Product description for RBS 6201

1/221 01-FGC 101 0570 Uen Rev F

Contents

1 Introduction

The RBS 6000 base station family is designed to meet the increasingly complex challenges facing operators today. RBS 6000 is built with tomorrow's technology and at the same provide backwards-compatibility with the highly successful RBS 2000 and RBS 3000 product lines. RBS 6000 base stations offer a seamless, integrated and environmentally friendly solution and a safe, smart and sound roadmap for whatever tomorrow holds.

RBS 6000 Series Key Features:

- Path to sustainability: The RBS 6000 Series ensures a smooth migration to new functionality and new technologies with existing sites and cabinets, thus providing a path to sustained revenues and profits.
- Power on demand: Reengineering the power supply and fully integrating it into the system were key objectives in designing the RBS 6000 series. The intelligent power supply provides power on demand that is exactly matched to what is needed at any given moment, thus ensuring that power consumption is kept to an absolute minimum.
- Multi-standard: All RBS 6000 base stations support multiple radio technologies.
- Integrated simplicity: New multi-purpose cabinets, an innovative common building practice for all components, modular design and an extremely high level of integration bring the functionality and capacity of an entire site down to the size of a cabinet

1.1 RBS 6201 – Indoor Macro Base Station

The RBS 6201 is an indoor macro base station that is part of the next-generation, multi-standard RBS 6000 family that also includes two outdoor macro base stations, micro base station a main-remote configuration and several Remote Radio Units (RRU).

Employing a simplified cabinet design and an innovative modular building practice, the RBS 6201 integrates a complete high-capacity site into a single cabinet. The cabinet contains two radio shelves and all power, transport network and supporting equipment.

The RBS 6201 two radio shelves can be equipped with virtually any combination of GSM, WCDMA and LTE, which are available for all common frequencies. A single radio shelf can provide up to 3×8 GSM or 3×4 MIMO WCDMA or 3×20 MHz MIMO LTE or a combination of above standards.

Providing a complete multi-standard site in a single cabinet is possible thanks to the modular building practice and an extremely high degree of integration. There are simply fewer parts, which are shared across all technologies, making the site easier to install, manage and maintain.

1.2 Safe, Smart and Sound Going Forward

The entire site-in-cabinet concept is designed to support all technologies in virtually any combination. This means that timing in network expansion is less critical and that there is less risk in investment decisions, since capacity can be added as it is needed for the technology that is in demand

Like the other members of the RBS 6000 family, the RBS 6201 provides space for an additional 3U for common transport network solution that supports a wide range of technologies including native IP, Ethernet, Asynchronous Transfer Mode (ATM) and PDH/SDH.

Tightly integrated into the RBS 6201 is a network and site management system that goes far beyond traditional O&M systems. This includes radio network management for all technologies, transport network and site management with antenna system and site power control via a single user interface, thus further increasing simplicity for the customer.

The completely redesigned power supply for the site is fully integrated into the RBS 6201. Power is supplied on demand using intelligent algorithms that ensure that the power supply produces only as much power as needed at any given moment and that units can be switched off when they are not needed, improving efficiency and decreasing power consumption.

1.3 RBS 6201 – Typical Deployment Scenarios

RBS 6201 supports high capacity, multi-standard applications in a single footprint. A complete site including high-capacity multi-standard radio, transport network equipment, and battery backup fits in a footprint measuring just 600 mm by 400 mm.

The RBS 6201 is a solution that can be used throughout the entire radio network where bit rate, coverage, and capacity are essential for a successful implementation. The cabinet can be used both in modernization scenarios and when a new site is established.

1.3.1 Metropolitan Indoor Site

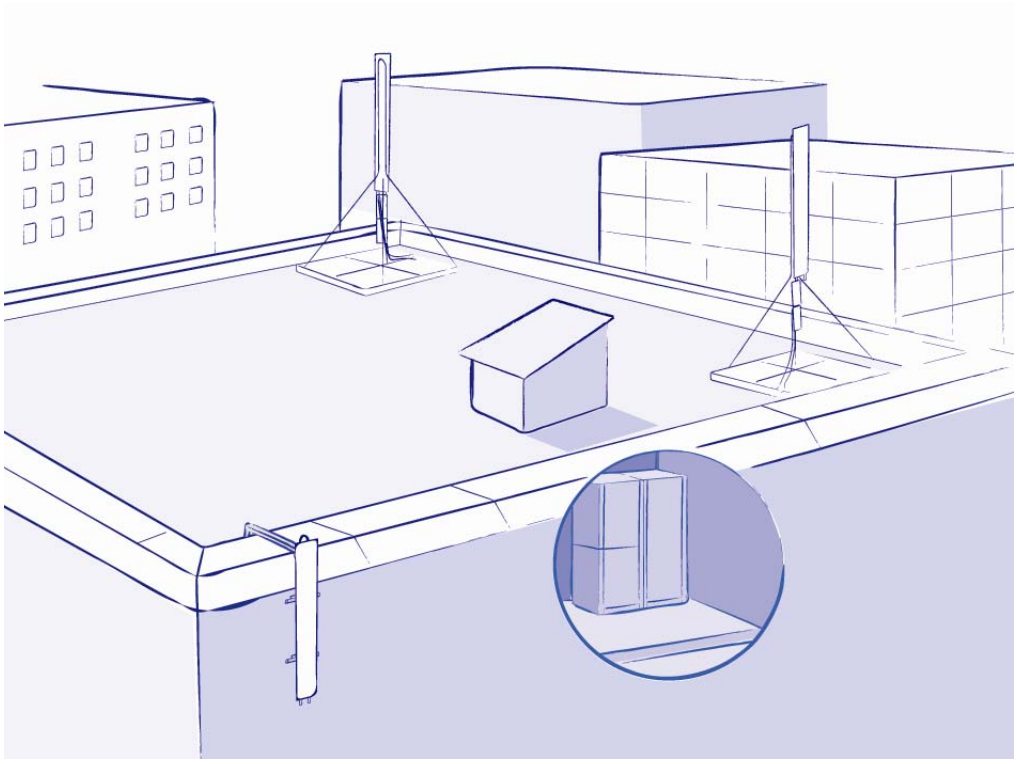


Figure 1 Metropolitan Indoor Site

The implementation of an RBS 6201 results in an efficient use of site footprint. In a modernization scenario, capacity is increased without the need to expand the site footprint. This is especially useful for site equipment rooms in dense urban locations, where the reduced site footprint leads to lower site rental costs. The superior radio performance and capacity of the RBS 6201 also means that the number of sites required is kept to a minimum, thereby further reducing operational expenditure.

1.3.2 Migrating to RBS 6201

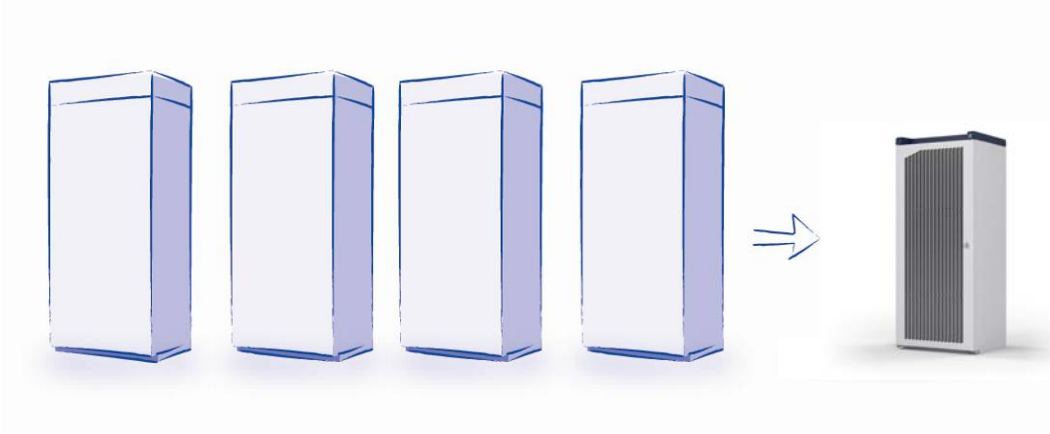


Figure 2 Migrating to RBS 6201

Smooth integration has been an important design criterion, and the RBS 6000 series ensures efficient migration to new functionality for existing cabinets and sites. Due to the high radio capacity that RBS 6201 provides it can replace multiple old base stations (up to 4 RBS 2206). The RBS 6000 series is designed to be fully backward compatible with existing RBS 2000 and RBS 3000 products, thereby providing a path to sustained revenues and profits.

The modernization path chosen for an existing site can be based on existing RBS versions, site capacity needs, and the operator's strategy for the future. The possibility to equip the RBS 6201 cabinet with high-capacity multi-standard radio, transport network equipment, and battery backup means that four cabinets can be reduced to a single cabinet.

2 Hardware Architecture

The flexible hardware architecture enables a variety of site deployments and consists of the following main components:

- Radio shelf – combination of Radio Units (RU) and Digital Units (DU)
- Power shelf – Power Supply Units (PSU) dimensioned for the specific site
- Transport shelf – for transport network equipment up to 3U high
- Enclosures – including climate system

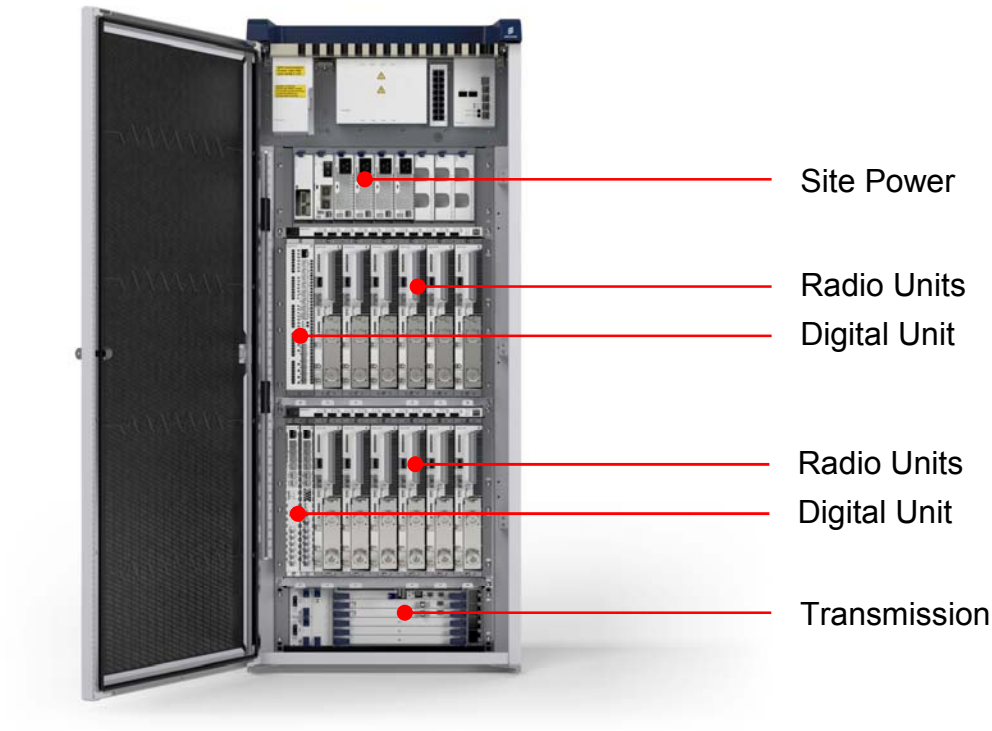


Figure 3 RBS 6201, Hardware Architecture

3 The RBS 6201

3.1 Radio Shelf

The RBS 6000 family uses the following main radio components for GSM, WCDMA and LTE:

- RU – Radio Unit
    - Transceiver (TRX)
    - Transmitter (TX) amplification
    - Transmitter/Receiver (TX/RX) duplexing
    - TX/RX filtering
    - Antenna supervision support
- DU – Digital Unit
    - Control processing
    - Clock distribution
    - Synchronization from transport network i/f or GPS
    - Baseband processing
    - Transport network interface
    - RU interconnects
    - Site Local Area Network (LAN) and maintenance interface

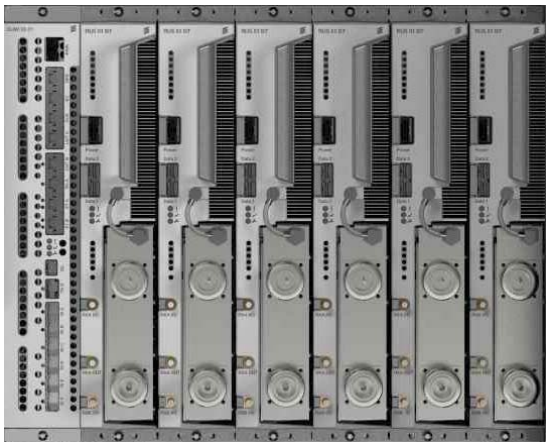


Figure 4 The Radio Shelf

The radio shelf in RBS 6000 base stations supports a wide variety of RU and DU for all main frequency bands and any combination of Radio Frequency (RF) technologies (GSM, WCDMA, or LTE). Each radio shelf supports up to 6 RU and a fully configured RBS 6201 can house up to 12 RU.

3.1.1 Radio Unit Architecture

The RU consists of a filter and a multi-carrier power amplifier. The radio has a up to 20 MHz bandwidth and up to 60 W of output power, available with hardware activation keys in steps of 20 W. The antenna system interfaces with a TX/RX port and an RX port. The radio (RUS) can transmit two standards simultaneously.

The RU contains co-siting ports, for example, for GSM/WCDMA antenna sharing, and cross-connection that minimizes the number of feeders if more than one RU per sector is used.

The antenna jumper cable that interfaces the RU should have a 90 degree bend 7/16 connector.

3.1.2 Radio Unit for GSM

Two GSM variants are offered: one low to mid-capacity (2 TRXs per radio) and one high-capacity version with (4 TRXs per radio).

The low to mid capacity radio, RUG, consists of two GSM TRXs, one hybrid combiner, two duplex filters, and two bias injectors. The radio supports 2×45 W uncombined or 2×20 W combined configurations. Up to six RU can be installed in one radio shelf, enabling up to 12 TRXs per radio shelf or 24 TRXs in an enclosure with two radio shelves. The low to mid capacity radio also supports supreme coverage mode by use of Transmitter Coherent Combining (TCC), which provides an increased cell radius for the downlink, 76 W. To compensate the uplink when TCC is used, 4-way RX diversity can be configured.

The high-capacity radio, RUS, consists of four GSM TRXs and a 60 W Multi-carrier Power Amplifier (MCPA). High-capacity GSM radio configurations such as 3×8 require only two antenna branches per sector when the MCPA version is used. Statistical use of power over the TRXs gives 4x20 W per RUS.

A mixed mode of low to mid and high capacity RU can be used for a coverage/capacity RBS site.

All GSM radio supports all time slots for General Packet Radio Services (GPRS) and Enhanced Data Rate for Global Evolution (EDGE), including EDGE Evolution enhancements.

3.1.3 Radio Unit for WCDMA

The RU for WCDMA is an evolution of the current RU/FU concept, which combines the previously separate RU and Filter Unit (FU) in one unit. The radio supports 60 W of output power with a bandwidth of 20 MHz. Each unit is capable of handling four cell carriers in both downlink and uplink. Multiple RU can be combined to create various single- or dual-band configurations with 1–6 sectors and 1–4 carriers.

With two units per sector the radio is prepared to support MIMO, transmitter diversity, and 4-way RX diversity. It also supports 3GPP/AISG-compatible Tower-Mounted Amplifier (TMA)/Antenna System Controller (ASC)/RET Interface Unit (RIU). VSWR (Voltage Standing Wave Ratio) is supported for antenna supervision.

3.1.4 Radio Unit for LTE

The RU for LTE supports 60 W output power with a bandwidth of 20 MHz. Multiple radio units can be combined into different radio configurations from 1–6 sectors and up to 20 MHz for single or dual band configurations.

With two units per sector the radio is prepared to support MIMO, transmitter diversity, and 4-way RX diversity. It also supports 3GPP/AISG-compatible TMA/ASC/RIU. VSWR is supported for antenna supervision.

3.1.5 Multi Standard Radio (RUS)

The RUS supports 60W output power for any standard with a bandwidth of up to 20 MHz. Each unit is capable of handling four cell carriers in both downlink and uplink. Multiple RU can be combined to create various single- or dual-band configurations with 1–6 sectors and 1–4 carriers.

With two units per sector the radio is prepared to support MIMO, transmitter diversity, and 4-way RX diversity. It also supports 3GPP/AISG-compatible Tower-Mounted Amplifier (TMA)/Antenna System Controller (ASC)/RET Interface Unit (RIU). VSWR is supported for antenna supervision.

3.1.6 Digital Unit for GSM

The Digital Unit GSM (DUG) can control up to 12 GSM carriers. If more than 12 TRXs are required, then an additional DUG can be installed on the radio shelf and synchronized with the other DUGs in the cabinet.

The DUG comes in two variants, DUG 10 supports RUG whereas DUG 20 supports RUS and RRUS.

The DUG supports the cross-connection of individual time slots to specific TRXs and extracts the synchronization information from the Pulse-Code Modulation (PCM) link to generate a timing reference for the RBS.

The DUG supports:

- E1/T1 transmission interface
- Baseband processing (DUG 20)
- Link Access Procedures on D-Channel (LAPD) concentration / multiplexing
- Dualband e.g. 3x2 900 + 3x2 1800 with one DUG
- Abis optimization
- Multi-drop (cascading)
- Synchronized radio network, through an external GPS receiver
- Transceiver Group (TG) synchronization
- Site LAN

To handle IP, combination with optional equipment such as SIU, MINI-LINK or OMS is recommended

3.1.7 Digital Unit for WCDMA

The Digital Unit WCDMA (DUW) comes in three variants, depending on capacity demand. The DUW contains the baseband, control, and switching, as well as the Iub and Mub interfaces. The DUW can handle different time-varying traffic mixes consisting of voice circuit-switched data, packet-switched data, and high-speed data such as High-Speed Packet Access (HSPA).

Baseband resources are pooled in the DUW and the number of Channel Elements (CE) and high-speed data capacity can be optimized to fit operator requirements for user type and number of services.

The baseband capacity is pooled independently of sectors and frequencies, and up to two baseband pools can exist (two DUW units) in the same node.

The baseband complies with 3GPP standards and is fully integrated with the same Operation and Maintenance (O&M) system as the RBS 3000 family. The software can be downloaded through the Operations Support System for Radio and Core (OSS-RC) interfaces, either locally or through the Radio Network Controller (RNC), and is stored in non-volatile memory in the RBS.

The RBS 6000 family software platform provides generic support for the application software and includes an execution platform with operating system, ATM and IP transport, and O&M infrastructure.

The DUW stabilizes the clock signal extracted from the transport network connection or optional external GPS equipment and uses it to synchronize the RBS.

The DUW provides:

- ATM connectivity
- A gigabit Ethernet or (100/1000 Base-T Ethernet)
- Channelized STM-1 transport network interface
- Four IMA capable E1/T1/J1 ports

Additional interfaces and transport network configurations are available as options.

3.1.8 Digital Unit for LTE

The Digital Unit for LTE (DUL) comes in one variant. The DUL contains the baseband, control, and switching, as well as the S1 and Mub interfaces for LTE RBSs. The DUL supports different time-varying traffic mixes over the LTE high-speed data interface.

The baseband capacity is pooled independently of sectors and frequencies, and up to two baseband pools can exist (two DUL units) in the same node.

The baseband complies with 3GPP standards and is fully integrated with the same O&M system as the RBS 3000 family. The software can be downloaded through the OSS-RC, either locally or through an access gateway, and is stored in non-volatile memory in the RBS.

The RBS 6000 family software platform provides generic support for the application software and includes an execution platform with operating system, IP transport, and O&M infrastructure.

The DUL stabilizes the clock signal extracted from the transport network connection or optional external GPS equipment and uses it to synchronize the RBS.

The DUL provides:

- Full IP connectivity
- A gigabit Ethernet transport network interface

Additional interfaces and transport network configurations are available as options.

3.2 RBS Power System

Figure 5 RBS Power System

The RBS power system is a modern efficient solution for delivering power to the RBS and in the evolution the system will also be able to deliver power to other equipment at the site. The system uses high-density Power Distribution Units (PDU) controlled by circuit breakers. Software algorithms can switch off AC and DC units and other components temporarily not in use to save energy and increase battery capacity.

The site power system, which eliminates the need for a separate site power plant, can charge batteries.

The RBS power system can use either AC or DC power. The AC power system can control power to selected units by means of applications. The tolerant rectifiers (PSU AC) allow large voltage variations, which eliminates the need for external voltage stabilizers.

The RBS can run directly on −48 V DC or, by means of DC/DC converters (PSU DC), on +24 V DC or −60 V DC.

Improved Efficiency of Integrated Power System

Energy efficiency has been improved by:

- New RBS power system with an improved efficiency
- Intelligent standby operation of one or more PSUs
- Selective shutdown of units

3.3 Battery Backup

The following battery backup solutions are available for the RBS 6201 and its site.

3.3.1 BBU 6201

In case of moderate battery backup needs, a small battery backup unit can be installed under the RBS. This means that a complete site, including transport network equipment, power and backup, is managed on one normal RBS footprint. The system's battery capacity ranges from 48V/40 Ah up to 48V/190 Ah.

The BBU acts as a base frame of the RBS and hence adds very little work to the site installation. The BBU is prepared for a quick and easy connection to the RBS.

3.3.2 BBS 6201

For demanding backup requirements, a larger battery rack (RBS size) is preferred. The BBS 6201 can support up to 680 Ah (−48V) in one cabinet. 680 Ah gives up to 18 h backup time. Several RBS cabinets can share the capacity of one BBS.

3.4 Climate System

The basic principle for the climate system is that any unit that needs cooling has to request it from the Support Control Unit (SCU). The main advantage of this is that the fans in the cooling system always work at an optimized level, which means that for any given operational condition, the RBS has minimal power consumption with minimal noise generation.

3.4.1 SCU

The SCU has the following functions:

- Control of fan speed and fan status
- Interface for smoke detector, external alarms, cabinet lamp, door-switch and heaters
- Generate cold-start signal
- Cabinet memory
- Transient protected EC-bus ports for external connections

The SCU communicates through the EC-bus.

3.5 RBS Site System Units

3.5.1 Antenna System and TMA

RBS 6000 supports advanced antenna systems to improve the radio performance. Often there are multiple antennas to cater for sectorisation, diversity branches, and various frequency bands. Adjustable antennas, for example, using RET of the vertical antenna beam direction. TMAs are used to eliminate feeder loss on the uplink and also improve the receiver sensitivity for the whole RBS 6000 system. Main–remote base station allows the entire radio to be placed near the antenna, and thereby avoid feeder loss on both uplink and downlink.

The RBS 6000 Site Concept will provide support for the wide and growing variety of antenna systems, independently of the specific radio technology inside the RBS 6000 cabinet.

RBS 6000 will support future development of 3GPP and AISG protocols and backward compatibility (for example, to Ericsson’s proprietary protocol) will also be included.

3.5.1.1 3GPP/AISG 2.0, Communication protocol

RBS 6000 support the 3GPP / AISG 2.0 protocol to control Antenna Line Devices, ALD’s, such as:

- RET units
- RIUs
- Ericsson Premium TMAs

The RET unit is unique for every antenna vendor. It is a device that is used for optimization of the radio network performance, by enabling remote control of the vertical tilt angle of the antenna beam direction. The operator can control the tilt via OSS-RC.

RIU, is an advanced Bias-T mounted on the feeder close to the antenna, forwarding power and control commands to RET units on antennas.

The Premium TMAs shall be used when operators want both UL-amplification and RET control. The Premium TMAs have a built in RIU and are enhanced to utilize the full functionality of 3GPP/AISG 2.0 protocol.

Both the Premium TMAs and RIU will be capable to handle any future features in the antenna system as long as it is based on 3GPP/AISG protocol.

In order to lower the cost associated with antenna system Ericsson has a portfolio with dual band antennas and dual band TMAs also possible to utilize the 3GPP/AISG ALDs.

3.5.2 Support Alarm Unit

The optional Site Alarm Unit (SAU) monitors and controls customer equipment.
The SAU can handle up to 32 external alarms and four output control ports.

3.5.3 75–120 Ohm Balun

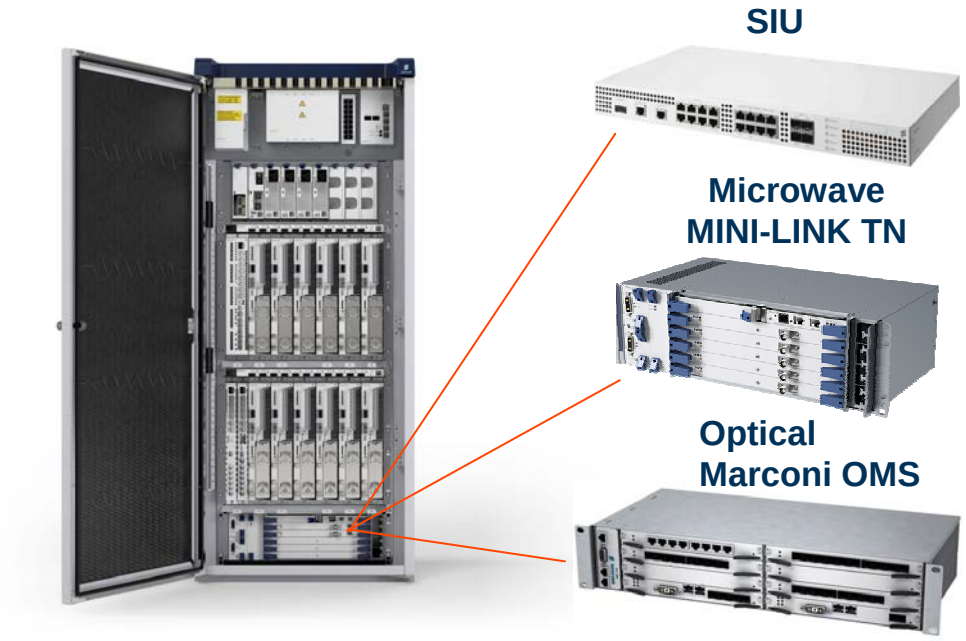
The balun converts 75 Ohm to 120 Ohm electrical transport network interfaces and includes OVP.

3.5.4 GPS

The RBS can be optionally connected to a GPS unit, which is used for synchronization of the RBS.

4 Transport Network Functionality

With the introduction of the RSB 6000 family, there is fully integrated support for any type of transport network media (microwave, optical fiber or copper) in combination with various technologies (IP/Ethernet, ATM, PDH/SDH, next gen SDH, xDSL etc.), redundancy schemes, aggregation methods and other functionalities that supports the Operator's choice of solution.



Since the Operator's mobile backhaul solution is often unique and depends on the Operator's requirements and market conditions, the RBS 6000 is provided with extra space that can be equipped with a wide range of alternative transport solutions by means of Ericsson's RAN-Transport portfolio, e.g. Site Integration Unit, MINI-LINK and Marconi OMS. These products are part of Ericsson IP RAN solution.

The SIU is a 1U high 19 inch wide mobile site router. The Site Integration Unit (SIU) acts as a cell-site gateway combining and optimizing all traffic from site to maximize usage of backhaul resources. In addition it supports connection of modern Ethernet based surveillance, alarm and other site equipment without requiring an extra line to the site. Towards the backhaul network it supports Ethernet, IP and PDH networks with both single and redundant circuits. Examples of applications for the SIU are:

- Abis Local Connectivity
  All local GSM voice traffic is switched locally in SIU, thereby reducing backhaul bandwidth with 100% for this traffic
- Transport sharing
  All RBSs (GSM, WCDMA and LTE) on site share dynamically the

available backhaul bandwidth. This enables the Operator to e.g. launch HSPA services with minimal backhaul capacity increase

- IP over E1/T1
  Makes it possible to deploy WCDMA Iub IP and LTE everywhere in the network, even when Ethernet services are not available. Combined with Transport sharing this gives a very efficient way of launching HSPA and LTE everywhere
- Security Gateway
  Protects the all site traffic with IPSec. Also enables efficient tunneling of traffic through service providers network
- Cellsite router
  Routing and VLAN capability to prioritize QoS enabled traffic over backhaul network.

MINI-LINK TN has a complete offering with indoor units to support all needed site configurations from small edge-nodes to more complex aggregation nodes. The solution is flexible to carry any protocol (Ethernet, ATM, SDH and PDH) and integrated with powerful protection mechanisms. As a result, the MINI-LINK TN matches the RBS 6000 family well in capacity and functionality.

Ericsson complements its microwave technology with a leading presence in the Optical Networking market place. The Marconi OMS family enables the Operator to build a robust transport infrastructure where dark fiber is available. A wide range of network topologies are supported, from star to meshed networks.

The OMS 800 and OMS 1400 can be integrated into RBS6201 and RBS6102.

The OMS 800 (Access-Edge) and 1400 (Metro-Edge) products are multi-service (Ethernet and TDM technology based) devices for grooming and transporting of packet data and voice (TDM) traffic in a Metro Access Network. OMS 800 products are small compact (1U) solutions with up-link transport based on NG-SDH with Ethernet. OMS 1410 is a compact (2U) hybrid solution that can either have uplink based on SDH or Ethernet.

5 Installation, Operation and Maintenance

RBS 6000 is connected to Ericsson's OSS-RC management system and provides functionality for fault, configuration, performance, and security management for all supported standards (GSM, WCDMA and LTE).

The RBS 6000 model consists of both system-specific data and shared data. The OSS-RC visualizes the RBS 6000 data in both logical and physical views. It is possible to visualize all RBS 6000 parts or only resources connected to a certain system.

Alarms from the RBS 6000 supervision functionality are transferred to the OSS-RC and presented in an unambiguous way, one alarm for each fault.

5.1 Installation

Before installation the RBS site is prepared with AC power, antennas, feeders, transport network equipment, and earth grounding. All internal RBS cabling and software are installed at the factory.

5.2 Software and Configuration

The RBS 6000 family software platform provides generic support for the application software and includes an execution platform with operating system and O&M infrastructure. RBS application software handles the RBS hardware and is built on the software platform.

5.3 Flexibility

Functionality is implemented primarily through software. Functional allocation in the RBS is software controlled by the configuration parameters stored in a database file. The benefit is that one shared hardware platform can be configured to match individual needs.

5.4 Expansion

The hardware and software of the RBS can be prepared for functionality and capacity that is not in use. New configurations may be applied without affecting cells in operation or calls in progress. Future enhancements can in many cases be implemented without affecting installed hardware.

RBS capacity is expanded by adding activation keys for baseband resources, carriers and output power.

5.5 Tools

All software necessary for management is integrated in the RBS, including graphical user interfaces and documentation, are accessible from the network element itself.

5.6 Fault Handling

All hardware units in the RBS have a built-in self-test functionality executed at startup.

Information about the installed hardware can be retrieved locally or remotely from the RBS, which makes it easy to generate an inventory list including all installed equipment.

Fault handling includes functions to restart software modules, parts of boards, boards, and, if necessary, the entire RBS. The overall ambition of fault handling is to deliver as high performance as possible with minimal effect on traffic at any given time.

6 Configurations

6.1 Radio Configurations

Each radio shelf in the RBS 6201 supports up to 6 RU. The RUS radio is a true multi-standard unit and can amplify two standards simultaneously.

Configuration	Bandwidth	Technology	Output Power*
GSM Low to Medium capacity	2 TRXs	SCPA	2×45 W uncombined** 2×20 W combined 1x76 W TCC
WCDMA	4 carriers	MCPA	60 W
LTE	20 MHz	MCPA	60 W
RUS	4 carriers/up to 20MHz	MCPA	60 W

* Typical output power from the antenna reference point
** These figures are valid for 850 and 900 MHz, for 1800 and 1900 MHz the output power is reduced with 0,5 dB

6.1.1 GSM

RUG

Example configurations

Configuration	Radio Units	Combining	Output Power per TRX	Antenna Branches
3×2	3	Combined Uncombined	20 W 40 W	(2)(2)(2) (2)(2)(2)
3×4	6	Combined Uncombined	20 W 40 W	(2)(2)(2) (4)(4)(4)
3×6	9	Combined	20 W	(3)(3)(3)
3×8	12	Combined	20 W	(4)(4)(4)
6×2	6	Combined Uncombined	20 W 40 W	(2)(2)(2)(2)(2)(2) (2)(2)(2)(2)(2)(2)
6×4	12	Combined	20 W	(2)(2)(2)(2)(2)(2)

Asymmetrical configurations of sectors and TRXs are also supported.

RUS

Example configurations

Configuration	Number of Radio Units	Output power per TRX*	Antenna branches
3×4	3	20 W	(2)(2)(2)
3×8	6	20 W	(2)(2)(2)
6×4	6	20 W	(2)(2)(2)(2)(2)(2)

* Normalized statistical output power and is based on that all timeslots is not continuously transmitting full power.

Asymmetrical configurations of sectors and TRXs are also supported.

6.1.2 GSM Dual band

RUG

Example configurations

Configuration	Number of Radio Units	Combining	Antenna Branches
3×2 I 3×2	3 I 3	Combined Uncombined	(2)(2)(2) I (2)(2)(2) (2)(2)(2) I (2)(2)(2)
3×4 I 3×4	6 I 6	Combined	(2)(2)(2) I (2)(2)(2)

The sectors with two carriers are either combined or uncombined. The sectors with 3 carriers always consist of one carrier uncombined and two carriers combined. The sectors with four carriers are always combined. Asymmetric configuration of sectors and carriers is also supported.

RUS

Example configurations

Configuration	Number of Radio Units	Output Power per TRX	Antenna Branches
3×4 I 3×4	3 I 3	20 W	(2)(2)(2) I (2)(2)(2)
3×8 I 3×8	6 I 6	20 W	(2)(2)(2) I (2)(2)(2)

6.1.3 WCDMA

Example configurations

Configuration	Number of Radio Units	Output Power per Cell Carrier (W)
3×1	3	20 / 40 / 60
3×1 MIMO	6	20+20 / 40+40 / 60+60
3×2	3	10 / 20 / 30
3×2	6	20 / 40 / 60
3×2 MIMO	6	10+10 / 20+20 / 30+30
3×3	3	20
3×3	6	3×2 10 / 20 / 30 + 3x1 20 / 40 / 60
3×3 MIMO	6	20+20
3×4	3	15
3×4	6	10 / 20 / 30
3×4 MIMO	6	15+15
6×1	6	20 / 40 / 60
6×2	6	10 / 20 / 30
6×1 MIMO	12	20+20 / 40+40 / 60+60
6×2 MIMO	12	10+10 / 20+20 / 30+30

Asymmetric configuration of sectors and TRXs is also supported. MIMO: e.g. 20+20 means 20 W per TX branch.

6.1.4 WCDMA Dual band

This table shows example of dual band configurations with the 1900 and 850 MHz frequency bands.

Example configurations

Configuration	Number of Radio Units	Output power per cell carrier (W)	
3×1 I 3×1	3 I 3	20 / 40 / 60	20 / 40 / 60
3×1 I 3×2	3 I 3	20 / 40 / 60	10 / 20 / 30
3×2 I 3×2	3 I 3	10 / 20 / 30	10 / 20 / 30
3×1 MIMO I 3×1 MIMO	6 I 6	20+20 / 40+40 / 60+60	20+20 / 40+40 / 60+60
3×2 MIMO I 3×2 MIMO	6 I 6	10+10 / 20+20 / 30+30	10+10 / 20+20 / 30+30

6.1.5 LTE

Example configurations

Configuration	Number of Radio Units	Output power (W)
3×20 MHz	3	60
3×20 MHz MIMO	6	60 + 60
6×20 MHz	6	60
6×20 MHz MIMO	12	60 + 60

6.1.6 LTE Dual band

Example configurations

Configuration	Number of Radio Units	Output power (W)
3×20 MHz I 3×20 MHz	3 I 3	60 I 60
3×20 MHz MIMO I 3×20 MHz MIMO	6 I 6	60 + 60 I 60 + 60

6.1.7 RBS 6201 Multi-standard

This table shows example of GSM/WCDMA and LTE multi-standard configurations for the RBS 6201.

Example configurations

Configuration	GSM	WCDMA	LTE
GSM + WCDMA	3×8	3×4	
GSM + LTE	3×8		3×20 MHz
WCDMA + LTE		3×4	3×20 MHz
GSM + WCDMA + LTE	3×4 I 3×4	3x4	3×20 MHz

6.2 Digital Unit Configurations

6.2.1 GSM

Configuration	DUG 10	DUG 20
TRXs per DUG	12	12
TG-synch	Yes	Yes

6.2.2 WCDMA

Configuration	DUW 10	DUW 20	DUW 30
Cell carriers per DUW	6	6	6
Channel Elements, (Downlink/Uplink)	128/128	384/384	768/512
DL Peak Throughput (Mbps)	42	126	252
UL Peak Throughput (Mbps)	12	36	48

6.2.3 LTE

Configuration	DUL 20
DL Peak Throughput (Mbps)	173
UL Peak Throughput (Mbps)	56
Number of users	1000

6.2.4 Transport Network Interfaces

Digital Unit	Number of DU per Radio Shelf	E1/T1	E1/T1/J1	STM-1	100/1000 Base-T Ethernet
DUG 10	2	4			
DUG 20	2		4		
DUW 10/20/30	1		4	1	1
DUL 20	2				1

7 Technical Specifications

7.1 Radio Frequencies

7.1.1 GSM

900 MHz System Data

Receiver: 890–915 MHz (P-GSM), 880–915 MHz (E-GSM)

Transmitter: 935–960 MHz (P-GSM) 925–960 (E-GSM)

Carrier bandwidth: 200 kHz

Channels per carrier: 8 full-rate channels

Modulation method: GMSK and 8-PSK

Duplex separation: 45 MHz

Carrier separation: 200 kHz with frequency hopping and 400 kHz without frequency hopping

1800 MHz System Data

Receiver: 1710–1785 MHz

Transmitter: 1805–1880 MHz

Carrier bandwidth: 200 kHz

Channels per carrier: 8 full-rate channels

Modulation method: GMSK and 8-PSK

Duplex separation: 95 MHz

Carrier separation: 200 kHz with frequency hopping and 400 kHz without frequency hopping

800 MHz System Data

Receiver: 824–849 MHz

Transmitter: 869–894 MHz

Carrier bandwidth: 200 kHz

Channels per carrier: 8 full-rate channels

Modulation method: GMSK and 8-PSK

Duplex separation: 45 MHz

Carrier separation: 200 kHz with frequency hopping and 400 kHz without frequency hopping

1900 MHz System Data

Receiver: 1850–1910 MHz

Transmitter: 1930–1990 MHz

Carrier bandwidth: 200 kHz

Channels per carrier: 8 full-rate channels

Modulation method: GMSK and 8-PSK

Duplex separation: 80 MHz

Carrier separation: 200 kHz with frequency hopping and 400 kHz without frequency hopping

7.1.2 WCDMA

2100 MHz System Data

Receiver: 1920–1980 MHz

Transmitter: 2110–2170 MHz

Channel bandwidth: 5 MHz

Duplex Separation: 190 MHz

1900 MHz System Data

Receiver: 1850–1910 MHz

Transmitter: 1930–1990 MHz

Channel bandwidth: 5 MHz

Duplex Separation: 80 MHz

1700/2100 MHz System Data

Receiver: 1710–1755 MHz

Transmitter: 2110–2155 MHz

Channel bandwidth: 5 MHz

Duplex Separation: 400 MHz

900 MHz System Data

Receiver: 880–915 MHz

Transmitter: 925–960 MHz

Channel bandwidth: 5 MHz

Duplex Separation: 45 MHz

850 MHz System Data

Receiver: 824–849 MHz

Transmitter: 869–894 MHz

Channel bandwidth: 5 MHz

Duplex Separation: 45 MHz

7.1.3 LTE

700 MHz System Data, band 13
Receiver: 746–758 MHz
Transmitter: 776–788 MHz
Channel bandwidth: Up to 10 MHz
Duplex Separation: 30 MHz

2100 MHz System Data
Receiver: 1920–1980 MHz
Transmitter: 2110–2170 MHz
Channel bandwidth: Up to 20 MHz
Duplex Separation: 190 MHz

2600 MHz System Data
Receiver: 2500–2570 MHz
Transmitter: 2620–2690 MHz
Channel bandwidth: Up to 20 MHz
Duplex Separation: 120 MHz

1700/2100 MHz System Data
Receiver: 1710–1755 MHz
Transmitter: 2110–2155 MHz
Channel bandwidth: Up to 20 MHz
Duplex Separation: 400 MHz

7.2 Power Options

High density power modules and electronically controlled distribution fuses. Software applications allows for managed shutdown of AC/DC units and system parts in order to save energy and extend battery operation. The built-in site power system eliminates the need for a separate site power plant. The system can handle battery charging of any lead acid batteries.

Power Option
−48 V DC
−60 V DC
+24 V DC
100–250 V AC

7.3 Power Consumption

The power consumption of the RBS 6201 depends on traffic load, radio configuration, frequency band, ambient temperature, and (for GSM) the use of interference-limitation features (Discontinuous Transmission (DTX) and downlink power control).

Please see the Power Consumption Guideline for RBS 6000 for the complete table of power consumption for different configurations.

7.4 Dimensions

Unit	Width	Depth	Height
Cabinet including door	600 mm	470 mm	1435 mm
Footprint	600 mm	400 mm	NA
Base frame	600 mm	400 mm	50 mm

7.5 Weight

Unit	Weight
Fully equipped cabinet with 12 RU, excl transport network equipment	170 kg
Base frame	10 kg
Empty cabinet	70 kg

7.6 Color

Color	Reference Number
White	NCS 0502-B
Blue	NCS 6030-R90B

8 Environmental Capabilities

8.1 Electromagnetic Compatibility

The RBS 6201 complies with the following Electromagnetic Compatibility (EMC) requirements:

EMC Compliance
2004/108/EC
R & TTE directive 1999/5/EC
EN 55022 Class B
GSM:11.21
FCC, part 15 Class B

8.2 Product Safety

In accordance with the Low Voltage Directive (LVD 73/23/EEC plus 93/68/EEC) of the European Union, the RBS 6201 complies with the following requirements regarding product safety:

Product Safety Compliance
EN 60 950-1/IEC 60 950-1 Edition 2
EN 60 215/IEC 215
EN 60 529/IEC 529
UL 60 950-1, 2nd edition, Information Technology Equipment Including Electrical Business Equipment
CSA C22.2 No. 60 960-1, Safety of Information Technology Equipment Including Electrical Business Equipment
CSA 22.2 No. 1-M94, Audio, Video and Small Electronic Equipment

The RBS 6201 is CE marked and UL/ETL listed in compliance with the above.

8.3 Environmental Requirements

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

8.3.1 Storage Requirements

Storage Requirements
ETS class 1.2 Weather Protected, Not Temperature Controlled Storage Locations in ETS 300 019-1-1

8.3.2 Transport Requirements

Transport Requirements
ETS class 2.3 Public Transportation in ETS 300 019-1-2

8.3.3 Earthquake Protection

Earthquake Protection
IEC 68-2-57 Zone 4 according to Telcordia Verteq II

8.3.4 Operational Requirements

Operational Requirements	
Class 3.1 of IEC 721-3-4 (ETS 300 019-1-4)	
Temperature range	+5ºC to +50ºC
Relative humidity	5–85%

9 Site Support

9.1 Tower Mounted Amplifier

The product portfolio for Ericsson TMAs is divided into Standard TMAs, Premium TMAs and Ericsson unique.
All TMAs are double except for the Standard single 800 TMA. This TMA for the 800 MHz band has a built in SMR filter and it would be too big if made as a double. It is normally enough to use one double TMA for every sector (RX diversity). Dual Band TMAs are also available as either Standard or Premium for some frequencies. See list below

Definitions

- Standard TMAs: Fixed gain, alarm method via current alarm. Primarily used for pure GSM applications
- Premium TMAs: Fixed gain, RET interface, 3GPP/AISG 2.0 compatible. To be used with WCDMA, LTE
- Ericsson unique: High adjustable gain, RET interface and uses primarily Ericsson proprietary protocol (will be supported by RBS 6000). Ericsson will not develop new TMAs based on this definition
- Dual Band TMA reduces the number of feeder when two frequencies are co-sited.

9.2 Remote Electrical Tilt

The RET function is used for optimization of the radio network performance, by enabling remote control of the vertical tilt angle of the antenna lobe. The operator can control the tilt via OSS-RC with the signals passing through the RBS and up the feeder cables to a converter near the antenna.

9.3 Site Power from a RBS 6000 Cabinet

The integrated RBS site power system can power external units with −48 V DC.

10 Abbreviations

Abbreviation	Meaning
3GPP	3rd Generation Partnership Project
AISG	Antenna Interface Standards Group
ASC	Antenna System Controller
ATM	Asynchronous Transfer Mode
BBS	Battery Backup System
BBU	Base Backup Unit
CE	Channel Elements
DTX	Discontinuous Transmission
DUG	Digital Unit GSM
DUL	Digital Unit LTE
DUW	Digital Unit WCDMA
EDGE	Enhanced Data Rates for Global Evolution
E-GSM	Extended GSM
EMC	Electromagnetic Compatibility
EUL	Enhanced Uplink
GPRS	General Packet Radio Services
GPS	Global Positioning System
GSM	Global System for Mobile communication
HSDPA	High Speed Downlink Packet Access
LAN	Local Area Network
LAPD	Link Access Procedures on D-Channel
LTE	Long Term Evolution
LVD	Low Voltage Directive
MCPA	Multi Carrier Power Amplifier
MIMO	Multiple Input Multiple Output
O&M	Operation & Maintenance
OSS-RC	Operation and Support System-Radio and Core
OVP	Over-Voltage Protection
PCM	Pulse-Code Modulation
PDH	Plesiochronous Digital Hierarchy
P-GSM	Primary GSM

Abbreviation	Meaning
PSU	Power Supply Unit
RBS	Radio Base Station
RET	Remote Electrical Tilt
RF	Radio Frequency
RIU	RET Interface Unit
RU	Radio Unit
RX	Receiver
SCU	Support Control Unit
SDH	Synchronous Digital Hierarchy
TCC	Transmitter Coherent Combining
TDM	Time Division Multiplexing
TG	Transceiver Group
TMA	Tower-Mounted Amplifier
TRX	Transceiver
TX	Transmit
VSWR	Voltage Standing Wave Ratio
WCDMA	Wideband Code Division Multiple Access