

# Instruction Manual



KONGSBERG

## MBR 144 OEM

### Maritime Broadband Radio







KONGSBERG

***MBR 144 OEM***  
***Maritime Broadband Radio***  
***Instruction Manual***

G210-58/2

December 2021 © Kongsberg Seatex AS

## Document information

- Product: MBR 144 OEM
- Document: Instruction Manual
- Document part number: G210–58
- Revision: 2

## Copyright

*The information contained in this document remains the sole property of Kongsberg Seatex AS. No part of this document may be copied or reproduced in any form or by any means, and the information contained within it is not to be communicated to a third party, without the prior written consent of Kongsberg Seatex AS.*

## Warning

*The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. You must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.*

*Kongsberg Seatex disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.*

## Disclaimer

*Kongsberg Seatex AS endeavours to ensure that all information in this document is correct and fairly stated, but does not accept liability for any errors or omissions.*

## Support information

If you require maintenance or repair, contact Kongsberg Maritime's support organisation. You can contact us using the following address: [km.support.seatex@km.kongsberg.com](mailto:km.support.seatex@km.kongsberg.com). If you need information about our other products, visit <http://www.kongsberg.com>.

## Table of contents

<b>ABOUT THIS MANUAL .....</b>	<b>7</b>
<b>MBR 144 OEM .....</b>	<b>8</b>
System description .....	8
System diagram .....	9
Scope of supply .....	10
Restrictions in guarantee .....	10
Radio frequency license .....	10
Equipment identification .....	11
FCC compliance statement .....	11
ISED Canada compliance statement .....	11
Exposure statement .....	13
Health and safety .....	13
Network security .....	13
Support information .....	14
<b>OPERATION .....</b>	<b>15</b>
Getting started .....	15
Turning on the Radio Unit .....	15
Enabling contact with the Radio Unit .....	16
Defining the IP address on the computer's network adapter .....	17
Operating procedures .....	19
Setting up the radio site for operation .....	19
Joining a wireless network .....	23
Editing an existing radio network .....	24
Adding or removing equipment .....	26
Enabling the embedded MBR link crypto .....	27
Checking the status of the MBR network .....	28
User preference procedures .....	29
Selecting colour palette for display .....	29
User interface .....	30
Operational principles .....	30
Display organisation .....	30
Display views .....	31
Functions and dialog boxes .....	36
Menu system .....	37
MBR Configuration Wizard .....	38
Configuration guide .....	38
Create site .....	39

Add radios to site.....	40
Configure site .....	41
Local Host List .....	43
Status .....	44
Edit network .....	45
Resource management.....	46
Join network .....	48
Crypto key configuration .....	48
System status .....	49
Network status.....	49
Individual radio site status.....	50
<b>INSTALLATION .....</b>	<b>51</b>
Preparations.....	51
Mechanical drawings.....	51
Necessary tools and equipment .....	52
Radio Unit location .....	52
Radio Unit power requirements .....	52
Arranging the antennas .....	52
Installing the Radio Unit.....	54
Cable layout and interconnections .....	55
Setting to work summary .....	56
<b>DRAWINGS.....</b>	<b>57</b>
About drawings.....	57
Radio Unit dimensions.....	58
<b>TECHNICAL SPECIFICATIONS.....</b>	<b>59</b>
Performance specifications .....	59
Interface specifications.....	59
Frequency specifications.....	60
Weights and outline dimensions .....	61
Power specifications.....	61
Environmental specifications .....	61
Standards and regulations .....	62
Manufacturer's conformity declaration .....	63
<b>MAINTENANCE .....</b>	<b>64</b>
Checking the product version .....	64
Updating the system software.....	64
Repairing the Radio Unit .....	65
<b>EQUIPMENT HANDLING.....</b>	<b>66</b>
Taking delivery .....	66

Unpacking and handling .....	66
Storage .....	67
Disposal .....	67





# About this manual

## **Purpose of manual**

The purpose of this manual is to provide the descriptions and procedures required to install, configure, operate and maintain the MBR 144 OEM.

## **Target audience**

This publication is intended for all users of the MBR 144 OEM system. This includes project engineering personnel, installation personnel, IT administrators and operators.

## **License information**

The MBR 144 OEM is not subject to product licensing. The product is a radio transmitting device. A frequency license is required for operation.

## **Maintenance purposes**

This manual is also intended as reference material for the maintenance personnel. Keep this manual for later use.

## **Software version**

The **Operation** chapter in this document is for Maritime Broadband Radios with software version 2.18 or higher.

This document describes the web interface configuration. For use of API (Application Programming Interface), refer to the API documentation.

# MBR 144 OEM

## Topics

[System description, page 8](#)

[System diagram, page 9](#)

[Scope of supply, page 10](#)

[Restrictions in guarantee, page 10](#)

[Radio frequency license, page 10](#)

[Equipment identification, page 11](#)

[FCC compliance statement, page 11](#)

[ISED Canada compliance statement, page 11](#)

[Exposure statement, page 13](#)

[Health and safety, page 13](#)

[Network security, page 13](#)

[Support information, page 14](#)

## System description

The MBR 144 OEM is a Maritime Broadband Radio (MBR). It is a part of the Maritime Broadband Radio (MBR) product family of real-time steerable phased array digital radio units. The MBR 144 OEM is designed for customer specific integration.

The MBR 144 OEM is an Ethernet based radio that requires no extra infrastructure to operate. It operates on OSI layer 2 as a network bridge transporting IP packets over the air interface connecting computers, sensors and systems together. The radio has a TDMA access protocol with user configurable time slot allocation. The MBR 144 OEM supports Internet Protocol version 4.

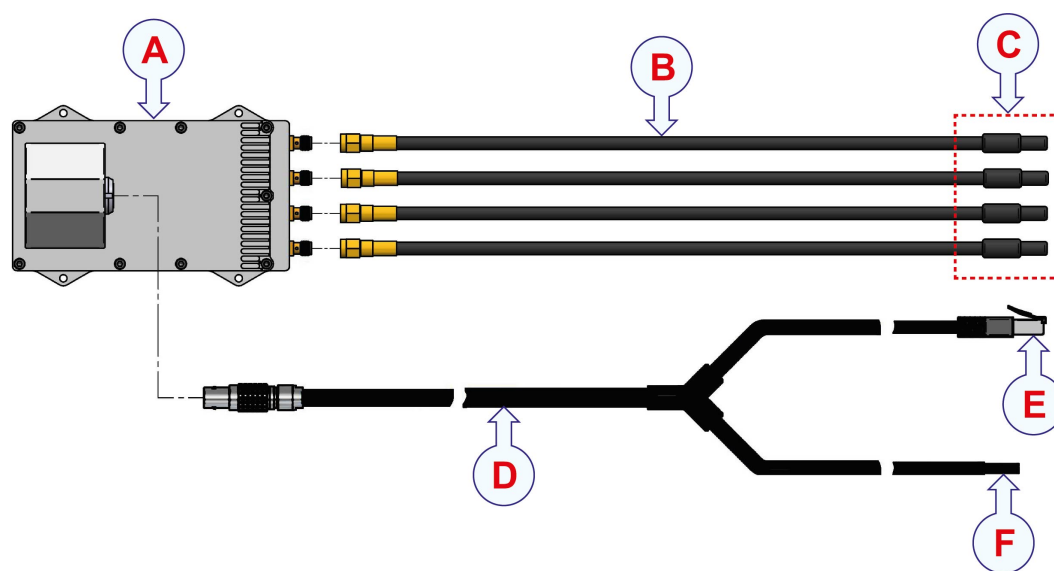
A *radio network* is a network of several MBR Units communicating together. The radio network operates as a wireless radio mobile ad hoc network (MANET) which can be

used as a stand-alone network or as an extension of your existing radio network, or fixed networks. The radio network is defined by network name, network id and encryption key. The MBR 144 OEM can be used together with all other MBR Units in the product family.

A *radio site* is one or several radio units connected together by a local Ethernet connection at the same location. The benefits of a radio site with several radio units is an increased coverage area or redundancy with radios covering the same area. Data links to remote MBR units will seamlessly be handed over from one Radio Unit to another Radio Unit on the same radio site.

The MBR 144 OEM is set up via a web interface which is available on each radio unit. It can also be set up from an API (application programming interface). Contact Kongsberg Seatex AS for information on API.

## System diagram



- A** *Radio Unit*
- B** *Antenna cable*
- C** *Antenna radiating part*
- D** *Combined Ethernet and power cable*
- E** *Ethernet connection to user equipment*
- F** *Connection to power source on vessel*

## Scope of supply

The basic items are included in the delivery. Additional optional items can be purchased from Kongsberg Seatex AS.

### Basic items

- 1 ea Radio Unit
- 1 ea Combined Ethernet and power cable
- 1 ea End-user documentation

### Additional required items

Observe these additional items which are required for installation and/or operation. They can be ordered from Kongsberg Seatex AS, or another Kongsberg office, or purchased locally.

- Dipole antennas
  - Power supply
  - Computer
- For configuration purposes

## Restrictions in guarantee

Changes or modifications to the product not explicitly approved by Kongsberg Seatex AS will void the guarantee.

The liability of Kongsberg Seatex AS is limited to repair of this product only under the given terms and conditions stated in the sales documents. Consequential damages such as customer's loss of profit or damage to other systems traceable back to this product's malfunctions, are excluded.

The warranty does not cover malfunctions of the product resulting from the following conditions.

- Incorrect power connection.
- Insufficient cooling of the Radio Unit.

## Radio frequency license

This product contains a radio transmitting device. A frequency license for the use of radio frequencies is required for operation. Use in national waters will require a frequency license issued by the relevant national authorities. The owner and user of the equipment are responsible for obtaining such a license prior to switching the product ON.

This product is in compliance with the standard ETSI EN 303 276. This applies to the frequency channels 5862 and 5890 MHz.

This product is in compliance with FCC (Federal Communications Commission) Part 15.407. This applies to the frequency band 5725 to 5850 MHz.

#### **Related topics**

[Frequency specifications, page 60](#)

## Equipment identification

This product has the following identifications for FCC (Federal Communications Commissions) and IC (Industry Canada).

- **FCC ID:** Q8IM144M2OEM
- **IC:** 5637A-M144M2OEM

## FCC compliance statement

This device complies with Part 15 of the FCC (Federal Communications Commission) Rules. Operation of the device is subject to the following conditions.

- 1 This device may not cause harmful interference.
- 2 This device must accept any interference received. Including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a marine and/or commercial environment. This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instructions, the equipment may cause harmful interference to radio communication. The equipment is not intended for operation in a residential area. Operation in such an area is likely to cause harmful interference. In which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment.

## ISED Canada compliance statement

Text in English

This device complies with Industry Canada (IC) license-exempt RSS standard(s). Operation is subject to the following two conditions.

- 1 This device may not cause interference.
- 2 This device must accept any interference, including interference that may cause undesired operation of the device.

#### Text in English

This radio transmitter (IC: 5637A-M144M2OEM) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for the type, are strictly prohibited for use with this device.

This device has been designed to operate with the antenna(s) listed below, and having a maximum gain of 6 dB. Antennas not included in this list or having a gain greater than 6 dB, are strictly prohibited for use with this device.

The required antenna impedance is 50 ohms.

Supported antennas:

- MBR 144 OEM antennas (MBR-E-ANTxx)

#### Texte en Français

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes.

- 1 L'appareil ne doit pas produire de brouillage.
- 2 L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillard est susceptible d'en compromettre le fonctionnement.

#### Texte en Français

Le présent émetteur radio (IC: 5637A-M144M2OEM) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Cet appareil a été conçu pour fonctionner avec les antennes listées ci-dessous et ayant un gain maximum de 6 dB. Les antennes non incluses dans cette liste, ou ayant un gain supérieur à 6 dB, sont strictement interdites pour l'exploitation de l'émetteur.

L'impédance d'antenne requise est de 50 ohms.

Antennes supportées:

- Antennes OEM MBR 144 (MBR-E-ANTxx)

## Exposure statement

To comply with FCC or IC RF exposure limits for general population or uncontrolled exposure, the antenna(s) used for this transmitter must be installed on outdoor permanent structures in order to provide a separation distance at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

This product contains a radio transmitting device. According to the output power of the equipment, the minimum distance for human beings in a controlled environment is:

- **Maximum power/ETSI EN 303 276:** 40 cm
- **FCC part 15.407:** 20 cm

## Health and safety

Operation or troubleshooting of this equipment will not imply any risk for high voltages, explosions or exposure to gas. The equipment complies with IEC 61010-1/EN 61010-1 standards regarding product safety.

## Network security

If a MBR 144 OEM system is connected to a local area network, data security is important.

Equipment manufactured by Kongsberg Seatex is frequently connected to the vessel's local area network (LAN). When you connect a computer to a local area network you will always expose the data on that computer. All other computers connected to the same network may be able to access your data. Several threats may immediately occur:

- Remote computers can read the data.
- Remote computers can change the data.
- Remote computers can change the behavior of the computer, for example by installing unwanted software.

Usually, two parameters are used to define the threat level:

- 1 The likelihood that any remote computer will do any of the above.
- 2 The damage done if a remote computer succeeds doing this.

Kongsberg Seatex has no information regarding the complete system installation on any vessel. Systems provided by Kongsberg Seatex are regarded as stand-alone offline systems. They are stand-alone even though they may be connected to a network for sensor interfaces and/or data distribution.

**Note**

---

*No network safety applications are installed on Kongsberg Seatex computers. The computers are therefore not protected against viruses, malware or unintentional access by external users.*

---

Securing the MBR 144 OEM system itself has no meaning unless there is a policy in place that secures all computers in the network. This policy must include physical access by trained and trusted users. The customer/end user of the MBR 144 OEM system will always be in charge of defining and implementing a security, policy and providing the relevant network security applications.

**Note**

---

*Kongsberg Seatex will not accept any responsibility for errors and/or damages caused by unauthorized use of or access to the MBR 144 OEM.*

---

## Support information

If you need technical support for your MBR 144 OEM system you must contact your local dealer, or one of our support offices.

- **Company name:** Kongsberg Seatex AS
- **Address:** Havnegata 9, 7010 Trondheim, Norway
- **Telephone:** +47 73 54 55 00
- **Telephone, 24h support:** +47 33 03 24 07
- **E-mail address:** km.support.seatex@km.kongsberg.com
- **Website:** <http://www.kongsberg.com/maritime>



# Operation

## Topics

[Getting started, page 15](#)

[Operating procedures, page 19](#)

[User preference procedures, page 29](#)

[User interface, page 30](#)

[Functions and dialog boxes, page 36](#)

## Getting started

### Topics

[Turning on the Radio Unit, page 15](#)

[Enabling contact with the Radio Unit, page 16](#)

[Defining the IP address on the computer's network adapter, page 17](#)

## Turning on the Radio Unit

The Radio Unit is turned on when the power connector is inserted in the power source on the vessel. The system power is controlled from the power source.

### Context

The software is pre-installed and the system will start automatically after it has been turned on.

### Procedure

- 1 Make sure that the Ethernet cable is properly connected.

- 2 Insert the power connector into the power source on the vessel. 24 V DC.
- 3 To turn off the Radio Unit, simply remove the power connector.

### Result

The system is now ready for configuration.

### Related topics

[Enabling contact with the Radio Unit, page 16](#)

[Defining the IP address on the computer's network adapter, page 17](#)

[Setting to work summary, page 56](#)

## Enabling contact with the Radio Unit

To be able to set up and communicate with the Radio Unit you must enable contact with the unit via a browser.

### Prerequisites

In order to set up the Radio Unit you need these items.

- Computer with an Ethernet adapter.
- Up-to-date browser. For example Chrome or Firefox.

The IP address of the Radio Unit is found on a label at the rear of the unit.

You must define which IP Address and Subnet mask the Ethernet adapter in the computer shall use for this communication.

### Context

You only need the computer for configuration or re-configuration purposes.

### Note

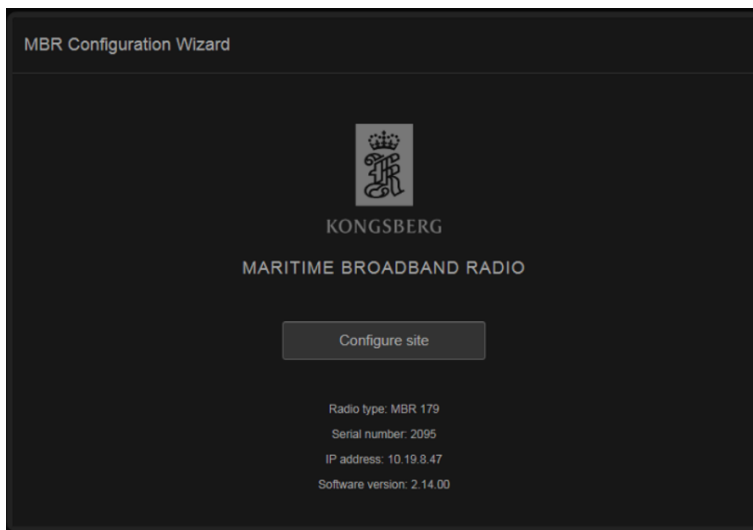
---

*The **MBR Configuration Wizard** page only appears the first time you set up your site. After the configuration is completed, the web interface takes you directly to the **Main** view.*

---

### Procedure

- 1 Set up the computer with:
  - **IP Address:** 10.19.127.10
  - **Subnet mask:** 255.255.0.0
- 2 Connect the computer to the Radio Unit via Ethernet.
- 3 Type the IP address of the Radio Unit in the browser address bar.  
Observe that the **MBR Configuration Wizard** page appears.



For previously configured systems the **Main** view appears.

## Result

You are now connected to the web interface on your local radio.

## Related topics

[Turning on the Radio Unit, page 15](#)

[Defining the IP address on the computer's network adapter, page 17](#)

[Setting up the radio site for operation, page 19](#)

[MBR Configuration Wizard, page 38](#)

[Setting to work summary, page 56](#)

## Defining the IP address on the computer's network adapter

You must define which IP Address and Subnet mask the Ethernet adapter in the computer shall use for this communication. As long as you do not replace the computer or the network adapter, you only need to do this once.

## Prerequisites

This procedure is made for the Microsoft® Windows® 7 and 10 operating systems. It is assumed that you are familiar with the Windows® operating systems, computer technology, and interface principles.

## Procedure

- 1 Close all the programs that are running on the computer.
- 2 Open the **Network Connections** dialog box.

This procedure is made for the Microsoft® Windows® 10 operating system.

- a In the bottom-left corner of your desktop, select the Windows® search function.

- b In the search box, type "Network Connections", and open the **Network Connections** dialog box.
- c Right-click the network adapter you are going to use and select **Properties** on the shortcut menu.
- d On the list of connections, select **Internet Protocol 4 (TCP/IPv4)**, and then **Properties**.

This procedure is made for the Microsoft® Windows® 7 operating system.

- a In the bottom-left corner of your desktop, select the Windows® **Start** button.
  - b On the right-hand side of the **Start** menu, select **Control Panel**.
  - c Observe that the Control Panel opens.
  - d Select **Network and Sharing Center**.  
(If the Control Panel is shown with categories, select **View network status and tasks**.)
  - e On the left-hand menu, select **Change adapter settings**.
  - f Click once on your network adapter to select it, then right-click and select **Properties** on the shortcut menu.
  - g On the list of connections, select **Internet Protocol 4 (TCP/IPv4)**, and then **Properties**.
- 3 Select **Use the following IP address**, and type the IP address and network mask.
    - IP Address: **10.19.127.10**
    - Subnet mask: **255.255.0.0**
  - 4 Select **OK** to save the selected settings, and then close all the dialog boxes.

#### **Related topics**

[Turning on the Radio Unit, page 15](#)

[Enabling contact with the Radio Unit, page 16](#)

[Setting up the radio site for operation, page 19](#)

[Setting to work summary, page 56](#)

# Operating procedures

## Topics

[Setting up the radio site for operation, page 19](#)

[Joining a wireless network, page 23](#)

[Editing an existing radio network, page 24](#)

[Adding or removing equipment, page 26](#)

[Enabling the embedded MBR link crypto, page 27](#)

[Checking the status of the MBR network, page 28](#)

## Setting up the radio site for operation

The setup is done using a wizard. The **MBR Configuration Wizard**. A *radio site* is one or several radio units connected together by a local Ethernet connection at the same location. A *radio network* is a wireless network of radio sites. You must set up the radio site before you can start the radio network configuration. All configuration of the MBR 144 OEM Maritime Broadband Radio (MBR) is done through the web interface.

## Prerequisites

The IP address for the Radio Unit is located on a label at the rear of the unit. You must have enabled contact with the Radio Unit.

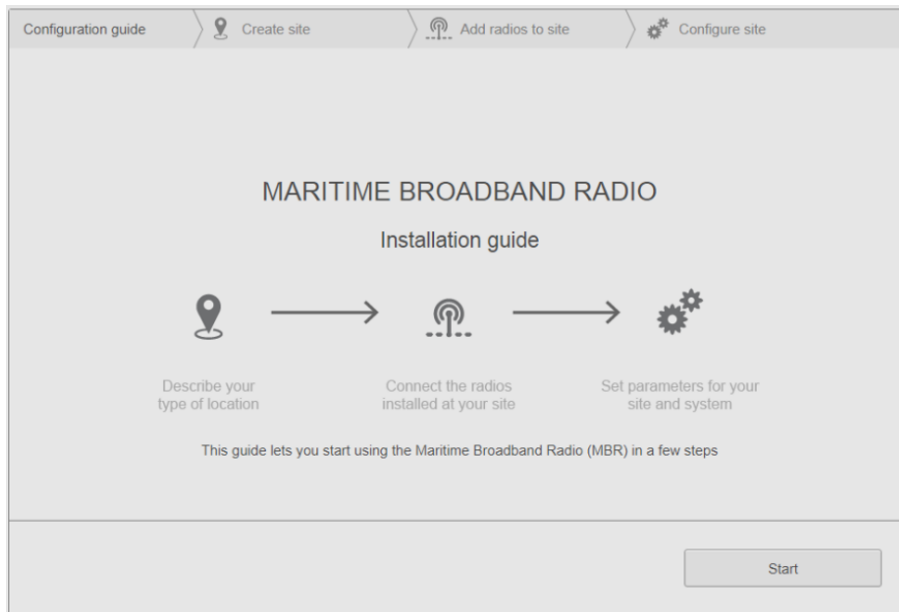
The IP address and the MAC address for the third party equipment must be known.

## Context

The MBR 144 OEM Maritime Broadband Radio (MBR) uses static layer 2 bridging (OSI model - Open Systems Interconnection Basic Reference Model). It needs both the IP address and the MAC address of the equipment in order to establish an IP connection over the wireless network.

## Procedure

- 1 On the **MBR Configuration Wizard** page, which appears after you have enabled contact with the Radio Unit, select **Configure site** to start the installation wizard.



## Note

---

*The default colour palette setting is with dark background. If your current light conditions require white background, select the white colour palette in the **Palette** group.*

---

- 2 Select **Start** on the **Configuration guide** page to start the step-by-step configuration of your radio site.

- 3 Type a suitable name for your radio site and select **Continue**.

The screenshot shows the 'Create site' step in a configuration guide. The breadcrumb trail at the top is 'Configuration guide > Create site > Add radios to site > Configure site'. The main text says: 'A radio site is one or several radio units connected together by Ethernet on one location. Enter a name for your site (e.g. name of your vessel)'. Below this is a text input field labeled 'Name of site' containing the text 'MS Vessel'. At the bottom are 'Back' and 'Continue' buttons.

- 4 Select the radios you want to add to the site. Type a description of the location of the Radio Unit. Select **Continue**.

**Note**

*Radio units connected on the local Ethernet will appear automatically. They are by default selected.*

The screenshot shows the 'Add radios to site' step. The breadcrumb trail is 'Configuration guide > Create site > Add radios to site > Configure site'. The site name 'MS Vessel' is shown at the top. The instruction says: 'Select the radios you would like to add to your site'. Below this is a table of available radios:

Available radios		Description	
<input checked="" type="checkbox"/>	MBR 189 Snr. 8888	<input type="button" value="Details"/>	<input type="text" value="Port"/>
<input checked="" type="checkbox"/>	MBR 179 Snr. 9999	<input type="button" value="Details"/>	<input type="text" value="Mast"/>

At the bottom are 'Back' and 'Continue' buttons.

- 5 Type the radio frequency. Select the data rate for the radio site from the **Rate** list.

Configuration guide > Create site > Add radios to site > Configure site

**MS Vessel**

Frequency [MHz]  
5862

Rate [Mbps]  
8.5

**Radios**

Port  
MBR 189 Snr. 8888 Details

Mast  
MBR 179 Snr. 9999 Details

Local Host	IP
Radio 2095	10.19.8.47
MBR Config PC	10.19.0.5

Manage Local Host List

Back Cancel Finish

- 6 Select **Manage Local Host List** to open the **Local Host List** dialog box. This is where you add the equipment to your radio site which shall be available in the wireless network.

Local Host List

IP address	Type	Description (Optional)	MAC address
--	Generic	--	<input checked="" type="radio"/> IP <input type="radio"/> MAC
<div>Add</div>			
10.19.8.47	Radio	Radio 2095	<input checked="" type="radio"/> <input type="radio"/> ×
10.19.0.5	PC	MBR Config PC	<input checked="" type="radio"/> <input type="radio"/> ×

Check stored MAC Close



- 7 Type the IP address of the equipment you want to connect. Select type of equipment from the **Type** list. Type a description of the equipment for identification purposes.

If the equipment is switched on, the MAC address appears automatically. If not, type the MAC address. Select **Add** to add the equipment.

**Note**

---

*You can add and/or change information later by selecting the equipment, making the changes and selecting **Update**. You can also delete equipment by selecting the **X** symbol at the end of the line.*

---

- 8 Continue for all the equipment you want to add. Select **OK** to save the selected setting and close the dialog box.
- 9 Select **Finish** to complete your radio site configuration.

## **Result**

The **Main** view appears and you are now ready to start using the radios.

## **Related topics**

[Enabling contact with the Radio Unit, page 16](#)

[Defining the IP address on the computer's network adapter, page 17](#)

[Configuration guide, page 38](#)

[Create site, page 39](#)

[Add radios to site, page 40](#)

[Configure site, page 41](#)

[Setting to work summary, page 56](#)

## Joining a wireless network

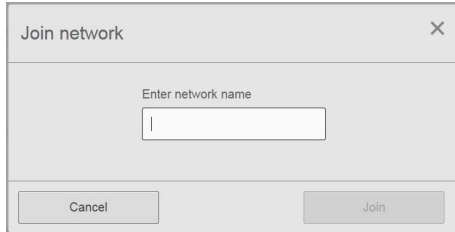
You must join the wireless network which you want your site to be a part of. If another radio site has created a new wireless network, you might want to join this network.

## **Context**

If you are out of range of the wireless network at the time you carry out this procedure, the radio will automatically detect the wireless network and establish a connection when you are within reach of this network.

## Procedure

- 1 On the **System** menu —> **Network**, select **Join** to open the **Join network** dialog box.



- 2 Type the name of the wireless network you want to join.

### Note

*The wireless network name is in upper case.*

---

- 3 Select **Join** to join the wireless network.

## Related topics

[Setting to work summary, page 56](#)

[Join network, page 48](#)

## Editing an existing radio network

During operation you might want to administer and make changes to the wireless network. If a new site has been established or you want to change the distribution of resources.

## Prerequisites

A wireless network must have been set up previously.

## Context

The site ID is equal to the serial number of the Radio Unit. For multiple-panel sites, the site ID is equal to the lowest serial number.

## Procedure

- 1 On the **System** menu —> **Network**, select **Edit** to open the **Edit network** dialog box.

**Edit network**

**Parameters**

Network

MBR-NET

Open resource [%]

0

**Participants**

Add by site ID

Enter site ID Add

Site	Resource distribution
MS Vessel (You)	50%
MS Boat	50%

Resource management Cancel Update

- 2 If you want, type a new site name in the **Add by site ID** box. Select **Add** to add a new site to the existing network.
- 3 If you want to change the bandwidth resources, or the superframe length for the wireless network, select **Resource management** to enter the **Resource management** dialog box.  
If you want to adjust the superframe, type the wanted **Superframe length**. Type the wanted **Resource distribution** in the Site list.

### Note

*For Superframe length it is recommended to use 50 – 100 ms. However, for special applications the superframe can be adjusted. This will affect the data throughput.*

- 4 Select **OK** to store the bandwidth settings and return to **Edit network**.
- 5 Select **Update** to save the network settings.

## Related topics

[Edit network, page 45](#)

[Resource management, page 46](#)

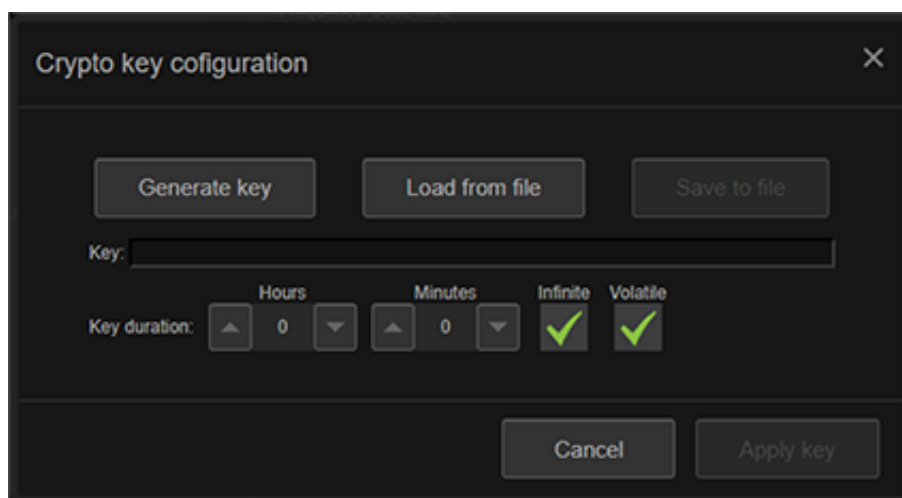


## Enabling the embedded MBR link crypto

Here you can generate, upload or download the symmetrical crypto keys for the MBR embedded link crypto. The same crypto key must be entered on all radios in the same wireless network so the radios can communicate with each other.

### Context

The crypto key length is 56 bits. The crypto key can be set to **infinite** duration or a time specific duration. The **Volatile** option specifies whether the key is stored in the MBR configuration indefinitely, or if the key is lost on the next power cycle, or until the key is re-configured.



### Procedure

- 1 On the **System** menu, select **Crypto**.
- 2 Select **Generate key** if you want to generate a new key. Select **Load from file** if you want to upload a crypto key from a text file.
- 3 Set a specific duration for the crypto key or select **Infinite** if you do not want an expiry date for the key.
- 4 Select **Volatile** if you want indefinite storage of the key.
- 5 Select **Apply key** to save the setting.

### Related topics

[Crypto key configuration](#) , page 48

## Checking the status of the MBR network

During operation you can check the status of the local radio site, the remote site(s) and the entire network of radio sites.

### Prerequisites

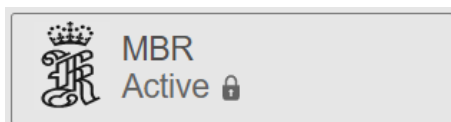
The radio site(s) must have been set up for operation. If not, there is no status information to display.

### Context

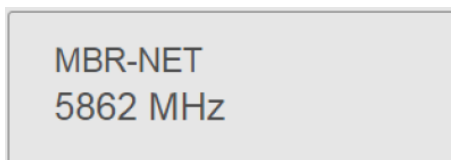
The status information is located to the left of the Main view. It is easily visible to the operator.

### Procedure

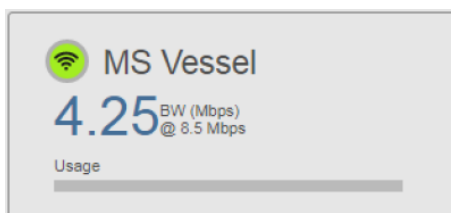
- 1 Look at the system status information to view the status about your local site.  
The status is **Active** when the radio site is set up for operation. The status is **Not configured** when the radio site is not set up for operation.



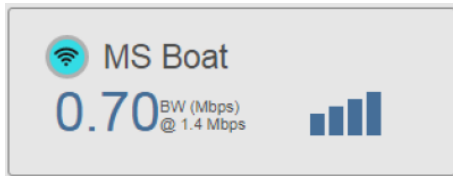
- 2 Look at the network information to view the status of the current radio network.  
The current name and the frequency of the network are displayed.



- 3 Look at the **Site list** to view information about each site in the radio network.  
The **Site list** holds information about your local site and remote radio sites.



**BW** indicates the bandwidth resource allocated to the local radio site. The **Usage** bar indicates the instantaneous usage of the bandwidth resource.



**BW** indicates the bandwidth resource allocated to the remote radio site. The signal strength bar indicates the signal strength of each local site.

### Related topics

[System status, page 49](#)

[Network status, page 49](#)

[Individual radio site status, page 50](#)

[Display organisation, page 30](#)

## User preference procedures

### Topics

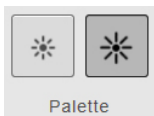
[Selecting colour palette for display, page 29](#)

### Selecting colour palette for display

You can select a colour scheme for the display which suits your current light conditions.

#### Context

The **Palette** function provides colour schemes for the display presentation. Two palettes are available. Day black and Day white.



#### Procedure

- 1 Select **Palette** on the **System** menu.
- 2 Select the colour scheme you want to use.

# User interface

## Topics

[Operational principles, page 30](#)

[Display organisation, page 30](#)

[Display views, page 31](#)

## Operational principles

The MBR 144 OEM has a graphical configuration and user interface. Use a mouse and keyboard to navigate, select and operate the system.

The MBR 144 OEM is operated and configured from the **System** menu.

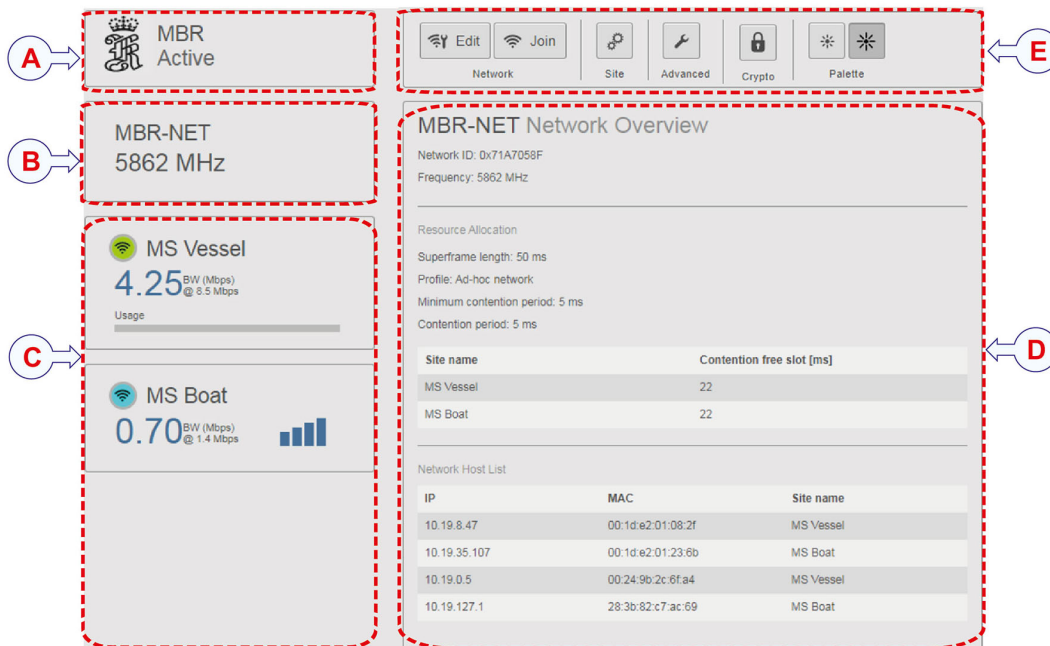
## Related topics

[Menu system, page 37](#)

## Display organisation

The display is made up of five main parts. Information boxes with information about the status of the overall system, the networks and the radio sites to the left. A **System menu**, from which you operate and configure the system, at the top. Below the **System menu** various views will appear, depending on which of the information boxes to the left are selected. These views contain more detailed information about the overall system, the networks and the local radio sites.





- A System status:** *It shows the overall radio system status.*
- B Network information:** *It shows the name and frequency of the current network.*
- C Site list:** *A list of radio sites in the current network.*
- D Status information views:** *Three views may appear here, depending on which box is selected to the left. System Overview, Network Overview or Local Site information.*
- E System menu:** *It provides various system settings and operational functions.*

### Related topics

[Checking the status of the MBR network, page 28](#)

## Display views

### Topics

[System Overview view, page 32](#)

[Network Overview view, page 33](#)

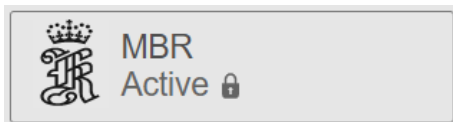
[Local Site view, page 34](#)

## System Overview view

The *System Overview* view shows all sites in the wireless network. It also shows the radio serial number, signal margin, distance and data age for every site.

### How to open

Select the **System status** box to the left in the **Main** view.



### Example

System Overview				
Remote sites on network				
<input type="checkbox"/> Expand multipanel sites				
Site name	Serial number	Signal margin [dB]	Distance [m]	Age [s]
MS Boat	9067	65.9	7.5	0.10

## Details

### Expand multipanel sites

This option applies to sites with more than one Radio Unit (panel). Select this option to show more information about the other Radio Units which belong to this multipanel site.

### Site name

This is the name of the remote radio sites in the network.

### Serial number

This is the serial number of the radios on each individual remote site.

### Signal margin [dB]

This is the receiver signal margin for the remote radio site (s).

### Distance [m]

This is the distance in metres to the remote radio site(s).

### Age [s]

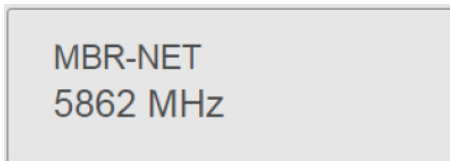
This is the age of the data which are shown for this site.

## Network Overview view

The *Network Overview* view is useful to monitor details about the wireless network. It shows the network parameters and the Network Host List. The Network Host List is the combination of all the Local Host Lists in the wireless network.

### How to open

Select the **Network status** box to the left in the **Main** view.



### Example

#### MBR-NET Network Overview

Network ID: 0x71A7058F  
Frequency: 5862 MHz

---

Resource Allocation

Superframe length: 50 ms  
Profile: Ad-hoc network  
Minimum contention period: 5 ms  
Contention period: 5 ms

Site name	Contention free slot [ms]
MS Vessel	22
MS Boat	22

---

Network Host List

IP	MAC	Site name
10.19.8.47	00:1d:e2:01:08:2f	MS Vessel
10.19.35.107	00:1d:e2:01:23:6b	MS Boat
10.19.0.5	00:24:9b:2c:6f:a4	MS Vessel
10.19.127.1	28:3b:82:c7:ac:69	MS Boat

## Details

### Network ID

This is the hexadecimal value of the network name used for identifying that each radio is on the same logical network.

### Frequency

This is the configured operating frequency of the network.

### Superframe length

This is the length of the repeating superframe of bandwidth allocation in milliseconds.

### Profile

This is the current network profile.

### Minimum contention period

This is the minimum contention period in the superframe. It shows the percentage of the bandwidth which is an open resource. Open resource is a contention-based multiple access protocol which allows radio sites to communicate without having a fixed allocated time slot.

### Contention period

It shows the contention period in milliseconds. Contention period is also called Open period, and is a contention-based multiple access protocol which allows radio sites to communicate without having a fixed allocated time slot.

### Site name

This is the name of the radio sites in the wireless network.

### Contention free slot [ms]

This is the reserved transmission time for a radio site.

### IP

This is the IP (internet protocol) address of the equipment in the Network Host List.

### MAC

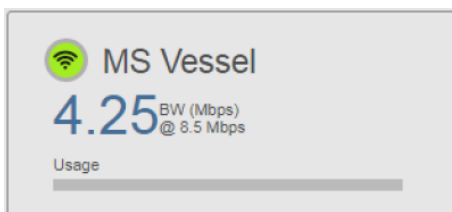
This is the MAC (media access control) address of the equipment in the Network Host List.

## Local Site view

The *Local Site* view is useful to monitor information about the local radio site. It shows local site setup parameters and information about sent and received datagrams.

### How to open

Select the **Local site** box to the left in the **Main** view.



## Example

MS Vessel Local Site

Radios on site: 9194

Data rate [Mbps]	Contention free slot length [ms]	Crypto status	Relay
8.5	47	Bypass	Off

Transmit Status

Transmit utilisation [%]	Transmit [kbps]	Sent IP frames	Sent wireless headers	Transmit busy
0	0	1080	1080	0

Frames Dropped

No link	Link busy	MAC busy
0	0	0

Received Status

Received headers	Received datagrams	Checksum errors
0	0	0

## Details

### Data rate [Mbps]

This is the configured data rate.

### Contention free slot length [ms]

This is the configured reserved transmission time for the local site.

### Crypto status

This is the status of the link crypto functionality.

### Relay

This shows the status of the relay functionality for this site, if the relay functionality has been enabled.

### Transmit utilisation [%]

This is the current transmission utilisation percentage of the allocated resource (contention free slot).

### Transmit [kbps]

This is the current transmission in kbps.

### Sent IP frames

This is the number of sent IP frames from this site.

**Sent wireless headers**

This is the number of wireless frames sent from this site (IP frames and management data).

**Transmit busy**

This shows the number of datagrams currently in queue for transmission.

**No link**

This shows the frames which have not been sent due to no link.

**Link busy**

This shows the frames which have not been sent due to a full transmission queue.

**MAC busy**

This shows the frames which have not been sent due to a busy MAC (media access control) controller.

**Received headers**

This is the counter for received wireless headers.

**Received datagrams**

This is the counter for received decoded datagrams.

**Checksum errors**

This is the counter for Checksum errors.

## Functions and dialog boxes

**Topics**

[Menu system, page 37](#)

[MBR Configuration Wizard, page 38](#)

[Configuration guide, page 38](#)

[Create site, page 39](#)

[Add radios to site, page 40](#)

[Configure site, page 41](#)

[Local Host List, page 43](#)

[Status, page 44](#)

[Edit network, page 45](#)

[Resource management, page 46](#)

[Join network, page 48](#)

[Crypto key configuration , page 48](#)

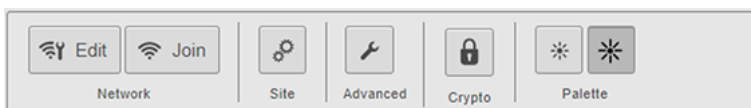
[System status, page 49](#)

[Network status, page 49](#)

[Individual radio site status, page 50](#)

## Menu system

The **System** menu is always visible at the top of the display. The menu provides various system settings and operational functions.



The **System** menu provides access to four groups of functions.

### Network

**Network** allows you to join an existing network or edit an existing network.

### Site

**Site** allows you to configure the radio site. Select **Site** to return to the configuration of your radio site. Here you can update the frequency, the data rate the third party equipment for the local radio site. You can also see the radio details for the radios on the local site.

### Advanced

**Advanced** contains a web page with a set of advanced functions, tuning and diagnostics. These settings are for experienced users only. They are not intended for use under normal conditions. Therefore, they are not described in this document.

### Crypto

**Crypto** opens the **Crypto key configuration**. Here you can generate, upload or download the symmetrical crypto keys for the MBR embedded link crypto.

### Palette

**Palette** provides you with colour schemes for the display presentation. Select the colour scheme which suits your light conditions.

## Related topics

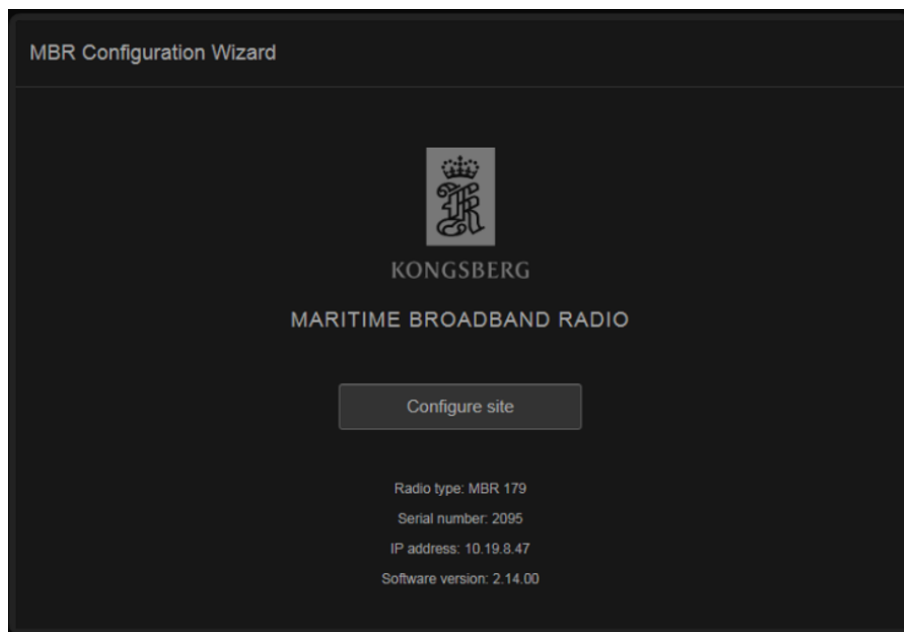
[Operational principles, page 30](#)

## MBR Configuration Wizard

The **MBR Configuration Wizard** page is the start page of your radio unit configuration. It only appears when the radio site is not configured. It is either the first time the radio is started, or after configuration is reset.

### How to open

The **MBR Configuration Wizard** page appears when you have enabled contact with the radio unit via the web interface.



### Details

#### Configure site

Select the **Configure site** button to open the installation wizard. The wizard takes you through the step-to-step configuration of your radio site.

#### Related topics

[Enabling contact with the Radio Unit, page 16](#)

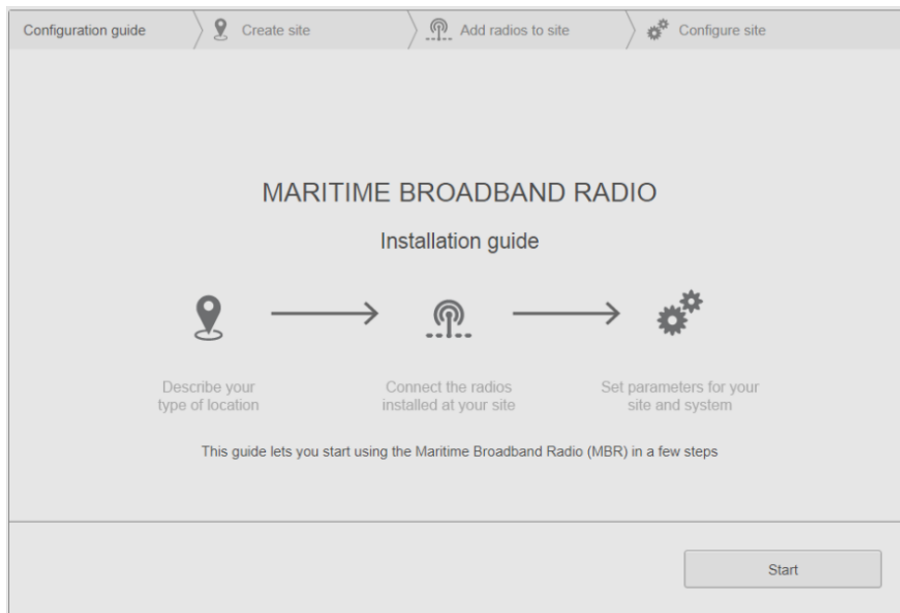
## Configuration guide

An installation wizard takes you through the setup of the radio site. The **Configuration guide** page is the first page in the step-to-step configuration of your radio site.

### How to open

Select the **Configure site** button on the **MBR Configuration Wizard** page to open the installation wizard.





## Details

### Start

Select the **Start** button to start the step-to-step configuration of your radio site.

### Related topics

[Setting up the radio site for operation, page 19](#)

## Create site

Here you can type the name of your radio site.

### How to open

This page is step 2 in the step-to-step configuration of your radio site.

The screenshot shows a web-based configuration interface. At the top, there is a navigation bar with four steps: 'Configuration guide', 'Create site', 'Add radios to site' (which is the active step, indicated by a radio icon), and 'Configure site' (indicated by a gear icon). Below the navigation bar, the main content area has a light gray background. It contains the following text: 'A radio site is one or several radio units connected together by Ethernet on one location.' followed by 'Enter a name for your site (e.g. name of your vessel)'. In the center, there is a text input field with the label 'Name of site' above it. The input field contains the text 'MS Vessel'. At the bottom of the form, there are two buttons: 'Back' on the left and 'Continue' on the right.

### Details

#### Name of site

Type a suitable name for your radio site. This name will be displayed in the **Site list** and in the **Network** view.

#### Related topics

[Setting up the radio site for operation, page 19](#)

## Add radios to site

Here you can add radios to your radio site.

#### How to open

This page is step 3 in the step-to-step configuration of your radio site.

The screenshot shows a web-based configuration interface for a radio site. At the top, there is a progress bar with four steps: 'Configuration guide', 'Create site', 'Add radios to site' (the current step), and 'Configure site'. Below the progress bar, the site name 'MS Vessel' is displayed. The main instruction is 'Select the radios you would like to add to your site'. There are two columns: 'Available radios' and 'Description'. Under 'Available radios', there are two entries: 'MBR 189 Snr. 8888' and 'MBR 179 Snr. 9999'. Each entry has a green checkmark icon and a 'Details' button. Under 'Description', there are two text input fields: 'Port' and 'Mast'. At the bottom of the form, there are 'Back' and 'Continue' buttons.

## Details

### Available radios

This is a list of available radios. Radio units connected on the local Ethernet will appear automatically. They are by default selected.

### Details

Select the **Details** button to open the radio **Status** box. This dialog box shows the serial number, product version, configured values and diagnostics for the Radio Unit.

### Name/description

Here you can type a description of the location of the Radio Unit.

## Related topics

[Setting up the radio site for operation, page 19](#)

[Status, page 44](#)

## Configure site

Here you can set the frequency, the data rate and select third party equipment for the local radio site. You can also see the radio details for the radios on the local radio site. This is also where you make changes to the radio site setup.

## How to open

This is the last page in the step-to-step configuration of your radio site.

Configuration guide

Create site

Add radios to site

Configure site

MS Vessel

Frequency [MHz]  
5862

Rate [Mbps]  
8.5

Radios

Port  
MBR 189 Snr. 8888  
Details

Mast  
MBR 179 Snr. 9999  
Details

Local Host	IP
Radio 2095	10.19.8.47
MBR Config PC	10.19.0.5

Manage Local Host List

Back

Cancel

Finish

Details

Frequency

This is the operating frequency of the radio site.

Rate

This is the operating data rate of the radio site.

Radios

This is a list of radios which are added to the radio site.

Details

Select the **Details** button to open the radio **Status** box. This dialog box shows the serial number, product version, configured values and diagnostics for the Radio Unit.

Local Host & IP

The **Local Host List** shows the current host name(s) and associated IP addresses in the Local Host List.

Manage Local Host List

This button opens the **Local Host List** dialog box. Here you can manage equipment which is connected to the radio site.

Related topics

[Setting up the radio site for operation, page 19](#)

[Local Host List, page 43](#)

[Status, page 44](#)

## Local Host List

In the **Local Host List** dialog box you can manage equipment connected to your radio site. It contains a list of equipment where the radio site provides IP connectivity in the MBR network.

### How to open

This dialog box is opened from the **Configure site** page.

IP address	Type	Description (Optional)	MAC address
--	Generic	--	<input type="radio"/> MAC
<div>Add</div>			
10.19.8.47	Radio	Radio 2095	<input checked="" type="radio"/>
10.19.0.5	PC	MBR Config PC	<input checked="" type="radio"/>

### Details

#### IP Address

This is the IP address of the equipment you want to add to your radio site.

#### Type

This is a drop-down list of various metadata information about the equipment which can be useful to add to your radio site. For example computers and motion sensors.

#### Description

Here you can type a name which describes the equipment you want to add to your radio site. When you type in this box, the **Add** button becomes active.

#### MAC address

This is the MAC (media access control) address of the equipment you want to add to your radio site. The circle becomes green when a MAC address is found

automatically for the entered IP address. Select the **MAC** button to change or view the MAC address.

#### Check store MAC

Select this button if you want to recheck the MAC address for every equipment added to the list in order to verify current status on the local network.

#### Related topics

[Adding or removing equipment, page 26](#)

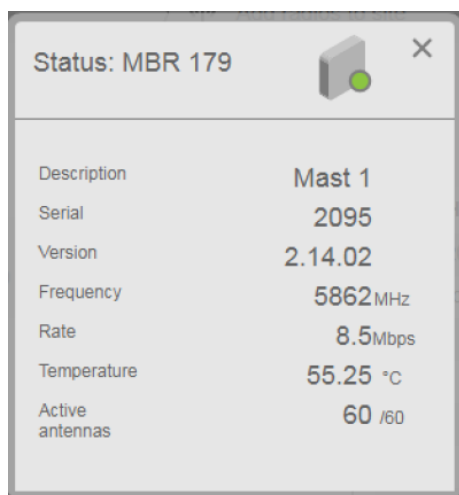
[Configure site, page 41](#)

## Status

The radio **Status** box shows the serial number, product version, configured values and diagnostics for the Radio Unit.

#### How to open

This box is opened by selecting the **Details** button in the **Add radio to site** page or the **Configure site** page in the step-to-step configuration.



#### Details

##### Description

This is the description of the location of the current Radio Unit.

##### Serial

This is the serial number of the Radio Unit.

##### Version

This is the software version of the Radio Unit.

##### Frequency

This is the operating frequency of the Radio Unit.

**Rate**

This is the configured data rate for the Radio Unit.

**Temperature**

This is the internal temperature of the Radio Unit.

**Active antennas**

This is the number of active antenna elements.

**Related topics**

[Add radios to site, page 40](#)

[Configure site, page 41](#)

[Checking the product version, page 64](#)

## Edit network

**Edit network** allows you to edit the wireless network.

**How to open**

This dialog box is opened from the **System** menu.

Site	Resource distribution
MS Vessel (You)	50%
MS Boat	50%

**Details****Network**

This is the name of the current wireless network.

### **Open resource**

It shows the percentage of the bandwidth which is an open resource. Open resource is a contention-based multiple access protocol which allows radio sites to communicate without having a fixed allocated time slot.

### **Add by site ID**

You can add a radio site to the site list of the network by typing the site ID for the remote site.

### **Site list and resource distribution**

They show all sites in the current network with the same network name and the resource distribution between the radio sites.

### **Resource management**

This button opens the **Resource management** dialog box. This is where you can change the resource distribution between the radio sites.

### **Related topics**

[Editing an existing radio network, page 24](#)

[Resource management, page 46](#)

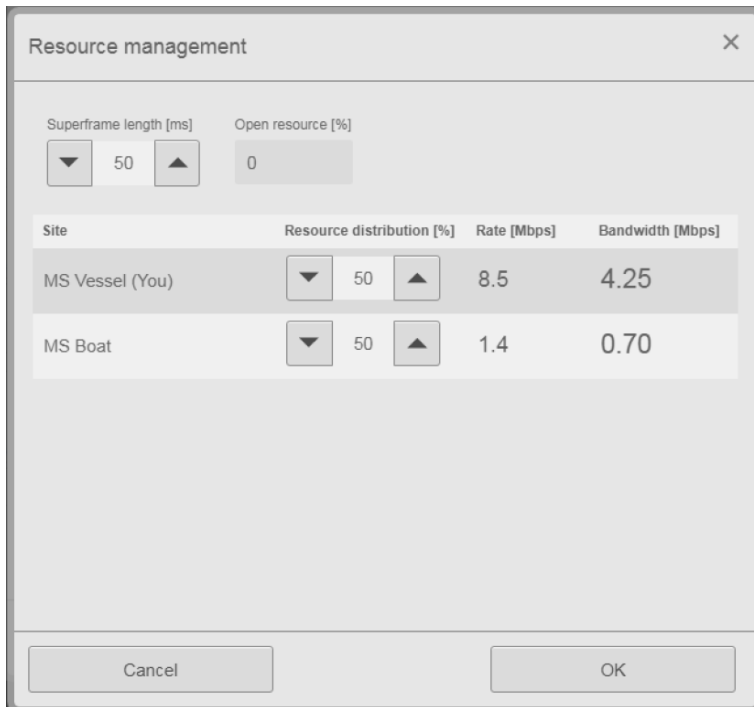
## **Resource management**

**Resource management** allows you to change the resource distribution between the radio sites in the radio network.

### **How to open**

This dialog box is opened from the **Edit network** dialog box.





The dialog box titled "Resource management" contains the following elements:

- Superframe length [ms]:** A dropdown menu showing "50" with up and down arrow buttons.
- Open resource [%]:** A text input field containing "0".
- Table:**

Site	Resource distribution [%]	Rate [Mbps]	Bandwidth [Mbps]
MS Vessel (You)	50	8.5	4.25
MS Boat	50	1.4	0.70
- Buttons:** "Cancel" and "OK" buttons at the bottom.

## Details

### Superframe length

This is the length of the repeating superframe of bandwidth allocation in milliseconds.

### Open resource

It shows the percentage of the bandwidth which is an open resource. Open resource is a contention-based multiple access protocol which allows radio sites to communicate without having a fixed allocated time slot.

### Site list and resource distribution

They show all sites in the current network with the same network name and the resource distribution between the radio sites.

### Rate

This is the operating data rate of the radio site.

### Bandwidth

It shows the bandwidth of the radio site for the selected resource distribution and the data rate.

## Related topics

[Editing an existing radio network, page 24](#)

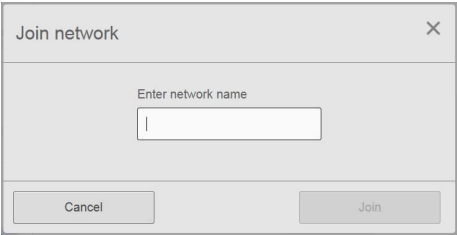
[Edit network, page 45](#)

## Join network

The **Join network** dialog box allows you to join an existing MBR network (Maritime Broadband Radio) by typing the network name.

### How to open

This dialog box is opened from the **System** menu.



### Details

#### Enter network name

This is the name of the wireless network you want to join. The wireless network name is in upper case.

### Related topics

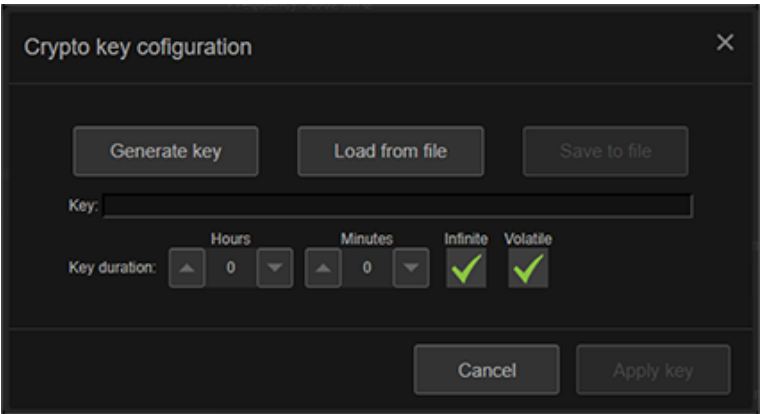
[Joining a wireless network, page 23](#)

## Crypto key configuration

The MBR link crypto encrypts the wireless link with the use of 56-bit symmetrical keys. The same crypto key must be entered on all radios in the same wireless network so the radios can communicate with each other.

### How to open

Select the **Crypto** button on the **System** menu to open the dialog box.



## Details

### Generate key

Select this button to generate a new crypto key.

### Load from file

Select this button if you want to upload a crypto key from a text file.

### Key

Here you can type the crypto key manually.

### Save to file

Select this option if you want to save a crypto key to a text file.

### Key duration

Here you can set a specific duration for the crypto key.

### Infinite, Volatile

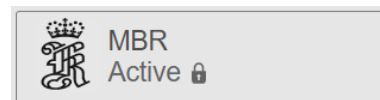
If you select **Infinite**, the key has no expiry date. If you select **Volatile**, the key is not active after the next power cycle.

## Related topics

[Enabling the embedded MBR link crypto, page 27](#)

## System status

The **System status** shows the status for the local radio site. The status is **Active** when the radio site is configured. The status is **Not configured** when the radio site is not configured.



The **System status** is located to the left in the **Main** view.

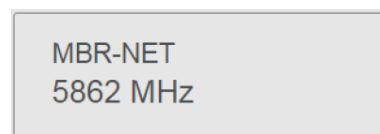
The padlock symbol indicates that a crypto key has been enabled.

## Related topics

[Checking the status of the MBR network, page 28](#)

## Network status

The **Network status** shows the current network name and the frequency of the network. The Network status is located to the left in the **Main** view.



## Related topics

[Checking the status of the MBR network, page 28](#)

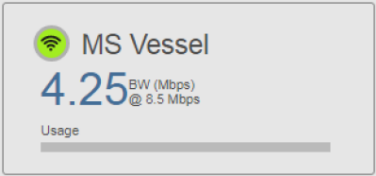
# Individual radio site status

The **Site list** contains information about each radio site in the network. Both for local and remote radio sites.

The **Site list** is located to the left in the **Main** view.

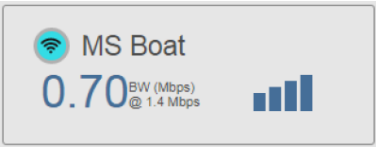
## Local radio site

The site name for the local radio site is displayed.  
**BW** indicates the bandwidth resource allocated to the local site. The **Usage** bar indicates the usage of the bandwidth resource.



## Remote radio site

The site name for the remote radio site(s) is displayed.  
**BW** indicates the bandwidth resource allocated to the remote site. The signal strength bar indicates the signal strength of each local site.



## Related topics

[Checking the status of the MBR network, page 28](#)

# Installation

## Topics

[Preparations, page 51](#)

[Arranging the antennas, page 52](#)

[Installing the Radio Unit, page 54](#)

[Cable layout and interconnections, page 55](#)

[Setting to work summary, page 56](#)

## Preparations

### Topics

[Mechanical drawings, page 51](#)

[Necessary tools and equipment, page 52](#)

[Radio Unit location, page 52](#)

[Radio Unit power requirements, page 52](#)

## Mechanical drawings

Outline dimension drawings are included in this manual.

Unless otherwise specified, all measurements are in millimetres. The drawings are not to scale.

### Related topics

[Radio Unit dimensions, page 58](#)

## Necessary tools and equipment

We assume that you are equipped with a standard set of tools. This tool set must comprise the normal tools for electronic and electromechanical tasks. This includes different screwdriver types, pliers, spanners, a cable stripper, a soldering iron, etc. Each tool must be provided in various sizes. We recommend that all tools are demagnetized to protect your equipment.

We recommend a 21 Ncm torque wrench to tighten the antenna connectors.

Unless otherwise stated, all mounting hardware (such as bolts, nuts, washers, screws etc.) referred to in this document is to be supplied by the customer or the shipyard.

An external computer is required for configuration of the Radio Unit through a web interface. You also need a computer if you want to change the configuration later.

## Radio Unit location

Correct location of the Radio Unit is important for the system performance. Consider these factors when installing the unit.

- Mount the Radio Unit in such a way that external cooling through the bottom aluminium plate is possible.
- Do not mount on heat-insulating surfaces.
- Use a stable power source with correct voltage. Maximum power consumption is 25 W.

### Related topics

[Installing the Radio Unit, page 54](#)

## Radio Unit power requirements

The Radio Unit must be powered by a dedicated power supply.

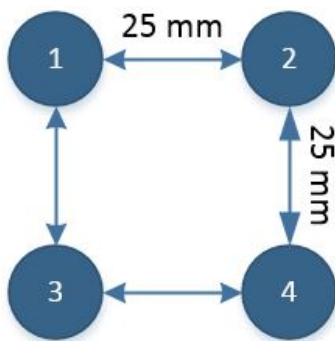
## Arranging the antennas

The four antennas constitute the antenna array. They can be arranged in a position that works best for your installation. There are three suggested ways to arrange the antenna array.

As the antenna array is self-calibrating, the antenna arrangement is flexible. You can safely select which of the three arrangements will best suit your operation.

### Quadratic array

Arrange the antennas in a square with 25 mm space between the antennas.



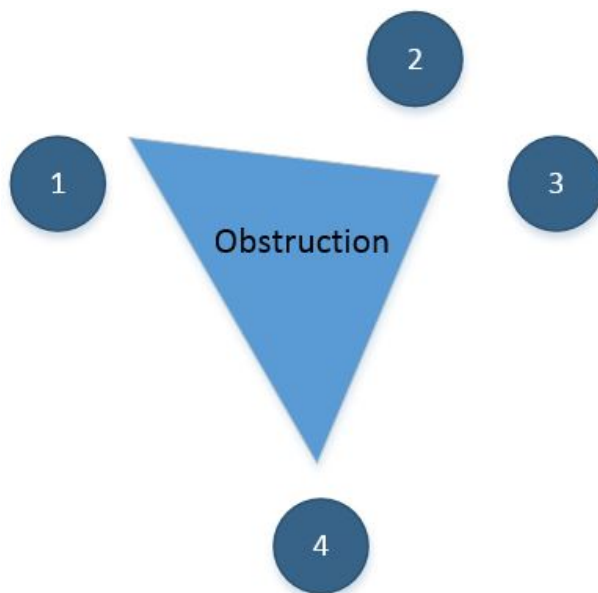
### Linear array

Arrange the antennas in a straight line with 25 mm space between the antennas.



### Distributed array

If you have a situation where an obstruction will cause shadowing of the signal in a particular direction, it is better for the signal margin to arrange the antennas around the obstruction.



### Related topics

[Installing the Radio Unit, page 54](#)

## Installing the Radio Unit

Mount the Radio Unit on a flat surface which allows for heat transfer.

### Prerequisites

Thermal paste or thermal pad for the aluminium bottom plate. M3 screws which fit the mounting surface. Torque wrench 21 Ncm to tighten the antenna connectors.

### Context

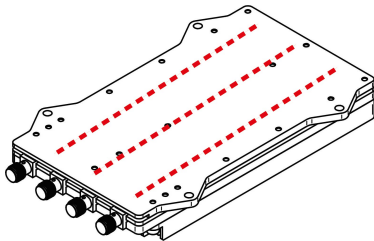
The Radio Unit has four mounting holes which must be used when mounting the unit.

The Radio Unit is connected to external equipment with the Ethernet end of the combined Ethernet and power cable. This cable is attached to the Radio Unit by a connector.

### Procedure

- 1 Find a suitable location for the Radio Unit according to your environment.
- 2 Apply thermal paste or a thermal pad to the bottom of the Radio Unit.

This is to prevent overheating of the Radio Unit.



- 3 Place the Radio Unit on a flat surface which allows for heat transfer.
- 4 Use the mounting holes and fasten the Radio Unit to the surface with for M3 screws.
- 5 Mount the four antennas according to one of the antenna arrangements.
- 6 Connect the antennas to the Radio Unit.  
Use a torque wrench to tighten the SMA antenna connectors.
- 7 Connect the Combined Ethernet and power cable to the connector on the Radio Unit.
- 8 Connect the Ethernet end of the cable to the user equipment.
- 9 Connect the power end of the cable to a power source on the vessel.

### Related topics

[Radio Unit dimensions, page 58](#)

[Arranging the antennas, page 52](#)

[Cable layout and interconnections, page 55](#)

[Radio Unit location, page 52](#)



## Cable layout and interconnections

The cable connections for the Radio Unit consists of:

- Combined Ethernet and power cable from the Radio Unit to user equipment.
- Four SMA antenna connectors.

The cable connector type is LEMO FGL.1B.308.CLLD72.

### Radio Unit Ethernet and power connector

Pin no.	Description/Cable colours
1	DC+
2	ETH Green/White
3	ETH Orange
4	DC-
5	DC-
6	ETH Orange/White
7	ETH Green
8	DC+
Cable screen	GroundShield

### Ethernet connector at user end

RJ-45 Pin no. (T-568B assignment)	Description/Cable colours
1	Orange/White
2	Orange
3	Green/White
4	Not connected
5	Not connected
6	Green
7	Not connected
8	Not connected

### Related topics

[Installing the Radio Unit, page 54](#)

## Setting to work summary

When all hardware units have been installed, and all the cables have been connected, the Radio Unit can be turned on and set to work.

### Procedure

- 1 Turn on the Radio Unit.
- 2 Enable contact with the Radio Unit.
- 3 Configure the radio site.
- 4 Join a radio network.

### Related topics

[Turning on the Radio Unit, page 15](#)

[Enabling contact with the Radio Unit, page 16](#)

[Defining the IP address on the computer's network adapter, page 17](#)

[Setting up the radio site for operation, page 19](#)

[Joining a wireless network, page 23](#)

# Drawings

## Topics

[About drawings, page 57](#)

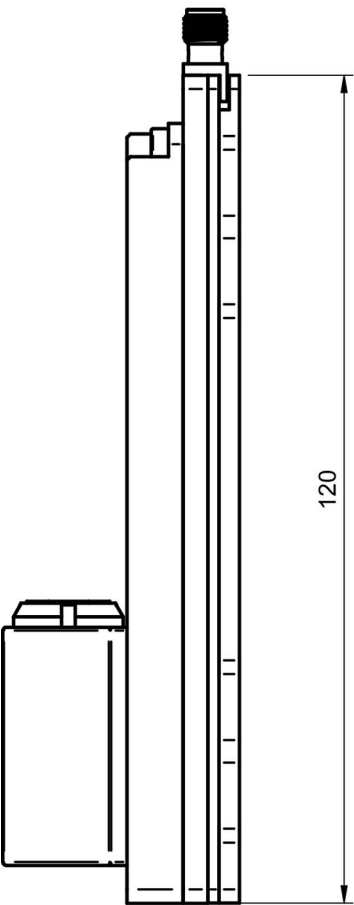
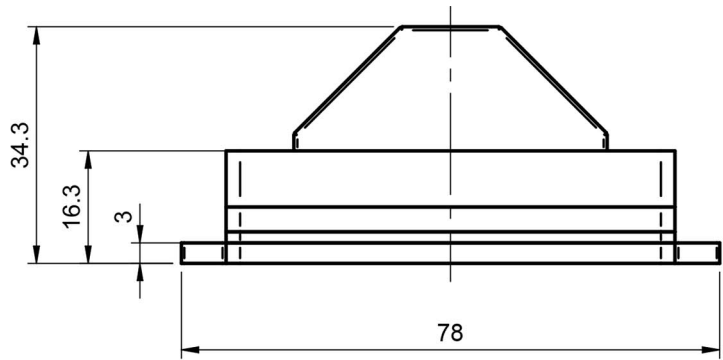
[Radio Unit dimensions, page 58](#)

## About drawings

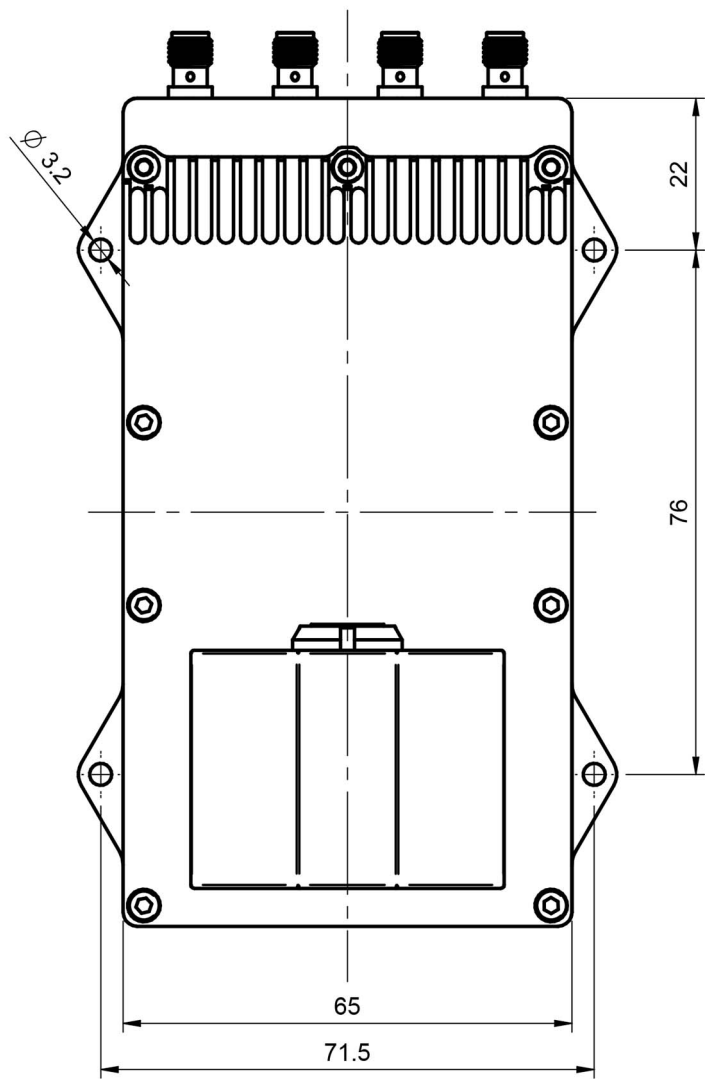
These drawings are for information and planning purposes only.

Unless otherwise specified, all measurements are in millimetres. The drawings are not to scale.

# Radio Unit dimensions



All measurements in mm.  
The drawing is not to scale.



# Technical specifications

## Topics

[Performance specifications, page 59](#)

[Interface specifications, page 59](#)

[Frequency specifications, page 60](#)

[Weights and outline dimensions, page 61](#)

[Power specifications, page 61](#)

[Environmental specifications, page 61](#)

[Standards and regulations, page 62](#)

[Manufacturer's conformity declaration, page 63](#)

## Performance specifications

These performance specifications summarize the main functional and operational characteristics of the MBR 144 OEM.

- **Operating range:** 20 km (Dependent on antenna placement and height).
- **User data:** 0.7 – 16.5 Mbps
  - Available rates: 0.7, 1.4, 2.8, 8.5, 16.5 Mbps
- **Antenna coverage:** 360 degrees azimuth, omnidirectional

## Interface specifications

The system will interface with external systems and sensors via Ethernet.

The MBR 144 OEM product is available in two versions.

### **MBR 144 OEM**

- **Ethernet/LAN:** 1 Port

### **MBR 144 OEM 2ETH**

- **Ethernet/LAN:** 2 Ports

## **Frequency specifications**

The radio frequency specifications summarize the frequency specifications for the receivers in the system.

- **Frequency range:**
  - **Frequency overall tuning range:** 4900 MHz - 5900 MHz  
Configurable range for the single 20 MHz channel.
  - **Frequency range ETSI EN 303 276:** 5852 and 5890 MHz
  - **Frequency range FCC part 15.407:** 5725 – 5850 MHz
- **Channel bandwidth:** 20 MHz
- **TX power:**
  - **HW Maximum:** Up to 2 W
  - **ETSI EN 303 276:** Up to 2 W
  - **FCC part 15.407:** Up to 1 W
- **Maximum EIRP:**
  - **HW Maximum:** 39 dBm
  - **ETSI EN 303 276:** 39 dBm
  - **FCC part 15.407:** 36 dBm
- **Modulation:** GMSK
- **Antenna gain:** 6 dBi
- **Antenna elements:** 4

### **Related topics**

[Radio frequency license, page 10](#)

## Weights and outline dimensions

These weights and outline dimension characteristics summarize the physical properties of the MBR 144 OEM.

### Radio Unit

- **Outline dimensions:**
  - **Height Radio Unit:** 35 mm
  - **Width Radio Unit:** 78 mm
  - **Length Radio Unit:** 120 mm (excl. SMA connectors)
- **Weight:**
  - **Weight – Radio Unit:** 260 g (excl. cable and antennas)
  - **Weight – Antennas 30 cm:** 95 g (4 pcs)
  - **Weight – Antennas 60 cm:** 160 g (4 pcs)
  - **Weight – Antennas 100 cm:** 255 g (4 pcs)
  - **Weight – Power and Ethernet cable 100 cm:** 65 g

## Power specifications

These power characteristics summarize the supply power requirements for the MBR 144 OEM system.

- **Voltage:** 12 – 24 V DC
- **Power consumption:** 25 W (maximum)
- **Idle:** 6 W

### Note

---

*Use a dedicated power supply or battery to power the Radio Unit.*

---

## Environmental specifications

These environmental specifications summarize the temperature and humidity specifications for the MBR 144 OEM.

- **Enclosure material:** Aluminium
- **Operating temperature:** -30 °C – 55 °C
- **Operating humidity:** 20 – 100 % RH

- **Storage humidity:** 20 – 70 % RH
- **Ingress protection (IP) code:** IP41

## Standards and regulations

This product is in compliance with relevant directives and product standards.

- **Radio Equipment Directive (RED) 2014/53/EU:**
  - Electromagnetic compatibility:
    - \* ETSI EN 301 843-1
    - \* ETSI EN 301 843-7
    - \* IEC 60945/EN 60945
  - Radio spectrum:
    - \* ETSI EN 303 276
  - Product safety:
    - \* IEC 61010–1/EN 61010–1
- **Environmental standards:**
  - IEC 60945/EN 60945
- **Radiation hazard standards:**
  - EN 50385



## Manufacturer's conformity declaration

This product is in compliance with relevant directives and product standards.



KONGSBERG

### EU DECLARATION OF CONFORMITY

Manufacturer's name: **Kongsberg Seatex AS**

Manufacturer's address: **Havnegata 9, N-7010 Trondheim, Norway**

**declares that the product:**

Product name: **Maritime Broadband Radio (MBR) and FishNet**

Model number: **MBR 144 OEM, MBR 144 Personal, MBR 144 Submersible and FishNet 144**

is in conformity with the **Radio Equipment Directive, RED, 2014/53/EU** and with reference to ETSI guide **ETSI EG 203 367**, using relevant sections of the following product standards:

Health and Safety (Article 3.1(a)) **EN 61010-1:2010/IEC 61010-1:2010**

EMC (Article 3.1(b) (Radio)) **EN 301 489-17 V3.1.1, EN 301 489-01 V2.1.1**

EMC (Article 3.1(b) (Radio)) **EN 60945:2002**

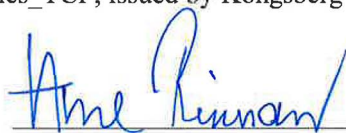
Spectrum (Article 3.2) **EN 301 893 V2.1.1 (parts of)**

Further, the product is compliant to RoHS Directive **2011/65/EU** with reference to standard **EN 50581:2012**.

**Test references**

Technical File: MBR\_144\_Series\_TCF; issued by Kongsberg Seatex AS.

Date and signature  
2018-10-19

  
Arne Rinnan, CTO

# Maintenance

## Topics

[Checking the product version, page 64](#)

[Updating the system software, page 64](#)

[Repairing the Radio Unit, page 65](#)

## Checking the product version

For software updates, or contact with customer support, it is useful to know the product version of the Radio Unit.

### Procedure

- 1 On the **System** menu, select **Site** to enter the **Configure site** page.
- 2 Under **Radios**, select the **Details** button for the radio for which you want to see the product version.  
Observe that the radio **Status** box appears. Here you can see both the serial number and the product version of the Radio Unit.
- 3 Close the dialog box by selecting **[X]** in the upper-right corner.

### Related topics

[Status, page 44](#)

## Updating the system software

We recommend that you keep your product updated with the latest software version.

With the newest product software you will be able to enjoy the latest features and functionalities.

You will either be contacted, or receive the software upon request, when updates are available.

Software updates will be made available for download. The software updated package includes the necessary files and procedures you need for update the product software.

**Related topics**

[Support information, page 14](#)

## Repairing the Radio Unit

The Radio Unit is not designed for repair in the field. All repairs and modifications of the unit, except for installation of new software versions and system setup, must be done by qualified personnel. A failed Radio Unit should be shipped back to Kongsberg Seatex AS or other agreed service point for repair.

**Related topics**

[Support information, page 14](#)

# Equipment handling

## Topics

[Taking delivery, page 66](#)

[Unpacking and handling, page 66](#)

[Storage, page 67](#)

[Disposal, page 67](#)

## Taking delivery

When the equipment arrives at its destination:

- Perform an inspection immediately to register any damage that may have occurred in transit.
- If you find any damage, both the insurance company and the shipping agent must be informed immediately.

## Unpacking and handling

Care should be taken when unpacking and handling the equipment. A visual inspection should be made to check that the equipment has not been damaged during shipment and that all components and parts are present according to the packing list.

The equipment contains delicate electronic components – handle with care and avoid shocks.

The equipment can be lifted by hand.

## Storage

After the equipment in the boxes has been inspected and it has been verified that no damage has occurred, the equipment must be stored in its original packaging until the time of installation. The storage premises must be dry and well protected.

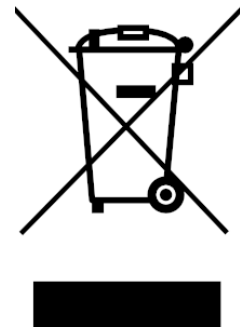
### Related topics

[Environmental specifications, page 61](#)

## Disposal

At the end of the product lifetime, all Kongsberg Seatex AS products must be disposed of in an environmentally-friendly way.

All electrical and electronic components must be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or local authorities. The correct disposal and separate collection of your old appliance will help prevent potential negative consequences for the environment and human health. This is a precondition for reuse and recycling of used electrical and electronic equipment. For more detailed information about disposal of your old appliance, please contact your local authorities or waste disposal service.



All disposal of mechanical, electromechanical, electronic and chemical waste - including all types of batteries - must take place according to national and international rules and regulations. Observe the relevant Waste Electrical and Electronic Equipment (WEEE) regulations.

The equipment can be returned to Kongsberg Seatex AS if there is no local WEEE collection. The equipment is marked with this waste pictogram.

# Index

## A

about	
maintenance .....	7
product license .....	7
purpose of this manual .....	7
target audience .....	7
Add radios to site dialog box	
description .....	40
adding equipment .....	26
additional required items	
not provided with the delivery .....	10
antenna array	
distributed .....	52
linear .....	52
quadratic .....	52
antennas	
how to arrange .....	52
arranging the antennas .....	52
audience	
this manual .....	7

## B

basic items	
provided with the delivery .....	10
book	
purpose .....	7
target audience .....	7
box	
radio Status box description .....	44

## C

checking individual site status .....	28
checking network status .....	28
checking system status .....	28
choosing display colour palette .....	29
colour palette	
how to choose .....	29
configuration	
set up radio site for operation .....	19
Configuration guide dialog box	
description .....	38
Start button .....	39
Configuration Wizard page	
description .....	38
Configure site dialog box	
description .....	41
conformity declaration	
Radio Unit .....	63
connecting	
external devices .....	54
Create site dialog box	
description .....	39
crypto key	
setting .....	27
crypto key configuration dialog box	
description .....	48

## D

description	
Add radios to site dialog box .....	40
Configuration guide dialog box .....	38
Configuration Wizard page .....	38
Configure site dialog box .....	41
Create site dialog box .....	39
crypto key configuration dialog box .....	48
Edit network dialog box .....	45
Join network dialog box .....	48
Local Host List dialog box .....	43
Local radio site status dialog box .....	50
Local Site view .....	34
Network Overview view .....	32
Network status dialog box .....	49
radio Status box .....	44
Remote radio site status dialog box .....	50
Resource management dialog box .....	46
system .....	8
System menu .....	37
System Overview view .....	33
System status dialog box .....	49
diagram	
system .....	9
dialog box	
Add radios to site dialog box description .....	40
Configuration guide dialog box description .....	38
Configure site dialog box description .....	41
Create site dialog box description .....	39
crypto key configuration .....	48
Edit network dialog box description .....	45
Join network dialog box description .....	48
Local Host List dialog box description .....	43
Local radio site status dialog box description .....	50
Network status dialog box description .....	49
Remote radio site status dialog box	
description .....	50
Resource management dialog box	
description .....	46
System status dialog box description .....	49
dialog boxes	
System menu .....	37
dimensions	
Radio Unit .....	58, 61
display	
colour palette .....	29
how it is organised .....	30
display organisation .....	30
disposal	
of equipment .....	67
distributed antenna array .....	52

## E

Edit network dialog box	
description .....	45
editing existing radio network .....	24
enabling contact with Radio Unit .....	16
environmental specifications	
Radio Unit .....	61

- 
- equipment
- disposal ..... 67
  - how to add or remove ..... 26
  - storage ..... 67
  - taking delivery ..... 66
  - unpacking ..... 66
  - WEEE waste handling ..... 67
- equipment handling ..... 66
- Ethernet and power cable
- pin layout ..... 55
- Ethernet interface
- network adapter ..... 17
- F**
- FCC identification number ..... 11
- frequency
- radio frequency interference ..... 11
  - specifications ..... 60
- functions
- System menu ..... 37
- G**
- guarantee
- restrictions ..... 10
- H**
- handling
- WEEE waste ..... 67
- hazard
- radiation hazard ..... 13
- health, safety, environment ..... 13
- how to
- add or remove equipment ..... 26
  - arrange the antennas ..... 52
  - check individual site status ..... 28
  - check network status ..... 28
  - check system status ..... 28
  - connect external devices ..... 54
  - edit existing network ..... 24
  - enable contact with Radio Unit ..... 16
  - find product version ..... 64
  - install Radio Unit ..... 54
  - join a wireless network ..... 23
  - repair Radio Unit ..... 65
  - set the crypto key ..... 27
  - set to work ..... 56
  - set up radio site for operation ..... 19
  - turn on Radio Unit ..... 15
  - upgrade the operational software ..... 64
- how to open
- System menu ..... 37
- I**
- identification
- FCC ..... 11
  - Industry Canada (IC) ..... 11
- individual site status
- how to check ..... 28
- Industry Canada (IC) identification number ..... 11
- information
- support ..... 14
- installing
- Radio Unit ..... 54
- interference
- radio frequency ..... 11
- internet
- network security ..... 13
- IP address
- network adapter ..... 17
- IP Address
- network adapter ..... 17
- J**
- join network
- how to ..... 23
- Join network dialog box
- description ..... 48
- K**
- Kongsberg Seatex AS
- support ..... 14
- L**
- license
- product license ..... 7
  - radio frequency ..... 10
- linear antenna array ..... 52
- Local Host List dialog box
- description ..... 43
- Local radio site status dialog box
- description ..... 50
- Local Site view
- description ..... 34
- location
- Radio Unit ..... 52
- M**
- main items
- provided with the delivery ..... 10
- maintenance ..... 7
- manual
- purpose ..... 7
  - target audience ..... 7
- MBR 144 OEM
- system diagram ..... 9
- menu
- System menu description ..... 37
  - System menu functions and dialog boxes ..... 37
- N**
- network
- how to edit existing network ..... 24
- network adapter
- IP Address ..... 17
  - IP address for transceiver communication ..... 17
  - Subnet mask ..... 17
- Network Overview view
- description ..... 32
- network security ..... 13

network status	
how to check .....	28
Network status dialog box	
description .....	49

## O

open	
System menu .....	37
operation	
joining a wireless network .....	23
operational principles .....	30
operational software	
upgrading .....	64
outline dimensions	
Radio Unit .....	61

## P

page	
Configuration Wizard page description .....	38
pages	
System menu .....	37
performance	
specifications .....	59
pin layout	
Ethernet and power cable .....	55
power	
requirements .....	52
specifications .....	61
power specifications	
Radio Unit .....	61
procedure	
adding or removing equipment .....	26
checking individual site status .....	28
checking network status .....	28
checking system status .....	28
connect peripheral equipment .....	54
editing existing network .....	24
enabling contact with Radio Unit .....	16
how to choose colour palette .....	29
how to find product version .....	64
installing Radio Unit .....	54
interfacing external devices .....	54
joining a wireless network .....	23
repairing Radio Unit .....	65
setting the crypto key .....	27
setting to work .....	56
setting up radio site for operation .....	19
turning on Radio Unit .....	15
upgrading the operational software .....	64
product	
regulations .....	62
standards .....	62
product license .....	7
product safety .....	13
product version	
finding .....	64
publication	
purpose .....	7
target audience .....	7
purpose	
this manual .....	7

## Q

quadratic antenna array .....	52
-------------------------------	----

## R

radiation hazard .....	13
radio frequency	
interference .....	11
license .....	10
specifications .....	60
radio site	
setup .....	19
radio Status box	
description .....	44
Radio Unit	
conformity declaration .....	63
dimensions .....	58
environmental specifications .....	61
how to enable contact .....	16
how to repair .....	65
installing .....	54
outline dimensions .....	61
power specifications .....	61
select location .....	52
turning on .....	15
reader	
this manual .....	7
regulations	
product regulations .....	62
Remote radio site status dialog box	
description .....	50
removing equipment .....	26
repairing	
Radio Unit .....	65
required items	
not provided with the delivery .....	10
requirements	
power .....	52
Resource management dialog box	
description .....	46
restrictions	
guarantee .....	10

## S

safety	
product safety .....	13
scope of supply	
basic items .....	10
required items not provided with the delivery .....	10
security	
network .....	13
setting	
crypto key .....	27
setting to work	
procedures .....	56
size	
Radio Unit .....	61
software	
upgrading .....	64
version .....	7
specification	
environmental Radio Unit .....	61
power Radio Unit .....	61



specifications		software	64
frequency	60	<b>V</b>	
performance	59	version	
power	61	finding product version	64
radio frequency	60	software	7
standard items		view	
provided with the delivery	10	Local Site	34
standard tools		Network Overview	32
installation of system units	52	System Overview	33
standards		<b>W</b>	
product standards	62	waste	
Start button		handling	67
Configuration guide dialog box	39	WEEE (Waste Electrical and Electronic Equipment)	67
status of individual site			
how to check	28		
status of network			
how to check	28		
status of system			
how to check	28		
storage			
of equipment	67		
Subnet mask			
network adapter	17		
support			
Kongsberg Seatex AS	14		
support information	14		
system			
description	8		
diagram	9		
System menu			
description	37		
functions and dialog boxes	37		
how to open	37		
System Overview view			
description	33		
system software			
upgrading	64		
system status			
how to check	28		
System status dialog box			
description	49		
<b>T</b>			
taking delivery			
of equipment	66		
target audience			
this manual	7		
technical requirements			
power	52		
technical specifications			
performance	59		
this manual			
purpose	7		
target audience	7		
tools			
installation of system units	52		
turning on			
Radio Unit	15		
<b>U</b>			
unpacking			
equipment	66		
upgrading			

©2021 Kongsberg Seatex