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Ericsson GSM System

# RBS 2106, RBS 2206, RBS 2207
# Hardware Reference Manual

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EN/LZT 720 0024 R5A

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*CAPTION LIST*

Document No.
001 59-EN/LZT 720 0024

RBS 2106, RBS 2206,
RBS 2207 Hardware
Reference Manual

Date 2004-02-13

Rev D

Doc nr: 3/001 59-EN/LZT 720 0024 Uen Rev E

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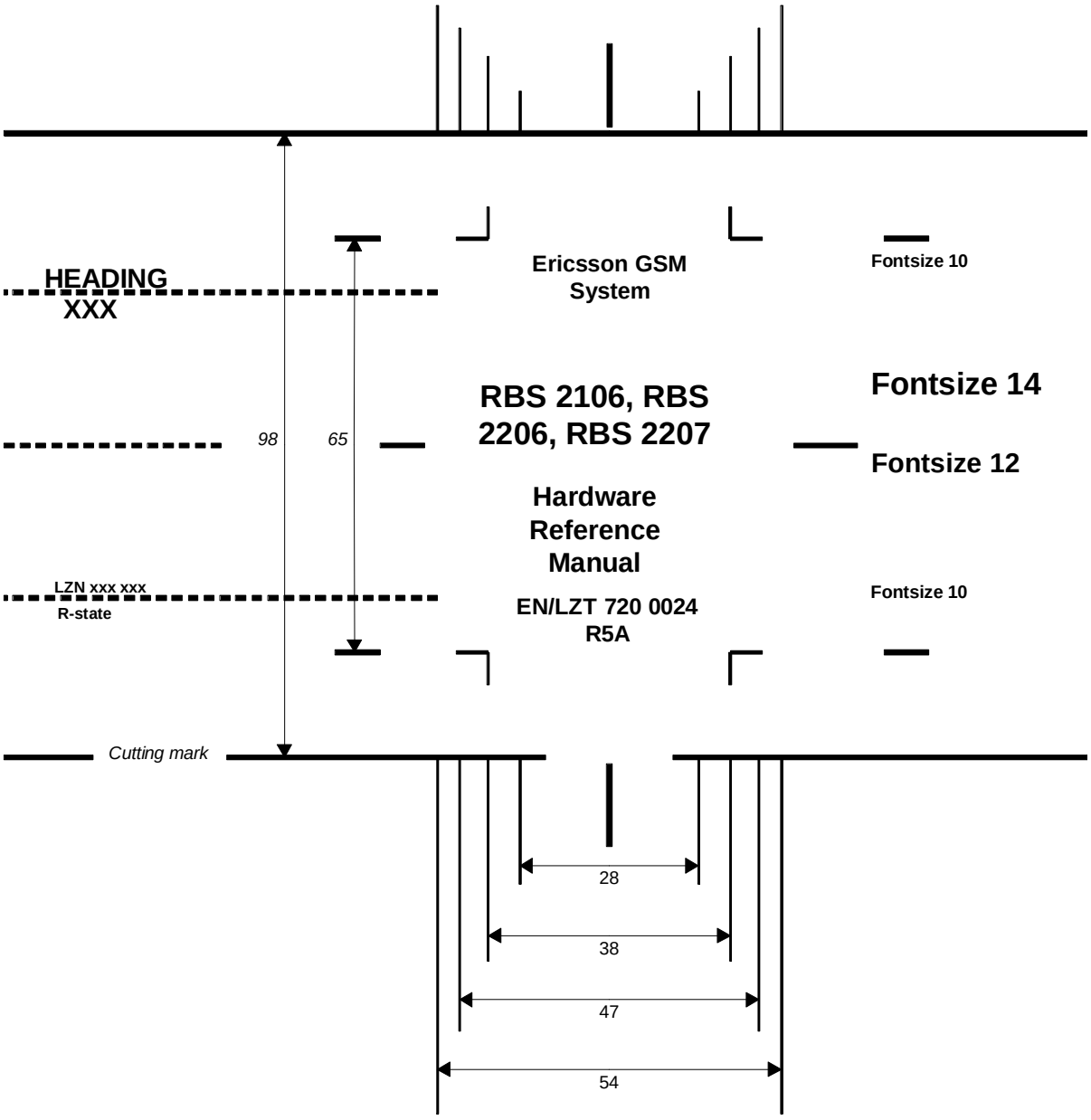
| Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)* | | Nr - *No.* | |
|---|---|---|---|
| KI/EAB/RWB/Z Marie Lundberg | | 2/001 59-EN/LZT 720 0024 Uen | |
| Dokansv/Godkänd - *Doc respons/Approved* | Kontr - *Checked* | Datum - *Date* | Rev / File |
| KI/EAB/RWB/Z Ulf Beijner | | 2004-02-13 | E |



# RBS 2106, RBS 2206, RBS 2207 Hardware Reference Manual

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# Contents

# 1 Introduction

This Hardware Reference Manual is valid for the Ericsson GSM system BSS R8 except for the description of GSM 800, which is valid from BSS R9.

## 1.1 Objectives

This manual describes the hardware for RBS 2106, RBS 2206 and RBS 2207, the Ericsson RBS 2000 Macro system based on 6–TRX and 12–TRX cabinets for GSM 800, E-GSM, P-GSM, GSM 1800 and GSM 1900. The manual is comprised of two parts; general chapters (which apply to all RBS 2000 cabinets) and product documents (which deal with specific RBS cabinets and replaceable units).

### General Chapters

The general chapters, which apply to all RBS 2000 cabinets, are:

- Introduction
- RBS 2000 Product Safety Requirements
- Environmental capabilities
- EMC capabilities
- Glossary

### Product Documents

The product documents are designed to be modular; that is, each is an independent CPI product. Updated versions of each product document can be downloaded from CPI Store and used to update the manual. The titles and product numbers are given in the table below.

*Table 1 Product documents*

| Title | Product Number |
|---|---|
| RBS 2106 Product Description | EN/LZT 720 0222 |
| RBS 2206 Product Description | EN/LZT 720 0225 |
| RBS 2207 Product Description | EN/LZT 720 0134 |
| Radio Configurations, RBS 2106 and RBS 2206 | EN/LZT 720 0318 |
| Radio Configurations, RBS 2207 | EN/LZT 720 0135 |

*Table 1 Product documents*

| Title | Product Number |
|---|---|
| RBS 2106 Antenna Configurations | EN/LZT 720 0319 |
| RBS 2206 Antenna Configurations | EN/LZT 720 0320 |
| RBS 2207 Antenna Configurations | EN/LZT 720 0136 |
| ACCU-01, Description | EN/LZT 720 0229 |
| ACCU-02, Description | EN/LZT 720 0230 |
| ADM-01, Description | EN/LZT 720 0300 |
| ASU, Description | EN/LZT 720 0232 |
| BFU-21, Description | EN/LZT 720 0234 |
| BFU-22, Description | EN/LZT 720 0276 |
| CDU-F, Description | EN/LZT 720 0237 |
| CDU-G, Description | EN/LZT 720 0236 |
| Combined Climate Unit, Description | EN/LZT 720 0239 |
| CXU-10, Description | EN/LZT 720 0240 |
| DCCU, Description | EN/LZT 720 0224 |
| DC/DC Converter, Description | EN/LZT 720 0301 |
| DC Filter for RBS 2106, Description | EN/LZT 720 0302 |
| DC Filter 01 for RBS 2206 and RBS 2207, Description | EN/LZT 720 0241 |
| dTRU, Description | EN/LZT 720 0242 |
| DXU-21, Description | EN/LZT 720 0244 |
| FCU-01, Description | EN/LZT 720 0246 |
| Heat Exchanger Climate Unit, Description | EN/LZT 720 0311 |
| HCU, Description | EN/LZT 720 0449 |
| IDM, Description | EN/LZT 720 0247 |
| IDM-02, Description | EN/LZT 720 0380 |
| PSU AC, Description | EN/LZT 720 0249 |
| PSU DC, Description | EN/LZT 720 0248 |
| TMA-CM, Description | EN/LZT 720 0250 |

## 1.2 Target Groups

Customers and Ericsson personnel involved in RBS activities.

## 1.3 RBS 2000 Library Overview

The Customer Product Information (CPI) for dTRU based RBS 2000 Macro comprises installation, test and maintenance, and reference manuals as well as spare parts catalogues.

For further information, see:

*Library Overview* *LZN 302 73*

## 1.4 Release History

Except editorial changes such as correction of spelling, grammar and layout, this manual has been revised as follows:

### 1.4.1 R4A to R4B

P-GSM added for CDU-G.

### 1.4.2 R3A to R4A

Chapters (documents) which have been added or updated for this release are listed in the table below.

*Table 2 Revised or updated chapters (documents)*

| Title | New Revision No. | Reason for Revision |
|---|---|---|
| RBS 2207 Product Description | R2A | This chapter is new. |
| RBS 2106, RBS 2206 Radio Configurations | R3A | Configurations have been added. |
| RBS 2207 Radio Configurations | R2A | This chapter is new. |
| RBS 2106 and 2206 Antenna Configurations | R2A | Configurations have been added. |
| RBS 2207 Antenna Configurations | R2A | This chapter is new. |
| IDM-02, Decription | R1A | This chapter is new. |

### 1.4.3 R2A to R3A

Chapters (documents) which have been added or updated for this release are listed in the table below.

*Table 3 Revised or updated chapters (documents)*

| Title | New Revision No. | Reason for Revision |
|---|---|---|
| RBS 2106 Product Description | R4A | Information has been added for the optional smoke detector. Information has been updated for cabinet weights. |
| RBS 2206 Product Description | R4A | Information has been added for the location of the TMA-CM, updated for the cabinet weights, and removed for the document tray.. |
| CDU-F, Description | R2A | The block diagram has been updated. |
| CDU-G, Description | R2A | The block diagram has been updated. |
| DXU-21, Description | R2A | Illustrations and the block diagram have been updated to reflect the new DXU-21 design. |
| HCU, Description | R1A | This chapter is new. |

### 1.4.4 R1A to R2A

Chapters (documents) which have been added or updated for this release are listed in the table below.

*Table 4 Revised or updated chapters (documents)*

| Title | New Revision No. | Reason for Revision |
|---|---|---|
| Radio Configurations, RBS 2106 and RBS 2206 | R1A | Information has been added for CDU-G 1x4, 1x6 and 1+1+2 configurations.<br>This chapter has been made into an independent CPI product. |
| RBS 2106 Antenna Configurations | R1A | Antenna connection field information has been updated for RF LMU connections.<br>This chapter has been made into an independent CPI product. |

*Table 4 Revised or updated chapters (documents)*

| Title | New Revision No. | Reason for Revision |
|---|---|---|
| RBS 2206 Antenna Configurations | R1A | This chapter has been made into an independent CPI product. |
| RBS 2106 Product Description | R3A | Information has been added for fuse requirements, ground leakage current, cable inlet measurements, acoustic dispersion, and the Heat Exchanger Climate Unit. Information has been updated for heat dissipation and RF LMU connections on the antenna connection field. |
| RBS 2206 Product Description | R3A | Information has been added for ground leakage current and external earth fault circuit breakers. Information has been updated for fuse requirements, battery back-up, and heat dissipation. |
| ADM-01, Description | R1A | This chapter is new. |
| Combined Climate Unit, Description | R1B | The title has been changed from *RBS 2106 Climate Unit, Unit Description.* |
| DC/DC Converter, Description | R1A | This chapter is new. |
| DC Filter for RBS 2106, Description | R1A | This chapter is new. |
| DC Filter 01 for RBS 2206, Description | R1B | The title has been changed from *DC Filter 01, Unit Description.* |
| Heat Exchanger Climate Unit, Description | R1A | This chapter is new. |
| PSU DC, Description | R1B | Minor editorial changes have been made. |

# 2 Product Safety Requirements RBS 2000

The purpose of this document is to specify the product safety requirements for RBS 2000.

## 2.1 References

| | |
|---|---|
| 73/23/EEC | Low Voltage Directive |
| CAN/CSA-C22.2 | No 1-M94<br>Audio, Video and Similar Electronic Equipment |
| CAN/CSA-C22.2 | No 950-95<br>Safety of Information Technology Equipment Including Electrical Business Equipment |
| EN 60950 | Safety of Information Technology Equipment Including Electrical Business Equipment |
| IEC 215 | Safety requirements for radio transmitting equipment |
| IEC 529 | Classification of degrees of protection provided by enclosures (IP Code) |
| IEC 60950 | Safety of Information Technology Equipment Including Electrical Business Equipment |
| UL 1419 | Standard for Professional Video and Audio Equipment |
| UL 1950 | Safety of Information Technology Equipment Including Electrical Business Equipment |

## 2.2 Product Safety

This part of the document defines the electrical, mechanical, heat and fire safety eequirements for the Radio Base Station.

**General**

The RBS is designed to comply with the following international standards:

- 73/23/EEC Low Voltage Directive. (To achieve this, the RBS shall conform to the standards below.)
- EN 60950 ‘‘Safety of Information Technology Equipment Including Electrical Business Equipment.’’

- The RBS fulfils the requirements in the general IEC 60950 including national differences noted in EN 60950.
- IEC 215 Safety requirements for transmitting equipment.
- The RBS shall be listed by National Recognized Testing Laboratory (NRTL).
- The RBS fullfills encapsulation class IP XX according to IEC 529.

In addition to this the product fulfills the environmental requirements.

The RBS is so designed and constructed that, under all conditions of normal use and under a likely fault condition, it protects against personal injury from electrical shock and other hazards.

The RBS is protected against serious fire originating in the equipment and mechanical hazards in the equipment, as well as mechanical hazards in the meaning of the applicable standard.

**For the US the following standards are applicable:**

- UL 1950 ‘‘Safety of Information Technology Equipment Including Electrical Business Equipment’’ .

**For Canada the following standards are applicable:**

- CAN/CSA-C22.2 No 1-M94 Audio, Video and Similar Electronic Equipment.

### 2.2.1 Declaration of Conformity

Tests and inspections shall be carried out according to ECMA requirements.

# 3 Environmental Capabilities

## 3.1 Scope

This chapter covers the environmental requirements for the indoor and outdoor temperature non-controlled operation conditions. The subjects are: Climatic, Biological, Chemically active substances, Mechanically active substances and Mechanical conditions.

## 3.2 Terminology

Definition of concepts:

**Normal Operation Conditions**

Environmental conditions where all units shall be able to function as specified.

**Safe Function**

Environmental stress above the limits for normal operation where all units shall continue to function during the stress, but performance or capacity may be reduced.

Reduction of performance or capacity shall be documented as a typical value.

When the environmental stress has dropped to normal operation conditions, function as specified shall automatically be achieved.

Safe function refers to an operation period of not more than 72 consecutive hours, and a total of not more than 15 days in one year.

**Non-destruction**

Environmental stress above the limits for safe function during which no function is guaranteed and performance may degrade in an unspecified manner.

When the environmental stress has dropped to normal operation conditions, no manual intervention (on site) is needed to restore full performance of the RBS.

Non-destruction refers to an operation period of not more than 96 consecutive hours, and a total of not more than 5.5 days in a 3-year period.

**GSM Concepts**

The GSM concepts for Normal operation and Extreme operation conditions as defined in GSM:11.20-12.3.2 are both equal to the Normal condition as defined and used in this document. This means that all RF parameters are guaranteed within the Normal condition range as defined in this document.

## 3.3 References

**IEC 721-3-..** Classification of groups of environmental parameters and their severities.

**ETSI 300 019-1-..** Classification of environmental conditions.

## 3.4 Transport -40°C - +70°C

### 3.4.1 General Conditions

The severity of the requirements is in conformity with: IEC 721-3-2 classes 2K4/2B2/2C2/2S2/2M2. and ETS 300 019-1-2 Class 2.3 "PUBLIC transportation".

These requirements are valid for equipped cabinets (excluding batteries). The values in these conditions are valid for a maximum transport time of 3 months. The time is measured from the moment the packages are leaving the shipping store, and includes storing in connection with the transport.

**Note:** These requirements restrict flight transportation to aircrafts with pressure cabins. As modern aircrafts have pressure cabins, these limitations are expected to be only formal.

**Note:** The severity levels are chosen with equipped cabinets in mind. Therefore, transport of equipment outside the cabinets can result in extremes. These extremes shall be handled by its own packing.

### 3.4.2 Climatic Conditions

During transportation the equipment could be exposed to extremes in temperature and humidity. The equipment must be packaged. The equipment shall be operational after being subjected to the ambient temperature and humidity stated hereafter.

The severity of these requirements are in conformity with: IEC 721-3-2 class 2K4. and ETS 300 019-1-2 Class 2.3.

**Requirements**

*Table 5 Environmental limits during transport*

| Environmental Parameters | Unit | Value |
|---|---|---|
| Temperature | °C | -40 - +70 |
| Relative humidity | % | 5 - 100 |

### 3.4.3 Biological Conditions

The severity of these requirements is in conformity with: IEC 721-3-2 class 2B2. and ETS 300 019-1-2 Class 2.3.

### 3.4.4 Chemically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-2 class 2C2. and ETS 300 019-1-2 Class 2.3.

**Note:** The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other is present in insignificant amounts.

### 3.4.5 Mechanically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-2 class 2S2. and ETS 300 019-1-2 Class 2.3.

### 3.4.6 Mechanical Conditions

The packing and transport method shall be chosen in order not to expose the equipment to stress beyond these limits. The equipment shall function as specified when installed after test.

The severity of these requirements is in conformity with: IEC 721-3-2 class 2M2. and ETS 300 019-1-2 Class 2.3.

**Requirements**

*Table 6 Mechanical parameters during transport*

| Environmental Parameters | | Unit | Value | | |
|---|---|---|---|---|---|
| Vibration sinus: | | | | | |
| | displacement | mm | 3.5 | | |
| | acceleration | $m/s^2$ | | 10 | 15 |
| | frequency | Hz | 2 - 9 | 9 - 200 | 200 - 500 |
| Random ASD: | | $m^2/s^3$ | | 1.0 | |
| | acceleration | $m/s^2$ | | 12.0 | |
| | frequency | Hz | | 2 - 200 | |
| Shock: | | | | | |
| | peak acceleration | $m/s^2$ | | 100 | |
| | duration | ms | | 11 | |

# 3.5 Storage -25°C - +55°C

## 3.5.1 General Conditions

The severity of the requirements is in conformity with: IEC 721-3-1 classes 1K4/1Z2/1Z3/1Z5/1B2/1C2/1S3/1M2, and ETS 300 019-1-1 Class 1.2. "WEATHERPROTECTED, not temperature-controlled storage".

During storage the equipment must be packaged. The values in these conditions are valid for a maximum storage time of 12 months. The time refers to equipment in its outer package and stored at the consignee in a conditioned store.

## 3.5.2 Climatic Conditions

The equipment must be in packaged condition.

The severity of these requirements is in conformity with IEC 721-3-1 classes 1K4/1Z2/1Z3/1Z5. and ETS 300 019-1-1 class 1.2.

**Requirements**

*Table 7 Environmental limits for storage conditions*

| Environmental Parameters | Unit | Value |
|---|---|---|
| Temperature | °C | -25 - +55 |
| Relative humidity | % | 10 - 100 |

### 3.5.3 Biological Conditions

The severity of these requirements is in conformity with IEC 721-3-1 class 1B2. and ETS 300 019-1-1 class 1.2.

### 3.5.4 Chemically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-1 class IC2 and ETS 200 019-1-1 Class 1.2.

**Note:** The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other is present in insignificant amounts.

### 3.5.5 Mechanically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-1 class 1S3. and ETS 300 019-1-1 Class 1.2.

### 3.5.6 Mechanical Conditions

The packing and transport method shall be chosen in order not to expose the equipment to stress beyond these limits. The equipment shall function as specified when installed after test.

The severity of these requirements is in conformity with: IEC 721-3-1 class 1M2. and ETS 300 019-1-1 Class 1.2.

**Requirements**

*Table 8 Mechanical parameters for storage conditions*

| Environmental Parameters | | Unit | Value | |
|---|---|---|---|---|
| Vibration sinus: | | | | |
| | displacement | mm | 3.5 | |
| | acceleration | $m/s^2$ | | 10 |
| | frequency | Hz | 2 - 9 | 9 - 200 |
| Shock: | | | | |
| | peak acceleration | $m/s^2$ | 40 | |
| | duration | ms | 22 | |

# 3.6 Handling -40°C - +70°C

## 3.6.1 General Conditions

This section refers to shorter periods of transport and storage in unpacked conditions. Precautions to avoid condensation before subjecting the equipment to operational conditions are necessary.

## 3.6.2 Climatic Conditions

During handling the equipment withstands the conditions stated in *Section 3.4.2 on page 10* in this document.

## 3.6.3 Biological Conditions

During Handling the equipment withstands the conditions stated in *Section 3.4.3 on page 11* in this document.

## 3.6.4 Chemically Active Substances

During Handling the equipment withstands the conditions stated in *Section 3.4.4 on page 11* in this document.

## 3.6.5 Mechanically Active Substances

During Handling the equipment withstands the conditions stated in *Section 3.4.5 on page 11* in this document.

### 3.6.6 Mechanical Conditions

The equipment endures stresses normal for handling, during handling the equipment withstand the conditions stated in *Section 3.4.6 on page 11* in this document.

## 3.7 Operation Indoor +5°C - +40°C

### 3.7.1 General Conditions

The severity of these requirements is in conformity with: IEC 721-3-3 classes 3K3/3Z2/3Z4/3B1/3C2(3C1)/3S2/3M1. and ETS 300 019-1-3 Class 3.1 "TEMPERATURE-controlled locations".

This clause refers to the environment which an RBS for indoor use shall endure.

**Note:** The different operating temperature levels according to Safe function and Non-destruction, refer to situations where the RBS is supposed to have been operating in "normal condition" mode for a certain time. Then the surrounding temperature in the compartment increases (decreases) according to these figures. Accordingly, this means that the surrounding temperature is allowed to change within the limits while the RBS still operates and has its own loss of energy.

### 3.7.2 Climatic Conditions

The severity of these requirements are in conformity with: IEC 721-3-3 classes 3K3/3Z2/3Z4. and ETS 300 019-1-3 Class 3.1.

*Table 9 Climate limits for indoor operation*

| Environmental Parameters | Unit | Value | | |
|---|---|---|---|---|
| | | Normal Condition | Safe Function | Non-de-struction |
| Temperature | °C | +5 - +40 | 0 - +45 | -10 - +55 |
| Relative humidity | % | 5 - 85 | 5 - 90 | 5 - 90 |

### 3.7.3 Biological Conditions

#### Requirements

There are no requirements for this condition.

### 3.7.4 Chemically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-3 classes /3C2(3C1)/. and ETS 300 019-1-3 Class 3.1.

**Note:** The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other is present in insignificant amounts.

### 3.7.5 Mechanically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-3 class /3S2/. and ETS 300 019-1-3 Class 3.1.

### 3.7.6 Mechanical Conditions

The severity of these requirements is in conformity with: IEC 721-3-3 class/3MI/. and ETS 300 019-1-3 class 3.1.

*Table 10 Mechanical parameters for indoor operation*

| Environmental Parameters | Unit | Value | |
|---|---|---|---|
| Vibration sinus: | | | |
| displacement | mm | 0.6 | |
| acceleration | $m/s^2$ | | 2 |
| frequency | Hz | 2 - 9 | 9 - 200 |
| Vibration random: | | | |
| ASD | $m^2/s^3$ | 0.1 | 1) |
| ASD | $m^2/s^3$ | 0.2 | 2) |
| acceleration | $m/s^2$ | 3.8 | 1) |
| acceleration | $m/s^2$ | 5.4 | 2) |
| frequency | Hz | 2 - 200 | |
| Shock: | | | |
| peak acceleration | $m/s^2$ | 40 | 3) |
| duration | ms | 11 | |

1) Safe function

2) Non-destruction

3) This requirement belongs to the Safe function with the exemption: performance of the RBS shall be verified as ‘‘no loss of calls’’ .

**Seismic Exposure**

The complete equipped RBS shall be tested for seismic exposure. Deviations shall be reported.

Safe function during seismic exposure. Deviations shall be reported.

*Table 11 Seismic exposure limits for indoor operation*

| | |
|---|---|
| Test frequency range | 1 - 15 Hz |
| Required Response Spectrum | RRS |
| Shape of RRS | as IEC fig. 3 |
| Number of time scale histories | 1/ testing direction |
| Duration of time scale histories | 35 s |
| Number of testing directions | 3 |

If necessary there are possibilities to equip the RBS with an optional Seismic Exposure protection device.

## 3.8 Operation Outdoor -33°C - +40°C

This Environmental class corresponds in full to Operation Outdoor -33°C - +45°C with the exception of the upper temperature limit.

## 3.9 Operation Outdoor -33°C - +45°C

The severity of the requirements is in conformity with: IEC 721-3-4 classes 4K2/4Z5/4Z7/4B1/4C2(4C3)/4S2/4M5. and ETS 300 019-1-4 Class 4.1. "NON-WEATHERPROTECTED location", except for the temperature range which is extended to +45°C.

This clause refers to the environment which an RBS for outdoor non-weather protected location endures.

The figures below refer to the environment that surrounds the cabinet, and the temperature is the shaded air temperature.

### 3.9.1 Climatic Conditions

The severity of these requirements is in conformity with: IEC 721-3-4 classes 4K2/4Z5/4Z7. and ETS 300 019-1-4 Class 4.1. In addition to this Ericsson demands more rigorous values than stated by IEC and ETSI above.

The RBS shall be designed for a power loss of max. 48 hours. This applies both to installation and operation.

*Table 12 Climate limits for outdoor operation*

| Environmental Parameters | Unit | Value | |
|---|---|---|---|
| | | Normal Condition | Non-destruction |
| Temperature | °C | -33 - +45 | -40 - +70 |
| Relative humidity | % | 15 - 100 | 15 - 100 |

### 3.9.2 Biological Conditions

The severity of these requirements is in conformity with: IEC 721-3-4 class /4B1/. and ETS 300 019-1-4 Class 4.1.

### 3.9.3 Chemically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-4 classes /4C2(4C1)/. and ETS 300 019-1-4 Class 4.1.

**Note:** The values are average yearly levels of airborne contaminants that can be accepted. It is assumed that one of the contaminants is dominant at each site, and that the other is present in insignificant amounts.

### 3.9.4 Mechanically Active Substances

The severity of these requirements is in conformity with: IEC 721-3-4 class /4S2/. and ETS 300 019-1-4 Class 4.1.

### 3.9.5 Mechanical Conditions

The severity of these requirements is in conformity with: IEC 721-3-4 class /4M5/. and ETS 300 019-1-4 Class 4.1.

*Table 13 Mechanical parameters for outdoor operation*

| Environmental Parameters | Unit | Value | | |
|---|---|---|---|---|
| Vibration sinus: | | | | |
| displacement | mm | 0.6 | | |
| acceleration | $m/s^2$ | | | 2 |
| frequency | Hz | 2 - 9 | | 9 - 200 |
| no. of sweep cycles | | | 5 | |
| no. of test directions | | | 3 | |
| testing method | | | IEC 68-2-6 | |
| Vibration random: | | | | |
| ASD | $m^2/s^3$ | | 0.1 | 1) |
| ASD | $m^2/s^3$ | | 0.2 | 2) |
| acceleration | $m/s^2$ | | 3.8 | 1) |
| acceleration | $m/s^2$ | | 5.4 | 2) |
| frequency | Hz | | 2 - 200 | |
| testing method | | | IEC 68-2-64 | |
| Shock: | | < 100 kg | > 100 kg | |
| peak acceleration | $m^2/s$ | 250 | 100 | 3) |
| duration | ms | 6 | 6 | |
| pulse shape | | | half sine | |
| no. of shock pulses | | | 500 per direction | |
| no. of test directions | | | 6 | |
| testing method | | | IEC 68-2-27 | |

1) Safe function

2) Non-destruction

3) These requirements belong to the Safe function with one exemption: performance of the RBS shall be verified as ‘‘no loss of calls’’ .

**Seismic Exposure**

The complete equipped RBS shall be tested for seismic exposure. Deviations shall be reported.

Safe function during seismic exposure. Deviations shall be reported.

*Table 14 Seismic exposure limits for outdoor operation*

| | |
|---|---|
| Test frequency range | 1 - 15 Hz |
| Required Response Spectrum | RRS |
| Shape of RRS | as IEC fig 3 |
| Number of time scale histories | 1/ testing direction |
| Duration of time scale histories | 35 s |
| Number of testing directions | 3 |

There are possibilities to equip the RBS with an optional Seismic Exposure protection device.

## 3.10 Operation Outdoor -33°C - +55°C

This Environmental class corresponds in full to Operation Outdoor -33°C - +45°C with the exception of the upper temperature limit.

## 3.11 Operation Mast Mounted Equipment -33°C - +45°C

This Environmental class corresponds to Operation Outdoor -33°C - +45°C with the exceptions stated below.

*Table 15 Environmental parameters for mast mounted equipment, -33°C - +45°C*

| Environmental Parameters | Unit | Value | |
|---|---|---|---|
| | | **Normal Condition** | **Non-destruction** |
| Temperature | °C | -33 - +45 | -40 - +70 |
| Change of temperature | °C/min | 6 | 6 |
| Vibration sinus: | | | |
| displace-ment | mm | 3.0 | |
| accelera-tion | $m/s^2$ | | 10 |
| frequency | Hz | 2 - 9 | 9 - 200 |
| Vibration random: | | | |
| ASD | $m^2/s^3$ | 0.5 | |
| frequency | Hz | 2 - 200 | |
| duration of exposure | min | 30 | |
| no. of test directions | Hz | 3 | |
| Fauna | none | Not Appl. | Not Appl. |

## 3.12 Operation Mast Mounted Equipment -33°C - +55°C

This Environmental class corresponds to Operation Outdoor -33°C - +55°C with the exceptions stated below.

*Table 16 Environmental parameters for mast mounted equipment, -33°C - +55°C*

| **Environmental Parameters** | **Unit** | **Value** | |
|---|---|---|---|
| | | **Normal Condition** | **Non-destruction** |
| Temperature | °C | -33 - +55 | -40 - +70 |
| Relative humidity | % | 5 - 100 | 5 - 100 |
| Absolute humidity | $g/m^3$ | 0.26 -40 | 0.26 - 40 |
| Change of temperature | °C/min | 6 | 6 |
| Rain temperature | °C | 5 | 5 |
| Vibration sinus: | | | |
| displace-ment | mm | 3 | |
| acceleration | $m/s^2$ | | 10 |
| frequency | Hz | 2 - 9 | 9 - 200 |
| Vibration random: | | | |
| ASD | $m^2/s^3$ | 0.5 | 0.2 |
| frequency | Hz | 2 - 200 | 200 - 500 |
| Shock: | | | |
| peak acc. | $m/s^2$ | 100 | 1) |
| duration | ms | 11 | |
| Fauna | none | Not Appl. | Not Appl. |

1) The requirements belong to the Safe function with one exemption: performance of the RBS shall be verified as ‘‘no loss of calls’’ .

# 4 EMC Capabilities

This specification covers the capabilities of the RBS 2000 in respect of EMC (ElectroMagnetic Compatibility). The capabilities include conducted and radiated emission as well as conducted and radiated immunity thresholds.

The internal EMC capabilities of RBS 2000 and interference appearing on antenna ports are not covered by this chapter.

## 4.1 References

1 89/336/EEC EMC directive

Council directive of 3 May 1989 on approximation of laws of the Member States relating to electromagnetic compatibility

2 ETS 300 342–2, Nov 1994

EMC for European digital cellular telecommunication (GSM) mobile radio and ancillary equipment.

3 EN 55 022, April 1987

Limits and methods of Measurement of Radio Interference Characteristics of Information Technology Equipment

4 EN 50 081-1, January 1992

Electromagnetic compatibility - Generic emission standard, Part 1: Residential, commercial and light industry

5 EN 50 082-1, January 1992

Electromagnetic compatibility - Generic immunity standard, Part 1: Residential, commercial and light industry

6 IEC 801-3, 1984

Radiated electromagnetic field requirement

7 EN 61000–3–2, EMC part 3, section 2

limits for harmonic current emissions, 1995

8 EN 61000–3–3, EMC part 3, section 2

limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current <16 A, 1994

9 EN 61000–4–2, 1995

Electrostatic discharge requirements

10 EN 61000–4–4, 1995

Electrical fast transient/burst requirement

11 EN 61000–4–5

Surge Immunity Requirements

12 EN 61000–4–8, 1993

Power frequency magnetic fiels immunity tests

13 EN 61000–4–11

Voltage Dips, short interruptions and voltage variations. Immunity tests

14 VDE 0878, 1986

Radio Interface Suppression of Telecommunication Systems and Apparatus

15 ITU-T Recommendation K.20, 1984

Resistibility of Telecommunication Switching Equipment to Overvoltages and Overcurrents.

## 4.2 Concepts

| | |
|---|---|
| **External signal line - outdoor systems** | Cable or lead longer than 1 metre intended for connection to units located outside the cabinet |
| **Telecommunication line** | Cable intended for connection to a public network |
| **Enclosure Port** | The physical boundary of the RBS through which electromagnetic fields may radiate or impinge |
| **Performance Criteria A** | The system shall continue to operate as intended. During the test, no degradation of performance or loss of function is allowed below the specified test level |
| **Performance Criteria B** | The system shall continue to operate as intended after the test. During the test, degradation of performance is however allowed below the specified test level. No change of actual operating state or stored data is allowed |

| | |
|---|---|
| **Performance Criteria C** | Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls |
| **Performance Criteria CT** | Continous phenomena applied to Transmitters. A communication link shall be established at the start of the test and maintained during the test. For the system the RXQUAL (as defined in GSM 05.08) of the downlink shall not exceed three, measured during each individual exposure in the test sequence |
| **Performance Criteria TT** | Transient phenomena applied to Transmitters. A communication link shall be established at the start of the test and maintained during and after injection of the transients |
| **Performance Criteria CR** | Continous phenomena applied to Receivers. A communication link shall be established at the start of the test and maintained during the test. For the system the RXQUAL (as defined in GSM 05.08) of the uplink shall not exceed three, measured during each individual exposure in the test sequence |
| **Performance Criteria TR** | Transient phenomena applied to Receivers. A communication link shall be established at the start of the test and maintained during and after injection of the transients |
| **Performance Criteria A(K.20):** | The test object shall withstand the test without damage or other disturbances after the test |
| **Performance Criteria B(K.20):** | A fire hazard should not arise in the test object. Any damage or permanent malfunction occuring should be confined to a small number of external line interface circuits. |

## 4.3 Capabilities

### 4.3.1 RBS Description

#### Hardware

The capabilities are tested for an RBS equipped with a minimum representative configuration of units. This system is representative of installed systems in terms of function, which includes at least one of each function unit type, and electromagnetic radiation characteristics. The number and types of sub-units are given from results of investigations in accordance with ETS 300 342-2, Nov 1994.

#### Software

The capabilities are valid for a standard setup of system software with default parameters.

#### Performance

For the immunity capabilities the RBS is operating and will fulfil the performance criteria stated for each test.

For emission capabilities all equipment in the RBS was enabled during verification to create the worst emission case.

#### EMC directive

The EMC capabilities of the RBS fulfills the mandatory requirements specified in the EMC directive, 89/336/EEC, which gives compliance for trade in EU member countries.

#### Generic Standards

The following generic standards are fulfilled by the system:

EN 50 081–1, Jan 1992 Emission

EN 50 082–1, Jan 1992 Immunity

### 4.3.2 Conducted Emission

*Table 17 Voltage fluctuation on AC power supply leads*

| | |
|---|---|
| Basic standard | EN 61000-3-3 |
| Limit | Set by Table II in EN 61000-3-3 |

*Table 18 Harmonics on AC power supply leads*

| | |
|---|---|
| Basic standard | EN 61000-3-2 |
| Limit | Set by Table 1 in EN 61000-3-2 |

*Table 19 Interference on AC power supply leads*

| | |
|---|---|
| Basic standard | EN 55 022 |
| Limit | Class B |
| Limit standard | VDE 0878, Conducted emission, part 1 |
| Limit | Class B |

*Table 20 Interference on DC power supply leads*

| | |
|---|---|
| Basic standard | EN 50 022 and proposed amendment to CISPR 22 |
| Limit | Class B |
| Limit standard | ETS 300 342-2, Nov 1994 |
| Limit | Class B |

*Table 21 Interference on signal and telecommunication lines*

| | |
|---|---|
| Basic standard | CISPR/G(sec) December 1993 |

### 4.3.3 Radiated Emission from Enclosure

*Table 22 Electric field emission*

| | |
|---|---|
| Basic standard | EN 55 022 |
| Limit | Class B |

*Table 23 Magnetic field emission*

| | |
|---|---|
| Limit standard | VDE 0878, Magnetic emission, part 1 |
| Limit | Class B |

### 4.3.4 Conducted Immunity on AC Input Power Ports

*Table 24 Fast transient test*

| | |
|---|---|
| Basic standard | EN 61000-4-4 |
| Test level | 4 kV common mode between all lines and cabinet ground reference |
| Performance | Criteria B |
| Limit standard | ETS 300 342-2 |
| Test level | 4 kV common mode between all lines and cabinet ground reference |
| Performance | Criteria A for a complete system<br>Criteria TT for transmitter units<br>Criteria TR for receiver units |

*Table 25 Surge test*

| | |
|---|---|
| Limit standard | ETS 300 342-2 |
| Test level | 2 kV common mode between all lines and cabinet ground reference [1)]<br>1 kV differential mode, between line and line |
| Performance | Criteria A for a complete system<br>Criteria TT for transmitter units<br>Criteria TR for receiver units |

[1)] System primary protected

*Table 26 RF common mode test*

| | |
|---|---|
| Limit standard | ETS 300 342-2 |
| Test level | 10 V(rms) |
| Performance | Criteria A for a complete system<br>Criteria CT for transmitter units<br>Criteria CR for receiver units |

*Table 27 Voltage dips and interruptions on AC ports*

| | |
|---|---|
| Basic standard | EN 61000-4-11 |
| Performance | Criteria A for a complete system |

### 4.3.5 Immunity on DC Input/Output Power Ports

*Table 28 Fast transient test*

| | |
|---|---|
| Basic standard | EN 61000-4-4 |
| Test level | 2 kV common mode between all lines and cabinet ground reference |
| Performance | Criteria B for a complete system |
| Limit standard | ETS 300 342-2 |
| Test level | 2 kV common mode between all lines and cabinet ground reference |
| Performance | Criteria A for a complete system<br>Criteria TT for transmitter units<br>Criteria TR for receiver units |

*Table 29 Surge test*

| | |
|---|---|
| Limit standard | ETS 300 342-2 |
| Test level | 1 kV common mode between line and cabinet ground reference<br>0.5 kV differential mode, between line and line |
| Performance | Criteria A for a complete system<br>Criteria TT for transmitter units<br>Criteria TR for receiver units |

*Table 30 RF common mode test*

| | |
|---|---|
| Limit standard | ETS 300 342-2 |
| Test level | 3 V(rms) |
| Performance | Criteria A for a complete system<br>Criteria CT for transmitter units<br>Criteria CR for receiver units |

### 4.3.6 Immunity on Telecommunication and External Signal Lines

*Table 31 Fast transient test*

| | |
|---|---|
| Basic standard | EN 61000-4-4 |
| Test level | 2 kV common mode between line and cabinet ground reference |
| Performance | Criteria B |
| Limit standard | ETS 300 342-2 |
| Test level | 4 kV common mode between line and cabinet ground reference |
| Performance | Criteria A for a complete system<br>Criteria TT for transmitter units<br>Criteria TR for receiver units |

*Table 32 Surge test 1.2/50 pulses*

| | |
|---|---|
| Limit standard | EN 61000-4-5 |
| Test level | 2 kV common mode between line and cabinet ground reference<br>1 kV differential mode between line and line |

*Table 32 Surge test 1.2/50 pulses*

| | |
|---|---|
| Performance | Criteria B for a complete system<br>Criteria TT for transmitter units<br>Criteria TR for receiver units |

*Table 33 Surge test 10/700 pulses*

| | |
|---|---|
| Limit standard | EN 61000-4-5 |
| Test level | 1 kV common mode between line and cabinet ground reference<br>1 kV differential mode between line and line |
| Performance | Criteria B for a complete system<br>Criteria TT for transmitter units<br>Criteria TR for receiver units |

*Table 34 Power induction test*

| | |
|---|---|
| Basic standard | ITU-T K.20 |
| Test level | 600 V(rms) common mode |
| Performance | Criteria A(K.20) |

*Table 35 RF common mode test*

| | |
|---|---|
| Limit standard | ETS 300 342-2 |
| Test level | 10 V(rms) |
| Performance | Criteria A for a complete system<br>Criteria CT for transmitter units<br>Criteria CR for receiver units |

### 4.3.7 Radiated Immunity of Enclosure Port

*Table 36 Immunity of continuous electric fields*

| | |
|---|---|
| Basic standard | IEC 801-3 |
| Test level | 10 V/m |
| Performance | Criteria A |
| Limit standard | ETS 300 342-2 |
| Test level | 10 V/m, 80 MHz - 1 GHz |
| Frequency range | 30 V/m, 1 GHz-20 GHz |

*Table 36 Immunity of continuous electric fields*

| | |
|---|---|
| Performance | Criteria A for a complete system |
| | Criteria CT for transmitter units<br>Criteria CR for receiver units |

*Table 37 Immunity of 50/60 Hz magnetic fields*

| | |
|---|---|
| Basic standard | EN 61000-4-8 |
| Test level | 10 A/m, 50/60 Hz |
| Performance | Criteria A |

### 4.3.8 Electro-static Discharges

*Table 38 Immunity of enclosure port*

| | |
|---|---|
| Basic standard | EN 61000-4-2 |
| Test level | Air discharges: 15 kV<br>Contact discharges: 8 kV |
| Performance | Criteria B |
| Limit standard | ETS 300 342-2 |
| Test level | Air discharges: 8 kV<br>Contact discharges: 4 kV. |
| Performance | Criteria A for a complete system<br>Criteria TT for transmitter units<br>Criteria TR for receiver units |

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*CAPTION LIST*

Document No.
001 59-EN/LZT 720 0024

RBS 2106, RBS 2206, RBS 2207 Hardware Reference Manual

Date
2004-02-10

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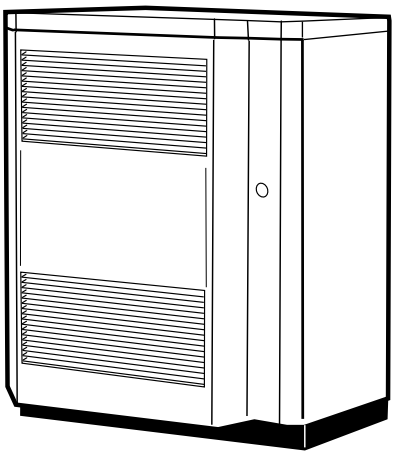
# RBS 2106

## Radio Base Station
## Product Description

The The RBS 2106, a member of the RBS 2000 family, is a 12 TRX radio base station for outdoor applications. RBS 2106 can be configured for omni cells, or for multi sector cells of up to three sectors.



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# Contents

# 1 Product Overview

The RBS 2106 is a high-capacity outdoor base station. It is used for outdoor applications, with up to six double Transceiver Units (dTRU). There is space inside the cabinet for transmission equipment and battery back-up.

The RBS 2106 is designed to be transported as a fully-assembled cabinet to the site. All units in the cabinet are easily accessible from the front of the cabinet, which means that the cabinet can be mounted against a wall.

## 1.1 Main features

The RBS 2106 can support the following features:

- 12 TRXs
- Co-siting (antenna sharing) with TDMA, WCDMA systems
- Discontinuous transmission/reception
- Duplex filters
- Dynamic power regulation
- Encryption/ciphering
- EDGE (hardware prepared)
- Expansion by TG-synchronisation
- External alarms
- Frequency hopping
- Internal battery back-up in three variants: One hour, half hour, or none
- Positioning with GPS/LMU
- Power Supply System: Can be connected to 200 - 250 V AC mains supplies
- Radio configurations supported on 800, 900, 1800 and 1900 MHz
- Receiver diversity
- Transmission Interface: The following transport network interface alternatives exist:

  T1 1544 kbit/s, 100 Ω, with internal synchronisation

  E1 2048 kbit/s, 75 Ω, with PCM synchronisation

  E1 2048 kbit/s, 120 Ω, with PCM synchronisation

- Wide range power input

## 1.2 Variants

The following variants are available and can be combined according to ordering information:

- Two climate systems, Combined Climate Unit or Heat Exchanger
- Available in two standard colours
- AC service outlet

## 1.3 Optional Equipment

The equipment listed below is available, but is not necessary for basic operation:

- ADM
- ASU
- Base frame
- Battery back-up
- Bias injector
- DC/DC converter
- DC Filter
- ddTMA
- DXX - two card
- ESB
- External alarms
- GPS/LMU (mounted internally or externally)
- Minilink
- Optional Expansion Unit
- Overvoltage protection (OVP) for external Alarms
- Smoke detector
- TMA-CM
- Transmission adapter

# 2 Dimensions

This section describes the RBS 2106 dimensions, space requirements and colour.

### Size and weight

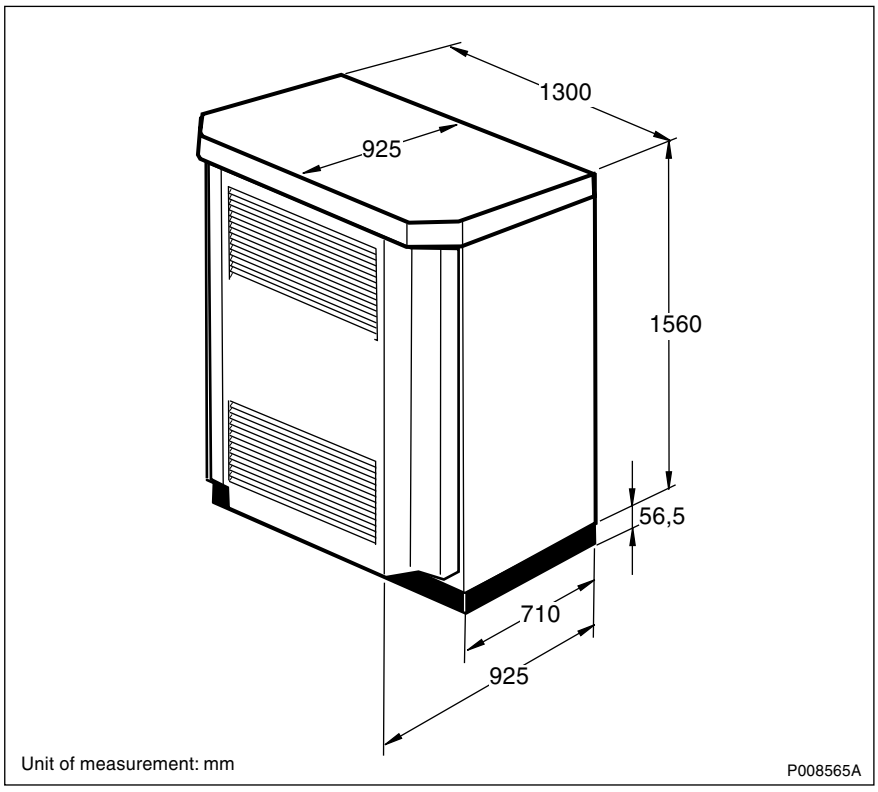



*Figure 1*

*Table 1 RBS 2106 weights*

| Unit | Weight |
|---|---|
| Fully equipped including batteries | 685 kg |
| Fully equipped excluding batteries | 560 kg |
| Door with climate unit | 150 kg |

### Surface and Colour

The RBS 2106 has a surface quality according to Ericsson standard class A3/B6.

*Table 2 RBS 2106 colours*

| Colour | Reference number | Ericsson number |
|---|---|---|
| Grey | RAL 7035 | MZY 543 03/8119 |
| Green | NCS 8010-G 10Y | MZY 543 03/685 |

# 3 Space Requirements

Installation and maintenance require that the door can be opened at least 90°. In practice this means that the space in front of the cabinet must be kept clear for a distance of 1300 mm, see figure below. No free space is needed at the back of the cabinet, but to ensure that the door can be opened easily there must be at least 20 cm of free space to the left of the cabinet.

If the RBS is located next to another cabinet of the same depth, no adjacent space is required. If the RBS is placed next to a wall, or any object protrudes on the left side, then 175 mm clearance is required to the left of the cabinet.

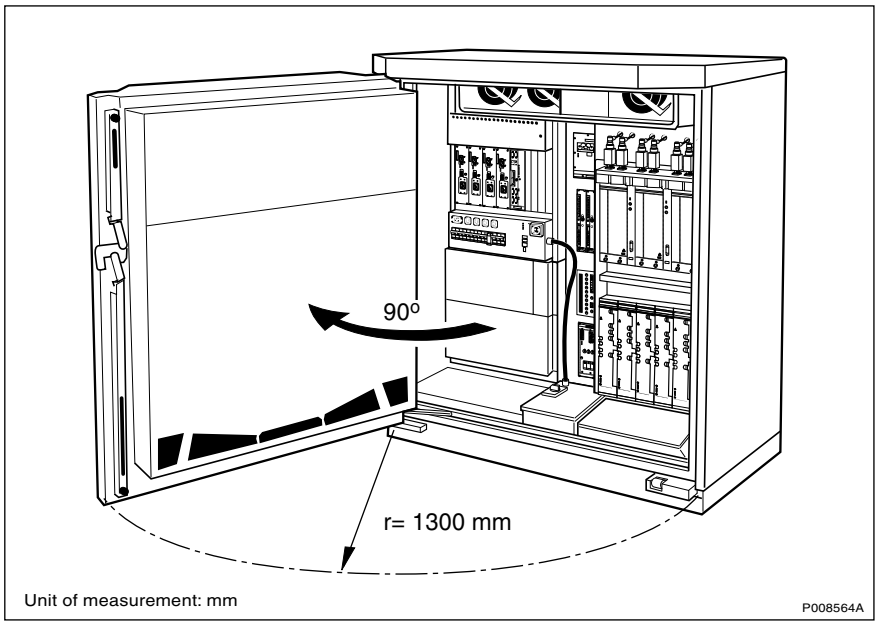



*Figure 2 Door opening requirements*

**Note:** All installation and maintenance work can be done with the door opened 90°.

During service a tent can be placed over the cabinet to protect the equipment from unsuitable weather conditions.

### Footprint

The footprint of the RBS 2106 is 1300 mm wide and 710 mm deep. Note that the door, which is 242 mm deep, is not included in the footprint, as it does not reach down to the ground. The installation frame of the RBS 2106 has the same bottom holing pattern as that of the RBS 2102.

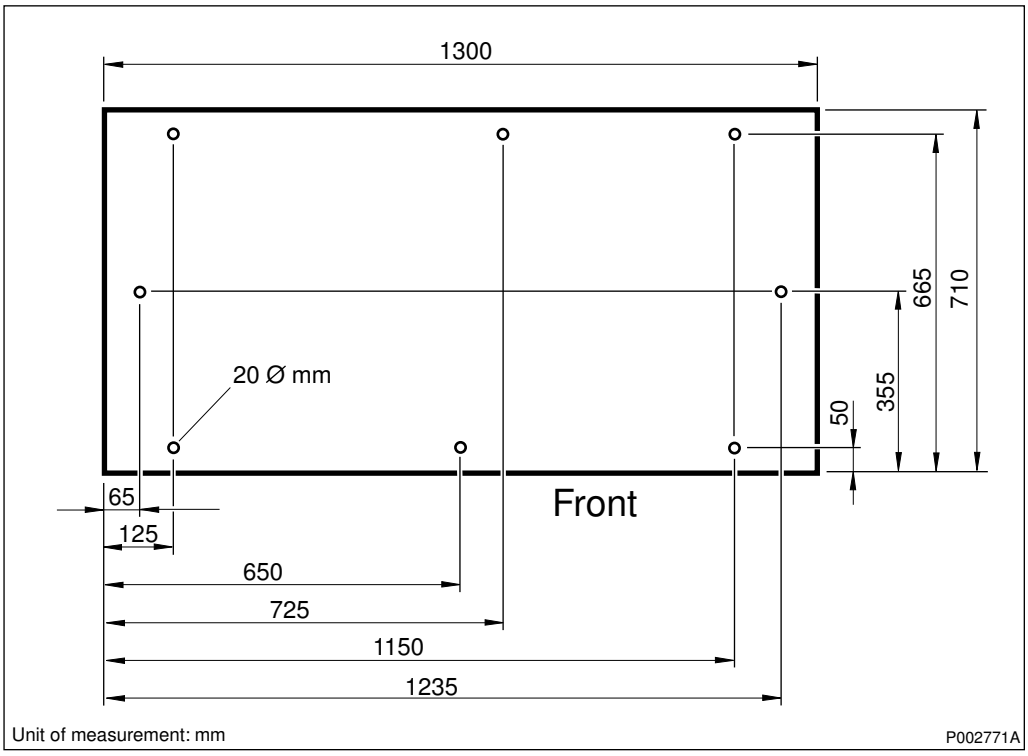



*Figure 3 Base frame and installation frame holing pattern*

# 4 Environment

The RBS 2106 is designed to operate within the limits stated for climatic requirements listed in the table below and to withstand ground vibrations as stated below.

## 4.1 Operating Environment

The operating environment and climatic specifications for the RBS 2106 are shown in the table below.

## Climatic Requirements

*Table 3 Climatic requirements*

| Description | Temperature | Relative humidity |
|---|---|---|
| Normal Conditions | –33°C to +45°C(1) | 15 – 100% |
| Transport | -40°C to +70°C | 5 – 100% |
| Storage | –25°C to +55°C | 10 – 100% |
| Handling | -40°C to +70°C | 5 – 100% |

*(1) Upper limit +40°C with the Heat Exchanger.*

## Acoustic Dispersion Heat Exchanger

The cabinet noise dispersion for an RBS 2106 with Heat Exchanger Climate Unit is shown in the two figures below. The figures show the noise dispersion generated by a free-standing cabinet and by a cabinet mounted against a wall.

**Note:** The acoustic noise dispersion values for a free-standing cabinet and a cabinet installed against a wall were tested according to the ISO 9614-2 standard, however deviations from these values may be experienced due to the nature of materials in the environment where the cabinet is installed. Objects may reflect or absorb sound and will affect acoustic dispersion.

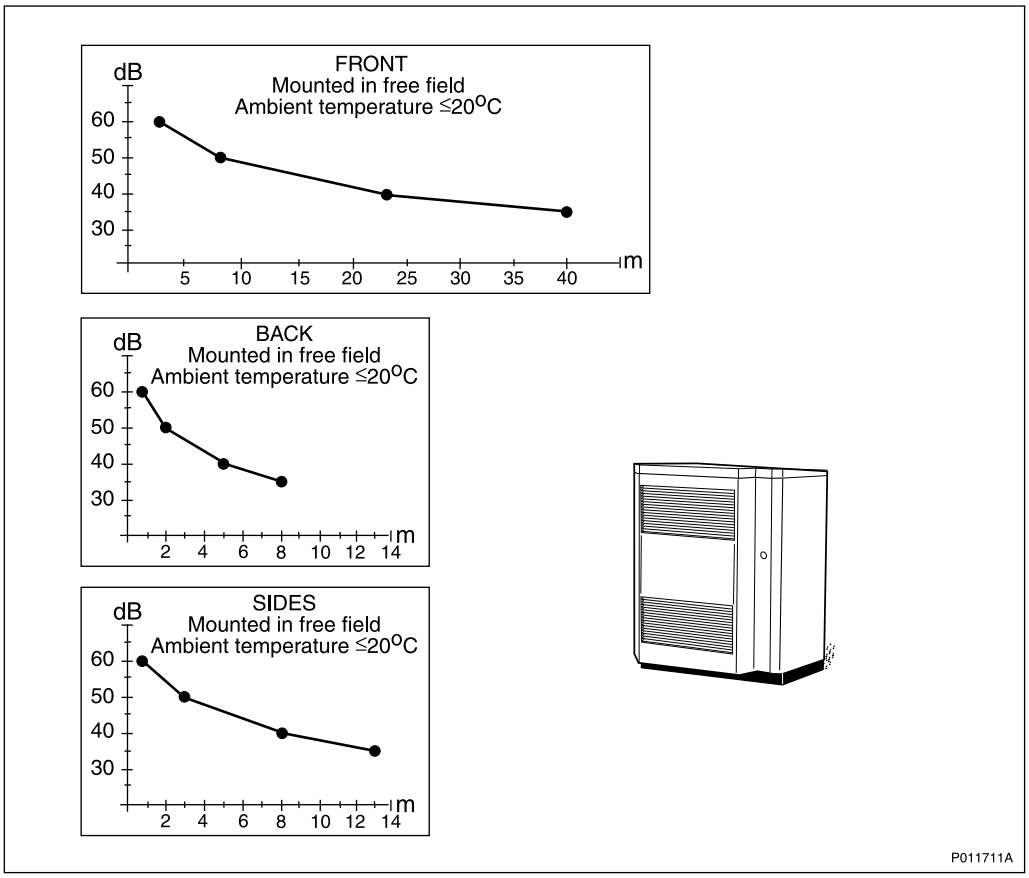



*Figure 4 Acoustic Dispersion for a Free-standing RBS 2106 with Heat Exchanger Climate Unit*

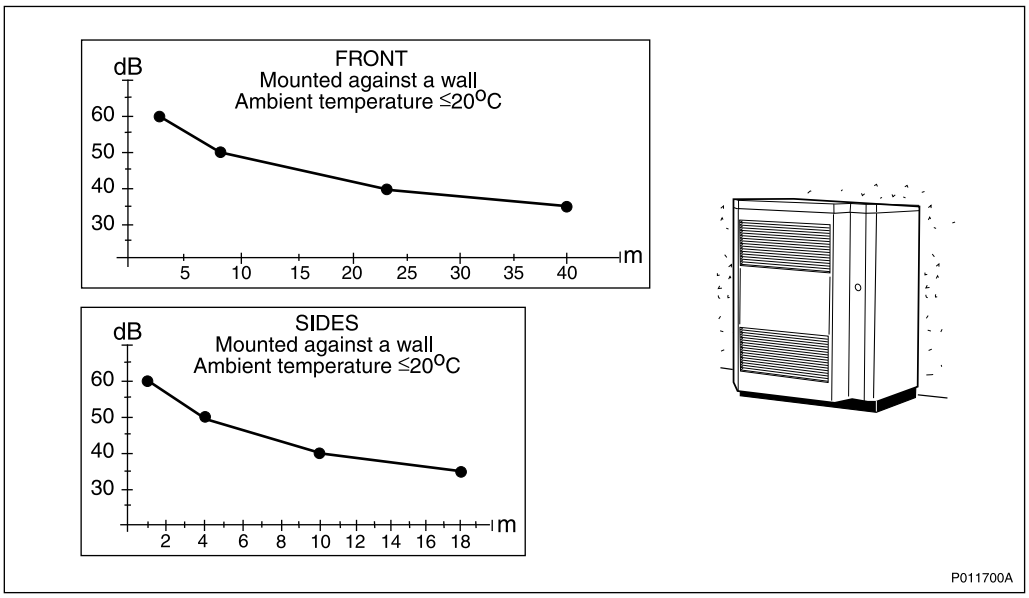



*Figure 5 Acoustic dispersion for a wall-mounted RBS 2106 with Heat Exchanger Climate Unit*

### Ground Vibrations

The RBS 2106 is designed to fulfill earthquake protection according to IEC 68-2-57.

### Levelling

In order to level the cabinet, the floor must be level to within ±3 mm/2000 mm and the floor gradient be within ±0.1°.

## 4.2 Environmental Impact

This section describes the effects that the cabinet has on the environment.

### Heat Dissipation

The RBS 2106 generates an average heat load of 3000 W. The exact figure is dependent upon configuration, equipment and site-specific conditions.

### Acoustic Dispersion

The cabinet noise dispersion for an RBS 2106 with Combined Climate Unit is shown in the two figures below. The figures show the noise dispersion generated by a free-standing cabinet and by a cabinet mounted against a wall.

**Note:** The acoustic noise dispersion values for a free-standing cabinet and a cabinet installed against a wall were tested according to the ISO 9614-2 standard, however deviations from these values may be experienced due to the nature of materials in the environment where the cabinet is installed. Objects may reflect or absorb sound and will affect acoustic dispersion.

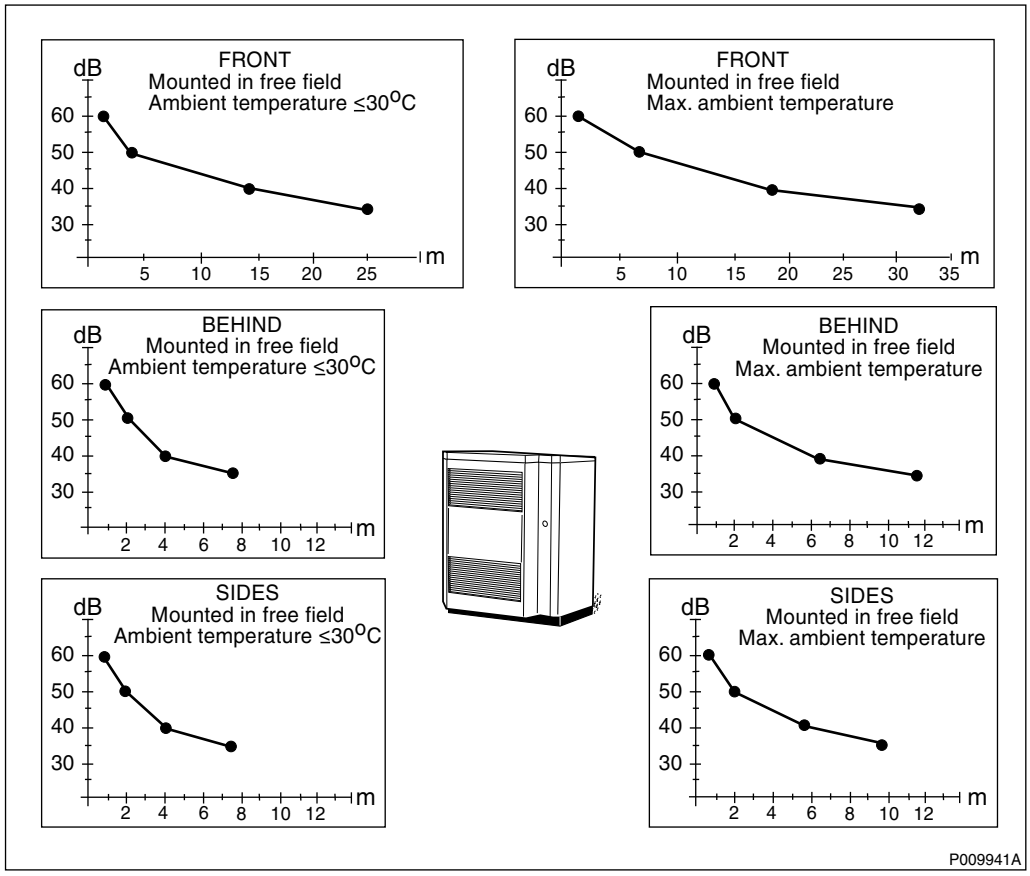



*Figure 6 Acoustic dispersion for a free-standing RBS 2106 with Combined Climate Unit*

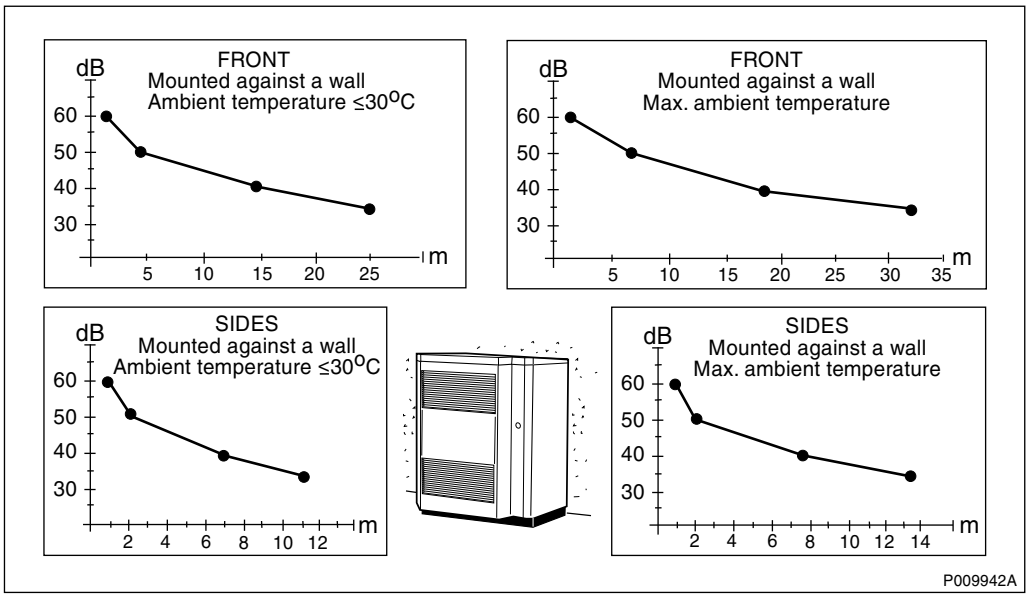



*Figure 7 Acoustic dispersion for a wall-mounted RBS 2106 with Combined Climate Unit*

## 4.3 Compliance Distances for Electromagnetic Exposure

The compliance distance is the minimum separation that should be kept between the antenna and a person in order to ensure that the ICNIRP RF exposure limits are not exceeded.

**Note:** ICNIRP, ‘‘Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)’’, International Commission on Non-Ionizing Radiation Protection, Health Physics, vol. 74, no. 4, 1998.

Ericsson has performed a free-space near-field RF exposure assessment of typical configurations of the RBS 2106 with a recommended antenna. The resulting dimensions, in meter, for a compliance boundary for both public and occupational exposure, are shown in *Table 4 on page 13*.

The compliance boundary is defined as a cylinder around the antenna, *see Figure below*. The antenna is not located at the center of the cylinder. Instead it is located almost at the edge, facing towards the center of the cylinder. The distance between the antenna’s rear and the edge of the cylinder is the ‘‘Distance behind antenna’’. The height of the cylinder is the antenna height plus equal distances above and below the antenna. The cylinder shape overestimates the compliance distances right beside the antenna.

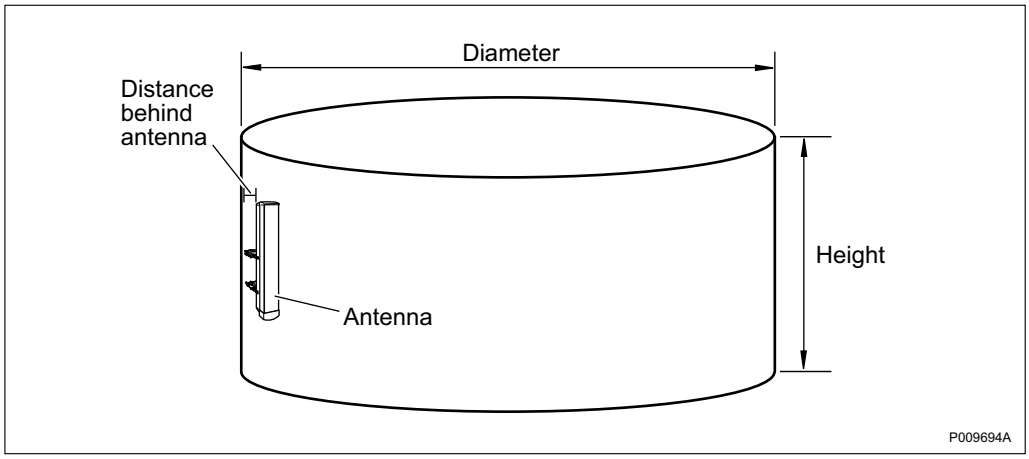



*Figure 8 Compliance boundary cylinder*

**Note:** *Table 4 on page 13* shows an example for a typical antenna. As the antenna field distributions will differ, complete calculations or measurements may be necessary in order to establish the compliance boundary for other configurations chosen by the customer. For further information on calculation methods, *see:*

| | | |
|---|---|---|
| | *Radio Site Installation Engineering Manual* | *EN/LZN 720 0069* |

*Table 4 Compliance boundary dimensions for the General Public (GP) and Occupational (O) exposure for typical configurations*

| Configuration | Frequency (MHz) | Dimensions of cylindrical compliance boundary in meter (m) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Diameter | | Height | | Distance behind antenna | |
| | | GP | O | GP | O | GP | O |
| 3x2 no hybrid | 900 | 6 | 3 | 1.7 | 1.5 | 0.1 | 0.1 |
| | 1800 | 5 | 1 | 1.6 | 1.4 | 0.1 | 0.05 |
| 3x4 combined | 900 | 6 | 3 | 1.6 | 1.5 | 0.1 | 0.1 |
| | 1800 | 5 | 1 | 1.6 | 1.4 | 0.1 | 0.05 |
| 3x2 TCC | 900 | 8 | 4 | 1.9 | 1.6 | 0.1 | 0.1 |
| | 1800 | 7 | 2 | 1.6 | 1.5 | 0.1 | 0.1 |
| 1x12 filter combiner | 900 | 11 | 5 | 2.3 | 1.6 | 0.1 | 0.1 |
| | 1800 | 9 | 4 | 1.8 | 1.6 | 0.1 | 0.1 |

The cylinder shape overestimates the compliance distances right beside the antenna. In reality the occupational compliance distance by the side, in line with the front of the antenna, is less than 0.1 meter for output power levels below 56 W and less than 0.3 meter for the other power levels reported here. For characteristics of an antenna recommended for typical configurations of RBS 2106, *see Table below*.

*Table 5 Characteristics for a typical antenna (KRE 101 1916/1)*

| | |
|---|---|
| Antenna specifications | X-pol macro RBS sector antenna |
| Antenna height | 1.3 m |
| Horizontal half-power beam width | 60 degrees |
| Vertical half-power beam width | 15 degrees at 900 MHz<br>7 degrees at 1800 MHz |
| Antenna gain | 14.5 dBi at 900 MHz<br>17 dBi at 1800 MHz |
| Down tilt | 0 degrees |

The nominal maximum power fed to the antenna, as a function of the number of transceiver units (TRUs) per antenna and the maximum power (including tolerances and transmission loss) per TRU, for RBS 2106 at 900 MHz and 1800 MHz, are given in *Table 6 on page 14*.

*Table 6 Maximum power to antenna for various RBS 2106 configurations*

| Configuration | Frequency (MHz) | Nominal output power per TRU (dBm)/(W) | Maximum power into antenna (1) (dBm)/(W) |
|---|---|---|---|
| 3x2 no hybrid | 900 | 45.2 / 33 | 47.2 / 52 |
| | 1800 | 44 / 25 | 46 / 40 |
| 3x4 combined | 900 | 41.7 / 15 | 46.7 / 47 |
| | 1800 | 40.5 / 11 | 45.5 / 35 |
| 3x2 TCC | 900 | 47.7 / 59 | 49.7 / 93 |
| | 1800 | 46.5 / 45 | 48.5 / 71 |
| 1x12 filter combiner | 900 | 42.7 / 19 | 52.5 / 177 |
| | 1800 | 41.5 / 14 | 51.3 / 135 |

*(1) Including power tolerance level (+2 dB) and transmission losses (-3 dB).*

## 4.4 Materials

All Ericsson products fulfil legal, market and Ericsson requirements regarding:

- Fire resistance of material, components, wires and cables
- Declaration of materials
- Use of restricted materials
- Recycling

### Package Material

The package material is recyclable.

# 5 Hardware Units

A high level of availability is achieved using strict functional modularity in a system of standardised Replaceable Units (RUs). A failed RU can easily be replaced by a new one.

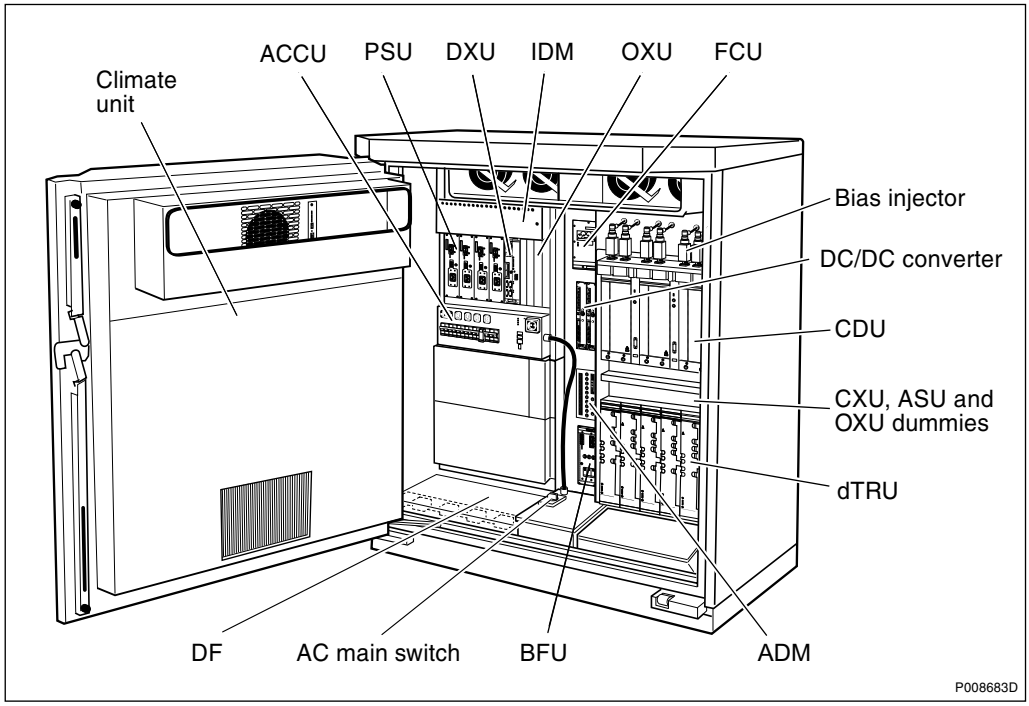



*Figure 9 RBS 2106 overview*

## 5.1 Standard Hardware Units

This section briefly describes the standard hardware units required for function, irrespective of configuration or frequency.

### ACCU - AC Connection Unit

The ACCU connects, disconnects, and distributes the incoming AC power supply to the PSUs and the climate unit. It consists of two parts: a Connection Unit and a Distribution Unit.

Number of units: 1.

### BFU – Battery Fuse Unit

The Battery Fuse Unit (BFU) supervises connection or disconnection of the batteries. It can also be used to provide prioritized power supply, for example to the transmission equipment.

Each RBS cabinet will require its own BFU, regardless of battery back-up configuration.

Number of units: 1.

### Climate Unit

The climate unit maintains the internal temperature and humidity inside the cabinet. The climate unit is mounted in the door of the cabinet.

Two types of climate unit are available:

- . Combined Climate Unit. This unit provides both heating and refrigeration.
- . Heat Exchanger climate unit. This provides heating, and cooling through forced convection. It has no refrigerating capacity; thus the cabinet cannot be cooled to a temperature lower than that of the outside (ambient) temperature.

Number of units: 1

### CDU - Combining and Distribution Unit

The CDU is the interface between the transceivers and the antenna system. All signals are filtered before transmission and after reception by means of bandpass filters. The CDU allows several dTRUs to share antennas. There are a maximum of three CDUs in one RBS 2106.

The CDU combines transmitted signals from several transceivers, and distributes the received signal to several transceivers. The CDU is hardware-prepared to support EDGE. Two different CDU types are used in the RBS 2106 to support all configurations:

- **CDU-F** is a filter combiner intended for high capacity solutions.
- **CDU-G** can be configured either for high capacity or for high coverage. It is a combiner that can be used for synthesizer hopping.

Number of units: 1 - 3

### CXU - Configuration Switch Unit

The task of the CXU is to cross-connect the CDU and the dTRU in the receiver path. The CXU makes it possible to expand or reconfigure a cabinet without moving or replacing any RX cables.

The RX inputs/outputs on the dTRU and the CDU are placed in such positions that they minimise the amount of cable types for connecting the CXU with the dTRUs and the CDUs.

The CXU is software configured.

Number of units: 1

### DF - Distribution Frame

The Distribution Frame (DF) is a connection and overvoltage protection (OVP) device for external alarms and PCM links. The DF protects equipment inside the RBS from overvoltage and overcurrent which may occur in external lines. Examples of equipment requiring OVP include transmission lines, ESBs, external alarms and positioning devices (GPS and LMU).

Number of units: 1

### DXU 21- Distribution Switch Unit

The DXU-21 is the central control unit for the RBS. It supports the interface to the BSC, and it collects and transmits the alarms. The DXU-21 controls the power and climate equipment for the RBS. It has a removable compact flashcard which makes it possible to replace a faulty DXU-21 without the need for loading RBS software from the BSC.

The DXU-21 is provided with four connections for transmission interfaces. It can handle both 2048 kbit/s (E1) and 1544 kbit/s (T1) transmission interfaces. The DXU-21 has hardware support for EDGE on 12 TRXs.

Number of units: 1

### dTRU - double Transceiver Unit

The dTRU contains two TRXs for transmission and reception of two radio carriers.

It has a built-in combiner with the optional possibility of combining two TX signals into one TX output. It is also prepared for four-branch RX diversity for further improvements in sensitivity.

One version of the dTRU supports only GMSK and the other version supports both GMSK and EDGE.

Number of units: 1 - 6

### FCU - Fan Control Unit

The FCU is concerned with cooling RUs, not with controlling the general temperature or humidity conditions within the cabinet.

The FCU monitors the temperature sensors located on certain RUs and controls the speed of the four internal cabinet fans accordingly. The fans are positioned between the CDU subrack and the roof, giving a common suction area.

Number of units: 1

### IDM - Internal Distribution Module

The IDM is a panel for distributing the internal +24 V DC power to the various units. Each distribution circuit in the cabinet is connected to a circuit breaker in the IDM.

Number of units: 1

### PSU - Power Supply Unit

The PSU converts 120 - 250 V to regulated +24 V DC.

Number of units: 1 - 4

## 5.2 Optional Hardware Units

This section describes the RBS 2106 optional hardware units.

### ASU - Antenna Sharing Unit

Antenna sharing is part of co-siting, that is, using another cabinet together with a GSM RBS 2106 cabinet in the same sector. The ASU allows a TDMA (or other) cabinet and a GSM RBS 2106 cabinet to share RX antennas.

Number of units: 0 - 1

### ADM - Auxiliary Distribution Module

The ADM handles distribution and fuse connection of system voltage (+24 V DC and -48 V DC) to the transport module (TM).

Number of units: 0 - 1

### Battery Back-up

Batteries can be installed inside the cabinet in either of the TM/BM spaces located to the left of the BFU. It is also possible to use an external source of battery supply via the DC filter; if this is done, internal batteries may not be used.

### Bias injector

The bias injectors are used to provide the TMA with DC power from the TMA-CM, over the RX/TX feeder cables. The bias injector is mounted between the antenna feeder and the CDU.

Number of units: 0 - 6

### DC/DC Converter

The DC/DC converter can supply -48 V DC power to transmission equipment in the TM compartment. It converts +24 V DC to -48 V DC.

Number of units: 0 - 2

### ddTMA

The ddTMA is to be mast-mounted and placed close to the antenna. It improves the receiver sensitivity. The ddTMA saves feeder cables by duplexing RX and TX signals to the same cable.

Number of units per cabinet: 0 - 6.

### DXX - Digital Cross Connector

Digital Cross Connect (DXX) is a plug-in unit which combines cross-connect, control and interface functions. It has four 2 Mbit/s interfaces complying with the G.703 standard. If the DXX option is used, it is located in an Optional Expansion Unit (OXU) position in the DXU/ PSU subrack.

Number of units: 0 - 1

### OXU - Optional Expansion Unit

The following Optional Expansion Unit (OXU) positions are available:

- Four spaces in the DXU/PSU subrack
- One 19-inch OXU position is available between the CXU and the dTRU subrack.

RUs which typically are located in the OXU slots include the DXX and the TMA-CM. The 19-inch position above the CXU is used for an Antenna Sharing Unit (ASU) in co-sited cabinets.

### Smoke Detector

The smoke detector is an optical device. Its purpose is to detect visual smoke. When smoke enters the detector, a light beam is deflected towards a photocell and an alarm is activated.

### TM - Transport Module

The Transport Module (TM) is a space in the cabinet reserved for transmission equipment.

**TMA-CM -Tower Mounted Amplifier Control Module**

The TMA-CM is used to provide ddTMA with 15 V DC power through the bias injectors. It also identifies ddTMA faults and forwards this information to the alarm module in the RBS. If a TMA-CM is used, it is located in one of the four OXU positions in the DXU/PSU subrack.

Number of units: 0 - 2

# 6 Interfaces

In this section, all external and internal connections are listed, as well as the test interface and the operator interface.

All external connectors enter the cabinet through the bottom of the cabinet.

Internal connections, test interface and operator interface are located on some cabinet hardware units.

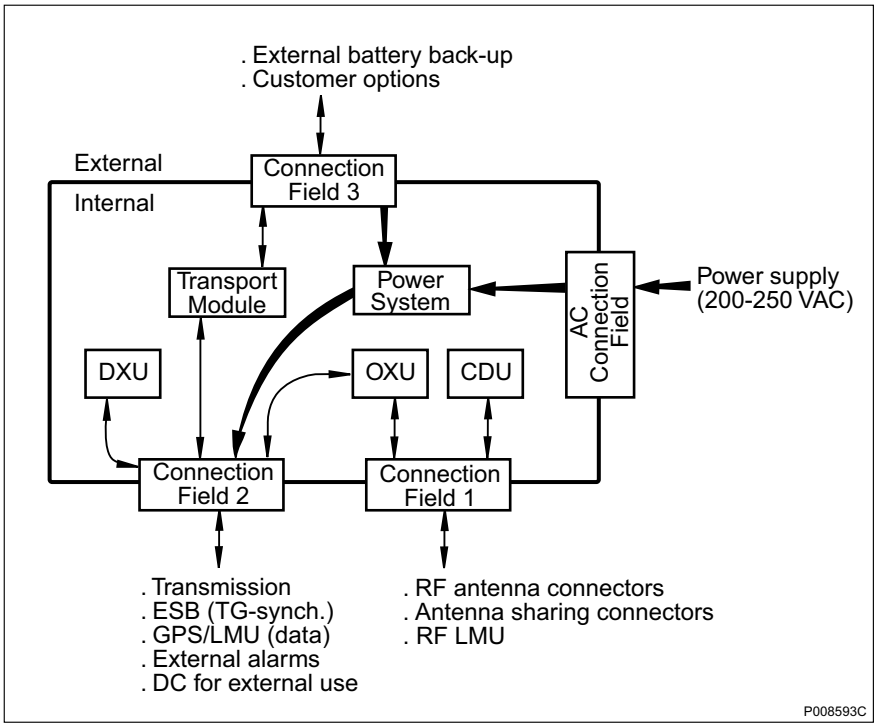



*Figure 10 Internal and external interfaces*

## 6.1 External Connections

All external connectors enter the cabinet through the bottom of the cabinet. The approximate locations of the connection fields are shown in the figure below, to aid in planning cable inlet allowances.

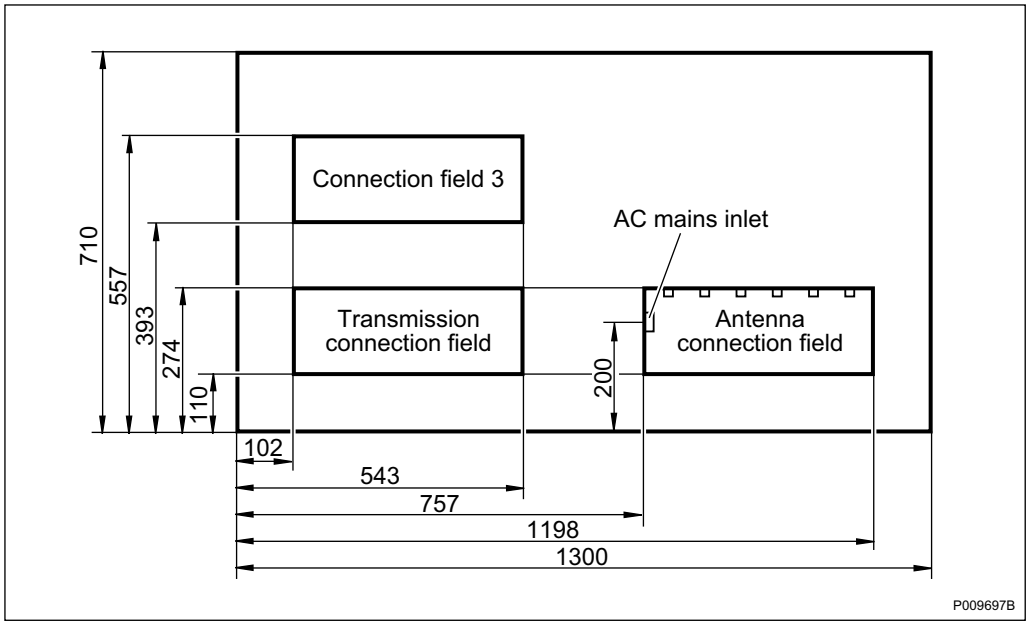



*Figure 11 Cable inlet measurements*

### Connections on Distribution Frame (DF)

The DF is a modular construction containing overvoltage arrestors for external alarms and OVP modules for PCM and ESB cables.

### Overvoltage Arrestors for External Alarms

All voltage arrestors, for example external alarms, have space for two alarms. The cable used should be single core, with a diameter of 0.3 - 0.8 mm.

*Table 7 Overvoltage arrestors*

| Alarm | Connector |
|---|---|
| Alarm 1+ | OVP 1, terminal 4 |
| Alarm 1– | OVP 1, terminal 3 |
| Alarm 2+ | OVP 1, terminal 2 |
| Alarm 2– | OVP 1, terminal 1 |
| Alarm 3+ | OVP 2, terminal 4 |
| Alarm 3– | OVP 2, terminal 3 |
| Alarm 4+ | OVP 2, terminal 2 |
| Alarm 4– | OVP 2, terminal 1 |
| Alarm 5+ | OVP 3, terminal 4 |

*Table 7 Overvoltage arrestors*

| Alarm | Connector |
|---|---|
| Alarm 5– | OVP 3, terminal 3 |
| Alarm 6+ | OVP 3, terminal 2 |
| Alarm 6– | OVP 3, terminal 1 |
| Alarm 7+ | OVP 4, terminal 4 |
| Alarm 7– | OVP 4, terminal 3 |
| Alarm 8+ | OVP 4, terminal 2 |
| Alarm 8– | OVP 4, terminal 1 |

### Antenna Connections

The antenna connectors are accessible from the antenna connection box in the bottom of the cabinet. The intake plate in the bottom of the cabinet is equipped with six antenna cable connectors.

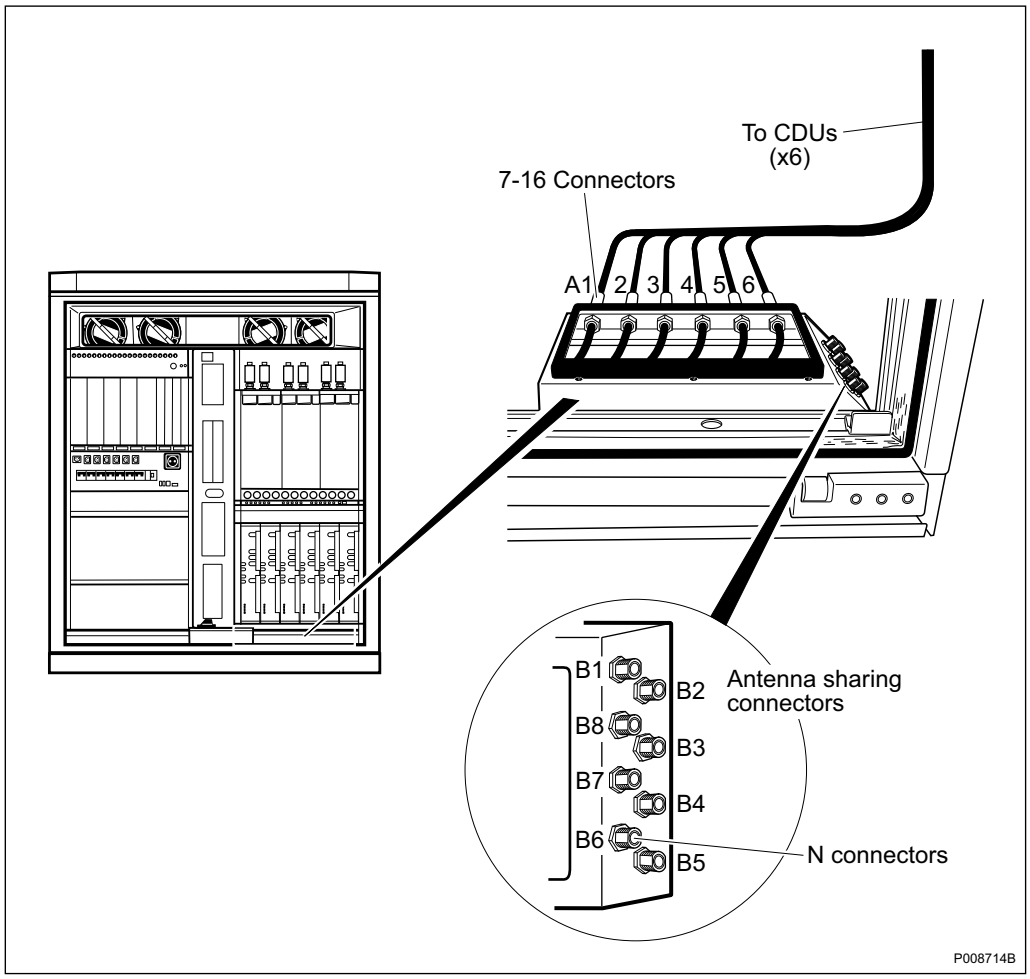



*Figure 12 Antenna connections*

*Table 8 Antenna connections*

| Connection No. | Connection to | Type of connector |
|---|---|---|
| A1 - A6 | Antenna | 7/16" IEC 169 - 4 |
| B1 - B6 | Antenna sharing | N connector IEC 169-16 |
| B7 - B8 | for future use | N connector IEC 169-16 |

### Other External Connections

*Table 9 External connections*

| Connection Location | Connection to | Type of connector |
|---|---|---|
| AC connection box | AC Mains connections | Screw terminal for wires 4 - 16 mm |
| ACCU | AC Service outlet | • IEC 83:1975 standard C 2b (Sweden, Germany and others)<br>• IEC 83:1975 standard B2, same as BS 1363:1984 standard 13A (UK)<br>• IEC 83:1975 standard A5-15 (USA) |
| Reference Earth | Earthing connection | M8 screw, 50 mm2 stranded copper wire |

### External connections to TM

Optical fiber and MiniLink radio cables are connected to the TM via connection field 3. Twisted pair cables connect to the TM via the OVP.

### Transport Network to TM

The external line from the transport network interfaces to the transport module. The type and impedance of the connector may differ from operator to operator.

## 6.2 Test Interface

The RBS 2106 is equipped with test interfaces for connection of external equipment.

| | |
|---|---|
| 13 MHz reference signal | The 13 MHz reference signal used to synchronise test equipment is located on the DXU. |
| System voltage test | The system voltage test port provides access to the system voltage (+24 V DC). It is located on the IDM. |
| OMT | The OMT interface is located on the front of the DXU. |

## 6.3 Operator Interface

The Man-Machine Interface (MMI) in the RBS 2106 is comprised of indicators and buttons located on the hardware units in the cabinet.

| Indicators | Description |
|---|---|
| Bat disconnect | Battery disconnected |
| Battery mode | Indicates that the RBS is running on battery |
| BS fault | One or more faults are detected on RUs in the RBS |
| External alarm | One or more supervised external alarms are active |
| Fault | Fault detected and localised to the RU |
| Local mode | The RU is in local mode |
| Operational | The RU is operational |
| Fan Fault | A fan is faulty |
| EPC Bus Fault | Communication to superior RU is lost |
| RF off | No RF signal |
| TMA 1 - 6 | The TMA is operational |
| Transmission OK | Signal and frame sync OK |
| H/E internal CCU | A fan is faulty |
| H/E external fan fault (Y) | A fan is faulty |
| Active cooler fan fault (Y) | A fan is faulty |
| Active cooler fault (Y) | The cooler is faulty |
| Heater fault (Y) | The heater is faulty |
| Power fault | AC or DC power is missing in the climate unit |

### Buttons

*Table 10 Switches and circuit breakers*

| Switch | Position | Function |
|---|---|---|
| DXU reset | DXU | Resets the DXU and all subunits |
| Local/remote | DXU, dTRU | Changes mode between local and remote |
| TRU reset | DTRU | Resets the dTRU |
| Battery disconnected | BFU | Disconnects the battery supply |
| DC out | BFU | Automatic CB for DC out |
| DC out 1 | BFU | Automatic CB for DC out 1 |
| DC out 2 | BFU | Automatic CB for DC out 2 |
| EC | BFU | Automatic CB for EC supply |
| Mains switch | ACCU | Mains switch for power supply |
| TMA/no TMA | ASU | Switch for TMA |

### Barcode

The barcode for product identification is readable without disturbing the RBS function.

# 7 Power System

This section provides information on the power system of the RBS 2106.

The main characteristics of the RBS 2106 power supply are:

- Only alternating current (AC) mains supply is used
- Battery back-up may be internal or external (but not both at the same time)
- The socket of the AC service outlet is available in three variants according to national standards

An overview of the power distribution system within the RBS 2106 is given in the figure below.

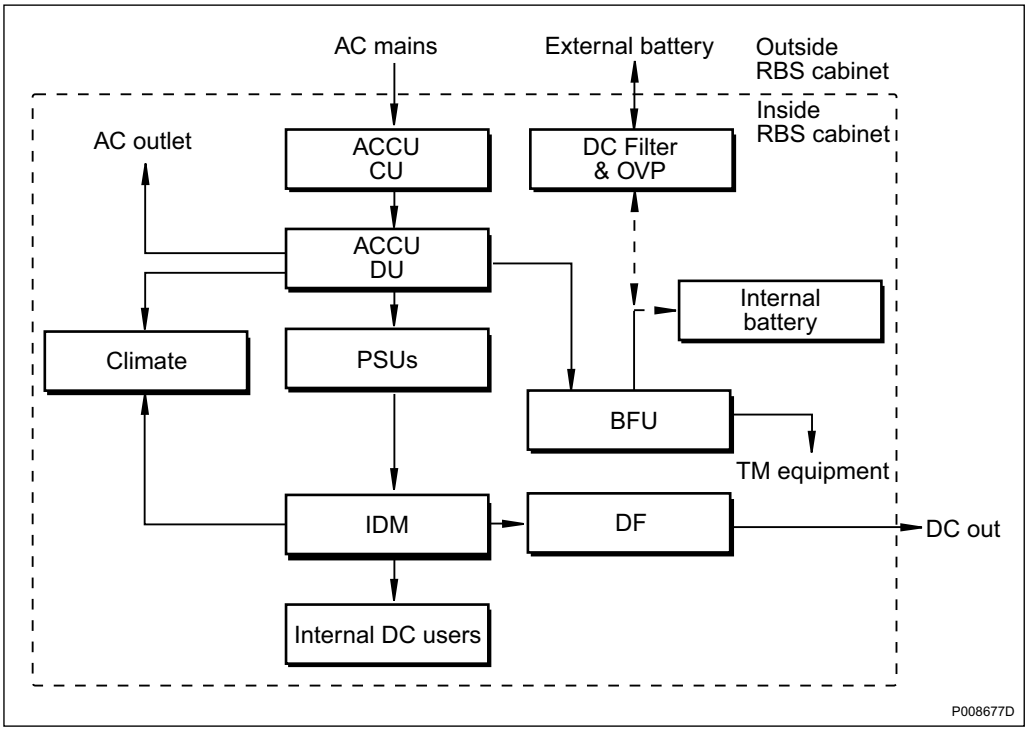



*Figure 13 Power system*

## 7.1 Power Supply

This section describes the AC Mains power supply, the external earth fault circuit breakers, and the mains fuses.

### AC Mains Supply Voltage

Single-phase, two-phase or three-phase AC may be used.

*Table 11 Power parameters*

| | |
|---|---|
| **Nominal voltage** | **200 - 250 V AC** |
| **Operating voltage** | 180 - 275 V AC |
| **Nominal frequency** | 50 - 60 Hz |
| **Operating frequency** | 45 - 65 Hz |
| **Maximum inrush current (total, all phases)** | 60 A for 10 ms (typical duration) |
| **Maximum ground leakage current** | 50 mA |
| **PSU capacity** | 4 x 1200 W (4800 W total) |
| **BFU** | 1 x 200 A |

### External Earth Fault Circuit Breakers

If external earth fault circuit (ground fault) breakers are used, then the recommended minimum trip value is 100 mA.

### Mains Fuses

*Table 12 Mains fuses recommendation*

| Minimum for Safe Function | Recommended for Maximum Selectivity | Maximum Allowed Fuse Rating |
|---|---|---|
| 25 A/40 A (1) | 32 A/50 A | 63 A |

*(1) Three-phase/Single phase*

## 7.2 Battery Back-up

Battery back-up is used to power the site during mains failure and also to protect the site from short-term interruptions in the mains supply.

### Internal Battery Back-up

The following battery back-up levels can be achieved in the cabinet itself:

- Full: one hour back-up time
- Half: half an hour back-up time

If no TM equipment is used, it is possible to add additional batteries in the TMA compartment. The back-up time will then be enhanced by 100%.

### External Battery Back-up

Two external battery back-up alternatives are supplied by Ericsson: the BBS or the battery frame. Both are connected via the DC Filter.

## 7.3 Output Power

The RBS can supply the TM with power according to the table below.

*Table 13 Output power*

| **-48 V DC** | **2 x 200 W** |
|---|---|
| +24 V DC | 2 x 250 W |
| -48 V DC and +24 V DC | 200 W + 250 W |

**Note:** Power to the transport module can be distributed to up to 10 internal users via the optional RU/ADM.

### 7.4 Power Consumption

*Table 14 Power consumption*

| **Climate system** | **Power consumption, input voltage >200 V AC** | **Power consumption, input voltage < 120 V AC** |
|---|---|---|
| **Heater plus forced-air cooling only** | 5948 W | 6049 W |
| **Heater plus refrigerated cooling** | 6588 W | 6049 W |

# 8 Transmission

The RBS 2106 supports two transmission standards:

- T1 1.5 Mbit/s, 100 Ω, with internal synchronisation
- E1 2 Mbit/s, 75 Ω, with PCM synchronisation
- E1 2 Mbit/s, 120 Ω, with PCM synchronisation

# 9 External Alarms

The RBS 2106 supports a maximum of 16 external alarms. The external alarm device can set the alarm by either an open or a closed condition.

The alarm device connected to the screw terminals should be isolated relay contacts. A closed contact (logic zero) is required to be below 2 kW, and an open contact (logic one) above 100 kW. The current through a closed 0 W contact is 1.2 mA. The voltage between terminals with an open contact is 24 V DC.

The external alarms are defined at the installation. They are defined by using the Operation and Maintenance Terminal (OMT) or from the BSC using the remote OMT.

**Note:** An installed DC/DC Converter is hard coded to alarm input16 in the External Alarm Unit. Pin 16 is therefore not available.

**Note:** An installed Smoke Detector is hard coded to alarm input 2 and 3 in the External Alarm unit. Pins 2 and 3 are therefore not available.

# 10 Standards, Regulations and Dependability

In this section a brief overview over standards, type approval and electromagnetic compatibility are stated.

## 10.1 Safety Standards

In accordance to the market requirements, the RBS 2106 complies with the following product safety standards:

- 73/23/EEC Low voltage directive
- IP 55 according to IEC 60529
- EN 60950 / IEC 60950
- EN 60215 / IEC 60215
- UL 1950
- CSA 22.2 No. 950

## 10.2 Other Standards and Regulations

### Marking

The product is marked with signs to show compliance with product safety standards.

### Type Approval Standards

The RBS complies with the European Community and the North America market requirements regarding radio performance. The product has the CE and FCC signs to show compliance to the legal requirements in respective region.

### Electromagnetic Compatibility (EMC)

The RBS complies with the European Community and the North America market requirements regarding EMC. The product has the CE and FCC signs to show compliance to the legal requirements in respective region.

## Dependability

The RBS 2106 is designed for a technical lifetime of 25 years (24-hour operation). The following preventive maintenance conditions must be fulfilled to guarantee the availability of the RBS:

| | |
|---|---|
| Fans | The fans must be inspected (cleaned if necessary) every year. The lifetime is estimated to at least 5 years. |
| The Climate Unit | The climate unit must be regularly inspected and cleaned (interval is approximately one year, but depends on the environmental conditions at the site). |
| Batteries | The batteries must be regularly inspected every year (oxide on the pole terminals). The batteries should be replaced according to the recommendations of the battery supplier. |

## Vandal Resistance

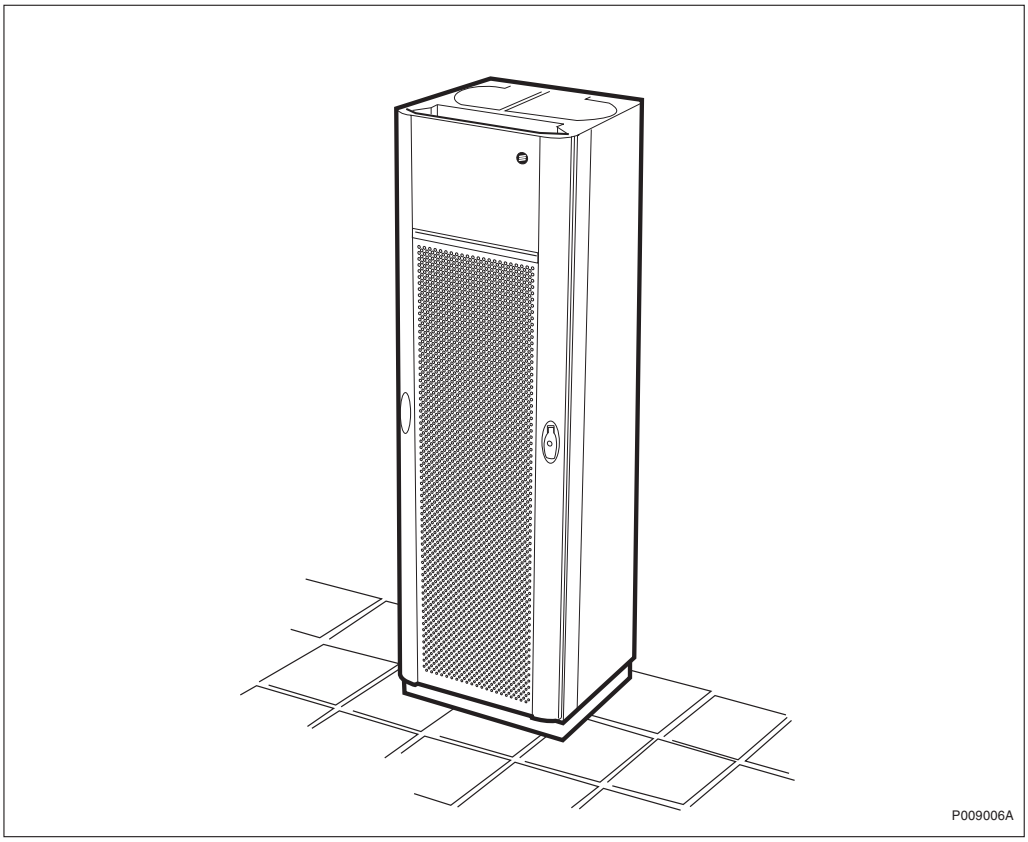
The RBS 2106 fulfils Ericsson’s requirements for vandal resistance.

Ericsson AB
SE-164 80 Stockholm
Sweden
asq.us@ericsson.com

# RBS 2206

## Radio Base Station
## Product Description

The RBS 2206, a member of the RBS 2000 family, is a 12–TRX radio base station for indoor applications. This cabinet covers the same floor areas as the RBS 2202, its predecessor, and boasts double capacity.

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# Contents

# 1 Product Overview

The RBS 2206 is a high-capacity indoor base station. It is used for indoor applications, with up to six double Transceiver Units (dTRU). The RBS 2206 is designed to be transported as a fully-assembled cabinet to the site. All units in the cabinet are easily accessible from the front of the cabinet, which means that the cabinets can be mounted side by side with their backs against a wall.

## 1.1 Main Features

The RBS 2206 can support the following features:

- 1, 2 or 3 sectors in one cabinet using CDU-F or CDU-G
- Co-siting (antenna sharing) with TDMA or WCDMA systems
- Discontinuous transmission/reception
- Duplex filters
- Dynamic power regulation
- Encryption/ciphering
- EDGE (hardware prepared)
- Expansion by TG-synchronisation
- External alarms
- Frequency hopping
- Positioning with GPS/LMU
- Radio configurations supported on 800, 900, 1800 and 1900 MHz
- Receiver diversity
- Transmission Interface: The following transport network interface alternatives exist:
  - T1 1544 kbit/s, 100 Ω, with internal synchronisation
  - E1 2048 kbit/s, 75 Ω, with PCM synchronisation
  - E1 2048 kbit/s, 120 Ω, with PCM synchronisation
- Wide range power input 120 – 250 V AC

## 1.2 Variants

There are three RBS 2206 cabinet versions:

- -48 to -60 V DC
- 120 - 250 V AC/ +24 V DC, 50/60 Hz
- +24 V DC (without PSUs)

### 1.3 Optional Equipment

The equipment listed below is available, but is not necessary for basic functionality.

- ASU
- Battery back-up
- Bias injectors
- DM
- dual duplex Tower Mounted Amplifier (ddTMA)

  **Note:** For GSM 1800 and GSM 1900 the ddTMA is mandatory equipment.
- DXX
- ESB
- Mini-DXC
- OVP
- TMA-CM
- Transmission Adapter (TA)

# 2 Dimensions

This section describes the physical characteristics of the RBS 2206.

*Table 1 Weight*

| Unit | Weight |
|---|---|
| RBS cabinet (fully equipped including base frame) | 230 kg (507 lbs.) |
| Base frame | 12 kg (26 lbs.) |

*Table 2 Colour*

| Colour | Reference No. |
|---|---|
| Grey | NCS 1002-R |

For dimensions, *see Figure 1 on page 5.*

# 3 Space Requirements

In the following sections the required space and recommended floor layout is indicated.

### Space above the RBS Cabinet

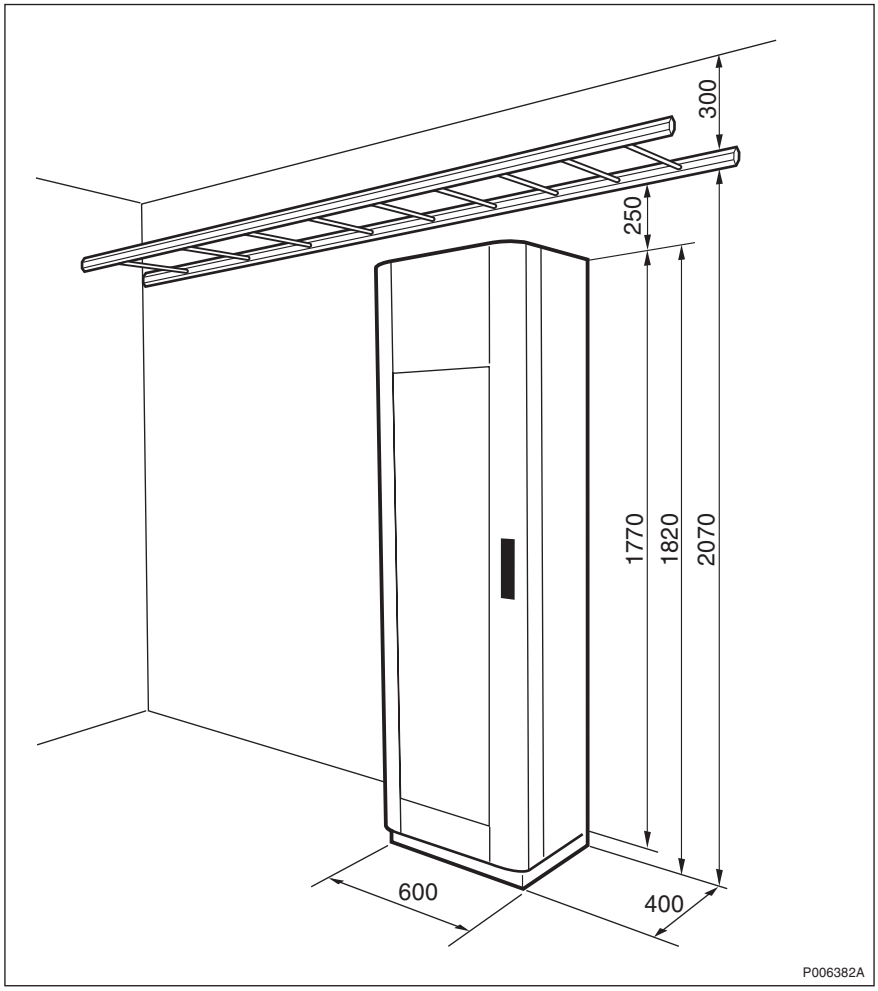



*Figure 1 RBS 2206, free space above the cabinet*

The recommended distance between the cabinet and cable ladder is 250 mm. A shorter distance makes it difficult to exchange fans and may restrict the air

flow. A space of 300 mm is recommended above the cable ladder to make cable installation work easier.

The door projects 50 mm in front of the cabinet.

### Layout for RBS Cabinets

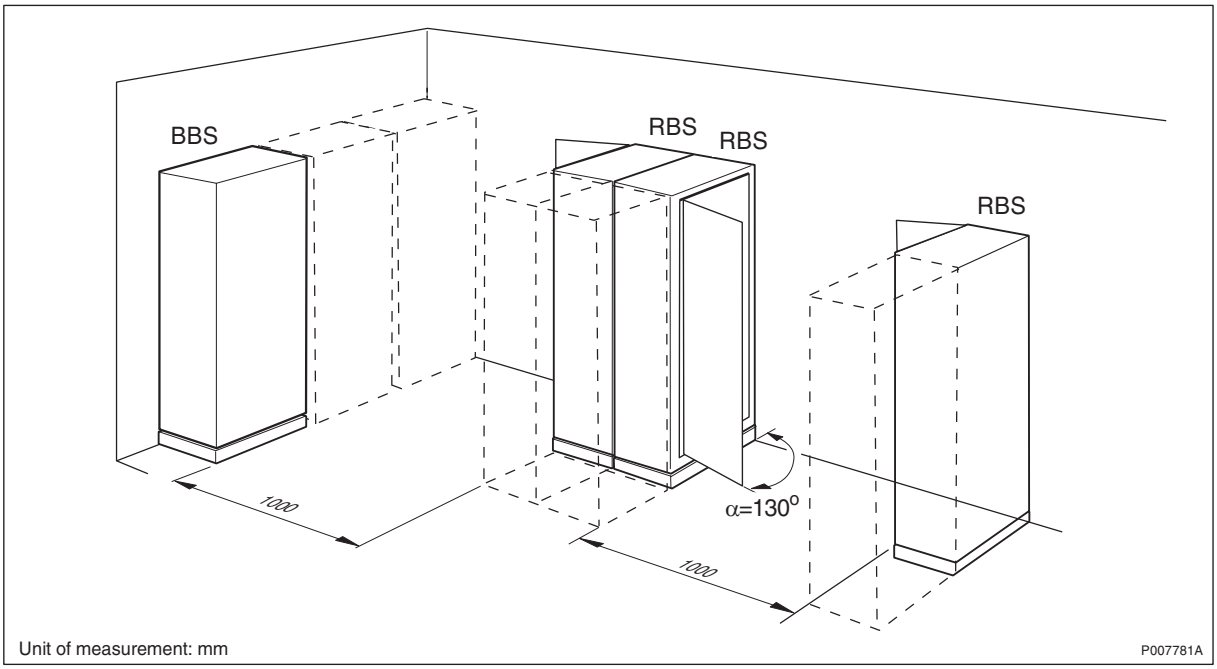



*Figure 2 Floor layout and space requirements*

The RBS cabinets and BBS racks are mounted on the floor, and may be positioned against a wall, back to back, or free standing without contact with other cabinets.

Expansion cabinets and racks can be positioned to the left or to the right of the master cabinet. However, expansion to the right is recommended in order to follow the same standard globally.

A distance of 1000 mm in front of the cabinets and racks for maintenance work is recommended.

**Note:** Space for future expansion must be considered as indicated in the dotted line in the figure above.

### Earthquake Requirements

If the RBS cabinet shall fulfill the requirements for earthquake protection, the space between wall and cabinet is to be at least 100 mm and between cabinets at least 150 mm.

### Footprint

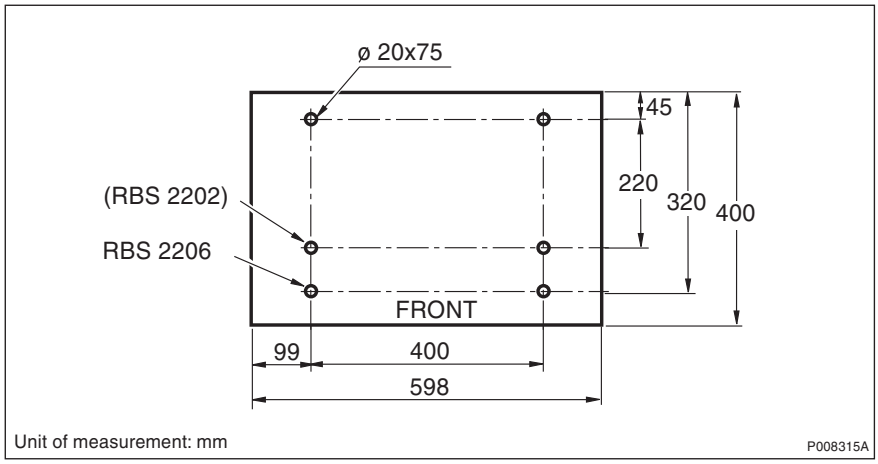



*Figure 3 Hole pattern overview*

The RBS 2206 has the same footprint as the RBS 2202 cabinet. The base frame is used as a template to mark new holes. If an RBS 2202 is being replace by an RBS 2206, the holes for the old cabinet can be used for the new cabinet.

# 4 Environment

The RBS 2206 is designed to operate within limits stated for climatic requirements and also to have a limited effect on the environment.

## 4.1 Operating Environment

The climatic requirements the RBS 2206 has on the site are shown in the table below.

*Table 3 Environmental specifications*

| Environmental Parameters | Normal Operation | Safe Function(1) | Non-destructive Conditions (2) |
|---|---|---|---|
| Temperature | +5 to +40 C° | 0 to +45 C° | -10 to +55 C° |
| Relative Humidity | 5 - 85% | 5 - 90% | 5 - 90% |

*(1) Normal operation describe the environmental conditions where all units function as specified.*
*(2) Non-destructive conditions describe environmental stress above the limits for normal conditions with no function guaranteed and unspecified degradation. When the environmental stress has dropped to normal conditions, restoring full RBS performance requires no manual intervention on site. Non-destructive conditions refer to a period of maximum 96 consecutive hours, and a total of maximum 5.5 days in a three-year period.*

### Acoustic Dispersion

The cabinet noise dispersion for an RBS 2206 with four fans is shown in the two figures below. The figures show the noise dispersion generated by a free-standing cabinet and by a cabinet mounted against a wall.

**Note:** The acoustic noise dispersion values for a free-standing cabinet and a cabinet installed against a wall were tested according to the ISO 9614-2 standard, however deviations from these values may be experienced due to the nature of materials in the environment where the cabinet is installed. Objects may reflect or absorb sound and will affect acoustic dispersion.

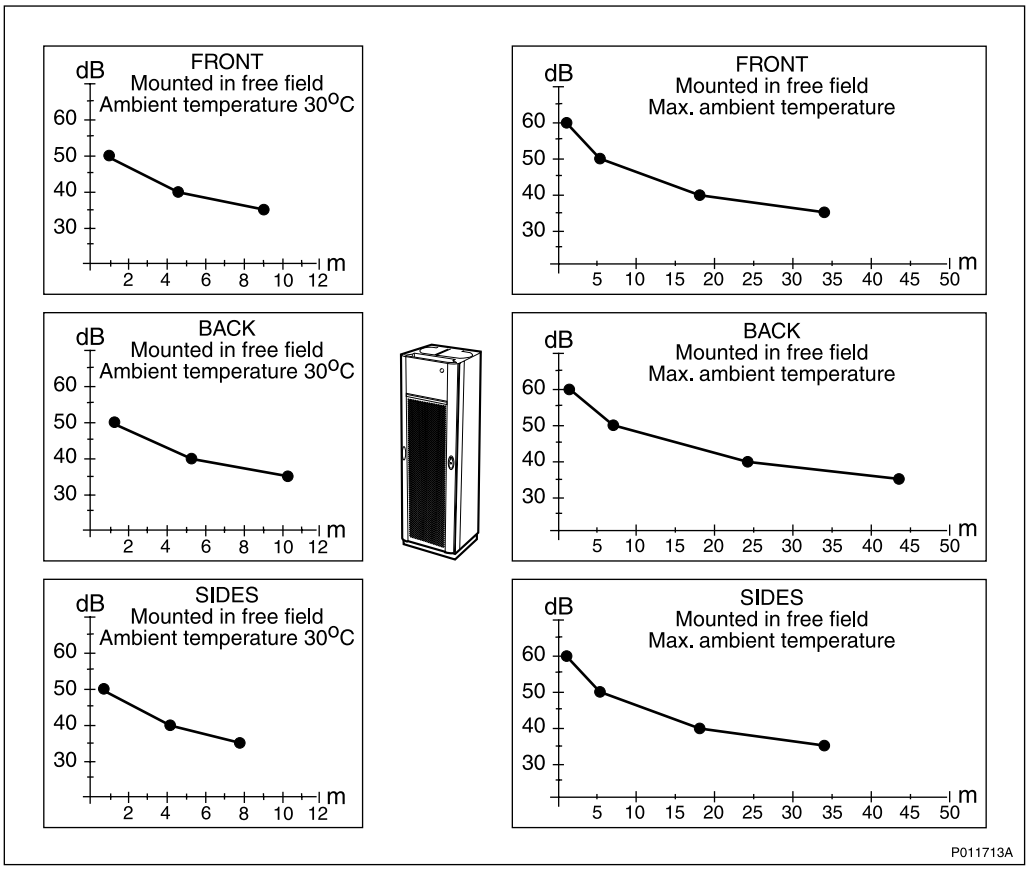



*Figure 4 Acoustic dispersion for a free-standing RBS 2206*

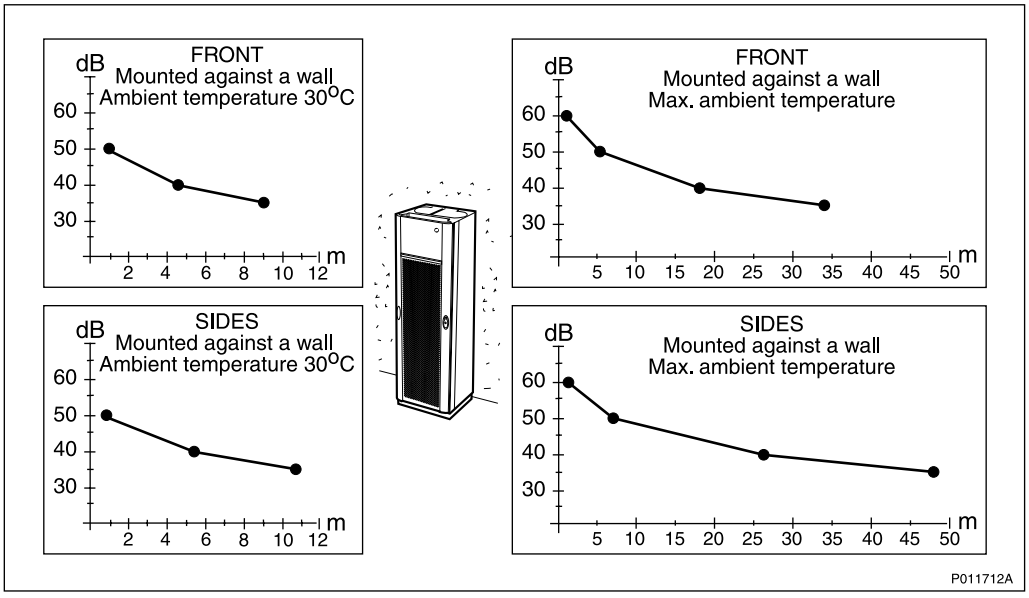



*Figure 5 Acoustic dispersion for a wall-mounted RBS 2206*

### Ground Vibrations

The RBS 2206 is tested to withstand random vibrations of up to 0.2 $m^2/s^2$. It is also tested for single shocks up to 40 $m/s^2$. The cabinet is tested for seismic exposure with a test frequency of 1 – 35 Hz. Maximum test level of the Required Response Spectrum (RRS) is 50 $m/s^2$ within 2 - 5 Hz. The shape of RRS is defined by the ETSI standard.

### Levelling

For cabinet levelling purpose, the floor must be level to within ±3 mm/2000 mm and the floor gradient be within ±0.1°.

## 4.2 Environmental Impact

This section describes the effects that the cabinet has on the environment.

### Heat Dissipation

The RBS 2206 generates an average heat load of 1500 W. The exact figure is dependent upon confguration, equipment and site-specific conditions.

## 4.3 Compliance Distances for Electromagnetic Exposure

The compliance distance is the minimum separation that should be kept between the antenna and a person in order to ensure that the ICNIRP RF exposure limits are not exceeded.

**Note:** ICNIRP, ‘‘Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)’’, International Commission on Non-Ionizing Radiation Protection, Health Physics, vol. 74, no. 4, 1998.

Ericsson has performed a free-space near-field RF exposure assessment of typical configurations of the RBS 2206 with a recommended antenna. The resulting dimensions, in meter, for a compliance boundary for both public and occupational exposure are shown in *Table 4 on page 11*.

The compliance boundary is defined as a cylinder around the antenna, *see Figure below*. The antenna is not located at the center of the cylinder. Instead it is located almost at the edge, facing towards the center of the cylinder. The distance between the antenna’s rear and the edge of the cylinder is the ‘‘Distance behind antenna’’. The height of the cylinder is the antenna height plus equal distances above and below the antenna. The cylinder shape overestimates the compliance distances right beside the antenna.

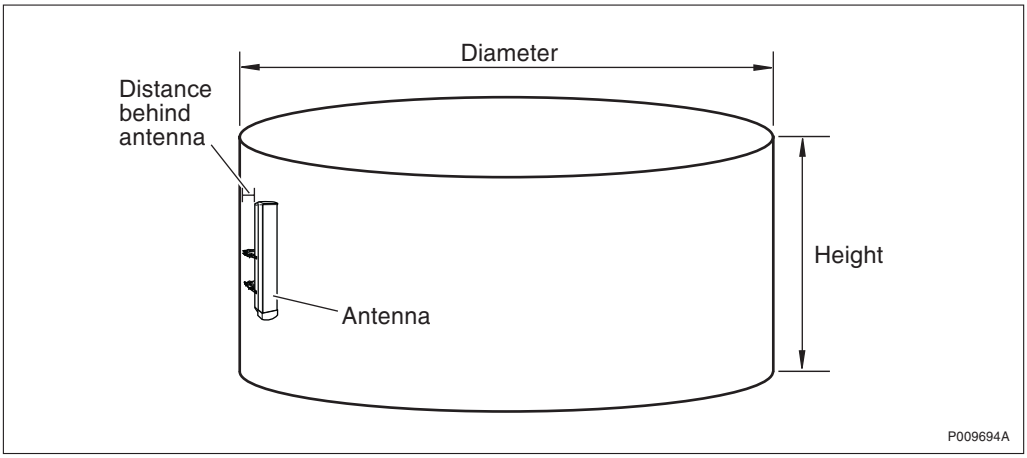



*Figure 6 Compliance boundary cylinder*

**Note:** *Table 4 on page 11* shows an example for a typical antenna. As the antenna field distributions will differ, complete calculations or measurements may be necessary in order to establish the compliance boundary for other configurations chosen by the customer. For further information on calculation methods, *see:*

| | | |
|---|---|---|
| | *Radio Site Installation Engineering Manual* | *EN/LZN 720 0069* |

*Table 4 Compliance boundary dimensions for the General Public (GP) and Occupational (O) exposure for typical configurations*

| Configuration | Frequency (MHz) | Dimensions of cylindrical compliance boundary in meter (m) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Diameter | | Height | | Distance behind antenna | |
| | | GP | O | GP | O | GP | O |
| 3x2 no hybrid | 900 | 6 | 3 | 1.7 | 1.5 | 0.1 | 0.1 |
| | 1800 | 5 | 1 | 1.6 | 1.4 | 0.1 | 0.05 |
| 3x4 combined | 900 | 6 | 3 | 1.7 | 1.5 | 0.1 | 0.1 |
| | 1800 | 5 | 1 | 1.6 | 1.4 | 0.1 | 0.05 |
| 3x2 TCC | 900 | 9 | 4 | 1.9 | 1.6 | 0.1 | 0.1 |
| | 1800 | 7 | 2 | 1.6 | 1.5 | 0.1 | 0.1 |
| 1x12 filter combiner | 900 | 12 | 5 | 2.3 | 1.6 | 0.1 | 0.1 |
| | 1800 | 10 | 4 | 1.9 | 1.6 | 0.1 | 0.1 |

The cylinder shape overestimates the compliance distances right beside the antenna. In reality the occupational compliance distance by the side, in line with the front of the antenna, is less than 0.1 meter for output power levels below 56 W and less than 0.3 meter for the other power levels reported here. For characteristics of an antenna recommended for typical configurations of RBS 2206, *see Table below*.

*Table 5 Characteristics for a typical antenna (KRE 101 1916/1)*

| | |
|---|---|
| Antenna specifications | X-pol macro RBS sector antenna |
| Antenna height | 1.3 m |
| Horizontal half-power beam width | 60 degrees |
| Vertical half-power beam width | 15 degrees at 900 MHz<br>7 degrees at 1800 MHz |
| Antenna gain | 14.5 dBi at 900 MHz<br>17 dBi at 1800 MHz |
| Down tilt | 0 degrees |

The nominal maximum power fed to the antenna, as a function of the number of transceiver units (TRUs) per antenna and the maximum power (including tolerances and transmission loss) per TRU, for RBS 2206 at 900 MHz and 1800 MHz, are given in *Table 6 on page 12.*

*Table 6 Maximum power to antenna for various RBS 2206 configurations*

| **Configuration** | **Frequency (MHz)** | **Nominal output power per TRU (dBm)/(W)** | **Maximum power into antenna** (1) **(dBm)/(W)** |
|---|---|---|---|
| 3x2 no hybrid | 900 | 45.5 / 35 | 47.5 / 56 |
| | 1800 | 44.5 / 28 | 46.5 / 45 |
| 3x4 combined | 900 | 42 / 16 | 47 / 50 |
| | 1800 | 41 / 13 | 46 / 40 |
| 3x2 TCC | 900 | 48 / 63 | 50 / 100 |
| | 1800 | 47 / 50 | 49 / 79 |
| 1x12 filter combiner | 900 | 43 / 20 | 53 / 190 |
| | 1800 | 42 / 16 | 52 / 151 |

*(1) Including power tolerance level (+2 dB) and transmission losses (-3 dB).*

## 4.4 Materials

All Ericsson products fulfil the legal, market and Ericsson requirements regarding:

- Fire resistance of material, components, wires and cables
- Declaration of materials
- Use of restricted material
- Recycling

### Package Material

The package material is recyclable.

# 5 Hardware Units

A high level of availability is achieved using strict functional modularity with a system of standardised units. A failed unit can easily be replaced by a new one. It is possible to add up to three new units in the PSU/DXU magazine.

The RBS 2206 cabinet contains the radio equipment, power supply and the climate equipment (fans). All required transmission equipment and battery back-up must be housed outside the cabinet.

Outside equipment is listed under optional units. Not all HW units are covered in this section, only those directly related to RBS.

## 5.1 Standard Hardware Units

This section briefly describes the standard hardware units required for functionality, irrespective of configuration or frequency.

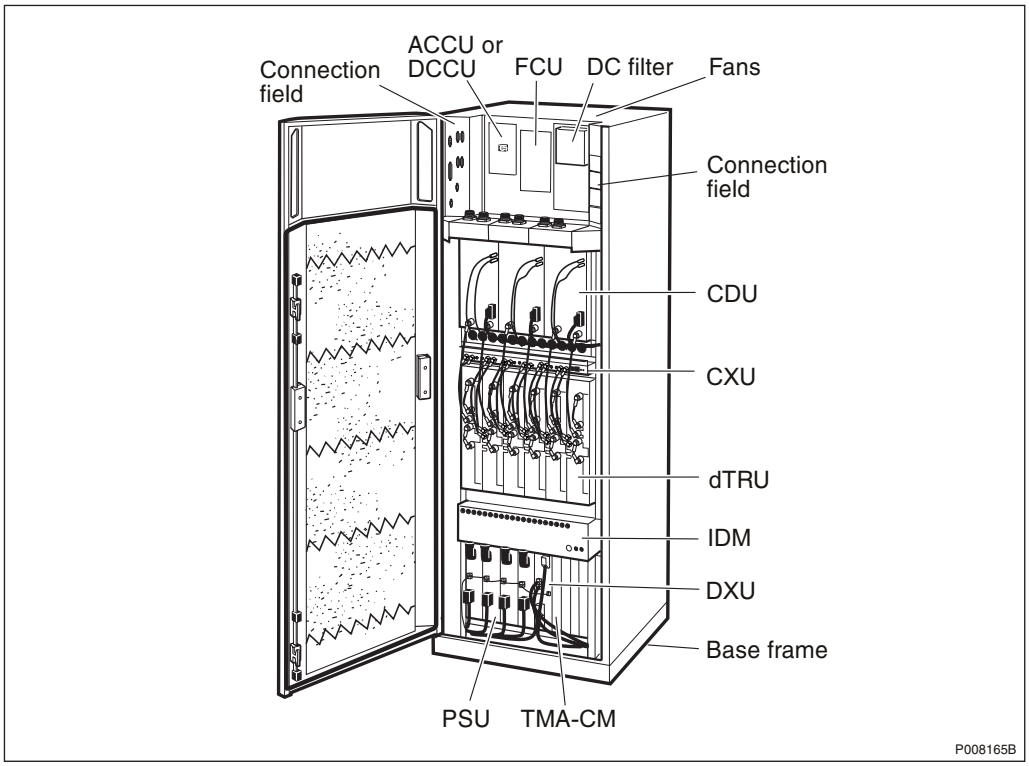



*Figure 7 Standard hardware units*

### ACCU - AC Connection Unit

The ACCU handles distribution and connection/disconnection of the incoming AC power supply voltages to the PSUs. Connection/disconnection is performed by the main switch. The unit also contains filter equipment.

Number of units: 1

### CDU - Combining and Distribution Unit

The CDU is the interface between the transceivers and the antenna system. All signals are filtered before transmission and after reception by means of bandpass filters. The CDU allows several dTRUs to share antennas. There are a maximum of three CDUs in one RBS 2206.

The CDU combines transmitted signals from several transceivers, and distributes the received signal to several transceivers. The CDU is hardware-prepared to support EDGE. Two different CDU types are used in the RBS 2206 to support all configurations:

- **CDU-F** is a filter combiner intended for high capacity solutions.

- **CDU-G** can be configured either for high capacity or for high coverage. It is a combiner that can be used for synthesizer hopping.

Number of units: 1 - 3

### CXU - Configuration Switch Unit

The CXU cross-connects the CDU and the dTRU in the receiver path. The CXU makes it possible to expand or reconfigure a cabinet without moving or replacing any RX cables. The RX inputs/outputs on the dTRU and the CDU are placed in such positions that they minimize the amount of cable types for connecting the CXU with the dTRUs and the CDUs. The CXU is configured by means of software.

Number of units: 1

### DCCU - DC Connection Unit

The DCCU handles distribution and connection/disconnection of the incoming DC power supply voltages to the PSUs. Connection/disconnection is performed by the main switch. The unit also contains filter equipment.

### dTRU - double Transceiver Unit

The dTRU contains two TRXs for transmission and reception of two radio carriers. It has a built-in combiner with the optional possibility of combining two TX signals into one TX output. It is also prepared for four-branch RX diversity for further improvements in sensitivity. This version of the dTRU supports only GMSK and a later version will support both GMSK and EDGE.

Number of units: 1 - 6

### DXU-21 - Distribution Switch Unit

The DXU is the central control unit for the RBS. It supports the interface to the BSC, and it collects and transmits alarms. The DXU controls the power and climate equipment for the RBS. It has a removable compact flashcard which makes it possible to replace a faulty DXU without the need for loading RBS software from the BSC. The DXU is also provided with four ports for transmission interfaces. It can handle both 2048 kbit (E1) and 1544 kbit (T1) transmission interfaces. The DXU has hardware support for EDGE on 12 TRXs.

Number of units: 1

### FCU - Fan Control Unit

The FCU controls the four fans in the cooling system by regulating fan speed. The FCU is controlled by the DXU.

Number of units: 1

### IDM - Internal Distribution Module

The IDM is a panel for distributing the internal +24 V DC power to the various units. Each distribution circuit in the cabinet is connected to a circuit breaker in the IDM.

Number of units: 1

### PSU - Power Supply Units

The PSUs are available in two versions, PSU AC for connection to AC mains, or PSU DC for connection to -48 or -60 V DC power supply. The PSU AC converts 120 - 250 V to regulated +24 V DC. The PSU DC converts -(48 - 60) V DC to regulated +24 V DC.

Number of units: 0 - 4

### DC Filter

The DC filter unit is the interface for +24 V DC power supply or battery back-up.

Number of units: 1

## 5.2 Optional Hardware Units

This section describes the hardware units that are available as options for the cabinet.

### ASU - Antenna Sharing Unit

The ASU is part of co-siting, that is, using another cabinet together with a GSM RBS 2206 cabinet in the same sector. The ASU allows a TDMA (or other) cabinet and a GSM RBS 2206 cabinet to share RX antennas.

Number of units: 0 - 1

### Bias injector

The bias injector is used to provide the ddTMA with DC power, from the TMA-CM, over the RX/TX feeder cables. Six bias injectors can be connected to one TMA-CM. The BIAS-IC is mounted outside the cabinet, as close to the RF output as possible.

Number of units: 0 - 6

### BBS

The RBS 2206 can be provided with battery back-up from an external cabinet, either a BBS 2000 or a BBS 2202.

### ddTMA - dual duplex Tower Mounted Amplifier

The ddTMA is to be mast-mounted and placed close to the antenna. It improves the receiver sensitivity. The ddTMA saves feeder cables by duplexing RX and TX signals to the same cable.

Number of units: 0 - 6

### DXX - Digital Cross Connector

A 1 or 2-card DXX plug-in unit that is a digital cross-connector. The one card version has four G.703/G.704 ports. The 2-card version has four G.703/G.704 ports and one slot for two to four additional interfaces that can be G.703/G.704 ports, HDSL, LTE or optical fibre. It is installed in the OXU.

Number of units: 0 - 1

### Mini-DXC

A cross-connect unit that provides five G.703/G.704 ports. It is installed in the OXU.

Number of units: 0 - 1

### OXU - Optional Expansion Unit

There are four positions available for optional RUs in the DXU/PSU subrack, for example for TMA-CM and DXX. One 19-inch OXU-position is also available between the CXU and the dTRU subrack.

Number of units: 0 - 1

**TMA-CM - Tower Mounted Amplifier - Control Module**

The Control Module is used to provide up to six ddTMAs with 15 V DC power through the bias injector. It is also used to identify TMA faults and forward this information to the alarm module in the RBS. The TMA-CM is mounted in an OXU position.

Number of units per cabinet: 0 - 2

# 6 Interfaces

In this section all external and internal connections are listed, as well as the test interface and the operator interface.

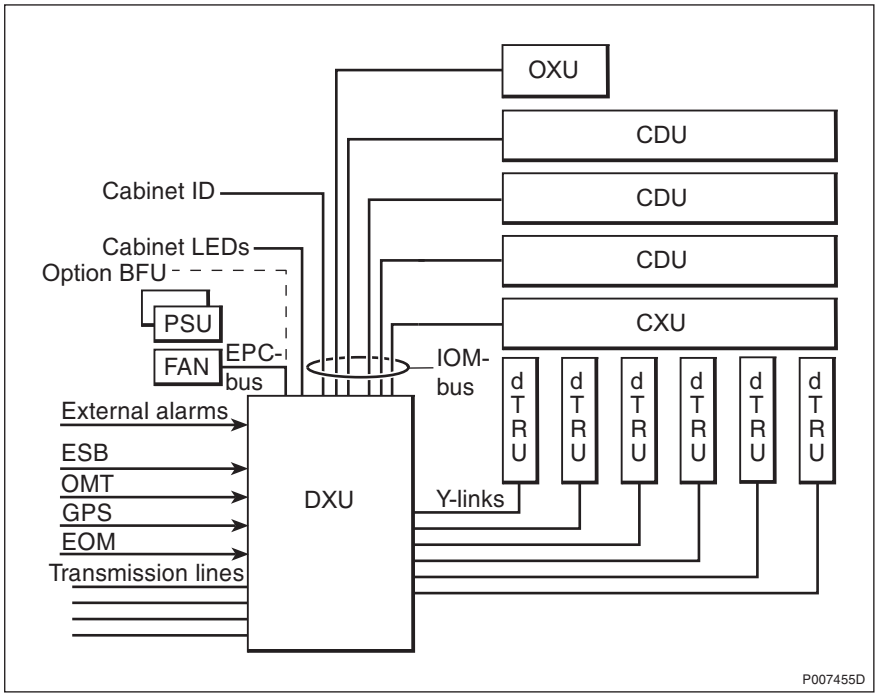



*Figure 8 Block diagram showing internal power and signal paths*

The connection field for external connectors is located at the top of the radio cabinet inside the door. Internal connections, the test interface and operator interface are located on some hardware units.

## 6.1 External Connections

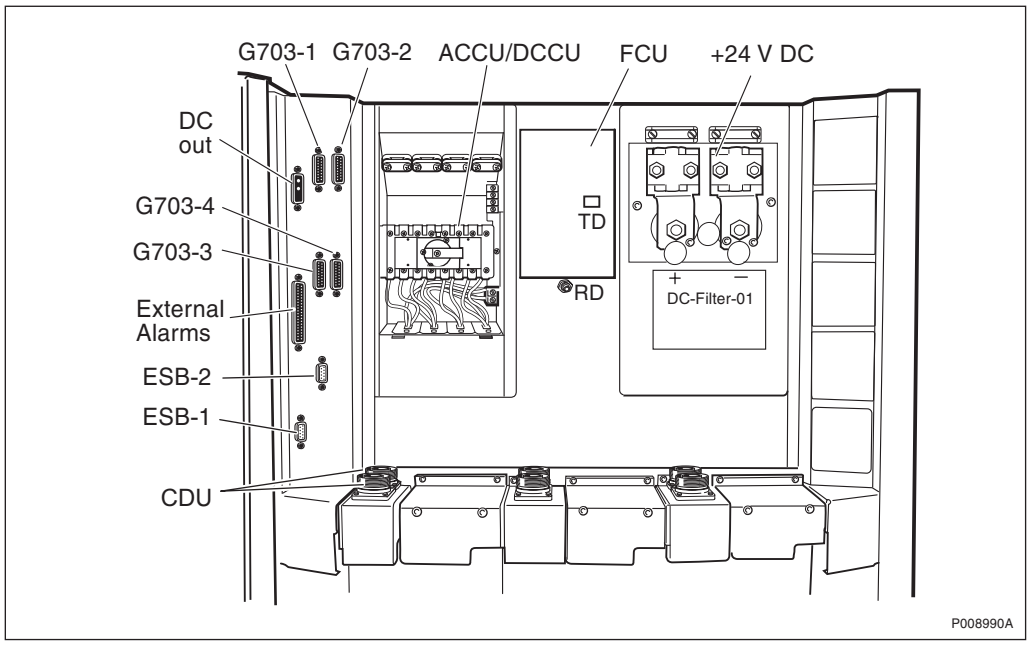



*Figure 9 External connectors (shown here with CDU-F)*

Antenna feeders are directly connected to the CDUs. If bias injectors are used, they are connected directly to the CDU and the antenna feeder is connected to the bias injector.

*Table 7 External connections*

| Connection Name | Description | Connector Type |
|---|---|---|
| CDU | Feeder (and bias injector) connection to antennas | 7-16 female connector |
| G703-1 | Transmission Link 1 | 15-pin female, D-sub |
| G703-2 | Transmission Link 2 | 15-pin female, D-sub |
| G703-3 | Transmission Link 3 | 15-pin female, D-sub |
| G703-4 | Transmission Link 4 | 15-pin female, D-sub |
| DC out | +24 V DC to external equipment | 3-pole female, D-sub |
| External Alarms | External alarm inputs to DF | 37-pin female, D-sub |
| ESB-1 | ESB to co-sited cabinets | 15-pin female, D-sub |

*Table 7 External connections*

| | | |
|---|---|---|
| ESB-2 | ESB to co-sited cabinets | 15-pin female, D-sub |
| FCU RD | Optical cable connector from the BBS | Opto connector |
| +24 V DC | DC filter + connection | Cable clamp |
| +24 V DC | DC filter - connection | Cable clamp |
| Earth | Earth stud M8 to main earth cable | M8 stud |
| ACCU 1 - 4 | Mains connection to PSU-AC 1 - 4 | Screw terminal |
| DCCU 1 - 4 | -48 V connection to PSU-DC 1 - 4 | Screw terminal |
| ASU | Antenna sharing connections | SMA-connector |

## 6.2 Test Interface

The test interface for the RBS 2206 is on the front panel of the DXU-21 unit. The OMT port is used to connect the Operation and Maintenance Tool (OMT) to the RBS. A remote OMT can also be used from the BSC, which sends signals over the Abis interface.

## 6.3 Operator Interface

The Man Machine Interface (MMI) in the RBS 2206 is based on visual indicators and buttons located on the hardware units in the cabinet and on the cabinet door.

### Internal Indicators

| | |
|---|---|
| AC Fault | One or more phases are faulty |
| Bat disconnect | Battery disconnected |
| External Battery mode | Indicates that the RBS is running on battery |
| RBS fault | One or more faults are detected on RUs in the RBS |
| DC disconnected | Indicates that DC (system voltage) is disconnected |
| EOM bus fault | (For future use) |

| | |
|---|---|
| EPC bus fault | Indicates the state of the EPC bus |
| Ext alarm | One or more supervised external alarms are active |
| Fault | Fault detected and localised to the RU |
| Local mode | The RU is in local mode |
| Operational | The RU is operational |
| Test result | Indicates the result of tests |
| Transmission OK | Indicates state of transmission on ports A - D |
| RF off | RF not enabled |

**External Indicators**

The RBS 2206 has three indicators on the cabinet door:

| | |
|---|---|
| RBS Fault | There is a fault in the RBS. |
| External Battery Mode | The RBS is operating on battery power. |
| External Alarm | There is at least one external alarm present in the RBS. |

**Buttons**

| | |
|---|---|
| dTRU reset | Resets the dTRU |
| DXU reset | Resets all subunits |
| Local/remote mode | Changes RU mode to local or remote |
| Test call | Initiates the test operation function |

**Barcode**

The barcode for product identification is readable without disturbing the RBS function.

# 7 Power System

The power system of the RBS 2206 depends on the choice of power supply and may include a number of units outside the RBS.

The RBS 2206 can be connected either to AC mains supply voltage or to DC supply voltage.

*Table 8 Power supply voltage alternatives*

| **Nominal voltage** | **Range** | **PSU** |
|---|---|---|
| 120 - 250 V AC, 50 - 60 Hz | 108 - 275 V AC, 45 - 65 Hz | PSU-AC |
| +24 V DC | +20.5 - +29 V DC | PSU not needed |
| -48 - -60 V DC | -40 - -72 V DC | PSU-DC |

## 7.1 AC mains supply voltage

AC mains supply voltage is connected to the cabinet using four AC cables. If the power supply does not meet the AC power requirements, then filters and stabilisers must be installed to protect the equipment and ensure proper operation.

There are two ways to connect power to the base station. They are:

- Single phase line to neutral
- Single phase line to line

**Note:** When single phase line to line is used, each PSU requires two circuit breakers.

*Table 9 AC mains power requirements*

| **Voltage range for specified Performance (phase voltage)** | **120 - 250 V AC** |
|---|---|
| Voltage range | 108 - 275 V AC (1) |
| Frequency | 45 - 65 Hz |
| Inrush current, max. | 30 A (1 - 30 ms) |
| Maximum AC power | 1.4 kW x 4 |
| Non-destructive range | 0 - 275 V AC |

*Table 9 AC mains power requirements*

| | |
|---|---|
| Overvoltage <20 ms | 325 V[2] |
| Maximum ground leakage current | 10 mA x 4 |

*(1) 1) 90 - 108 V AC with reduced output power. 1000 W per PSU*

*(2) 2) Install external filter and stabiliser if not met.*

### Mains Fuses

*Table 10 Mains fuses recommendation*

| Minimum for Safe Function | Recommended for Maximum Selectivity | Maximum Allowed Fuse Rating |
|---|---|---|
| 4x10 A /16 A[1] | 4x16 A | 4x20 A |

*(1) 1) For 200 - 250 V range only.*

### External Earth Fault Circuit Breakers

If external earth fault (ground fault) circuit breakers are used, then the recommended minimum trip value is 100 mA.

## 7.2 +24 V DC Supply Voltage

*Table 11 DC power requirements*

| | |
|---|---|
| **Nominal** | +24 V DC |
| **Default** | +27.2 V DC |
| **Range** | +20.5 - +29.0 V DC |
| **Non-destructive range** | +0 - +32 V DC |
| **Inrush current** | Max. 500 A (0.1 - 10 ms) |

### Fuses

*Table 12 +24 V DC fuse recommendation*

| Minimum for Safe Function | Recommended for Maximum Selectivity | Maximum Allowed Fuse Rating |
|---|---|---|
| 1x160 A[1] | 1x200 A | 1x250 A |

*(1) May be used when no transmission and/or optional equipment is installed.*

## 7.3 -(48 - 60) V DC Supply Voltage

*Table 13 DC supply voltage requirements*

| | |
|---|---|
| **Nominal** | -48/-60 V DC |
| **Range** | -(40.0 - 72.0) V DC |
| **Non-destructive range** | +0 - (-80) V DC |
| **Inrush current** | 200 A (0.1 - 5 ms) |

### Fuses

*Table 14 -(48 - 60) V DC fuse recommendation*

| Minimum for Safe Function | Recommended for Maximum Selectivity | Maximum Allowed Fuse Rating |
|---|---|---|
| 4x32 A | 4x35 A | 4x40 A |

## 7.4 Battery Back-up

Battery back-up is used to power the site during mains failure and to protect the site from short interruptions in the AC mains supply. It is available in an external cabinet.

It is possible to supply external transmission equipment from the battery cabinet. The transmission equipment is then provided with power supply longer than the RBS. In the event of mains failure, the batteries in the BBS 2000 or BBS 2202 will deliver the necessary power to the radio cabinet as well as to the transmission equipment, if used. This enables the radio system to continue operating during mains failure.

Battery back-up can be delivered for 1, 2, 4, 6 or 8 hours back-up time, depending on the chosen configuration of the RBS. The BBS can feed +24 V DC or -48 V DC to the TM equipment. The -48 V DC supply requires an internal DC/DC converter in the BBS. It is possible to share battery back-up between an RBS 2202 and an RBS 2206.

## 7.5 Power Consumption

The power consumption figures shown in the table below are for dimensioning cables and fuses. The figures in the table have been rounded off.

*Table 15 Higher power consumption*

| **RBS 2206 Cabinet (fully equipped)** | **Power Supply Voltage** | | |
|---|---|---|---|
| | 120 -250 V AC | +24 V DC | -48 V DC |
| **Maximum power consumption** | 3.2/5.7 kW(1) | 2.7 kW | 3.2 kW |

*(1) Power consumption during maximum battery charging*

The RBS can supply transmission equipment with +24 V DC. The maximum power output is 250 W.

# 8 Transmission

The RBS 2206 is normally connected to a Distribution Frame (DF) for transmission (PCM lines). Four PCM cables are connected to the ports on the front of the DXU. The RBS 2206 supports two transmission standards:

- T1 1.5 Mbit/s, 100 W balanced PCM line
- E1 2 Mbit/s, 75 W unbalanced (balun used), or 120 W balanced line

### PCM Overvoltage Module

This module contains overvoltage protection for the PCM lines. If the PCM lines are terminated in equipment outside the RBS equipment room, these lines must be protected by overvoltage protectors (OVP) in the DF. Failure to do so might damage the DXU-21, if a voltage transient is transported along the cable. The RBS 2206 is designed for 100/120 ? balanced (twisted pair) cable. If 75 ? unbalanced (coaxial) cable is to be connected, the module must contain a balun card that converts 75 ? unbalanced to 100/120 ? balanced line.

LAPD concentration and LAPD multiplexing are used to make the transmission resource more efficient.

### Optional Transmission Equipment

The cabinet can be connected to optional transmission equipment that is mounted externally. The optional transmission equipment used is:

- Transmission adapter (not connected to DF)
- DXX (installed in the OXU)
- Mini-link
- Mini DXC (installed in the OXU)

- TMR 9202

The connectors used for this are:

- PCM cables
- +24 V DC cables
- Blank panels for connectors to the OXU

# 9 Alarms

The RBS 2206 can be connected to a maximum of 16 external alarms. A DF is used for external alarm connection. Each alarm connection is provided with over-voltage protection. (One OVP module protects two alarm connections.) The alarm device can set the alarm by either an open or closed circuit.

The alarm device connected to the screw terminals should be isolated relay contacts. A closed contact (logic zero) is required to be below 2 k?, and an open contact (logic one) above 100 k?. The current through a closed 0 ? contact is 1.2 mA. The voltage between terminals with an open contact is 24 V DC. The external alarms are defined during installation using the Operation and Maintenance Terminal (OMT) or from the BSC.

# 10 Standards, Regulations and Dependability

In this section a brief overview of standards, type approval, and electromagnetic compatibility are stated.

## 10.1 Safety Standards

In accordance with the market requirements, the RBS 2206 complies with the following product safety standards:

- 73/23/EEC Low voltage directive
- IP 20 according to IEC/EN 60529
- FCC rules, part 68
- EN 60950 / IEC 60950
- EN 60215 / IEC 60215
- UL 1950 / CSA C22.2 No.950

## 10.2 Other Standards and Regulations

### Marking

The product is marked with signs to show compliance with product safety standards.

### Type Approval Standards

The RBS complies with the European Community and the North America market requirements regarding radio performance. The product has the CE and FCC signs to show compliance to the legal requirements in respective region.

### Electromagnetic Compatibility (EMC)

The RBS complies with the European Community and the North America market requirements regarding EMC. The product has the CE and FCC signs to show compliance to the legal requirements in each respective region.

### Dependability

The RBS 2206 is designed for a technical lifetime of 25 years (24-hour operation). The following preventive maintenance conditions must be fulfilled to guarantee the availability of the RBS:

| | |
|---|---|
| Fans | The fans must be inspected (cleaned if necessary) every year. The lifetime is estimated to at least 5 years. |
| Air filters | The air filters must be regularly inspected and cleaned (interval depends on the environmental conditions at the site). |

### Vandal Resistance

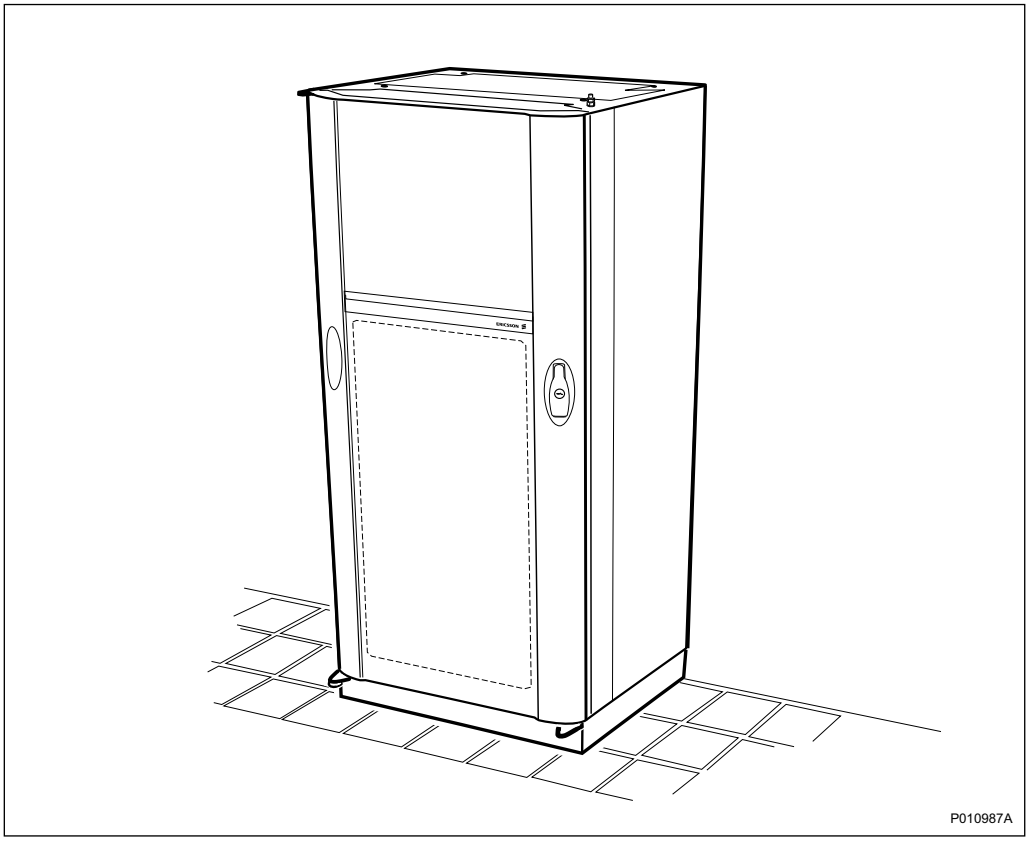
Unauthorised access is not possible without damaging the unit.

Ericsson AB
SE-164 80 Stockholm
Sweden
asq.us@ericsson.com

# RBS 2207

## Radio Base Station
## Product Description

The RBS 2207, a member of the RBS 2000 family, is a 6–TRX radio base station for indoor applications. This cabinet covers the same floor area as the RBS 2202 and RBS 2206, but the cabinet height is lower.

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# Contents

# 1 Product Overview

The RBS 2207 is a medium capacity indoor base station. It is used for indoor applications, with up to three double Transceiver Units (dTRU). The RBS 2207 is designed to be transported as a fully-assembled cabinet to the site. All interior units are easily accessible from the front of the cabinet, which means that the cabinets can be mounted side by side with their backs against a wall.

## 1.1 Main Features

The RBS 2207 can support the following features:

- 1, 2 or 3 sectors in one cabinet using CDU-G
- Discontinuous transmission/reception
- Duplex filters
- Dynamic power regulation
- Encryption/ciphering
- EDGE
- Expansion by tranceiver group (TG) synchronization
- External alarms
- Frequency hopping
- Global positioning system (GPS) synchronization
- Radio configurations supported on 800, 900, 1800 and 1900 MHz
- Receiver diversity
- Transmission Interface: The following transport network interface alternatives exist:

  - T1 1.5 Mbit/s, 100 Ω, with internal synchronization

  - E1 2 Mbit/s, 75 Ω, with PCM synchronization

  - E1 2 Mbit/s, 120 Ω, with PCM synchronization
- Wide range power input 120 - 250 V AC
- Wide range power input -48 to -60V DC

## 1.2 Variants

There are three RBS 2207 cabinet versions:

- -48 to -60 V DC
- 120 - 250 V AC, 50 to 60 Hz, +24 V DC, with optional battery back-up
- +24 V DC (without PSUs)

### 1.3 Optional Equipment

The equipment listed below is available, but is not necessary for basic functionality.

- Battery back-up (in a separate cabinet)
- Bias injectors
- dual duplex Tower Mounted Amplifier (ddTMA)
- External synchronization bus (ESB)
- Distribution Frame (DF) with OVP
- TMA-CM
- Transmission Adapter (TA)
- GPS receiver

## 2 Dimensions

The following section describes the measurements of the RBS 2207.

*Table 1 Weight*

| Unit | Weight |
|---|---|
| RBS cabinet (fully equipped including base frame) | 180 kg (397 lbs.) |
| Base frame | 8 kg (18 lbs.) |

*Table 2 Color*

| Color | Reference No. |
|---|---|
| Grey | NCS 1002-R |

## 3 Space Requirements

The following sections indicate the required space and recommended floor layout.

### Free Space above the RBS Cabinet

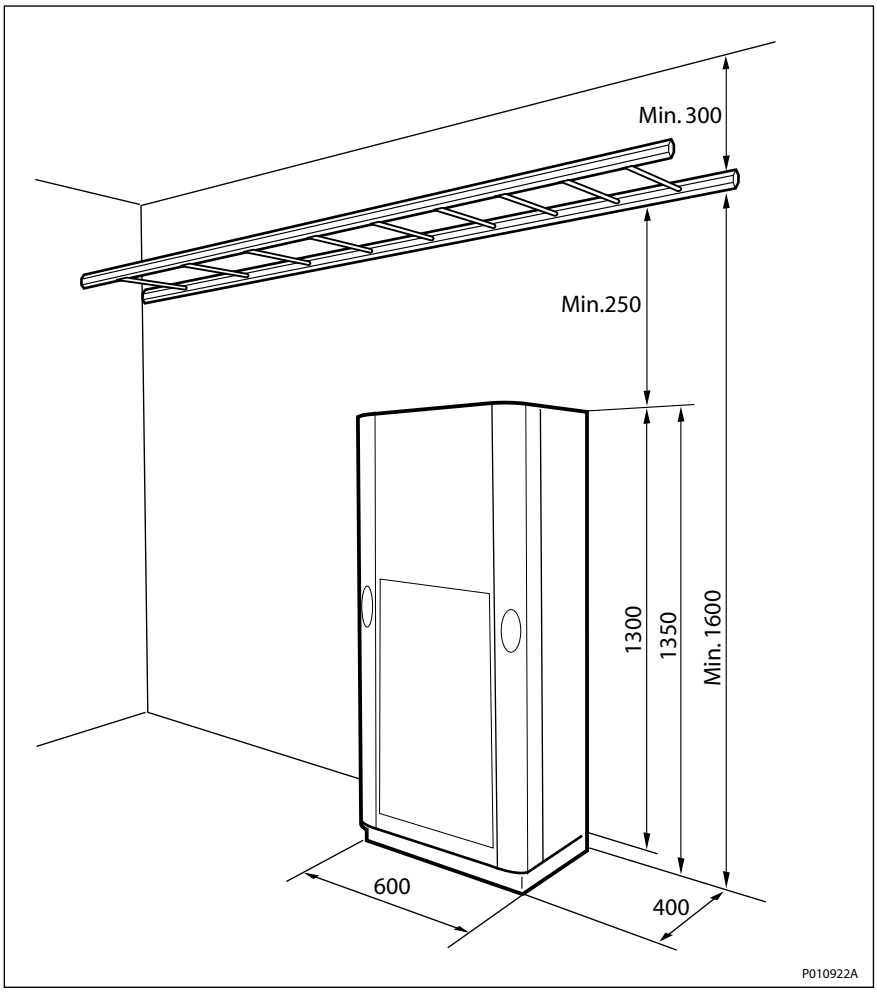



*Figure 1 RBS 2207, free space above the cabinet*

The recommended distance between the cabinet and cable ladder is 250 mm. A shorter distance makes it difficult to exchange fans and may restrict the air flow. A space of 300 mm is recommended above the cable ladder, in order to simplify the cable installation work.

The door projects 50 mm in front of the cabinet.

### Layout for RBS Cabinets

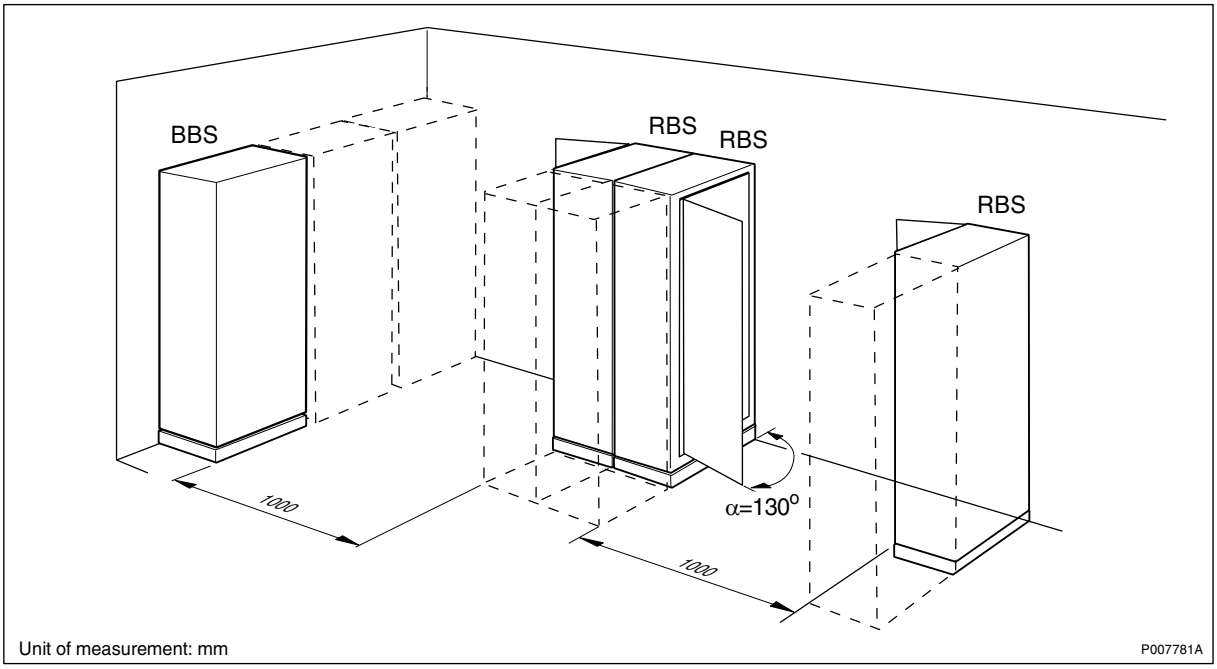



*Figure 2 Floor layout and space requirements*

The RBS cabinets and battery back-up system (BBS) racks are mounted on the floor, and may be positioned against a wall, back to back, or free standing without contact with other cabinets.

Additional cabinets and racks can be positioned to the left or right of the first installed cabinet. However, expansion to the right is recommended in order to follow the same global standard.

A distance of 1000 mm in front of the cabinets and racks for maintenance work is recommended.

**Note:** Space for future expansion must be considered as indicated in the dotted line in the figure above.

### Earthquake Requirements

If the RBS cabinet is to fulfill the requirements for earthquake protection, the space between wall and cabinet is to be at least 100 mm and between cabinets at least 150 mm.

### Footprint

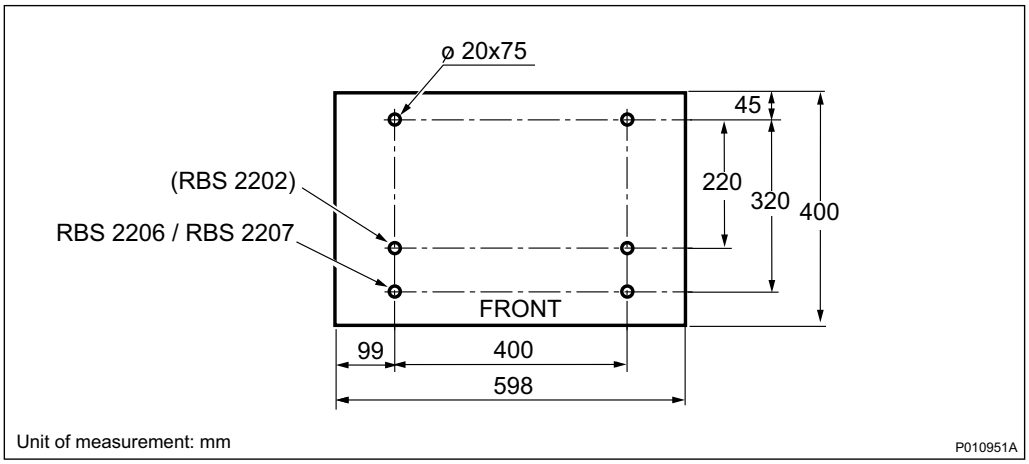



*Figure 3 Hole pattern overview*

The RBS 2207 has the same footprint as the RBS 2202 and 2206 cabinets. The base frame can be used as a template to mark new holes. If an RBS 2202 or an RBS 2206 is being replaced by an RBS 2207, the holes for the old cabinet can be used for the new cabinet.

# 4 Environment

The RBS 2207 is designed to operate within limits stated for climatic requirements, and also to have a limited effect on the environment.

## 4.1 Operating Environment

The climatic requirements the RBS 2207 has on the site are shown in the table below.

*Table 3 Environmental specifications*

| Environmental Parameters | Normal Operation (1) | Safe Function | Non-destructive Conditions (2) |
|---|---|---|---|
| Temperature | +5 to +40 C° | 0 to +45 C° | -10 to +55 C° |
| Relative Humidity | 5 - 85% | 5 - 90% | 5 - 90% |

*(1) Normal operation describes the environmental conditions where all units function as specified.*
*(2) Non-destructive conditions describe environmental stress above the limits for normal conditions with no function guaranteed and unspecified degradation. When the environmental stress has dropped to normal conditions, restoring full RBS performance requires no manual intervention on site. Non-destructive conditions refer to a maximum period of 96 consecutive hours, and a maximum total of 5.5 days in a three-year period.*

### Ground Vibrations

The RBS 2207 is tested to withstand random vibrations of up to 0.2 $m^2/s^2$. It is also tested for single shocks up to 40 $m/s^2$. The cabinet is tested for seismic exposure with a test frequency of 1 - 35 Hz. Maximum test level of the Required Response Spectrum (RRS) is 50 $m/s^2$ within 2 - 5 Hz. The shape of RRS is defined by the ETSI standard.

### Levelling

For cabinet levelling purposes, the floor must be level to within ±3 mm/2000 mm and the floor gradient be within ±0.1°.

## 4.2 Environmental Impact

This section describes the effect that the cabinet has on the environment.

### Heat Dissipation

The RBS 2207 generates an average heat load of 1000 W. The exact figure is dependent upon confguration, equipment and site-specific conditions.

## 4.3 Compliance Distances for Electromagnetic Exposure

The compliance distance is the minimum separation that should be kept between an antenna and a person in order to ensure that ICNIRP RF exposure limits are not exceeded.

**Note:** ICNIRP, ‘‘Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300GHz)’’, International Commission on Non-Ionizing Radiation Protection, Health Physics, vol. 74, no. 4, 1998.

Ericsson has performed a free-space near-field RF exposure assessment of typical configurations of RBS 2207 with a recommended antenna. The resulting dimensions, in meter, for a compliance boundary for both public and occupational exposure are shown in Table 4.

The compliance boundary is defined as a cylinder around the antenna, see figure below. The antenna is not located at the centre of the cylinder. Instead it is located almost at the edge, facing towards the center of the cylinder. The distance between the antenna’s rear and the edge of the cylinder is the "Distance behind antenna". The height of the cylinder is the antenna height plus equal distances above and below the antenna. The cylinder shape overestimates the compliance distances right beside the antenna.

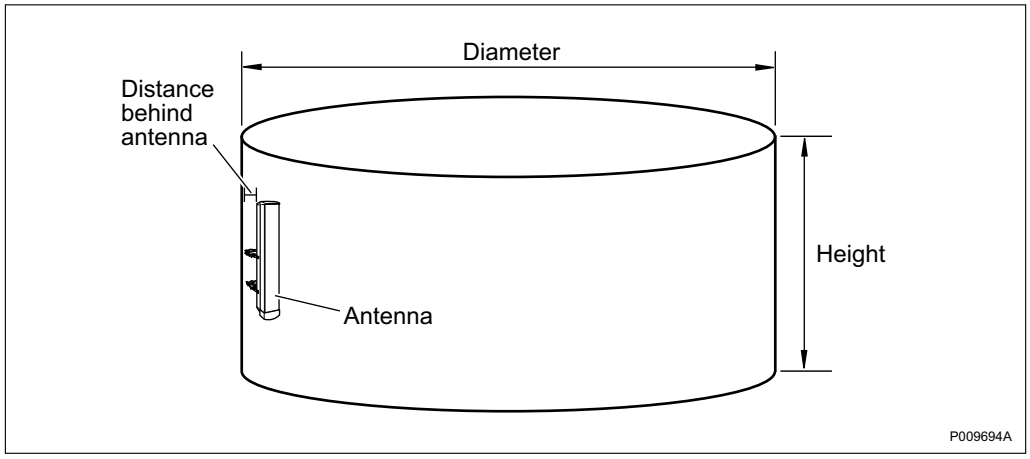



*Figure 4 Compliance boundary cylinder*

**Note:** Table 4 shows an example for a typical antenna. As the antenna field distributions will differ, complete calculations or measurements may be necessary in order to establish the compliance boundary for other configurations chosen by the customer. For further information on calculation methods, see:

| | | |
|---|---|---|
| | *Radio Site Installation Engineering Manual* | *EN/LZN 720 0069* |

*Table 4 Compliance boundary dimensions for the general public (GP) and occupational (O) exposure for typical configurations.*

| | | **Dimensions of cylindrical compliance boundary in meter (m)** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Diameter** | | **Height** | | **Distance behind** | |
| **Frequency (MHz)** | **RBS configuration** | **GP** | **O** | **GP** | **O** | **GP** | **O** |
| 900 | 3x2 uncombined | 7 | 3 | 1.7 | 1.4 | 0.1 | 0.1 |
| 1800 | 3x2 uncombined | 5 | 1 | 1.6 | 1.4 | 0.1 | 0.05 |
| 900 | 3x2 combined | 4 | 1 | 1.5 | 1.4 | 0.1 | 0.1 |
| 1800 | 3x2 combined | 2 | 0.5 | 1.4 | 1.4 | 0.1 | 0.05 |
| 900 | 3x1 comb. TCC | 6 | 3 | 1.7 | 1.4 | 0.1 | 0.1 |
| 1800 | 3x1 comb. TCC | 5 | 1 | 1.6 | 1.4 | 0.1 | 0.05 |

Compliance distances to the side of the antenna for occupational exposure are 0.15 m for all configurations above. For characteristics of an antenna recommended for typical configurations of an RBS 2207, *see Table 5.*

*Table 5 Characteristics for a typical antenna (KRE 101 1916/1)*

| | |
|---|---|
| Antenna specifications | X-pol macro RBS sector antenna |
| Antenna height | 1.3 m |
| Horizontal half-power beam width | 65 degrees |
| Vertical half-power beam width | 14.5 degrees at 900 MHz, 7.8 degrees at 1800 MHz |
| Antenna gain | 14 dBi at 900 MHz, 16.5 dBi at 1800 MHz |
| Downtilt | 0 degrees |

The maximum power fed to the antenna, as a function of the number of transceiver units (TRUs) per antenna and maximum power (including tolerances and transmission loss) per TRU, for RBS 2207, are given in *Table 6*.

*Table 6 Maximum power to antenna for various RBS 2207 configurations*

| RBS configurations | Frequency (MHz) | Nominal output power per TRU (dBm)/(W) | Maximum power into antenna[1] (dBm)/(W) |
|---|---|---|---|
| 3x2 uncombined | 900 | 45.5/35 | 47.5/56.2 |
| | 1800 | 44.5/28 | 46.5/44.7 |
| 3x2 combined | 900 | 42/16 | 44/25 |
| | 1800 | 41/13 | 43/20 |
| 3x1 combined | 900 | 48/63 | 47/50 |
| TCC | 1800 | 47/50 | 46/40 |

*(1) Including power tolerance level (+2dB) and transmission losses (–3dB).*

## 4.4 Materials

All Ericsson products fulfill the legal, market and Ericsson requirements regarding:

- Fire resistance of material, components, wires and cables
- Declaration of materials
- Use of restricted material
- Recycling

### Package Material

The package material is recyclable.

# 5 Hardware Units

A high level of availability is achieved using strict functional modularity with a system of standardized units. A failed unit can easily be replaced by a new one.

The RBS 2207 cabinet contains the radio equipment, power supply and the climate equipment (fans). All required transmission equipment and battery back-up must be housed outside the cabinet.

Outside equipment is listed under optional units. Not all HW units are covered in this section, only those directly related to the RBS.

## 5.1 Standard Hardware Units

This section briefly describes the standard hardware units required for functionality, irrespective of configuration or frequency.

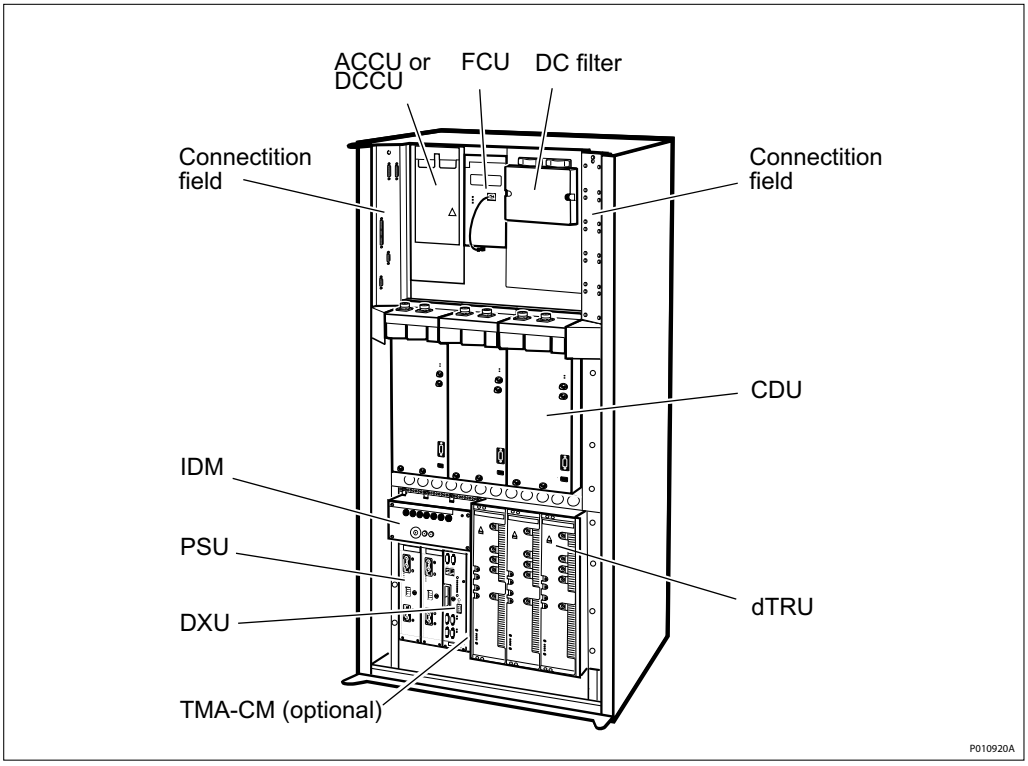



*Figure 5 Standard hardware units*

### ACCU - AC Connection Unit

The ACCU distributes the incoming AC power supply voltages to the PSUs. The unit also contains AC filter equipment.

Number of units: 0 - 1

### CDU - Combining and Distribution Unit

The CDU is the interface between the transceivers and the antenna system. All signals are filtered before transmission, and after reception, by means of bandpass filters. The CDU allows several dTRUs to share antennas. There is a maximum of three CDUs in one RBS 2207.

The CDU distributes the received signal to several transceivers. The CDU supports EDGE. Only CDU-G is used in the RBS 2207. CDU-G can be configured either for high capacity or for high coverage. It is a combiner that can be used for synthesizer hopping. To achieve capacity, the CDU uses the

hybrid combiner in the dTRU. To achieve coverage, the CDU is used in a configuration when the hybrid combiner in the dTRU is not used.

Number of units: 1 - 3

**DCCU - DC Connection Unit**

The DCCU distributes the incoming DC power supply voltages to the PSUs. The unit also contains DC filter equipment.

Number of units: 0 - 1

**dTRU - double Transceiver Unit**

The dTRU contains two TRXs for transmission and reception of two radio carriers. It has a built-in combiner with the optional possibility of combining two TX signals into one TX output. It is also prepared for four-branch RX diversity, for further improvements in sensitivity.

Number of units: 1 - 3

**DXU-21 - Distribution Switch Unit**

The DXU is the central control unit for the RBS. It supports the interface to the BSC, and it collects and transmits alarms. The DXU controls the power and climate equipment for the RBS. It has a removable compact flashcard, which makes it possible to replace a faulty DXU without the need for loading RBS software from the BSC. It can handle both 2 Mbit (E1) and 1.5 Mbit (T1) PCM links.

Number of units: 1

**FCU - Fan Control Unit**

The FCU controls the four fans in the cooling system by regulating fan speed. The FCU is controlled by the DXU.

Number of units: 1

**IDM-02 - Internal Distribution Module**

The IDM contains circuit breakers for distribution of the internal +24 V DC power to the various units.

Number of units: 1

### PSU - Power Supply Units

The PSUs are available in two versions, PSU AC for connection to AC mains, or PSU DC for connection to -48 to -60 V DC power supply. The PSU AC converts 120 - 250 V to regulated +24 V DC. The PSU DC converts -48 to -60 V DC to regulated +24 V DC.

Number of units: 0 - 2

### DC Filter

The DC filter unit is the interface for +24 V DC power supply or battery back-up.

Number of units: 0 - 1

## 5.2 Optional Hardware Units

This section describes the optional RBS 2207 hardware units.

### Bias injector

The bias injector is used to provide the ddTMA with DC power, from the TMA-CM, over the RX/TX feeder cables. Six bias injectors can be connected to one TMA-CM. The BIAS-IC is mounted outside the cabinet, as close to the RF output as possible.

Number of units: 0 - 6

### BBS

The RBS 2207 can be provided with battery back-up from an external cabinet, either a BBS 2000 or a BBS 2202 equipped with BFU-21 or BFU-22.

### ddTMA - dual duplex Tower Mounted Amplifier

The ddTMA is to be mast-mounted and placed close to the antenna. It improves the receiver sensitivity. The ddTMA saves feeder cables by duplexing RX and TX signals to the same cable.

Number of units: 0 - 6

### TMA-CM - Tower Mounted Amplifier - Control Module

The Control Module is used to provide up to six ddTMAs with 15 V DC power through the bias injector. It is also used to identify TMA faults and forward this information to the alarm module in the RBS.

Number of units per cabinet: 0 - 1

# 6 Interfaces

In this section all external and internal connections are listed, as well as the test interface and the operator interface.

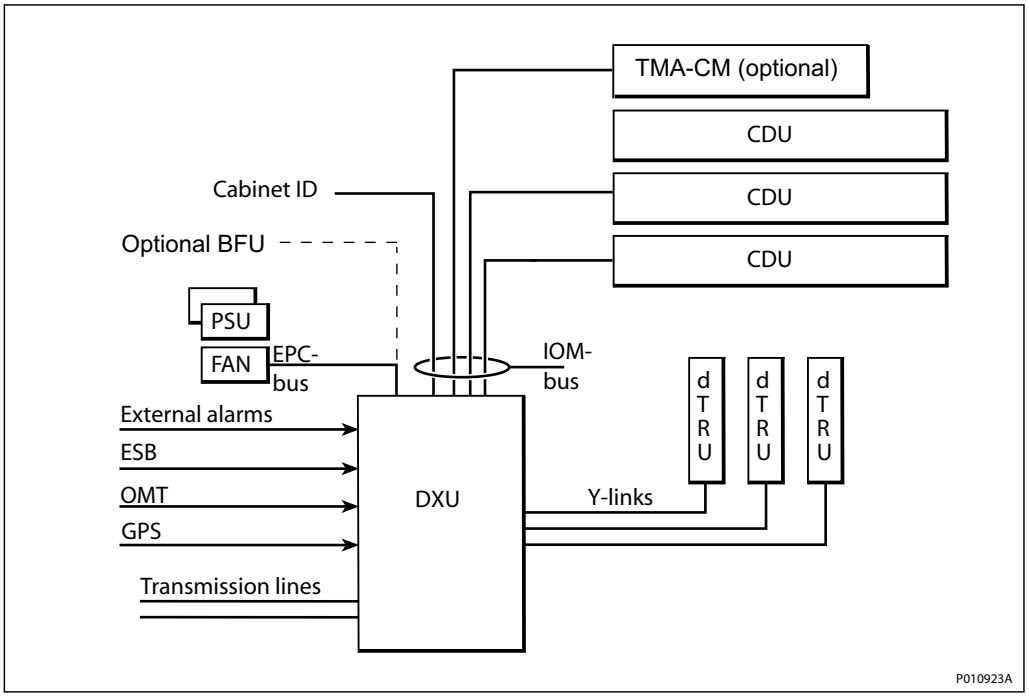



*Figure 6 Block diagram showing internal power and signal paths*

The connection field for external connectors is located at the top of the radio cabinet inside the door. Internal connections, the test interface and operator interface are located on some hardware units.

## 6.1 External Connections

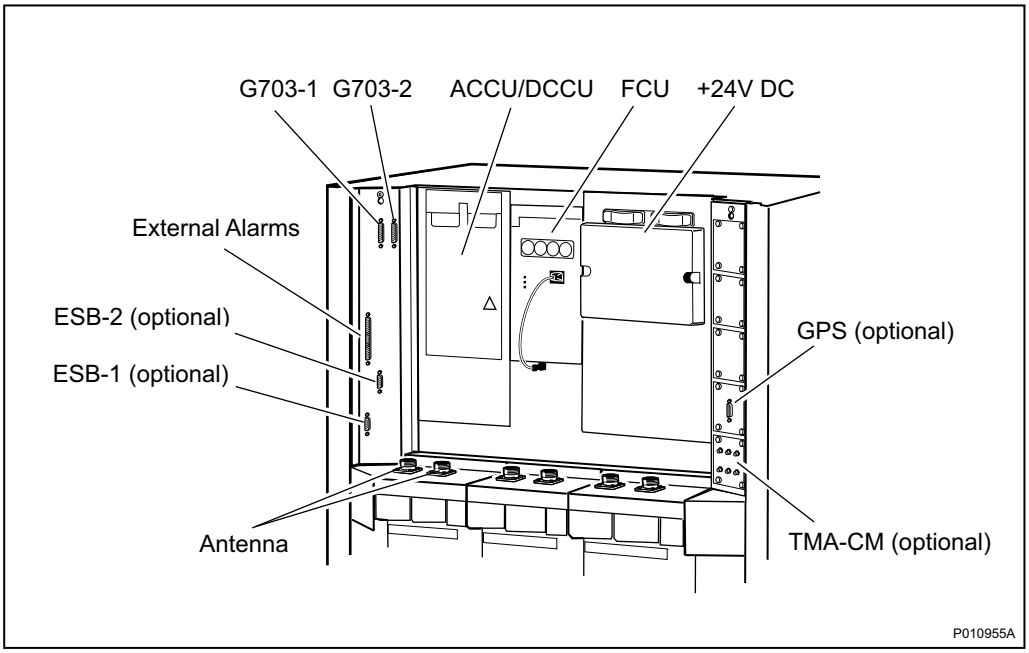



*Figure 7 External connectors*

Antenna feeders are directly connected to the CDUs. If bias injectors are used, they are connected directly to the CDU and the antenna feeder is connected to the bias injector.

*Table 7 External connections*

| Connection Name | Description | Connector Type |
|---|---|---|
| CDU | Feeder (and bias injector) connection to antennas | 7-16 female connector |
| G703-1 | Transmission Link 1 | 15-pin female, D-sub |
| G703-2 | Transmission Link 2 | 15-pin female, D-sub |
| External Alarms | External alarm inputs to DF | 37-pin female, D-sub |
| ESB-1 | ESB to co-sited cabinets | 9-pin female, D-sub |
| ESB-2 | ESB to co-sited cabinets | 9-pin female, D-sub |
| FCU RD | Optical cable connector from the BBS | Opto connector |
| FCU TD | Optical cable connector to the BBS | Opto connector |
| +24 V DC | DC filter + connection | Cable clamp |
| +24 V DC | DC filter - connection | Cable clamp |
| Earth | Earth stud M8 to main earth cable | M8 stud |
| ACCU 1 - 2 | Mains connection to PSU-AC 1 - 2 | Screw terminal |
| DCCU 1 - 2 | -48 V connection to PSU-DC 1 - 2 | Screw terminal |

## 6.2 Test Interface

The Operation and Maintenance Tool (OMT) port is used to connect the OMT to the RBS. A remote OMT can also be used from the BSC, which sends signals over the Abis interface.

## 6.3 Operator Interface

The Man Machine Interface (MMI) in the RBS 2207 is based on visual indicators and buttons located on the hardware units in the cabinet.

**Internal Indicators**

| | |
|---|---|
| Battery mode | Indicates that the RBS is running on battery |
| RBS fault | One or more faults are detected on RUs in the RBS |
| EPC bus fault | Indicates the state of the EPC bus |
| Ext alarm | One or more supervised external alarms are active |
| Fault | Fault detected and localised to the RU |
| Local mode | The RU is in local mode |
| Operational | The RU is operational |
| Test result | Indicates the result of tests |
| Transmission OK | Indicates state of transmission on ports A - D |
| RF off | RF not enabled |

**Buttons**

| | |
|---|---|
| dTRU reset | Resets the dTRU |
| DXU reset | Resets all subunits |
| Local/remote mode | Changes RU mode to local or remote |
| Test call | Initiates the test operation function |

**Barcode**

The barcode for product identification is readable without disturbing the RBS function.

# 7 Power System

The power system of the RBS 2207 depends on the choice of power supply and may include a number of units outside the RBS.

The RBS 2207 can be connected either to AC mains supply voltage or to DC supply voltage.

*Table 8 Power supply voltage alternatives*

| **Nominal voltage** | **PSU** |
|---|---|
| 120 - 250 V AC, 50 - 60 Hz | PSU-AC |
| +24 V DC | PSU not needed |
| -48 to -60 V DC | PSU-DC |

## 7.1 AC mains supply voltage

AC mains supply voltage is connected to the cabinet using two AC cables. If the power supply does not meet the AC power requirements, then filters and stabilisers must be installed to protect the equipment and ensure proper operation.

There are two ways to connect power to the RBS. They are:

- Single phase line to neutral
- Single phase line to line

**Note:** When single phase line to line is used, each PSU requires two circuit breakers or fuses.

*Table 9 AC mains power requirements*

| **Voltage range for specified Performance (phase voltage)** | **120 - 250 V AC** |
|---|---|
| Voltage range | 90 - 275 V AC (1) |
| Frequency | 45 - 65 Hz |
| Inrush current, max. | 30 A (1 - 30 ms) |
| Maximum AC power | 1.4 kW x 2 |
| Non-destructive range | 0 - 275 V AC |
| Overvoltage <20 ms | 325 V(2) |
| Maximum ground leakage current | 10 mA x 2 |

*(1) 1) 90 - 108 V AC with reduced output power. 1000 W per PSU*

*(2) 2) Install external filter and stabiliser if not met.*

### Mains Fuses

*Table 10 Mains fuses recommendation*

| Minimum for Safe Function | Recommended for Maximum Selectivity | Maximum Allowed Fuse Rating |
|---|---|---|
| 2x10 A /16 A(1) | 2x16 A | 2x20 A |

*(1) 1) For 200 - 250 V range only.*

### External Earth Fault Circuit Breakers

If external earth fault (ground fault) circuit breakers are used, then the recommended minimum trip value is 100 mA.

## 7.2 +24 V DC Supply Voltage

*Table 11 DC power requirements*

| | |
|---|---|
| **Nominal** | +24 V DC |
| **Default** | +27.2 V DC |
| **Range** | +20.5 to +29.0 V DC |
| **Non-destructive range** | +0 to +32 V DC |
| **Inrush current** | Max. 500 A (0.1 - 10 ms) |

### Fuses

*Table 12 +24 V DC fuse recommendation*

| Minimum for Safe Function | Recommended for Maximum Selectivity | Maximum Allowed Fuse Rating |
|---|---|---|
| 1x80 A(1) | 1x100 A | 1x200 A |

*(1) May be used when no transmission and/or optional equipment is installed.*

## 7.3 -48 to -60 V DC Supply Voltage

*Table 13 DC supply voltage requirements*

| | |
|---|---|
| **Nominal** | -48 to -60 V DC |
| **Range** | -40.0 to -72.0 V DC |
| **Non-destructive range** | +0 to -80 V DC |
| **Inrush current** | 200 A (0.1 - 5 ms) |

### Fuses

*Table 14 -48 to -60 V DC fuse recommendation*

| Minimum for Safe Function | Recommended for Maximum Selectivity | Maximum Allowed Fuse Rating |
|---|---|---|
| 2x32 A | 2x35 A | 2x40 A |

## 7.4 Battery Back-up

Battery back-up can be used to power the site during mains failure and to protect the site from interruptions in the AC mains supply. It is available in an external cabinet.

In the event of mains failure, the batteries in the BBS 2000 or BBS 2202 deliver the necessary power to the radio cabinet as well as to the transmission equipment, if used. This enables the radio system to continue operating during mains failure. The transmission equipment is provided with power supply longer than the RBS.

Battery back-up can be delivered for at least 1, 2, 4, 6 or 8 hours back-up time, depending on the chosen configuration of the RBS. The BBS can feed +24 V DC or -48 V DC to transmission equipment. The -48 V DC supply requires an internal DC/DC converter in the BBS. It is possible to share battery back-up between an RBS 2202 or 2206 and an RBS 2207.

## 7.5 Power Consumption

The power consumption figures in the table below show peak load. The figures in the table have been rounded off.

*Table 15 Power consumption*

| RBS 2207 Cabinet (fully equipped) | Power Supply Voltage | | |
|---|---|---|---|
| | 120 -250 V AC | +24 V DC | -48 V DC |
| **Maximum power consumption** | 1.7/2.9[(1)]kW | 1.4 kW | 1.7 kW |

*(1) Power consumption during maximum battery charging*

# 8 Transmission

The RBS 2207 is normally connected to a Distribution Frame (DF) that serves as an interface for the transmission (PCM) lines. Two PCM cables

are connected to the ports on the connection field of the RBS. The RBS 2207 supports two transmission standards:

- T1 1.5 Mbit/s, 100 Ω balanced PCM line
- E1 2 Mbit/s, 75 Ω unbalanced (Transmission Adapter used), or 120 Ω balanced line

Link access procedures on C-channel (LAPD) concentration and LAPD multiplexing can be used to make the transmission resource more efficient.

### PCM Overvoltage Module

This module is mounted in the DF and contains overvoltage protection for the PCM lines. If the PCM lines are terminated in equipment outside the RBS equipment room, these lines must then be protected by overvoltage protectors (OVP) in the DF. Failure to do so might damage the DXU-21, if a voltage transient is transported along the cable. The RBS 2207 is designed for 100/120 Ω balanced (twisted pair) cable. When a 75 Ω unbalanced (coaxial) cable is to be connected, the module contains a balun card that converts 75 Ω unbalanced to 100/120 Ω balanced line.

### Optional Transmission Equipment

The cabinet can be connected to optional transmission equipment that is mounted externally. The optional transmission equipment used is:

- Transmission adapter to connect 75 Ω unbalanced line directly to the RBS
- Mini-link
- TMR 9202

# 9 Alarms

The RBS 2207 can be connected to a maximum of 16 external alarms. The DF is used for external alarm connection. Each alarm connection is provided with over-voltage protection. (One OVP module protects two alarm connections.) The alarm device can set the alarm by either an open or closed circuit.

The alarm device connected to the screw terminals should be isolated relay contacts. A closed contact (logic zero) is required to be below 2 kΩ, and an open contact (logic one) above 100 kΩ. The current through a closed 0 Ω contact is 1.2 mA. The voltage between terminals with an open contact is 24 V DC. The external alarms are defined during installation either using the Operation and Maintenance Terminal (OMT) or from the BSC.

# 10 Standards, Regulations and Dependability

In this section a brief overview of standards, type approval, and electromagnetic compatibility are stated.

## 10.1 Safety Standards

In accordance with the market requirements, the RBS 2207 complies with the following product safety standards:

- 73/23/EEC Low voltage directive
- IP 20 according to IEC/EN 60529
- Federal Communications Commission (FCC) rules, part 68
- EN 60950 / IEC 60950
- EN 60215 / IEC 60215
- UL 1950 / CSA C22.2 No.950

## 10.2 Other Standards and Regulations

### Marking

The product is marked with signs to show compliance with product safety standards.

### Type Approval Standards

The RBS complies with the European Community and the North America market requirements regarding radio performance. The product has the Conformité Européenne (CE) and FCC signs to show compliance to the legal requirements in respective region.

### Electromagnetic Compatibility (EMC)

The RBS complies with the European Community and the North America market requirements regarding EMC. The product has the CE and FCC signs to show compliance to the legal requirements in each respective region.

## Dependability

The RBS 2207 is designed for a technical lifetime of 20 years (24-hour operation). The following preventive maintenance conditions must be fulfilled to guarantee the availability of the RBS:

| | |
|---|---|
| Fans | The fans must be inspected (cleaned if necessary) every year. The lifetime is estimated to be at least 7 years. |
| Air filters | The air filters must be regularly inspected and cleaned (interval depends on the environmental conditions at the site). |

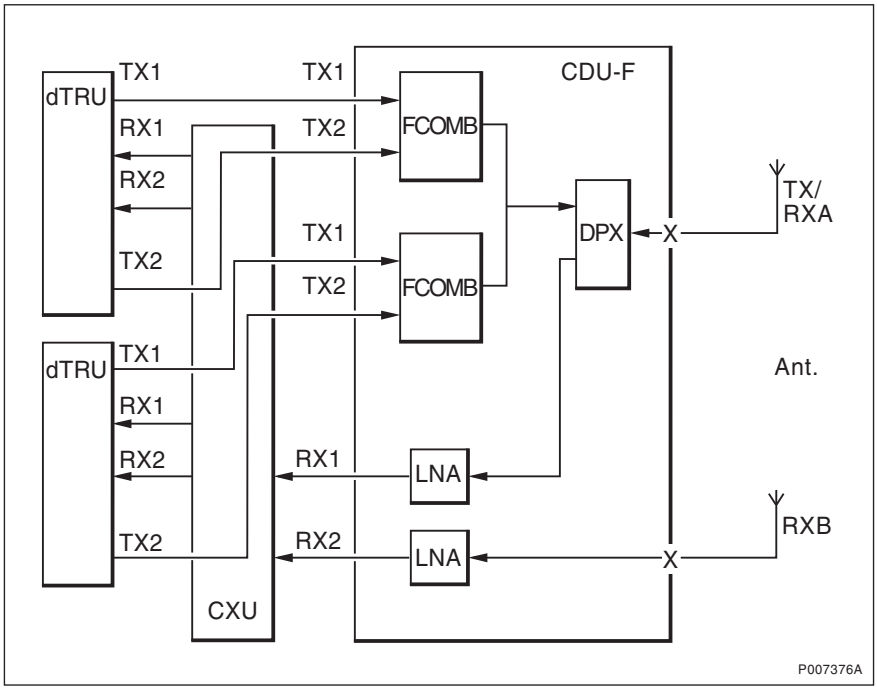
## Vandal Resistance

Unauthorised access is not possible without damaging the unit.

Ericsson AB
SE-164 80 Stockholm
Sweden
asq.us@ericsson.com

# RBS 2106 and RBS 2206
## Radio Configurations
## Description

This document describes the radio configurations for RBS 2106 and RBS 2206.



# Contents

# 1 Introduction

The radio configurations described are valid for RBS 2106 and RBS 2206, equipped with a maximum of six dTRUs/12 TRXs per cabinet. The descriptions include basic configurations, site cell configurations, and co-siting. They also include information about configurations with CDU-G and CDU-F as well as valid GSM frequencies (the GSM 800 configurations are valid from BSS R9).

## 1.1 Mobile Telephone System

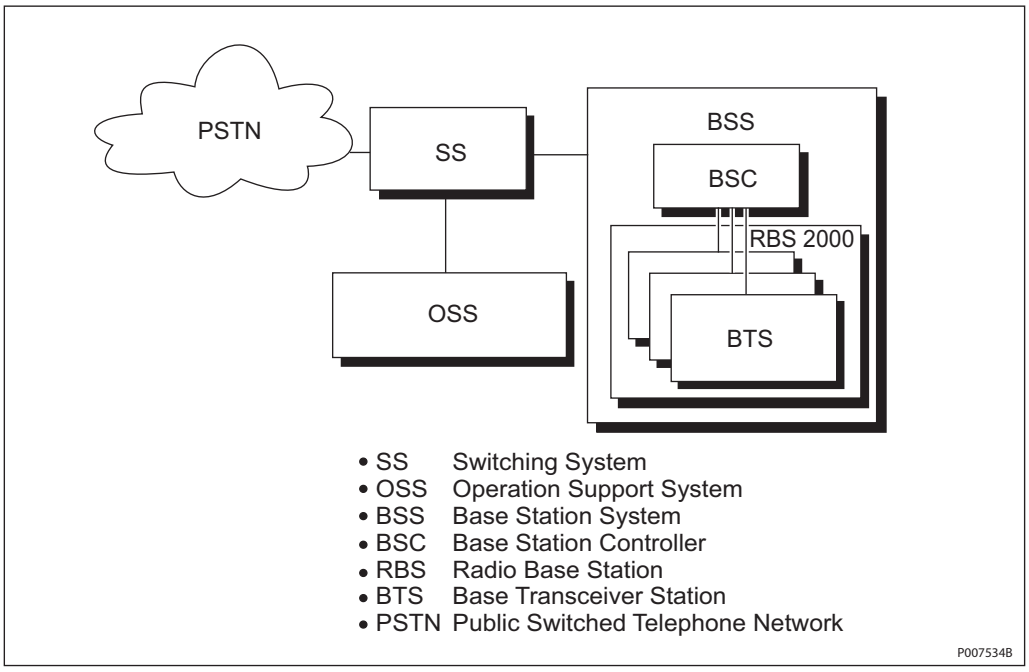



*Figure 1 RBS 2000 in the Ericsson GSM System*

The Base Station System (BSS) contains two functional entities; the Base Station Controller (BSC) and the Base Transceiver Station (BTS).

The BSC handles radio-related functions, such as handover, management of the radio network resources, and cell configuration data. It also controls radio frequency power levels in RBSs and MSs.

The BTS is a network component which serves one cell and is controlled by the BSC. The BTS contains a number of transceivers. It consists of the radio transceivers and all the digital signal processing equipment. RBS 2000 contains equipment for 1 – 3 BTSs.

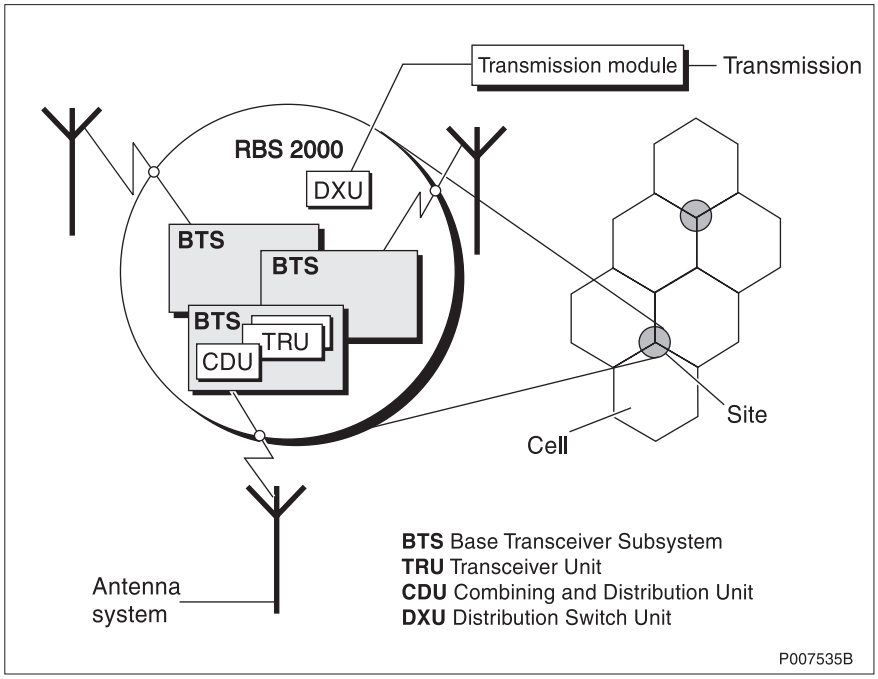



*Figure 2 An Example of an RBS 2000 Servicing a Three-Cell Site*

### 1.2 Radio Base Station

The Radio Base Station 2000 (RBS 2000) is Ericsson's second generation of RBS, developed to meet the GSM specifications for BTSs.

## 2 References

**GSM:05.05** 3GPP TS 45.005 release 4 Radio Transmission and Reception.

**GSM:05.08** 3GPP TS 45.008 release 4 Radio Subsystem Link Control.

## 3 Definitions

**Tower Mounted Amplifier (TMA)**

The TMA compensates for signal loss in the receiver antenna cables, reduces system noise and improves uplink sensitivity. The TMA can consist of a duplex filter. Duplex is the function that allows communication in two directions (sending and receiving) on one channel.

The TMA used for dTRU based products is Dual Duplex TMA (ddTMA).

Some configurations can use a TMA designed for reception only (rTMA).

### Antenna Reference Point

The antenna reference point is the point where the radio signal crosses the RBS border, that is, the connector for the antenna feeder. See the figure below.

**Note:** The TMA is inside the RBS border.

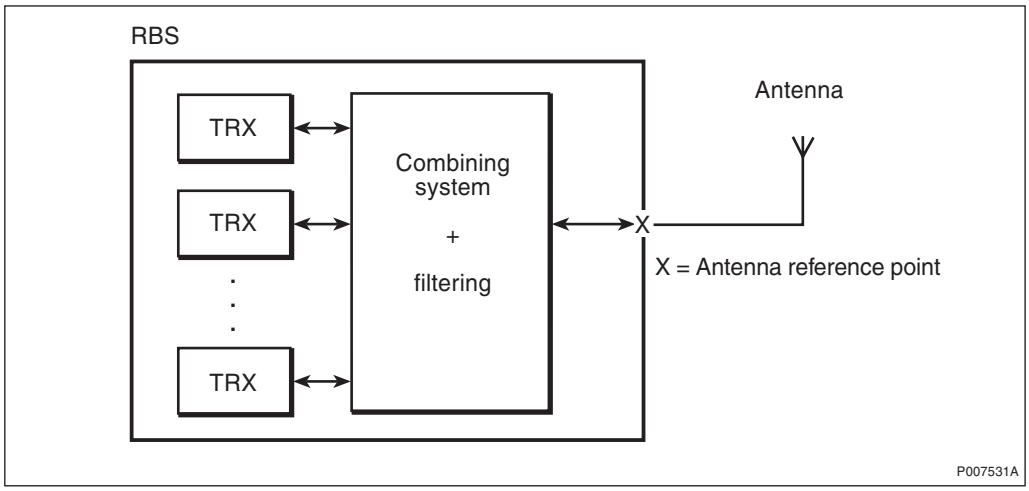



*Figure 3 Antenna Reference Point*

### Antenna System

The antenna system is constituted by all RF transmission and reception antennas, directed to cover the same area or multi-casting configurations.

### Antenna Sharing Unit (ASU)

An ASU is used for sharing RX antennas between RBSs.

### Base Transceiver Station (BTS)

A BTS is a unit operating on a set of frequencies in one cell.

### Basic Configuration

A basic configuration is a specified set of transceivers, CDUs (and in some cases) TMAs, connected to one antenna system.

A basic configuration can be multiplied or used in combination with other basic configurations to build the required site equipment.

Variations of a basic configuration may exist, differing in cable lengths. This depends on factors such as implementation in different cabinets.

**Radio Base Station (RBS)**

An RBS is all equipment in an Ericsson base station, and may be comprised of several BTSs.

Each RBS has one DXU, controlling a maximum of 12 TRXs.

**Site Cell Configuration (SCC)**

The SCC is a geographical concept describing how an area around one RBS site is divided into radio traffic areas. The following types of site are defined:

| | |
|---|---|
| **Omni-site** | Radio coverage in one 360 degree sector, that is in one area, using one BTS. |
| **2-sector site** | Radio coverage in two sectors, that is two distinct areas, using two BTSs. |
| **3-sector site** | Radio coverage in three sectors, that is three distinct areas, using three BTSs. |

## 3.1 Cabinet Types

| | |
|---|---|
| **RBS 2106** | Outdoor cabinet with a maximum of six dTRUs/12 TRXs per cabinet |
| **RBS 2206** | Indoor cabinet with a maximum of six dTRUs/12 TRXs per cabinet |

# 4 Frequency Bands

| | | |
|---|---|---|
| GSM 800 | Uplink: | 824 – 849 MHz |
| | Downlink: | 869 – 894 MHz |
| P-GSM 900 | Uplink: | 890 – 915 MHz |
| | Downlink: | 935 – 960 MHz |
| E-GSM 900 | Uplink: | 880 – 915 MHz |
| | Downlink: | 925 – 960 MHz |
| GSM 1800 | Uplink: | 1710 – 1785 MHz |
| | Downlink: | 1805 – 1880 MHz |

| | | |
|---|---|---|
| GSM 1900 | Uplink: | 1850 – 1910 MHz |
| | Downlink: | 1930 – 1990 MHz |

These frequency bands are supported by the configurations described in this document.

# 5 Basic Configurations

The GSM 800, GSM 900, GSM 1800 and GSM 1900 configurations meet the GSM requirements, except where otherwise stated.

The capacity of a configuration is defined at the TX and RX antenna reference points at the RBS border. There is an X close to every reference point in the following figures. The RBS border is not included in the figures.

The equivalent output power with SW power boost (TX diversity) configured is the original output power specified for the basic configuration increased by typically 3 dB, if separate TX antennas are used. The configurations that support SW power boost are listed in Section 6.3 on page 47.

Functional views of radio signal paths for various configurations are shown in Figure 4 on page 8 up to and including Figure 20 on page 39. Only components necessary to illustrate the configuration are shown.

In some configurations, the radio signal paths can differ depending on where in the cabinet the basic configuration is used. The figures show fully-equipped cabinets with two or three BTSs, that is two or three basic configurations are shown in the same figure. These are different physical implementations of the same basic configuration, not different configurations. The second BTS is drawn with dotted lines to show how an SCC in a fully-equipped cabinet is connected.

## 5.1 dTRU Topology

### Configuration of Hybrid Combiner

The dTRU can be configured with or without the hybrid combiner, using two external cables.

### RX Signals Distributed from Two Ports

The RX signals can be distributed from the RX1 and RX2 ports to all four receivers when both transceivers are connected to the same antenna system.

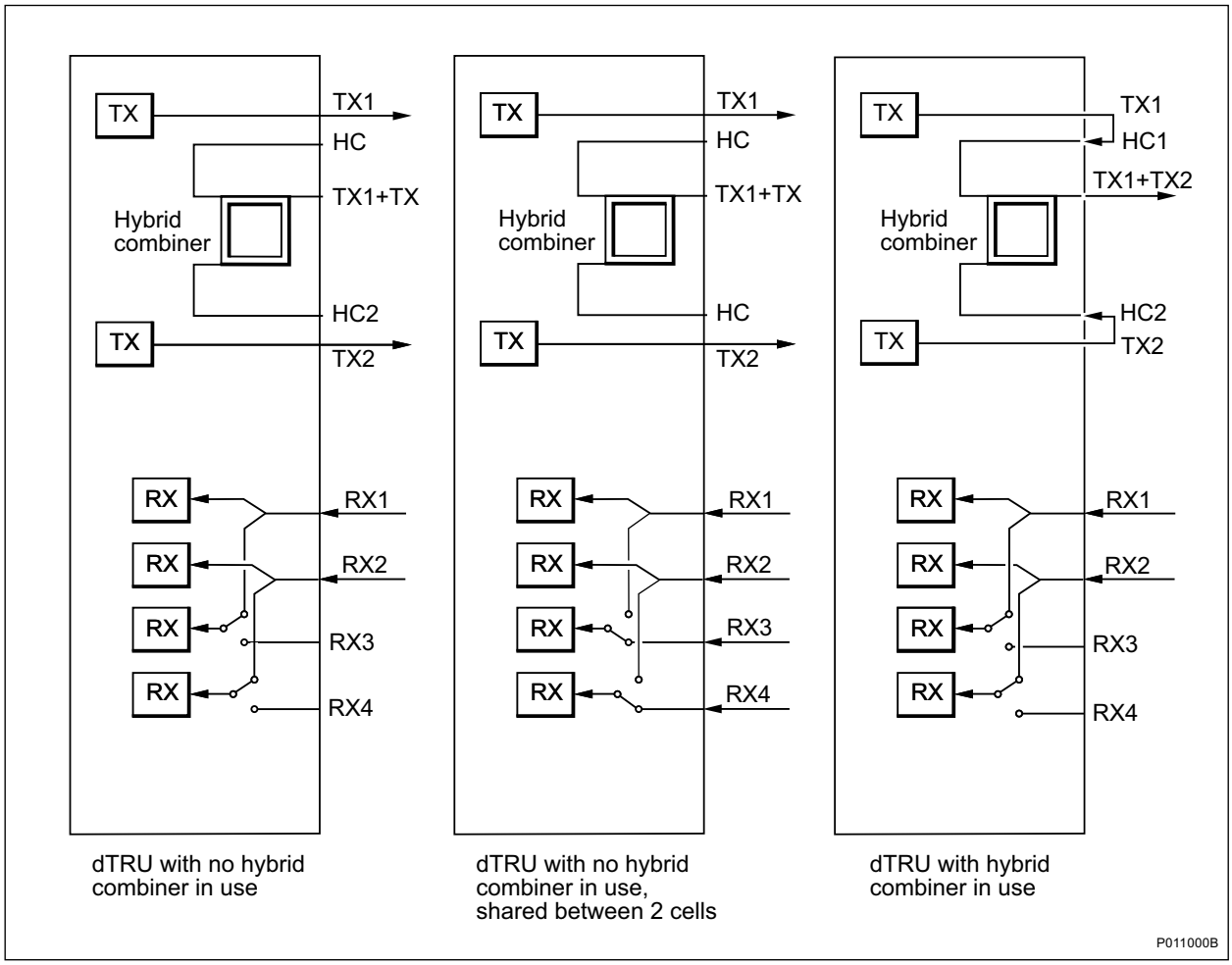



*Figure 4 dTRUs with and without Hybrid Combiners in Use*

## 5.2 CDU-F Configurations

### Configuration 1x4 CDU-F

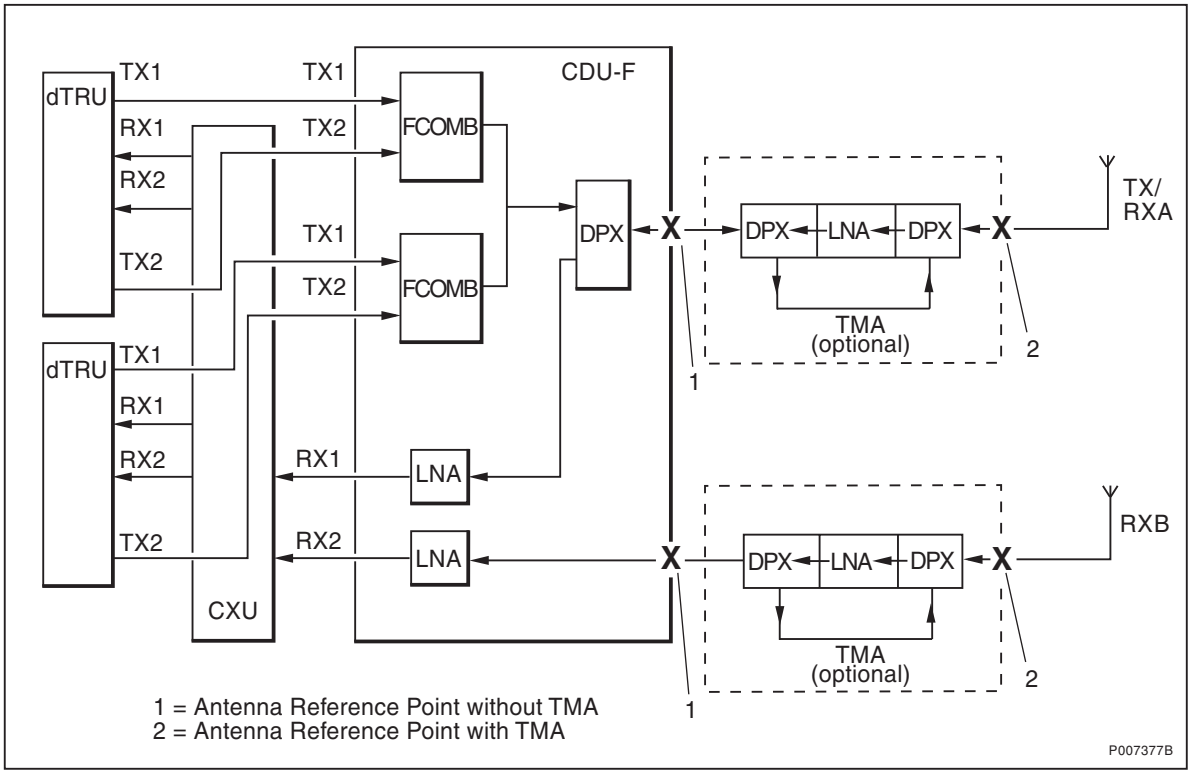



*Figure 5 1x4 CDU-F*

### Characteristics

| | | |
|---|---|---|
| Number of CDUs | 1 | |
| Frequency band | E-GSM | (F9dt_2.4) |
| | GSM 1800 | (F18dt_2.4) |
| Max. number of TRXs | 4 | |
| Number of feeders | 2 | |
| Number of antennas | 2 | |
| Antenna configuration | TX/RX + RX | |
| TMA configuration | ddTMA + ddTMA or<br>ddTMA + rTMA | |

*Table 1 3 x 4 Configurations with CDU-F*

| Cell | Antenna | TMA<br>No. (TMA Config. Only) | CDU<br>No./Connector | CXU/dTRU<br>No./Connector |
|---|---|---|---|---|
| 1 | TX/RXA | 1 | 1/TX/RX | 1/RX1, 2/RX1 |
| | RXB | 2 | 1/RX | 1/RX2, 2/RX2 |
| 2 | TX/RXA | 3 | 2/TX/RX | 3/RX2, 4/RX2 |
| | RXB | 4 | 2/RX | 3/RX1, 4/RX1 |
| 3 | TX/RXA | 5 | 3/TX/RX | 5/RX2, 6/RX2 |
| | RXB | 6 | 3/RX | 5/RX1, 6/RX1 |

**Configuration 2x6 CDU-F**

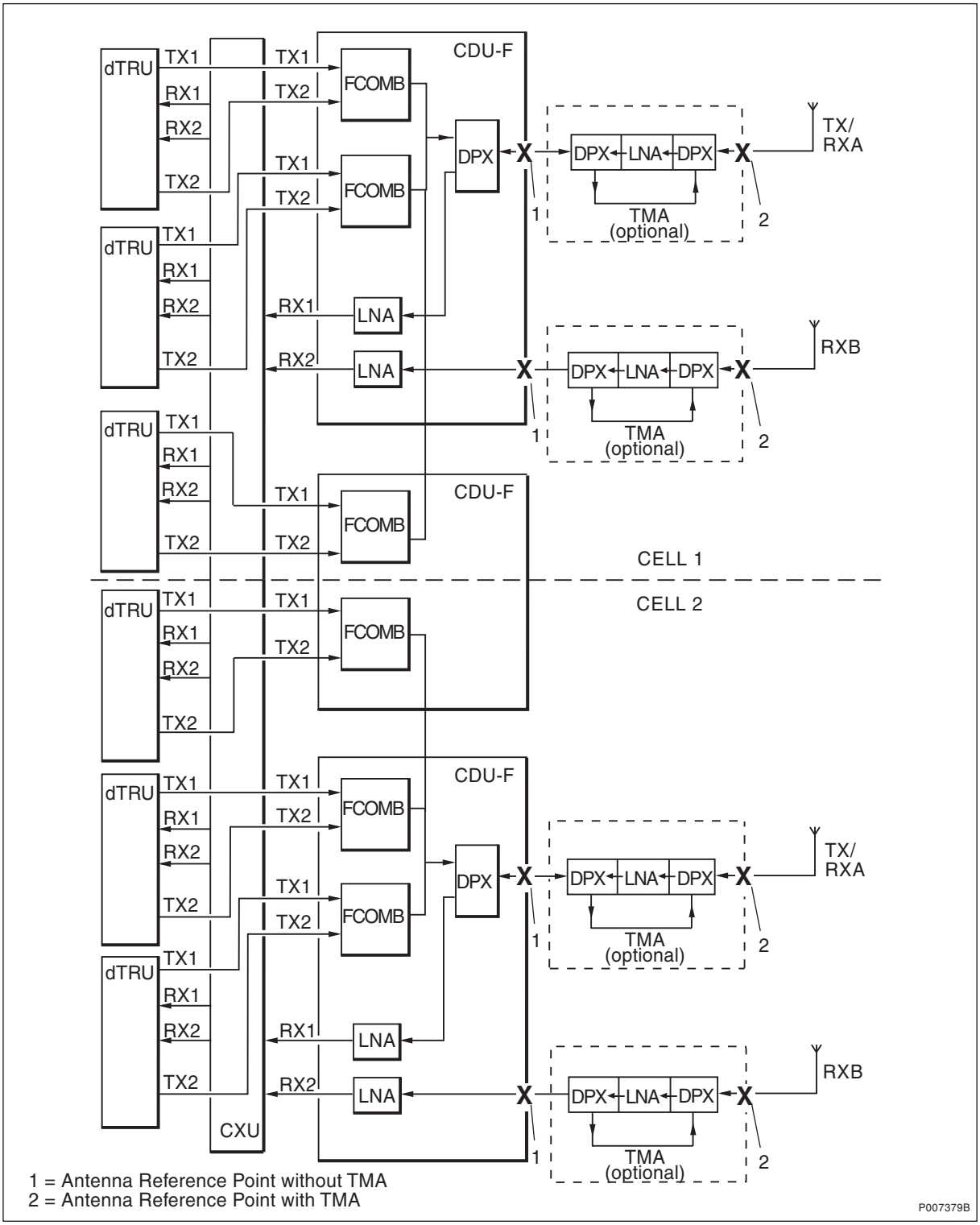



*Figure 6 2x6 CDU-F*

**Characteristics**

| | |
|---|---|
| Number of CDUs | 2[1] |
| Frequency band | E-GSM |
| | GSM 1800 |
| Max. number of TRXs | 6 |
| Number of feeders | 2 |
| Number of antennas | 2 |
| Antenna configuration | TX/RX + RX |
| TMA configuration (optional) | ddTMA + ddTMA or<br>ddTMA + rTMA |

*Table 2 2 x 6 Configurations with CDU-F*

| Cell | Antenna | TMA<br>No. (TMA Config. Only) | CDU<br>No./Connector | CXU/dTRU<br>No./Connection |
|---|---|---|---|---|
| 1 | TX/RXA | 1 | 1/TX/RX | 1/RX1, 2/RX1, 3/RX1 |
| | RXB | 2 | 1/RX | 1/RX2, 2/RX2, 3/RX2 |
| 2 | TX/RXA | 5 | 3/TX/RX | 4/RX1, 5/RX2, 6/RX2 |
| | RXB | 6 | 3/RX | 4/RX2, 5/RX1, 6/RX1 |

### Configuration 1x8 CDU-F

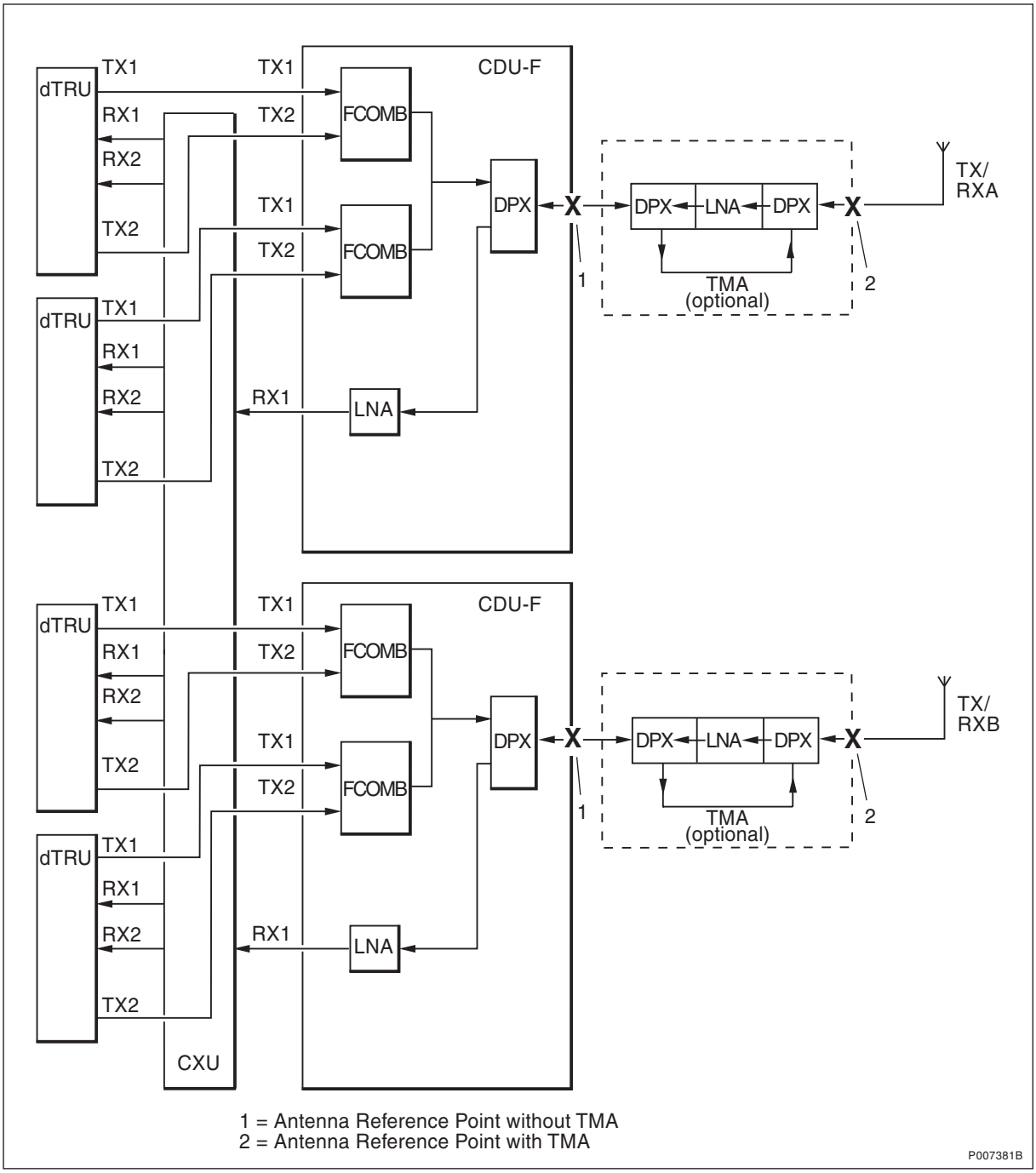



*Figure 7 1x8 CDU-F*

### Characteristics

| | |
|---|---|
| Number of CDUs | 2 |

**Characteristics**

| | |
|---|---|
| Frequency band | E-GSM |
| | GSM 1800 |
| Max. number of TRXs | 8 |
| Number of feeders | 2 |
| Number of antennas | 2 |
| Antenna configuration | TX/RX + TX/RX |
| TMA configuration (optional) | ddTMA + ddTMA |

*Table 3 Configurations with CDU-F and Maximum 8 TRXs per Cell*

| Cell | Antenna | TMA<br>No. (TMA Config. Only) | CDU<br>No./Connector | CXU/dTRU<br>No./Connection |
|---|---|---|---|---|
| 1 | TX/RXA | 1 | 1/TX/RX | 1/RX1, 2/RX1, 3/RX1, 4/RX1 |
| | TX/RXB | 3 | 2/TX/RX | 1/RX2, 2/RX2, 3/RX2, 4/RX2 |
| Alt. 1 | TX/RXA | 3 | 2/ TX/RX | 3/RX2, 4/RX2, 5/RX1, 6/RX1 |
| | TX/RXB | 5 | 3/TX/RX | 3/RX1, 4/RX1, 5/RX2, 6/RX2 |

## Configuration 1x8 CDU-F Shared between Two Cabinets

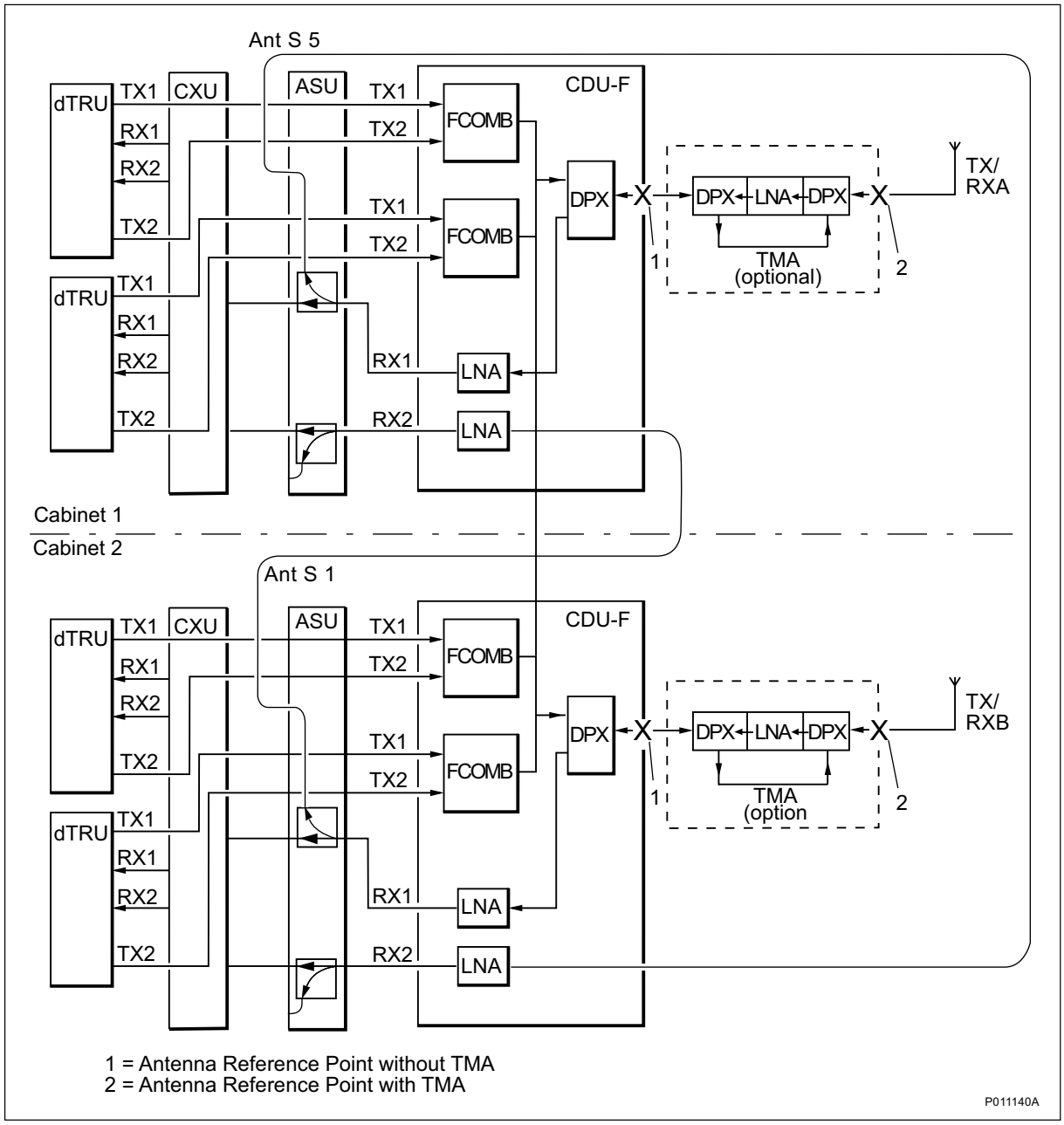



*Figure 8 1 x 8 CDU-F Configuration, Mid-Sector*

### Characteristics

| | |
|---|---|
| Number of CDUs | 1 per cabinet |
| Frequency band | E-GSM |

**Characteristics**

| | GSM 1800 |
|---|---|
| Max. number of TRXs | 4 per cabinet |
| Number of feeders | 2 + co-siting cables |
| Number of antennas | 2 |
| Antenna configuration | TX/RX + TX/RX |
| TMA configuration (optional) | ddTMA + ddTMA |

*Table 4 1 x 8 CDU-F (mid-sector)*

| Cell | Antenna | TMA No. (TMA Config. Only) | CDU No./Connector | CDU/dTRU No./Connector |
|---|---|---|---|---|
| 2 Cabinet 1 | TX/RXA | 5 | 3/TX/RX | 5/RX2, 6/RX2 |
| | RXB(1) | | 3/RX | 5/RX1, 6/RX1 |
| 2 Cabinet 2 | TX/RXB | 1 | 1/TX/RX | 1/RX1, 2/RX1 |
| | RXA(1) | | 1/RX | 1/RX2, 2/RX2 |

*(1) Via co-siting cable*

**Configuration 1x12 CDU-F**

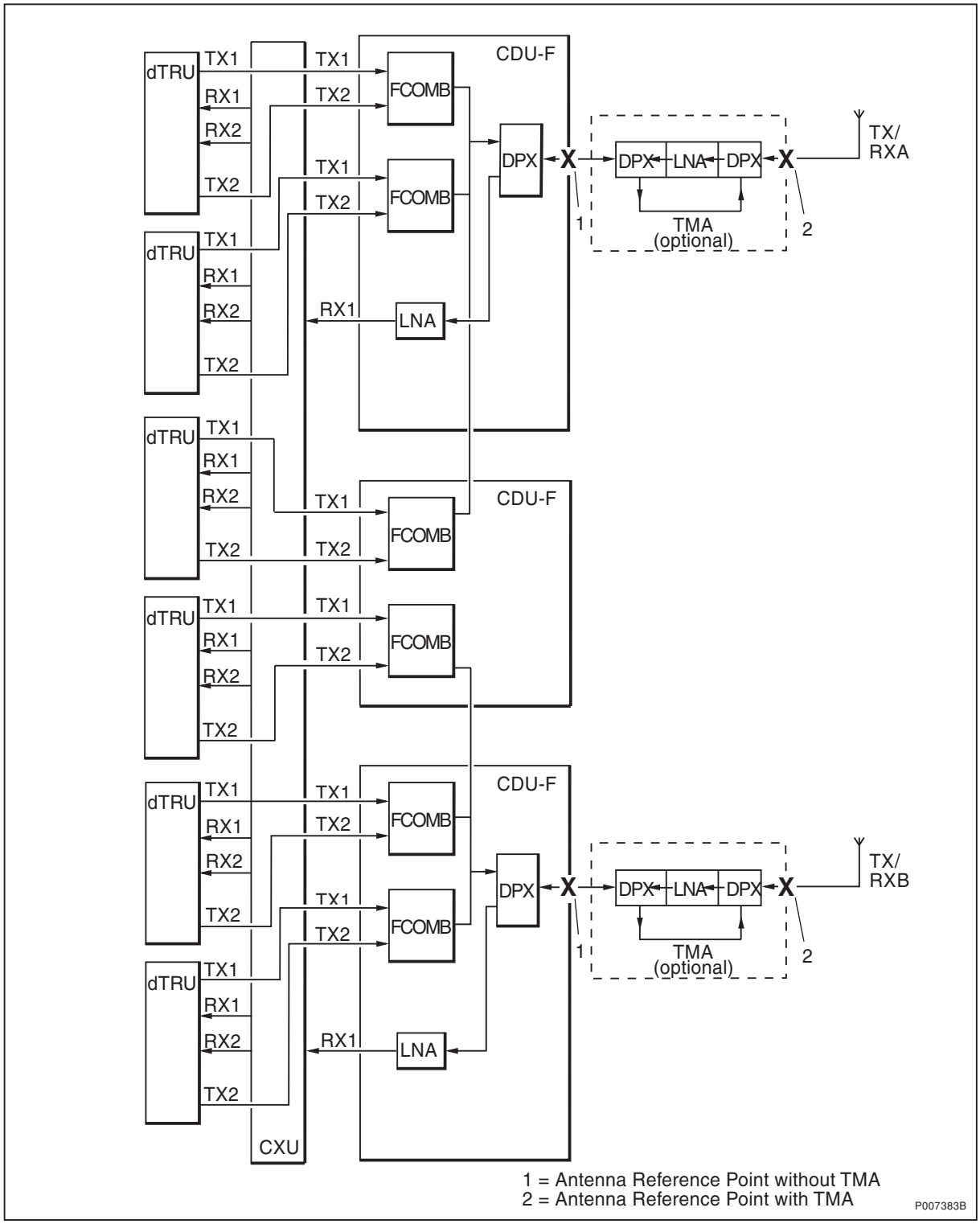



*Figure 9 1x12 CDU-F*

*Table 5 Configurations with CDU-F and 12 TRXs per Cell*

| Antenna | TMA<br>No. (TMA Config. Only) | CDU<br>No./Connector | CXU/dTRU<br>No./Connection |
|---|---|---|---|
| TX/RXA | 1 | 1/TX/RX | 1..6/RX1 |
| TX/RXB | 5 | 3/TX/RX | 1..6/RX2 |

## 5.3 CDU-G Configurations

### Configuration 2x1 CDU-G without Hybrid Combiner

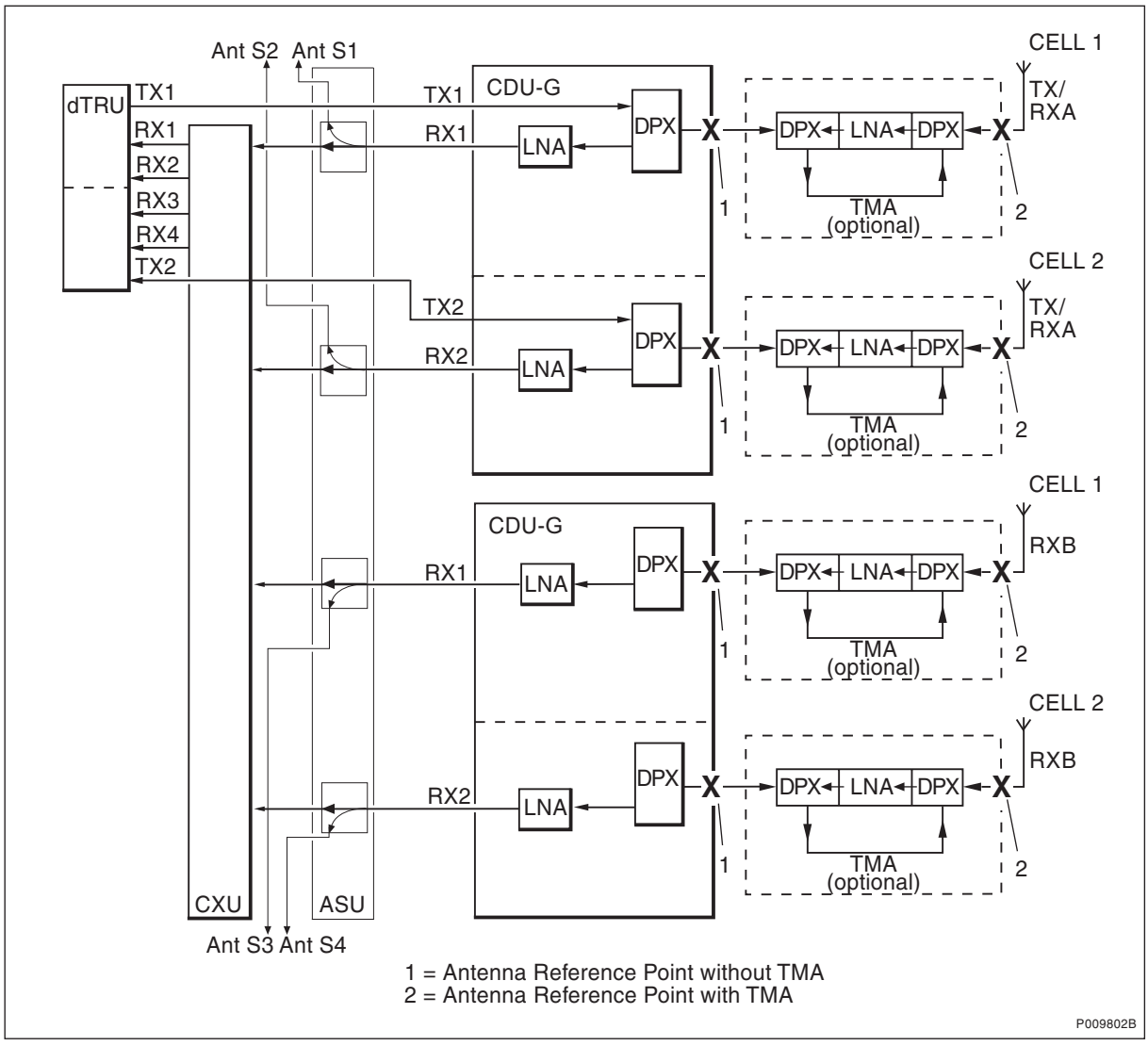



*Figure 10 2x1 CDU-G Uncombined*

In the figure above, Ant S1 – S4 represent the antenna sharing signal which goes to the next cabinet. For connector numbers, *see Table 6 on page 19.*

**Characteristics**

| | |
|---|---|
| Number of CDUs | 2 (2 CDUs support two sectors) |
| Frequency band | GSM 800 |
| | P-GSM 900 |
| | E-GSM 900 |
| | GSM 1800 |
| | GSM 1900 |
| Max. number of TRXs | 1 (1 dTRU supports two sectors) |
| Number of feeders | 2 |
| Number of antennas | 2 |
| Antenna configuration | TX/RX + RX |
| TMA configuration (optional) | ddTMA + ddTMA |

**Note:** The ASU is optional equipment.

*Table 6 2x1 Configurations with CDU-G*

| Cell | Antenna | TMA | CDU<br>No./Connector | Antenna Sharing Connector<br>(Co-siting Only) | dTRU/CXU<br>No./Connector |
|---|---|---|---|---|---|
| 1 | TX/RXA | 1 | 1/TX/RX1 | 1 | 1/RX1 |
| | RXB | 3 | 2/TX/RX1 | 3 | 1/RX2 |
| 2 | TX/RXA | 2 | 1/TX/RX2 | 2 | 1/RX4 |
| | RXB | 4 | 2/TX/RX2 | 4 | 1/RX3 |

For cell 3, see Figure 11 on page 20 or Figure 15 on page 29

### Configuration 1x2 CDU-G without Hybrid Combiner

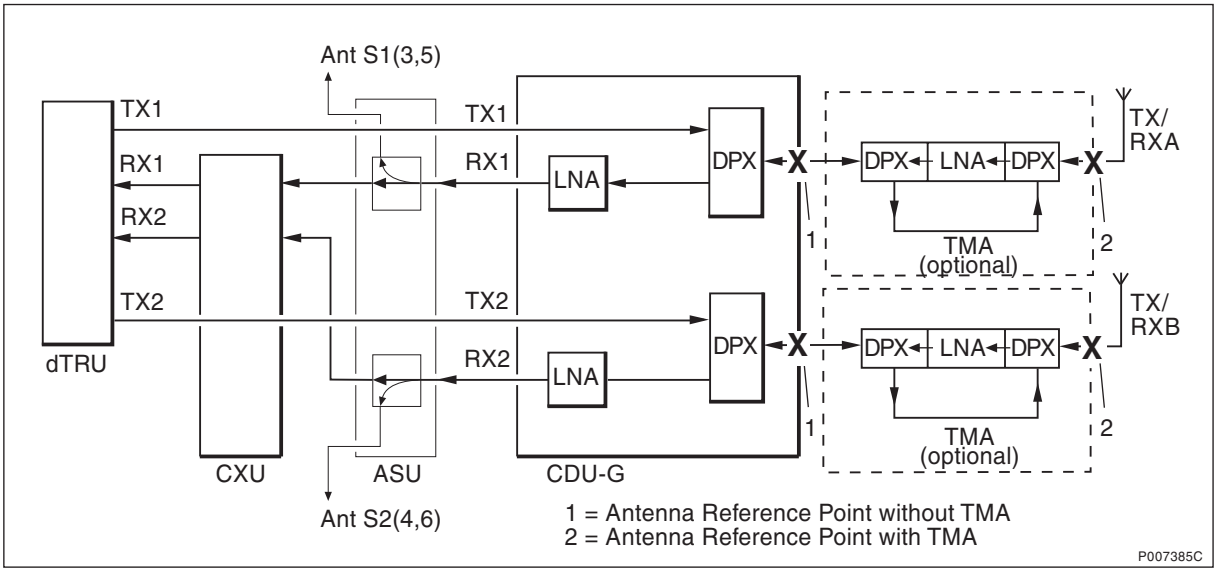



*Figure 11 1x2 CDU-G Uncombined*

In the figure above, Ant S1 and Ant S2 represent the antenna sharing signal which goes to the next cabinet. For connector numbers, *see Table 7 on page 21.*

**Characteristics**

| | |
|---|---|
| Number of CDUs | 1 |
| Frequency band | GSM 800 |
| | P-GSM 900 |
| | E-GSM 900 |
| | GSM 1800 |
| | GSM 1900 |
| Max. number of TRXs | 2 |
| Number of feeders | 2 |
| Number of antennas | 2 |
| Antenna configuration | TX/RX + TX/RX |
| TMA configuration (optional) | ddTMA + ddTMA |

**Note:** The ASU is optional equipment.