Base Station System

Chapter 7

This chapter is designed to provide the student with an overview of the base station system. It addresses base station system components, their functions, features, and required specifications.

OBJECTIVES:

Upon completion of this chapter the student will be able to:

- Explain that the BSC controls the radio resources for the RBS
- Outline the main working functions of a BSC, TRC and RBS
- Outline that an RBS contains a transmitter and a receiver and is the interface towards the MS
- Describe briefly the 3 different positioning methods available with Flexible Positioning Support

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7 Base Station System

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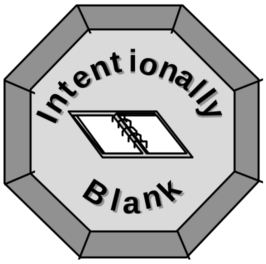
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INTRODUCTION

The Base Station System (BSS) is responsible for all the radio-related functions in the system, such as:

- Radio communication with the mobile units
- Handover of calls in progress between cells
- Management of all radio network resources and cell configuration data.

Ericssons BSS consists of three components:

- **Base Station Controller (BSC):** the BSC is the central node within a BSS and co-ordinates the actions of TRCs and RBSs.
- **Transcoder Controller (TRC):** the TRC provides the BSS with rate adaptation capabilities. This is necessary because the rate used over the air interface and that used by MSC/VLRs are different - 33.8 kbits/s and 64 kbits/s respectively. A device, which performs rate adaptation is called a transcoder.
- **Radio Base Station (RBS):** an RBS acts as the interface between MSs and the network, by providing radio coverage functions from their antennae.

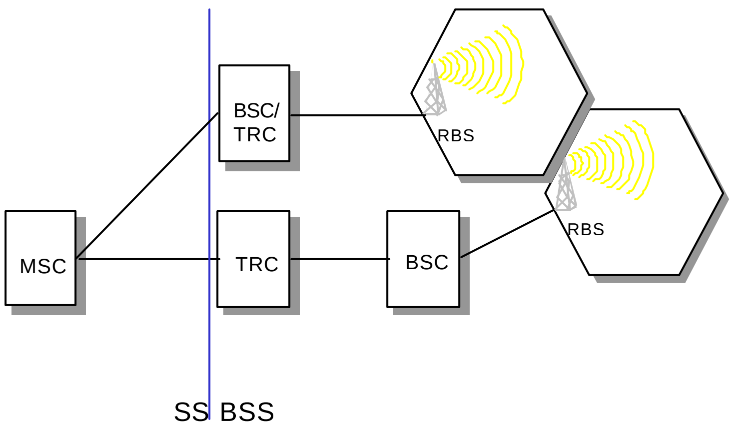


Figure 7-1 BSS in Ericssons GSM systems

BASE STATION CONTROLLER AND TRANSCODER CONTROLLER

The Ericsson BSC product family consists of a combined BSC/TRC and a remote BSC (without transcoders). The transcoders are pooled, meaning they can be allocated on demand – Full rate, Half rate, Enhanced Full Rate, AMR (Adaptive Multi Rate) Full Rate or AMR Half Rate.

There two main options available for implementing the TRC and BSC in Ericssons BSS:

- **BSC/TRC:** a combined BSC and TRC on the same AXE. This is suitable for medium and high capacity applications, e.g. urban and suburban area networks. The node can handle up to 1,020 transceivers (TRXs). 15 remote BSCs can be supported from one BSC/TRC.
- **Stand-alone BSC and stand-alone TRC:** the stand-alone BSC (without transcoders) is optimized for low and medium capacity applications and is a complement to the BSC/TRC, especially in rural and suburban areas. It caters for up to 500 TRXs. The stand-alone TRC is located at the MSC/VLR to increase transmission efficiency. A stand-alone TRC can support 16 remote BSCs.

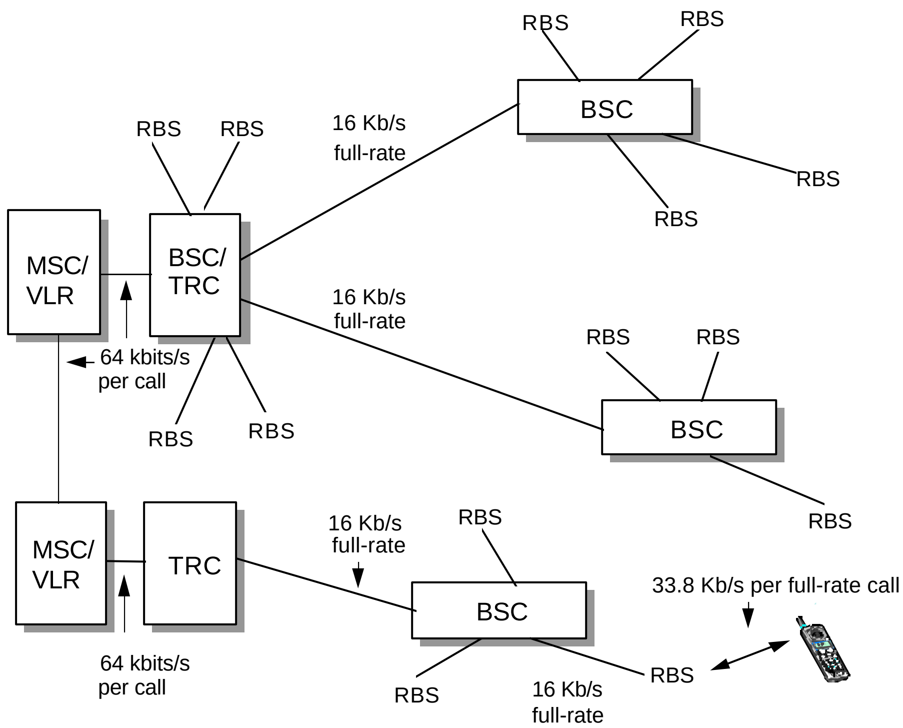


Figure 7-2 TRC utilization and transmission rates in BSS

RADIO BASE STATIONS

Ericsson's Radio Base Station (RBS) 2000 series of base stations implements the GSM-defined BTS. This includes the following RBSs:

- RBS 2101
- RBS 2102
- RBS 2103
- RBS 2202
- RBS 2205
- RBS 2301
- RBS 2302
- RBS 2302 MAXITE
- RBS 2401

Ericsson's RBS 3000 series implements the BTS for UMTS otherwise known as WCDMA systems.

OTHER ACCESS NETWORK EQUIPMENT AND ENHANCERS

☞ Did you know?

In Sweden, all three of the mobile network operators are working with the national rail company to ensure coverage for travellers. This involves placing an antenna on top of the train and a leaky cable running within the length of the train.

Many mobile networks include additional equipment and solutions to provide improved coverage and capacity. Examples include:

- **Repeaters:** these are placed in locations throughout the access network to repeat the digital signal from the MS and BTS. This helps to reduce the BER (Bit Error Rate) and thus provide better quality calls to subscribers. A typical location for a repeater may be on top of a building

- **Leaky cable:** this is simply a cable carrying the electromagnetic energy, which has "holes" in it to leak out this radio signal at regular intervals. This may be suitable in areas which are difficult to cover using traditional base station equipment. For example, a leaky cable could be used to provide coverage within an underground train system

- **Cell Capacity Enhancers:** the capacity of a cell (sector) is determined by the number of traffic channels available, which means the number of transceivers that can be configured in a cell is very important. The frequency reuse determines how many transceivers it is feasible to have in a cell. Thus the tighter the frequency reuse, the more transceivers you can allocate in a cell.

- **Network Capacity Enhancers:** To be able to use the capacity available in all cells to its maximum extent, without sacrificing network availability (Grade of Service), is the essential issue when talking about network capacity. Ericsson's Multi- Layered Hierarchial Cell Structure (HCS) is a good example of such a traffic management function.

- **Channel Capacity Enhancers:** Channel capacity enhancers help when defining the capacity of a GSM timeslot. Normally the full timeslot is used for one subscriber (Full Rate), but by allowing two subscribers to share one timeslot (Half Rate), the capacity can be increased.

TRANSCODER CONTROLLER (TRC)

TRC FUNCTIONS

The primary functions of a TRC are to perform transcoding and to perform rate adaptation.

Transcoding

As previously explained, the function of converting from the PCM coder information (following A/D conversion) to the GSM speech coder information is called transcoding. This function is present in both the MS and the BSS.

Rate Adaptation

Rate adaptation involves the conversion of information arriving from the MSC/VLR at a rate of 64 kbits/s to a rate of 16 kbits/s, or transmission to a BSC (for a full rate call). These 16 kbits/s contains 13 kbits/s of traffic and 3 kbits/s of inband signaling information.

This is an important function. Without rate adaptation the links to the BSC would require four times the data rate capabilities. Such transmission capabilities form an expensive part of the network. By reducing the rate to 16 kbits/s, it is possible to use one quarter of the transmission links and equipment.

In Ericssons GSM systems, the TRC contains units, which perform transcoding and rate adaptation. These hardware units are called Transcoder and Rate Adaptation Units (TRAUs).

All TRAUs are pooled, meaning that any BSC connected to the TRC can request the use of one of the TRAUs for a particular call.

The TRC also supports discontinuous transmission. If pauses in speech are detected, comfort noise is generated by the TRAU in the direction of the MSC/VLR.

In GSM mobile systems, the transcoder (TRA) is located in the GSM/BSS. AMR is a new speech codec type, transcoder device defined for GSM. It consists of a number of different codecs which together with the associated channel coding has been optimized for different radio environments.

By using between different codecs as the radio environment changes a significant improvement in speech quality is possible. The same AMR codec has also been specified for use in WCDMA systems. This will guarantee similar speech quality in both GSM and WCDMA systems.

TRC IMPLEMENTATION

☞ Did you know?

In previous versions of Ericssons GSM systems the TRC did not exist. Its functions were included as part of the BSC. This has been changed to reduce the data rate between the MSC and BSC sites, thus reducing transmission network costs.

The TRC is implemented on the AXE platform consisting of standard APZ and APT subsystems and the following APT subsystems:

Subsystem	Functions
ROS: Radio Operation and maintenance Subsystem	Transmission network management
RTS: Radio Transmission and transport Subsystem	TRAU Handling

Table 7-1 BSC Subsystems

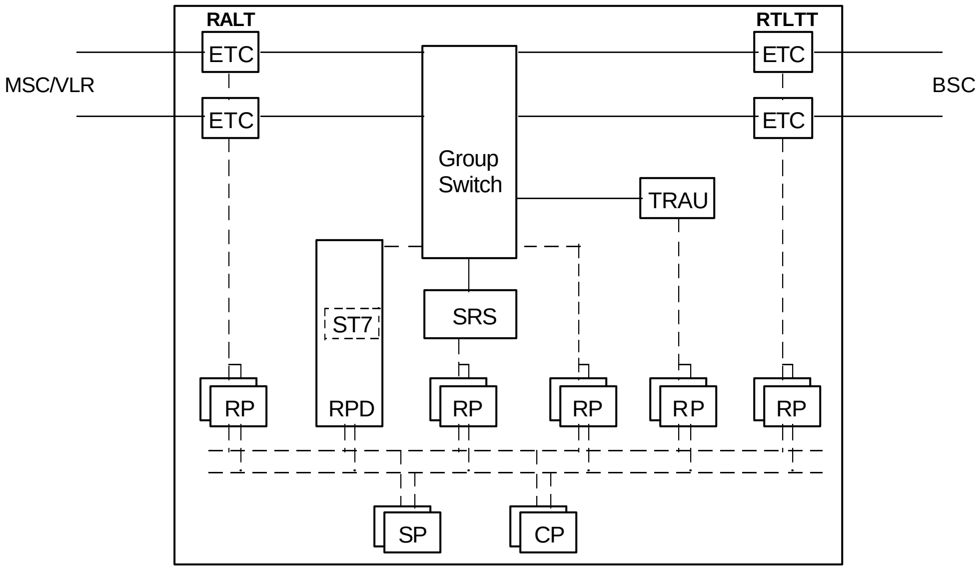


Figure 7-3 TRC hardware configuration

The hardware that is specific to the TRC is:

- Transcoder and Rate Adapter Unit (TRAU)

BASE STATION CONTROLLER (BSC)

BSC FUNCTIONS

☞ Did you know?

During the initial specification of GSM, the radio-related functions were intended to be included in the MSC. However, the increasing complexity of the GSM radio system led to the requirement for more dedicated radio intelligence.

The BSC controls a major part of the radio network. Its most important task is to ensure the highest possible utilization of the radio resources. The BSC may be implemented on the AXE 10 platform or the new AXE 810 platform.

The parts of the AXE 810 that will be used in the BSC are the new APT devices, APT1.5, and new IO system called APG40. Together with the APZ 212 25 and the APZ 212 30, which are used as central processors, they make up the new BSC/TRCs and remote BSCs.

The main functional areas of the BSC are:

- Radio Network Management
- RBS Management
- Multi Band Support
- TRC Handling
- Transmission Network Management
- Internal BSC Operation and Maintenance
- Positioning Services
- Handling of MS connections
- GSM-UMTS Cell Reselection and Handover

Radio Network Management

Radio network management includes the following tasks:

- **Administration of radio network data** including:

  _ Traffic Management (e.g. TCHs in GSM, PDCHs in GPRS as there will be a hardware component PCU, Packet Control Unit and software upgrade in the BSC to support packet switched traffic)

  – Cell Description Data (e.g. cell identity, BCCH channel number, maximum and minimum output powers in the cell, RBS type, etc.)

- System information data (e.g. information about whether or not the cell is barred from access, maximum output power allowed in the cell, BCCH channel identities in neighboring cells)
- Locating data (e.g. cell rank used in HCS and high traffic load situations)
- Cell load sharing data, i.e. parameters for forcing early handovers from congested cells, GSM/WCDMA handovers.

- **Traffic and event measurements:** (e.g. number of call attempts, congestion, traffic levels for a cell, traffic levels for an MS, number of handovers, number of dropped connections, etc.).
- **Idle channel measurement:** the RBS collects statistics from the MSs about signal strength and quality. These statistics are then used during the channel allocation process, so that a channel with low interference is allocated for a call.

RBS Management

Ericsson's RBS implementation is transceiver-orientated, ensuring good redundancy features. This means that as little as possible of the equipment is common to several transceivers.

This philosophy inevitably leads to a master slave relationship between the BSC and the transceivers in the RBS. A logical model of the RBS is built up within the BSC and RBS equipment can be logically defined, connected and disconnected.

The main tasks of RBS management are:

- **RBS configuration:** this involves the allocation of frequencies to channel combinations and power levels for each cell according to available equipment. If equipment becomes faulty causing the loss of important channels, reconfiguration of the remaining equipment is activated, sacrificing less important channels.
- **RBS software handling:** this involves the control of program loads.
- **RBS equipment maintenance:** RBS faults and disturbances are recorded and logged continuously.

Multi Band Support

The Multi Band BSC feature allows the operator to define a mixed BSC that is capable of handling BTS equipment from more than one frequency.

Previously the BSC was capable of handling BTSs on the 900, 1800 and 1900 frequency bands. Now support of TRUs (Transceiver Unit) on the GSM 800 frequency band is also added.

TRC Handling

Although TRAUs are located in a TRC, the BSC, as controller of the radio resources of a GSM network, actually co-ordinates the sourcing of a TRAU for a call.

During call set-up, the BSC instructs the TRC to allocate a TRA device to the call. If one is available, the TRC confirms the allocation of a TRA device. The TRA device is considered to be under the control of the BSC for the duration of the call.

Transmission Network Management

The transmission network for a BSC includes the links to and from MSC/VLRs and RBSs. This involves the following tasks:

- **Transmission interface handling:** this provides functions for administration, supervision, test and fault localization of the links to RBSs. The BSC configures, allocates and supervises the 64 kbits/s circuits of the PCM links to the RBS. It also directly controls a remote switch in the RBS that enables efficient utilization of the 64 kbits/s circuits.
- **High Speed Signalling link**: This feature provides enhanced C7 signalling capacity for the A interface (BSC-MSC) and A-ter interface (BSC-TRC).

Internal BSC Operation and Maintenance

Operation and maintenance tasks can be performed locally in the BSC or remotely from the OSS. Internal BSC operation and maintenance involves the following features:

- **TRH maintenance:** administration, supervision and test of the TRansceiver Handler (TRH) is carried out in the BSC. The TRH consists of both hardware and software. A TRH is located on a

Regional Processor for the Group switch (RPG). One RPG thus serves several transceivers. There can be several RPGs in the BSC.

- **Processor load control in the BSC:** this function ensures that during processor overload situations, a large number of calls can still be handled by the BSC. If too many calls are accepted, real time requirements such as call set-up times can not be fulfilled. To prevent this, some calls need to be rejected in situations of high load. Calls already accepted by the system are given full service and are not affected by the overload situation.

Handling of MS Connections

Call Set Up

Call set up involves the following processes:

- **Paging:** the BSC sends paging messages to the RBSs defined within the desired LA. The load situation in the BSC is checked before the paging command is sent to the RBS.
- **Signaling set-up:** during call set-up, the MS connection is transferred to an SDCCH allocated by the BSC. If the MS initiated the connection, the BSC checks its processor load before the request is further processed.
- **Assignment of traffic channel:** after SDCCH assignment, the call set-up procedure continues with the assignment of a TCH by the BSC. As this takes place, the radio channel supervision functions in the BSC are informed that the MS has been ordered to change channels. If all TCHs in the cell are occupied an attempt can be made to utilize a TCH in a neighboring cell.

During a Call

The main BSC functions during a call are:

- **Dynamic power control in MS and RBS:** the BSC calculates adequate MS and BTS output power based on the received measurements of the uplink and downlink. This is sent to the BTS and the MS every 480 ms to maintain good connection quality.
- **Locating:** This function continuously evaluates the radio connection to the MS, and, if necessary, suggests a handover to another cell. This suggestion includes a list of handover candidate cells. The decision is based on measurement results from the MS and BTS. The locating process is being executed in the BSC.

- **Handover:** if the locating function proposes that a handover take place, the BSC then decides which cell to handover to and begins the handover process.

  If the cell belongs to another BSC, the MSC/VLR must be involved in the handover. However, in a handover, the MSC/VLR is controlled by the BSC. No decision making is performed in the MSC because it has no real time information about the connection.

- **Frequency Hopping:** two types of hopping are supported by the BSC:
  - Baseband hopping: this involves hopping between frequencies on different transceivers in a cell
  - Synthesizer hopping: this involves hopping from frequency to frequency on the same transceiver in a cell

GSM-UMTS Cell Reselection and Handover

This feature allows end-users with multi Radio Access Technology (RAT), namely GSM and WCDMA (Wideband Code Division Multiple Access) capable mobile phones to roam between networks. The mobile user can change between the WCDMA RAN (Radio Access Network) and the GSM radio access network without loss of service (provided the service is supported in both networks). It gives support for mobility in idle mode, for handover of circuit switched connections (GSM to WCDMA RAN and vice versa), and for cell reselection/updates for packet based service.

- Cell reselection is the work of the MS to move smoothly between cells, and attach to the best cell. The reselection is done according to standardized procedures and based on broadcast parameters. The BSS broadcasts necessary information about WCDMA neighbors to make it possible for the MS to reselect a WCDMA cell. By setting thresholds, the MS can be directed to the preferred system.

FLEXIBLE POSITIONING SUPPORT

With Flexible Positioning Support it is possible to launch a large number of applications. Some examples are fleet management, positioning of emergency calls and access to localized services. The BSC provides positioning information to the Service Mobile Positioning Center (SMPC). All mobiles can be positioned both indoors and outdoors, wherever there is GSM coverage. The operator can easily launch new positioning based services to their entire subscriber base.

Three different methods of positioning are supported:

- CGI+TA uses Cell Global Identity (CGI) and Timing Advance (TA) to retrieve the position. This method gives a location estimate with an accuracy of 300-500m. CGI+TA is mobile assisted which means that most of the calculating is done in the network.

- A-GPS (Assisted Global Positioning System) uses the GPS service to retrieve positioning information. The method uses satellite to give a location estimate with an accuracy 5-15m. It requires that the MS have an integrated GPS receiver. A-GPS is mobile based, which means that the calculation of the co-ordinates is done in the MS.

E-OTD (Enhanced Observed Time-Difference) is based on the measured arrival of bursts to nearby pairs of BTSs. The MS measures the OTD. Synchronisation, normal and dummy bursts can be measured on. Since BTS transmission frames are not synchronised, the network must measure the RTD (Relative Time Difference) between bursts from different BTS's. This is done by LMUs (Location Measurement Units). One LMU is required on approximately every third to fifth BTS. To obtain accurate triangulation, OTD and RTD measurements are needed for at least three distinct BTS pairs (three BTSs). Based on the measured OTD values, the location of the MS can be calculated in the network or by the MS itself. The time difference in signals from each base station allows for accurate triangulation and positioning. Accuracy is about 60m in rural areas and 200m in built up urban areas.

BSC IMPLEMENTATION

The BSC is implemented on a non-AM-based AXE platform consisting of standard APZ and APT subsystems and the following APT subsystems:

Subsystem	Functions
RCS: Radio Control Subsystem	• Radio network management • Handling of MS connections
ROS: Radio Operation and maintenance Subsystem	• Transmission network management • Internal BSC operation and maintenance
RTS: Radio Transmission and transport Subsystem	• TRC Handling
TAS: Transceiver Administration Subsystem	• RBS Management
LHS: Link Handling Subsystem	• Transmission network management

Table 7-2 BSC Subsystems

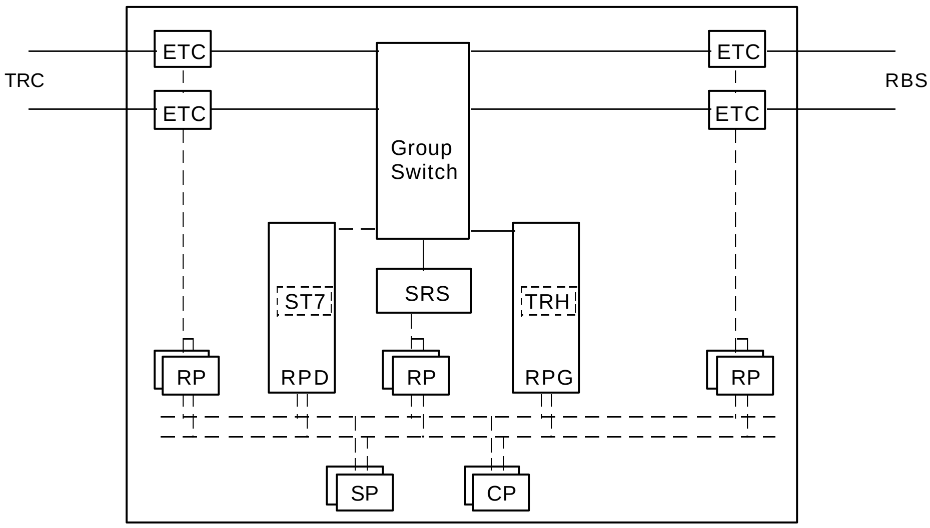


Figure 7-4 BSC hardware configuration

The hardware that is specific to the BSC is:

- Regional Processor for the Group switch (RPG)/TRansceiver Handler (TRH)

BSC/TRC

It is possible to combine the functions of the TRC and BSC in one AXE-based node.

The subsystems in a BSC/TRC are the same as those used in a stand-alone BSC.

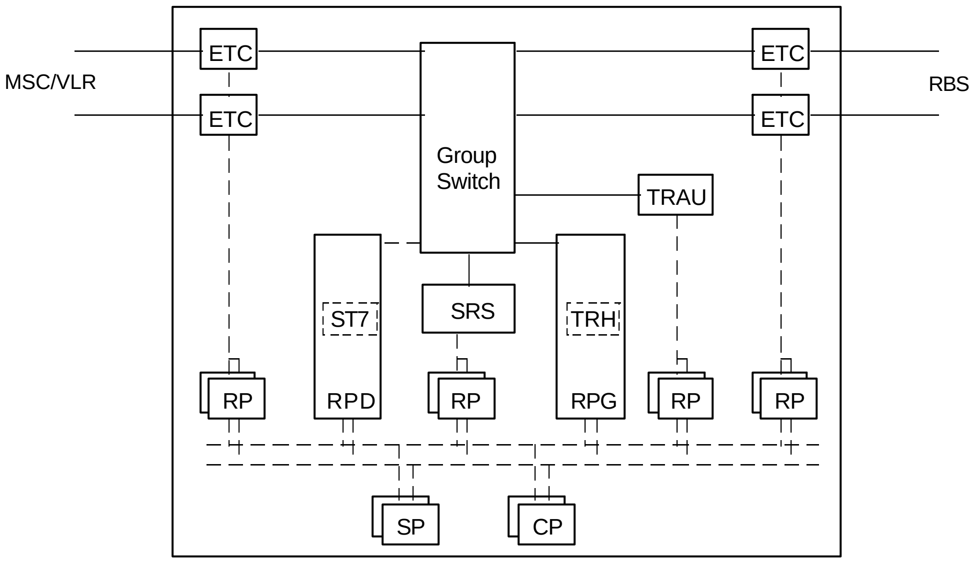


Figure 7-5 BSC/TRC hardware configuration

The hardware that is specific to the BSC/TRC is:

- RPG/TRH
- TRAU

RADIO BASE STATION (RBS)

RBS INTRODUCTION

An RBS includes all radio and transmission interface equipment needed on site to provide radio transmission for one or several cells.

The RBS 2000 family is Ericsson's second generation of RBS offering products with a low total lifetime cost[1]. This is achieved by functions including long Mean Time Between Failure (MTBF) performance and short Mean Time To Repair (MTTR). In addition, this product line is quick and easy to install thus giving the possibility to achieve a rapid network roll out.

RBS 2000 provides products for both indoor and outdoor installations and is available for GSM 900, GSM 1800 and GSM 1900.

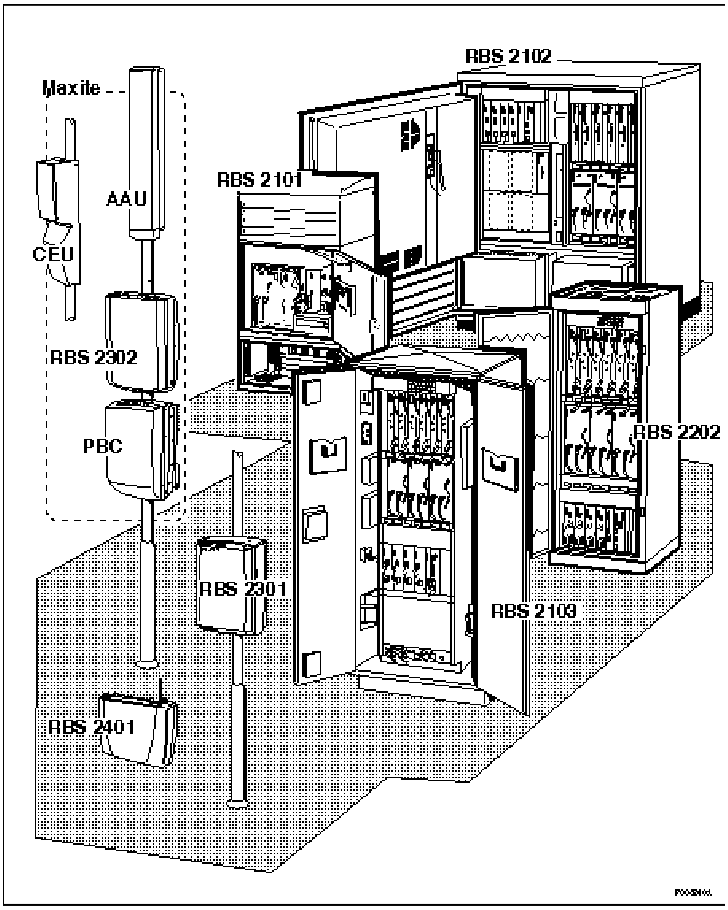


Figure 7-6 Examples of the RBS 2000 series

[1] Ericssons first generation of RBS for GSM was called the RBS 200 series

RBS FUNCTIONS

RBS functionality can be divided into the following areas:

- Radio resources
- Extended Cell Range
- Signal processing
- Signaling link management
- Synchronization
- Local maintenance handling
- Functional supervision and testing
- Increased capacity on Abis

Radio Resources

An RBSs main function is to provide connection with the MSs over the air interface. This includes the following tasks:

- **Configuration and system start:** site configuration involves loading of software from the BSC and setting parameters prior to system startup, including:
  - Transmitter and receiver frequencies
  - Maximum output power
  - Base Station Identity Code (BSIC)
- **Radio transmission:** to transmit several frequencies using the same antenna, a combiner or sets of combiners are needed. An RBS can have an extended cell range up to 121km. Transmission power is controlled from the BSC.
- **Radio reception:** in addition to reception of traffic on the physical channels, a primary RBS function the detection of channel requests from MSs (e.g. when a call is being made).

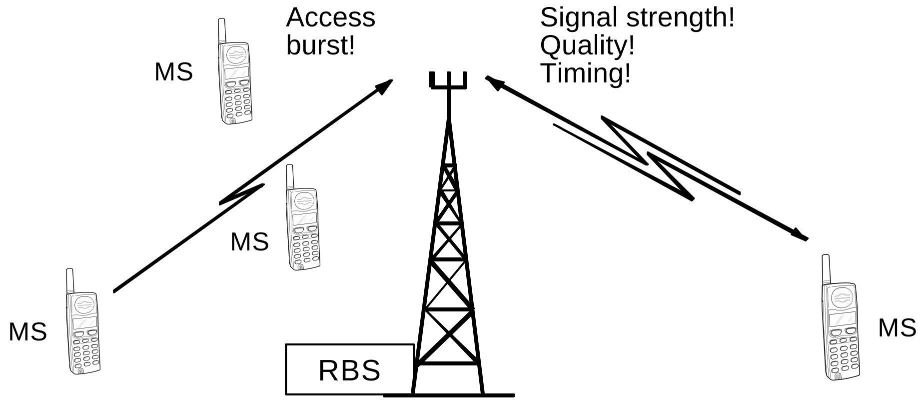


Figure 7-7 The RBS listening for channel requests and measuring the uplink on an established connection

Extended Cell Range

The purpose of extended cell range is to provide the possibility to carry traffic at a distance from the Base Station that is larger than the normal GSM limit of 35km. It is suitable for sparsely populated areas with low transmission loss such as deserts, coastal areas, maritime environments etc. The gain in cell radius is at the expense of capacity due to the reduction of the available channels by 50%. Extended cell range provides a radius of up to 121km. The 121km range is available for the existing RBS 2000 macro cabinets (RBS 2202, 2102, 2101) and with the dTRU that is used in the RBS 2206.

Signal Processing

An RBS is responsible for the processing of signals before transmission and after reception. This includes:

- Ciphering using the ciphering key
- Channel coding and interleaving
- Adaptive equalization
- Realization of diversity
- Demodulation

Signaling Link Management

An RBS manages the signaling link between the BSC and MS, applying the appropriate protocols to the information being sent.

Synchronization

Timing information is extracted from the PCM-links from the BSC and is sent to a timing module within the RBS. This enables the RBS to synchronize with the correct frequency reference and TDMA frame number.

Local Maintenance Handling

An RBS enables operation and maintenance functions to be carried out locally at the RBS site, without BSC connection. In this way, field technicians can maintain RBS equipment and software on site.

Functional Supervision and Testing

Supervision and testing of RBS functions is supported, using either built-in tests during normal operation or tests executed by command.

Increased Capacity on Abis

This feature increases transmission capacity between the Base Station Controller (BSC) and the BTS. This increase in capacity is achieved by the introduction of the new high capacity BTS platform, DXU21 in the RBS2000. The DXU supports four PCM inlets hence doubling the transmission capacity over the A-bis interface. This improved throughput will be most significant in order to support higher data rates for packet switching.

RBS 2000 IMPLEMENTATION

All types of RBS within the RBS 2000 series have the following characteristics:

- Support for user flexibility by providing modular hardware and software designs.
- Transceiver oriented design, which stresses using as little common equipment as possible ensuring dependable performance.
- Design and use are aimed at keeping system life cycle costs low.

The RBS 2000 series is based on standardized hardware units called Replaceable Units (RU). The major RUs are:

- Distribution switch Unit (DXU)

- TRansceiver Unit (TRU)
- Combining and Distribution Unit (CDU)
- Power Supply Unit (PSU)
- Energy Control Unit (ECU)

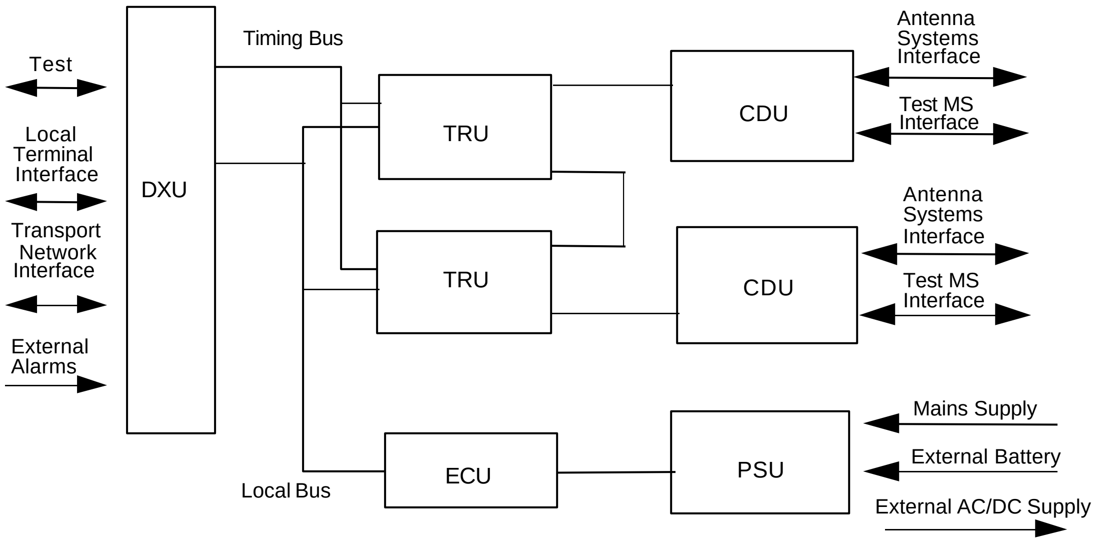


Figure 7-8 Replaceable units in RBS 2000

Distribution switch Unit (DXU)

The DXU performs the following tasks:

- Provides an interface to the BSC
- Manages the link resources and connects the traffic time slots from the BSC link to the TRUs
- Controls signaling to the BSC and performs concentration
- Extracts synchronization information from the link and generates a timing reference for the RBS

In addition, the DXU has a database which stores information about installed hardware.

TRansceiver Unit (TRU)

One TRU includes all functionality needed for handling one radio carrier (i.e. the 8 time slots in one TDMA frame). It is responsible for radio transmitting, radio receiving, power amplification and signal processing.

The TRU contains a radio frequency test loop between the transmitter and the receiver. This facilitates TRU testing by generating signals and looping them back. TRUs are connected by a bus to enable frequency hopping. Some RBS products can contain up to 12 TRUs.

Combining and Distribution Unit (CDU)

The CDU is the interface between the TRUs and the 2-way antenna system. The task of the CDU is to combine signals to be transmitted from various transceivers and to distribute received signals to the receivers. All signals are filtered before transmission and after reception using bandpass filters.

A range of CDU types have been developed to support different configurations within the RBS 2000 family. They consist of different types of CDUs, including:

- Without combiners
- With hybrid combiners
- With filter combiners to support large configurations

CDUs with duplex filters make it possible to transmit and receive using the same antennae

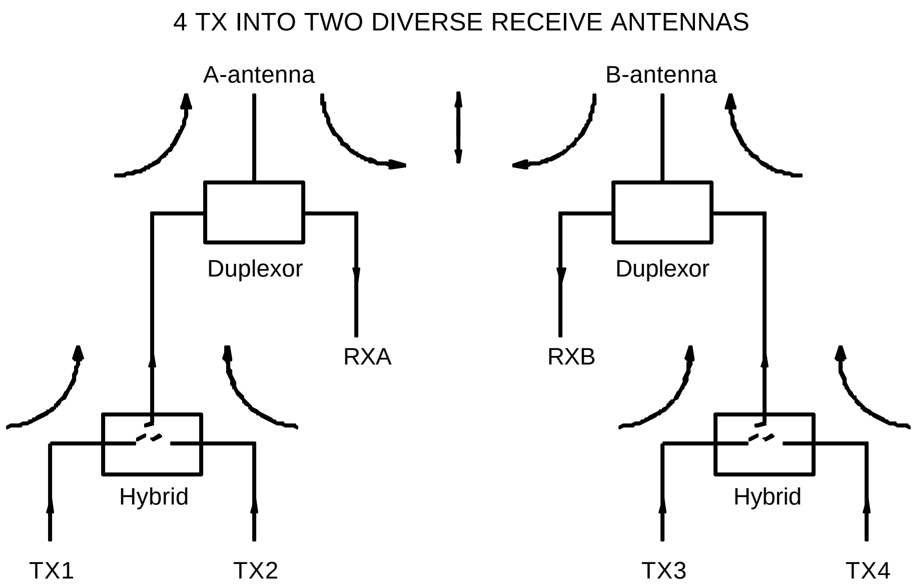


Figure 7-9 Example of a CDU type C

Power Supply Unit (PSU)

The PSU rectifies the power supply voltage to the +24 VDC necessary for RBS operation.

Energy Control Unit (ECU)

The ECU controls and supervises the power equipment and regulates the environmental conditions inside the cabinet.

The RBS 2000 is pre-assembled at the factory including program load and parameter settings making a quick startup possible.

Assembly can also be carried out on site. The RBS software is downloaded from the BSC and stored in a non-volatile (flash memory) program store. In a working RBS, this flash memory keeps cell down time low because traffic does not need to be interrupted. Power failure recovery can also be done quickly.

RBS 2000 IN A NETWORK

The Transmission Drop and Insert (TDI) function makes it possible to connect RBSs together. This is an important cost saving feature of Ericsson's RBSs, as an RBS need not be connected to the BSC directly via a dedicated link. Instead it may be more economic to connect that RBS to another RBS in the region, thus saving on expensive transmission costs. The following network topologies are supported:

- Star: this is the traditional architecture, where each RBS is connected directly to a BSC
- Cascade: a cascade architecture includes RBSs connected to each other without a loop, thus using transmission resources efficiently
- Loop: this architecture includes RBSs connected to each other with a loop, ensuring that even if one link fails, another path is available

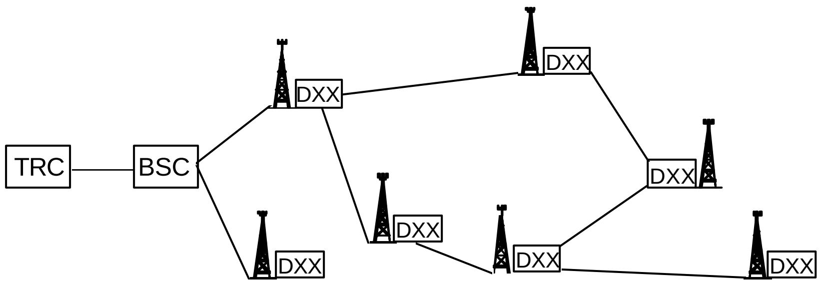


Figure 7-10 Ericssons RBS 2000 Network Configurations

RBS 3000 IN A NETWORK

The RBS 3000 hardware is flexible and allows different traffic mixes of voice, packet and circuit data with different bit rates, without hardware modification.

- Most of the RBS 3000s that will be deployed will co-site with the already implemented RBS 2000 products.

RBS 2000 SERIES DESCRIPTIONS

RBS Type	Location	Max. TRU	Cells	Coverage Type	Dimensions (h-w-d) (mm)	Temperature Range (°C)
RBS 2101	Outdoor	2	1	Macro	1285-705-450	-33...+55
RBS 2102	Outdoor	6	1-3	Macro	1605-1300-760	-33...+45
*RBS 2106	Outdoor	12	1-3	Macro	1614-1300-940	-33…+45
RBS 2202	Indoor	6	1-3	Macro	1775-600-400	+5...+40
RBS 2205	Indoor	6	1-3	Macro	2030-600-400	+5...+40
*RBS 2206	Indoor	12	1-3	Macro	1850-600-400	+5…+40
RBS 2301	Indoor/Outdoor	2	1	Micro	535-408-160	-33...+45
RBS 2302	Indoor/Outdoor	2	1	Micro	535-408-170	-33...+45
RBS 2308	Outdoor	4	1	Micro	565-428-222	-33…+45
Maxite	Indoor/Outdoor (GSM 900 only)	2	1	Macro	535-408-160	-33...+45
RBS 2401	Indoor	2	1	Pico	387-510-126	+5…+40

Table 7-3 RBS 2000 Series

*Note: RBS 2106 and 2206 contain 6 dTRU

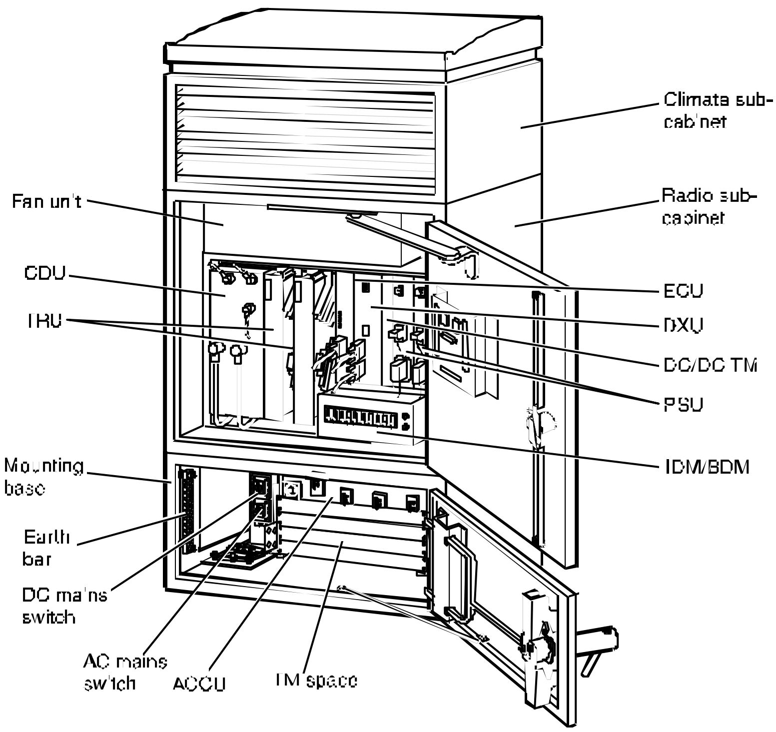


Figure 7-11 RBS 2101

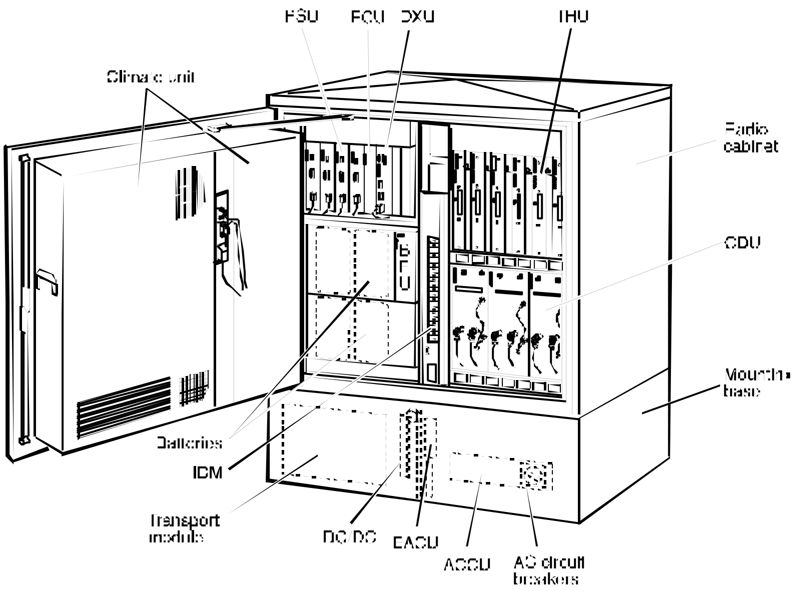


Figure 7-12 RBS 2102

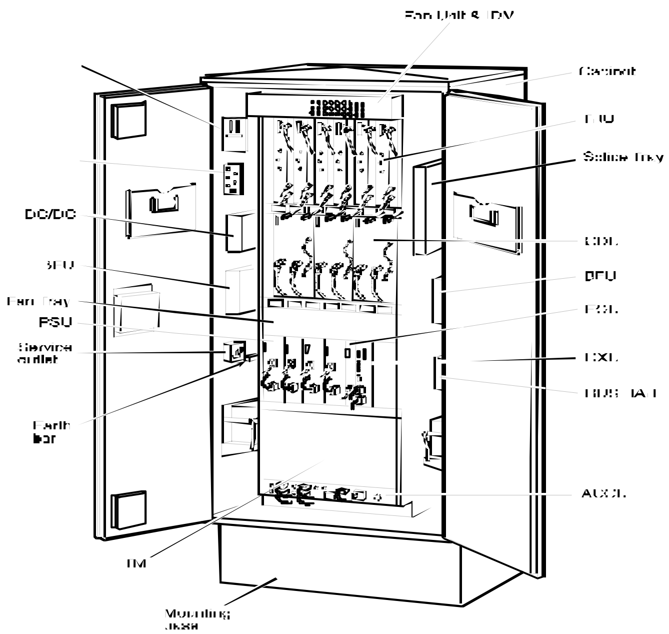


Figure 7-13 RBS 2103

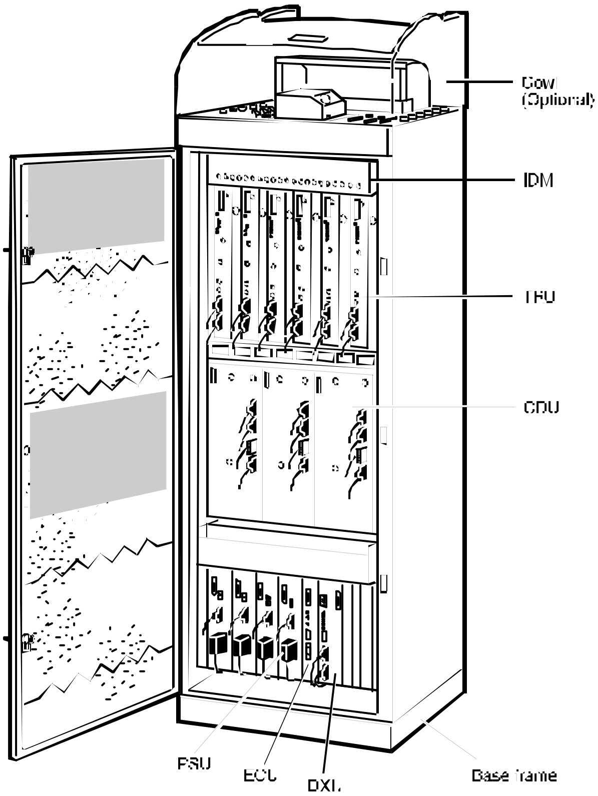


Figure 7-14 RBS 2202

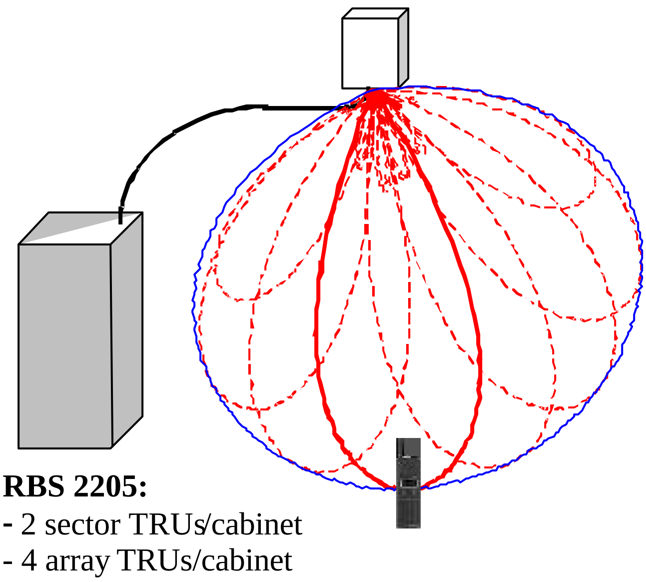


Figure 7-15 RBS 2205, GSM Capacity Booster

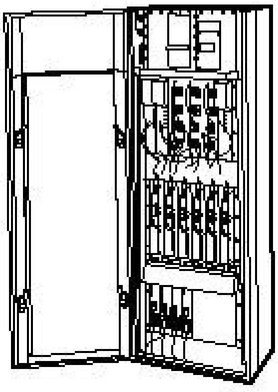


Figure 7-16 RBS 2206 Indoor Macro

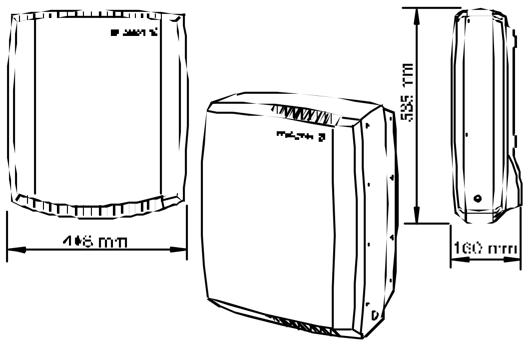


Figure 7-17 RBS 2301. RBS 2302 is almost identical

Figure 7-18 RBS 2308. Micro RBS, successor of RBS 2302

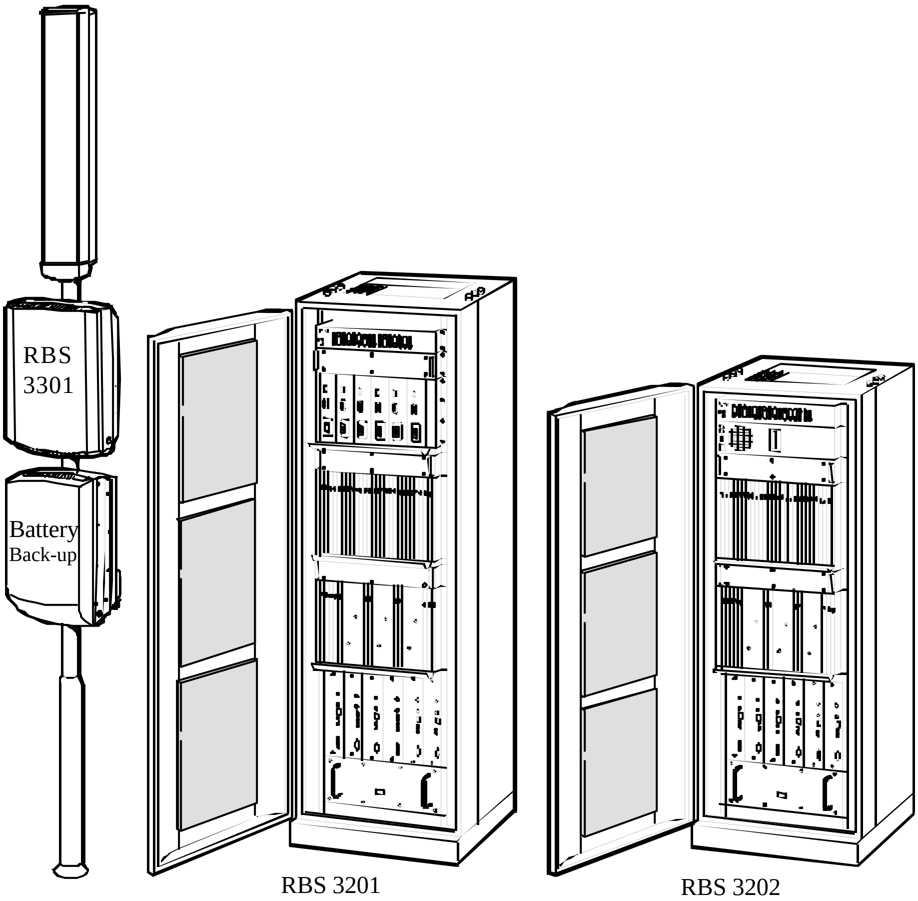
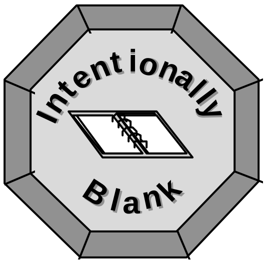


Figure 7-19 Examples of the RBS 3000 series.


Intentionally
Blank