NOKIA

468962A.505_NOLSD
Nokia MetroSite EDGE BTS, Release 5

Warnings and Cautions

The information in this documentation is subject to change without notice and describes only the product defined in the introduction of this documentation. This documentation is intended for the use of Nokia's customers only for the purposes of the agreement under which the documentation is submitted, and no part of it may be reproduced or transmitted in any form or means without the prior written permission of Nokia. The documentation has been prepared to be used by professional and properly trained personnel, and the customer assumes full responsibility when using it. Nokia welcomes customer comments as part of the process of continuous development and improvement of the documentation.

The information or statements given in this documentation concerning the suitability, capacity, or performance of the mentioned hardware or software products cannot be considered binding but shall be defined in the agreement made between Nokia and the customer. However, Nokia has made all reasonable efforts to ensure that the instructions contained in the documentation are adequate and free of material errors and omissions. Nokia will, if necessary, explain issues which may not be covered by the documentation.

Nokia's liability for any errors in the documentation is limited to the documentary correction of errors. NOKIA WILL NOT BE RESPONSIBLE IN ANY EVENT FOR ERRORS IN THIS DOCUMENTATION OR FOR ANY DAMAGES, INCIDENTAL OR CONSEQUENTIAL (INCLUDING MONETARY LOSSES), that might arise from the use of this documentation or the information in it.

CE

CE 0523 ⓘ	Hereby, Nokia Corporation, declares that this product is in compliance with the essential requirements and other relevant provisions of Directive: 1999/5/EC. The product is marked with the CE marking and Notified Body number according to the Directive 1999/5/EC
FCC	FCC §15.21 - Information to user - This product is used as an intentional radiated equipment and any changes or modifications on the equipment without any approval by Nokia could void the user"s authority to operate the equipment.

FCC §15.105 - Information to user - This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Contents

List of tables

List of figures

1 About this document

This document details the safety precautions to be followed when working with the Nokia MetroSite EDGE Base Station. The instructions in *Nokia MetroSite EDGE Base Station: Installation* and *Nokia MetroSite EDGE Base Station: Maintenance* must be followed when installing the Nokia MetroSite EDGE Base Station and performing any maintenance on it. Failure to follow these instructions may be dangerous to the installation and maintenance personnel.

1.1 Safety guidelines

The safety guidelines are designed as follows:

- Warnings alert the reader to dangers which may cause loss of life, physical injury or ill health. The symbol denoting a warning is presented below.

Warning

This is a warning!

- Cautions are used to denote possible damage to equipment but not dangers to personnel. The symbol denoting a caution is presented below.

Caution

This is a caution!

2 Warnings

2.1 Personnel

Installation, commissioning and maintenance measures for any Nokia Base Station (BTS) may be performed only by trained and authorized personnel. The Nokia MetroSite EDGE Base Station must be installed so that only authorized personnel have access to its sensitive parts.

Warning

Always prevent unauthorized personnel from accessing the Nokia MetroSite EDGE Base Station.

2.2 Dangerous voltage

Potentially lethal voltages are present within this system. For more information on grounding and on the power supply, refer to *Nokia MetroSite EDGE Base Station: Requirements for Installation and Operation.*

The symbol shown in the *Dangerous voltage symbol* Figure denotes dangerous voltage. The Nokia MetroSite EDGE Base Station is labelled with this symbol.

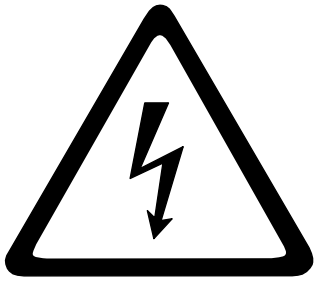

Figure 1. Dangerous voltage symbol

Warning

Make sure that applicable high voltage safety precautions are taken before attempting to work on the system with the power connected!

Warning

Potentially lethal voltages can be induced if the equipment is not grounded correctly. Ensure that all ground connections are secure and non-removable!

Warning

An electrical plug with a ground connection is not sufficient as it can be pulled off. There is a possibility of surge voltage through the transmission lines in the case of lightning.

Warning

Connect the Nokia MetroSite BTS to the main grounding busbar of the site! Electrical currents from power and communication cables are dangerous.

Warning

Ensure that the ground connection is established before an AC or DC power outlet is connected to the BTS! Ensure that the ground connection is removed only after the AC or DC power outlet is disconnected!

Warning

The power switch of the Nokia MetroSite EDGE Base Station does not disconnect it from the power network (AC/DC). The power switch of the Nokia MetroSite EDGE Base Station power supply unit has two positions: ON and stand-by.

A separate main switch on the site is considered to be the disconnect device for safety and service purposes.

The symbol shown in the *Stand-by symbol on the power supply unit* Figure is used to denote the stand-by position of the power supply unit power switch.

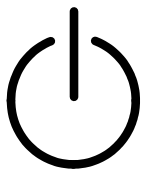

Figure 2. Stand-by symbol on the power supply unit

Warning

Do not rely on the power switch alone to isolate a supply. When switching OFF the Nokia MetroSite EDGE Base Station, make sure that the power supply is completely isolated by setting the power switch to OFF (including the site mains power switch), disconnecting all relevant connectors, and removing all relevant fuses!

Warning

The site mains power switch must be turned OFF before connecting the mains power cable to the Nokia MetroSite EDGE Base Station!

When using an external synchronisation source, make sure that the ground for the Nokia MetroSite EDGE Base Station and for the device supplying the synchronisation signal are at the same ground potential. If this is not the case, make sure that the synchronisation cable shield is capacitively grounded at the supply end.

2.3 Weight

Warning

The Nokia MetroSite EDGE Base Station weighs 28 to 40 kg (62 to 88 lb) depending on the number of TRXs. Lifting of the fully equipped BTS requires at least two people.

2.4 High temperatures

The symbol shown in the *Hot surface symbol* Figure denotes a hot surface. Equipment whose surface reaches high temperatures is labelled with this symbol.

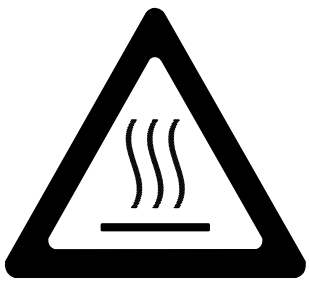

Figure 3. Hot surface symbol

Warning

During operation, the interior of the Nokia MetroSite EDGE Base Station reaches a temperature of 60° to 80°C (140° to 176°F).

2.5 Toxic hazards

2.5.1 Beryllium oxide

Some components in the Nokia MetroSite EDGE Base Station use beryllium oxide (BeO), which can be harmful to human health.

Beryllium oxide is used in:

- Power amplifiers
- RF transistors (isolator internal load)

Note

5W GSM/EDGE transceiver units (WTxx type) do not contain beryllium oxide but 5W GSM transceiver units (HVTxx type) do contain beryllium oxide. See the document *Nokia MetroSite EDGE Base Station: Product Description* for more information on transceiver unit types.

The equipment containing BeO carries a beryllium oxide warning label, as shown in the *Beryllium oxide warning label* Figure.

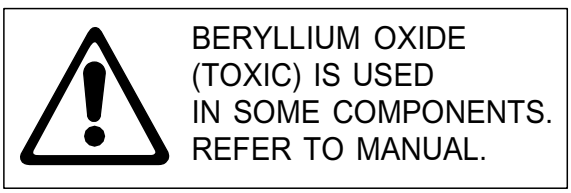

Figure 4. Beryllium oxide warning label

Warning

Personnel who handle, use or dispose of components containing BeO should be aware of its nature and of the necessary safety precautions. Beryllium oxide is released into the air if the components containing it are damaged.

Warning

The sub assemblies or components in units containing BeO must not under any circumstances be subjected to mechanical strain that might damage the components and thereby release beryllium oxide into the air.

Warning

The components containing BeO must never be thrown out with general or domestic waste. Dispose of the equipment in the manner appropriate to chemical or special waste, and according to the local regulations!

2.6 Electromagnetic fields and RF power

The Nokia MetroSite EDGE Base Station generates electromagnetic radiation. This can exceed safety levels very close to the antennas. Personnel must observe the general guidelines presented in the *General Guidelines* Section, and calculate and apply the minimum safety distance as shown in the *Formula for minimum safety distances* Section.

2.6.1 General guidelines

Warning

Do not disconnect the antenna when the BTS is transmitting!

Warning

This equipment generates electromagnetic radiation which can exceed safety levels when a person is working in very close proximity to the antennas. Calculate and observe the minimum safety distance precautions when working in close proximity to antennas operating at full power!

Warning

Electromagnetic radiation can leak from loose or improperly connected antenna connectors. Personnel must ensure that antenna connectors are properly connected when carrying out procedures such as installation and commissioning and must not touch unshielded connectors when RF power is on.

Warning

Do not install the Nokia MetroSite EDGE Base Station or its antennas in areas where there is a potential risk for interference with inadequately shielded medical equipment, such as life supporting devices, hearing aids or other electrically or magnetically sensitive devices!

Warning

When installing the Nokia MetroSite EDGE Base Station or its antennas, the emission of other antennas nearby must be known beforehand so that ambient emissions can be managed properly.

2.6.2 Formula for minimum safety distances

This section presents the formula for calculating the minimum safety distances for BTS site equipment. An example of how to use the calculation is given in the *Safety distance calculation example* Section.

$$r_{min} = \sqrt{\frac{N \times 10^{\frac{(G-L)}{10}} P}{4 \pi S}}$$

Figure 5. Formula for calculating minimum safety distance (r_{min})

The *Formula for calculating minimum safety distance* Equation refers to the following factors:

- G is the antenna gain (in dB) compared to isotropically radiating antenna
- P is the power delivered to the antenna (W)
- L is the total loss (in dB) between the transmitter and the antenna input
- N is the number of transmitters combined to the antenna
- S is the maximum allowed power density in air (W/m^2). See the *Formula for maximum power density* Section for an example of how to calculate this.

2.6.3 Formula for maximum power density

The *Calculating maximum power density, in preparation for a safety distance calculation* Table describes how the maximum power densities for different frequencies are calculated. Maximum power density (S) is a required parameter when calculating minimum safety distances.

Table 1. Calculating maximum power density, in preparation for a safety distance calculation

Environment	Formula / Description
Controlled Environments*	The minimum distances are calculated using the reference levels for maximum power density presented in the CENELEC test standard EN 50360:2001, as follows: For the frequency range 400 to 2000 MHz, S = f/40 W/m^2 (where S is the maximum power density and f is the frequency in MHz) averaged over any 6 minute time interval. For example, S_{max} for 5W at 900 MHz is 22.5 W/m^2. These reference levels are in agreement with other guidelines (such as IEEE/ANSI, IRPA, NCRP, FCC).
Uncontrolled Environments*	The minimum distances are calculated using the reference levels for maximum power density presented in the CENELEC test standard EN 50360:2001, as follows: For the frequency range 400 to 2000 MHz, S = f/ 200 W/m^2 (where S is the maximum power density and f is the frequency in MHz) averaged over any 6 minute time interval. For example, S_{max} for 5W at 900 MHz is 4.5 W/m^2. These reference levels are in agreement with other guidelines (such as IEEE/ANSI, IRPA, NCRP, FCC).
* Controlled environments refer to locations where there is exposure to persons aware of the potential exposure. Uncontrolled environments refer to locations where there is exposure to persons not aware of the potential exposure and who have no control over it.	

2.6.4 Safety distance calculation example

Warning

The safety distance calculations presented in this section do not provide actual safety distances for a BTS site, they are only an example of how to use the formula. Safety distance calculations must be done by trained professionals for each individual BTS site.

Using the formula for minimum safety distances and the appropriate information for each factor, safety distances can be calculated as shown in the *Calculating minimum safety distances (example site only)* Table (which describes an example environment only).

Table 2. Calculating minimum safety distances (example site only)

Parameter	**Unit**	**Example values for a MetroSite EDGE BTS with a 7dBi indoor panel antenna**					
		5W				**10W**	
f (frequency)	MHz	800	900	1800	1900	900	1800
P_{out} (maximum TX power)	W	5	5	5	5	10	10
L (loss, cable and combiner)	dB	5	5	5	5	5	5
G (antenna gain)	dB	7	7	7	7	7	7
N (number of TRXs per antenna)	N	1	1	1	1	1	1
S, controlled environment (power density)	W/m^2	21.25	22.50	45	47.5	22.50	45
S, uncontrolled environment (power density)	W/m^2	4.25	4.5	9	9.5	4.5	9
Example safety distance for the example parameter values in a controlled environment	r_{min} [m]	0.17 m	0.17 m	0.12 m	0.12 m	0.24 m	0.17 m

Table 2. Calculating minimum safety distances (example site only) (cont.)

Parameter	**Unit**	**Example values for a MetroSite EDGE BTS with a 7dBi indoor panel antenna**					
		5W				**10W**	
Example safety distance for the example parameter values in an uncontrolled environment	r_{min} [m]	0.39 m	0.38 m	0.27 m	0.26 m	0.54 m	0.38 m

3 Cautions

3.1 Handling the BTS

3.1.1 Storage and transportation

Caution

During storage and transportation, the Nokia MetroSite EDGE Base Station must remain in its original package in order to:

- avoid mechanical damage
- maintain traceability
- protect the units against static electricity

Caution

Handle the Nokia MetroSite EDGE Base Station with care. Do not drop the base station or the package containing it.

3.1.2 Weight

Caution

Persons in charge of the transportation and installation of the Nokia MetroSite EDGE Base Station must note that a fully equipped Nokia MetroSite base station weighs 28 to 40 kg (62 to 88 lb).

3.1.3 Grounding

The Nokia MetroSite EDGE Base Station may receive damaging over voltages through the antenna equipment, communication cables or power supply lines.

⚠ Caution

Sufficient protective grounding is required. An electrical power plug with ground connection is not sufficient: the grounding of the Nokia MetroSite EDGE Base Station must be based on a fixed grounding cable.

3.1.4 Electro-static discharge protection

⚠ Caution

Always wear a close-fitting antistatic wrist strap around your uncovered wrist when handling the Nokia MetroSite EDGE Base Station!

The Nokia MetroSite EDGE Base Station contains electro-static sensitive devices, which means that they may be permanently damaged by electro-static discharges encountered in routine handling, testing and transportation. The Nokia MetroSite EDGE Base Station is labelled with an electro-static sensitive device symbol as shown in the *Electro-static sensitive device label* Figure.

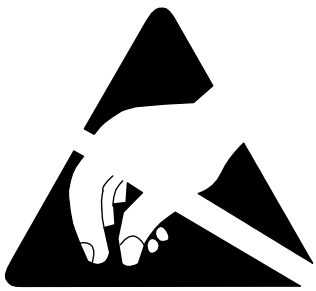

Figure 6. Electro-static sensitive device label

Electro-static discharges are caused by direct contact or by an electro-static field. If a charged body approaches an electrically conducting surface, the acquired potential is discharged. An equalizing current can then flow in the associated circuitry and generate permanently damaging voltages by induction. The human body should be grounded at the same potential as the component or equipment being handled. A wrist strap creates an equipotential electrical connection between the object and the human.

The Nokia MetroSite EDGE Base Station has a grounding point (ESD stud) to which a wrist strap must be connected. The wrist strap should be used and connected to the ESD stud as shown in the *Using the antistatic wrist strap* Figure.

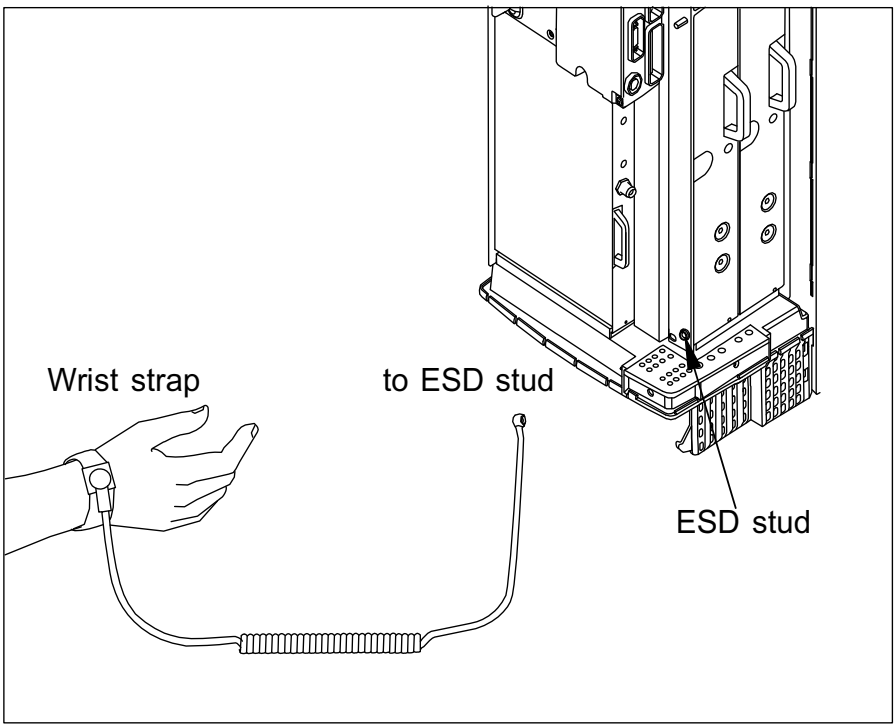

Figure 7. Using the antistatic wrist strap

3.2 BTS power supply

3.2.1 AC and DC connectors

Caution

Ensure the correct polarity. Incorrect polarity causes damage to the equipment.

Caution

The Nokia MetroSite BTS power switch does not disconnect the base station from the power network (AC or DC). The separate main switch on the site is considered to be the power disconnect device for safety and service purposes.

Caution

Do not connect AC or DC power until you have verified that the line voltage is correct!

Caution

For DC power connection ensure that the correct DC cable is used between the BBU and BTS, the 24V DC and 48V DC cables have different DC current handling capacities!

3.2.2 Grounding of AC power supply units

Caution

Ensure that the Nokia MetroSite EDGE Base Station is connected to a grounded power outlet!

3.2.3 Current limiting protection for GR-1089-CORE

Caution

For 800 MHz and 1900 MHz frequency units to meet the requirements of GR-1089-CORE an approved external current limiting protector (such as heat coils) must be fitted to the FXC E1/T1 ports to protect them from over current fault conditions!

Index