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Product Data

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1 Product Data RBS 3202

1.1 Introduction

This document describes the technical data for engineering the Radio Base Station (RBS) 3202.

1.1.1 Purpose

The purpose of this document is to provide technical data for the RBS 3202. The data is used for installation engineering purposes and no functionality is described in this document.

The data is structured as follows:

- Physical characteristics such as dimensions, footprints, and weight are described in chapter 1.2.
- Standard configurations are described in chapter 1.3.
- External requirements such as grounding, climate control, power, and physical site specifications are described in chapter 1.4.
- Connection interfaces are described in chapter 1.5.

1.1.2 Target Group

This document is written for all personnel involved in the implementation activity of the site installation engineering.

Personnel working on Ericsson products or systems must have the training and competence required to perform their work correctly.

1.2 Technical Data

This section provides the following technical data for the RBS 3202:

- Overview (chapter 1.2.1)
- Dimensions and footprint (chapter 1.2.2)
- Weight (chapter 1.2.3)

1.2.1 Overview

The RBS 3202 is a Macro RBS cabinet and can be installed in a building or in a shelter. It is assembled and tested at the factory and delivered equipped according to the standard configuration.

Figure 1 RBS 3202 Main Components

The RBS 3202 consists of the following main components (see figure 1):

- Cabinet top

  The cabinet top consists of the following components:

  - Connection Field (CF) position T
  - Left antenna connection interface position H
  - Right antenna connection interface position J
  - Power connection interface position P
  - Grounding connection interfaces

- Capacitor Unit (CU) including fans position D
- Baseband (BB) subrack position C and Fan Unit

  The BB subrack typically consists of the following components:

  - Baseband Interface Board (BBIFB)
  - Exchange Terminal Board (ETB)
  - General Purpose Processor Board (GPB)
  - Random Access Receiver Board (RAXB)
  - Switch Core Board (SCB)
  - Timing Unit Board (TUB)
  - Transmitter Board (TXB)

- Radio Frequency (RF) subrack position B and Fan Unit

  The RF subrack typically consists of the following components:

  - Air Interface Unit (AIU)
  - Radio Frequency Interface Board (RFIFB)
  - SCB
  - Transceiver Board (TRXB)

- Multicarrier Power Amplifier (MCPA) subrack position A and Fan Unit

The MCPA subrack typically consists of the following components:

- MCPA
- MCPA Hub

1.2.2 Dimensions and Footprint

figure 2 shows the RBS 3202 cabinet with dimensions.

Figure 2 RBS 3202 Cabinet Dimensions, with Base

The RBS 3202 cabinet dimensions are the following:

Cabinet width	600 mm
Cabinet depth without door	400 mm
Total cabinet depth including door	450 mm
Cabinet height without base	1650 mm
Height of base	55 mm
Total cabinet height including base	1705 mm
Height of locking bar (while in transport mode)	70 mm
Height of power connection box	120 mm
Adjustable feet, height variation	0 mm to 10 mm

figure 3 shows the RBS 3202 footprint with dimensions.

Figure 3 Base with Dimensions (mm)

The overall dimensions for the base are the following:

Width	600 mm
Depth	400 mm
Height	50 mm

1.2.3 Weight

The weight of the cabinet and base are the following:

RBS 3202 cabinet, fully equipped	200 kg
Base	10 kg

1.3 Standard Configurations

This section provides information about the standard configurations for the RBS 3202.

The following configurations exist:

- The 1 x 1 configuration has one sector and one carrier.
- The 2 x 1 configuration has two sectors and one carrier.
- The 3 × 1 configuration has three sectors and one carrier.

This configuration has two transmission solutions: ET-M1 and ET-M4.

1.4 External Requirements

This section provides information about external site requirements for the RBS 3202.

The following requirements are described in this section:

- Grounding requirements (chapter 1.4.1)
- Power requirements (chapter 1.4.2)
- Physical site requirements (chapter 1.4.3)
- Climate control requirements (chapter 1.4.4)

1.4.1 Grounding Requirements

All cabinets are connected to the same grounding point in the equipment room. For more information about grounding requirements, see *Installation of Grounding Network (1531-FCM 101 1614)*.

1.4.2 Power Requirements

The power requirement for the RBS 3202 is nominal -48 V DC, with a 150 A fuse. Operational voltage is between –40.5 V DC and –57.0 V DC.

Table 1 Nominal and Maximum Power Consumption by Configuration

Configuration	**Average Power Consumption**	**Maximum Power Consumption**
3 × 1	1.6 kW	2.3 kW

The figures for maximum power consumption are a round value and state maximum power consumption only. Power consumption will be lower for most traffic scenarios.

1.4.3 Physical Site Requirements

Floor Requirements

The floor should be as close to level as possible. The slope must not exceed 1.5 mm/m. This allows the adjustable feet of the base to compensate for irregularities.

Shelter Requirements

The RBS 3202 cabinet is designed for "free standing" installation.

Room Requirements

figure 4 and figure 5 show the room requirements for the RBS 3202.

Figure 4 Distances in Earthquake Zone

Figure 5 Distances in Non-earthquake Zone

A minimum of 200 mm must be left between cabinets and cable ladders to allow air flow to the cabinet.

A 300 mm space between the cable ladder and the ceiling is recommended, this allows working space during the installation of cables. A distance of 1000 mm is required in front of the cabinets. The cable inlet must be aligned with the indoor and outdoor cable ladders. The inlet must also allow sufficient space to handle the installation. Dimensions for the earthquake zone are shown infigure 4. Dimensions for the non-earthquake zone are shown in table 2.

Table 2 Distances in Earthquake Zone and Non-earthquake Zone

Dimension	Earthquake Zone	Non-earthquake Zone
Cabinet front to wall or surrounding equipment	1000 mm	1000 mm
Cabinet side or back to the wall	75 mm	10 mm
Cabinet top to cable ladder	200 mm	200 mm
Cable ladder to ceiling	300 mm (recommended)	300 mm (recommended)

1.4.4 Climate Control Requirements

The RBS 3202 is designed for normal operation in climate control class 3.1 of ETS 300 019–1–3 in accordance with IEC/EN 60 721-3-3.

Climate control must be configured to site power consumption and site heat generation.

The RBS 3202 can function under the following operating conditons:

- Normal operating conditions

  Normal operating conditions are defined as environmental conditions where all units function as specified.

- Exceptional (safe) operating conditions

  Exceptional operating conditions are defined as environmental stress above the limits for normal operation where all units continue to function under stress, but performance or capacity may be reduced. Reduction of performance or capacity must be documented. When environmental stress returns to normal conditions, function as specified is automatically achieved. Exceptional operating conditions are normally tested with one parameter at a time exceeding the limits for normal operation. Exceptional operating conditions are considered to be a period of not more than 72 consecutive hours, and a total of not more than 15 days in one year.

- Non-destructive operating conditions

  Non-destructive operating conditions are defined as environmental stress above the limits for safe function during which no function is guaranteed and performance may be degraded in an unspecified manner. When environmental stress returns to normal conditions, no manual intervention (on the site) is required to restore full performance of the RBS 3202. If remote control action must be performed to restore specified performance, the event must be documented. Non-destruction operating conditions are normally tested with one parameter at a time exceeding the limits for normal operation. Non-destruction operating conditions are considered to be a period of not more than 96 consecutive hours, and a total of not more than 5.5 days in a 3 years period.

Normal, exceptional, and non-destructive operating conditions for the RBS 3202 are shown in table 3.

Table 3 Operating Conditions

Measurement	**Normal Operation**	**Exceptional Operation**	**Non-destruction Operative**
Temperature	+5°C to +40°C	0°C to +45°C	-10°C to +55°C

Relative humidity	5% to 85%	5% to 90%	5% to 90%
Absolute humidity	1 g/m³ to 25 g/m³	less than 25 g/m³	less than 25 g/m³

Table 4 Nominal and Maximum Heat Generation by Configuration

Configuration	**Average Heat Generation**	**Maximum Heat Generation**
3 × 1	1.6 kW	2.3 kW

1.5 Connection Interfaces

This section provides information about the interfaces to the RBS 3202.

The CF, plus the interfaces for grounding, power, and antennas, are located on the RBS 3202 cabinet top. The top of the cabinet is shown in figure 6.

The CF is used as the interface to the cabinet boards. The CF contains the interfaces for transmission, local Operation and Maintenance (O&M) and Auxiliary Unit Hub (AU-Hub).

Figure 6 Interfaces

The following interfaces are described in this section (the numbers in the list coordinate with the numbers in figure 6):

1 Grounding interfaces (chapter 1.5.1)

2 Power interface (chapter 1.5.2)

3 Antenna interfaces (chapter 1.5.3)

4 Transmission interface, ET-M1 (chapter 1.5.4)

5 Transmission interface, ET-M4 (chapter 1.5.4)

6 SiteLAN interface including local Operation and Maintenance (O&M) (chapter 1.5.5)

7 AU-Hub interface (chapter 1.5.6)

8 Transmission Adapter

1.5.1 Grounding Connection Interface

figure 7 shows the grounding connection interface for the RBS 3202.

Figure 7 Grounding Connection Interface

All cabinets must be connected to the same grounding point inside the equipment room.

Two grounding points are located on the cabinet top on the left and right side of the ventilation net. See figure 7 for a detailed view. If only one of the grounding points is used, choose the grounding point with the most suitable location. The grounding point connectors are two M8 screws with M8 cable lugs. Grounding can be made using either one or both of the grounding points.

1.5.2 Power Connection Interface

figure 8 shows the power connection interface for the RBS 3202.

Figure 8 Power Connection Interface

The power connection interface is located on the cabinet top in a black protective box (shown in figure 8). The recommended power cables dimension is 70 mm² and the power connectors are two M8 screws with washers and M8 cable lugs.

1.5.3 Antenna Connection Interfaces

figure 9 shows the antenna connection interfaces for the RBS 3202.

Figure 9 Antenna Connection Interfaces

The antenna connection interfaces are located on the cabinet top; three antenna feeder connectors on each side. The connectors are 7/16 IEC-169–4 female connectors.

The connectors are labeled position H1 to position H3 on the left-hand top of the cabinet and position J1 to position J3 and on the right-hand top of the cabinet. See figure 9 for a detailed view of the connectors.

The antenna cables must be connected as follows:

- Sector 1A to position J1
- Sector 1B to position H1
- Sector 2A to position J2
- Sector 2B to position H2

- Sector 3A to position J3
- Sector 3B to position H3

1.5.4 Transmission Interface

The transmission connection interfaces are located in the CF on the cabinet top. The female connector is located in the CF.

The following two types of transmission are supported by the RBS 3202:

- ET-M1
- ET-M4

ET-M1

figure 10 shows the ET-M1 transmission interface for the RBS 3202.

Figure 10 ET-M1 Transmission Interface

Each ET-M1 board (located in the CF, positions T02 and T02) is equipped with eight 8–pin, non-keyed, female, RJ-45 connectors (shown in figure 10). Each connector has one port. Three types of transmission standards and cable characteristics for the ET-M1 are shown in table 5.

Table 5 Transmission Connection Interface Standards

Tran-mission Standard	***Trans-mission Capacity***	***Physical Layer Interface Specifi-cation***	***Cable Imped-ance***	***Cable Type***	***Number of Ports***
J1	1.5 Mbps	G.703	110 ohm	Balanced lines	32
E1	2.0 Mbps	G.703	120 ohm	Balanced lines	32
E1	2.0 Mbps	G.703	75 ohm	Unbal-anced lines	8

figure 11 shows the ET-M1 transmission interface with the transmission adapter installed for the RBS 3202.

Figure 11 ET-M1 Transmission Interface with Transmission Adapter Installed

The RBS 3202 can be delivered with two transmission adapters. Use the 75 ohm incoming transmission cable. The 75 ohm signal will be converted to 120 ohm in the transmission adapter, and then continue to ET-M1.

ET-M4

figure 12 shows the ET-M4 transmission connection interface for the RBS 3202.

Figure 12 ET-M4 Transmission Connection Interface

The connection for each ET-M4 board (located in the CF, positions T09 and T11) is equipped with two pairs of female SC connectors. A detailed view of the ET-M4 interface is shown in figure 12. The transmission standard and cable characteristics for the ET-M4 are shown in table 6.

Table 6 Transmission Standard and Cable Characteristics, ETB-M4

Trans-mission Name	Transmission Capacity	Standards	Cable Type	Number of Ports
STM-1	155 Mbit/s	ANSI T1.105–1995, ITU 1.432.2 G.703 ITU G.957	Optical fiber	6 ET-M4 boards

1.5.5 SiteLAN Interface

figure 13 shows the SiteLAN interface for the RBS 3202.

Figure 13 Local O&M Interface

The connector for local O&M is an 8-pin, non-keyed, female, RJ-45 connector located in the CF in position T17A (shown in figure 13). Ethernet and serial cables can be connected to the O&M interface The connector in position T17A is provided for redundancy.

1.5.6 AU-Hub Interface

figure 14 shows the AU-Hub interface for the RBS 3202.

Figure 14 AU-Hub Interface

The AU-Hub interface is located at position T22 in the CF (shown in figure 14). The interface is equipped with two 10-pin, keyed, female RJ-45 connectors for the External Alarm (XALM) and two 10-pin, keyed, female RJ-45 connectors for the Power Control Unit (PCU).

The alarm and communication cables connect the AU-Hub to the Power Control Unit (PCU) and External Alarm (XALM).

Table 7 Cable Characteristics

Interface Type	**Cable Type**	**Cable Product Number**	**Cable Position in CF**
PCU	Balanced lines	TSR 482 0248/15m	22A
XALM	Balanced lines	TSR 482 0243/15m	22C

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Node Description

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1 Introduction

This document describes Radio Base Station (RBS) 3202 in a Radio Access Network (RAN) that uses Wideband Code Division Multiple Access (WCDMA) technology. The RBS provides the air interface for the network through antennas and is connected to a Radio Network Controller (RNC), which provides the network control functions. It can also be connected to the network management system RAN Operation Support (RANOS).

1.1 Purpose

This document is intended as a first level introduction to the RBS for network operations and maintenance (O&M) personnel.

1.2 Scope

The document gives a brief description of the RBS and the RAN.

The RBS is described as follows:

- Hardware Structure
- Software Structure
- Functions
- External Interfaces
- Operation & Maintenance

1.3 RBS Documentation Structure

The RBS Customer Library includes the following types of user documents:

- Safety and Environmental Information
- Presentation
- Descriptions
- Installation Instructions
- Operation & Maintenance
- Spare Part Catalog
- Glossary of Terms

A complete description of all RAN customer documentation included in RAN is given in WCDMA RAN CPI Library, *88/1551–HSD 101 02/1*

2 RAN Overview

An RBS is part of the WCDMA RAN and provides the air interface between the RAN and User Equipment (UE). figure 1 shows an overview of the RAN, Core Network (CN) and Network Management Systems.

Figure 1 Radio Network Overview

The WCDMA RAN consists of the following parts:

- Core Network

  The CN is not included within the RAN. It interacts with the RNC and provides support for the network features and telecommunication services. The CN is also responsible for providing call control as well as mobility for, and localization of the User Equipment (UE). The CN handles both packet-oriented services, such as data, and circuit-oriented services, such as speech.

- RNC

  The RNC manages radio links, carrying for example voice or data. The RNC also manages and optimizes the radio network resources and controls mobility. A single RNC can connect to one or more RBSs. An RNC can also be connected to other RNCs to increase capacity.

  The RNC is also connected to the core network. O&M is handled through embedded management and handles: configuration, fault, performance, and security management. For detailed information regarding the RNC, please refer to *Node Description, RNC 3810,*6/1551–AXD10503/1.

- RBS

  A detailed overview of RBS is given in section 2.1.

- RANOS

  RANOS is a software package for handling RAN O&M tasks. RANOS gives a consolidated view of RAN information such as: alarms, configuration and basic performance. RANOS also provides several interfaces for integration within an existing network management environment.

- TRAM

  Tools for Radio Access Management (TRAM) gives support for planning, test, and performance monitoring of the radio and transport network. The resulting configuration data from the TRAM design is downloaded to the nodes using RANOS.

2.1 RBS Overview

The RBS provides radio resources and maintains the radio links to the UE within cells. O&M is handled through embedded management and deal with issues such as: configuration, fault, performance, and security management.

Common Platform

The RBS hardware and software are based on a common platform used both in RBS and RNC. From this platform it is possible to create an Asynchronous Transfer Mode (ATM) cell-switching network node. The common platform consists of an ATM transport system, a distributed real-time telecommunication control system, and an element management system built with Java technology. ATM is used for communication between boards, subracks and nodes.

Hardware

The RBS comprises at least of one cabinet with three subracks: Baseband (BB), Radio Frequency (RF) and Multiple Carrier Power Amplifier (MCPA) Subracks. The capacitor unit (CU) is a subrack external unit.

Software

The RBS software architecture consists of two layers: the common platform layer and the application program layer:

- The common platform layer provides basic support for the application program and includes the operating system and provides support for ATM transport, and O&M.
- The application program runs on top of the common platform layer and defines the RBS functionality.

A Main Processor (MP) executes the RBS software.

2.2 Main Services and Functions

The RBS provides radio resources for the RAN. It provides radio transmission and reception in one or more cells. The RBS functionality is divided into traffic and O&M functions:

- The traffic related functions handle the communication with the RNC and the UE. This also includes the handling of cells, transport channels, and ATM links.
- The O&M functions ensure that the system becomes and remains operational, handles equipment malfunctions, and monitors the RBS performance.

2.3 RBS Characteristics and Configurations

The RBS has a CE marking and fulfills requirements set by various certifying bodies for Radio Frequency, EMC etc. For detailed information on product safety, product data and environmental characteristics, please refer to *HEALTH AND SAFETY INFORMATION* and *PRODUCT DATA*.

The RBS has a modular architecture with scalable capacity. Various configurations consist of one of more cabinets, each containing a number of subracks. For detailed information on different RBS configurations, see *CONFIGURATION DATA*

The RBS is powered by DC –48V.

2.4 Design for Environment

Ericsson has received a worldwide ISO 14001 certification granted by British Standards Institute, BSI, for its Environmental Management System (EMS). An important part of Ericssons Environmental work is Design for Environment (DfE). The DfE guidelines are implemented in all new design projects. The environmental work done for RBS 3202 has among other things resulted in a complete materials declaration and an *END OF LIFE TREATMENT INFORMATION* document.

3 Hardware Structure

An RBS consists of one or more cabinets dependant on the configuration. A single cabinet is currently configured to handle one Radio Frequency carrier in three sectors.

Each cabinet contains four subracks that can be equipped with several plug in units (PIU) depending on configuration and various traffic and transmission capacities. Each subrack is equipped with its own fan. Each subrack is equipped with its own fan. The location of the subracks, climate unit, and interface connection field in a cabinet is shown in figure 2.

Figure 2 Hardware Locations

The numbers in the figure above denote:

- A) Interface Connection Field (ICF)
- B) Capacitor Unit (CU)
- C) Baseband (BB) subrack
- D) Radio Frequency (RF) subrack
- E) MCPA subrack

Each subrack houses a number of boards designed for different functions. The boards and units are described later in this chapter

The Baseband and RF subrack are based on a common platform. The backplane and Switch Core Boards (SCBs) use the ATM protocol for communication within and between subracks. The cabinet's BB and RF subracks are also connected to each other through the Baseband Interface Board (BBIFB) and the Radio Frequency Interface Board (RFIFB) carrying the downlink and uplink traffic streams.

3.1 Connection Fields

Located on the cabinet top are the Connection Fields, which comprises an Interface Connection Field (ICF) and connection interfaces for grounding, power, and antenna jumper cables.

The ICF is used as an interface to the cabinet boards and contains the interfaces for transmission, local O&M and Auxiliary Unit Hub (AU-Hub).

3.2 Capacitor Unit

The Capacitor Unit smooths the -48 Vdc supply, which powers the RBS. It ensures that the RBS remains in operation during any short transient drop.

3.3 Baseband Subrack

The baseband subrack comprises an Iub interface connection with an RNC, the MP cluster, and the baseband functionality. Baseband functionality consists of transport channels, encoding and decoding, spreading of bits, combining of channels, reception through a rake receiver, and searching and random access processing. Subracks in a multi-subrack system are interconnected in a star configuration in which one of the baseband subracks serves as the main subrack. Equipping of the subrack differs depending on whether it is the main or the extension subrack.

The following sections give a brief description of the boards in the subrack.

ETB

The Exchange Terminal Board (ETB) provides the connections for the Iub and remote Mub interfaces. It serves as an interface between the transmission cables and the Asynchronous Transfer Mode (ATM) switch on an SCB. The type of ETBs depends on the transmission standard.

SCB

The Switch Core Board (SCB) contains an ATM switch and interfaces to the ATM switch ports located on other boards via the backplane. An SCB can be connected with up to four other SCBs located in other subracks.

The SCB also has a connector and filter for the system power. The system power is distributed within the subrack via the backplane. The SCB also supervises and controls the subrack fans.

The two outer positions in a subrack are always reserved for SCBs. In larger configurations with more than five subracks, Switch Extension Boards (SXB) are added to the main BB subrack to extend the number of SCB connections.

RAXB

The Random Acces/Receiver Board (RAXB) comprises the baseband receiver part, which takes care of decoding, searching and rake receiving for dedicated and random access transport channels, and cell combination for softer hand over. A soft hand over takes place when a UE moves from one sector to another using the same frequency.

RAXBs within a baseband subrack share the load to achieve high availability. If one RAXBs fails, the load is divided over the remaining RAXB. This ensures the RBS continues to handle traffic, although with reduced capacity.

GPB

The General Processor Board (GPB) operates as an MP and contains and executes the main part of the RBS software. It controls devices on boards and in auxiliary units. The GPB has flash disk storage, an Ethernet connection and an RS232 interface.

TXB

The Transmitter Board (TXB) comprises the baseband transmitter part for handling transport channels, encoding, cell splitting, modulation and spreading, and channel combining.

TUB

The Timing Unit Board (TUB) generates and distributes local timing signals.

BBIFB

The Baseband Interface Board (BBIFB) connects the baseband subrack to the RF subrack. The connection carries the downlink and uplink traffic streams, and timing signals.

3.4 Radio Frequency Subrack

The RF subrack contains all the RF processing hardware, except for the power amplifiers and an optional ASC. It takes care of D/A and A/D conversion, RF modulation and demodulation, RF carrier combining and splitting, and low noise amplification for reception.

The following sections give a brief description of the boards in the subrack.

SCB

SCB is described at page 6 .

AIU

The Antenna Interface Unit Board (AIU) consists of a filter and control unit, and a combiner and splitter unit. The filter and control unit provide the following:

- Duplex filtering of the transmitter and receiver signal
- Low-noise amplification of the receiver signal
- Power measurement of transmitter signal
- Flexible frequency and signal splitting

The combiner and splitter unit performs frequency combination in the downlink, signal splitting, and high power combination when two MCPA modules are used. Frequency combination can be either two-way or four-way (when three frequencies have to be combined, the fourth input is unused). When using two MCPA modules for amplification, the combined signal is split, and after amplification the signals are coherently combined again and sent to one antenna.

RFIFB

The Radio Frequency Interface Board (RFIFB) connects the RF subrack to the baseband subrack. The connection carries the downlink and uplink traffic, and timing signals. The RFIFB also implements power clipping for downlink traffic.

TRXB

The Transceiver Board (TRXB) provides channel filtering, delay and gain adjustment, A/D and D/A conversion, and RF modulation and demodulation. A TRXB comprises two independent transceivers for two transmitter and receiver signal pairs.

3.5 MCPA Subrack

The MCPA subrack contains the linear power amplifiers for the RF carriers. The subrack contains positions for up to six MCPA modules. It is connected to the RF subrack through front panel cabling.

MCPA

The MCPA is a 20 W RF power amplifier with a bandwidth of 20 MHz. Each power amplifier can simultaneously amplify up to four RF carriers, by dividing the power over the carriers. Two MCPAs can be combined to increase the output power to 40 W by using the AIU in the RF subrack.

MCPA Hub

The MCPA Hub is the connection interface between the MCPA and the RFIF.

3.6 Internal Cables

This section gives a brief description of the internal RBS cables.

Inter-Subrack Link

The inter-subrack link is a common platform ATM interface cable for inter-subrack communication. This interface cable is a high-speed point-to-point communication link. It carries control signaling from the MP to device boards in the subracks.

Gamma Cable

The gamma cable connects the BBIFB and RFIFB. The BBIFB and RFIFB can connect two gamma cables, one for each antenna branch. It carries serial traffic streams from the gamma interface.

Intra-Cabinet Timing Cable

The intra-cabinet timing cable is a connection between the BBIFB and RFIFB. This cable connection distributes timing signals from the RF subrack to the baseband subrack and to read RFIFB product information.

Inter-Subrack Timing Cable

The inter-subrack timing cable distributes timing signals from the TUB to RF subracks. The cable is connected to the BBIFB in the main baseband subrack and to all RFIFBs. In a multi-cabinet configuration these cables must be of same length.

Internal Jumper Cable

The internal jumper cable connects an AIU to the connection field at the top of the RBS cabinet. As an AIU can handle two antenna branches, two cables are connected per AIU. The cable carries the transmit RF and receive RF signals.

For mast mounted equipment, the AIU can feed power through both cable connections. One of the antenna connectors also has the capability to carry the auxiliary unit interface, which supervises and controls units, for example the ASC.

MCPA and MCPA Fan Unit Control Cable

The MCPA and MCPA fan unit control cable is the auxiliary unit control connection for the MCPA and MCPA fan unit. The cable is connected between RFIFB and MCPA connector hub. MCPAs within the MCPA subrack and the fan unit are controlled through the same the connection.

Low-Power Multi-Carrier TX Cable

The low-power multi-carrier TX cable carries the low power RF signal after carrier combination and signal splitting (if applicable) from the AIU to the MCPA.

High-Power TX Cable

The high-power TX cable carries the RF signal from the MCPA to the AIU after power amplification.

Site LAN Cable

The site LAN cable is an Ethernet based connection for the thin client. The site LAN cable connects the Ethernet interface of the MP to the connection field at the top of the RBS cabinet.

Transmission Cable

This transmission cable connects the ETB to the connection field at the top of the RBS cabinet.

Capacitor Unit Control Cable

The capacitor unit control cable is an auxiliary unit interface connection for supervising and controlling the capacitor unit. The interface cable connects the SCB to the capacitor unit via the connection field at top of the RBS cabinet.

XALM Interface Cable

The XALM interface cable connects the SCB to the connection field at the top of the RBS cabinet. It is an auxiliary unit interface and handles the customer specific alarms and control outputs as well as alarms for Ericsson external equipment.

High-Power Combining Cable

The high-power combining cable is used when combining two MCPAs. The high power combiner in the AIU combines the signal from two MCPAs and sends it to one antenna.

Low-Power Single Carrier TX Cable

The low-power single carrier TX cable connects the TX output of the Transceiver PBA to the AIU for carrier combination and signal splitting, if applicable.

BB Subrack Fan Unit Cable

The BB subrack fan unit cable connects the baseband subrack fan unit to the SCB and is used for supervision and control of the fans.

RF Subrack Fan Unit Cable

This RF subrack fan unit cable connects the RF subrack fan unit to the SCB and is used for supervision and control of the fans.

4 Software Structure

The functionality consists of two parts that operate on the infrastructure and a common platform. The two parts are:

- Control plane functionality
- User plane functionality

figure 3 shows the general RBS software architecture.

Figure 3 Architectural Overview

Control Plane Functionalties

The control plane functionalities are:

- Traffic Control
- O&M

User Plane Functionalties

The user plane functionalties are:

- Transport
- Baseband
- Radio
- Antenna near parts

4.1 Layered Views

There are three important views of an RBS node, each showing a specific aspect and containing several layers:

- Platform View
  - Common Platform Layer
  - Application Program Layer
- Traffic control view
  - Traffic Service Layer
  - Logical Resource Layer
  - Equipment Layer
  - Hardware Layer
- Management view
  - Presentation Layer
  - Management Adaption Layer
  - Resource Layer

Platform View

The platform view consists of two layers: the common platform layer and the application program layer. The application program layer is the software executing on top of the common platform. So, from the platform point of view, there is no specific structure for the application program.

The common platform layer isolates the application program layer from the implementation details of the processor and ATM platform. This makes it possible to change the processor and ATM parts without having to modify the application program.

A standard web browser is used for RBS management through the element manager. The platform layer supports the Element Manager (EM) by providing common platform support functions such as a graphical interface, Java applet communication and online context sensitive help.

Traffic Control View

This view hides the specific RBS hardware from the actual services supplied by the RBS. This is done to encapsulate the parts of the system that change when hardware is modified. Modification normally takes place when an RBS is updated (for example, capacity increase) or when different types of RBSs are supported.

There are four layers in the traffic control view:

- Traffic service layer that carries out the application program procedures using logical resources, for example, channels.
- Logical resource layer that provides logical resources for the traffic service layer. It transforms operations on logical resources into operations on devices.
- Equipment layer that makes functionality hardware independent by providing devices to logical resource layer.
- Hardware layer that hides the hardware details.

Management View

The management view covers the application program and the common platform. It hides implementation details from the user interface.

There are three layers in the management view:

- The presentation layer holds the GUI, which consists of, for example, HTML pages and Java applets. They include, for example, workflow-oriented forms for system configuration and support for reading and presenting an event log. The presentation layer is implemented using web pages and applets, which can be viewed using a standard web browser.
- The management adaptation layer represents objects visible through the Mub management interface. These objects contain attributes, that can be read or written, and methods for operations on these objects through the standard web browser.
- The resource layer hides the lower level implementation details of the objects, which reduces the impact of changes.

Fault detection functions in the resource layer, and also in the common platform, ensure fault and error detection. The hardware layer within the resource layer provides fault and error detection support on a low level. However, it has no direct interface to the management adaptation layer. The management adaptation layer and the common platform generate the corresponding alarms. Events can have their origin in any part of the system, but the management adaptation layer and the common platform generate the event reports.

5 Functions

The RBS functions can be divided into RBS application and common platform functions. RBS application functions use common platform functions to realize their tasks. An overview of the main RBS application function groups and their interfaces is given in figure 4. The interfaces are described in page 15.

Figure 4 Main RBS Application Function Groups

Measurement functionality is divided into a detector part (normally in radio transport functions) and a control part, that controls the measurement. Measurement functions have different roles in the measurement functionality.

The O&M for traffic control functions is included within the function itself. Security aspects are handled within each function that interfaces with the Mub. Security support is provided by the platform functions.

Functions that have an interface for management only cover functionality towards an Mub user. The Mub user can be either an element management node or RANOS.

5.1 Application Functions

The application functions of the RBS are divided into function groups each covering some specific RBS functionality. See table 1 for RBS function groups.

Table 1 RBS Function Groups

Function group	Task
Radio Transport	Radio transport functions manages user data processing in the baseband and RF parts of the RBS node. It handles the air interface Uu. Measurement detector functionality is also included.

Function group	Task
Synchronization	Synchronization functions provide correct data timing, and prevent data loss due to slip of sent and received information through the system. They also provide stable frequency references for RF stabilization. Synchronization functions are managed through the Mub interface. Synchronization frames are carried over the Iub interface to and from RNC.
Bearer	Bearer functions transfer user or control data between the RNC and RBS. The data is carried over the Iub interface
Traffic Control	Traffic control functions provide control of traffic-related resources such as common and dedicated radio connections, cells and ATM connections. They also provide control of measurement requested from the RNC. Traffic control is performed through the Iub interface and is managed over the Mub interface.
Configuration Management	Configuration management functions create and delete RBS Managed Objects (MO). Attributes of these MOs can be set and read. These functions are performed over the Mub interface. Some functionality also exists that uses the Iub interface.
Fault Management	Fault management functions detect, isolate, and recover from faults in supervised functions. Faults are reported through alarms, that also are logged and maintained in an active alarm list. Alarm handling is performed through the Mub interface. Supervision functions are always active and do not have to be configured.
Performance Management	Performance management functions collect, store and report statistics regarding RBS measurements. These functions are performed through the Mub interface.

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Function group	Task
Infrastructure	Infrastructure functions handle power feeding, environmental control and basic infrastructure software functionality. These functions are managed through the Mub interface.
User Interface	The user interface handles the GUI. This function group contains the GUI functionality.

5.2 Platform Functions

The Platform contains all the functionality necessary to switch ATM cells and variable length cells (that is, ATM Adaptation Layer type 2 (AAL2) Common Part Sublayer (CPS) packets) within an ATM-based telecommunications network. It also includes CCITT Signalling System number 7 (SS7) support (Signalling Connection Control Protocol (SCCP) Message Transfer Part layer 3 broadband (MTP3b) as well as functionality for network signalling using Q.2630.1 for AAL2 connections.

6 External Interfaces

The RBS is connected to the outside world through the Iub, Uu and Mub interfaces. Besides these interfaces the RBS also provides a management GUI that uses the Mub, and a Visual and Mechanical Interface (VMI), which comprises indicators, switches, buttons, cables, and so on. An overview of the external interfaces is given in figure 5. Descriptions of the interfaces are given below.

Figure 5 External Interfaces

6.1 Iub Interface

The Iub interface is the interface between the RBS and the RNC. The Iub is divided into several protocol layers as follows:

- Physical layer (L1)
- ATM and ATM adaptation layers (L2)
- Network layer (L3) for frame handling

The L3 protocol for the RNC plane is called NBAP. The L2 and L3 part of air interface channels RACH, FACH, PCH and DCH terminate in the RNC.

From an RBS perspective, the different air interface channels are all treated as transparent user plane channels.

6.2 Uu Interface

The Uu interface is the radio interface between RBS and the UE. The radio interface is divided into three protocol layers as follows:

- Physical layer (L1)
- Data link layer (L2)
- Network layer (L3)

The L2 comprises of Medium Access (MAC) and Radio Link Control (RLC). The MAC provides unacknowledged transfer of SDUs between peer MAC entities, and the RLC provides data transfer of SDU and can also support the retransmission protocol. L3 comprise the Radio Resource Control (RRC), which interfaces with L2.

6.3 Mub Interface

The Mub is the management interface for the RBS and, in contrast to the Iub, is not standardized. The interaction between the system and a user is realized by means of a thin client. The thin client is a computer with basic software installed such as a web browser. The thin client gets software that is dependent on the managed node by loading Java applets from the node at execution time.

The Mub is based on IP, so the RBS has an IP address. Remote management uses IP over ATM and on-site management uses Ethernet. The necessary low-level communication layers including FTP server, HTTP server, SNMP agent, ORB and Telnet server are provided by the common platform.

The management interfaces are shown in figure 6.

Figure 6 Management Interfaces

Each is used for different purposes as follows:

- Telnet

  Telnet provides local and remote access to the operating system shell in the RBS. The command line interface provides a set of commands handled by a Unix shell-like command interpreter.

- IIOP

  IIOP (IP based Inter-ORB Protocol) is the protocol used in Common Object Request Broker Architecture (CORBA). It is the main protocol used for

RBS O&M. The element manager and the network manager (RANOS) uses the protocol.

- SNMP

  Simple Network Management Protocol (SNMP) monitors and configure the IP-router and IP protocols, and optionally for monitoring ATM resources.

- HTTP

  HTTP transfers HTML documents such as online documentation and Java applets from the file system in the RBS node to a managing system.

- FTP

  FTP transfers files to and from the file system in the RBS. This is primarily used for loading software, configuration data and other large volume data.

6.4 GUI

The Graphical User Interface (GUI) is the man-machine interface provided to the user. GUI applications are web based (HTML and Java applets) and run in a standard web browser. Two general types exist:

- Workflow oriented wizards, for example for node expansion, initial configurations and so on
- Panels used to set preferences, options and so on

6.5 Visual and Mechanical Interface

The visual and mechanical interface consists of:

- Visual indicators
- Switches and buttons
- Incoming external power
- External alarms and outputs
- Connectors, cables and screws

Visual Indicators

Each unit or board in the RBS is equipped with a red Light Emitting Diode (LED) for fault indication and a green LED for the indication of operation. Additionally, boards with a processor are equipped with a yellow LED for traffic indication. All LEDs light simultaneously for one second when the power is switched on.

Connectors, cables and screws

RBS switches and buttons serve the following functions:

- The AIU has RF jumpers or cables to allow for different RBS configurations with the same unit. The jumpers connect combiners and splitters that are applicable for a certain configuration.

7 Operation & Management

This section describes different tasks included in O & M of the RBS 3202.

7.1 Standard Operation

The RBS needs to be configured to suit the requirements of the operator, special Configuration Operating Instructions give information regarding different configurations.

The RBS is monitored by aid of the RBS Element Manager (EM). The EM is accessed by connecting a thin client to the Site LAN connection plate. Instructions on how to configure and connect a thin client to the RBS is found in *PRODUCT HANDLING*.

For a detailed description of the EM, please refer to *ELEMENT MANAGER*. The following are tasks performed via the EM:

- RBS EM topology view handling
- Configuration management
- Software management
- Alarm management
- Restart
- Timing Unit (TU) switch
- Object properties handling
- Locking and unlocking of objects
- Online help

7.2 Alarms

From RANOS or in the EM you are able to display a list of all alarms the RBS may raise. From the Alarm List you are able to:

- Display alarm details
- Acknowledge alarms
- Unacknowledge alarms

- Add comments to an alarm
- View specific alarm help instructions in an Operating Instruction (OPI)

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Configuration Data

Contents **Page**

1 RBS 3202 Configuration Data

1.1 Introduction

This document describes standard HW configurations of the 3202 radio base station.

1.2 Purpose

The document is intended to be used as reference material when an RBS site is engineered.

2 Standard Configurations

The RBS 3202 is currently only available in the 1*1, 2*1, and 3*1 configurations. All three configurations are housed in on single radio rack.

The RBS comprises at least of one cabinet with three subracks: Baseband (BB), Radio Frequency (RF) and Multiple Carrier Power Amplifier (MCPA) Subracks (see figure 1). The capacitor unit (CU) is a subrack external unit.

2.1 1*1 Configuration

The 1*1 configuration has one sector with one TX-antenna

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Figure 1 Hardware Overview of RBS 3202 (1*1 Maximum Configuration)

The minimal 1*1 configuration (1 RAX units) offers a total capacity of 16 CEs, the maximum configuration (2 RAX units) offers a total capacity of 32 CEs (E1/J1 transmission).

For an overview of required hardware for configuration 1*1 see table 1.

Table 1 HW Units 1*1 Configuration)

HW Unit	*No. of Units*	*Comments*
SCB	1	
GPB	1	
TUB	1	
BBIFB	1	
ETB-M1	0–4	Total 1–6 ETBs
ETB-M4	0–2	
RAXB	1–2	
TXB	1	
RFIFB	1	
TRXB	1	
AIU	1	
MCPA	1	
MCPA-hub	1	

2.1.1 Power Requirements

The power requirement for the RBS 3202 is nominal –48V, with 150A fuse. Operational voltage is between –40,5 V DC and –57,0 V DC.

Table 2

Configuration	Nominal Power Consumption	Maximum Power Consumption
1x1	– kW	– kW

2.2 2*1 Configuration

Hardware Overview of RBS 3202 (2*1 Configuration)

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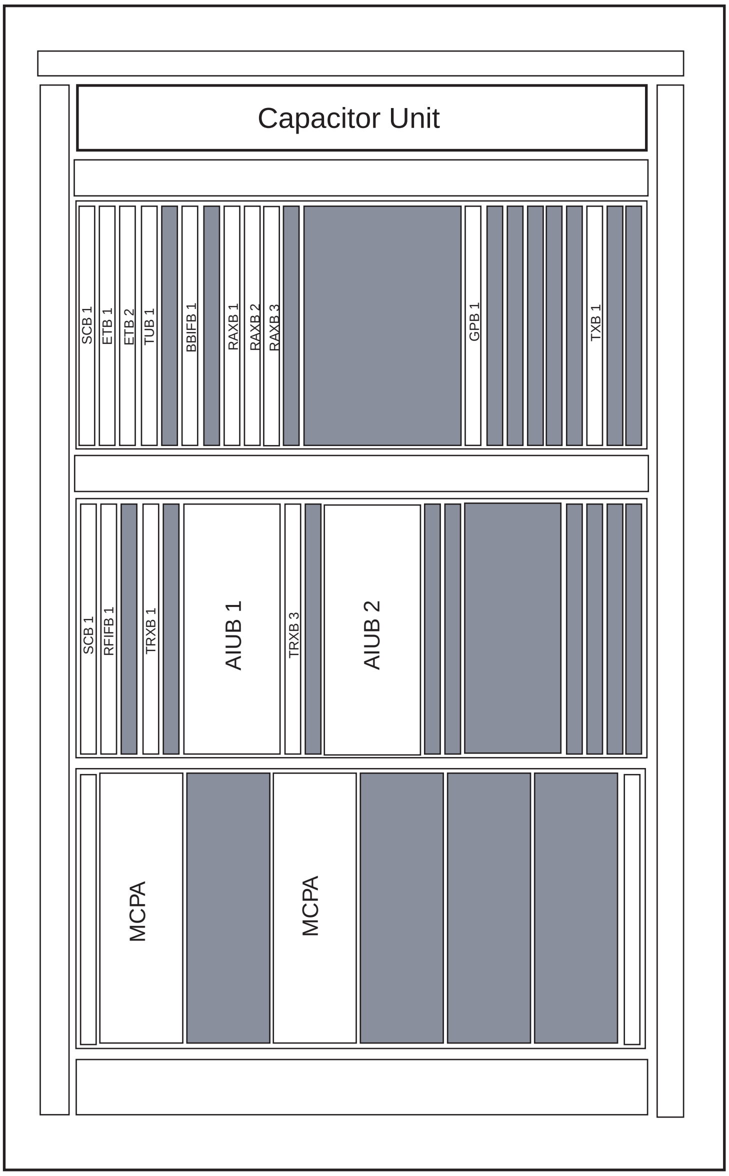

Figure 2 Hardware Overview of RBS 3202 (2*1 Maximum Configuration)

The minimal 2*1 configuration (2 RAXB) offers a total capacity of 32 CEs, the maximum configuration (3 RAXB) offers a total capacity of 48 CEs (E1/J1 transmission).

For an overview of required hardware for configuration 2*1 see table 3.

Table 3 HW Units (2x1 Configuration)

HW Unit	*No. of Units*	*Comments*
SCB	1	
GPB	1	
TUB	1	
BBIFB	1	
ETB-M1	0–4	Total 1–6 ETBs
ETB-M4	0–2	
RAXB	2–3	
TXB	1	
RFIFB	1	
TRXB	2	
AIU	2	
MCPA	2	
MCPA-hub	1	

2.2.1 Power Requirements

The power requirement for the RBS 3202 is nominal –48V, with 150A fuse. Operational voltage is between –40,5 V DC and –57,0 V DC.

Table 4

Configuration	Nominal Power Consumption	Maximum Power Consumption
2x1	– kW	– kW

2.3 3*1 Configuration

The 3*1 configuration has three sectors and one carrier with one TX-antenna/sector.

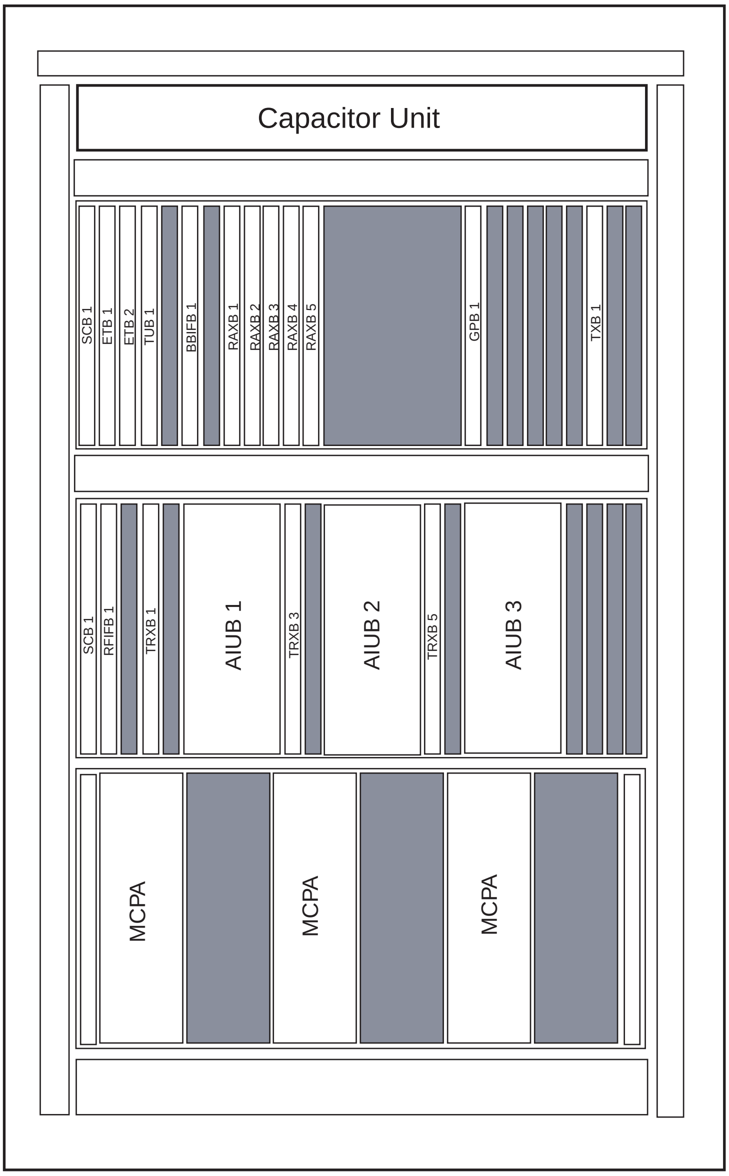

Figure 3 Hardware Overview of RBS 3202 (3*1 Maximum Configuration)

The minimal 3*1 configuration (3 RAX units) offers a total capacity of 48 CEs, the maximum configuration (5 RAX units) offers a total capacity of 80 CEs (E1/J1 transmission).

For an overview of required hardware for configuration 3*1 see table 5.

Table 5 HW Units (3*1 Configuration)

HW Unit	*No. of Units*	*Comments*
SCB	1	
GPB	1	
TUB	1	
BBIFB	1	
ETB-M1	0–4	Total 1–6 ETBs
ETB-M4	0–2	
RAXB	Min 3 Max 5	
TXB	1	
RFIFB	1	
TRXB	3	
AIU	3	
MCPA	3	
MCPA-hub	1	

2.3.1 Power Requirements

The power requirement for the RBS 3202 is nominal –48V, with 150A fuse. Operational voltage is between –40,5 V DC and –57,0 V DC.

Table 6

Configuration	Nominal Power Consumption	Maximum Power Consumption
3x1	1.6 kW	2.3 kW

3 Transmission Guidelines RBS 3202

Transmission Connection Interface is shown infigure 4.

Figure 4 Transmission Connection Interface with MiniWift

The external transmission cables are connected to the Connection Field (CF) located on top of RBS cabinet. The choice of connection points depends on the configuration of ETB.

Panel of the CFs are connected internally to the ETBs in the subracks.

- ET-M1
- ET-M4

ET-M1

The connection interface in the Connection Field (CF) is equipped with eight female RJ-45 connectors for the ETB cables. Each connector have one port. Three types of transmission standards for the ET-M1 are presented in table 7 and table 8 .

Table 7 Transmission standards, ET-M1

Transmission Standard	Transmission Capacity (Mbit/s)	Physical Layer Interface Specification
J1	1.5	G703
E1	2	G703

Table 8 Cable Characteristics.

Transmission Standard	Cable Impedance	Cable Type
J1	110Ω	Twisted pair
E1	120Ω	Twisted pair
E1	75Ω	Coaxial

ET-M4

The connection interface in the Connection Field (CF) is equipped with two pairs of female SC connectors for the ETB cables. The transmission standard for the ET-M4 is presented in table 9 and table 10

Table 9 Transmission Standard ET-M4

Transmission Standard	Transmission Capacity (Mbit/s)
STM-1	155

Table 10 Cable Characteristics

Transmission Standard	Cable Type
STM-1	Optical Fibre

The connection panels for the CFs are connected to the boards in the subracks.

3.1 Transmission Adapter Option

A transmission adapter can be installed next to the CF. The transmission adapter is a converter between the 75Ω coax interface and the 120Ω twisted pair aimed for the E1 interface. The signal is transformed to 120Ω in the transmission adapter and distributed (see figure 5) to the CF and further on to the ETB.

Figure 5 Transmission Adapter Option Installed

3.2 Transmission Configurations RBS 3202

table 11 lists possible transmission configurations for the RBS 3202 (only E1/J1).

Table 11 Transmission Configurations RBS 3202 (E1/J1)

BB Subrack Slot position	2	3	22	23	24	25
	ETB1	ETB2	ETB3	ETB4	ETB5	ETB6
1, 4 or 8 *E1/J1	ETB-M1					
1, 4 or 8 *E1/J1+Transmission Adapter	ETB-M1					
16*E1/J1	ETB-M1	ETB-M1				
24*E1/J1	ETB-M1	ETB-M1	ETB-M1			
32*E1/J1	ETB-M1	ETB-M1	ETB-M1	ETB-M1		
1, 4 or 8* E1/J1+2*STM1	ETB-M1				ETB-M4	
1, 4 or 8* E1/J1+Transmission Adapter+2*STM1	ETB-M1				ETB-M4	
16*E1/J1+2*STM1	ETB-M1	ETB-M1			ETB-M4	
24*E1/J1+2*STM1	ETB-M1	ETB-M1	ETB-M1		ETB-M4	
1, 4 or 8*E1/J1+4*STM1	ETB-M1				ETB-M4	ETB-M4
16*E1/J1+4*STM1	ETB-M1	ETB-M1			ETB-M4	ETB-M4
24*E1/J1+4*STM1	ETB-M1	ETB-M1	ETB-M1		ETB-M4	ETB-M4

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32*E1/J1+4*STM1	ETB-M1	ETB-M1	ETB-M1	ETB-M1	ETB-M4	ETB-M4
2*STM1	ETB-M4					
4*STM1	ETB-M4	ETB-M4				