

RBS 2207 Product Description

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- Please note that this description includes details on both basic and optional products. It does not necessarily correspond to any specific release or delivery time, nor is it a complete technical specification.

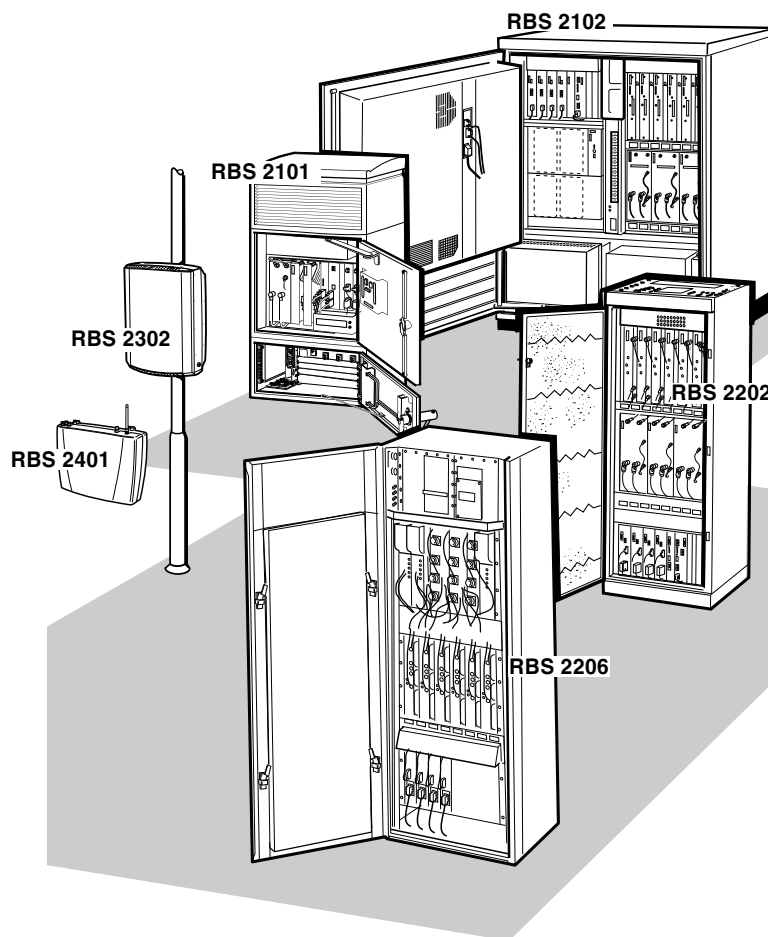
1 Introduction

The purpose of this document is to describe the powerful RBS 2207, which is a 6 TRX indoor GSM radio base station. The document aims to give a general overview of the RBS 2207.

1.1 A new powerful member of the RBS 2000 family

The RBS 2207 is a new member of the highly successful RBS 2000 family. This guarantees a world-class supply flow, fast installation and commissioning, reliable operation & maintenance and coexistence with other RBS 2000 products.

The RBS 2207 is an indoor macro base station supporting up to six transceivers per cabinet. The cabinet has the same footprint and capacity as the RBS 2202 but is the height is lower. Radio performance is improved and a number of new features are added.



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*Figure 1. The RBS 2000 family.
A number of EDGE capable base stations, including the RBS 2207,
are being added to the family.*

1.2 RBS 2207 – Optimised for coverage

Being a member in the RBS 2000 family, RBS 2207 is to date one of the most powerful indoor RBSs in the world. Keeping the successful characteristics of the existing RBS 2000 portfolio and improving functionality as well as operation and maintenance makes the RBS 2207 the most cost effective solution for growing GSM operators.

The RBS 2000 family supports a wide range of features, however extreme coverage is the keyword for RBS 2207. Being a RBS 2000 member also guarantees coexistence with the installed base of RBS 2000 products. Ericsson's synchronization based BSS features ensure that transceivers from different generations of radio base stations can easily form common cells. Operators can therefore bridge the past with the future.

Through the unique double radio concept, the RBS 2207 can be remotely configured for extreme coverage to standard coverage. In the booster mode (TCC, transmitter coherent combining) the double transmitter acts as one TRX, however with double the output power.

The 6-transceiver RBS 2207 cabinet has the same footprint as RBS 2206 and shares the superior performance, thanks to the new double-capacity transceivers and combiners. The RBS 2207 (and 2206) has to date the best output power and sensitivity in its class. The double Transceiver Unit, dTRU, has many inbuilt and powerful features. The dTRU has an in-built hybrid combiner, possible to bypass, and supports TMA through internal gain adjustment – it is also prepared for 4-way diversity. The improved radio performances means increased site-to-site distance, and therefore, less sites. Another example of a cost saving feature is the supported 121 km Extended Range. The combiner unit (CDU) supports three transmitting modes: capacity/standard mode, coverage mode and TCC (extreme coverage mode), making it very flexible. It also has an in-built duplex filter, saving feeders. The support of coverage modes makes the RBS 2207 perfect for rural sites or when fast rollout is required at a minimum cost. The cabinet has internal TMA support.

The RBS 2207 is ready for GSM data services, including General Packet Radio Service (GPRS), High Speed Circuit Switched Data (HSCSD) and EGPRS (with the EDGE dTRU).

A powerful Distribution Switch Unit (DXU) and fast internal buses guarantee full EDGE support. With the optional BSS feature RBS 2000 synchronization, it is possible to have up to 128 transceivers in one cell.

2 RBS 2207 Architecture

The RBS 2207 comprises the following major units:

- Power Supply Unit (PSU)
- Distribution Switch Unit (DXU)
- Internal Distribution Module (IDM)
- Double Transceiver Unit (dTRU), EDGE & GSM variants
- Combining and Distribution Unit (CDU)
- AC or DC Connection Unit (ACCU/DCCU)
- Fan Control Unit (FCU)
- DC filter

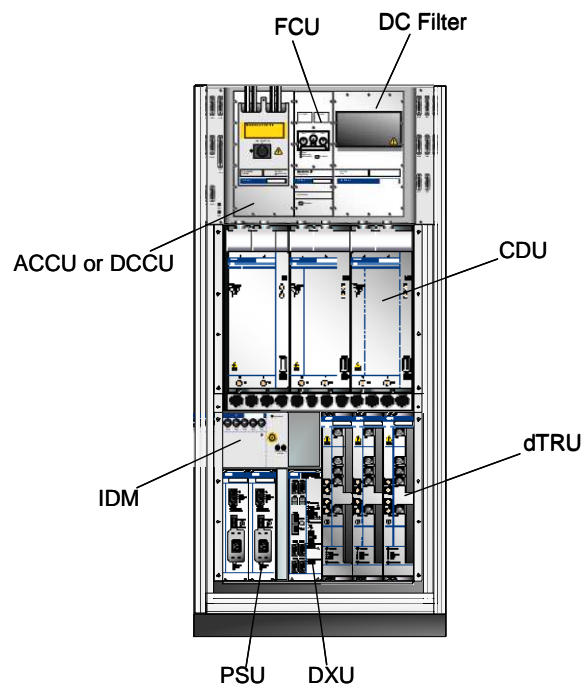


Figure 2. RBS 2207.

Power Supply Unit (PSU)

The *in-built PSU* rectifies or converts the power supply voltage to regulated system voltage, +24 VDC. The PSU is available in two versions; AC (120 – 250 V) and DC (-48/60 V). This means the RBS can be directly powered from the mains or from an existing –48V power supply system. When powered from an existing +24 V system, no PSU is needed.

The PSUs are connected in parallel at the secondary side and may be configured with an N+1 redundancy.

When using a battery backup, an extra PSU is recommended for recharging of batteries. If the RBS is equipped with a redundant PSU no extra PSU is required for battery charging.

RBS 2207 is equipped with limited transient protection. An external “transient voltage surge suppressor” and “lightning protection” is recommended.

The PSU is common for all Ericsson’s macro base stations of from the latest generation, i.e RBS 2106, RBS 2206 and RBS 2207.

Internal Distribution Module (IDM)

The IDM handles the distribution and fusing of the system voltage (+24 VDC) to the units in the cabinet. There is a connector for connection of an ESD bracelet and instrument electrical earth on the IDM.

The IDM for the RBS 2207 has a unique outline. Its function is the same as for IDMs used in other Ericsson macro base stations from the latest generation.

Distribution Switch Unit (DXU)

The DXU provides a system interface to the 2 Mbit/s or 1.5 Mbit/s link and cross connects individual time slots to certain transceivers. The DXU also extracts the synchronisation information from the PCM link and generates a timing reference for the RBS.

The DXU supports LAPD Multiplexing (supports up to 15 TRXs per E1), LAPD Concentration (supports up to 13 TRXs per E1) and the Multi Drop functionality (up to 5 RBSs in a chain).

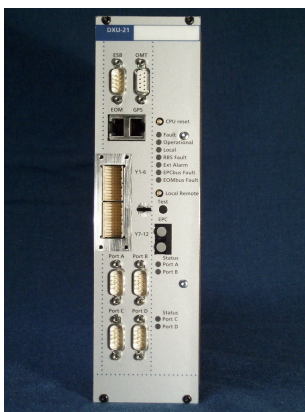


Figure 3. Front view of DXU-21.

The RBS 2207 is delivered with one DXU-21 per cabinet that has some powerful features:

- It is equipped with four transmission ports (E1/T1.5 is supported by the same DXU-21 version). Note that only two of these ports will be accessed when used in RBS 2207
- It is hardware prepared for support of EDGE functionality on all time slots on up to six transceivers.
- It will support a synchronised radio network with help of an interface to an external GPS receiver.
- It supports TG synchronisation.
- It has built in ECU functionality.

The DXU is common for all Ericsson's macro base stations from the latest generation, i.e RBS 2106, RBS 2206 and RBS 2207.

Double Transceiver Unit (dTRU)

The dTRU is a two-transceiver Replaceable Unit. Up to three dTRU units can be installed in one RBS 2207 cabinet, enabling up to 6 TRXs per cabinet.



Figure 4. Double Transceiver Unit.

There are different versions of the dTRU dependent on frequency band and EDGE support. All dTRUs are HW prepared to handle HSCSD and GPRS, the EDGE dTRU is HW prepared to also handle the EGPRS functionality.

The dTRU supports different ciphering standards. Either A5/1 or A5/2 can be used. The ciphering is controlled via software.

The dTRU has a unique feature called TCC (tranceiver coherent combining) that provides an extended cell radius for the downlink. TCC mode means that the same signal is transmitted through both transceivers in the dTRU and the signals are added coherently in a hybrid combiner inside the dTRU. The result is an output signal with twice the maximum power provided by a single TRX.

Extended Range up to 121 km is supported.

The dTRU is hardware prepared to support performance improvements via software upgrades, e.g. four-branch RX diversity and Interference Rejection Combining (IRC).

The dTRU is common for all Ericsson's macro base stations of from the latest generation, i.e RBS 2106, RBS 2206 and RBS 2207.

Combining and Distribution Unit (CDU)

The CDU is a filter and distribution unit for transmitted as well as for received signals.

Antenna supervision is supported by the CDU. This is done via measurements of transmitted and reflected power followed by VSWR calculations. All circuitry needed, such as couplers and measurement receiver, is included in the CDU.

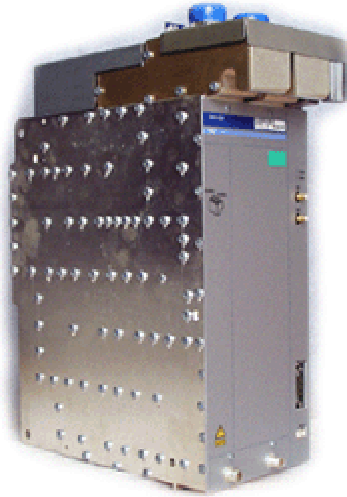


Figure 6. CDU

The duplex filters allows both receiver and transmitter path connections to a common antenna without any need for external components.

The CDU supports EDGE.

AC/DC connection unit (ACCU / DCCU) and DC filter

The ACCU/DCCU handles the distribution and connection of the incoming power supply voltages 120-250 VAC (ACCU) or -48/-60 VDC (DCCU) to the PSUs.

The DC filter handles the connection of the incoming +24 VDC power supply and battery backup.

Battery backup is available together with 120-250 VAC supply voltage.

The ACCU/DCCU and the DC filter are common for all Ericsson's indoor macro base stations of the latest generation, i.e RBS 2206 and RBS 2207.

Fan Control Unit (FCU)

The FCU controls the fans in the cabinet. The climate handling in the cabinet maintains the internal temperature range, within the specified limit, while avoiding excessive noise generation from the cooling fans. The climate handling is controlled by the DXU via the FCU with the aid of temperature sensors placed inside the RUs.

The FCU is common for all Ericsson's macro base stations of from the latest generation, i.e RBS 2106, RBS 2206 and RBS 2207.

Tower Mounted Amplifier (TMA)

A Tower Mounted low noise Amplifier (TMA) is an option that can be used in order to compensate for losses in the antenna feeder and to improve the overall receiver performance. All the configurations are available with double duplex TMA as option. Bias injectors and a TMA control module (TMA-CM) are needed in the cabinet for TMA support. The BIAS injector is used to provide the TMA with DC power from the TMA-CM over the RF feeders.

The RBS 2207 cabinet

- Indoor specified.
- Supports up to three double transceiver units (6 TRXs) per cabinet.
- One cabinet can be configured as a one, two or three sector cell configuration.
- The cabinet fulfils seismic requirements
- The cabinet door can be hinged on the left or right hand side.



Figure 7. RBS 2207 cabinet.

All units in the cabinet are easily accessible from the front of the cabinet. There are no requirements on access to the cabinet from the sides or the back, which implies that the cabinets can be mounted side by side with the back to a wall.

Cable entries for antenna feeders, transmission cables, and mains power are concentrated at the top of the cabinet.

Backup batteries must be housed outside the RBS 2207 cabinet. Battery backup is available for different backup times in external cabinets.

3 Technical Specification

3.1 Mechanical Dimensions

Table 1. Mechanical Dimensions.

Unit	Width (mm)	Depth (mm)	Height (mm)
Cabinet incl. base frame	600	400	1350
Cabinet	600	400	1300
Base frame*)	600	400	50

*) The Base Frame is mandatory.

3.2 Weight

Table 2. Weight.

Unit	Weight (kg)
Fully equipped cabinet excl. base frame	170

3.3 Power Requirements

Table 3. Power Requirements.

Power Option
-[48/60] VDC (range -39 – -72 V DC)
+24 VDC (range 20.5 – 29 V DC)
120-250 VAC

3.4 Power Consumption

The maximum operating power consumption for RBS 2207 is 750 W typical / 1100 W maximum (DC power with 6 TRX).

When the integrated 1200 W PSU-s are used for battery charging, the maximum power, on the AC side, can temporarily rise to 2700 W.

3.5 Colour

Table 4. Colour.

Colour	Reference Number	Ericsson Number
White	NCS 1002-R	MZY 38320/985

3.6 Electromagnetic Compatibility (EMC)

All RBS 2207 models fulfils the Electromagnetic Compatibility (EMC) requirements according to:

- ETS 300 342-2, the BTS product standard, in line with the European EMC Directive 89/336/EEC.
- 1999/5/EC Radio and TTE directive.
- EN 55022 Class B.
- GSM:11.21
- FCC, part 15.

The RBS 2207 has CE and FCC labels to show this compliance.

3.7 Acoustical Noise

The maximum sound level for RBS 2207 operating at 40 °C ambient temperature is < 60 dB(A), 1 metre in front of the cabinet.

3.8 External Alarms

RBS 2207 provides connections for external alarms. The external alarms are defined by the customer and are reported to the BSC via LAPD signalling on the A-bis O&M interface.

There are 16 external alarms available (unoccupied). The external alarms are defined by using the Operation and Maintenance Terminal (OMT) or the Remote OMT. The external device sets the alarm by either an open or closed condition.

3.9 Battery Backup

Battery backup is available in an external cabinet, BBS 2000, providing desired backup time (up to more than 12 hours).

In the external battery cabinet a Battery Fuse Unit, BFU, is installed. The BFU supervises and connects/disconnects the batteries at low voltage. It is possible to supply external transmission equipment outside the RBS 2207 with power from the system voltage (+24 VDC). This can be only be provided from the battery backup (prioritised supply). It is possible to share battery backup between RBS 2207 and RBS 2206/2202/200.

3.10 Transmission

All RBS 2000 models support multi-drop bypass functionality. Each RBS can be configured for stand alone or linear cascade mode. The configuration is performed by means of the OMT.

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

The RBS 2207 cabinet is equipped with two external ports supporting in total up to 4 Mbit/s.

Interfaces

T1, 1.5 Mbits/s, 100 Ohm

E1, 2 Mbit/s, 120 Ohm

E1, 2 Mbit/s, 75 Ohm (optional adapter required)

The interfaces are supported on the same physical ports.

Connections

E1/120 Ohm and T1/100 Ohm is connected to the RBS 2207 cabinet via a 15-pin DSUB connector. E1/75 Ohm is connected to the RBS 2207 via an adapter that includes an impedance converter with BNC connectors.

E1/120 Ohm and T1/100 Ohm transmission supports Long Haul. E1/G.703 and T1/DS1 offer multi vendor compatibility on the transmission level. Normally E1/G.703 and T1/DS1 only offers short haul interfaces, enabling distances up to 6 dB loss. The long haul feature allows for 30 dB loss and a more cost efficient transmission network configuration.

Coaxial connection (75 Ohm) is only available for E1 operation and does not support long haul. The distance allowed between units is determined by the cable loss, according to the 6 dB receiver sensitivity specified in G.703.

3.11 Other Requirements

Product Safety

The RBS 2207 shall, in accordance with the Low Voltage Directive (LVD) 73/23/EEC and the CE marking amendment directive 93/68/EEC valid within for European Union, comply with the following requirements regarding product safety:

- EN 60 950/IEC 60 950
- EN 60 215/IEC 60 215
- EN 60 529/IEC 60 529

The RBS 2207 is also designed to fulfil the following safety standards valid for North America:

- UL 1950, 3rd Edition, "Information Technology Equipment Including Electrical Business Equipment"
- CSA C22.2 No. 950-95, "Safety of Information Technology Equipment Including Electrical Business Equipment"
- CSA 22.2 No. 1-M94, "Audio, Video and Small Electronic Equipment"

The RBS 2207 has CE and FCC labels to show this compliance.

Environmental Requirements

The requirements for climatic/mechanical environment are based on ETSI standard ETS 300 019 Classification of Environmental Conditions and IEC 721.

Storage Requirements

The RBS 2206 complies with ETS class 1.2 Weather Protected, Not Temperature Controlled Storage Locations in ETS 300 019-1-1.

Transportation Requirements

The RBS 2207 complies with ETS class 2.3 Public Transportation in ETS 300 019-1-2.

Earthquake Protection

The RBS 2207 is designed to fulfil earthquake protection according to IEC 68-2-57.

In-Use Requirements

The RBS 2206 is designed for normal operation in the climate conditions of class 3.1 of IEC 721-3-4 (ETS 300 019-1-4).

Temperature range: +5 °C to +40 °C, Relative humidity: 5 to 85 %.

4 GSM 800 Radio Specification

The operating specifications of the radio equipment will in most cases exceed the performance requirements specified in the GSM Technical Specifications

4.1 System Data

Receiver:	824 to 849 MHz
Transmitter:	869 to 894 MHz
Carrier bandwidth:	200 kHz
Channels per carrier:	8 full rate channels
Modulation method:	GMSK, EDGE (The EDGE dTRU handles both GMSK and 8-PSK)
Duplex Separation:	45 MHz

The RBS output power is dynamically controlled. The control range is 30 dB in 2 dB steps including the configuration steps from maximum output.

4.2 GSM 800 Configurations

Table 5. Configurations with dTRUs operating in uncombined mode.

TRX config.	No. of cabinets	TMA	Number of CDUs	Number of dTRUs	Number of Antennas ¹
1x2	1	Opt.	1	1	(1)
2x2	1	Opt.	2	2	(1)(1)
3x2	1	Opt.	3	3	(1)(1)(1)
1+1	1	Opt.	2	1	(1)(1)
1+1+2	1	Opt.	3	2	(1)(1)(1)

In the 1+1 and 1+1+2 configurations one dTRU is used to give support for two sectors with one TRX per sector. One dTRU is used for the 1+1 configuration and two dTRU for the 1+1+2 configuration.

Table 6. Configurations with with dTRUs operating in TCC mode.

TRX config.	No. of cabinets	TMA	Number of CDUs	Number of dTRUs	Number of Antennas ¹
1x2	1	Opt.	1		(1)
2x2	1	Opt.	2		(1)(1)
3x2	1	Opt.	3		(1)(1)(1)

¹ The number of antennas are for physical antennas for configurations where cross-polarised antennas are used. Double the number of antennas for single polarisation antennas.

5 GSM 900 Radio Specification

The operating specifications of the radio equipment will in most cases exceed the performance requirements specified in the GSM Technical Specifications.

5.1 System Data

Receiver:	880 to 915 MHz (E-GSM)
Transmitter:	925 to 960 MHz (E-GSM)
Carrier bandwidth:	200 kHz
Channels per carrier:	8 full rate channels
Modulation method:	GMSK, EDGE (The EDGE dTRU handles both GMSK and 8-PSK)
Duplex Separation:	45 MHz

The RBS output power is dynamically controlled. The control range is 30 dB in 2 dB steps including the configuration steps from maximum output.

5.2 GSM 900 Configurations

Table 7. Configurations with dTRUs operating in uncombined mode.

TRX config.	No. of cabinets	TMA	Number of CDUs	Number of dTRUs	Number of Antennas ¹
1x2	1	Opt.	1	1	(1)
2x2	1	Opt.	2	2	(1)(1)
3x2	1	Opt.	3	3	(1)(1)(1)
1+1	1	Opt.	2	1	(1)(1)
1+1+2	1	Opt.	3	2	(1)(1)(1)

In the 1+1 and 1+1+2 configurations one dTRU is used to give support for two sectors with one TRX per sector. One dTRU is used for the 1+1 configuration and two dTRU for the 1+1+2 configuration.

Table 8. Configurations with with dTRUs operating in TCC mode.

TRX config.	No. of cabinets	TMA	Number of CDUs	Number of dTRUs	Number of Antennas ¹
1x2	1	Opt.	1		(1)
2x2	1	Opt.	2		(1)(1)
3x2	1	Opt.	3		(1)(1)(1)

¹ The number of antennas are for physical antennas for configurations where cross-polarised antennas are used. Double the number of antennas for single polarisation antennas.

6 GSM 1800 Radio Specification

The operating specifications of the radio equipment will in most cases exceed the performance requirements specified in the GSM Technical Specifications.

6.1 System Data

Receiver:	1710 to 1785 MHz
Transmitter:	1805 to 1880 MHz
Carrier bandwidth:	200 kHz
Channels per carrier:	8 full rate channels
Modulation method:	GMSK, EDGE (The EDGE dTRU handles both GMSK and 8-PSK)
Duplex Separation:	95 MHz

The RBS output power is dynamically controlled. The control range is 30 dB in 2 dB steps including the configuration steps from maximum output power.

6.2 GSM 1800 MHz Configurations

Table 9. Configurations with dTRUs operating in uncombined mode.

TRX config.	No. of cabinets	TMA	Number of CDUs	Number of dTRUs	Number of Antennas ¹
1x2	1	Opt.	1	1	(1)
2x2	1	Opt.	2	2	(1)(1)
3x2	1	Opt.	3	3	(1)(1)(1)
1+1	1	Opt.	2	1	(1)(1)
1+1+2	1	Opt.	3	2	(1)(1)(1)

In the 1+1 and 1+1+2 configurations one dTRU is used to give support for two sectors with one TRX per sector. One dTRU is used for the 1+1 configuration and two dTRU for the 1+1+2 configuration.

Table 10. Configurations with with dTRUs operating in TCC mode.

TRX config.	No. of cabinets	TMA	Number of CDUs	Number of dTRUs	Number of Antennas ¹
1x2	1	Opt.	1		(1)
2x2	1	Opt.	2		(1)(1)
3x2	1	Opt.	3		(1)(1)(1)

¹ The number of antennas are for physical antennas for configurations where cross-polarised antennas are used. Double the number of antennas for single polarisation antennas.

7 GSM 1900 Radio Specification

The operating specifications of the radio equipment will in most cases exceed the performance requirements specified in the GSM Technical Specifications.

7.1 System Data

Receiver:	1850 to 1910 MHz
Transmitter:	1930 to 1990 MHz
Carrier bandwidth:	200 kHz
Channels per carrier:	8 full rate channels
Modulation method:	GMSK, EDGE (The EDGE dTRU handles both GMSK and 8-PSK)
Duplex Separation:	80 MHz

The RBS output power is dynamically controlled. The control range is 30 dB in 2 dB steps including the configuration steps from maximum output power.

7.2 GSM 1900 MHz Configurations

Table 11. Configurations with dTRUs operating in uncombined mode.

TRX config.	No. of cabinets	TMA	Number of CDUs	Number of dTRUs	Number of Antennas ¹
1x2	1	Opt.	1	1	(1)
2x2	1	Opt.	2	2	(1)(1)
3x2	1	Opt.	3	3	(1)(1)(1)
1+1	1	Opt.	2	1	(1)(1)
1+1+2	1	Opt.	3	2	(1)(1)(1)

In the 1+1 and 1+1+2 configurations one dTRU is used to give support for two sectors with one TRX per sector. One dTRU is used for the 1+1 configuration and two dTRU for the 1+1+2 configuration.

Table 12. Configurations with with dTRUs operating in TCC mode.

TRX config.	No. of cabinets	TMA	Number of CDUs	Number of dTRUs	Number of Antennas ¹
1x2	1	Opt.	1		(1)
2x2	1	Opt.	2		(1)(1)
3x2	1	Opt.	3		(1)(1)(1)

¹ The number of antennas are for physical antennas for configurations where cross-polarised antennas are used. Double the number of antennas for single polarisation antennas.

8 Abbreviations

ACCU	AC Connection Unit
AO	Application Object
BCCH	Broadcast Control Channel
BDM	Battery Distribution Module
BFU	Battery Fuse Unit
BSC	Base Station Controller
BSS	Base Station System
BTS	Base Transceiver Station
CDU	Combining and Distribution Unit
CXU	Configuration Switch Unit
dB	Decibel
dBm	Decibel relative to 1 milliwatt
DCCU	DC Connection Unit
DTX	Discontinuous Transmission
DUPL	Duplex
DXU	Distribution Switch Unit
DXX	digital cross-connect
EACU	External Alarm Connection Unit
ECU	Energy Control Unit
ECSD	EDGE Circuit Switched Data
EDGE	Enhanced Data rates for Global Evolution
EGPRS	EDGE GPRS
EMC	Electromagnetic Compatibility
FCOMB	Filter Combiner
FCU	Fan Control Unit
GMSK	Gaussian Minimum Shift Keying
GPRS	General Packet Radio Services
GSM	Global System for Mobile Communications
HCOMB	Hybrid Combiner
HCS	Hierarchical Cell Structure
HSCSD	High Speed Circuit Switched Data
HW	Hardware
IDB	Installation Data Base
IDM	Internal Distribution Module
IRC	Interference Rejection Combining
kbit/s	kilobits per second
kg	kilogram
kW	kilowatt
L	Litres
lb	pound
LAPD	Link Access Protocol on D-channel
LED	Light Emitting Diode
LTE	Line Transmission Equipment
Mbit/s	Megabit per second
MCU	Measuring Coupler Unit
mm	millimetre
MMI	Man Machine Interface
MO	Managed Object
MS	Mobile Station
NMC	Network Management Centre

O&M	Operation and Maintenance
OML	Operation and Maintenance Link
OMT	Operation and Maintenance Terminal
OS	Operating System
OSS	Operation Support System
PC	Personal Computer
PCM	Pulse Code Modulation
PSK	Phase Shift Keying
PSTN	Public Switched Telephone Network
PSU	Power Supply Unit
RBS	Radio Base Station
RX	Receiver
RF	Radio Frequency
RSL	Radio Signalling Link
RU	Replaceable Unit
RXBP	Receiver Band Pass Filter
RXD	Receiver Divider
RXDA	Receiver Divider Amplifier
SDCCH	Stand Alone Dedicated Control Channel
SO	Service Object
STC	Signalling Terminal Central
TCH	Traffic Channel
TG	Transceiver Group
TDMA	Time Division Multiple Access
TMA	Tower Mounted Amplifier
TRU	Transceiver Unit
TS	Time Slot
TX	Transmitter
TXBP	Transmitter Band Bass Filter
VAC	Volts, Alternating Current
VDC	Volts, Direct Current
VSWR	Voltage Standing Wave Ratio
W	Watt