information about all R60 Station parameters and how to configure them.

**Section 7, Maintenance**, describes how to upgrade the firmware and software of the R60 Station.

**Section 8, Supervisor Web**, describes the specific functions provided by the Supervisor Web GUI of the R60 Station.

**Section 9, SNMP Monitoring**, describes the SNMP functionality as supported by the R60 Station.

**Section 10, NMEA sentences**, describes additional features of the R60 related to NMEA interface sentences, in addition to the NMEA/IEC standards.

**Section 11, Technical data**, contains technical characteristics of the R60 Station.

**Section 13, ACRONYMS**, contains brief descriptions of acronyms used in this document.

## 1.2 References

- Ref [1] R60 VDES Base Station Installation Manual  
*Document number:* 7000 120-008
- Ref [2] Technical characteristics for a universal ship borne automatic identification system using time division multiple access in the VHF maritime mobile band  
*Document number:* ITU-R. M. 1371-5
- Ref [3] IALA guidelines on the universal automatic identification system (AIS)  
*Document number:* IALA Ed 1.1
- Ref [4] IALA recommendation on AIS shore stations and networking aspects related to the AIS service  
*Document number:* IALA A-124. Ed. 2.1
- Ref [5] Maritime navigation and radio communication equipment and systems – Automatic identification systems (AIS)  
Part 1: AIS Base Stations - Minimum operational and performance requirements, methods of testing and required test results  
*Document number:* IEC 62320-1 Ed.2
- Ref [6] Maritime navigation and radio communication equipment and systems – Automatic identification systems (AIS)  
Part 2: AIS AtoN Stations – Operational and performance requirements, methods of testing and required test results  
*Document number:* IEC 62320-2 Ed.1



- Ref [7] Maritime navigation and radio communication equipment and systems – Automatic identification systems (AIS)  
Part 3: Repeater station – Minimum operational and performance requirements, Methods of test and required test results  
*Document number:* IEC 62320-3 Ed.1
- Ref [8] IALA GUIDELINE G1139 THE TECHNICAL SPECIFICATION OF VDES Edition 1, December 2017
- Ref [9] Statement of Conformity  
*Document number:* BSH/454.AIS Base/Saab R60 VDES Base Station
- Ref [10] Operational and Performance Testing of the SAAB R60 AIS AtoN Station and R60 VDES Base Station in accordance with IEC 62320-2:2016, Doc No: 75955291-01



## 2 FRONT PANEL

### 2.1 Power Button

The R60 power button is a momentary push button with a built in RGB LED for status indication.








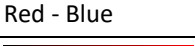
The R60 supervisor will always be powered on and accessible while either AC or DC power is available.

#### 2.1.1 Operation

To power on the R60, push the button. The R60 station will power on immediately.

To power off the R60, push and hold the button depressed for at least 2 seconds.

#### 2.1.2 LED Indications

LED Colour	LED Behaviour	Description
 Black	Steady	Powered off and no AC or DC power is available
 Black - Blue	Fade	AC or DC power source is available. Powered off but supervisor is powered on.
 Green - Blue	Fade	Powered on and is booting.
 Green	Steady	Operational with no active alarms.
 Red	Steady	Operational with at least one active alarm.
 Green - Yellow	Fade	Operational with no active alarms. Configured for hot standby and is currently operating in standby mode.
 Red - Blue	Fade	Software load in progress. The R60 is not operational.
 Black - Red	Fade	Failure, the R60 is not operational

## 2.2 Front Display

### 2.2.1 Introduction

The R60 front display shows status information and other operational related information. It is also possible to configure network communication settings.



The display is a 4.3" colour capacitive touch display. The graphical user interface is navigated by pressing on the soft buttons in the display or by pressing and dragging a finger to scroll through lists. Input is done via virtual keyboard shown when a parameter value field is selected.

### 2.2.2 Main Menu

The main menu consists of a status bar and a menu button section.

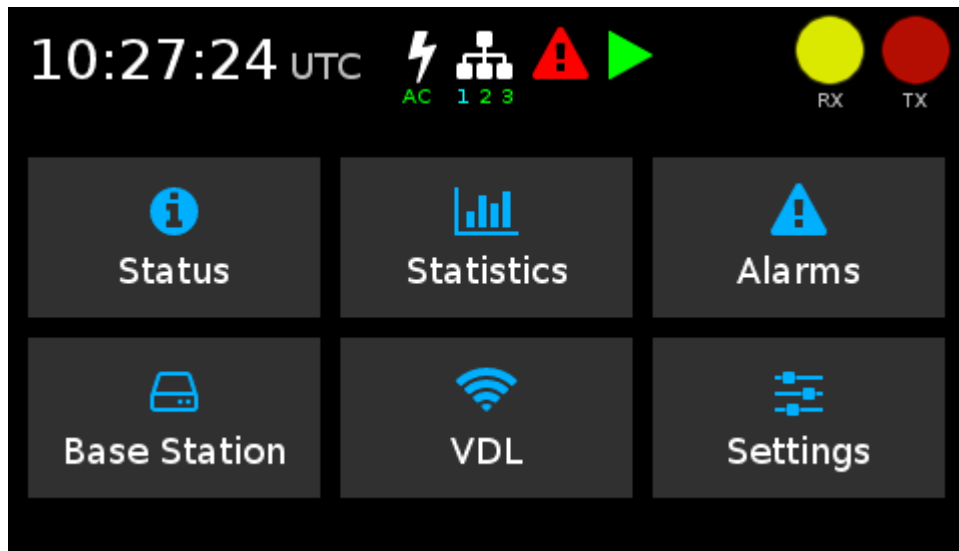





Figure 2-1: Front display main menu

#### 2.2.2.1 Status Bar

Item	Description
07:37:16 UTC	Current time in UTC
	Current power source AC DC
	Ethernet link status. Number indicates physical Ethernet interface. Colour indicates current link speed Grey: No link Magenta: 10Mbit Green: 100Mbit Cyan: 1Gbit
	Alarm status. Icon is red when at least one alarm is active and grey when no alarm is active.
	Base station is configured for hot standby and is currently operating as master.



Item	Description
	The R60 is configured for hot standby and is currently operating in standby mode.
	Soft LED. Blinks yellow when receiving.
	Soft LED. Blinks red when transmitting.

### 2.2.3 Status

R60 status is displayed in a number of groups according to the table below.

Group	Parameter	Description
R60 Station	Temperature	Current temperature inside the unit.
	AC	AC power available
	DC	DC power available
	DC Voltage	DC power voltage level
	Source	Current power source (AC or DC)
	State	Indicates R60 stations state: <i>Booting</i> : R60 station is starting up <i>Operational</i> : R60 station is operational <i>Loading software</i> : Software load in progress, R60 station is not operational <i>Failure</i> : System failure, R60 station is not operational.
	Uptime	R60 station supervisor uptime in <i>days hh:mm:ss</i>
GNSS	Source	Current GNSS source
	Visible Satellites	The number of GNSS satellites that theoretically could be detected at the R60 location.
	Satellites in Use	The number of GNSS satellites that are received and used by the R60.
Self-Surveyed Position	Latitude	Latitude
	Longitude	Longitude
	Altitude	Altitude in meters
	Accuracy	Self-surveyed position accuracy in percent
Hot Standby	Hot Standby Mode	Current hot standby mode, available modes are: <i>Not active</i> <i>Manual</i> <i>Autonomous</i>
	Hot Standby Status	Current hot standby status: <i>Master</i>





Group	Parameter	Description
		<i>Standby</i>
	<b>Alarm Status</b>	Hot standby alarm status
<b>VDL</b>	<b>Channel</b>	VHF data link (VDL) channel
	<b>Units</b>	Number of received units (including own station)
	<b>Load</b>	Link load in percent including transmitted and received messages during last minute.
<b>Ethernet</b>	<b>ETH1</b>	Link status and speed of Ethernet interface 1
	<b>ETH2</b>	Link status and speed of Ethernet interface 2
	<b>ETH3</b>	Link status and speed of Ethernet interface 3 (Supervisor)
<b>Local Storage</b>	<b>Total Size</b>	Available total size of local storage media
	<b>Used Size</b>	Used size of local storage media
	<b>Status</b>	Status of local storage
<b>SW/HW Version</b>	<b>Product</b>	R60 station product number
	<b>License</b>	Current license
	<b>Hardware</b>	R60 station hardware number
	<b>Hardware Version</b>	R60 station hardware version
	<b>Serial Number</b>	R60 station serial number
	<b>Software Version</b>	R60 station software version
	<b>Supervisor Software Version</b>	R60 station supervisor software version

Table 2-1 Front display status parameters

### 2.2.4 Statistics

This page displays a bar chart of transmissions and receptions over the last 30 minutes.

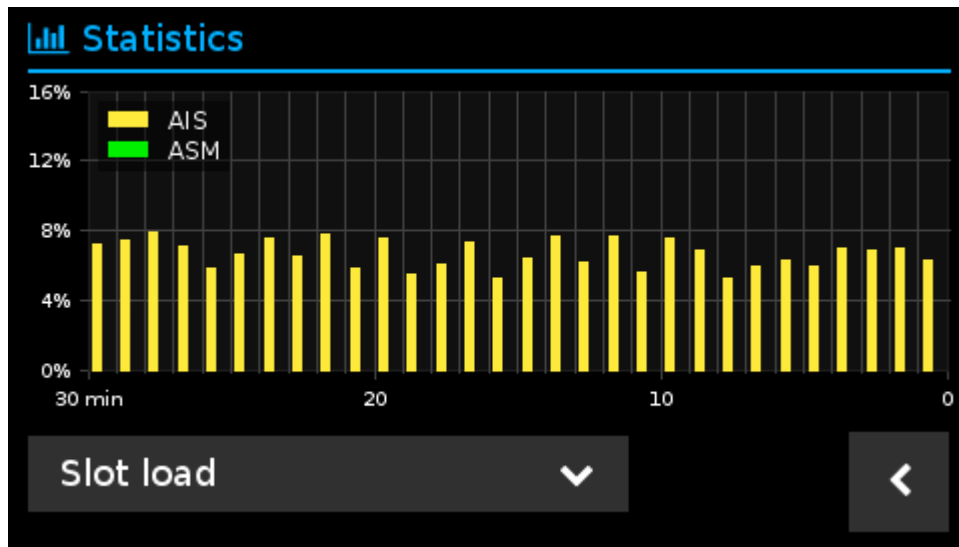


Figure 2-2: Statistics view

### 2.2.4.1 Slot load

This chart shows current slot load in percent over the last 30 minutes for AIS and ASM respectively.

### 2.2.4.2 Own slots

This chart shows own transmissions in percent over the last 30 minutes for AIS and ASM respectively.

### 2.2.5 Alarms

This page displays current alarm status of the base station. See section 5.2 for a detailed description of the available alarms.



### 2.2.6 Base Station, AtoN and Receiving Station

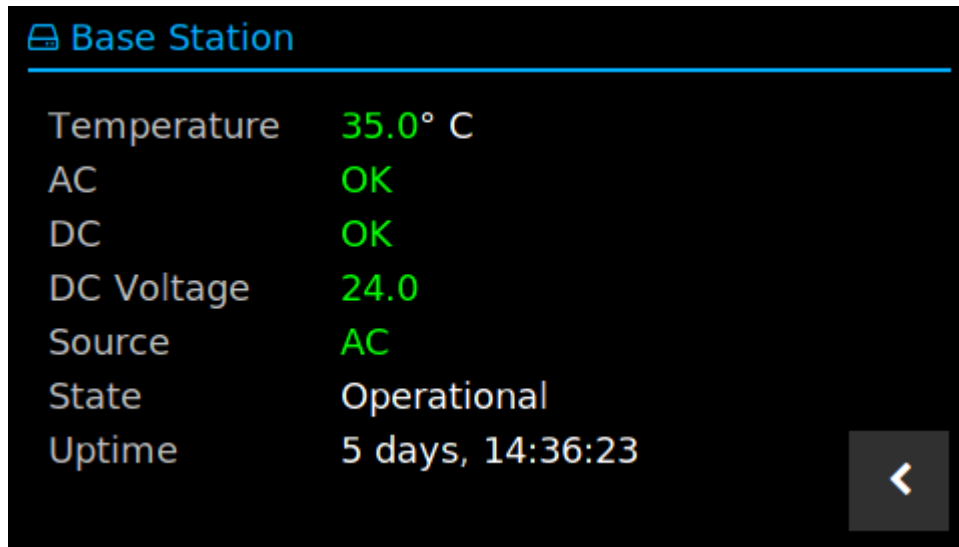


Figure 2-3: R60 station status view

See Table 2-1 for details.

### 2.2.7 VDL

See Table 2-1 for details.



### 2.2.8 Settings

The configuration parameters possible to set via the front display GUI is specified in the table below. Input is done by means of a virtual keyboard shown when a parameter value is pressed.

Group	Parameter	Description
Network ETH1	IP Address	IP address of Ethernet interface 1
	Netmask	Netmask of Ethernet interface 1
	Gateway	Gateway of Ethernet interface 1
Network ETH2	IP Address	IP address of Ethernet interface 2
	Netmask	Netmask of Ethernet interface 2
	Gateway	Gateway of Ethernet interface 2
Network ETH3 (Supervisor)	IP Address	IP address of Ethernet interface 3 (Supervisor)
	Netmask	Netmask of Ethernet interface 3 (Supervisor)
	Gateway	Gateway of Ethernet interface 3 (Supervisor)
Display	Display timeout	Sets time until display turns off from last touch input.
	Brightness	Sets the display brightness
	Language	Sets the display language

Table 2-1 – Front display configuration parameters

### **3 GETTING STARTED**

This section contains an introduction to the different variants of the R60. It also describes how to connect to a R60 station and navigate the web GUI.

Section 3.10 suggests a step-by-step procedure to set up a new R60 Station.

#### **3.1 R60 station variants and licenses**

The R60 Station provides many different functions, not all of them are available in every R60 station.

The R60 Station can be ordered in four different variants.

- Receiving only
- Aids-to-Navigation only (IEC 62320-2)
- Standard Base Station (IEC 62320-1)
- Full Base Station (IEC62320-1, IEC 62320-2, and IEC 62320-3)

The available functionality is determined by a license key. This license key is loaded on the R60 at delivery and enables the functions ordered by the customer. The loaded license key determines the variant and functionality of the R60 Station.

Common for all the variants is that they use the same hardware platform, and by replacing the license key it is possible to change from one unit variant to another if national regulations allow for it. It may be possible for the user to purchase a different license key separately and upgrade the R60 to a different variant.

The variants as listed above are identified by different product name and part number. The product label applied on the R60 station at delivery reflects the variant at delivery. When a license update is performed, this will affect the product P/N.

For the user of this manual it is important to be aware that the web interface will respond slightly differently depending on the variant of the R60. All R60 features are always present in the web GUI, while features that are not licensed to operate in a particular R60 variant are greyed out.

For more information on licensing, see section 4.

#### **3.2 Installation and compatibility**

The R60 Station can be supplied by AC or DC power, either as stand-alone or connected to both AC and DC simultaneously. In case the R60 Station is connected to both AC and DC at the same time, it uses AC and power and switches automatically to using DC as backup in case of failure of the AC supply. For specifications on power supply see Ref. 1

The web page GUI does not require any installation. The following standard web browsers are recommended:



- Internet Explorer (version 11)
- Google Chrome (version 81)
- Mozilla Firefox (version 75)
- Microsoft Edge (version 41)

### 3.3 Connecting to the R60 web interface

To connect to the R60 for monitoring and configuration functionality follow these instructions.

A standard web browser is used to access the R60 web GUI. Examples of compatible web browsers are listed in section 3.2.

To connect to the R60 you must know the IP address of the R60 unit. Default IP parameters are found in Ref [1].

A password is not required to connect to the R60 unit web page GUI. However, some features in the GUI do require a password to be accessed.

Follow these few steps to connect to a R60 Station using the web page GUI:

1. Make sure the R60 Station is turned on.
2. Make sure the R60 Station is connected to a TCP/IP network and reachable from the computer where the web GUI shall be accessed.
3. Open your web browser.
4. In the browser address field, type in the unit (ETH1 or ETH2) IP address in the format xxx.xxx.xxx.xxx and press Enter.

If your browser can access the R60 unit, and if you have used the correct IP address, the web GUI start page will now appear. The start page displays the four main categories as shown in Figure 3-5.

### 3.4 Connecting to the R60 supervisor

To connect to the R60 for equipment supervision and configuration functionality follow these instructions.

A standard web browser is used to access the R60 supervisor web GUI. Examples of compatible web browsers are listed in section 3.2.

To connect to the R60 supervisor you must know the IP address of the R60 supervisor unit and be connected using Ethernet port 3. Default IP parameters are found in Ref [1]. It is not the same as the main web GUI.

A password is not required to connect to the R60 supervisor unit web page GUI. However, some features do require a password.

Follow these few steps to connect to a R60 supervisor using the web page GUI:

1. Make sure the base station has power.



2. Make sure the base station is connected to a TCP/IP network using port 3 and reachable from the computer where the web GUI shall be accessed.
3. Open your web browser.
4. In the browser address field, type in the ETH3 IP address in the format xxx.xxx.xxx.xxx and press Enter.

If your browser can access the R60 supervisor unit, and if you have used the correct IP address, the web GUI start page will now appear. The start page displays as shown in Figure 3-1.

### 3.5 Introduction to the R60 web interface

The web GUI is used for setting parameters and monitoring operation of the R60 Station.

The GUI is a web site, and similarly to any site on internet it consists of a start page and sub-pages. The site and its pages are divided into four main categories:

- *HW/SW Info*, shows software, hardware and license information.  
More information is found in section 4.
- *Monitor*, used for monitoring the operation of an R60.  
More information is found in section 5.
- *Configure*, used for configuring the R60.  
More information is found in section 5.5.
- *Maintenance*, used for upgrading the R60 software and/or firmware.  
More information is found in section 7.

The first page reached when accessing the web site (the *home* page) is shown in Figure 3-1 below. It displays the four main categories, while for some categories there are also sub-categories (sub-pages).

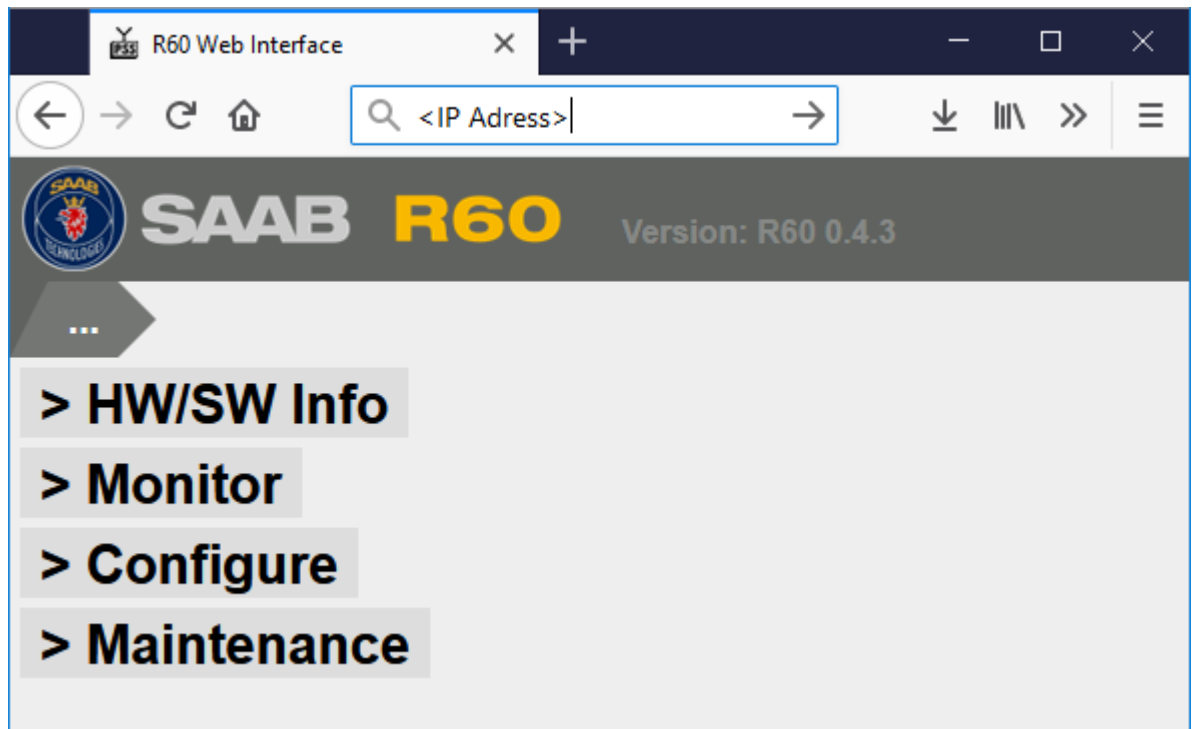


Figure 3-1: Web GUI start page, showing the four main categories

Wherever you are in the R60 web GUI interface you can always come back to this start page by clicking on the text “R60” as shown in Figure 3-2.

To come back to the start page, click on the text “R 60” (in the marked area).



Figure 3-2: How to come back to the web GUI start page



## 3.6 Navigating the web interface

Mouse-click on one of the main categories listed in Figure 3-1 to enter the category.

In the line just below the page header text “R60” there is a *navigator line* that indicates the selected category and sub-category as applicable. See Figure 3-3 below.

If no category is selected the navigator line indicates three dots (as can be seen in Figure 3-2). By hovering the mouse pointer over the three dots a menu with the main categories will appear, and this menu can also be used to click-select a main category.

In Figure 3-3 below the user has navigated into the pages of the main category “Monitor” and the sub-category “Status”, and this is shown in the navigator line.

Navigator line, showing currently selected main category and sub category / page

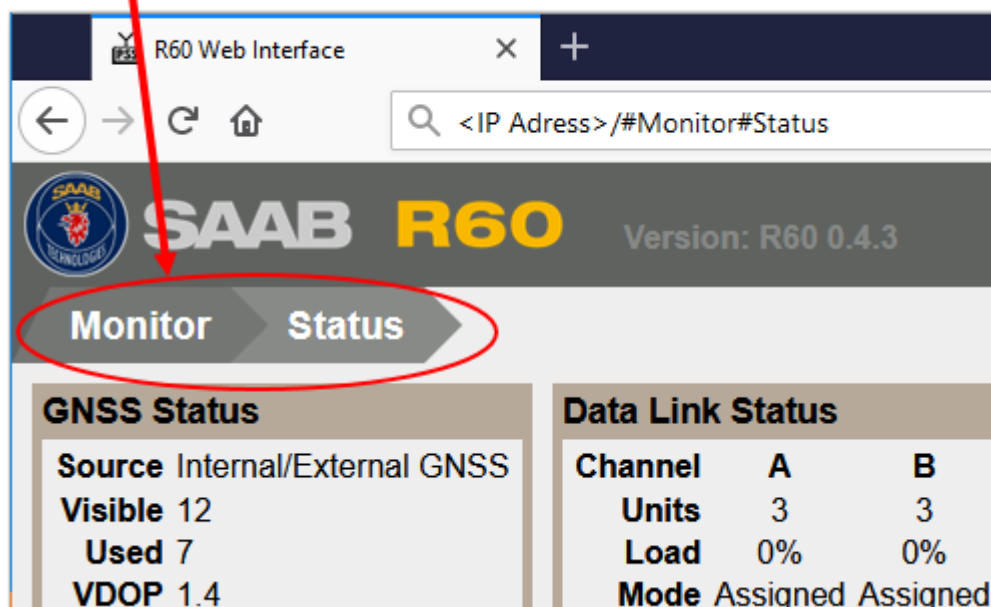


Figure 3-3: The *navigator line* shows selected category and if applicable also sub-category

When a category page is selected, the navigator line becomes a shortcut to other GUI web pages. See examples 1 and 2 below.

### Navigating shortcuts, Example 1:

By moving the cursor over the main category text, shortcuts to other main categories appear. Shortcuts can be clicked on to navigate directly to that other main category page. See example in Figure 3-4.

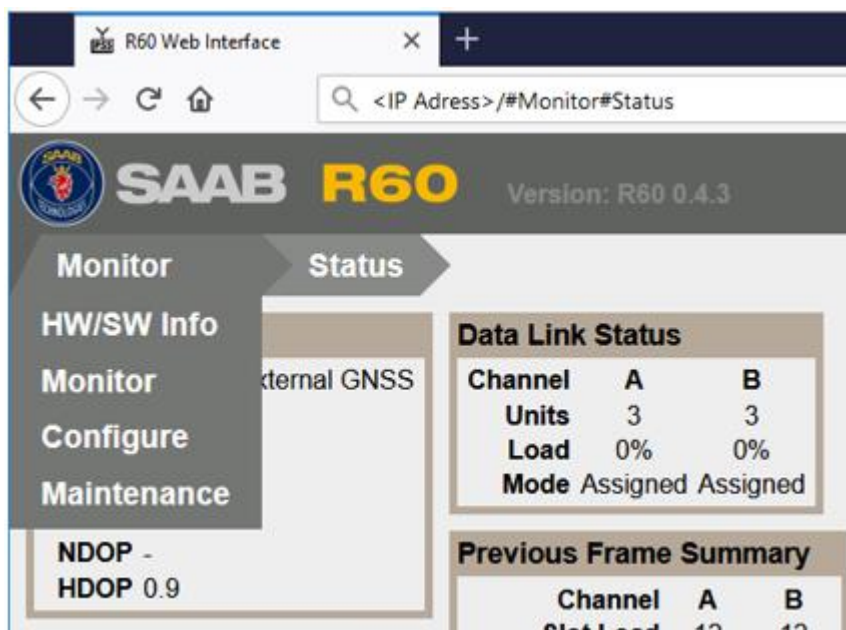


Figure 3-4: Shortcuts to the top level of the present main category, or directly to the top level of another main category

### Navigating shortcuts, Example 2:

By moving the cursor over the sub-category text, shortcuts to other sub-categories (within in the same main category) appear, if available. Shortcuts can be clicked on to navigate directly to that other main category page. See example in Figure 3-5 below and Figure 3-9 on page 32.

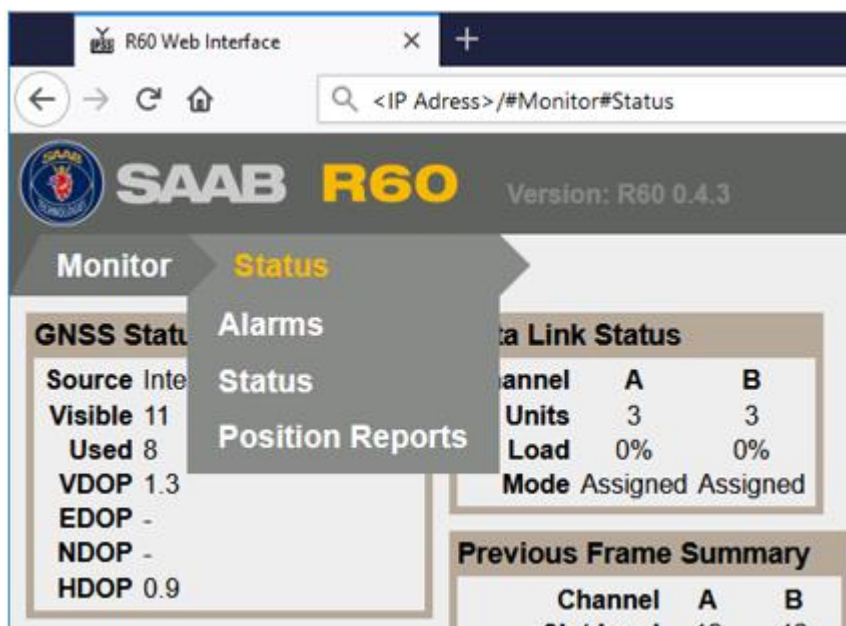


Figure 3-5: Shortcuts to top level of the present sub-category, or directly to other sub-categories

### 3.7 Visual appearance of the web interface

When comparing pictures in this manual to the view on your screen, be aware that by changing the size of the web browser window the web page content is re-arranged.

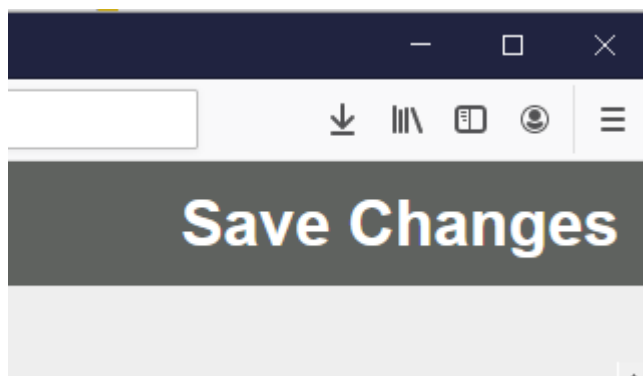
The web page will automatically adapt and try to display as much information as possible in the available area. The content on your screen can therefore appear in a different position compared to the illustration in this manual.

The web browser used may also result in minor variations.

### 3.8 Saving parameter changes in the web interface

When changing a parameter or setting in the R60 web GUI, a button named *Save Changes* appears in the upper right corner of the browser window. Please be aware that changes are not stored and will not have any effect on the unit until this button is used.

When clicking on the *Save Changes* button the changes are stored in the R60 memory. The settings will take effect immediately, i.e. it is not necessary to reboot the base station.



**Figure 3-6:** Make sure to use the *Save Changes* button to store changed settings

All unsaved changes are abandoned when the present (web) page is left for another page, so be careful to save changes before changing page.

If a parameter is changed by mistake and the original setting is unclear, all unsaved settings changes on the page can quickly be made undone by simply leaving the page (e.g. by moving one level up in the category hierarchy or to another web page on the same level) and then go back to the page again and start over.

### 3.9 Introduction to main categories

The web interface of the R60 Station contains four main categories as detailed in section 3.5. This section contains brief introductions to these main categories.

## 3.9.1 HW/SW Info

The category *HW/SW Info* is used to display version information about various software, firmware and hardware in the R60 unit. It also lists which licensed features are enabled.

Further details are found in section 4.

## 3.9.2 Monitor

The category *Monitor* is used to display unit status, unit alarms and position reports. More details about the monitoring features is found in section 5.

## 3.9.3 Configure

The category *Configure* is used to check or change settings in the R60 Station. Settings that can be changed are for instance communications interface capabilities, VDL data link and other AIS features, clock reference sources, etc.

More detailed information about base station settings, and how to edit them, is found in section 5.5.

## 3.9.4 Maintenance

The category *Maintenance* is used to upgrade the unit software and/or firmware, power cycle the base station and import/export/restore the configuration.

To enable the R60 to be integrated into third party SNMP monitoring tools, the SNMP MIB definitions text file can also be downloaded [here](#).

More details about how to perform the maintenance tasks is found in section 7.

## 3.10 Quick introduction to set-up of a new R60 station

This section describes the general procedure to set up a new R60 Station using the web GUI. Only the basic procedure is described here, while section 5.5 contains a complete list of all configurable settings and deals with more advanced topics.

**Before starting:** If current R60 settings are unknown, unplug the VHF antenna to avoid unintended transmissions. Transmitting without an antenna does not damage the R60.

### 3.10.1 General set-up procedure

Follow the steps below in order to set up the base station parameters:

1. **Install the R60 Station** according to the installation manual (Ref [1]).  
Make sure the R60 is connected to a TCP/IP network and reachable from the computer where the web browser is used.
2. **Turn on the power** to the base station. See the installation manual for instructions (Ref [1])  
Also open an Internet browser tool (see section 3.2 for compatibility).
3. **Connect to the R60 Station** as described in section 3.3.
4. **Select the main category *Configure*** (see sections 3.5 and 3.9.3)
5. **Type in the password** and press *Enter* key or click on “Go”.

The default password is “Config” and it is case sensitive.

A new page with a number of sub-categories appear, like in Figure 3-7 (note: the view can appear differently depending on the web browser size).

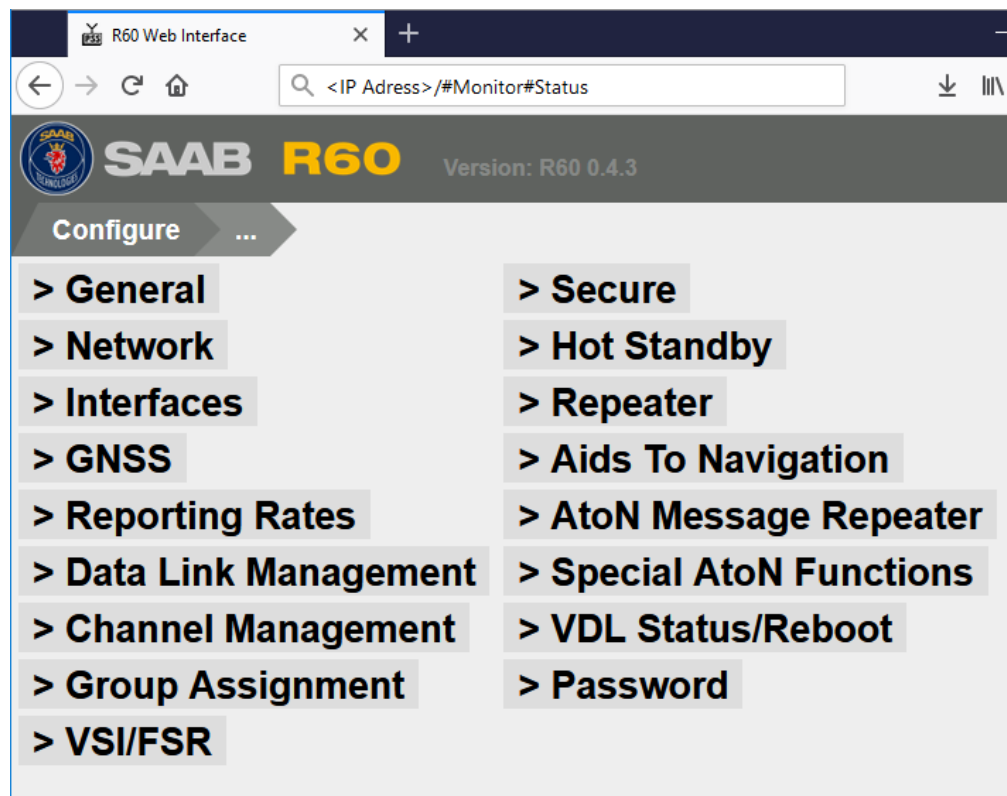
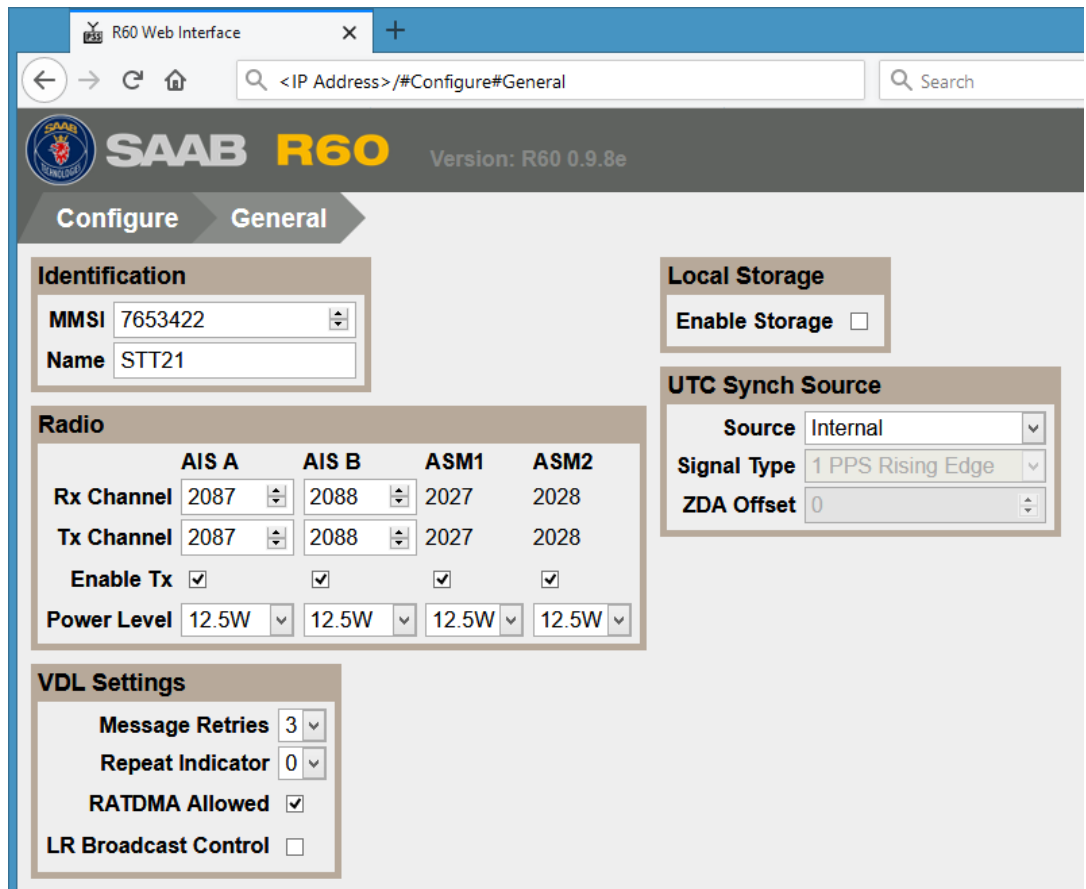


Figure 3-7: Top menu of the Configure category

To come back to the category start page as in Figure 3-7 from any entered sub-page you can use the navigation line and click on the *Configure* main category shortcut (navigation line shortcuts is described in section 3.6).

6. **Select the sub-category *General*** by placing the mouse cursor over the *General* sub category header and click on it. A page similar to Figure 3-8



**R60 Web Interface**

<IP Address>/#Configure#General

**SAAB R60** Version: R60 0.9.8e

**Configure** **General**

**Identification**

MMSI: 7653422

Name: STT21

**Radio**

	AIS A	AIS B	ASM1	ASM2
Rx Channel	2087	2088	2027	2028
Tx Channel	2087	2088	2027	2028
Enable Tx	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Power Level	12.5W	12.5W	12.5W	12.5W

**VDL Settings**

Message Retries: 3

Repeat Indicator: 0

RATDMA Allowed: ☒

LR Broadcast Control: ☐

**Local Storage**

Enable Storage: ☐

**UTC Synch Source**

Source: Internal

Signal Type: 1 PPS Rising Edge

ZDA Offset: 0

Figure 3-8: *General*, sub-page of the *Configure* category

Set up the parameters as described in section 6.3 on page 50. Normally, only the MMSI needs to be changed.

7. If you changed any parameter on the *General* page now is the time to **save the changes to the base station** by clicking on the *Save Changes* button that appears in the upper right corner of the page.
8. Leave the *General* category and move to the *GNSS* settings category. Since the *General* and *GNSS* sub categories are in the same main category group (*Configure*), the fastest way to do this is to move the cursor to hover over (or click on) the *General* text in the navigation line, and in the menu that appears click on the *GNSS* sub-category (see Figure 3-9).

The *GNSS* page appears (Figure 3-10).



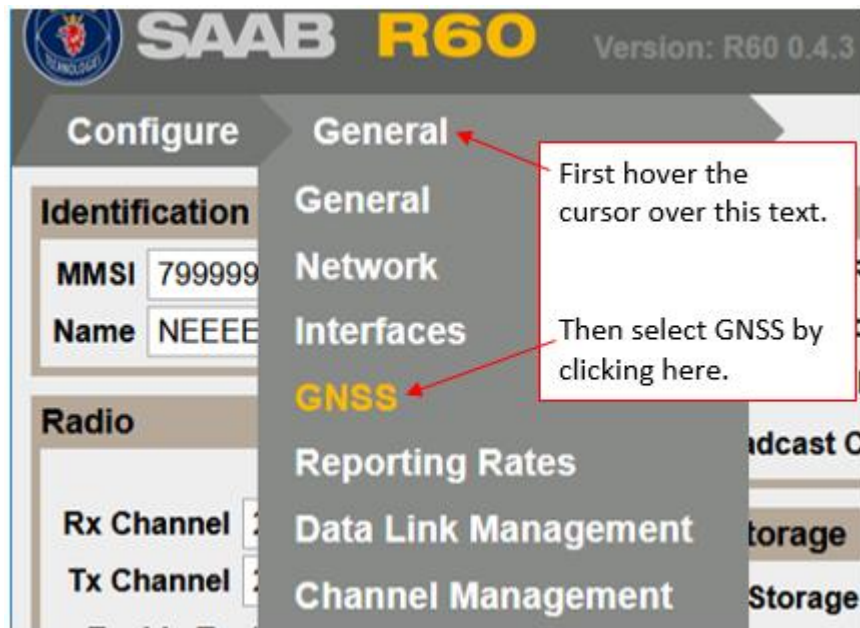


Figure 3-9: Changing from the *General* sub category directly to the *GNSS* sub category

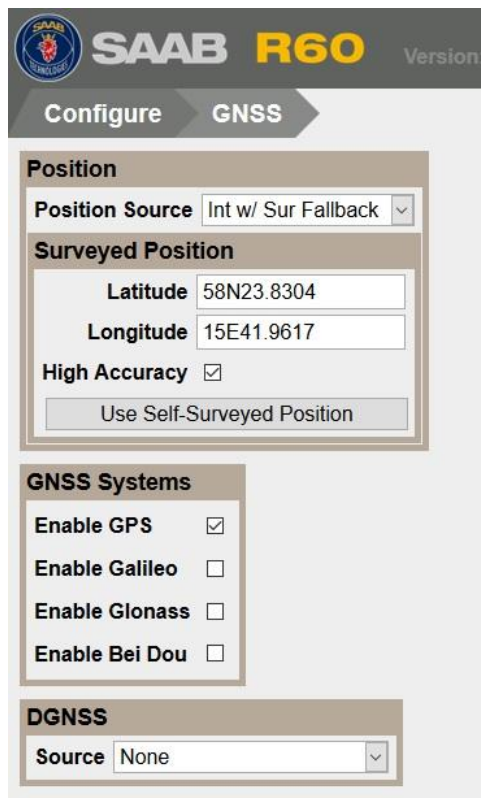


Figure 3-10: GNSS sub category

The settings in this category are described in further detail in section 6.6.





The information in the **Position** group is used in the base station reports (AIS Message 4). Normally a R60 is operated with **Position Source** set to *Surveyed* and the correct position of the base station VHF antenna is then manually typed into the **Surveyed Position** Latitude and Longitude fields.

If the position is not known, the R60 Station can generate a self-surveyed position. A self-surveyed position is a GNSS position averaged over the last 24 hours, where the process of calculation begins at power up and continues until the R60 is rebooted or powered down. To use the self-surveyed position, first set **Position Source** to *Surveyed* and then click on the *Use Self-Surveyed Position* button to set the Latitude and Longitude fields to the self-surveyed position. The self-surveyed position is further described in section 6.6.3.

9. If you changed any parameter on the *GNSS* page now is the time to **save the changes to the base station** by clicking on the *Save Changes* button that appears in the upper right corner of the page.
10. Leave the *GNSS* category and move to the *Reporting Rates* settings category. Since the *GNSS* and *Reporting Rates* categories are in the same main category group (*Configure*), the fastest way to do this is to move the cursor to hover over (or click on) the *GNSS* text in the navigation line, and in the menu that appears click on the *Reporting Rates* sub-category (similar to as illustrated in Figure 3-11).



Message	Parameter	A	B
Msg 4 (Base Station Report)	UTC Minute	0	0
	Start Slot	4	379
	Increment	750	750
Msg 22 (Channel Mgmt)	UTC Minute	0	0
	Start Slot	-1	-1
	Increment	1125	1125
Msg 17 (DGNSS)	UTC Minute	0	0
	Start Slot	-1	-1
	Increment	0	0
	Size	1	1
Msg 23 (Group Assignment)	UTC Minute	0	0
	Start Slot	-1	-1
	Increment	0	0
Msg 20 (Data Link Mgmt)	UTC Minute	0	0
	Start Slot	0	6
	Increment	2250	2250
Msg 24 (Name)	UTC Minute	0	0
	Start Slot	-1	-1
	Increment	0	0

Figure 3-11: **Reporting Rates** page (Applies for base Stations only)

Set up the base station FATDMA properties for the messages you wish to have broadcasted on the VHF Data Link (VDL). Please note the settings displayed in Figure 3-11 are provided as an example only and should not be used as a reference for your application. Refer to section 6.7 for more detailed information.

11. If you changed any parameter on the *Reporting Rates* page now is the time to **save the changes to the base station** by clicking on the *Save Changes* button that appears in the upper right corner of the page.
12. Leave the *Reporting Rates* category and move to the *Data Link Management* settings category. A page similar to Figure 3-12 should appear.



R60 Web Interface

<IP Address>/#Configure

SAAB R60 Version: R60 0.4.3

Configure Data Link Management

1 - 4	5 - 8	9 - 12	13 - 16	17 - 20
21 - 24	25 - 28	29 - 32	33 - 36	37 - 40

### Channel A

	1	2	3	4
Start Slot	4	0	10	1
Increment	250	2250	75	2250
Block Size	1	1	2	1
Ownership	Local	Local	Local	Clear
Timeout	7	7	7	7

### Channel B

	1	2	3	4
Start Slot	129	6	20	7
Increment	250	2250	75	2250
Block Size	1	1	2	1
Ownership	Local	Local	Local	Clear
Timeout	7	7	7	7

Figure 3-12: **Data Link Management page (Applies for base Stations only)**

This category specifies which slots the base station shall reserve for its transmissions. The settings will be broadcasted on the VDL in the data link management message (AIS message 20).

**Note:**

The settings in this page must reflect the settings of the *Reporting Rates* page.



You must reserve at least the slots that the scheduled FATDMA messages occupy.

Please note the settings displayed in Figure 3-12 are provided as an example only and should not be used as a reference for your application. Refer to section 6.8, for a more detailed description about the settings on this page.

13. If you changed any parameter on the *Data Link Management* page now is the time to **save the changes to the base station** by clicking on the *Save Changes* button that appears in the upper right corner of the page.
14. Leave the *Data Link Management* category and move to the *Network* settings category. A page similar to Figure 3-13 should appear.

The screenshot shows the SAAB R60 Web Interface with the 'Network' tab selected. The page displays configuration options for three Ethernet interfaces (ETH1, ETH2, ETH3), each with fields for IP Address, Netmask, and Default Gateway. Below these are sections for 'Enabled Ports' (8030, 8230, 8022, 10001) and 'Net Services' (Web Server, SNMP). On the right, there is a 'Network VDM Output Filter' section with a 'Position Reports Area' (Latitude N, Longitude E, Latitude S, Longitude W) and an 'AIS Message Types' table.

AIS Message Types	
0-7	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
8-15	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
16-23	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
24-31	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
32-39	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
40-47	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
48-55	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
56-63	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Figure 3-13: Network page

Set up the parameters as required. Normally, only the IP settings need to be changed.



15. If you changed any parameter on the *Network* settings page now is the time to **save the changes to the R60 station** by clicking on the *Save Changes* button that appears in the upper right corner of the page. If the IP address is changed, the web browser will automatically be redirected to the new address.
16. If the R60 is to be used stand-alone, i.e. in a configuration without redundancy, the basic setup is now complete. Otherwise, continue with the redundancy settings described in section 3.10.2.
17. The setup is complete. If the VHF antenna was unplugged in the beginning of the setup procedure, it can now be reconnected.

### 3.10.2 Set-up procedure for a redundant configuration

The R60 station can be installed as a part of a redundant solution (hot-standby).

Note, a hot-standby installation will require a hot-standby cable (P/N 7000 100-775, see Ref [1] for further details).

Redundancy settings are found by using the navigator line and clicking on the *Configure* main category and then select the *Hot Standby* sub category.

A page similar to Figure 3-14 appears.

Figure 3-14: *Hot Standby* category page. The settings in the picture specifies the R60 operation when used in a configuration without redundancy



1. If the R60 station is used standalone (without redundancy) then the *BSC Configuration* shall be selected to be *Stand Alone*.

If the base station is used in a hot-standby (redundancy) configuration, then the *BSC Configuration* shall be selected to be either *Dual BSC A* or *Dual BSC*, and *Preferred Status* shall be *Master* or *Hot Standby*. Further information can be found in section 6.13.

2. If changes are made to any of the redundancy settings, make sure to click on the *Save Changes* button before leaving the *Hot Standby* sub-category page.
3. The setup is complete. If the VHF antenna was unplugged in the beginning of the setup procedure, it can now be reconnected.



## 4 HW/SW INFO

### 4.1 Introduction

The *HW/SW Info* category is accessed by opening the R60 start web page (see section 3.3) and then click on "> HW/SW Info".

This category is used to display version information about various software, firmware and hardware in the R60 unit.

### 4.2 License info

The different functions in the R60 are enabled or disabled by a license key. The R60 is delivered with a license key that enables functions in accordance with what the customer has ordered, and which determines the variant and P/N of the Base Station.

Variant alternatives are:

- Receiving only
- Aids-to-Navigation only
- Standard
- Full

### 4.3 Version functionality

The functionality as available in the different versions is summarized below. Available functionality is presented as part of the *HW/SW Info* GUI.

Function	Description	Rx	AtoN	Std.	Full
<b>Receive AIS</b>	Reception and output of AIS and ASM messages.	x	x	x	x
<b>Transmit AIS</b>	Transmission of all AIS messages on the VDL link.	-	-	x	x
<b>Independent</b>	Independent base station functionality as defined in Ref [5].	-	-	x	x
<b>AIS Repeater</b>	Option to have R60 act as a repeater in accordance with Ref [7], see sections 3.1 and 6.14.	-	-	-	x
<b>Hot Standby</b>	Automatic or manual redundancy connection ability, see section 6.13.	-	x	x	x
<b>VHF Transmission Monitoring</b>	Standby station monitoring of data transmitted via VHF by active base station	-	x	-	x
<b>Aids to Navigation</b>	Generation and control of Aids to Navigation (AtoN) messages, see section 6.15.	-	x	-	x
<b>AtoN Repeater</b>	Repetition of selected Aids to Navigation AIS messages, see section 6.16.	-	x	-	x



Function	Description	Rx	AtoN	Std.	Full
<b>DSC (ch mgmt)</b>	Transmission option for channel management via DSC, see section 6.9.	-	-	-	x
<b>External Synch</b>	Possibility to connect an external 1PSS source for synchronization purposes, see section 6.3.	-	-	-	x
<b>RTCM (ext input)</b>	Ability to receive RTCM data on serial port for correction of internal GPS and generation of <i>AIS message 17</i> , see section 6.7.	-	-	-	x
<b>NWK Connection</b>	Capability to interface with external network.	x	x	x	x
<b>VSI Precision Timing</b>	High precision VDL message reception timing in VSI messages.			-	x
<b>Local Storage</b>	Ability to store data locally in the R60 when no network is connected.	x	-	-	x
<b>Third AIS Channel</b>	Reception and transmission of VDL link message with information content defined by external units.	-	-	-	x
<b>Ports</b>	Available TCP network presentation interface ports.	8021 - 8030 8230 10001	8021 - 8030 8230 10001	8021 - 8030 8230 10001	8021 8022 8030 8230 10001

Table 4-1 – Licensed features in the R60 base station

### 4.4 Unavailable functions

Functions in the R60 which are unavailable due to version appear as disabled (greyed out), and cannot be configured by the web GUI.

### 4.5 Update license

Some functions of the R60 are only accessible for specific variants. It may be possible upgrade the base station to a different variant by purchasing an upgrade kit. The upgrade kit contains a license key which can be installed by the user and provides access to the functionality included in the new variant.





## 5 MONITOR

### 5.1 Introduction

The web GUI can be used to monitor the operation of the R60. Monitoring functions are available in the *Monitor* category, accessed by opening the R60 start web page (section 3.3) and then click on “> Monitor”.

### 5.2 Monitor > Alarms

In the *Monitor* category main page, selecting the *Alarms* sub-category will display the *Alarms* view.

In this view you can monitor the current alarm status. The meaning of the listed alarms is described in Table 5-1.





Alarm	Description
<b>Tx</b>	Indicates an internal hardware error in the R60 station or if the antenna terminal is short or open (antenna feeder problem).
<b>Antenna VSWR</b>	Indicates that the impedance of the VHF antenna system is far from 50Ω.
<b>Rx Channel A</b>	Receiver 1 (channel A) receiver is faulty. Indicates an internal error in the R60 station.
<b>Rx Channel B</b>	Receiver 2 (channel B) receiver is faulty. Indicates an internal error in the R60 station.
<b>General Status</b>	Indicates internal error(s) in the R60 station.
<b>Clock</b>	Indicates whether the base station is synchronised to UTC time.
<b>Sensor Position in Use</b>	Indicates if proper position information is available or if an undefined surveyed position is used.
<b>Frame Synch</b>	This alarm is active when the base station is unable to retrieve AIS frame synchronization.
<b>DGNSS Input</b>	Indicates valid DGNSS information is not available. Note that this alarm can be expected if no DGNSS source is connected to the base station or if the R60 is not equipped with the DGNSS broadcast option, unless the R60 is configured to have no DGNSS corrections.
<b>R60 Station Position</b>	This alarm indicates that the surveyed base station position does not correspond to the position retrieved from GNSS, indicating the coordinates entered on the GNSS page are likely to be incorrect. This means VDL users will get an incorrect position report from the base station.
<b>Temperature</b>	This alarm will go active if the R60 internal temperature exceeds +65°C (149°F)
<b>DC Power</b>	This alarm will go active if an external DC power supply is detected, but produces too low voltage. If no AC power is present the R60 will only work for a short period of time after this alarm has been generated. If AC power is present, this alarm indicates that the DC power backup is faulty and will not be sufficient in case of a mains blackout.
<b>Slot Configuration</b>	This alarm will go active if the R60 is setup with an invalid transmission schedule. If this alarm is active some VDL messages will never be transmitted.
<b>Hot Standby Connection</b>	This alarm indicates that no connection to another R60 exists. If this alarm is active the R60 will only work in non-redundant mode.



Alarm	Description
<b>Hot Standby Configuration</b>	This alarm indicates that the hot standby functionality is not properly set up and includes conflicts with the settings in the other unit. This condition must be handled if the redundancy shall be meaningful. It will be generated on both R60s in the hot standby pair.
<b>VHF Transmission Monitoring</b>	This alarm indicates the status of the VHF transmission monitoring. If an alarm is triggered, the transmissions received by the monitoring R60 station differ from the information that the active R60 station have sent out. This indicates antenna problem with either the active or the integrity monitoring R60 station. It will be generated on the active R60 in the hot standby pair.
<b>Time Synch</b>	Indicates the mode of synchronization for the R60 station. Should be ' <i>UTC direct</i> ' unless the base station have problems with the GNSS reception. The indicator will go yellow if any other means of synchronization is used, such as: <i>UTC Indirect</i> , <i>Synchronised to a base</i> , or <i>Synchronised to a mobile</i> .

**Table 5-1 – Description of features monitored in the Alarms sub-category**

The alarm indicators are colour coded and the meaning of the different colours are described in Table 5-2.

Indicator Icon	Meaning
 <b>OK</b>	The alarm condition is inactive
 <b>Sync to Mobile</b>	The alarm condition is active but not critical to the operation
 <b>Failed</b>	The alarm condition is active
 <b>Not applicable</b>	The alarm is not applicable for the current configuration

**Table 5-2 – Description of alarm indicator icons**

### 5.3 Monitor > Status

In the *Monitor* category main page, selecting the *Status* sub-category will display the *Status* view.

The *Status* page provide details about the status of the base station:

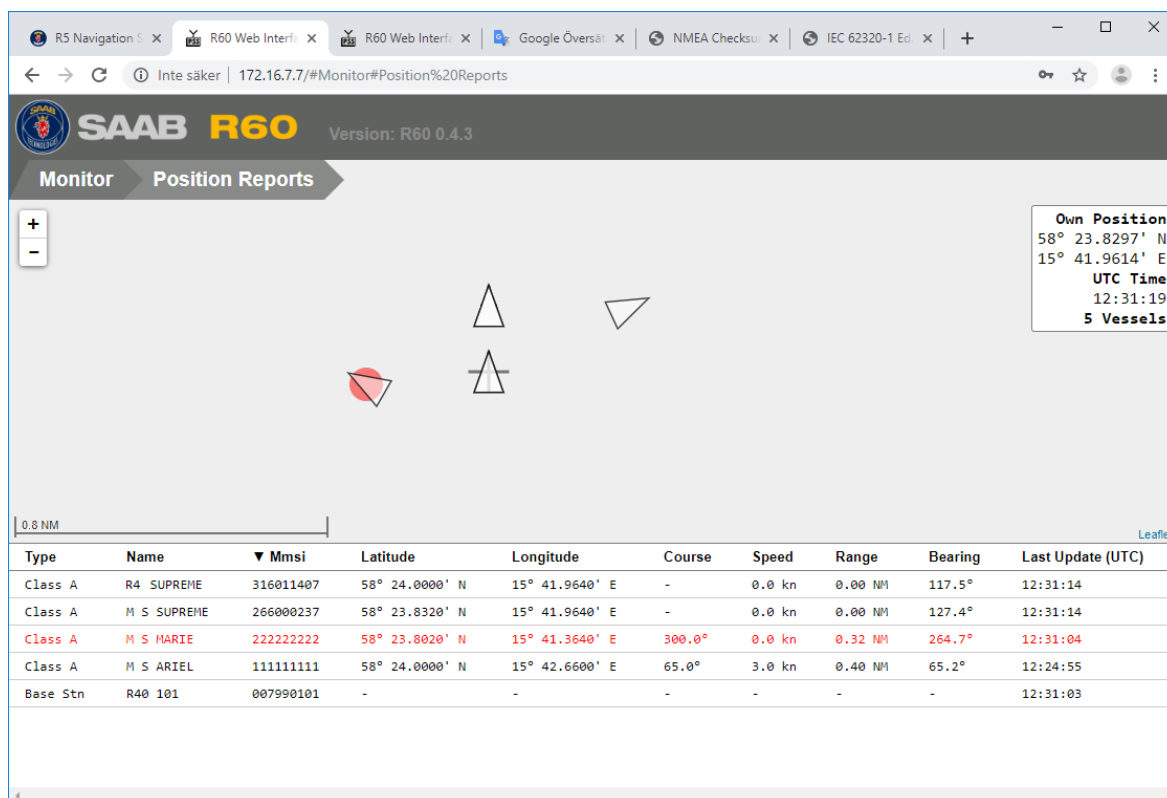
Status item	Description
<b>GNSS</b>	Shows GNSS-related information such as: <ul style="list-style-type: none"> <li>Visible satellites: The number of GNSS satellites that theoretically could be detected at the R60 location.</li> <li>Used: The number of GNSS satellites that are received and used.</li> <li>Precision parameters.</li> </ul>
<b>Base Station</b>	Shows R60 station information such as: <ul style="list-style-type: none"> <li>Current UTC date/time in the base station.</li> <li>Temperature inside the base station.</li> <li>R60 station has AC power.</li> <li>R60 station has DC power.</li> <li>The voltage of the DC power.</li> </ul>
<b>Hot Standby</b>	This field shows the following parameters: <ul style="list-style-type: none"> <li>Mode: Can be <i>HS not active</i>, <i>forced</i> or <i>autonomous</i>.</li> <li>Status: Can be <i>Master</i> (i.e. the R60 is used for transmission) or <i>Standby</i>.</li> <li>Alarm status: Indicates if there are any hot standby alarms present.</li> </ul>
<b>Self-Surveyed Position</b>	Shows the current self-surveyed position and its accuracy.
<b>Local Storage</b>	Shows the status, size and usage of the R60 local storage memory. A R60 will only store data locally when storage is enabled and no network system capable of handling stored data is connected to it.
<b>Data Link</b>	Provides information about the current status of the VHF data link such as the number of AIS units received recently (own base included), link load (Number of transmitted and received message last minute).
<b>Previous Frame Summary</b>	Shows standardised radio related information of the previous AIS frame.
<b>Current Reservations</b>	Expected AIS link usage for the current AIS frame.
<b>NTP Server</b>	Shows the current status of the NTP server: <ul style="list-style-type: none"> <li><i>Disabled</i> – Server is disabled by configuration</li> <li><i>No GNSS time</i> – Server lacks time from GNSS</li> <li><i>Synchronizing</i> – NTP Server is synchronizing to its internal time source</li> <li><i>OK</i> – NTP server is up and running</li> </ul>

Table 5-3 – Featured display of the R60 unit status

## 5.4 Monitor > Position reports

In the *Monitor* category main page, select the *Position Reports* sub-category to monitor position reports retrieved from all the current VDL users (including the R60 unit itself). See page example in Figure 5-1.

The message data is displayed in both a list and a graphical plot. The list shows information about the VDL users in text and numbers such as vessel type, name, MMSI, etc. The graphical area shows the same VDL users as icons plotted on a blank map.



**Figure 5-1: Monitoring *position reports* page. Clicking on (selecting) an object in the plot area or in the list makes it highlighted in red, both in the list and in the plot area**

The centre of the plot is normally the position of the R60 station. If another plot centre for some reason is wanted, then move the mouse into the plot area (pointer appearance changes to a hand) and drag on the background while keeping the mouse button pressed. The plot picture will follow the mouse movement. Fix the new location by letting go of the mouse button.

The plot can also be zoomed in or out either by clicking on the “+”/“-” buttons in the top left corner or by placing the mouse pointer in the plot area and then turning the mouse wheel. The scale used is indicated in the lower left corner.

The list of users can be sorted by each column, by clicking on the column header. Clicking on the heading will switch between ascending and descending sorting.

To find a listed vessel or other object in the plot, simply click in the list on the line for the object in question. The list line is then highlighted in red colour, and in the plot area the corresponding symbol is also highlighted in red as illustrated in Figure 5-1.

Similarly, if you want more details about a vessel or other plotted object then click on the object in question in the plot area. The object is then highlighted in red colour, and the corresponding list line is highlighted in red.

## 5.5 Monitor > Data log

In the *Monitor* category main page, selecting the *Data Log* sub-category will display the *Data Log* view. Data log shows NMEA data of sent and received radio messages as well as additional status information. Data is displayed in the same format as that used to provide data to systems connected to the R60.

### 5.5.1 Log panel

In this view all AIS messages are logged in a scrolling panel showing the latest 500 messages. When new messages are received the oldest are removed. The oldest are shown on top and newest at the bottom. The time shown for each message is the time it was received in the web client.

### 5.5.2 Clipboard panel

If a log is needed for later use, this panel can be used. It allows for messages to be logged in the computer's memory and then copied to the Windows clipboard. This way it can be pasted into a file and saved. See page example in Figure 5-2.

The *Start Log* button tells the page to start logging messages to memory. Any messages that are received after the button is pressed will be saved in the web pages memory for later use. When clicking the button it changes to *Stop Log* and pressing it again will stop the logging to memory. The data in memory will stay there until, either the *Clear Log* button is pressed, or the web page is reloaded.

It is possible to log data for many hours (depending on traffic load), but it will affect the computer performance negatively as the memory of the computer is filled with the log.

The *Copy Log* button takes the logged messages in memory and copies them to the windows clipboard. Once the button has been pressed, you can paste the contents into a file and save the file. (Note: The log can't be saved to a file directly by the page because of how web browsers are stopped from accessing files for security reasons.)

The *Clear Log* button empties the log in memory, freeing up the memory.

At the bottom of the *Clipboard* panel, the number of entries currently in memory is displayed.



Figure 5-2: Monitoring Data Log page.

## 5.6 Monitor > VDL Link Map

In the *Monitor* category main page, select the *VDL Link Map* sub-category to monitor transmissions and reservations from all the current VDL users (including the R60 unit itself), presented in a grid representing the slots. See page example in Figure 5-3.

### 5.6.1 Information Panel

Displays the information of the currently selected slot. E.g. in Figure 5-3 slot number 1370 has been selected on channel AIS B.

Table 6: VDL Link Map information panel fields

Field	Shown for	Description
<i>Slot Nr</i>	Both	Slot number for currently selected slot.
<i>Channel</i>	Both	Channel for currently selected slot.
<i>Message MMSI</i>	Transmissions	MMSI of message in selected slot.
<i>Telegram Id</i>	Transmissions	Telegram id of message in selected slot.
<i>Reservation Owner</i>	Reservations	Owner of reservation.
<i>Reservation Timeout</i>	Reservations	Time until reservation times out in minutes and seconds.

### **5.6.2 Legend panel**

Shows the colors used in the channel grids and what they represent.

### **5.6.3 Channels panel**

Shows the available channels with a checkbox for each channel. Each chosen channel will be represented by a grid.

### **5.6.4 Freeze/Unfreeze button**

Toggles freezing of updates to the channel grids.

When active, the channel grids stay as they were when the button was pressed. New transmissions are still received in the background and saved internally.

When unfrozen, the grids are updated according to the internal state to correspond to the latest data.

### **5.6.5 Channel grid panels**

For each channel chosen in the *Channels panel*, the corresponding channel grid will be shown here.

One whole grid represents one minute of transmissions for that channel. The grids also include reservations based on data link management messages (message 20) received. If a slot is reserved by multiple entities, only the latest received reservation will be shown for that slot.

The current slot is shown by a red line on the right edge of that slot. See page example in Figure 5-3.

A slot can be selected by clicking on it to get more details about it. The currently selected slot is shown in the grid by a red box around the slot. Detailed information for the selected slot is shown in the *Information panel*. See page example in Figure 5-3.

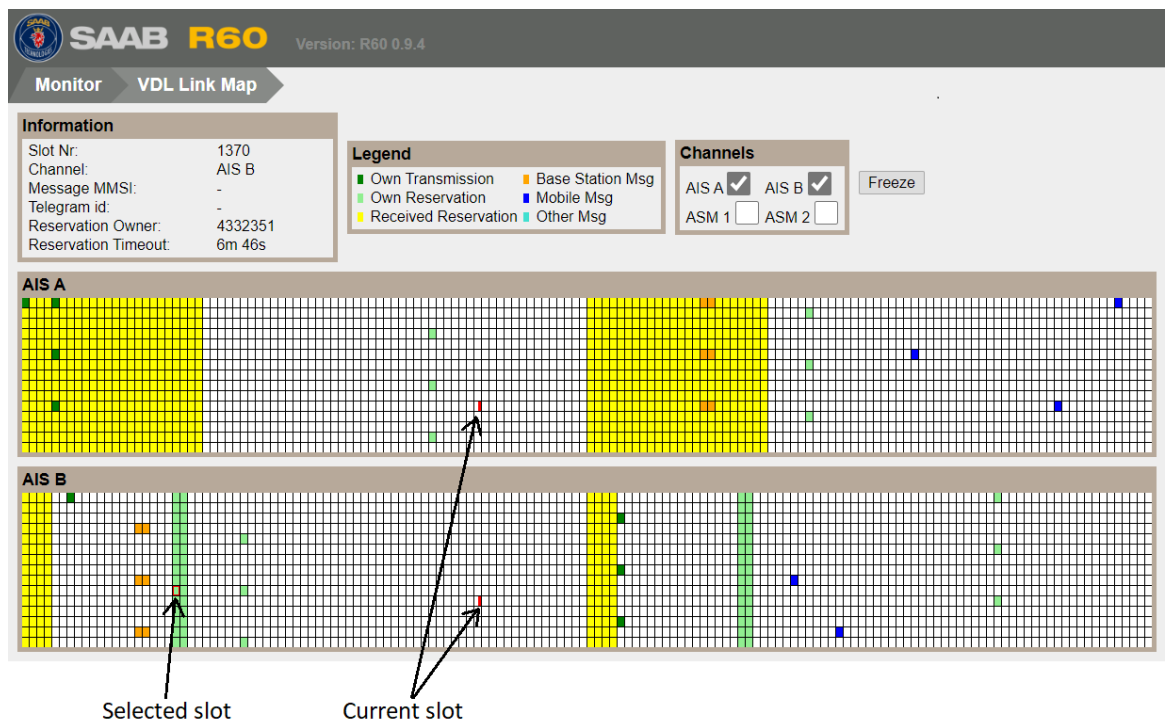


Figure 5-3: Monitoring VDL Link Map page



## 6 CONFIGURE

### 6.1 Introduction

All R60 station settings are collected in the main category *Configure*. Settings that can be changed are for instance communications interface capabilities, VDL data link and other AIS features, clock reference sources, etc.

This chapter explains how to set the different base station parameters in the R60 via the web GUI. For detailed descriptions about the meaning of each parameter, please refer to the documents Ref [2], Ref [3], Ref [4] and Ref [5].

When the *Configure* category is selected a password is required (Figure 6-1).

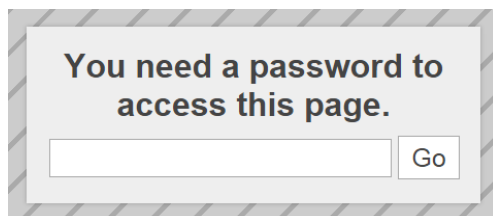


Figure 6-1: Password is required to enter the *Configure* category

The default password is “*Config*” (case sensitive), but please note this password is also a parameter that can be changed by the user. If the password is accepted, the *Configure* page with a number of sub-categories appear. It looks like in Figure 3-7.

In each of the sub-categories listed on the *Configure* category page, you can modify the R60 settings.

### 6.2 Editing and storing changes

When a sub-category is selected, the current values of all settings on that particular sub-category page are automatically read from the R60 unit and displayed in the GUI.

It should be noted that if a settings value is changed it is not automatically written to the R60. The unit will continue operating with previous settings until the changed settings are *saved* by clicking on the *Save Settings* button.

The *Save Changes* button is only visible when (unsaved) changes have been made. When a settings parameter is changed, the *Save Changes* button appears in the upper right corner of the browser window.

When edited parameters are saved, they are stored in the R60 station. New settings are used right away by the R60 unit.

Note that to save changes the *Save Changes* button must be clicked before leaving the page where the changes have been made. If the web page is left for another page or category before the *Save Changes* button is clicked, then all unsaved changes are abandoned (lost).



### 6.3 Configure > General

General settings for the R60 unit are found by selecting the *Configure* base category and then select the *General* sub-category.

The parameters are described in the following table:

Group	Parameter	Description
Identification	MMSI	The MMSI number for the base station site. If the PSS site has two base stations in a hot standby configuration both base stations shall have the same MMSI.
	Name	The name transmitted in AIS message 24 (if configured <sup>1</sup> ). If the PSS site has two base stations in a hot standby configuration both base stations shall have the same name.
VDL Settings	Message Retries	Specifies how many times an ABM message shall be resent if no acknowledge is received from the remote unit.
	Repeat Indicator	This parameter indicates the repeat indicator value of VDL messages generated by the base station. The value can be set in the range 0-3, where 0 is set by default.
	RATDMA Allowed	Select to allow the base station to use RATDMA access to VDL.
	LR Broadcast Control	Use to set long range control bit in base station report (AIS message 4) for control of Class A transmission of AIS message 27.
UTC Synch Source	Source	<p>The UTC synchronisation source used by the Base Station.</p> <p>UTC source alternatives are:</p> <ul style="list-style-type: none"><li>• <i>Internal</i>. Internal synchronisation source is used</li><li>• <i>External</i>. External synchronisation is used</li><li>• <i>Int W/ Ext Fallback</i>. Internal synchronisation source is used with external source as back-up in case the internal synchronisation source fails</li><li>• <i>Ext W/ Int Fallback</i>. External reference source is used with internal source as back-up in case the external source fails</li></ul> <p>The <i>Fallback</i> alternatives means the base station automatically change to the fallback source if the base station fails to get UTC time from the primary source.</p> <p>It is recommended to primarily use the <i>internal</i> GNSS for UTC synchronisation. The <i>external</i> option requires that the site is equipped with an additional time source which is connected to the base station.</p>
	Signal Type	Selects which type of signal the time synchronization signal is. If an 1PPS signal is used then a ZDA sentence must be provided on a serial input.
	ZDA Offset	Used to specify the offset between the 1PPS and ZDA sentence, to make the timing correct.
Local Storage	Enable Storage	<p>Select to enable storage of data locally in the R60.</p> <p>Data is only stored when the following conditions are met:</p> <ul style="list-style-type: none"><li>• Storage is enabled</li></ul>

<sup>1</sup> Message 24 is enabled or disabled in the category Reporting Rates. See section 6.7.



Group	Parameter	Description
		<ul style="list-style-type: none"><li>• The R60 knows the UTC time</li><li>• No external network client capable of receiving stored data (e.g. the Saab MARITIMECONTROL/CoastWatch network) is connected to the R60</li></ul> <p>Local storage is intended to be used as a temporary backup solution when a site network connection goes down, thereby eliminating the risk of missing events during the downtime. When a network client capable of receiving stored data comes back online the stored data is sent to it and new data is no longer stored.</p>
Radio	Rx Channel	VHF radio channels used for the base station site. Normally the default parameters shall be used, but in areas where channel management is active other channels may be appropriate. Default parameters are 2087 (=AIS1/161.975MHz) for AIS A and 2088 (=AIS2/162.025MHz) for AIS B. ASM channels are locked to channels 2027 (=ASM1/161.950MHz) and 2028 (=ASM2/162.000MHz) and cannot be changed.
	Tx Channel	VHF radio channels used for transmissions. Normally, these should be the same as for the Rx channels. ASM channels are locked to channels 2027 (=ASM1/161.950MHz) and 2028 (=ASM2/162.000MHz) and cannot be changed.
	Enable Tx	Enables/Disables transmissions on each channel. If these boxes are not checked no AIS or ASM transmissions will be made by the base station.
	Power Level	Specifies if the base station shall use low or high VHF output power. For standard R60 base stations the settings correspond to: High power: 12.5 W Low power: 1 W

Table 6-1 – General parameters



### 6.4 Configure > Network

Network and TCP/IP settings for the R60 are found by selecting the *Configure* base category and then selecting the *Network* sub-category.

Default IP parameters are found in Ref [1].

The R60 can also be set up to filter received AIS messages (VDMs) before output on the network, both using an area filter for position report, and the AIS message type. These settings affect all network TCP port except port 8230.

The parameters are described in the following table:

Group	Parameter	Description
IP Settings ETH1	IP Address	IP address of the R60 ETH1 network connection.
	Netmask	R60 Netmask setting for the ETH1 IP network connection.
	Default Gateway	R60 default gateway setting for the ETH1 IP network connection.
IP Settings ETH2	IP Address	IP address of the ETH2 network connection.
	Netmask	R60 Netmask setting for the ETH2 IP network connection.
	Default Gateway	R60 default gateway setting for the ETH2 IP network connection.
IP Settings ETH3	IP Address	IP address of the R60 ETH3 network connection.
	Netmask	R60 Netmask setting for the ETH3 IP network connection.
	Default Gateway	R60 default gateway setting for the ETH3 IP network connection.
Enabled Ports	8030 8230 8022 10001	Enable or disable TCP network connections for each port.
Net Services	Web Server	Enables/Disables the internal web server in the R60. <b>Warning:</b> <i>Do not disable this parameter from the web interface unless there are other tools or interfaces available to access the R60. Disabling the web server will disable the web interface!</i>
	SNMP	Enables/Disables SNMP monitor access to the R60. For more information about SNMP monitoring, see section 9.
	NTP	Enables/Disables the NTP server in the R60. NTP allows synchronization of clocks between systems. Just configure your clocks to use the R60 IP address as time server.
Network VDM Output Filter	Enable	Enable/disable use of position reports area filter. If enabled only AIS position reports that are within the defined area (see latitude/longitude settings below) will be output to network clients, all other position report will be blocked. Position reports with unknown position will always be output to the network, unless blocked by the <b>AIS Message Types</b> filter.
	Latitude N, Latitude S	The latitude of position reports must be between the <b>Latitude N</b> and <b>Latitude S</b> settings to be output to network clients.



Group	Parameter	Description
		Please note that <b>Latitude N</b> must be north of <b>Latitude S</b> , otherwise the area filter is ignored.
	<b>Longitude E, Longitude W</b>	The longitude of position reports must be between the <b>Longitude E</b> and <b>Longitude W</b> settings to be output to network clients. When <b>Longitude E</b> is west of <b>Longitude W</b> the area for which position report are output extends across the 180° meridian.
	<b>AIS Message Types</b>	Enable/disable each individual AIS message by the message type. By hovering the mouse pointer over the checkbox, a short description of each AIS message can be seen. When a box is unchecked, all AIS messages of that type will be blocked and not output to network clients.

Table 6-2 – Network parameters



### 6.5 Configure > Interfaces

Settings for the R60 external interfaces are found by selecting the *Configure* base category and then the *Interfaces* sub-category.

The parameters are described in the following table:

Group	Parameter	Description
Identification	Unique Id	Base Station's Unique identifier is used for system level identification. If the PSS site has two base stations in a hot standby configuration both base stations shall have the same unique id. The maximum number of characters is 15.
	Talker ID	The NMEA string format prefix that the base station shall use when communicating on the serial or network ports.
	ADS Interval	Interval between the outputs of AIS device status sentences. The recommended interval is 60 s. If the ADS interval is set to 0 the ADS sentence is not provided periodically but is will still be provided when there is a change in the status or the base station receives a query for ADS.
COM Ports	Bitrate	Specifies the bit rate of the serial ports of the base station.
	Checksum	Checking the box enables the integrity check (checksum) for the specified port. Unchecking the box disables the port checksum.
Legacy Interface		Enable to use a legacy base station interface, for compatibility with old AIS network systems. Available settings are: <ul style="list-style-type: none"><li>• <i>None</i>: No legacy, use full R60 interface</li><li>• <i>R40 Mk IV</i>: mode for emulating R40 with SW 5.1.5</li><li>• <i>R40 Mk III</i>: mode for emulating R40 with SW 4.1.20</li></ul>
Comment Block	Enable Comment Block	Select to enable legacy comment block functionality. When enabled, comment blocks will be added to output sentences and input sentences with a destination are required to have a destination that match the base station unique id. Note: TAG block functionality is automatically disabled when <i>comment block</i> is enabled.
TAG Block	Tx	Controls if the corresponding TAG block parameter is added to output sentences.
	Rx	Controls if the corresponding TAG block parameter shall be used for input sentences.
	Limit	Selects the format, or limit for counting, TAG block parameters.
	TBS Source IDs	Selects which unique identifiers are allowed as source (s) in received TAG blocks when Rx for s parameter is enabled. The maximum number of characters is 15.
Alarm Relay		Specifies which error conditions that shall generate alarms. Enabled alarms have an impact on: <ul style="list-style-type: none"><li>• The digital output port of the R60, see Ref [1]</li><li>• The conditions that turn the power button LED on the R60 front panel RED</li></ul>

Table 6-3 – Parameters for *Interfaces*

## 6.6 Configure > GNSS

Settings for position and DGNSS are found by selecting the *Configure* base category and then select the *GNSS* sub-category.

On this page settings are made for base station position source, surveyed position and differential corrections.

### 6.6.1 Position

For proper operation and messaging the R60 unit must know its own location. These settings determine the position that will be used and broadcast on the VDL in the base station report message. The position can come from three different sources: *surveyed*, *internal* or *external*.

As the Base Station is a static unit, usage of *Surveyed* Position is recommended. Always verify accuracy of the position before applying. *Internal* or *external* can be used if the position of the site has not been established.

The *external* option requires that the site is equipped with position information which is connected to the base station.

The *Position Source* can also be selected to operate in a fall-back (redundancy) solution, by selecting one of the following alternatives:

- **Int w/ Sur Fallback.** *Internal* position source is the primary source, *Surveyed* position is the fall-back alternative in case the R60 fails to get a position from the internal source.
- **Int w/ Ext Fallback.** *Internal* position source is the primary source, while an *Externally* provided position is the fall-back alternative in case the R60 fails to get a position from the internal source.
- **Ext w/ Sur Fallback.** *External* position source is the primary source, *Surveyed* position is the fall-back alternative in case the R60 fails to get a position from the external source.
- **Ext w/ Int Fallback.** *External* position source is the primary source, *Internal* position is the fall-back alternative in case the R60 fails to get a position from the external source.

If one of the above fall-back alternatives is selected the base station automatically change to the fall-back source if the base station fails to get a position from the primary source.

### 6.6.2 DGNSS

The R60 can send out DGNSS (Differential Global Navigation Satellite System) messages using the AIS Message 17, to be used by any vessels listening to the VDL. For this to be possible the R60 needs DGNSS corrections.



**Note:** The differential corrections will not be transmitted unless the R60 has been configured to transmit *Message 17*.<sup>2</sup>

DGNSS corrections can be configured from different sources and will also be used to correct the internal GNSS receiver in the R60.

### 6.6.3 Self-surveyed position

The self-surveyed position is a GNSS position measured and averaged over the last 24 hours by the R60 unit. The averaging results in a more accurate and reliable position information compared to a single measure. The process of measuring and averaging begins at power up and continues until the R60 is rebooted or powered down.

To retrieve the currently calculated values of *Latitude*, *Longitude*, *Altitude* and *Accuracy* select *Position Source* as *Surveyed* and click the *Use Self-Surveyed Position* button. The surveyed position parameters will be updated using the self-surveyed information, the *Accuracy* will be set to high if the accuracy level is better than 95 %.

For the settings to take effect press the *Save Changes* button that appears in the upper right corner of the page.

### 6.6.4 Viewing self-surveyed position

The self-surveyed position and the present accuracy can be viewed in the *Monitor* category by selecting the *Status* sub-page.

The Accuracy of self-surveyed position value indicates the accuracy of the self-surveyed latitude, longitude and altitude values. The value starts at 0% when the base station is turned on, and continues until it reaches 100% after approximately 24 hours.

Recommend is an accuracy level of at least 15% if the values are to be used for an ordinary base station.

### 6.6.5 GNSS parameters

The different settings have the following meaning:

Parameter	Description					
Position Source	See description in 6.6.1.					
Surveyed Position	<p><b>Latitude &amp; Longitude</b></p> <p>When the <i>position source</i> has been set to <i>surveyed</i>, the position of the base station has to be entered in the position fields. The coordinates format is:</p> <table><tr><td>degrees</td><td>N/S/E/W</td><td>minutes</td><td>.</td><td>fractions of minutes</td></tr></table> <p>Example: Latitude = 16N12.9823, meaning 16° North and 12.9823'</p> <p><b>High accuracy</b></p>	degrees	N/S/E/W	minutes	.	fractions of minutes
degrees	N/S/E/W	minutes	.	fractions of minutes		

<sup>2</sup> Message 17 is enabled and configured in the "Reporting Rates" category. See section 6.7.





Parameter	Description
	<p>If the entered position has been established with an accuracy of at least <math>\pm 10</math> meters, activate this check box in order to enable transmission of the base station report with the high accuracy position flag set.</p> <p><b>Use Self-Surveyed Position</b> Alternative to entering the coordinates above manually, the position as presently self-surveyed by R60 can be used by clicking this button. More details are found in section 6.6.3.</p>
<b>GNSS Systems</b>	<p>Selects which GNSS systems should be used by R60 internal GNSS receiver. Available systems are: <b>GPS</b>, <b>Galileo</b>, <b>GLONASS</b> and <b>BeiDou</b>.</p> <p>Note, a maximum of 3 GNSS systems can be used concurrently, but due to restrictions in the GNSS hardware all combinations are not available. If GLONASS and BeiDou are both enabled, no more systems can be selected, otherwise all combinations of maximally 3 systems are allowed.</p>
<b>DGNSS</b>	<p><b>Source</b> Selects the source for differential GNSS corrections.</p> <ul style="list-style-type: none"><li>• <i>None</i>: disables use of corrections.</li><li>• <i>Serial Input</i>: receives corrections on RS-232 or RS-422 serial port in RTCM format.</li><li>• <i>AIS Msg 17 (Monitor only)</i>: selects that received AIS message 17 corrections should be output on the RS-232 port in RTCM format. This alternative disables transmission of AIS message 17.</li></ul>

Table 6-4 – Parameters on the *GNSS* page



### 6.7 Configure > Reporting rates (Base Station only)

Settings for reporting rate are found by selecting the *Configure* base category and then select the *Reporting Rate* sub-category.

The reporting rate settings specifies exactly which FATDMA slots shall be used for transmitting messages on each channel. This is done by specifying a start slot and a slot increment as:

Parameter	Description
UTC Minute	The UTC minute for the start slot. This is only of interest if increment is larger than one frame.
Start Slot	The first FATDMA slot that the message type shall be broadcasted in. If you do not want the message type to be broadcasted at all, set the start slot to -1.
Increment	The number of slots between the start slot and the next transmission of the message type.
Size	The number of consecutive slots that shall be used (only for message 17).

Table 6-5 – Parameters for *Reporting Rates*

The reporting rates of the base station report (Msg 4) are fully determined by the start slot of channel A. This is thus the only editable setting of this message.

Most of the other messages set up in this category have additional settings found in other categories such as section 6.3 (Msg 24), 6.6 (Msg 17), 6.8 (Msg 20), 6.9 (Msg 22) and 6.10 (Msg 23). Please note, settings for all messages in this category should reflect the settings in the *Data Link Management* category (section 6.8).

### 6.8 Configure > Data link management (Base Station only)

Settings for data link management are found by selecting the *Configure* base category and then select the *Data Link Management* sub-category.

In this category it is possible to edit the slots that shall be reserved by the base station. This slot reservation will be transmitted to other users of the VDL in the data link management message (message 20).

It is possible to reserve 40 blocks of slots for each channel.

Settings for four blocks can be viewed and edited at the same, and the upper left box in “Configure > Data link management” is used to select for which blocks settings are to be made.

There are two identical sets of settings; one for channel A and one for channel B respectively. The settings have the following meaning:

Parameter	Description
Start Slot	The first FATDMA slot of the reservation block.



Parameter	Description
Increment	The number of slots between the start slot and the next reservation of the block.
Block Size	The number of consecutive slots that shall be reserved.
Ownership	<p>The ownership parameter can be set to:</p> <ul style="list-style-type: none"><li>• <b>Clear:</b> No reservation shall be made.</li><li>• <b>Local:</b> The reservation can be used by this base station for FATDMA and unscheduled transmissions. Reservations for the base station's own messages (4, 17, 20, 22, 23 and 24) must be made as Local reservations.</li><li>• <b>Remote:</b> The reservation is made on behalf of another FATDMA transmitter and is not used by the local base station. Use this when you want to reserve slots for an AtoN unit or another base station.</li></ul>
Timeout	Number of frames ahead for which other VDL users shall reserve the slots. Thus, a value of 7 means that a mobile transponder can use the reserved slots after 7 frames have passed since it lost contact with the base station.

**Table 6-6 – Parameters for *Data Link Management***



## 6.9 Configure > Channel management (Base Station only)

Settings for channel management are found by selecting the *Configure* base category and then select the *Channel Management* sub-category.

Use this category to specify channel management regions where the worldwide-standardised AIS channels (AIS1 and AIS2) shall not be used. A total of 8 different channel management regions (zones) can be defined.

The settings made in this category will be broadcast in the channel management VDL message, which must be enabled for the channel management information to reach the AIS users.

The channel management information can however also be transmitted via DSC (in parallel to the channel management VDL message). This is also set up on this page.

Parameters for each region are set up independently. The square-shaped numbered buttons in the upper left part of “Configure > Channel management” are used to select the region.

The parameters have the following meaning:

Parameter		Description				
Regions	In use	Enables/disables the transmission of the channel management zone information.				
	Zone Size	Specifies the width of the transitional zone in NM. <b>Note:</b> DSC transitional zone has a fixed value.				
	Channel A Channel B	The A & B channels for the zone.				
	High Power	Specifies if the VDL users inside the zone shall be requested to use high (12.5W) or low (1W) VHF output power.				
	Tx/Rx Mode	Specifies the mode for channel A & B usage that the mobile transponders are requested to use while inside the zone. <ul style="list-style-type: none"><li>TxA/TxB, RxA/RxB: Transmission on both A and B channels</li><li>TxA, RxA/RxB: Transmission on channel A only</li><li>TxB, RxA/RxB: Transmission on channel B only</li></ul>				
	NE Latitude NE Longitude SW Latitude SW Longitude	Channel management zones are square-shaped areas defined geographically by their North-East (NE) and South-West (SW) corners. The coordinates format is: <table border="1"><tr><td>degrees</td><td>N/S/E/W</td><td>minutes</td><td>.</td><td>fractions of minutes</td></tr></table> Example: Latitude = 16N12.9823, meaning 16° North and 12.9823'	degrees	N/S/E/W	minutes	.
degrees	N/S/E/W	minutes	.	fractions of minutes		
DSC (All Regions)	Transmission Interval	The interval, in minutes, with which channel management messages will be sent over DSC. A value of zero disables DSC transmissions. <i>See also the note below</i>				

Table 6-7 – Parameters for *Channel Management*



**Note:** When DSC is used for transmitting channel management zones, then the base station will be unable to receive anything on the AIS channels during DSC transmissions.



### 6.10 Configure > Group assignment (Base Station only)

Settings for group assignment are found by selecting the *Configure* base category and then select the *Group Assignment* sub-category.

Use this page to specify the *Group Assignment* message (Message 23) broadcasted by the base station. The reporting rate is configured in the *Reporting Rate* category (see section 6.7).

Configuration of multiple *Group Assignment Regions* is possible, one for each *Mobile Type*. The region is selected by clicking on the region buttons in the *Group Assignment Regions* group. In *Legacy Mode* (see 6.5) only a single region is supported.

When a region is selected, the settings set for this region is displayed. The settings have the following meaning:

Parameter	Description
Enable	Enable or disable Group Assignment Messages for selected region
Mobile Type	<p>There are 16 available mobile types. Normally this is automatically selected based on the selected region number. In legacy R40 Mk III mode this can be selected in a drop-down list (and only a single region can be used).</p> <p>The available mobile types are:</p> <ul style="list-style-type: none"><li>• All types of mobiles</li><li>• Class A mobiles</li><li>• All types of Class B mobiles</li><li>• SAR airborne mobiles</li><li>• Class B "SO" Stations</li><li>• Class B "CS" Stations (CS = Carrier Sense)</li><li>• Regional 7 – 9</li><li>• Inland Waterway Stations</li><li>• Base station coverage area</li><li>• Reserved 11 – 15</li></ul>
Ship Type	The ship type. More information about ship type is found in Ref [2].
Reporting Interval	<p>There are 12 available reporting intervals which appear in a drop-down list.</p> <ul style="list-style-type: none"><li>• <b>Autonomous mode:</b> The receiving station shall set the reporting interval as given by the autonomous mode.</li><li>• <b>Next shorter interval:</b> The receiving station shall increase the reporting rate to the next shorter interval.</li><li>• <b>Next longer interval:</b> The receiving station shall decrease the reporting rate to the next longer interval.</li><li>• <b>Fixed Interval:</b> The receiving station shall set the reporting interval to a fixed value (2s, 5s, 10s, 15s, 30s, 1 min, 3 min, 6 min and 10 min).</li></ul>
Tx/Rx Mode	<p>There are 3 available modes which appear in a drop-down list.</p> <ul style="list-style-type: none"><li>• <b>TxA/TxB,RxA/RxB:</b> Transmit on channels A and B, receive on channels A and B.</li><li>• <b>TxA,RxA/RxB:</b> Transmit on channel A, receive on channels A and B.</li><li>• <b>TxB,RxA/RxB:</b> Transmit on channel B, receive on channels A and B.</li></ul>
Quiet Time	<p>Set to command the receiving station to be quiet.</p> <p>0 = no quiet time commanded (default)</p> <p>1-15= number of minutes for the receiving station to be quiet.</p>



Parameter	Description					
Region	<p>The region is, if used, a square-shaped area defined geographically by its North-East (NE) and South-West (SW) corners.</p> <p>The coordinates format is:</p> <table><tr><td>degrees</td><td>N/S/E/W</td><td>minutes</td><td>.</td><td>fractions of minutes</td></tr></table> <p>Example: Latitude = 16N12.9, meaning 16° North and 12.9'</p> <p>If the fields are set to ‘-’, then the region is not used.</p>	degrees	N/S/E/W	minutes	.	fractions of minutes
degrees	N/S/E/W	minutes	.	fractions of minutes		

**Table 6-8 – Parameters for *Group Assignment***



### 6.11 Configure > VSI & FSR sentences

Settings for VSI/FSR are found by selecting the *Configure* base category and then select the *VSI/FSR* sub-category.

In this category it is possible to select the output of measurements made during operation of the base station. The VSI (VDL signal information) sentence provides measurement information associated with a single AIS message (transmitted or received). The FSR (frame summary of AIS reception) sentence provides the average noise and a summary of slot use during the previous frame, and expected slot use for the current frame. The FSR sentence is output at the start of the current frame. For more information on VSI and FSR sentences, see Ref [5].

The settings have the following meaning:

Parameter	Description
<b>Enable VSI/FSR Sentences About ...</b>	Enables or disables output of VSI and FSR sentences both, one of or none of the channels A or B. The following options are available: <ul style="list-style-type: none"><li>• Enable <i>VSI/FSR Sentences</i> about channel A</li><li>• Enable <i>VSI/FSR Sentences</i> about channel B</li><li>• Enable <i>VSI/FSR Sentences</i> about every channel</li><li>• Enable <i>VSI/FSR Sentences</i> about no channel</li></ul> <p>The VSI/FSR sentences are disabled for channels for which sentences are not explicitly enabled.</p>
<b>VSI Sentence</b>	<p>These parameters are only valid if VSI sentences are enabled in the “Enable VSI/FSI Sentences About ...” drop down list.</p> <p>The features listed below are enabled by setting a tick in the associated box. If the box is unchecked, the feature associated with that box is disabled.</p> <p><b>Output with Each VDM sentence</b> Enables/disables output of VSI sentence with each VDM sentence (received message).</p> <p><b>Output with Each VDO sentence</b> Select to activate output of VSI sentence with VDO sentence (transmitted message).</p> <p><b>Output Signal Strength</b> Enables/disables output of receiver input signal strength of the received message in the VSI sentence.</p> <p><b>Output First Slot Nr</b> Enables/disables output of the first number of message in the VSI sentence.</p> <p><b>Output Msg Arrival Time</b> Enables/disables output time of message arrival in the VSI sentence.</p> <p><b>Output Signal to Noise Ratio</b> Enables/disables output signal to noise ratio in the VSI sentence.</p>
<b>FSR Sentence</b>	These parameters are only valid if FSR sentences are enabled in the “Enable VSI/FSI Sentences About ...” drop down list.





Parameter	Description
	<p>The features listed below are enabled by setting a tick in the associated box. If the box is unchecked, the feature associated with that box is disabled.</p> <p><b>Output FSR Sentence After Each Frame</b> Enables/disables output of FSR sentences.</p> <p><b>Output Channel Load</b> Enables/disables Channel Load information (slot usage).</p> <p><b>Output Nr of Msgs with Bad CRC</b> Enables/disables output of number of received messages with bad CRC.</p> <p><b>Output Forecast Channel Load</b> Enables/disables information about total slot (own and others) reservations in current frame.</p> <p><b>Output Average Noise Level</b> Enables/disables output of average noise level during previous frame.</p> <p><b>Output Received Signal Strength</b> Enables/disables output of number of slots with received signal strength (at least 10 dB) above the noise level during previous frame.</p>

Table 6-9 – Parameters for VSI/FSR category page



### 6.12 Configure > Third AIS Channel (Full Base Station only)

Settings for setup Third AIS Channel are found by selecting the *Configure* base category and then select the *Third AIS Channel* sub-category.

Use this category page to setup Third AIS Channel settings.

The settings have the following meaning:

Group	Parameter	Description
Transceiver Settings	Channel Letter	The channel letter used for input and output of messages on the Third AIS channel transceiver.  A value of '-' indicates normal operation and disables Third AIS Channel mode on the selected transceiver. The parameters below will then not be used for the selected transceiver.  Any other value (D-Z) will activate Third AIS Channel mode on the selected transceiver and parameters below will be used.
	Channel	The VHF radio channel that shall be used for Third AIS Channel operation.
	Enable Tx	Enables/Disables transmissions on each channel. If these boxes are not checked no transmissions will be made by the base station on the selected transceiver.
	Power Level	Specifies if the base station shall use low or high VHF output power. For standard R60 Base Station unit the settings correspond to: High power 12.5W Low power 1W
Network Settings	The filter option to be applied to each of the TCP network interfaces of the base station. The available settings are: <ul style="list-style-type: none"><li>• <b>Only AIS A &amp; B</b> Only messages on channel A and B will be output/accepted on the selected port.</li><li>• <b>Only Third Channel</b> Only messages on channels D-Z will be output/accepted on the selected port.</li><li>• <b>All AIS</b> All messages will be output/accepted on the selected port.</li></ul>	
	Port 8021	Setting for the R60 standard interface TCP port 8021 (MARITIMECONTROL/CoastWatch).
	Port 8030	Setting for the R60 standard interface TCP port 8030 and 10001.
	Port 8022	Setting for the R60 Third Channel interface TCP port 8022.

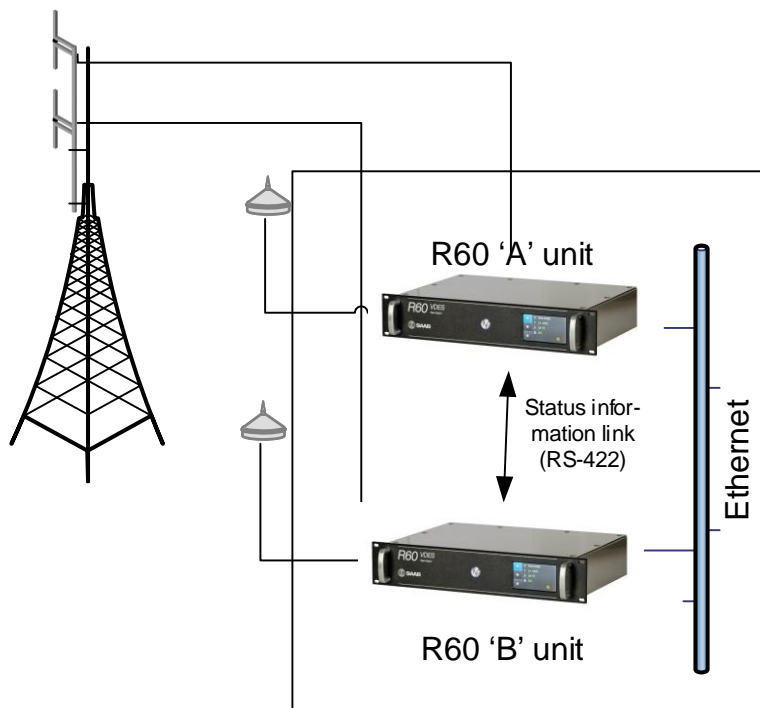
Table 6-10 – Parameters for *Third AIS Channel* category page

**Note:** For users with legacy terminology from R40: This function corresponds to “secure” in R40.

## 6.13 Configure > Hot standby

Settings in this category are used to configure two R60 units used as a redundant pair in a hot-standby configuration. Make sure that the R60 units have been connected together with a hot-standby cable (see Ref [1]) before setting the parameters.

When two R60 Station units are used in a redundant configuration only the primary (A) unit is used for transmissions, while the hot standby (secondary) unit (B) monitors the integrity of the primary unit.



**Figure 6-2: R60 in a redundant pair configuration**

In case of a detected failure in the primary base station unit, the spare unit will immediately take on the role of becoming the primary base station without any degradation of the AIS/VDES system. The problems at the site can then be addressed without immediate actions and without discontinuity of the AIS/VDES service.

To further improve the monitoring of the primary unit it is possible to let the spare unit check the integrity of on-air messages transmitted from the primary unit. This feature is enabled with the “VHF Transmission Monitoring” parameter, see Table 6-11 below. When enabled the standby base station will receive and check messages sent by the primary R60 and will also detect problems with transmission content or poor modulation. Thus, the hot-standby redundant configuration will not only offer redundancy to the system but also increased integrity.

In the configuration the two R60 stations are separated by means of the letters ‘A’ or ‘B’. For the configuration to be meaningful one base station must be configured as the ‘A’-unit and one as the ‘B’-unit. The letters ‘A’ and ‘B’ shall not be confused with which



one of the units that has the status of primary (master) or spare (standby); each unit can have either of these roles (although not at the same time).

Group	Parameter	Description
Hot Standby	<b>BSC Configuration</b>	<p>The following options exist:</p> <ul style="list-style-type: none"> <li><i>Stand alone</i>: This should be used when only one R60 exists at the R60 station site or when the units shall operate independently.</li> <li><i>Dual, BSC A</i>: Hot standby shall be used and the unit currently being configured should be the 'A' unit of the pair.</li> <li><i>Dual, BSC B</i>: Hot standby shall be used and the unit currently being configured should be the 'B' unit.</li> </ul>
	<b>Mode</b>	<p>The following options exist:</p> <ul style="list-style-type: none"> <li><i>No hot-standby</i>: The hot standby operation is disabled. The BSC configuration should be set to <i>stand alone</i>.</li> <li><i>Autonomous mode</i>, further described below this table.</li> <li><i>Forced mode</i>, further described below this table.</li> </ul>
	<b>Preferred Status</b>	<p>This parameter has the purpose of specifying which R60 station shall have the <i>Master</i> role. In <i>Autonomous mode</i>, the parameter is used when none of the units have a better status than the other. In <i>Forced mode</i> it selects the <i>Master</i> unit.</p> <p>Two options exist:</p> <ul style="list-style-type: none"> <li><i>Master</i>: The R60 currently being configured will become the primary (master) unit, unless <i>Autonomous mode</i> determines the other unit has a better status.</li> <li><i>Hot Standby</i>: The R60 currently being configured will let the other R60 become the primary (master) unit, unless <i>Autonomous mode</i> determines this unit has a better status.</li> </ul>
	<b>Silent</b>	<p>When this box is checked, the R60 unit that is in spare (hot-standby) mode will not send (forward) any received messages to the IP network. Uncheck this box if the two R60 units not receive the same targets, e.g. due to differences in antenna performance or directivity.</p>
VHF Transmission Monitoring	<p>The VHF transmission monitoring function is used in a redundant configuration to make the spare unit verify the VHF radio signals transmitted by the primary unit.</p> <p>The transmissions received by the spare unit are interpreted and compared with the information that the primary unit intended to transmit. If the transmitted-and-received and intended transmitted data differ, the VHF transmission monitoring alarm will be raised, as described in section 5.2 on page 41.</p>	
	<b>Enabled</b>	The VHF transmission monitor is enabled by checking the checkbox.
	<b>Level</b>	The level parameter indicates the number of consecutive messages not received correctly before raising the alarm, and should be set to 8 by default. The range of this value is 1 to 15.
Silent Mode Test Transmission	<p>This feature is used in a redundant configuration to make the spare standby base station perform test transmissions to verify the transmitter and antenna chain.</p>	
	<b>Rate</b>	<p>The transmission rate can be set from 1 minute up to 7 days.</p> <p>Set the transmission rate to 0 to disable the Silent Mode Test Transmissions.</p>



Table 6-11 – Parameters for the *Hot Standby* redundancy category page

In order to have a maximum level of flexibility, there are two modes of active hot-standby operation:

1. **Autonomous mode:** The R60 units will automatically determine which one of the units that has the best status. The base station with the best status will become the primary/master unit, and be used for transmission and reception.
2. **Forced mode:** In this mode, the units will not switch automatically, but only according to a command sent over the network. This enables a remote or external application to decide which of the two base stations that shall be used for transmission and reception.

If the hot-standby parameters of the two redundant R60 units conflict, a *Hot Standby Alarm* will be generated (refer to section 5.2).

## 6.14 Configure > Repeater (Full Base Station only)

The R60 supports AIS repeater functionality in accordance with IEC 62320-3, Ref [7].

The standard defines how an AIS repeater shall work and defines many functionalities intended to avoid overloading the VDL and reducing the risk of misconfiguration. Among other many different filters for what shall be repeated are defined. All this results in a fairly complex configuration, but allows for complex repeating scenarios to be implemented.

The *Repeater* category page is located in the *Configure* main category group. It is divided into a number of sub-categories where settings are made, see sections 6.14.2 to 6.14.5.

### 6.14.1 Process used to repeat a message

For the R60 to repeat messages at all a number of conditions must be fulfilled:

- Repeater must be enabled (see *General* → *Enable* in Table 6-12).
- Repeater MMSI must be defined (see *General* → *MMSI* in Table 6-12).
- Transmit of the repeater report must be setup (see *Report* in Table 6-12).
- Repeat must be enabled on the channel in question (see *Transmit* → *Enable Tx* in Table 6-12).
- UTC time must be known, this means the R60 must be in UTC direct or indirect synchronization.

The only AIS messages that can be repeated are 1, 2, 3, 5, 6, 7, 8, 12, 13, 14, 15, 18, 19, 21, 24, 25 and 26. Also timestamps cannot be older than 30 seconds (for AIS messages which contains a timestamp).

Before a message is repeated, it must also pass all repeater filters.

First, it must pass the MMSI filters, see 6.14.4 for configuration and how the MMSI filters work.

Then it must pass the area filters. There must be at least one include area, or nothing will be repeated. See 6.14.5 for information on how the area filters work.

Once a message has passed the area filtering it may still be stopped from repetition due to down-sampling. Only position reports from ships are affected by down-sampling (message 1, 2, 3 and 18).

Down-sampling is the process of reducing the number of messages which are repeated by only repeating every other, third, etc., position report of a vessel (see *Downsampling* in Table 6-12). There is also automatic down-sampling which happens when the maximal number of slots used for repeated messages is exceeded.

There are further checks done by the R60 before repeating, but these are automatically handled and require no configuration. Please refer to Ref [7] for further information.



Once a message has passed all filters, and possible down-sampling, the R60 selects a slot for transmission. First available FATDMA slots (see 6.14.3) are checked. If no reserved FATDMA slots are available the repeater uses RATDMA, provided it is enabled (see *General* → *Enable RATDMA* in Table 6-12). If neither is available, the message will not be repeated.

A message is always repeated onto the same channel as it was received on.

### 6.14.2 Configure > Repeater > General

This category contains general settings for the repeater function, like enabling or disabling of the feature, etc.

The *General* repeater settings are described in Table 6-12 below.

Group	Parameter	Description				
General	Enable	Enables or disables the repeater function of the base station.  Please note that additional conditions must be fulfilled for the repeater to function, but if it is disabled using this parameter nothing will be repeated.				
	MMSI	The MMSI number for the repeater report. Must be non-zero to enable the repeater.				
	Enable RATDMA	Select to allow the R60 to use RATDMA access to VDL when repeating messages.				
	Enable SART Test	Enable repetition of AIS SART test messages. Should not be enabled normally.				
	Max Slots	Maximum number of slots allowed to be used per frame for repeated messages. Range: 0 – 400. Setting this value too low will in effect disable the repeater.				
	Encryption Key	Encryption key used for configuration of the repeater via the VDL in accordance with the repeater standard. It is recommended to set this to all zero which disables the over-the-air configuration. The only parameter that can be configured over-the-air is the repeater enable, and to do this external software is required.				
Position	The position used in the repeater report.					
	Position Source	The position source can be: <b><i>Surveyed</i></b> – the position is defined by the <i>Latitude</i> and <i>Longitude</i> parameters below. <b><i>Internal</i></b> – the position of the internal GNSS of the R60 is used.				
	Latitude Longitude	If the position source is selected to be <i>surveyed</i> in the previous parameter, then the position is typed in here.  The coordinates format is: <table border="1"><tr><td>degrees</td><td>N/S/E/W</td><td>minutes</td><td>.</td><td>fractions of minutes</td></tr></table> <i>Example:</i> Latitude = 16N12.9823, meaning 16° North and 12.9823'	degrees	N/S/E/W	minutes	.
degrees	N/S/E/W	minutes	.	fractions of minutes		
Report	Repeater report transmission settings.					



Group	Parameter	Description
	<b>UTC Minute</b>	The UTC minute for the start slot. This is only of interest if interval is larger than one frame (one minute).
	<b>Start Slot</b>	The slot used to transmit the repeater report message. To disable the broadcast set the start slot to -1.
	<b>Interval</b>	The number of slots between the start slot and the next transmission on the same channel.
	<b>Access</b>	Selects the access scheme used for transmitting the repeater report: <b>By interval</b> – Automatically selects SOTDMA/ITDMA/RATDMA based on the interval. <b>FATDMA</b> – Uses the exact slots defined above. <b>ITDMA/RATDMA</b> – Randomizes transmit slot with the slot defined above being the start of the selection interval. <b>SOTDMA</b> – Same as ITDMA/RATDMA except the for the access scheme on the VDL. Only valid for interval $\leq 2250$ slots (one minute).
<b>Transmit</b>	Settings for transmission of repeated messages.	
	<b>Enable Tx</b>	Enable or disable repetition for channel A and/or B.
	<b>Power</b>	Specifies the output power used for repeated messages, 1 or 12.5 W.
<b>Downsampling</b>	Settings for down-sampling. This only applies to ships' position reports.	
	<b>Down-sampling</b>	Selects how many reports should be repeated for each vessel. <b>No downsampling</b> – No position reports stopped. <b>Fixed interval</b> – All vessels will be repeated approximately as often, regardless of how often they transmit. <b>2nd</b> – Every other position report will be repeated. <b>3rd</b> – Every third position report will be repeated. ... <b>15th</b> – Every 15 <sup>th</sup> position report will be repeated.
	<b>Max Interval</b>	This parameter is only used when <i>Downsampling</i> (above) is set to <b>2nd</b> – <b>15th</b> . The maximal number of slots between repeated messages of a vessel. If the time since last repeat exceeds this number of slots, a repeat is done. There are two settings, one for moving and one for stationary vessels.
	<b>Fixed Interval</b>	This parameter is only used when <i>Downsampling</i> (above) is set to <b>Fixed Interval</b> . How many slots there should be between repeated messages of a vessel. When the time since last repeat exceeds this number of slots, a repeat is done. There are two settings, one for moving and one for stationary vessels.

Table 6-12 – Parameters for the *Repeater – General* category page

### 6.14.3 Configure > Repeater > Reservations

For the repeater to be able to use FATDMA the slots must be configured in this category. This is done using *Owner Local* (see Table 6-13), otherwise RATDMA is the only possible method for repeated messages to be transmitted. It is also possible to



disallow certain slots for usage when repeating messages, this is done using *Owner Remote* (see Table 6-13).

The slots reserved for repeater usage (*Local*) needs to be announced on the VDL using message 20. This can be done by another AIS base station or the R60 itself can announce the slots. To have the R60 do it the same slots shall be setup under data link management (see 6.8), and transmission of message 20 must be enabled (see 6.7). To allocate the slots exclusively for repeated messages the *Ownership* shall be *Remote* in the data link management configuration, or *Local* to allow the R60 the option of using the slots both for base station transmissions and repeated messages. If FATDMA is to be used for repeated messages, the recommended way is to configure the slots as *Local* both here and under data link management, allowing the R60 maximal slot selection flexibility.

The *Repeater – Reservation* settings are described in Table 6-13 below:

Group	Parameter	Description
Channel A Channel B	Owner	The ownership parameter can be set to: <ul style="list-style-type: none"> <li>• <i>Clear</i>: No reservation made for repeater.</li> <li>• <i>Local</i>: The reservation can be used by the R60 for transmitting repeated messages using FATDMA.</li> <li>• <i>Remote</i>: The R60 is prohibited from using the specified slots for transmitting repeated messages.</li> </ul>
	Start Slot	The first slot of the reservation block.
	Increment	The number of slots between the start slot and the next reservation of the block.
	Block Size	The number of consecutive slots that shall be reserved.

**Table 6-13 – Parameters for the *Repeater - Reservations* category page**

#### 6.14.4 Configure > Repeater > MMSI filter

This category contains parameters used to define filtering for which messages will be repeated based on the MMSI of those messages.

The R60 compares the source MMSI of incoming AIS messages to the MMSI filter configuration:

- If there is any MMSI include filter defined the source MMSI must be in one of them.
- Otherwise, if there is any MMSI exclude filter defined the source MMSI must not be in any of them.

If all MMSI filters on this page are disabled, no MMSI filtering is done.

The *Repeater – MMSI Filters* settings are described in Table 6-14 below:

Group	Parameter	Description
MMSI Filters	There are 16 filter positions with the following settings alternatives:	
	Filter	<b>Disabled</b> – The MMSI filter position is not used.



Group	Parameter	Description
		<b>Include</b> – Messages originating from vessels with MMSI numbers in the range from <i>First</i> to <i>Last</i> of any of the include ranges are the only ones considered for repetition. Messages originating from any other MMSI will not be repeated. <b>Exclude</b> – Messages originating from vessels with MMSI numbers in the range from <i>First</i> to <i>Last</i> will not be repeated, unless they are also in an <i>include</i> range. If one or more filters use the <i>exclude</i> setting, while no filter is defined to use the <i>include</i> setting, then <i>all</i> messages originating from any MMSI number other than the listed exclusions will be considered for repetition.
	<b>First</b>	First MMSI number in the range (inclusive).
	<b>Last</b>	Last MMSI number in the range (inclusive). To define a range equal to a single MMSI number simply set the <i>Last</i> to be the same as <i>First</i> .

Table 6-14 – Parameters for the *Repeater – MMSI Filter* category page

### 6.14.5 Configure > Repeater > Area filter

This category contains parameters used to define area filtering. Up to 16 areas can be defined. Exclude areas are areas from which no repetition is made, those areas only define a geographical region. Include areas on the other hand also define a number of additional filter criteria, SOG, COG, navigational status and more, see Table 6-15.

When determining which area to use for filtering of a particular message the position in the message is used (if it is a position message), otherwise the last known position for the vessel is used. Position messages without a valid position are never repeated.

Exclude areas have higher priority than include areas, this means if a vessel is inside both an include area and an exclude area, the exclude area takes precedence and messages from the vessel are not repeated.

A message from a vessel which is not inside any area is not repeated, the vessel must be in at least one include area for it to be considered.

Once an include area has been determined all the filter parameters of the area are checked. For a message to be repeated *all* the enabled filters must be passed. See Table 6-15 for information on how the individual area filters work.

If multiple include areas match the vessel position the message must pass *all* those areas' filters to be repeated.

The settings for *Repeater – Area Filter* are described in the table below:

Group	Parameter	Description
<b>Area Index</b>	<b>1 – 16</b>	16 independent filter areas can be defined. Which area number (index) to define settings for is selected in this window by simply clicking on the desired index number.



Group	Parameter	Description				
		All other parameters on this page are unique for the selected area index.				
Area Filter	Defines the geographical region of for the area filter.					
	Filter	<p><b>Disabled</b> – The selected area index is not used at all.</p> <p><b>Include</b> – All vessel reports within the defined area, that fulfil (all) the defined criteria, will be repeated.</p> <p><b>Exclude</b> – The filter will <i>exclude</i> a defined area; any vessel reports from within an exclude area are stopped from being repeated. Settings other than the coordinates are not used.</p>				
	Latitude NE Longitude NE Latitude SW Longitude SW	<p>The repeater area is a square-shaped area defined geographically by its North-East (NE) and South-West (SW) corners.</p> <p>The coordinates format is:</p> <table><tr><td>degrees</td><td>N/S/E/W</td><td>minutes</td><td>.</td><td>fractions of minutes</td></tr></table> <p><i>Example:</i> Latitude = 16N12.9823, meaning 16° North and 12.9823'</p>	degrees	N/S/E/W	minutes	.
degrees	N/S/E/W	minutes	.	fractions of minutes		
Repeat Indicator	Max	Defines the maximal repeat indicator a received message can have. If the repeat indicator exceeds this maximum value the message is not repeated.				
	Increment	The repeater will increment the repeat indicator in the message before re-broadcasting it. This parameter defines how the repeat indicator is incremented. Either it is increased by 1, or set to 1, 2 or 3 (regardless of previous value). If this does not result in an increase the message will not be repeated.				
Speed Filter	Min SOG [knots]	All message from vessels with a SOG less than this parameter are not repeated. Set to zero to disable this filter.				
	Stationary	Check this to stop all messages from vessels that are stationary from being repeated. Stationary is defined as at anchor or moored in addition to SOG ≤3 knots for Class A, and SOG ≤2 knots for Class B.				
Course Filter	Filter	<p>Selects how the course filter should work. The COG of the vessel is compared to the <i>First</i> and <i>Last</i> parameters below.</p> <p><b>Disabled</b> – No check of COG is done.</p> <p><b>Include</b> – No repeat is done unless COG is between <i>First</i> and <i>Last</i>.</p> <p><b>Exclude</b> – No repeat is done if COG is between <i>First</i> and <i>Last</i>.</p>				
	First	Beginning of sector checked (degrees north).				
	Last	End of sector checked (degrees north).				
Nav Status Filter	Enable	Enables or disables the navigational status filter feature.				
	<selections>	Tick the appropriate box to select navigational status filtering. Messages from vessels with a navigational status not ticked will not be repeated.				
Message Filter	Enable	Enables or disables the message number filter feature.				
	<selections>	Tick in the appropriate box to specify which AIS messages will be repeated. For definitions of message numbering, see Ref [2].				



Group	Parameter	Description
		Only the selected AIS messages will be repeated, if no box is ticked no message are repeated for the area.
Ship/Cargo Type Filter	Filter	Selects how the ship and cargo filter should work. If a vessel ship/cargo type is not known no check is made, otherwise all messages from the vessel are checked. <b>Disabled</b> – Disables this check. <b>Include all except list</b> – Messages from vessels with types listed in the exceptions are not repeated. <b>Exclude all except list</b> – Messages from vessels with types not listed in the exceptions are not repeated.
	Exceptions	List of exceptions to the general include/exclude rule above. Types are numbers in range 0 – 255; see Ref [2] for a definition of them. The list can be cleared using the <i>Clear</i> button. Individual types can be removed by marking them in the list and using the <i>Remove</i> button. New types can be added using the box below the list and pressing the <i>Add</i> button.

Table 6-15 – Parameters for the *Repeater – Area Filter* category page



## 6.15 Configure > Aids to navigation (AtoN Station and Full Base Station)

Settings for aids to navigation are found by selecting the *Configure* base category and then select the *Aids to Navigation* sub-category.

The R60 unit is compatible to Type 3 *Aids to Navigation* (AtoN) as defined in Ref [6] and Ref [10]. It can be set up to transmit AtoN data by means of VDL message number 21 as defined in Ref [2]. By doing this, the AIS users can receive information about the AtoNs even if the AtoNs themselves are not equipped with any AIS VDL transmitter. The AIS users will not know the difference, so this is sometimes referred to as virtual AIS targets. As many as 30 virtual/synthetic AtoN targets can be generated by the R60.

The parameters have the following meaning:

Group	Parameter	Description					
-	1-30	AtoN target definition number. All other settings on this page are related to the selected target definition number.					
General	Active	Check this box in order to enable transmission of the displayed AtoN data.					
	MMSI	The IALA MMSI number assigned to the AtoN.					
	Name	The name of the AtoN.					
	Type	The AtoN type. There are 32 available types, which appear in a drop-down list. More information about AtoN types is found in Ref [6].					
	EPFS	Type of electronic position fixing device for the AtoN position. Default is <i>surveyed</i> .					
	Timestamp	UTC second when the report was generated (0 - 59). 60 if the time stamp is not available, which is also the default value. 61 if the positioning system is in manual input mode. 62 if the Electronic Position Fixing System operates in estimated (dead reckoning) mode. 63 if the positioning system is inoperative.					
	Update Timer	The update time in seconds. If the AtoN target is not updated via Ethernet during this time period, the target will be deactivated. If the value is 0 then no updates are necessary. The target will continuously be sent with a period specified in the reporting interval.					
Position	Latitude Longitude	The latitude and longitude of the AtoN position.  The coordinates format is: <table border="1"><tr><td>degrees</td><td>N/S/E/W</td><td>minutes</td><td>.</td><td>fractions of minutes</td></tr></table> Example: Latitude = 16N12.9823, meaning 16° North and 12.9823'	degrees	N/S/E/W	minutes	.	fractions of minutes
		degrees	N/S/E/W	minutes	.	fractions of minutes	
Transmit Schedule	The R60 can use two different methods to select transmit slots for AtoNs: <ul style="list-style-type: none"><li>RATDMA: In this case the base station needs to have RATDMA enabled to allow it to find appropriate transmit slots, see section 6.3.</li><li>FATDMA: In this case the slots selected for transmission should be allocated using <i>Remote ownership</i> in Data Link Management, see section 6.8.</li></ul>						



Group	Parameter	Description
	<b>RATDMA</b>	Check this circle to use RATDMA for AtoN transmission scheduling. If RATDMA is used then the <i>Report Interval</i> is enabled
	<b>Reporting Interval</b>	The delay in seconds between the transmitted reports for this AtoN. Avoid setting this value too low, as it will increase the VDL load, but use values below 360 (6 minutes) to avoid the target to be removed from the target lists of the AIS users between transmissions. This setting is only used when RATDMA is selected.
	<b>FATDMA</b>	Check this circle to use FATDMA for AtoN transmission scheduling. In this case, the <i>UTC Minute</i> , <i>Start Slot</i> and <i>Increment</i> settings are enabled.
	<b>UTC Minute</b>	The UTC minute for the start slot. This is only of interest if increment is larger than one frame (one minute).
	<b>Start Slot</b>	The start slot of the AtoN message 21 broadcast (AtoN). Note that message 21 are always 2 slots long.
	<b>Increment</b>	The number of slots between the start slot and the next transmission on the same channel.
	<b>Flags</b>	Flags are used to set bits of data in the AtoN report transmitted.
	<b>Assigned Mode</b>	Normally not used. See Ref [2] and Ref [6] for further information.
	<b>High Accuracy</b>	Check this box if the AtoN position is surveyed with high accuracy. High accuracy is valid if the entered position has been established with an accuracy of at least 10 meters.
	<b>Virtual Target</b>	Check this box if the described AtoN does not exist physically.
	<b>Off Position</b>	Check this box to indicate that the AtoN is off position. This is only valid for a floating AtoN.
	<b>RAIM</b>	Check this box to indicate that the AtoN is using RAIM.
<b>Dimension</b>	<b>A/B/C/D</b>	The dimensions in meters of the AtoN.  Dimension parameters are defined with the position of the AtoN as reference.

Table 6-16 – Parameters for the *Aids to Navigation* category page



### 6.16 Configure > AtoN message repeater (AtoN Station and Full Base Station)

To configure the AtoN message repeater, use the settings in the *AtoN Message Repeater* category page.

The R60 can be set up to act as an Aids to Navigation (AtoN) repeater. In this mode the R60 will listen to AtoN messages from specific MMSIs. When an AtoN message is received from that particular MMSI the R60 will start repeating the same AtoN message on the VHF-channels. Up to 30 AtoN message repeaters can be set up.

The AtoN repeater functionality has two main purposes:

- Extend the range of AtoNs; since base stations normally has much better range than AtoNs, primarily due to antenna height and output power.
- Increase the report rate of AtoNs; since AtoN can be small devices with limited available power (e.g. battery) their report rate can be limited.

The parameters on the page have the following meaning:

Group	Parameter	Description
-	<b>1-30</b>	AtoN repeater number. All other settings on this page are related to the selected repeater number.
<b>Settings</b>	<b>Active AtoN Repeater</b>	Check this box to enable/activate the repeater functionality for the selected repeater number.
	<b>MMSI</b>	The IALA MMSI number assigned to the AtoN.
	<b>Reporting Rate</b>	The interval in seconds between the transmitted reports for this AtoN. Avoid settings this value too low, as it will increase the VDL load, but use values below 360 (6 minutes) to avoid the target to be removed from the target lists of the AIS users between transmissions.
	<b>Update Timer</b>	The update time in seconds. If no message is received from the AtoN during this time period, the target will no longer be repeated. If the value is 0, the AtoN information will continuously be sent out with the period specified in the reporting interval, e.g. only one reception from the AtoN is necessary to continuously repeat it.

**Table 6-17 – Parameters for the AtoN Message Repeater**



## 6.17 Configure > Special aids to navigation functions

**Note:** This functionality requires an external interface hardware unit (7000 000-684), which must be ordered separately, in order to work.

To configure the special AtoN functions, use the settings in the *Special AtoN Functions* category page.

The R60 can be set up to receive input from an external interface hardware unit, and based on the input modify the AtoN status bits of one of the defined AtoNs (see 6.15). In addition to setting the AtoN status bits, a binary message 6 AtoN status message and binary message 8 Meteorological and Hydrographic data message (DAC 1, FI 31) can be setup for transmission. Some of the data in the transmitted messages are taken from the selected AtoN.

For the AtoN status message it is possible to setup dynamic transmission based on changes in the external digital inputs. When this functionality is enabled there is a rate limiting functionality to avoid causing VDL overload. The function uses TX tokens to avoid too many transmits. For each transmit (due to a digital input change) a TX token is consumed. If there are no available TX tokens no transmit will be made. The TX token count is increased by one at a configurable *Token Rate*, up to a configurable *Max Tokens*.

The parameters on the page have the following meaning:

Group	Parameter	Description
Installation	AtoN Index	Selects which AtoN to use: 0 = Disable the special AtoN functionality. 1 – 30 = Set AtoN status bits in the selected AtoN, also <i>AtoN Status Message</i> and <i>Met/Hydro Message</i> are taken from the selected AtoN's configuration (MMSI, position, off position indicator).
	Light	Selects how AtoN lights are installed (used to set message 21 AtoN status bits). <b>Not installed/monitored</b> – Lights not installed or installed but unmonitored. <b>Monitored</b> – Lights are installed and monitored.
	RACON	Selects if/how AtoN RACON is installed (used to set message 21 AtoN status bits). <b>Not installed</b> – RACON is not installed. <b>Not monitored</b> – RACON is installed, but unmonitored. <b>Monitored</b> – RACON is installed and being monitored.
AtoN Status Message	Active	Check this box in order to enable transmission of the <i>AtoN Status Message</i> .
	Target MMSI	The destination MMSI for the <i>AtoN Status Message</i> . The R60 does not expect an acknowledgement message for <i>AtoN Status Message</i> .
	Report Rate	The interval in seconds (10 – 86400) between transmitted status messages. If additional messages are transmitted due to the <i>Digital Input Change Tx</i> settings (see below), the next transmit will be this number of seconds from that transmit.





Group	Parameter	Description
Digital Input Change Tx	DAC	Designated Area Code for the binary <i>AtoN Status Message</i> .
	FI	Functional Identifier for the binary <i>AtoN Status Message</i> .
	Max Tokens	The maximal number of TX tokens that can be available for extra transmits, due to digital input changes. 0 = Disables transmits due to digital input changes. 1 – 10 = Max number of TX tokens.
Met/Hydro Message	Token Rate	Interval in seconds (3 – 180) between TX tokens being added.
	DIO 0-23	Selects which digital inputs to monitor for digital input changes. Deselecting all will disable transmits due to changes in digital inputs.
	Active	Check this box in order to enable transmission of the <i>metrological and hydrographical message</i> (DAC 1, FI 31).
Visibility Sensor	Report Rate	The interval in seconds (10 – 86400) between transmitted met/hydro messages.
	Max Range	Maximal range of visibility sensor.
	Range	Formula for calculating the range (in NM) based on current (in mA) from external interface unit.

Table 6-18 – Parameters for the *Special AtoN Functions*



### 6.18 Configure > VDL status/reboot

The R60 can be set up to send out status information about itself to a specific MMSI. When this mode is activated, the R60 will regularly transmit a status message to the selected target MMSI.

The R60 can also be setup to allow VDL reboot. For a VDL reboot command to be valid it must be received from the same target MMSI as used in the status transmissions and the correct password is required. To generate a VDL reboot a specific algorithm not covered by this document must be used.

Configure R60 status transmissions and VDL reboot using the settings in the *VDL Status/Reboot* category.

The parameters on the page have the following meaning:

Group	Parameter	Description
Target MMSI	-	The target MMSI to which all status messages are addressed. This is also the MMSI from which VDL reboots must be received. If this field is set to “-1” then all status transmissions and VDL reboot are disabled.
Status Transmissions	Tx channel	Use this drop-down menu to one of the following: Disable the status transmissions Transmit status messages on Channel A Transmit status messages on Channel B Transmit status messages alternating on Channel A and Channel B
	Transmission Rate	Selects the interval in seconds between status message transmissions. Valid range is 10 to 86400 seconds (24 hours).
Status Transmissions	Output Selection	There are a number of different status information messages which can be sent. More information is found in Table 6-20 One or more messages can be selected. If no status messages is selected then the status transmissions are disabled.
VDL Reboot	Enable	Selects if VDL reboot should be enabled. A valid target MMSI and password is also required for VDL reboot to work.
	Password	Selects the password needed to perform a VDL reboot. The password has 1 – 8 characters.

Table 6-19 – Parameters for *VDL Status/Reboot*

The status information messages that can be sent are defined in the table below:

Status message	Description
General status	Information about: <ul style="list-style-type: none"><li>• R60 temperature</li><li>• DC input voltage</li><li>• AC input status</li><li>• Time sync</li><li>• Number of GNSS satellites (used and visible)</li><li>• R60 uptime</li></ul>



Status message	Description
	<ul style="list-style-type: none"><li>R60 serial number</li></ul>
<b>Alarm status</b>	Information about which alarms are active.
<b>Surveyed position</b>	The self-surveyed position taken from the internal GNSS receiver.
<b>VDL status A</b>	Information about VDL loads for channel A.
<b>VDL status B</b>	Information about VDL loads for channel B.
<b>Base station software</b>	Software version of R60 base station part.
<b>Controller and radio software</b>	Software version of R60 controller and radio parts.
<b>GPS operational software</b>	Software version of internal GNSS receiver.
<b>GPS boot software</b>	Software version of internal GNSS receiver.
<b>GPS model number</b>	Model type of internal GNSS receiver.
<b>License</b>	Information of the enabled R60 functions as defined by the license key.
<b>BSC status</b>	Information about BSC: <ul style="list-style-type: none"><li>Hot standby mode</li><li>Hot standby status</li><li>Storage status</li></ul>
<b>BSC alarm status</b>	Information about which BSC alarms are active.

Table 6-20 – R60 status information messages



### 6.19 Configure > Password

To configure the password, use the settings on the *Password* category page.

The password needed for configuration/maintenance in the R60 web interface can be changed. The password must be 6 – 32 character long and consist only of printable ASCII character characters: numbers (0-9), letter (a-z and A-Z), space character, and special characters (! " # \$ % & ' ( ) \* + , - . / : ; < = > ? @ [ \ ] ^ \_ ` { | } ~)

The parameters on the page have the following meaning:

Group	Parameter	Description
Change Password	Old Password	Current password. Needs to be confirmed to allow change of password.
	New Password	The password to change to (must fulfil the password requirements above).
	Confirm Password	Must be same as <i>New Password</i> .

Table 6-21 – *Password* parameters

## **7 MAINTENANCE**

By using the *Maintenance* category, the R60 station firmware and software can be upgraded. Import, export and restore of the configuration is also supported.

It may be possible to upgrade to a different product variant with extended functionality by purchasing and installing a different license key. Restrictions may exist due to national regulation.

The *Maintenance* category can also be used to download the R60 unit SNMP MIB definitions and restart the base station.

### **7.1 Configuration**

The current configuration of the base station can be save to a file (*Export to file*), restored from a file (*Import from file*), and restored to factory default values (*Restore defaults*).

When changing the configuration the current password must be entered in the *Password* field.

During import of configuration, there is an option to skip the network parameters. This is to allow importing the configuration remotely without risking the network connection settings changing.

### **7.2 Restart R60 station**

To power cycle the R60 press the *Restart* button.

### **7.3 Upgrade firmware/software**

To update the R60 firmware and software, simply use the file upload tool on the *Maintenance* category page.

To perform a firmware and software upgrade, perform following steps:

1. Click the *Select upgrade file* button.
2. Browse the file structure to find and select the .R60Pkg-file for upload. Click on the "Open" button (or similar in your language). The upgrade process will start.
3. The file is uploaded to the R60. A progress bar displays the data transfer.
4. Once the file is uploaded/written to the device the R60 will reboot and web GUI will reload. The upgrade process is then finished.

Note! This is the procedure to follow regardless of type of update. The contents of the .R60Pkg-file controls what is updated.



### 7.4 SNMP MIB

The R60 supports SNMP monitoring. The SNMP MIB file can be downloaded by pressing the *Download MIB Definition* button and be used by a third party SNMP monitor software to display the data.

## 8 SUPERVISOR WEB

The supervisor web GUI has some status information and network settings. It is only possible to access by using ETH3 port on the base station. The status is parts of what can be found in the main web GUI.

Note that Reboot from the supervisor will not do a soft reboot but toggle power; resulting in a hard reboot.

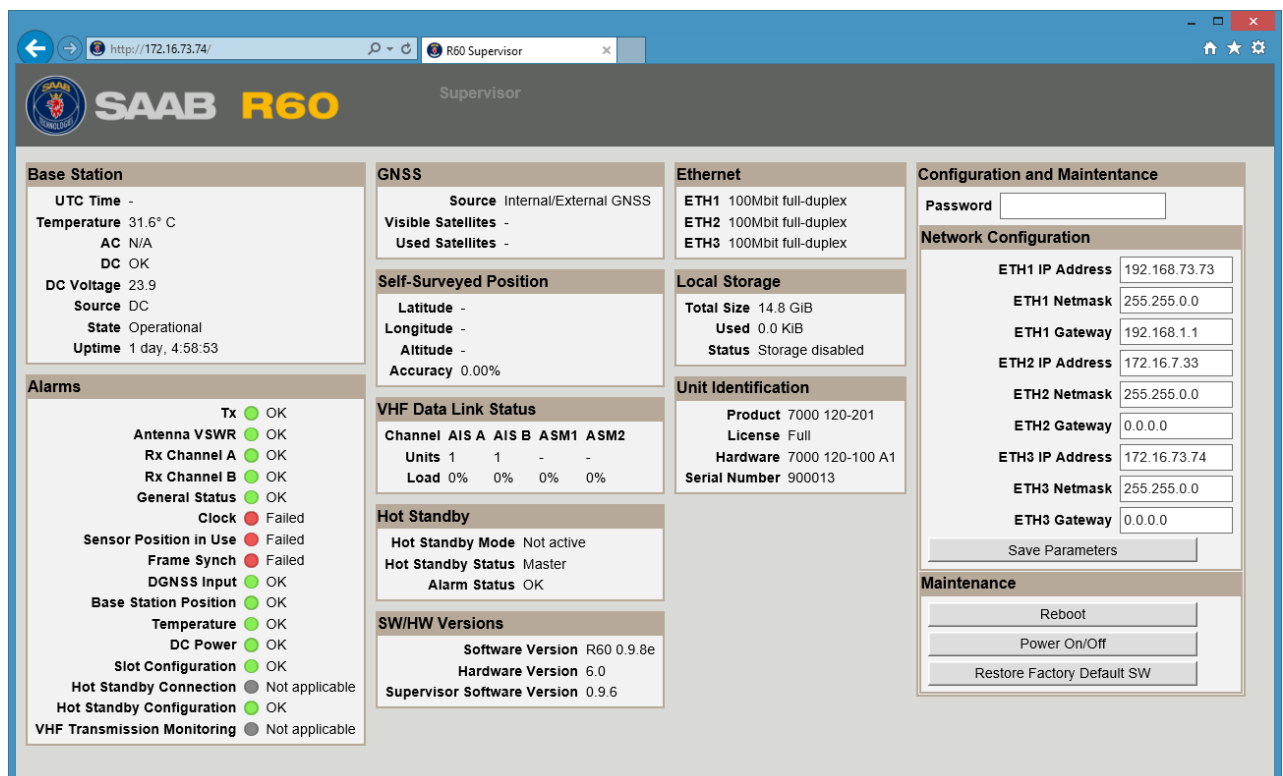


Figure 8-1: Supervisor Info

Group	Parameter	Description
Base Station		Shows R60 station information such as: <ul style="list-style-type: none"> <li>Current UTC date/time in the base station.</li> <li>Temperature inside the base station.</li> <li>R60 has AC power.</li> <li>R60 has DC power.</li> <li>Current state</li> <li>Uptime (of supervisor)</li> </ul>
Alarms		See Table 5-1 and more details 5.2 Monitor > Alarms
GNSS		Shows GNSS-related information such as: <ul style="list-style-type: none"> <li>Visible satellites: The number of GNSS satellites that theoretically could be detected at the R60 location.</li> <li>Used: The number of GNSS satellites that are received and used.</li> <li>Precision parameters.</li> </ul>



Group	Parameter	Description
Self-Surveyed Position		Shows the current self-surveyed position and its accuracy.
VHF Data Link Status		Provides information about the current status of the VHF data link such as the number of AIS/ASM units received recently (own base included), link load (number of transmitted and received message last minute).
Hot Standby	Mode	Can be <i>HS not active</i> , <i>forced</i> or <i>autonomous</i> .
	Status	Can be <i>Master</i> (i.e. the R60 is used for transmission) or <i>Standby</i> .
	Alarm	Indicates if there are any hot standby alarms present.
SW/HW Versions	Software Version	Software version of R60 Station.
	Hardware Version	Hardware version of R60.
	Supervisor Software Version	Software version of R60 supervisor.
Ethernet		Status of all Ethernet ports on the R60.
Local Storage		Shows the status, size and usage of the R60 local storage memory. A R60 will only store data locally when storage is enabled and no network system capable of handling stored data is connected to it.
Unit Identification		Product number, license, hardware number and serial number of the R60 base station
Password		Password entry for configuration and maintenance functions.
Network Configuration	IP Address	IP address of the R60 VDES Base station. (ETH3 is supervisor)
	Netmask	R60 Netmask setting for the IP network connection.
	Default Gateway	R60 default gateway setting for the IP network connection.
Maintenance	Reboot AIS/ASM	Hard reboot by cutting power.
	Power On/Off	Power on/shut down base station. Supervisor is always powered on when main power is available.
	Restore Factory Default SW	Initiates a restore of factory loaded software. Software restore takes approximately 2 minutes.

Table 8-1 Parameter information provided via Supervisor GUI



## 9 SNMP MONITORING

The R60 VDES base station includes support for SNMP monitoring.

SNMP monitoring can be enabled/disabled using a configuration parameter, see section 6.4.

There is a management information base (MIB) describing the parameters available for SNMP monitoring in the R60. The MIB can be downloaded from the R60 unit via the web GUI; see section 7.4.

All R60 parameters have the same object identifier prefix as the R40:  
*iso.org.dod.internet.private.enterprises.transpondertech.r40* (1.3.6.1.4.1.26308.3)

## 10 NMEA SENTENCES

The R60 uses standard NMEA sentences as defined in Ref [5] to communicate. In addition to the standardised sentences, a number of Saab proprietary sentences are also used.

During normal operation both standard and proprietary sentences are used and will be output from the R60. Saab proprietary sentences start with *\$PSTT* and are thus easily identified.

### 10.1 Channel management

The standardized ACA sentence is used to define channel management zones. The R60 can handle a total of 8 zones which are identified via the sequence number field of the ACA sentence (0-7).

Each zone can be turned on or off by using the *in-use* flag field. To enable the zone for transmission in message 22, the *in-use* flag field is set to '1'. To disable it the *in use* flag field is set to '0'.

The preferred method to setup channel management is to use the *Channel Management* page (a sub-page of the *Configure* main category) in the R60 web GUI as described in section 6.9 of this document.

### 10.2 Multiple group assignment areas

The standardized AGA sentence is used to define a group assignment area. An R60 Base Station supports multiple such areas. One group assignment area is available for each mobile<sup>3</sup> type (resulting in a total of 16 areas). It is possible to have the R60 handle only a single group assignment area, which is the behaviour when using R40 Mk III legacy mode.

When multiple areas are supported, each area can be enabled or disabled by using the coordinate settings. All coordinates of an area must be valid to enable it. Setting any of the latitudes to 91 degrees north, or longitudes to 181 degrees east, disables the area.

The preferred method to setup channel management is by using the *Group Assignment* page (a sub-page of the *Configure* main category) page as described in this document in section 6.10.

### 10.3 Data link messages

VDM sentences can be used to send arbitrary data from the base station. When doing so the R60 modifies certain messages in order to preserve VDL link integrity, in accordance with Ref [5]. Only position messages and messages containing slot offsets are modified.

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<sup>3</sup> See list of Mobile types in Table 6-8, section 6.10

### **10.3.1 DGNSS message 17**

When the R60 is setup for message 17 (DGNSS) transmission<sup>4</sup> there has to be some source for the DGNSS data. The standard specifies that one possible source is VDM input.

Consequently when a VDM with encapsulated message 17 is input to the R60 the message will be saved internally waiting for the message 17 slot, instead of outputting it on the VDL like other VDM messages.

This behaviour only happens for VDM messages with encapsulated message 17 where the output channel in question is setup for message 17 transmissions. For a channel with no message 17 transmission schedule, a received encapsulated message 17 is treated like any other VDM input and is not saved but output onto the VDL.

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<sup>4</sup> Message 17 is enabled and configured in the “Reporting Rates” category. See section 6.7.



## 11 TECHNICAL DATA

PHYSICAL DATA	
Type	19" rack mount. Unit height: 2U
Dimensions	
Height:	89 millimetres (3.51")
Width:	483 millimetres (19.02")
Depth:	357 millimetres (14.06")
Weight:	4.5 kilograms (10 Lbs)

DC-POWER	
Power input requirements	10.8-31.2 V
Grounding	The negative DC feed is isolated from the chassis.
Current need (typical):	@ +24 V
During transmission	
- with 12.5W VHF output power setting	109 W/4.52 A
- with 1W VHF output power setting	61 W/2.55 A
Operating (except during transmission)	19 W/0.78 A
Off, but supplied with DC only	1.6 W/65 mA
Normal operation	22 W/0.9 A
Recommended fuse	20 A (T20A 50VDC ) 5x20mm

AC-POWER	
Power input requirements	100-240 volts @ 50/60 Hz
Power consumption (typical):	
During transmission:	
- with 12.5W VHF output power setting	110 W
- with 2W VHF output power setting	74 W
Operating (except during transmission)	51 W
Off, but supplied with AC.	21 W
Normal operation	53 W
Recommended fuse	3 A ( T3A 250V ) 5x20mm

VHF TRANSCEIVER	
Frequency	155 – 162.5 MHz
Channel Bandwidth	25 kHz, future VDE options 50 kHz, 100 kHz
Channel Selection	Channel numbers as in ITU-R M. 1084-4
Output power	AIS: LOW (1W) and HIGH (12.5W) ASM: from 1W to 12.5W
Bit rate (Tx/Rx)	9.6 kbps (AIS), 19.2 kbps (ASM), 307.2 kbps (VDE option max bit rate)
Modulation	GMSK (AIS) FSK (DSC) $\pi/4$ QPSK (ASM and VDE option). 16-QAM (VDE option)

ELECTRICAL INTERFACES	
Data Ports	RS-232/422 V11. Bit-rate up to 115 200 bps
TCP/IP Port	3 x Ethernet (UDP, UDP Multicast, TCP) Up to 10 simultaneous TCP data clients
GNSS-Antenna	TNC-Female, with 5V @ 40mA power supply to GNSS antenna pre-amplifier
1PPS and IRIG-B 003	Via 9-pin D-sub (male)
VHF-Antenna	N-Female, separate RX and TX antenna ports (option)
Digital Input and Output Port	Via 9-pin D-sub (male)



AC-power	IEC 320 connector
DC-power	AMP CPC Type III+
Serial data	9-pin D-sub (male)

ENVIRONMENTAL DATA	
Temperature/humidity:	-15°C to +55°C (Operational) -55°C to +85°C (Storage) Humidity 0-95%

INTERNATIONAL STANDARDS	
General	IEC 62320-1
Electromagnetic Compatibility	EN 301 489-1 EN 55032:215 EN 61000
Radio performance	IEC 62320-1
Electrical safety	IEC 62368-1
Environment	IEC 60945



### 12 DECLARATIONS, APPROVALS AND CERTIFICATES

#### 12.1 AIS Base Station Statement of Conformity

BSH - Postfach 30 12 20 - 20305 Hamburg

Saab AB (publ) TransponderTech  
Låsblecksgatan 3  
58941 Linköping

SWEDEN



BUNDESAMT FÜR  
SEESCHIFFFAHRT  
UND  
HYDROGRAPHIE

Dienststz Hamburg

**Konformitätsbestätigung/ Statement of Conformity No.**

**Nr. BSH/454.AIS Base/Saab R60 VDES Base Station**

Die nautische Ausrüstung **AIS Basisstation**  
*The nautical equipment* **AIS Base Station**

mit der Typbezeichnung **R60 VDES Base Station**  
*with the type designation*

des Herstellers **Saab AB (publ)**  
*manufactured by* **TransponderTech**  
**Låsblecksgatan 3**  
**58941 Linköping**  
**SWEDEN**

ist nach den folgenden Normen/Standards, soweit für diesen  
Ausrüstungsgegenstand anwendbar, erfolgreich geprüft worden.  
*has been tested successfully according to the following standards as applicable for this equipment:*

Norm/Standard	Prüfnorm/Test Standard
IMO MSC.74 (69) Annex 3	IEC 61162-1 Ed. 5.0 (2016) <sup>1</sup>
ITU-R M. 1084-5, 2012	IEC 61162-2 Ed.1.0, 1998 <sup>1</sup>
ITU-R M. 1371-5, 2014 <sup>1</sup>	IEC 62320-1 Ed.2.0, 2015

<sup>1</sup> as far as applicable for an AIS base station

Dem Antragsteller wie oben / as above  
*It is hereby confirmed to the applicant*

wird die Eignung für den nachstehenden Verwendungszweck bestätigt:  
**AIS Basisstation**  
*that the equipment is suitable for use as: AIS base station*

Datum  
22.04.2020  
Durchwahl  
+ 49 (0) 40 3190 - 7300  
Aktenzeichen  
(bitte bei Antwort angeben)  
Nr. BSH/454.AIS Base/Saab  
R60 VDES Base Sta-  
tion



Bernhard-Nocht-Str. 75  
20359 Hamburg  
Tel.: + 49 (0) 40 3190 - 0  
Fax: + 49 (0) 40 3190 - 5000  
posteingang@bsh.de  
www.bsh.de

Bankverbindung:  
Bundeskasse - Dienstort Kiel -

IBAN:  
DE15 2000 0000 0020 0010 00  
BIC: MARKDEF1200

Umsatzsteuer-Identifikations-  
nummer:  
DE 311239341



### 1. Bestandteile der Ausrüstung

*Components of the equipment*

#### 1.1 Bestandteile, die zum Betrieb erforderlich sind

*Components necessary for operation*

Component	Type or part number	Remarks
AIS Base Station	R60 VDES Base Station	Software version under test: 0.9.7
GPS antenna	MA-700	Or equivalent
VHF antenna	---	

#### 1.2 Zusätzliche Optionen / Anlagenkombinationen

*Additional options / combinations of the equipment*

- Independent operation
- External and internal position source
- Support of Edition 1 legacy sentences
- DGNSS RTCM input
- External UTC Sync source

### 2. Ausnahmen

*Exceptions*

TAG blocks are implemented only for the network interface.

### 3. Dokumentation

*Documentation*

**Installation Manual**  
**User Manual**

**Document id: 7000 120-008**  
**Document id: 7000 120-009**

**Test report Base station protocol tests**  
**Assessment report (Physical radio tests)**  
**Saab R60 - EMC reports**  
**Environmental report**  
**Environmental report**  
**Safety report**

**Document id: 75947098-1**  
**Document id: F190480E1**  
**Document id: F190480E2**  
**Document id: U190480E1**  
**Document id: U200305E1**  
**Document id: S190480E1**

Im Auftrag

*For the Federal Maritime and Hydrographic Agency*

Doreen Thoma



## 12.2 Module B Certificate



## EU-TYPE EXAMINATION (MODULE B) CERTIFICATE

## Radio Equipment Directive (RED) 2014/53/EU

**PHOENIX TESTLAB**  
Notified Body Number **0700**



This is to certify that:  
PHOENIX TESTLAB did undertake the relevant type examination procedures for the radio equipment identified below which was found to be in compliance with the essential requirements of Radio Equipment Directive (RED) 2014/53/EU subject to any conditions in the annex attached hereto.

Certificate No.	19-112199
Manufacturer	Saab AB (publ) TransponderTech
Address	Låsblecksgatan 3 589 41 Linköping SWEDEN
Product Description	VDES Base Station, AIS Base Station
Brand Name / Model Name	Saab / R60

**The radio equipment meets the following essential requirements**

Article 3.1 a): Health and Safety	<b>Conform</b>
Article 3.1 b): Electromagnetic Compatibility	<b>Conform</b>
Article 3.2: Effective and Efficient Use of Radio Spectrum	<b>Conform</b>
Additional Essential Requirements:	
Article 3.3 g) Access to emergency services	<b>Conform</b>

Date of issue:	<b>2020-05-05</b>	Expiry date:	<b>2025-05-04</b>
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This certificate remains valid unless cancelled or revoked, provided the conditions in the attached annex are complied with. The conditions for the validity of this certificate are listed in the Annex.

The attached Annex forms part of this certificate. This certificate consists of 3 pages.



  
Signed by Klaus Knörig  
Notified Body

Phone +49(0)5235-9500-24  
Fax +49(0)5235-9500-28  
notifiedbody@phoenix-testlab.de

PHOENIX TESTLAB GmbH  
Königswinkel 10  
D-32825 Blomberg, Germany  
www.phoenix-testlab.de





### 12.3 REACH and RoHS declaration



# SAAB

7000 120-073,A

## R60 VDES Base Station/OSNT R60 VDES Base Station Compliance statement REACH and RoHS

Product No. 7000 120-100  
7000 120-320

We hereby confirm that the R60 VDES Base Station HW, P/N 7000 120-100, and the OSNT VDES Base Station HW, P/N 7000 120-320 is in compliance with Regulation EC No 1907/2006 of the European parliament and of the council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH ) and of the 2011/65/EU Directive of the European Parliament and of the Council on the use of certain hazardous substances in electrical and in electronic equipment (RoHS), including Amendment (EU) 2015/863, as follows:

The hardware structural assembly and all electrical components included in the product are REACH/RoHS compliant.

- The product does not contain any banned substances (Annex XIV to REACH)
- Some electrical components have been identified to contain more than 0,1% weight content of Lead (CAS number 7439-92-1) which is a Substance of Very High Concern and has been included on the REACH Candidates list for eventual inclusion to Annex XIV. The total amount used of the substance in Saab AB (publ) TransponderTech products does not exceed the limit of 1 ton/year. Lead has been included on the Candidates list because of toxicity for reproduction.
- The components containing Lead are compliant with RoHS via exemptions.

This information is based in reasonable inquiry of our suppliers and represents our current actual knowledge on the information they provided. This information may be subject to change. It is the Saab policy to avoid, where possible, using substances on the SVHC list in our products.

Linköping, 2019-12-11  
Place and Date

  
Signed for and on behalf of Saab

Product Area Owner  
Title

Johanna Gustafsson  
Clarification of signature

Saab AB (publ)  
TransponderTech

Address  
Låsblecksgatan 3  
TELEPHONE

SE-589 41 Linköping  
SWEDEN  
+46 13 18 00 00

VAT Reg no. SE556036079301  
Company Identity no. 556036-0793

COMPANY UNCLASSIFIED / NOT EXPORT CONTROLLED / NOT CLASSIFIED



### 13 ACRONYMS

<b>AC</b>	Alternate Current
<b>AIS</b>	Automatic Identification System
<b>ASM</b>	Application Specific Messaging (on additional channels)
<b>AtoN</b>	Aids to Navigation
<b>bps</b>	Bits Per Second
<b>BSC</b>	Base Station Controller
<b>COG</b>	Course Over Ground
<b>CRC</b>	Cyclic Redundancy Check
<b>DAC</b>	Designated Area Code
<b>DC</b>	Direct Current
<b>DGNSS</b>	Differential Global Navigation Satellite System
<b>DIO</b>	<i>Digital Input/output</i>
<b>DSC</b>	Digital Selective Calling
<b>EPFS</b>	Electronic Position Fixing Device
<b>FI</b>	Function Identifier
<b>Frame</b>	One UTC minute on the AIS TDMA link, this is divided into 2250 slots.
<b>FSI</b>	<i>Frequency Set Information</i>
<b>FSR</b>	Frame Summary of AIS Reception
<b>GLONASS</b>	Global Navigation Satellite System
<b>GNSS</b>	Global Navigation Satellite System
<b>GPS</b>	Global Positioning System
<b>GUI</b>	Graphical User Interface
<b>HW</b>	Hardware
<b>HS</b>	Hot Standby
<b>IEC</b>	International Electro-technical Commission
<b>IP</b>	Internet Protocol
<b>ITDMA</b>	Incremental Time-Division Multiple Access
<b>LED</b>	Light Emitting Diode
<b>MIB</b>	Management Information Base
<b>MMSI</b>	Maritime Mobile Service Identity
<b>N/A</b>	Not Applicable



<b>NM</b>	Nautical Miles
<b>NMEA</b>	National Marine Electronics Association
<b>NTP</b>	Network Time Protocol
<b>NWK</b>	Network
<b>P/N</b>	Part Number
<b>PSS</b>	Physical Shore Station
<b>RACON</b>	Radar Beacon
<b>RAIM</b>	Receiver Autonomous Integrity Monitoring
<b>RATDMA</b>	Random Access Time Division Multiple Access. The way unscheduled messages are handled by a base station or transponder.
<b>RGB</b>	Red Green Blue
<b>RTCM</b>	Radio Technical Commission for Maritime Services
<b>Rx</b>	Receive
<b>SAR</b>	Search and Rescue
<b>SART</b>	Search and Rescue Transmitter
<b>SNMP</b>	Simple Network Management Protocol
<b>SOG</b>	Speed Over Ground
<b>SOTDMA</b>	Self-Organized Time-Division Multiple Access
<b>SW</b>	Software
<b>TAG</b>	Transport, Annotate and Group. Message blocks used together with NMEA sentences
<b>TBS</b>	TAG block configuration, accepted sources
<b>TCP</b>	Transmission Control Protocol
<b>Tx</b>	Transmit
<b>UTC</b>	Universal Time Co-ordinated
<b>VDES</b>	VHF Data Exchange System
<b>VDL</b>	VHF Data Link
<b>VDM</b>	VHF Data Link Message
<b>VDO</b>	VHF Data Link Own-vessel Message
<b>VHF</b>	Very High Frequency – Frequencies in the range: 3 – 300 MHz
<b>VSI</b>	VDL Signal Information
<b>VSWR</b>	Voltage Standing Wave Ratio