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UltraSite EDGE BTS IBBU Unit Descriptions

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Contents

1 Statutory information

1.1 CE Marking

Standard	Description
CE 0168 !	Hereby, Nokia Corporation, declares that this Nokia UltraSite EDGE Base Station is in compliance with the essential requirements and other relevant provisions of Directive: 1999/5/EC.

1.2 FCC Statement

Standard	Description
FCC Statement	Hereby, Nokia Corporation declares that this Nokia UltraSite EDGE Base Station is in compliance with the essential requirements and other relevant provisions of Directive: 1999/5/EC. The product is marked with the CE marking and Notified Body number according to the Directive 1999/5/EC. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The term "IC:" before the radio certification number only signifies that Industry Canada technical specifications were met.

2 Technical description of UltraSite EDGE BTS IBBU units

2.1 Delivery content of UltraSite EDGE BTS IBBU upgrade transportation package

Table 1. Delivery content of UltraSite EDGE BTS IBBU upgrade transportation package

Part	Quantity	Check
BATA backplane (pre-installed)	1	
Rectifiers (BATx)	1-5 (user-defined)	
Batteries (BBAx)	2	
ADUA (pre-installed with cabinet control unit)	1	

2.2 AC/DC Connection (ADUA) unit

2.2.1 Technical description of AC/DC Connection/Cabinet control (ADUA/CCUA) unit of UltraSite EDGE BTS with IBBU

The AC/DC Connection Unit (ADUA) provides power to all of the loads in the UltraSite EDGE BTS. The ADUA is located at the bottom of the IBBU. The AC inlet for the site is connected to the ADU, which contains the DC distribution and circuit breakers for each power outlet (for the BTS, batteries and other customer equipment).

The ADUx supports configurations ranging from a minimum base station configuration in the same cabinet (up to six TSxx units) to a maximum of 18 TSxx units formed by a two-cabinet configuration.

The Cabinet Control Unit (CCUA) is located inside the ADUA, plugs into the ADUx unit and manages the following functions for the IBBU or UltraSite Support cabinet:

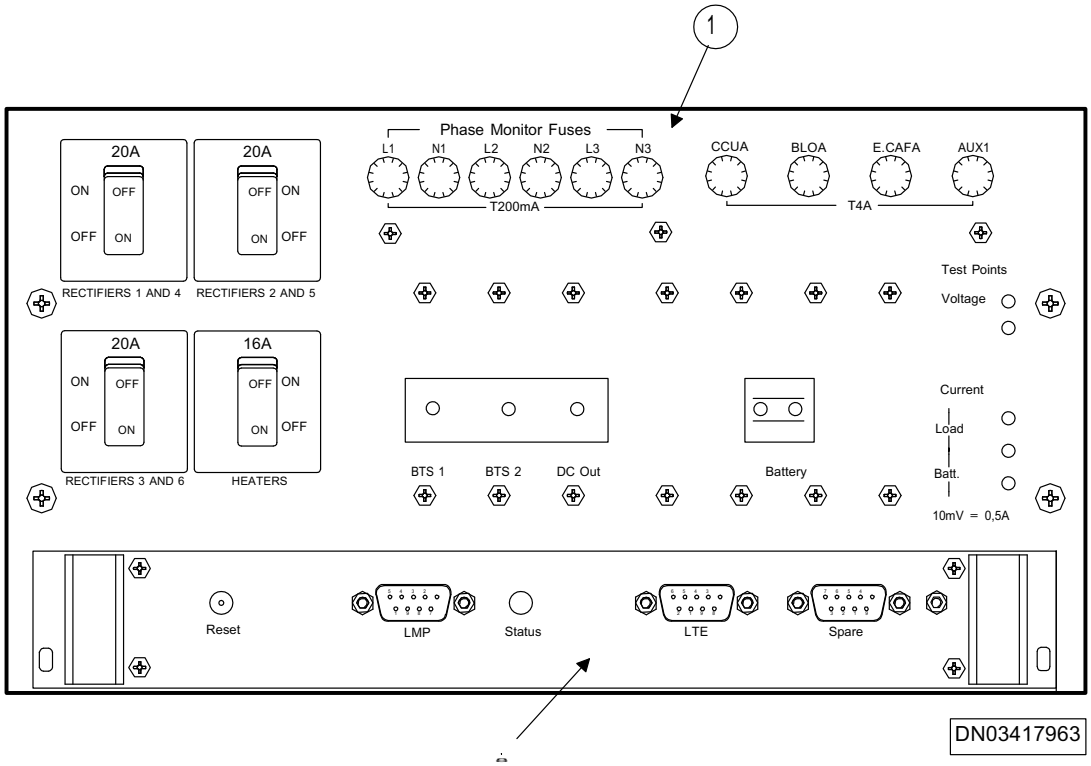
- battery control
- climatic control
- alarm reporting
- serial and version number reporting

2.2.1.1 Function

The Nokia UltraSite AC/DC Connection Unit (ADUA) is an integral part of the Nokia UltraSite Support which has been designed to be used with the Nokia UltraSite EDGE BTS.

The basic function of the ADUA is to distribute the AC mains to the rectifiers and then to distribute the DC output from the rectifiers to the intended loads. Should a mains failure occur, the ADUA ensures a battery supply for a determined period.

Incorporated in the ADUA is a Cabinet Control Unit (CCUA) which interfaces to the Q1 bus to provide control and monitoring functions for the Nokia UltraSite Support. The CCUA is located at the bottom of the ADUA and has a front panel present on the ADUA front panel.



1	ADUA Front Panel
2	CCUA

Figure 1. ADUA front panel (including CCUA)

2.2.1.2 Operation

ADUA

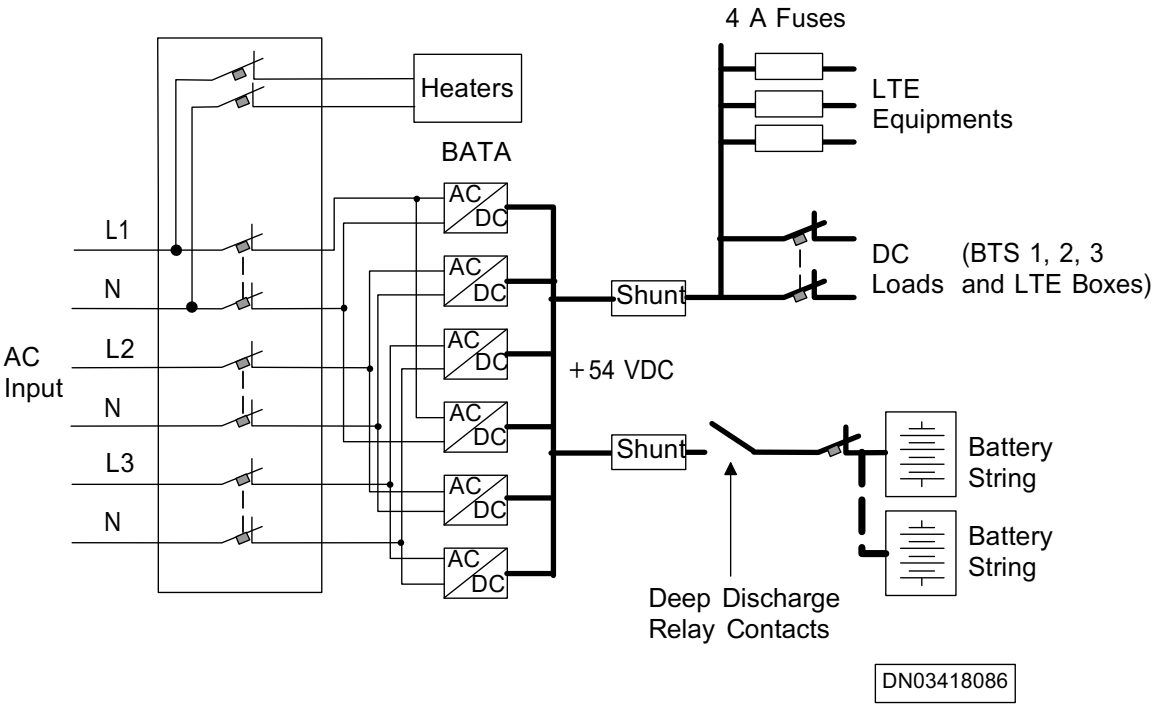


Figure 2. AC and DC distribution

The ADUA contains the necessary circuitry to provide a positive-earth 48 VDC power supply for use by the internal telecommunications equipment and the co-sited telecommunications equipment.

In the ADUA, up to six rectifiers can be accommodated for the AC mains input.

The unit can receive either a single-phase AC supply or a three-phase AC supply. The three-phase AC supply is connected to lines L1, L2 and L3. The AC supply is distributed to the rectifiers. Each line supplies two rectifiers (for example, L1 feeds rectifiers 1 and 4). The AC supply is fed also to the Mat heater(s), as required.

Table 2. Mains phase input connection to rectifiers

Phase connection	Rectifiers 1 - 6	Rectifiers 7 - 12
Line 1	BATA 1 BATA 4	BATA 7 BATA 10
Line 2	BATA 2 BATA 51	BATA 8 BATA 1
Line 3	BATA 3 BATA 6	BATA 9 BATA 12

Note

The battery Mat heater(s) are supplied from Line 3.

The DC supply produced by the rectifiers (nominally 54 VDC) is distributed by the ADUA to the connected loads (e.g.: The batteries, the DC loads and the LTE Box equipment) as determined by customer requirements. Should the AC mains fail, the ADUA will provide a battery supply to the loads for a duration that depends on the DC load and the battery capacity.

Note

The distribution will vary depending on the configuration.

CCUA

The CCUA is a programmable unit and provides control and monitoring functions. The functions affected by the CCUA are as follows:

- Management of the Integrated Battery Backup Unit (IBBU)
- Battery and power management. Should the AC mains fail, the CCUA causes the system to enter the battery back-up mode of operation. When this occurs, the level of battery output-voltage is monitored for ‘low alarm level’ and ‘low level disconnect’. The appropriate action is undertaken by the CCUA should either event occur
- Climatic control. The temperature within the cabinet is monitored and the speed of the fans (controlled by the temperature of the rectifiers) is adjusted to maintain the temperature within specific constraints
- Alarm reporting. An alarm is generated by the CCUA should an alarm state prevail and the alarm is sent to the base station via the Q1-bus
- Serial number and version reporting of the CCUA, the rectifiers and the LTE x units

There are three modes of operation and these are described in the sections that follow.

Battery back-up mode

In this mode of operation, the batteries provide the DC power requirements of the Support system and the base station.

During this time, the CCUA monitors the DC voltage level and should the level fall to the battery low-level parameter, a Battery Low alarm is raised. Should the DC voltage level continue to fall and go below the Low Voltage Disconnect (LVD) level, the CCUA will disconnect the battery supply from the load via the LVD relay. This condition is maintained until the DC voltage is restored to a level above 50 V. The batteries are then reconnected.

Site support mode

This mode is entered when the CCUA detects the Support Mode to be active. The mode is used to either manually or automatically effect a battery test.

During this mode of operation, the CCUA reduces the rectifier (BATA) output to the level of the Support Mode level. The whole DC power is then taken from the batteries.

Normal operation is resumed when the tests have been completed satisfactorily and the Support Mode signal disappears.

Boost charge mode

The CCUA monitors the status of the batteries to determine whether or not boost charging of the batteries is required. This can be done on a periodic basis or when the batteries have been discharged below a set DC value (automatic).

The maximum boost charge duration is 2 hours after which time, normal system operation is resumed.

Periodic boost charging does not occur unless 16 weeks (a period determined by the user) have elapsed since the previous boost charge. The time limit of 2 hours applies where the battery temperature is either equal to or in excess of +30º C. During battery charging, the current level is monitored and maintained within limits set by the CCUA.

Unit fan: rectifier internal temperature compensation

The CCUA monitors (once a minute) the internal temperature of the rectifier units and controls the unit fan speeds accordingly; 1 fan unit / 2 rectifiers. Control of the fan speed for the unit is adjusted according to the warmer rectifier. The fan will operate until the rectifier temperature cools down to an acceptable level at which point the fan is switched OFF.

The unit fan speed is set to a minimum when there is no temperature information from the two associated rectifiers.

The temperature of the rectifiers is measured once a minute by the CCUA. This function is undertaken by software control.

The unit fans are switched off when the temperature of the rectifier units is below a set level (+10º C) and switch on when the temperature is above this set level. The unit fan-speed increases from 40% (PWM signal 25%) to 100%. The relationship between the PWM and fan speed is a straight line function.

Table 3. Typical PWM/fan speed figures

PWM Control (%)	**Fan Control (%)**	**PWM Control (%) Fan Control (%) Fan Speed (maximum RPM)**
100	0	100
80	20	85
60	40	70
40	60	50

Table 3. Typical PWM/fan speed figures (cont.)

PWM Control (%)	Fan Control (%)	PWM Control (%) Fan Control (%) Fan Speed (maximum RPM)
20	80	35

When the PWM control is < 20% and fan control is > 80%, the fan is stopped.

The CCUA generates an alarm when either a fan stops rotating or when the rotation of a unit fan is too slow compared to the PWM signal.

The fan speed is dependent on the supply voltage. The CCUA checks that the reduced fan speed is not attributable to a reduced voltage supply. This is accomplished by comparing the rotation speed (rpm) measurements with other fans. An alarm is activated when the other fans are rotating at the desired speed (see Alarms 4.2.3.

The fans can be controlled separately for test purposes.

Battery cooling interface

The CCUA monitors the battery temperature. When the ‘Battery Temperature High’ alarm is signalled, the cabinet fan is set to full speed. This is accomplished under the control of the BOI for the IBBU cabinet.

Battery test

The batteries can be tested either automatically from the CCUA or manually. These tests can be completed either locally from the CCUA front panel LMP connector and an attached laptop computer (via the RS232 interface) or remotely from the NMS (via Q1-bus and the RS485 interface).

Automatic battery testing can be arranged to occur at set times during a year, where four times a year is usual. The period of a test is pre-defined.

The batteries must be in a fully charged state before an automatic test can take place. This status is determined by the CCUA.

The ‘Battery Failure’ alarm occurs when the battery output voltage is too low during the automatic test. The test is discontinued should the output voltage of the batteries fall below the ‘Support Mode’ level. This is also the lower level for discharge of the batteries during automatic testing.

When manual testing of the batteries is taking place, the ‘Support Mode’ level can be activated either locally via a CCUA front panel connector or remotely from the NMS.

During a battery test (automatic or manual), the DC output from the rectifiers is decreased to the ‘Support Mode’ level. At this time, the power for the load is taken from the batteries.

CCUA generated alarms

The alarm status indicated by the CCUA is polled by the base station control unit (BOI) via the Q1-bus. An alarm condition remains ON until the fault is corrected.

The CCUA sends some alarm signals to the EAC interface. A D-9 connector enables up to 9 alarm signals from the CCUA to be conveyed to the BTS. These alarms are user programmable so that the user can define the nature of alarms.

Table 4. CCUA generated alarms

Alarm Number	Description	Alarm Status	Cause
1	SSS outdoor cabinet door open	major	Cabinet door open
2	SSS extension outdoor cabinet (battery cabinet) door open	major	Cabinet door open
3	Battery failure during automatic battery test	major	Battery output voltage too low
4	LTE compartment temperature low in SSS indoor cabinet	critical[1]	Temperature below programmed level
5	LTE compartment temperature high in SSS indoor cabinet	critical[1]	Temperature above programmed level
6	Battery temperature low	major[2]	Temperature below programmed level
7	Battery temperature high	major[2]	Temperature above programmed level

Table 4. CCUA generated alarms (cont.)

Alarm Number	Description	Alarm Status	Cause
8	CCUA unit failure	critical	CCUA faulty or any temperature sensor faulty or missing
9	DC voltage high	critical	Support DC output above programmed level
10	DC distribution failure	critical	DC distribution fuse has failed, BATA over temperature alarm ON, or deep discharge relay in wrong position
11	Mains breakdown phase 1	critical	Rectifier AC input voltage too low
12	Mains breakdown phase 2	critical	Rectifier AC input voltage too low
13	Mains breakdown phase 3	critical	Rectifier AC input voltage too low
14	Battery low	major	DC battery output voltage below programmed level
15	Increase capacity	major[1]	Power consumption of load higher than fixed warning $level_3$
16	Overvoltage protector activated	minor	overvoltage protector has generated an alarm
17	PSM alarm 1	critical	Occurs when any urgent alarm is active
18	PSM alarm 2	major	Occurs when any warning alarm is active

Table 4. CCUA generated alarms (cont.)

Alarm Number	Description	Alarm Status	Cause
19	PSM alarm 3	minor	Occurs when any message alarm is active
20	PSM alarm 4	reserved for future use	Reserved
21	PSM alarm 5	reserved for future use	Reserved
22	PSM alarm 6	reserved for future use	Reserved
23	IBBS temperature increased	information to the BTS	Rectifier internal temperature increases above fixed level
24	IBBU temperature high	information to the BTS	Rectifier internal temperature increases above fixed level
25	Configuration change	information to the BTS	Serial and version numbers of unit changed. The CCUA gives the new configurational data when requested by the BOI

[1]User can enable or disable the alarm using PSMMan

[2]Information for BTS

[3]Warning level is: Number of rectifier units -1 piece x power of one rectifier unit < power consumption of the load.

Table 5. Unit fan alarms generated by the CCUA

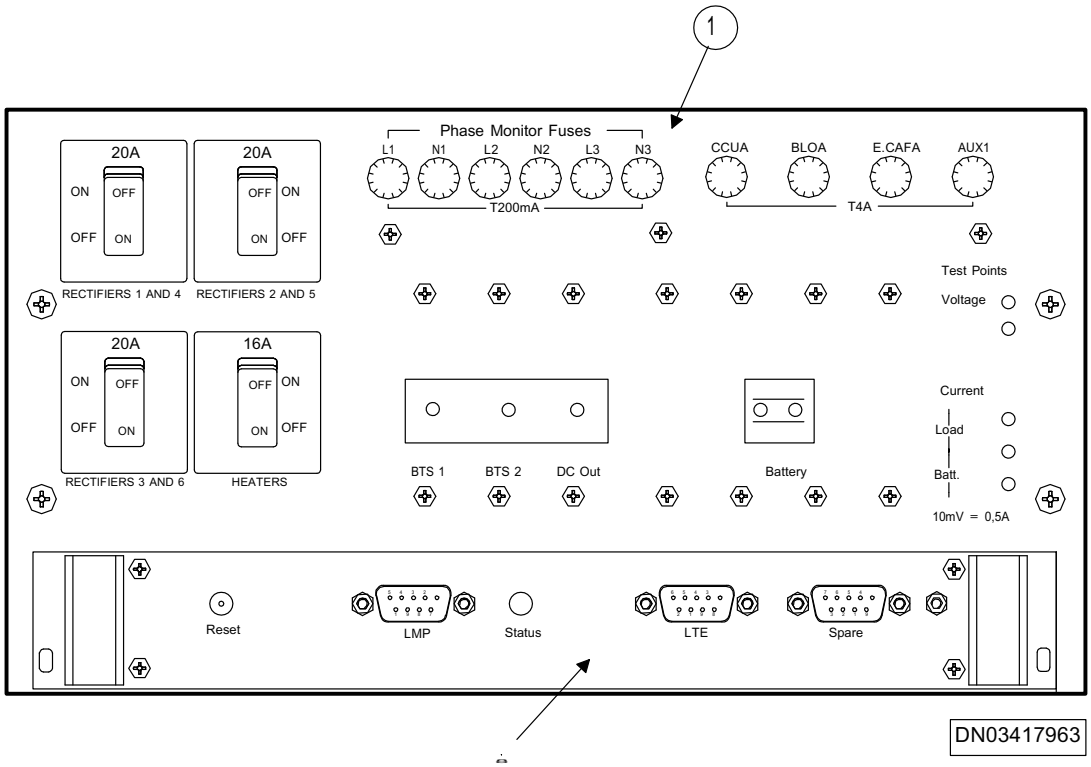
Alarm Number	Description	Alarm Status	Cause
Unit fan alarms			
1	Unit fan (position x) performance decreased	Major	Alarm when fan speed in position x has reduced by 20% from its reference speed (rotation speed too slow compared to speed control). Alarm activated after 5 speed measurements
2	Unit fan (position x) failure	major	Alarm when fan in position x has stopped rotating
Cabinet fan alarms			
1	Cabinet fan (position x) decreased performance	critical	Alarm when fan speed in position x has reduced by 20% from its reference speed (rotation speed too slow compared to speed control). Alarm activated after 5 speed measurements
2	Cabinet fan (position x) failure	critical	Alarm when fan in position x has stopped rotating

2.2.1.3 Construction

The AC/DC Connection Unit (ADUA) is located at the bottom of the IBBU that is located in a Nokia UltraSite EDGE BTS cabinet.

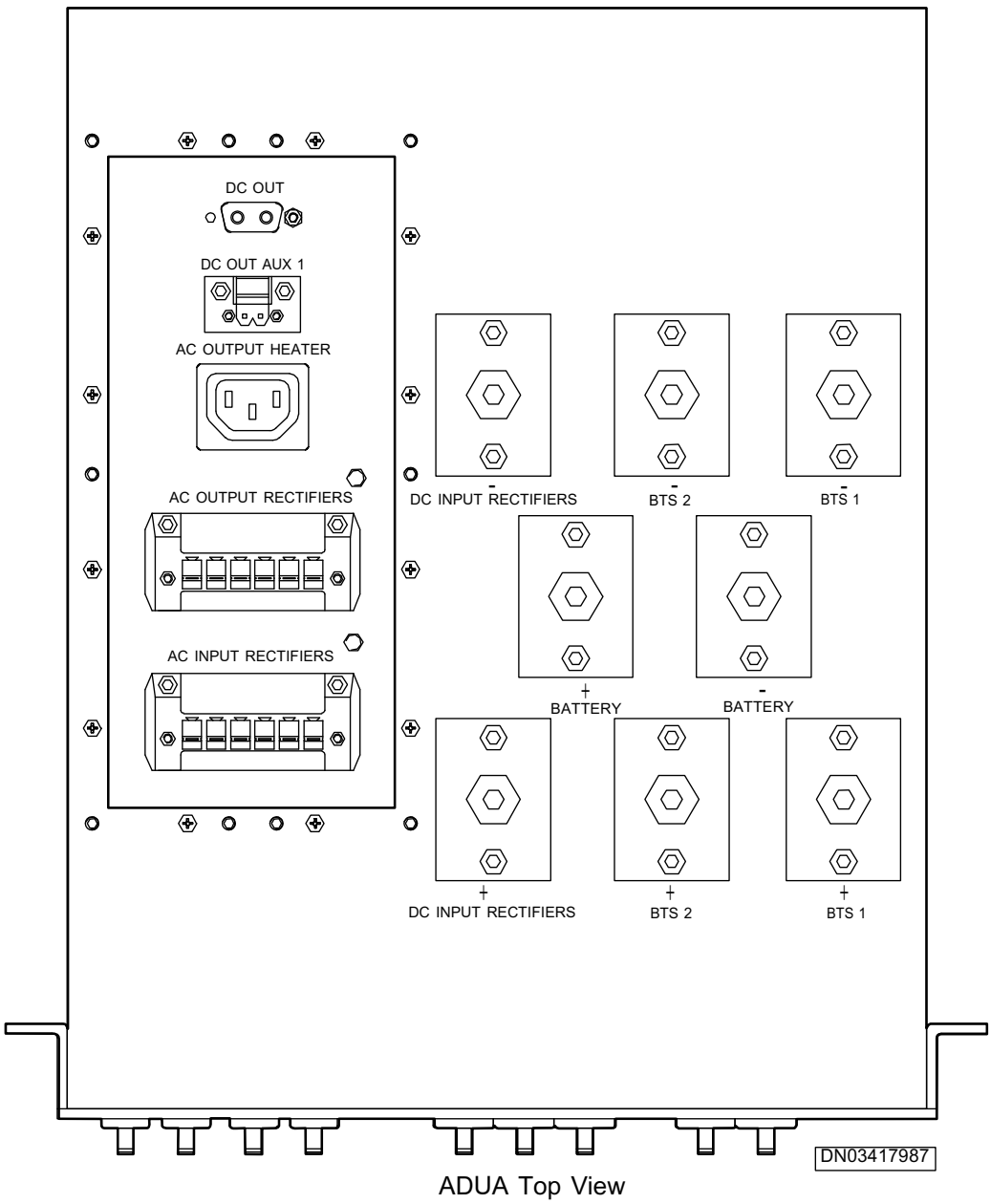
The ADUA contains the Cabinet Control Unit (CCUA) that is a plug-in module located at the lower front of the ADUA.

ADUA



1	ADUA front panel
2	CCUA

Figure 3. ADUA front panel



ADUA Top View

Figure 4. ADUA top view

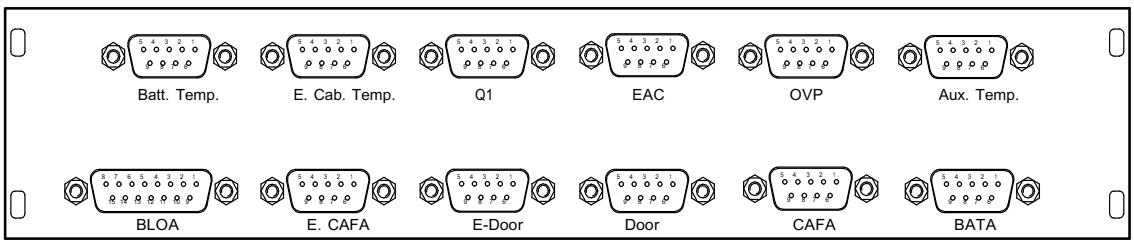


Figure 5. ADUA rear panel

The ADUA front panel has a number of circuit breakers, fuses and test points mounted on it. On each of the front panels there is also the Cabinet Control Unit (CCUA) that fits into the front panels at the bottom and push fits via guides into the backplane.

ADUA front panel

Each ADUA front panel comprises these items:

- Four single-pole ON/OFF switches
- Six fuses (200 mA). These are in the AC mains input lines (live and neutral)
- Four fuses (4 A)
- Five test sockets (2 mm). Three red and two black
- A number of LEDs to indicate the status of (for example) the BTS 1, the BTS 2, the DC Out and the batteries
- The CCUA

ADUA top surface items

Each ADUA top surface comprises these items:

- The DC Out connector (2-pin)
- The DC Out Auxiliary 1 connector
- A single-phase (AC) mains connector

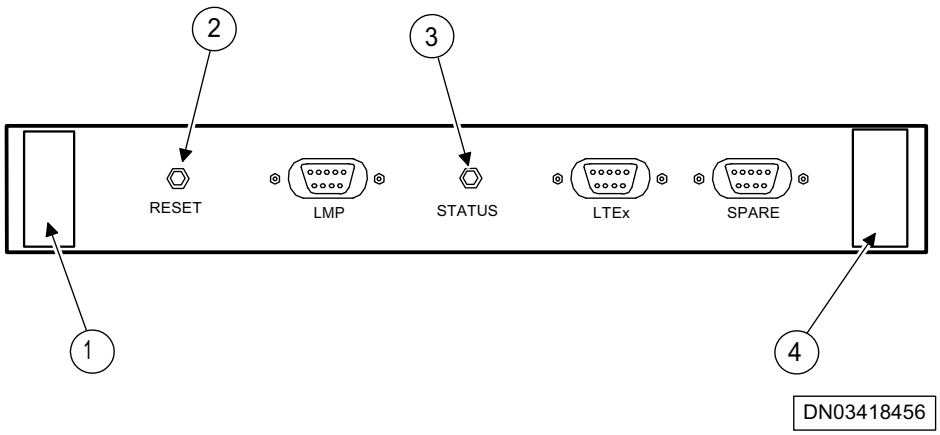
- Two high-power feed-through terminal-connectors (Phoenix Contact Power Combicon). These provide the AC input connection for the 1300W Rectifiers (BATA)
- Eight cable entries for the BATAs, the BTSs, the Battery + and the Battery - cables

ADUA rear panel

The rear panel comprises eleven D-9 type connectors and a single D-15 type connector as follows:

- The eleven D-9 connectors provide connection to/from these items: - The fans for the cabinet and the extension cabinet - Various alarm signals via the RS485 interface (e.g.: Battery temperature, Extension Cabinet temperature, Overvoltage protection (OVP), Auxiliary temperature, cabinet Door open and the extension Door open) - The connection to the Q1-bus - The BATA - An EAC connector
- The D-15 connector feeds the BATA unit blowers

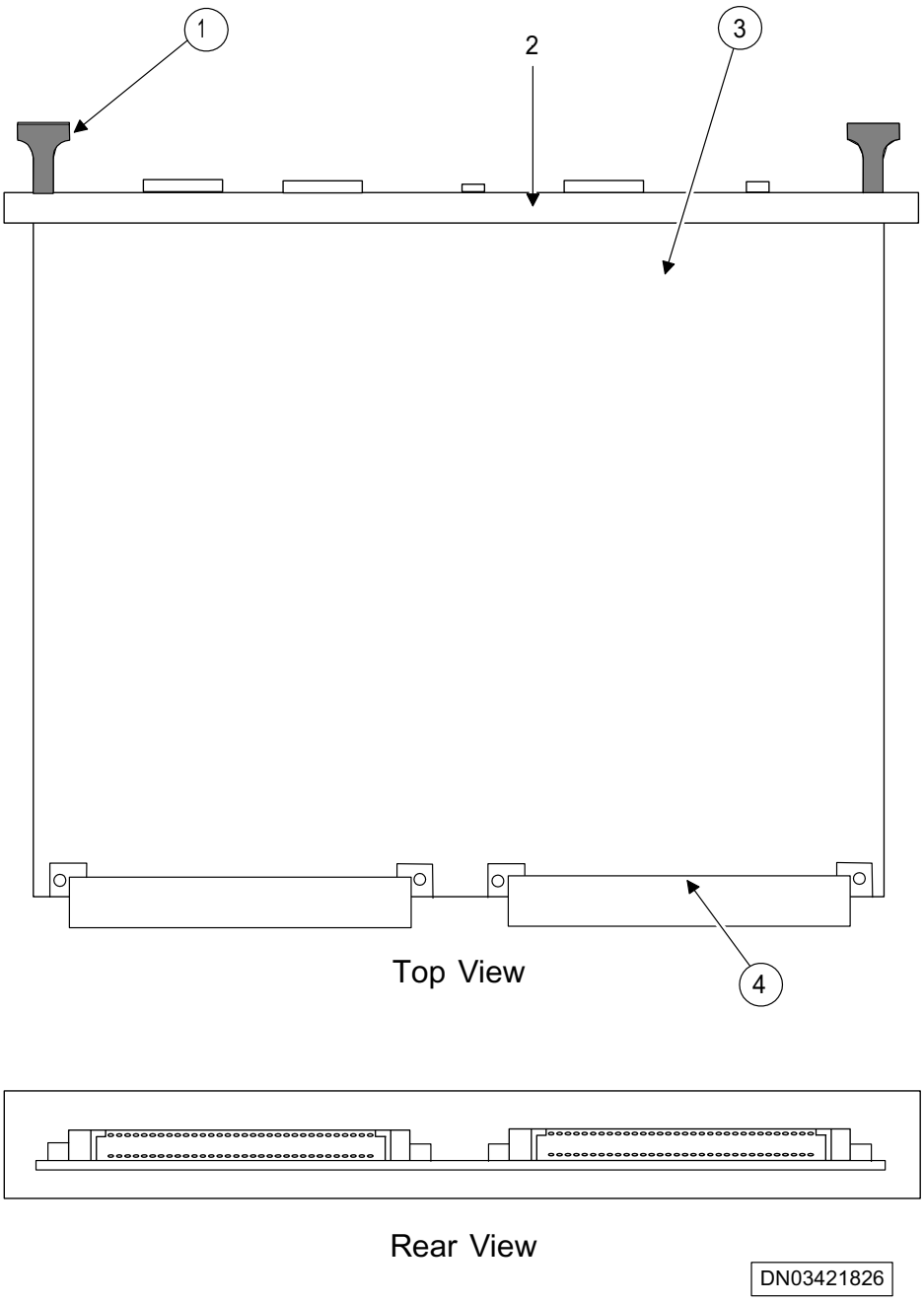
CCUA



1	Handle
2	Pushbutton
3	LED

4	Handle

Figure 6. CCUA front panel



1	Handle (x 2)
2	Front panel
3	PCB
4	64-way connector (x 2)

Figure 7. CCUA top and rear views

The CCUA consists of a PCB on which are mounted two 64-pin connectors at the rear and a panel at the front. The assembly locates in guides at the bottom of the ADUA and when inserted fully, the two 64-pin connectors push-fit into connectors on the backplane. Handles on the front panel assist in the insertion and removal of the CCUA.

The two 64-pin connectors provide the connectivity for the control functions and the monitoring functions of the CCUA.

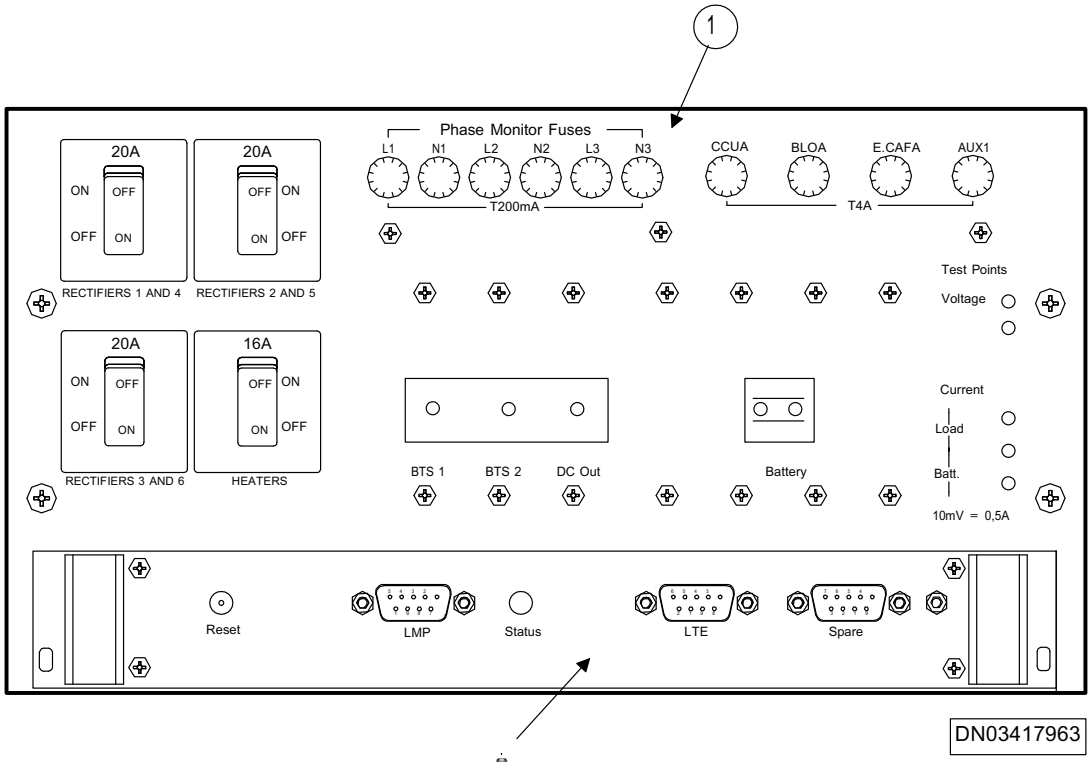
The front panel comprises these items:

- An LMP D-9 female connector (provides the ability to connect locally a laptop computer)
- An LTEx D-9 female connector (allows the connection of the CCUA to the LTEx controller unit via a D-9 connector on the LTEx front panel)
- A D-9 female connector (spare)
- A reset push-button
- A 3-colour LED (indicates the CCUA condition)

2.2.2 Interfaces of the AC/DC Connection/Cabinet (ADUA/CCUA) unit of UltraSite EDGE BTS with IBBU

2.2.2.1 ADUA

ADUA front panel



1	ADUA front panel
2	CCUA

Figure 8. ADUA front panel layout

Table 6. ADUA front panel details

Item	**Function**
CCUA	*CCUA*
Circuit breakers:	
Rectifiers and Heaters	ON/OFF control of the power supply to the separate banks of rectifiers and heaters

Table 6. ADUA front panel details (cont.)

Item	Function
Fuses:	
AC Phase Monitor (x 6)	Protection (200 mA) for the AC phases (line and neutral)
CCUA	CCUA protection (4 A fuse)
BLOA (unit fans)	Protection for the unit fans (4 A fuse)
ECAFA (extension cabinet fan)	Protection for the extension cabinet fan (4 A fuse)
AUX 1	Protection for the auxiliary supply (4 A fuse)
Test points:	
DC voltage	Sockets to allow the measurement of the battery charging current
Battery current	Sockets to allow the measurement of the battery charging current
Load current	Sockets to allow the measurement of the load current
Socket	

Hardware interfaces

Table 7. Connectors

Interface	Purpose	Connector type
CCUA	Interface the cabinet sensors, the cabinet controls, the ADUA internal signals and the CCUA	64-way DIN 41612

Table 7. Connectors (cont.)

Interface	Purpose	Connector type
AC input	Provides AC power to the unit	3-phase AC mains (one neutral and one earth per phase); can be adapted to suit a 2-phase power network as found in the US
Rectifiers	AC connection to the rectifiers	High power feed through terminal (type Phoenix Contact Power Combicon)
DC input	Provides DC power to the unit	Screw terminals with plastic covers
BTSs	DC output connections to the two BTSs	Screw terminals with plastic covers
Batteries	DC output connections from the batteries	Screw terminals with plastic covers
Cabinet fans	DC outputs to the cabinet fans	Single D-15 connector (female)
DC output AUX	DC outputs for the LTE box cooling via backplane connectors	Single 6 A rated output

DC output to the CCUA

The ADUA each provides a single DC output to the CCUA. Connection is made inside the ADUA.

The circuit is protected with a series-connected fuse. Associated with the supply is an LED. Should the fuse fail then the fuse is illuminated RED.

AC input

The maximum current capicity of each phase is 20 A (ADUB)

Table 8. AC mains input pin configuration

Pin	Assignment
1	Phase 1

Table 8. AC mains input pin configuration (cont.)

Pin	Assignment
2	Neutral 1
3	Phase 2
4	Neutral 2
5	Phase 3
6	Neutral 3

AC output to rectifiers

Table 9. AC output to rectifiers pin configuration

Pin	Assignment
1	Phase 1
2	Neutral 1
3	Phase 2
4	Neutral 2
5	Phase 3
6	Neutral 3

AC to Mat heaters

The ADUA provides a single AC supply to the Mat heater(s) in the extension cabinet via a 2-pole relay controlled by the CCUA.

DC input

The DC output from the rectifiers is fed to the ADUA via the backplane connectors.

The ADUA accepts one input connection from the rectifiers.

DC to BTS

The ADUA provides a DC output to BTS 1 (which constitutes the main BTS) and to BTS 2 (which is the extension BTS).

DC battery output

The ADUA provides a single DC output to the batteries.

Each circuit is protected by a circuit breaker and a relay is used to prevent the batteries from deep discharging. The circuit breaker is under the control of the CCUA.

DC output to fans

The ADUA provides three outputs for the cabinet fans and these outputs are protected with a common series connected fuse. An associated LED is illuminated RED should the fuse fail.

The ADUB provides six outputs for the cabinet fans and these outputs are protected with a common series-connected fuse. An associated LED is illuminated RED should the fuse blow. The six fan outputs are combined into a single D-15 female connector.

Table 10. ADUA DC output to fans

Pin	Description
1	+48 VDC (GND)
2	-48 VDC
3	Fan 1 tacho
4	Fan 1 PWM
5	Fan 2 tacho
6	Fan 2 PWM
7	Fan 3 tacho
8	Fan 3 PWM
9	Fan 4 tacho (not used in IBBU)
10	Fan 4 PWM (not used in IBBU)

Table 10. ADUA DC output to fans (cont.)

Pin	Description
11	Fan 5 tacho (not used in IBBU)
12	Fan 5 PWM (not used in IBBU)
13	Fan 6 tacho (not used in IBBU)
14	Fan 6 PWM (not used in IBBU)
15	Not used

DC output AUX

The ADUA provides a single 6 A rated output. A series-connected 4 A fuse protects the circuit.

Measurement points

The following measurement points are provided on the front panel of the ADUA:

- A number of measurement points are provided on the front panel of both the ADUA
- Battery current
- Load current

The negative pole of the current measurements are combined. The current measured is related as 1 A equals 20mV.

Cabinet sensors and controls interface

The ADUA supports a number of sensors and distributes their status to the CCUA for processing. The unit supports the transmission and the reception of the control signals to and from the CCUA.

Table 11. ADUA cabinet sensors

Cabinet Sensors
Cabinet door OPEN sensor (ADUB only)
Extension cabinet door OPEN sensor

Table 11. ADUA cabinet sensors (cont.)

Cabinet Sensors
Overvoltage protector trip contact
Extension cabinet temperature sensor
Extension cabinet temperature sensor Battery compartment temperature sensor
AUX temperature sensor. This may be used as a temperature sensor for the optional LTE compartment.

Table 12. ADUA cabinet controls

Cabinet Controls
Rectifier control (2 x for ADUB)
Rectifier cooling fans (3 x (ADUA); 2 x 3 (ADUB))
Extension cabinet cooling fan (1 x (ADUA); 2 x (ADUB)
EAC alarm interface (eight digital alarm-outputs)
Q1 interface (to BOI)

Internal alarms, signals and controls interface

The ADUA signals and sends/receives the information to/from the CCUA.

Table 13. ADUA internal alarms, signals and controls

Signal	Meaning
AC mains breakdown	The incoming AC mains is monitored by means of relays for the detection of a breakdown in one of its phases
Mat heater(s)	ADUA: switches the AC output to the extension cabinet using a double pole relay ADUB: switches the AC output to the support cabinet and/or extension cabinet using two double pole relays

Table 13. ADUA internal alarms, signals and controls (cont.)

Signal	Meaning
Battery and load currents	Measures the battery currents and the load currents using current transducers: ADUA: 4 V at 400 mA outputs and 12 V supply ADUA: 4 V at 400 mA outputs and 12 V supply ADUB: 4 V at 400 mA outputs and 12 V supply
DC breaker alarm	Generates an alarm signal should a DC breaker trip or fuse fails. The alarm is combined with the LVD position and the battery breaker trip alarm
Battery low voltage disconnect (LVD)	A contactor isolates the negative pole of the battery should the LVD be detected. This prevents the batteries from deep discharging

2.2.2.2 CCUA

Table 14. Connectors

Interface	Connector type
Q1	D-9 (female)
LMP	D-9 (female)
RS485	D-9 (female)

Table 15. Q1 port connector pin configuration

Pin number	Signal
1	RX / IN +
2	Not connected
3	GND

Table 15. Q1 port connector pin configuration (cont.)

Pin number	Signal
4	Not connected
5	TX / OUT +
6	RX / IN -
7	Not connected
8	Not connected
9	TX / OUT -

Table 16. LMP connector pin configuration

Pin number	Signal
1	Spare
2	LMP_IN
3	LMP_OUT
4	Spare
5	GND
6	Spare
7	Spare
8	Spare
9	V3P (may also be V5P- future)

Table 17. RS485 pin configuration port connector

Pin number	Signal
1	Not connected

Table 17. RS485 pin configuration port connector (cont.)

Pin number	Signal
2	TXDA
3	RXDB
4	Not connected
5	Not connected
6	Not connected
7	7 TXDB
8	TXDA
9	Not connected

Control and monitoring interface

The CCUA affects the control and the monitoring functions on the Nokia UltraSite Support but can itself be controlled as follows:

- Locally by means of a laptop PC connected to the LMP connector (RS232 interface)
- Remotely from the Network Management System (NMS) via the Q1-bus (RS485 interface)

Where necessary, the whole range of CCUA software can be upgraded.

The Q1-bus interfaces the CCUA to the base station control unit (BOI) and the information conveyed to/from the CCUA is as follows:

- The CCUA alarms
- The rectifier alarms
- The control number
- The serial number
- The version number
- Temperature information from the rectifier unit. This information is used to regulate the speed of the cooling fans

Rectifier interface

The following information is conveyed between the CCUA and the rectifiers via the RS485-bus:

- Alarm input signals
- Control output signal for rectifier support mode. This enables active load sharing of the rectifiers
- Temperature information for regulation of the rotation speed of the external unit fans
- DC voltage control output. The nominal voltage is 54.5 VDC at 25º C . The rectifier output voltage is controlled to be between 52 VDC and 58 VDC (regulated in 110 mV steps)

Fan interface

The fan interface (for unit and cabinet) comprises these:

- 48 VDC (nominal) supply voltage to the fans
- A PWM signal (fan speed) output to the fans
- A rotation-information signal input (2 pulses/revolution, square wave) from the fans

2.2.3 AC/DC Connection/Cabinet control (ADUA/CCUA) unit LEDs for UltraSite EDGE BTS with IBBU

2.2.3.1 Front panel

The CCUA component of the ADUA unit has a tri-colour LED on the front panel to indicate the operating conditions.

Table 18. CCUA component LED indications

LED colour	Significance
RED	Unit Failure

Table 18. CCUA component LED indications (cont.)

LED colour	Significance
YELLOW None	Any alarm from the cabinet or the Q1 connection to the BTS is missing This does not apply to alarms used as information to the BTS
GREEN	Unit is on and operating

2.3 1300 W Rectifier (BATA) unit

2.3.1 Technical description of 1300 W Rectifier (BATA) unit of UltraSite EDGE BTS with IBBU

Rectifier generated alarms

2.3.1.1 Function

The BATx unit can be used in both the IBBU and separate site support cabinets. The IBBU provides the space for five BATx units, positioned above the ADUx. The BATx units are numbered from 1 to 5, top to bottom.

Note

There are six positions on the backplane but one (the bottom one) is redundant in IBBU.

The BATA is connected through backplane technology into either the UltraSite Support or the UltraSite BTS with integrated battery backup. The BATA is hot-pluggable and can, therefore, be either added or removed during operation without disconnecting power to either the BTS or the radios. The BATA and BATA backplane are IP55-protected against environmental factors.

The 1300 W Rectifier (BATA) is an integral part of the Nokia UltraSite Support which is used with the Nokia UltraSite EDGE BTS. The AC supply and the DC supply are connected to and from the BATA via a BATA backplane module. Other connections, routed through the BATA backplane module, are:

- an RS485 interface
- unit cooling fans

The BATA units can be removed and replaced without disturbance to the Support system operation (i.e., the units are “hot swappable”).

2.3.1.2 Operation

The BATA generates the float-charging voltage to the batteries and the DC power supply to the BTS. The BATA is able to boost charge the batteries. The nominal DC output voltage (54.5 VDC at 25 °C) of the BATA is programmable and temperature-compensated. Both the AC input and the DC output feature overvoltage protection. The BATA is also overheat protected.

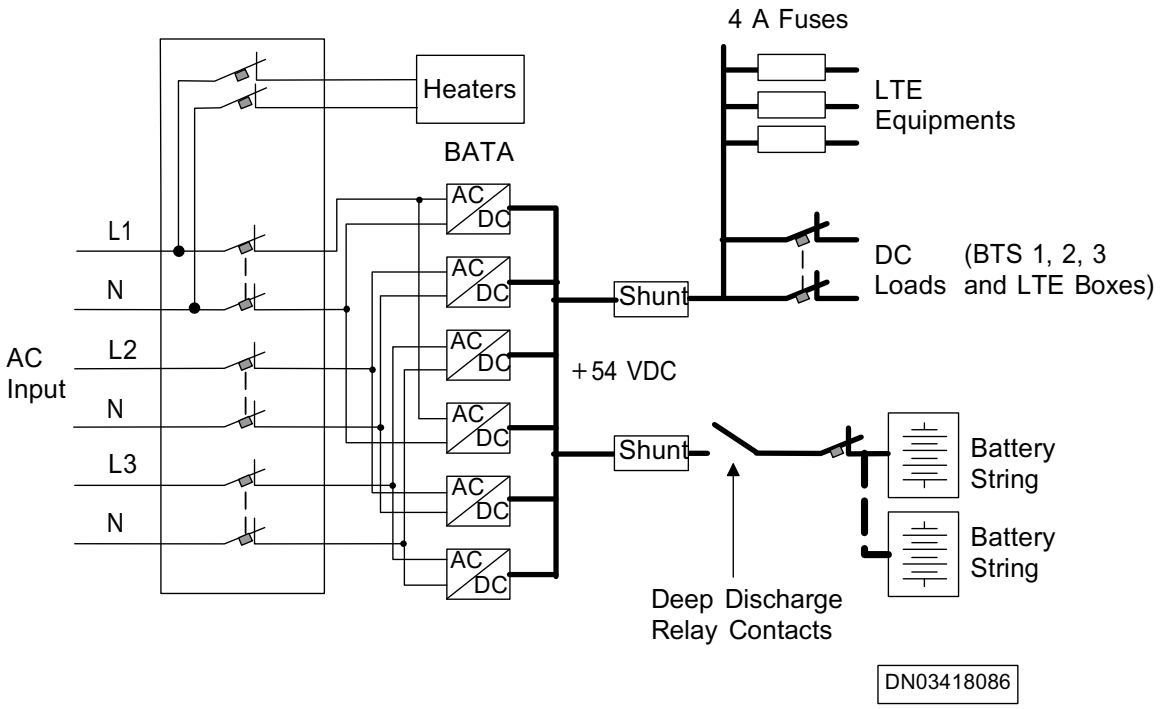


Figure 9. BATA power relationship

Rectifier generated alarms

Table 19. BATA generated alarms

Alarm Number	Description	Alarm Status	Cause
1	BATA unit (position x) failure	major/critical[1]	Alarm when BATA in position x faulty
2	BATA unit (position x) over temperature	major	Alarm when BATA in position x shows overtemperature (output power reduction started)
3	BATA unit (position x) over temperature shutdown	major	Alarm when BATA in position x has been shutdown because of overtemperature
4	BATA unit (position x) overvoltage shutdown	major	Alarm when BATA in position x has been shutdown because of overvoltage
5	BATA unit (position x) load-sharing failure	major	Alarm when BATA in position x is not sharing the load current being drawn
6	BATA unit (position x) auxiliary supply failure	major	Alarm when BATA in position x is non functional
7	BATA unit (position x) mains supply failure	major	Alarm when input AC voltage to BATA in position x is out of range

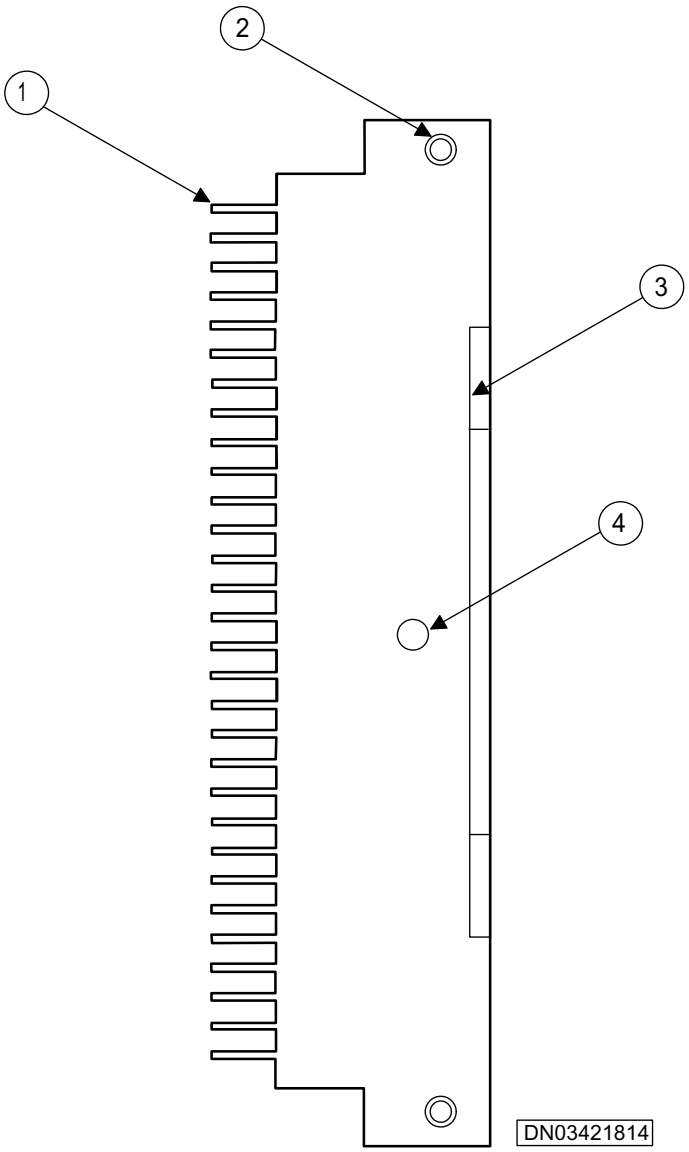
[1]If more than one BATA is faulty, the status is 'critical'.

2.3.1.3 Construction

The 1300 W Rectifier (BATA) is designed to plug into a BATA backplane located at the rear of the IBBU. The number of BATAs is determined by the UltraSite Support configuration and the BTS requirements. An LED (used to indicate the condition of the BATA) is mounted on the front panel. There is a handle on the front panel to assist in either the insertion or the withdrawal of the BATA. The

BATA connects with the BATA backplane. Extending back from the front panel is the metal cast-frame that has metal fins on one side to assist in cooling to maintaining the BATA within operating safe temperatures. External cooling fans (to IP54 standard) are used to assist in the maintenance of the temperature.

At the rear of the BATA is a connector that consists of 10 large pins and a group of twelve small pins. In addition there are two large guide-pins that locate into two holes in the BATA backplane to assist in the correct location of the BATA when it is inserted. Further assistance for locating the BATA in the cabinet is provided by a set of raised circular indentations on the floor of the BATA enclosure. M4, Torx 20 screws secure each BATA in its location.



1	Cooling fins
2	Fixing screw (x2)
3	Handle
4	Status LED

Figure 10. BATA front panel view

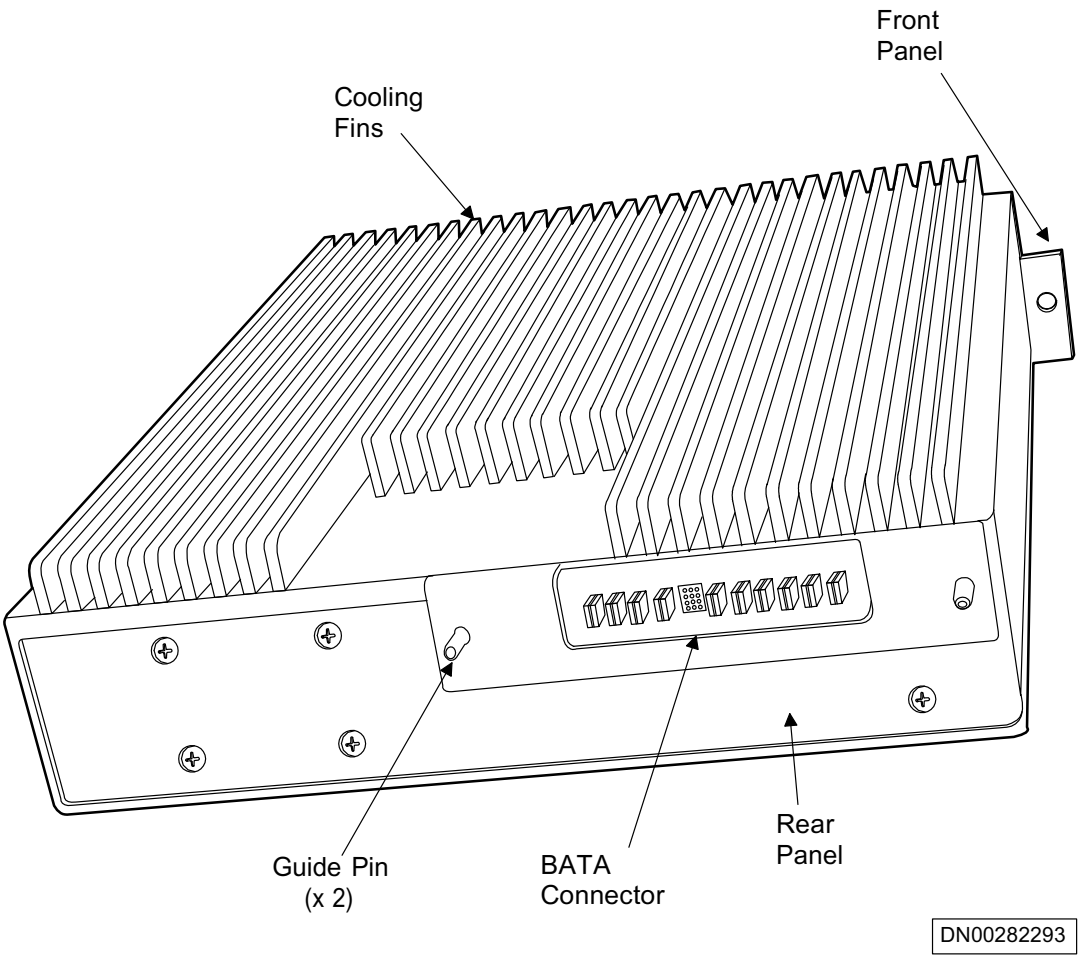


Figure 11. BATA back view

2.3.1.4 BATA backplane

The backplane module is secured to the inside rear of the cabinet (in the BATA enclosure) with a number of screws. At the top, left-hand side (as viewed from the front) of the backplane is the cable entry for the AC power supply to the BATA. At the right-hand side (as viewed from the front) are a set of four cable entries. The purpose of each is detailed as follows (from top to bottom):

- The first cable entry is used for these two cables: The Fan Supply In and the Fan Supply Out
- The second cable entry is used for these two cables: The RS485-bus In and the RS485-bus Out
- The third cable entry is used for the entry of the DC Output “-ve” cable
- The forth cable entry is used for the entry of the DC Output “+ve” cable

On the front panel of the backplane are a number of connectors that are used as follows:

- A set of five connectors. There is one for each of the five BATAs. The connector at the rear of a BATA is a push-fit into one of these connectors. Each of these connectors consists of ten large pins and a set of twelve small pins
- Three D-9 type connectors. These are used provide connection for the BATA cooling fans that are mounted above the BATA backplane
- A backplane coding switch. This is used to identify the backplane with regards to other backplanes when installed

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Note

The number for each backplane (when more than one is installed) must be different to any of the others. This is to assist in the system identification for fault finding and reporting.

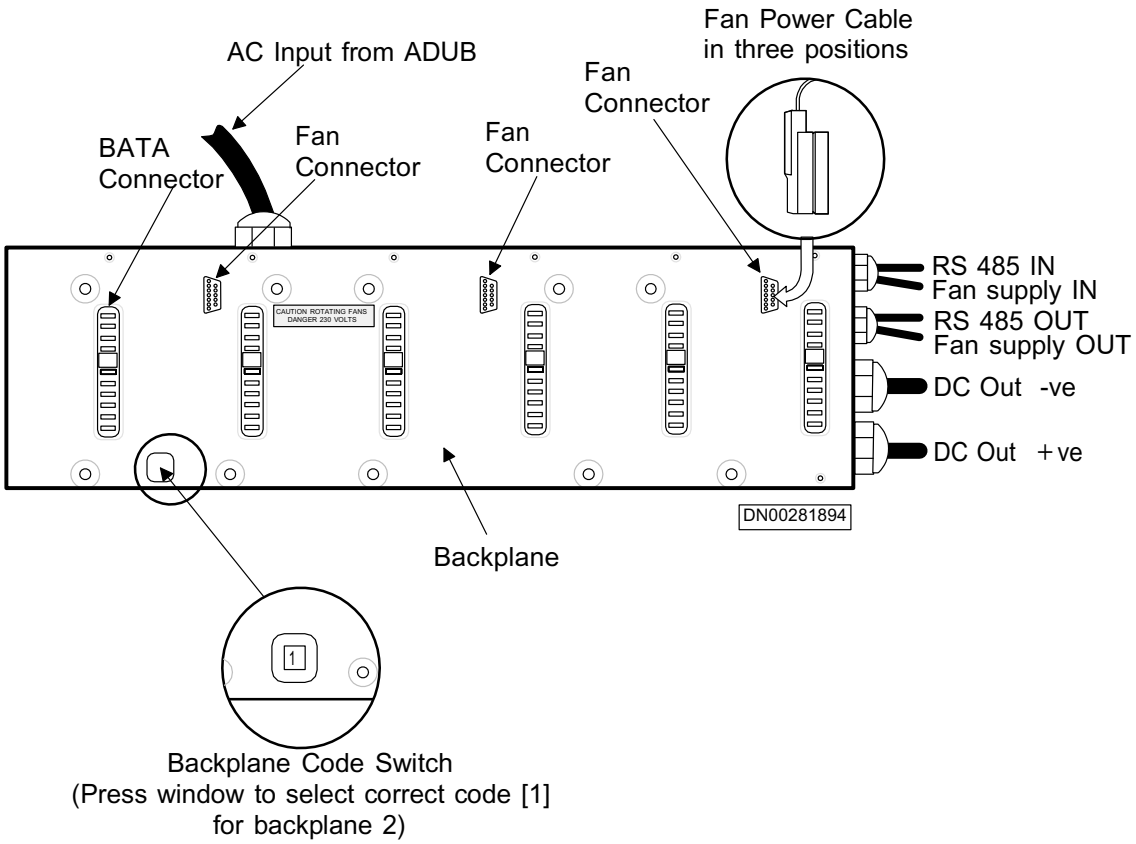

Figure 12. BATA backplane view

2.3.2 Interfaces of the 1300 W Rectifier (BATA) unit of UltraSite EDGE BTS

2.3.2.1 Control interface

Control signals from the CCUA are transmitted to the 1300 W Rectifier (BATA) via the RS485 interface. The RS485 interface connector is located on the BATA backplane.

During manual or automatic battery test, the CCUA generates a Support Mode control signal when the batteries are to provide the entire load power.

Note

In support mode, the DC output from the rectifier is 43.0 VDC ±0.5 VDC.

The E^2PROM associated with the RS485/BATA interface is organised into byte allocations.

Table 20. E^2PROM organisation

Byte Allocation	Function
0 - 10	Unit serial number Filled by manufacturer
11 - 19	Hardware version Filled by manufacturer
20 - 33	Identity and firmware version Filled by manufacturer
34 - 39	Spare (for identity and firmware version) - (Nokia)
40 - 59	Software version Filled by manufacturer
60 -99	Manufacturer's name Filled by manufacturer
100 - 113	Test time stamp Filled by manufacturer
114 - 127	Reserved for Nokia test engineering purposes

2.3.2.2 Backplane

The backplane enables the BATA units to be connected to the ADUA or ADUB as appropriate. AC is supplied to the BATA units via the backplane and the DC output from the BATA units is supplied via the backplane to the ADUA or ADUB.

In addition to the power connectivity, the backplane enables various monitored signals relating to the BATAs to be passed via the RS485 interface to the CCUA. Also, control signals from the CCUA are passed to the BATAs via the RS485 interface. Fan signals are transmitted via the fan interface.

Each backplane, as required, is located at the rear inside of the rectifier rack and can be fixed in position either vertically or horizontally. Cable entry fixtures on the backplane facilitate various cables to/from the backplane to be connected to the appropriate units and equipment.

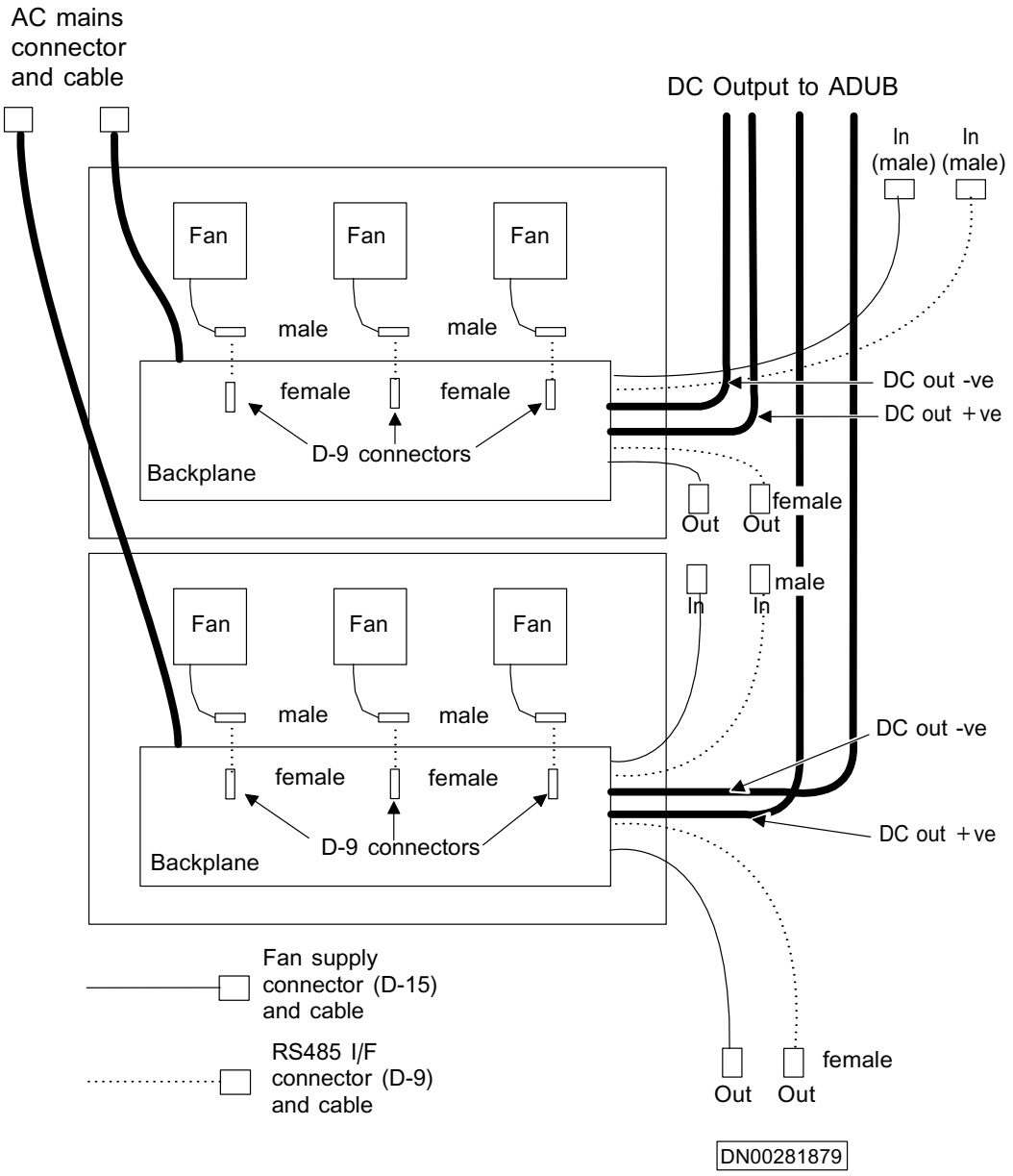

Figure 13. BATA backplane interface

BATA and Backplane front panel

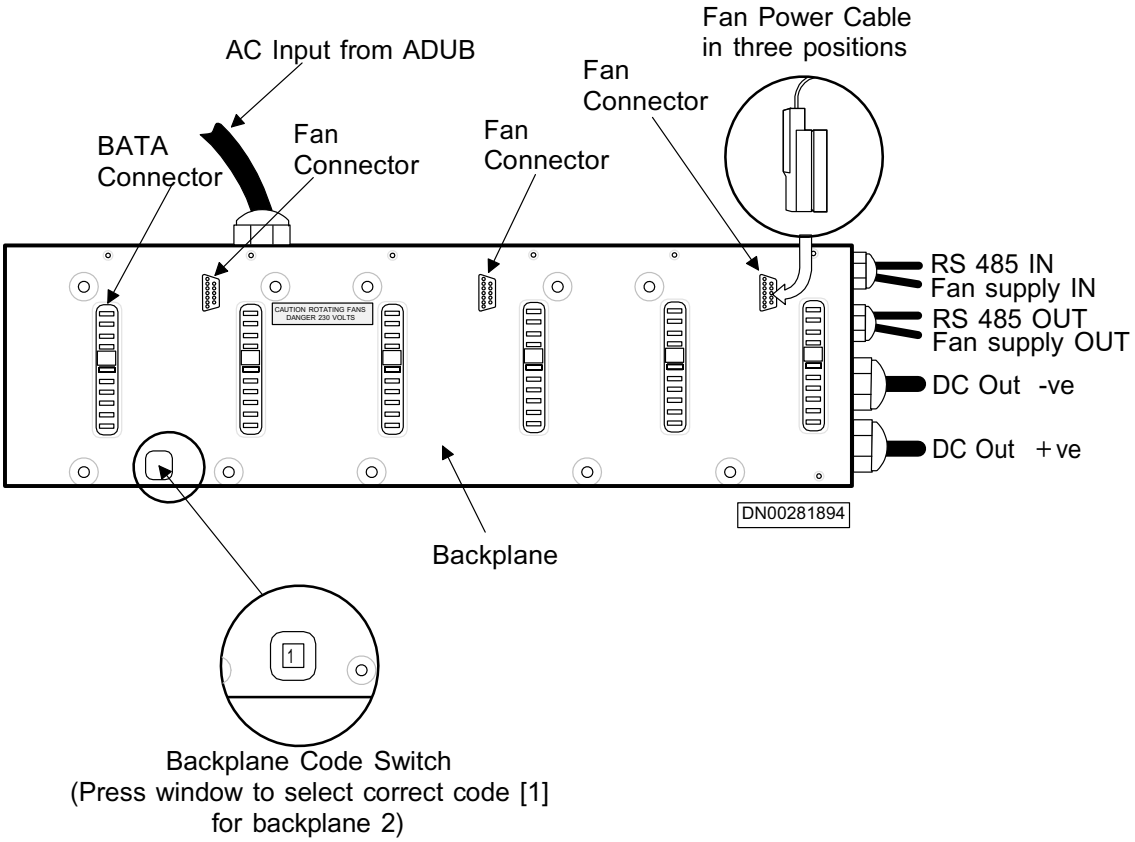

Figure 14. BATA backplane view

Table 21. Connectors

Interface	Connector type
BATA	Push-fit connector with 10 large pins and 12 small pins
AC supply cable	Phoenix type PC 4/6-STF-7, 62
RS 485 port	D-9 (male)
Unit fan	D-9 (female)
BATA cooling fans	D-15 (male and female)

Table 21. Connectors (cont.)

Interface	Connector type
DC out - ve	
DC out + ve	

BATA connector

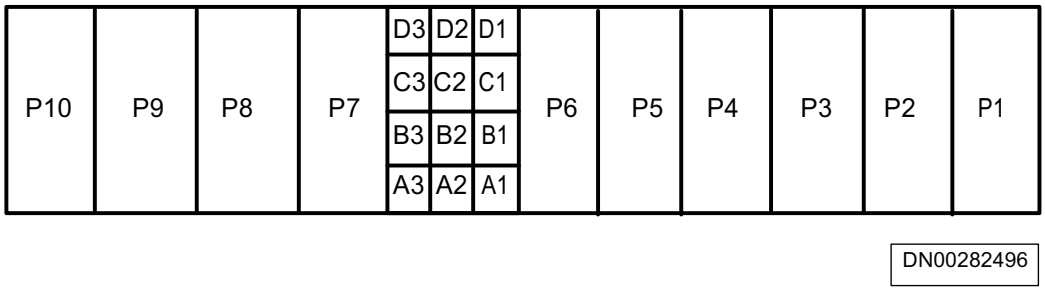

Figure 15. BATA connector pin-out designations

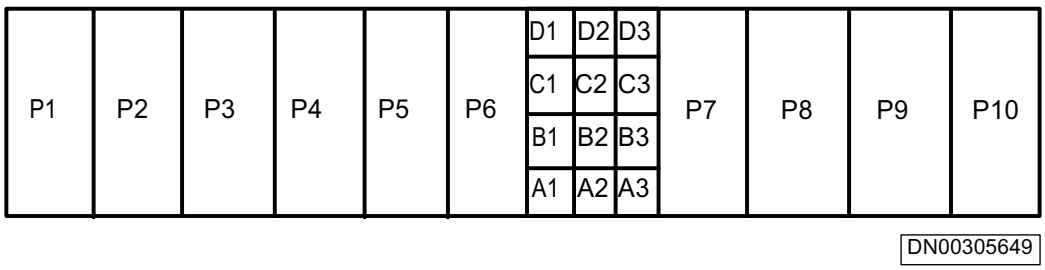

Figure 16. Backplane connector pin-out designations

Table 22. Connector pin configuration

Pin Number	Signal Name	Description	RS485 Pin
P1	Bat+	Battery positive	-
P2	Bat+	Battery positive	-

Table 22. Connector pin configuration (cont.)

Pin Number	Signal Name	Description	RS485 Pin
P3	(Bat+)	Battery positive premating pin	-
P4	(Bat-)	Battery negative premating pin	-
P5	Bat-	Battery negative	-
P6	Bat-	Battery negative	-
P7	PE	Protective earth	-
P8	-	Pin not present	-
P9	L	AC input: L	-
P10	N	AC input: N	-
A1	TXDA	RS485 signal	2
B1	TXDB	RS485 signal	7
C1	RXDA	RS485 signal	8
D1	RXDB	RS485 signal	3
A2	U-A0	Unit address bit A0	-
B2	U-A1	Unit address bit A1	-
C2	U-A2	Unit address bit A2	-
D2	BP-A0	Backplane address bit A0	-
A3	LS-bus	Load sharing signal	5
B3	Test mode	Only connected in the BATA to set test modes; open pin in the backplane	-
C3	n.C.	Not connected	-
D3	n.C.	Not connected	-

Note

The backplane has the same connector pinout designations and signal names as the BATA unit, but the gender of the connectors is different.

AC supply cable connector

Table 23. AC supply cable connector pin configuration

Pin Number	Description
1	Phase 1 Live
2	Phase 1 Neutral
3	Phase 2 Live
4	Phase 2 Neutral
5	Phase 3 Live
6	Phase 3 Neutral

RS485 port connector

Table 24. RS485 port connector pin configuration

Pin Number	Description
1	Test mode
2	TXDA
3	RXDB
4	GND
5	LS
6	GND
7	TXDB
8	RXDA

Table 24. RS485 port connector pin configuration (cont.)

Pin Number	Description
9	Not connected

Note

Pins 1, 4, 5, 6 and 9 are not connected in the CCUA D-9 connector.

Unit fan connector

Table 25. Unit fan connector pin configuration

Pin Number	Description
1	V48RTN (return) (+48 VDC)
2	Not connected
3	V48N (-48 VDC)
4	Not connected
5	Not connected
6	FANST/fan x (RPM information)
7	Not connected
8	FANCTRL/ fan x (PWM control)
9	Not connected

BATA cooling fans

Table 26. BATA cooling fan connector pin configuration

Pin Number	Description	
	Male connector	**Female connector**
1	V48RTN (+48 VDC return)	V48RTN (+48 VDC return)
2	V48N (-48 VDC)	V48N (-48 VDC)
3	FANST/fan 1 (RPM information)	FANST/fan 4 (RPM information)
4	FANCTRL/fan 1 (PWM control)	FANCTRL/fan 4 (PWM control)
5	FANST/fan 2 (RPM information)	FANST/fan 5 (RPM information)
6	FANCTRL/fan 2 (PWM control)	FANCTRL/fan 5 (PWM control)
7	FANST/fan 3 (RPM information)	FANST/fan 6 (RPM information)
8	FANCTRL/fan 3 (PWM control)	FANCTRL/fan 6 (PWM control)
9	FANST/fan 4 (RPM information)	Not connected
10	FANCTRL/fan 4 (PWM control)	Not connected
11	FANST/fan 5 (RPM information)	Not connected
12	FANCTRL/fan 5 (PWM control)	Not connected
13	FANST/fan 6 (RPM information)	Not connected
14	FANCTRL/fan 6 (PWM control)	Not connected
15	Not connected	Not connected

2.3.3 1300 W Rectifier (BATA) LEDs for UltraSite EDGE BTS with IBBU

The BATA has a tri-colour LED on the front panel to indicate the operating condition.

Table 27. LED indications

LED colour	Significance
RED	Illuminated when the Unit Alarm is present or BATA overtemperature protection is active
YELLOW	Illuminated either when the AC mains supply to the BATA is out of range or the BATA does not receive a message from the CCUA (via the RS485 interface) within in a pre-defined time; the interface is NOT OK
GREEN	Illuminated when the output and the load sharing are satisfactory

2.4 Battery (BBAx) unit

2.4.1 Technical description of Battery (BBAx) unit of UltraSite EDGE BTS with IBBU

Configuration

The batteries are configured into strings, with each string comprising four batteries connected in a series. In the Integrated Battery Backup (IBBU), the number of battery strings is limited to one.

Capacity

The battery capacity is determined by the required back-up time and the desired power load. The available battery capacity depends on the BTS configuration. Because the number of battery strings is limited to one in the IBBU, the maximum battery capacity of BBAG is limited to 40 Ah.

Charge

The battery charge is maintained by the DC output of the 1300 W Rectifier (BATA). If the AC mains supply breaks down, the batteries provide the power for the loads. The batteries are equipped with temperature sensors.

3 Glossary

3.1 Glossary for UltraSite EDGE BTS

3.1.1 Abbreviations and acronyms

This section lists abbreviations and acronyms used throughout Nokia UltraSite EDGE Solution documentation.

AC	Alternating Current
ACFU	AC Filter Unit
A/D	Analog/Digital
ADC	Analog to Digital Converter
ADUA	AC/DC control and distribution unit for Integrated Battery Backup (IBBU)
AGC	Automatic Gain Control
ALS	Automatic Laser Shutdown
AMR	Adaptive Multi-Rate coding
ANSI	American National Standards Institute
ANT	Antenna connector
ARFN	Absolute Radio Frequency Channel Number
ASIC	Application Specific Integrated Circuit
ATM	Asynchronous Transfer Mode

AWG	American Wire Gauge
AXC	ATM cross-connect
AXU	ATM cross-connect unit
BAPT	Bundesamt für Post und Telekommunikation Telecommunications advisory agency of Federal Republic of Germany
BATx	Rectifier for battery backup
BBAG	12 V battery for Integrated Battery Backup (IBBU)
BB2x	Transceiver Baseband unit • BB2A for GSM • BB2E for GSM/EDGE
BCCH	Broadcast Control Channel
BCF	Base Control Function
BER	Bit Error Ratio The ratio of the number of bit errors to the total number of bits transmitted in a given time interval.
BIST	Built-In Self Test A technique that provides a circuit the capability to carry out an implicit test of itself.
BOIx	Base Operations and Interfaces unit
BPxN	Bias Tee without VSWR monitoring • BPDN for GSM 900/1800/1900 • BPxV Bias Tee with VSWR monitoring • BPGV for GSM 900 • BPDV for GSM 1800/1900
BS	British Standards
BSC	Base Station Controller

BSS	Base Station Subsystem
BTS	Base Transceiver Station (Base Station)
CC	Cross-Connection
CCCH	Common Control Channel
CCITT	Comité Consultatif International Télégraphique et Téléphonique International Telegraph and Telephone Consultative Committee (Telecommunications advisory agency of France)
CCUA	Cabinet Control Unit
CDMA	Code Division Multiple Access A technique in which the radio transmissions using the same frequency band are coded in a way that a signal from a certain transmitter can be received only by certain receivers
CE	Cable Entry; Consumer Electronics; Conformit Européen (European Conformity) CH Channel
CHDSP	Channel Digital Signal Processor
CN	Change Note A short trouble management document in a specified form sent to a customer about a modification in a product
CRC	Cyclic Redundancy Check A method for detecting errors in data transmission.
CRMx	Core Mechanics for Nokia UltraSite EDGE Base Station Indoor and Outdoor cabinet • CRMA for Indoor and Outdoor cabinets • CRMB for Site Support cabinets • CRMC for Midi Indoor and Outdoor cabinets
CSC	Customer Services Centre
D/A	Digital/Analog

DC	Direct Current
DCS	Digital Cellular System
DDS	Direct Digital Synthesis The frequency synthesis in which logic and memory are used to digitally construct the desired output signal, and a digital-to-analogue converter is used.
DL	(Downlink) The direction of transmission in which the BTS is the transmitting facility and the mobile station is the receiving facility.
DIP	Dual In-line Package
DRAM	Dynamic Random Access Memory
DRX	Discontinuous Reception
DSP	Digital Signal Processor
DTX	Discontinuous Transmission
DU2A	Dual Band Diplex Filter unit for GSM 900/1800
DVxx	Dual Variable Gain Duplex Filter unit • DVTB for GSM/EDGE 800 • DVTC for GSM/EDGE 800 co-siting • DVGA for GSM/EDGE 900 • DVHA for GSM/EDGE 900 customer-specific H band • DVJA for GSM/EDGE 900 customer-specific J band • DVDC for GSM/EDGE 1800 • DVDA for GSM/EDGE 1800 A band • DVDB for GSM/EDGE 1800 B band • DVPA for GSM/EDGE 1900
E1	European Digital Transmission Format Standard (2.048 Mbit/s)
EAC	External Alarms and Controsl

EC	European Community
EDGE	Enhanced Data rates for Global Evolution
EEC	European Economic Community
EEPROM	Electronically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
EN	European Norm
EQDSP	Equaliser Digital Signal Processor
ESD	Electrostatic Discharge
ET	Exchange Terminal
ETSI	European Telecommunications Standards Institute
Ext.	External
FACCH	Fast Associated Control Channel
FACH	Forward Access Channel
FCC	Federal Communications Commission The United States federal agency responsible for the regulation of interstate and international communications by radio, television, wire, satellite, and cable.
FC E1/T1	Wireline transmission unit (75 [ohm] E1, 120 [ohm] E1, or 100 [ohm] T1) of Nokia UltraSite EDGE Base Station without cross-connection capability.
FCLK	Frame Clock
FET	Field Effect Transistor
FHS	Frequency Hopping Synthesiser

FIFP	Forwarded Intermediate Frequency Power
FIKA	+24 VDC Installation Kit
FPGA	Field Programmable Gate Array
FXC E1	Wireline transmission unit (75 [ohm] E1) with four line interfaces to the 2 Mbit/s (E1) transmission line; cross-connection capability at 8 kbit/s level.
FXC E1/T1	Wireline transmission unit (120 [ohm] E1 or 100 [ohm] T1) with four line interfaces to the 2 Mbit/s (E1) or 1.5 Mbit/s (T1) transmission line; cross-connection capability at 8 kbit/s level.
FXC RRI	Radio link transmission unit (radio indoor unit) with cross-connection capability at 8 kbit/s level. Used with MetroHopper Radio and FlexiHopper Microwave Radio.
Gb	Interface between RNC and SGSN
GMSK	Gaussian Minimum Shift Keying
GND	Ground; Grounding (protective earthing). See Grounding and PE.
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications • GSM 800 GSM 800 MHz frequency band • GSM 900 GSM 900 MHz frequency band • GSM 1800 GSM 1800 MHz frequency band • GSM 1900 GSM 1900 MHz frequency band
GUI	Graphical User Interface
HDLC	High-level Data Link Control
HETA	Base station cabinet heater
HO	Handover

	The action of switching a call in progress from one radio channel to another, to secure the continuity of the established call
HSCSD	High-Speed Circuit Switched Data
HV	High Voltage
HW	Hardware Specfically, electronic equipment supporting data transmission and processing tasks, and the electrical and mechanical devices related to their operation
IAKx	Indoor Application Kit for Nokia UltraSite EDGE Base Station • IAKA for UltraSite Indoor cabinet • IAKC for UltraSite Midi Indoor cabinet
IBBU	Integrated Battery Backup
IC	Integrated Cell
ICE	Intelligent Coverage Enhancement
ID	Identification; Identifier IE Information Element The basic unit of a transaction capabilities application part (TCAP) message.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IF	Intermediate Frequency
IFM	Interface Module
IFU	Interface unit
ILKA	Indoor Lock Kit
ILMT	Integrated Local Management Tool

IMA	Inverse Multiplexed ATM
IP	Ingress Protection
IRPA	International Radiation Protection Association
ISDN	Integrated Services Digital Network
ISHO	Inter-system handover The handover from one system to another.
ISO	International Organization for Standardization
ITU	International Telecommunication Union
L2	AC Phase 2
L3	AC Phase 3
Iu	The interconnection point between the RNC and the Core Network
Iub	Interface between the RNC and node B
Iubis	Interface between the RNC and the BTS
Iur	The logical interface for the interconnection of two radio network controller (RNC) components of the UMTS terrestrial radio access network (UTRAN) system
JIS	Japanese Industrial Standard
LAN	Local Area Network A data transmission network covering a small area.
LAPD	Link Access Protocol on D-channel between the BSC and BTS
LED	Light Emitting Diode
LMB	Local Management Bus
LMP	Local Management Port

LNA	Low-Noise Amplifier
LO	Local Oscillator
LTE	Line Terminal Equipment
LV	Low Voltage
LVD	Low Voltage Disconnect
LVDS	Low Voltage Differential Signalling
LVTTL	Low Voltage Transistor Transistor Logic
M2xA	2-way Receiver Multicoupler unit • M2LA for GSM/EDGE 800/900 • M2HA for GSM/EDGE 1800/1900 • M6xA 6-way Receiver Multicoupler unit • M6LA for GSM/EDGE 800/900 • M6HA for GSM/EDGE 1800/1900
MAC	Medium Access Control function, handles the channel allocation and multiplexing, that is, the use of physical layer functions.
MCLG	Master Clock Generator
MDF	Main Distribution Frame
MHA	Masthead Amplifier
MMI	Man-Machine Interface
MML	Man-Machine Language A text-based command language with a standardised structure, designed to facilitate direct user control of a system.
MNxx	Masthead Amplifier specific to Nokia UltraSite EDGE Base Station • MNGA for GSM/EDGE 800/900 • MNDA for GSM/EDGE 1800 A band • MNDB for GSM/EDGE 1800 B band

	• MNPA for GSM/EDGE 1900 A band • MNPB for GSM/EDGE 1900 B band • MNPC for GSM/EDGE 1900 C band
MPT	Ministry of Posts and Telecommunications Telecommunications regulatory agency of Great Britain.
MS	Mobile Station User equipment which uses a radio connection, and which can be used in motion or at unspecified points. This is usually a mobile phone.
MSC	Mobile Switching Centre The mobile network element which performs the switching functions in its area of operation, and controls cooperation with other networks.
MTBF	Mean Time Between Failure
NCRP	National Council on Radiation Protection and Measurements
NCU	Node Control Unit
NEBS	Network Equipment Building Systems
NED	Nokia Electronic Documentation
NMS	Network Management System
O&M	Operation and Maintenance
OAKB	Cable entry kit for BTS co-siting
OAKx	Outdoor Application Kit for Nokia UltraSite EDGE Base Station • OAKA for UltraSite Outdoor cabinet • OAKC for UltraSite Midi Outdoor cabinet • OAKD for UltraSite Midi Outdoor to Talk-family Co-siting
OBKA	Outdoor Bridge Kit

OCXO	Oven Controlled Crystal Oscillator An oscillator in which the crystal and critical circuits are temperature-controlled by an oven.
OEKA	Outdoor (cable) Entry Kit
OFKA	Outdoor Air Filter Kit
OFKC	MIDI Outdoor Air Filter Kit
OMU	Operation and Maintenance Unit
OMUSIG	OMU Signalling
OVP	Over-Voltage Protection
PC	Personal Computer
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PE	Protective earthing (grounding) See GND and Grounding.
PFC	Power Factor Correction
PLL	Phase-Locked Loop
Point-to-point	Transmission between two fixed points
PSM	Power System Management
PWM	Pulse Width Modulation
PWSx	AC/DC Power Supply unit • PWSA for 230 VAC input • PWSB for -48 VDC input • PWSC for +24 VDC input
Q1	Nokia proprietary transmission management protocol

RACH	Random Access Channel
RAKE	A receiver capable of receiving and combining multipath signals
RAM	Random Access Memory
RAN	Radio Access Network A third generation network that provides mobile access to a number of core networks of both mobile and fixed origin.
RCD	Residual Current Device
RF	Radio Frequency
RFF	Radio Frequency Fingerprinting
RIFP	Reflected Intermediate Frequency Power
RLE	Radio Link Equipment
RNC	Radio Network Controller The network element in a radio access network which is in charge of the use and the integrity of radio resources.
ROM	Read Only Memory
RRI	Radio Relay Interface
RSSI	Received Signal Strength Indicator
RTC	Remote Tune Combining
RTxx	Remote Tune Combiner • RTGA for GSM/EDGE 900 • RTHA for GSM/EDGE 900 H band • RTJA for GSM/EDGE 900 J band • RTDC for GSM/EDGE 1800 • RTDA for GSM/EDGE 1800 A band • RTDB for GSM/EDGE 1800 B band • RTPA for GSM/EDGE 1900

RTN	Return
RX	Receiver; Receive
SCF	Site Configuration File
SCT	Site Configuration Tool
SDCCH	Stand-alone Dedicated Control Channel
SDH	Synchronous Digital Hierarchy
SMB	Sub-Miniature B Connector
SMS	Short Message Service
SSS	Site Support System
STM	Synchronous Transport Module
STM-1	Synchronous Transport Module (155 Mbit/s)
SW	Software
Sync	Synchronization The process of adjusting corresponding significant instances of signals, in order to obtain the desired phase relationship between these instances.
T1	North American Digital Transmission Format Standard (1.544 Mbit/s)
TC	Transcoder
TCH	Traffic Channel The logical radio channel that is assigned to a base transceiver station and is primarily intended for conversation.
TCP/IP	Transport Control Protocol/Internet Protocol
TCS	Temperature Control System
TDMA	Time Division Multiple Access

TE	Terminal Equipment Equipment that provides the functions necessary for user operation of the access protocols.
TMS	Transmission Management System The network system for managing equipment settings, and for centralised retrieval of statistics and alarm information from transmission equipment connected to the system.
TS	Time Slot A cyclic time interval that can be recognised and given a unique definition.
TRE	Transmission Equipment
TRX	Transceiver
TRXSIG	TRX Signalling
TS	Time Slot
TSxx	Transceiver (RF unit), specific to Nokia UltraSite EDGE Base Station • TSTB for GSM/EDGE 800 • TSGA for GSM 900 • TSGB for GSM/EDGE 900 • TSDA for GSM 1800 • TSDB for GSM/EDGE 1800 • TSPA for GSM 1900 • TSPB for GSM/EDGE 1900
TTL	Transistor Transistor Logic
TX	Transmitter; Transmit
UC	Unit Controller
UI	User Interface
UL	Underwriters Laboratories

UL (Uplink) The direction of transmission in which the mobile station is the transmitting facility and the BTS is the receiving facility.

- 2-way uplink diversity - The function by which a BTS uses two antennas and two receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.
- 4-way uplink diversity - The function by which a BTS uses four antennas and four receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.

UMTS Universal Mobile Telecommunications System

UTRAN / UMTS
Terrestrial Radio Access Network

A radio access network (RAN) consisting of radio network controllers (RNCs) and base transceiver stations (BTSs). It is located between the Iu interface and the wideband code division multiple access (WCDMA) radio interface.

UPS Uninterruptible Power Supply

VC Virtual Channel

VCO Voltage Controlled Oscillator

An oscillator for which a change in tuning voltage results in a predetermined change in output frequency.

VLL Line-to-Line Voltage

VP Virtual Path

The unidirectional transport of ATM cells belonging to virtual channels that are associated by a common identifier value.

VPCI Virtual Path Connection Identifier

An identifier which identifies the virtual path connection between two B-ISDN ATM exchanges, or between a B-ISDN ATM exchange and a B-ISDN user.

VPI — Virtual Path Identifier

An identifier which identifies a group of virtual channel links at a given reference point that share the same virtual path connection.

VSWR — Voltage Standing Wave Ratio

The ratio of maximum to minimum voltage in the standing wave pattern that appears along a transmission line. It is used as a measure of impedance mismatch between the transmission line and its load.

VXxx — Transmission unit, specific to Nokia UltraSite EDGE Base Station

- VXEA for FC E1/T1
- VXRA for FC RRI
- VXRB for FXC RRI
- VXTA for FXC E1
- VXTB for FXC E1/T1

WAF — Wideband Antenna Filter unit

WAM

Wideband Application Manager unit

WBC — Wideband Combining unit

WCC — Wideband Cabinet Core

WCDMA — Wide band Code Division Multiple Access

A spread spectrum CDMA technique used to increase the capacity and coverage of wireless communication networks.

WCH — Wideband Cabinet Heater

WCxA — Wideband Combiner, specific to Nokia UltraSite EDGE Base Station

- WCGA for GSM/EDGE 800/900
- WCDA for GSM/EDGE 1800
- WCPA for GSM/EDGE 1900

WEK	Wideband Extension Kit
WFA	Wideband Fan
WHX	Wideband Heat Exchanger
WIC	Wideband Input Combiner
WIK	Wideband Indoor Kit
WOC	Wideband Output Combiner
WOK	Wideband Outdoor Kit
WPA	Wideband Power Amplifier unit
WPS	Wideband Power Supply unit
WSC	Wideband System Clock
WSM	Wideband Summing and Multiplexing unit
WSP	Wideband Signal Processor unit
WTR	Wideband Transmitter and Receiver

3.1.2 Terms

This section provides definitions for terms used throughout Nokia UltraSite Solution documentation.

Abis Interface
: Interface between a Base Transceiver Station (BTS) and the Base Station Controller (BSC) and between two BTSs.

Absolute radio frequency channel number
: See absolute radio frequency number.

Absolute radio frequency number; absolute radio frequency channel number; ARFN; ARFCN
: Radio frequency used in connection with, for example, mobile originating and terminating test calls.

Adaptive multi-rate speech codec; AMR speech codec; AMR codec; AMR
: Speech codec which adapts its operation optimally according to the prevailing channel conditions.

Air Interface — Interface between MS and BTS.

Alarm — Announcement given to the operating personnel about abnormal functioning of the system or about a failure, or an indication of the degradation of the service level or reliability.

Alarm Status — Classification of the severity of an alarm, such as Critical, Major, Minor, and Information.

Alternating current; AC
A periodic current having a mean value zero.

Analogue-to-digital converter; Analog-to-digital converter /US/; A/D converter; ADC
A device which converts an analogue input signal to a digital output signal carrying equivalent information.

Application-specific integrated circuit; custom circuit; custom IC; ASIC
Integrated circuit which is designed for a specific application and a specific customer and which is not available to other customers.

ATM connection control; connection control; CC
Function that keeps track of connection resources and based on those handles the operations related to different kind of cross-connections.

ATM inverse multiplexing
See inverse multiplexing for ATM.

Backplane — Connector board at the back of Nokia UltraSite cabinets to which plug-in units are directly connected. See also BATA backplane and RFU backplane.

Base station — See base transceiver station.

Base station controller; BSC
Network element in the public land mobile network (PLMN) for controlling one or more base transceiver stations (BTS) in the call set-up functions, in signalling, in the use of radio channels and in various maintenance tasks.

Base station system; BSS
System of base stations (BSs) and base station controllers which is viewed by the mobile services switching centre (MSC) through a single interface.

Base transceiver station; base station; BTS; BS
: Network element in a mobile network responsible for radio transmission and reception to or from the mobile station.

BATA backplane
: Additional backplane required in a Site Support cabinet when using 12 rectifiers.

Bias Tee
: Unit that provides DC power for an associated MHA unit.

Cabinet Control Unit
: Module of the ADUA or ADUB that manages battery control, climatic control, alarm reporting, and serial and version number reporting for the IBBU or Nokia UltraSite Support cabinet. The CCU connects to the BOIx with Q1-bus.

Cell
: Coverage area of a given BTS where transmission is acceptably received.

Cell breathing
: Variation of the cell coverage area; depends on the interference and power requirements.

Cellular Network
: Two or more base stations connected together to provide an area of coverage for Mobile Stations (MS).

CENELEC
: Comité European de Normalisation ELECtrotechnique. European Committee for Electrotechnical Standardization.

Chain Connection
: Transmission solution in which the BTSs are interconnected through a chain, and the first BTS in the chain is connected to the BSC. See Loop Connection, Multidrop Connection, and Star Connection.

Chip
: Signal element.

Chip rate
: Number of chips transmitted in one second.

Commissioning
: Tasks performed to enable the BTS to be connected to the network. Includes operational tests and configuring of the transmission equipment.

Coverage Area
: See Cell.

Cross-connection
: Connection between input and output ports of a network element.

Cross-connection bank
: Information base that defines the cross-connections of a network element. The network element contains two or more banks, one of which is always active.

Custom circuit
: See application-specific integrated circuit.

Custom IC
: See application-specific integrated circuit.

D-bus
: Bus used for traffic communication between the transmission units and BB2x units (D1-bus) and for internal O&M communication with the BOIx, BB2x, and RTxx units (D2-bus).

Despreading
: The received wideband signal is modulated with the spreading code to get a narrowband signal after the multipath propagation in spread spectrum systems.

Digital signal processor; DSP
: A processor designed for signal handling, resembling an ordinary microprocessor.

Discontinuous reception; DRX
: Means of saving battery power (for example in hand-portable units) by periodically and automatically switching the mobile station receiver on and off.

Discontinuous transmission; DTX
: Feature which enables saving battery power (for example in hand-portable units) and reducing interference by automatically switching the transmitter off when no speech or data are to be sent.

Downlink Diversity
: See Frequency Hopping.

Earthing
: See Grounding.

F-bus
: Frequency Hopping bus. See Frequency Hopping.

Finger; rake finger; RAKE finger
: Receiver unit that despreads one multipath signal.

Four-way uplink diversity; 4-way uplink diversity
: Function by which a base transceiver station (BTS) uses four antennas and four receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.

Forward link
: See downlink.

Flash memory
: Nonvolatile, electronically writable memory, similar to EEPROM in function, but which must be erased in blocks.

Flexbus
: Bidirectional coaxial cable that carries up to 16 x 2 Mbit/s signals and power between transmission equipment, such as a radio outdoor and indoor unit.

Frequency-change oscillator
: See local oscillator.

Frequency Hopping
: Function in which a BTS swaps two transmitters on a single channel to obtain improved overall MS receiver sensitivity in a system that is subject to random fading.

Gain
: Signal amplification, expressed in dBi—decibels over a theoretic, isotropic, and uniformly radiating antenna.

Grounding
: Protecting the equipment and the users against lightning and surges through the external connections.

I^2C-bus
: Integrated Inter Cell communication bus used for polling, autodetection, version and serial number management, temperature polling, and alarm collection in units without a microprocessor.

Handover
: The handover occurs between two cells; the signal goes through one base station or base station sector at a time.

Human-machine interface; man-machine interface; HMI; MMI
: A subsystem or function which provides user interface functions in a man-machine language.

Installation
: Tasks performed to enable the BTS to be mounted at the site.

Integration
: Tasks performed to make the BTS functional in the cellular network. Includes making test calls.

Inter-frequency handover
: Handover where the new carrier frequency is different from the current one.

Inter-system handover
: Handover from one system to another, e.g. between a 3rd generation system and GSM.

Inverse multiplexing for ATM; ATM inverse multiplexing; inverse multiplexing; IMA
: The transmission method in which ATM cells in a cell stream are divided across several physical E1 links on a cell-by-cell basis, and then reassembled at the receiving end without affecting the original cell order.

Loop connection
: Transmission solution in which BTSs are interconnected in a loop. For example, the first and last BTSs are connected to the BSC. See Chain Connection, Multidrop Connection, and Star Connection.

Macrocellular
: Application that covers large areas with a cell radius of 1 to 10 km (0.6 to 6 miles). The coverage area is achieved when the antenna is installed high and off the ground.

Maximum ratio combining
: A signal combining technique in which each signal is multiplied by a weight factor that is proportional to the signal amplitude: the strong signals are further amplified, while the weak signals are attenuated.

Microcellular
: Application that typically covers areas with a cell radius of 100 m to 1 km (327 feet to 0.6 miles). The antennas are installed below rooftop level.

Microwave radio
: Radio equipment for establishing an aligned and fixed radio connection between two points.

Midi
: Indoor or Outdoor cabinet with up to six TRXs.

Multidrop Connection
: Transmission solution in which one or more BTS chains are connected to one BTS that is connected to the BSC. See Chain Connection, Loop Connection, and Star Connection.

Network Element

Any equipment that can be managed, monitored, or controlled in a telecommunications network.

Network Topology

Method of transmission between the cells of a network. Examples of transmission solutions are chain, loop, multidrop, and star connections.

Node Manager

A feature of Power System Management (PSM), the Node Manager software called PSMMan is used to control network elements, or nodes, of the Site Support System.

Nokia FlexiHopper

Nokia family of Flexbus-compatible microwave radios for the 13, 15, 18, 23, 26, and 38 GHz frequency bands, in which the radio transmission capacity can be selected using software. The radio transmission capacity of Nokia FlexiHopper can be 2 x 2, 4 x 2, 8 x 2, or 16 x 2 Mbit/s.

Nokia FlexiHopper outdoor unit can be used with different indoor units: FIU 19, RRIC, FC RRI, and FXC RRI.

Nokia Hopper Manager

PC software application used for controlling and monitoring Nokia FlexiHopper and Nokia MetroHopper radios connected to FIU19 or RRIC indoor units.

Nokia MetroHopper

Nokia Flexbus-compatible radio for the 58 GHz frequency band that does not require coordinated frequency planning. The main use of Nokia MetroHopper is to provide 4 x 2 Mbit/s, point-to-point wireless access for Nokia MetroSite BTS and Nokia MetroHub.

Nokia MetroHopper outdoor unit can be used with different indoor units: FIU 19, RRIC, FC RRI, and FXC RRI.

Nokia MetroHub

Nokia’s compact transmission node with cross-connection and grooming functions, such as FXC RRI. Nokia MetroHub contains up to five transmission units.

Nokia MetroSite GSM BTS

Nokia’s compact four-TRX GSM base station for Nokia MetroSite capacity solution. Nokia MetroSite GSM BTS can contain one transmission unit.

Nokia Q1 Connection Tool
: Program that makes connection and node definitions for identifying objects on a Nokia Q1 managed network. See Q1.

Nokia UltraSite
: Multimedia coverage and capacity macrocellular base station.

Omnidirectional Cell
: Cell with a 360× sector; also known as standard cell.

Operator
: Telecommunications company running telecommunications services in a specific geographical area.

PCM time slot
: 1.5 Mbit/s PCM circuit is divided into twenty-four 64 kbit/s time slots.

  2 Mbit/s PCM circuit is divided into thirty-two 64 kbit/s time slots.

Peltier elements
: Elements that absorb or emit heat when an electric current passes across a junction between two materials. Used for heating and cooling IP20 protection class equipment.

Point-to-point
: Transmission between two fixed points.

Q1-bus
: Bus in Nokia UltraSite EDGE BTS, used for local transmission management (Q1int) and for extending the management to external equipment.

Radio interface; air interface; AI
: The interface between the mobile station (MS) and the radio equipment in the network. This is defined by functional characteristics, common radio (physical) interconnection characteristics, and other characteristics as appropriate.

Radio Relay
: Microwave radio unit that replaces a fixed cable with a microwave radio link in the Abis Interface.

Rectifier
: Device for converting alternating current to direct current. See BATx.

RFU backplane
: Backplane in Nokia UltraSite EDGE BTS cabinet to which RF units are attached.

Sectored BTS Site
: A site with multiple cells positioned to supply the desired radiation.

Sectored Cell — A cell with a conical coverage area achieved by means of a directional aerial.

Single Sector — A part of the BTS's physical equipment that serves a single cell in the network radio topology.

Site — Location where telecommunication equipment has been installed. For example, a site can contain a base station and transmission equipment with an equipment shelter and antenna tower.

Several network elements can be located at a site.

Soft handover — Handover where the signal goes through two base stations or base station sectors at a time.

Softer handover — Handover where the signal goes through two sectors in one base station area at a time.

Software Package — Software collection consisting of the components of the BTS operating system.

Spreading — A process in which the signal is modulated with the pseudo noise code to get a wideband signal for multipath propagation in spread spectrum systems.

Spreading code — A code that is used to despread a signal in spread spectrum communications.

Star Connection — Transmission solution in which three branches with one BTS in each are connected to a common node. See Chain Connection, Loop Connection, and Multidrop Connection.

Synchronisation (Sync) — Process of adjusting the corresponding significant instances of signals (between adjacent and serving cells) to obtain the desired phase relationship between these instances.

Uplink — Direction of transmission in which the mobile station is the transmitting facility and the BTS is the receiving facility.

Uplink Diversity

2-way uplink diversity – Function in which a BTS uses two antennas and two receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.

4-way uplink diversity – Function in which a BTS uses four antennas and four receivers simultaneously on a single channel to obtain improved overall BTS receiver sensitivity in an environment that is subject to random multipath fading.

See Frequency Hopping.

Related Topics

Technical description of AC/DC Connection/ Cabinet control (ADUA/CCUA) unit of UltraSite EDGE BTS with IBBU

Reference

Technical data for the AC/DC Connection/Cabinet Control (ADUA/CCUA) unit of UltraSite EDGE BTS with IBBU

Interfaces of the AC/DC Connection/Cabinet Control (ADUA/CCUA) unit with IBBU

AC/DC Connection/Cabinet control (ADUA/CCUA) unit LEDs for UltraSite EDGE BTS with IBBU

Technical description of 1300 W Rectifier (BATA) unit of UltraSite EDGE BTS with IBBU

Instructions

Installing a 1300 W Rectifier (BATA) unit

Removing a 1300 W Rectifier (BATA) unit

Replacing a 1300 W Rectifier (BATA) unit

Reference

Technical data for the 1300 W Rectifier (BATA) unit

Interfaces of the 1300 W Rectifier (BATA) unit

1300 W Rectifier (BATA) unit LEDs

Technical description of Battery (BBAx) unit of UltraSite EDGE BTS with IBBU

Instructions

Installing a Battery (BBAx) unit

Removing a Battery (BBAx) unit

Replacing a Battery (BBAx) unit

Reference

Technical data for the Battery (BBAx) unit