NOKIA

Nokia UltraSite EDGE

Base Station

Nokia UltraSite EDGE Product Descriptions Manual

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CE

CE 0523 ⓘ

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The product is marked with the CE marking and Notified Body number according to the Directive 1999/5/EC.

Contents

Summary of changes

First Release, 30 June 2000

Second Release, 12 January 2001

Third Release, 01 August 2001

1 About this document

This document describes Nokia UltraSite EDGE Base Station (BTS) products. The BTS is part of the Nokia UltraSite Macrocellular Solution that delivers high-capacity and wide-coverage macrocellular BTS products, complete with transmission and auxiliary equipment.

Contents

This document contains the following information about Nokia UltraSite EDGE BTS:

- Chapter 2 – General description
- Chapter 3 – Cabinet construction
- Chapter 4 – BTS units
- Chapter 5 – Technical data

Readership

This document is for readers who want detailed information about the BTS. Nokia recommends that you have a basic knowledge of base station systems and equipment.

For specific instructions on application planning, installation, and commissioning, see *Nokia UltraSite EDGE Base Station User Manual*.

2 General description

This chapter describes Nokia UltraSite EDGE BTS and provides information on:

- Operation
- Transmission

Nokia UltraSite EDGE BTS supports both omni-directional and sectorised configurations for traditional voice and future data applications. The BTS can be used in GSM 800, 900, 1800, or 1900 systems, or as a GSM 800/1900 or GSM 900/1800 dual-band BTS. With the addition of EDGE/EGPRS, the BTS offers a maximum data rate of over 400 kbit/s with multiple timeslots, as compared to over 100 kbit/s with multiple timeslots for GSM/GPRS.

Nokia UltraSite EDGE BTS is available in the following cabinets for outdoor and indoor applications:

- Nokia UltraSite EDGE BTS Outdoor
- Nokia UltraSite EDGE BTS Indoor

- Nokia UltraSite EDGE BTS Midi Indoor (used when vertical space is limited)
- Nokia UltraSite EDGE BTS Midi Outdoor (used when vertical space is limited)

Note

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 when the equipment is operated in a commercial environment.This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Note

For sites with minimised requirements, both the outdoor and indoor cabinets can hold an Integrated Battery Backup (IBBU). However, an IBBU reduces the maximum number of Transceiver (TSxx) units in the cabinet from 12 to 6.

Note

To upgrade Nokia UltraSite EDGE BTS from GSM to EDGE requires the EDGE version of:

- BTS software
- Transceiver (TSxx) unit
- Transceiver Baseband (BB2x) unit

The BTS cabinet, backplane, and other units do not change.

2.1 Operation

Nokia UltraSite EDGE BTS performs the radio functions of the Base Station Subsystem (BSS). This section describes the following types of signalling associated with operating the BTS:

- Uplink and downlink
- Internal BTS

The BTS receives and sends signals through:

- Air interface – frequencies that connect the BTS to the Mobile Station (MS)
- Abis interface – cable or radio link that connects the BTS to the Base Station Controller (BSC), which is the central element of the BSS

Figure 1 illustrates the BTS interfaces.

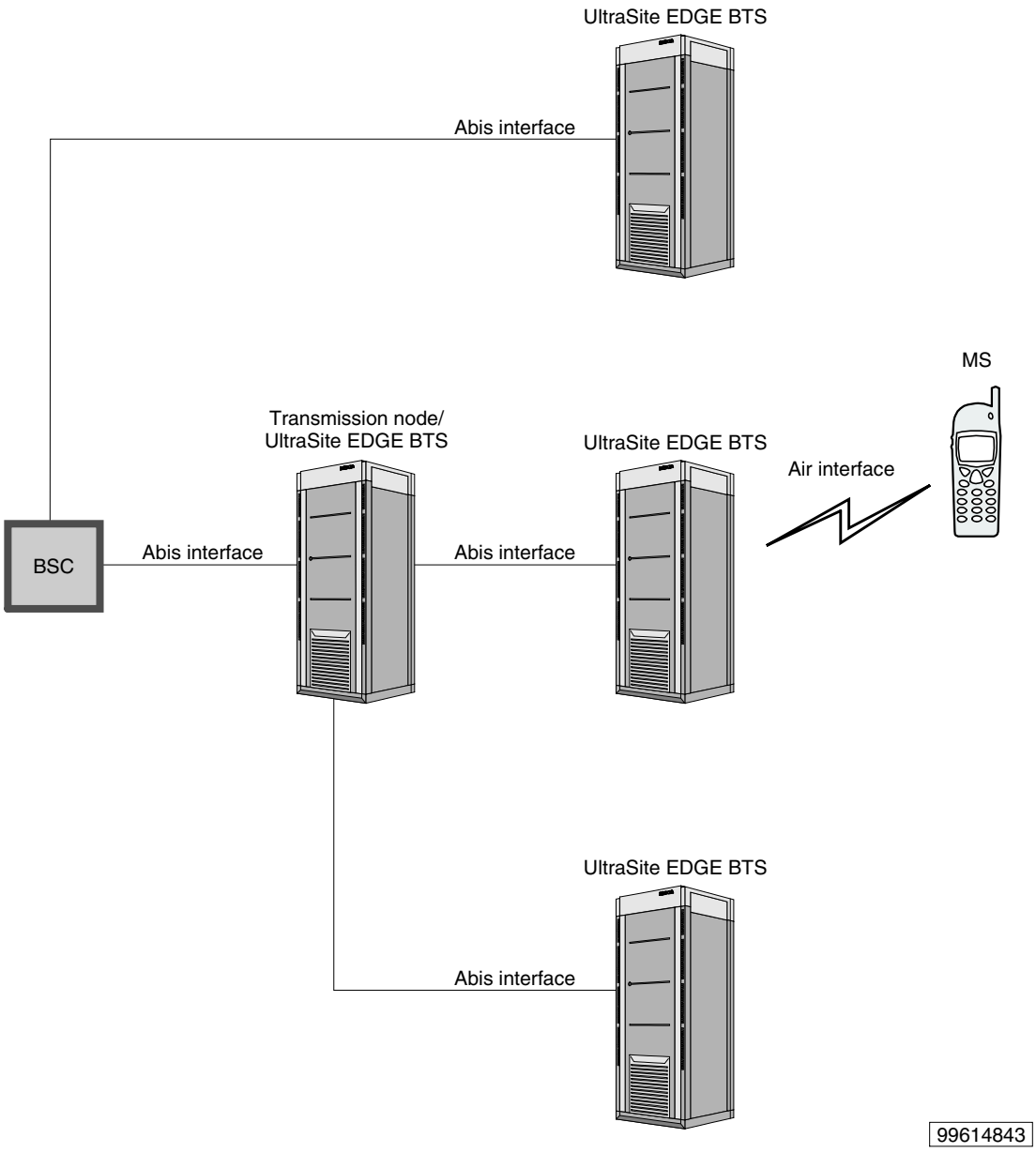

Figure 1. BTS interfaces

2.1.1 Uplink and downlink signalling

In the uplink path, the BTS receives signals from the MS; in the downlink path, the BTS sends signals to the MS. Uplink and downlink signals travel through the Air interface on different frequencies with the higher frequency carrying downlink signals.

Uplink signal path

The uplink signal path involves the following actions:

- The antenna picks up a signal from the MS through the Air interface.
- The antenna passes the signal to the optional Masthead Amplifier (MNxx) and Bias Tee (BPxx) units or to the optional Dual Band Diplex Filter (DU2A) unit.
- The signal passes through either the Dual Variable Gain Duplex Filter (DVxx) or Remote Tune Combiner (RTxx) unit to the Receiver Multicoupler (M2xA or M6xA) and Transceiver RF (TSxx) units.
- The Transceiver module (TRX) on the TSxx unit converts the received signal to Intermediate Frequency (IF) levels and filters the signal.
- The TSxx unit then sends the signal to the Transceiver Baseband (BB2x) unit for digital signal processing.
- The BB2x unit sends the processed signal to the Transmission (VXxx) unit, which passes the signal through the Abis interface to the BSC.

Downlink signal path

The downlink signal path involves the following actions:

- The BSC receives a signal from the network and sends the signal to the VXxx unit through the Abis interface.
- The VXxx passes the signal to the BB2x unit for digital signal processing.
- The BB2x unit sends the processed signal to the TSxx unit.
- The TRX module on the TSxx unit filters the signal, raises it to the carrier frequency, and amplifies it.
- The TSxx unit then sends the signal either to the RTxx unit or through the optional Wideband Combiner (WCxA) unit to the DVxx unit.
- The DVxx or RTxx unit sends the signal through either the optional DU2A unit or the BPxx and MNxx units to the antenna, which passes the signal through the Air interface to the MS.

Figures 2 and 3 illustrate the uplink and downlink signal paths.

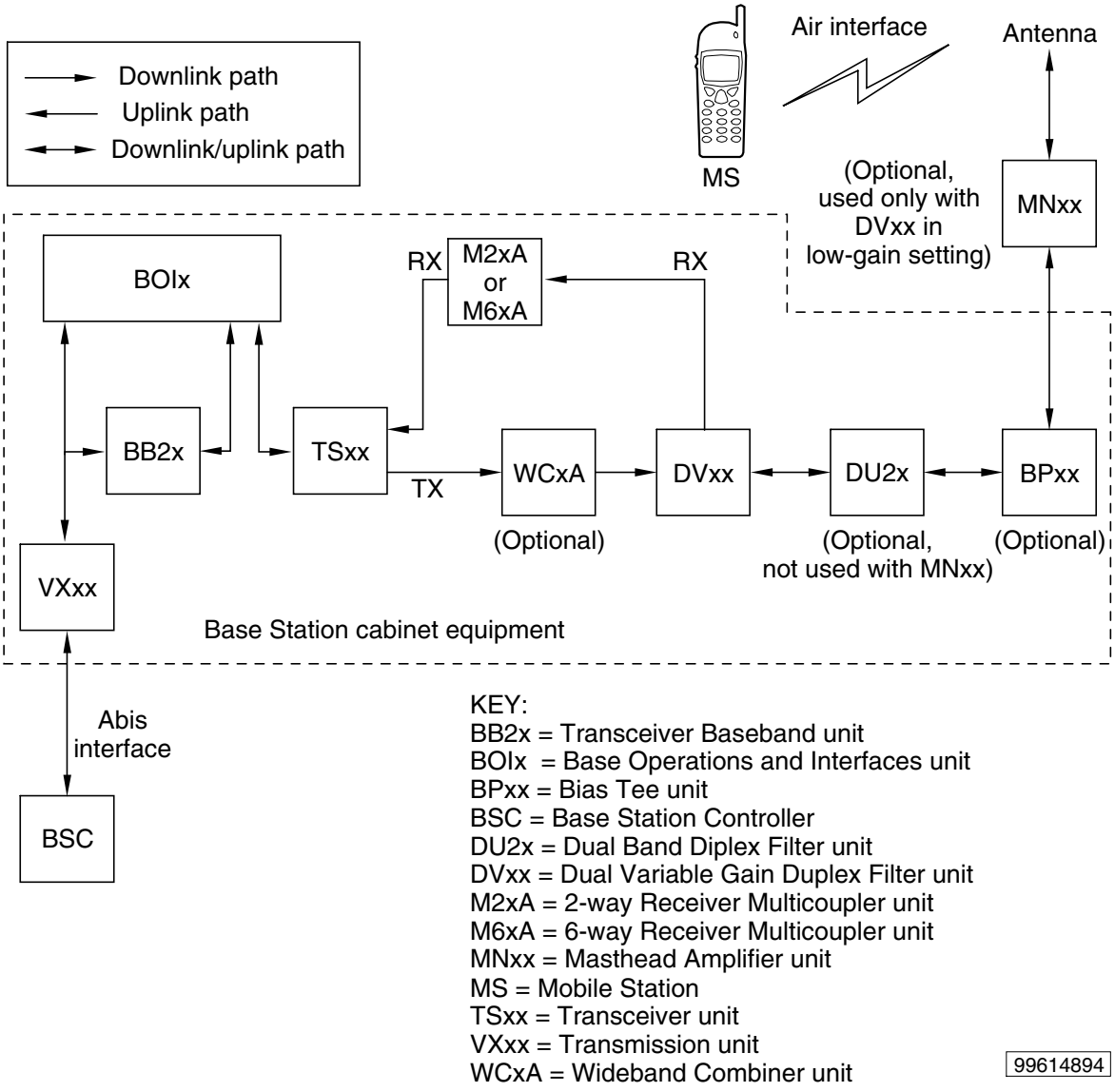

Figure 2. Uplink and downlink signal paths (using DVxx)

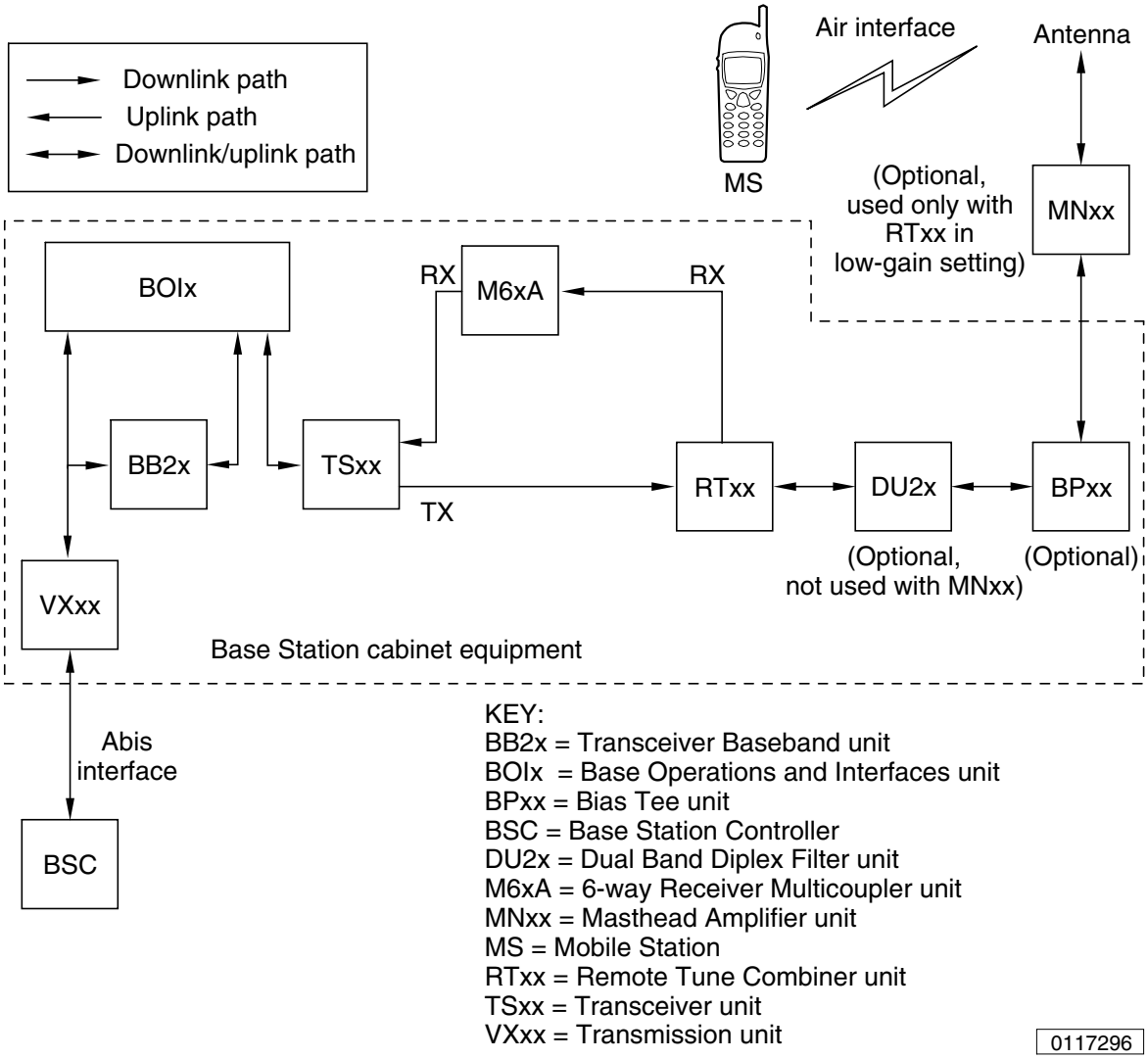

Figure 3. Uplink and downlink signal paths (using RTxx)

2.1.2 Internal BTS signalling

Buses on the BTS backplane and interconnected cables carry signals between the internal BTS units.

Table 1 lists the buses and their functions.

Table 1. BTS buses

Bus	Function
D1-bus	Data transfer and signalling between BOIx, BB2x, and VXxx units: • GSM - uses one D1-bus • EDGE - uses four D1-buses
D2-bus	Internal Operations and Maintenance (O&M) functions and communication between BOIx, BB2x, and RTxx units; software download
Local Management Bus (LMB)	Control of VXxx unit
Q1-bus	Polling and management of VXxx unit
I^2C-data buses	Polling, auto detection, temperature readings, and alarm collection – Power Supply (PWSx) unit, DVxx unit, and interface module
Uplink/downlink serial data bus[a]	Control, status, and traffic data between BB2x and TSxx units
F-bus[b]	Baseband frequency hopping

a. Located between the BB2x and TSxx units (through the BOIx unit cross-connection).
b. Located between BB2x units.

Figure 4 illustrates the internal bus architecture.

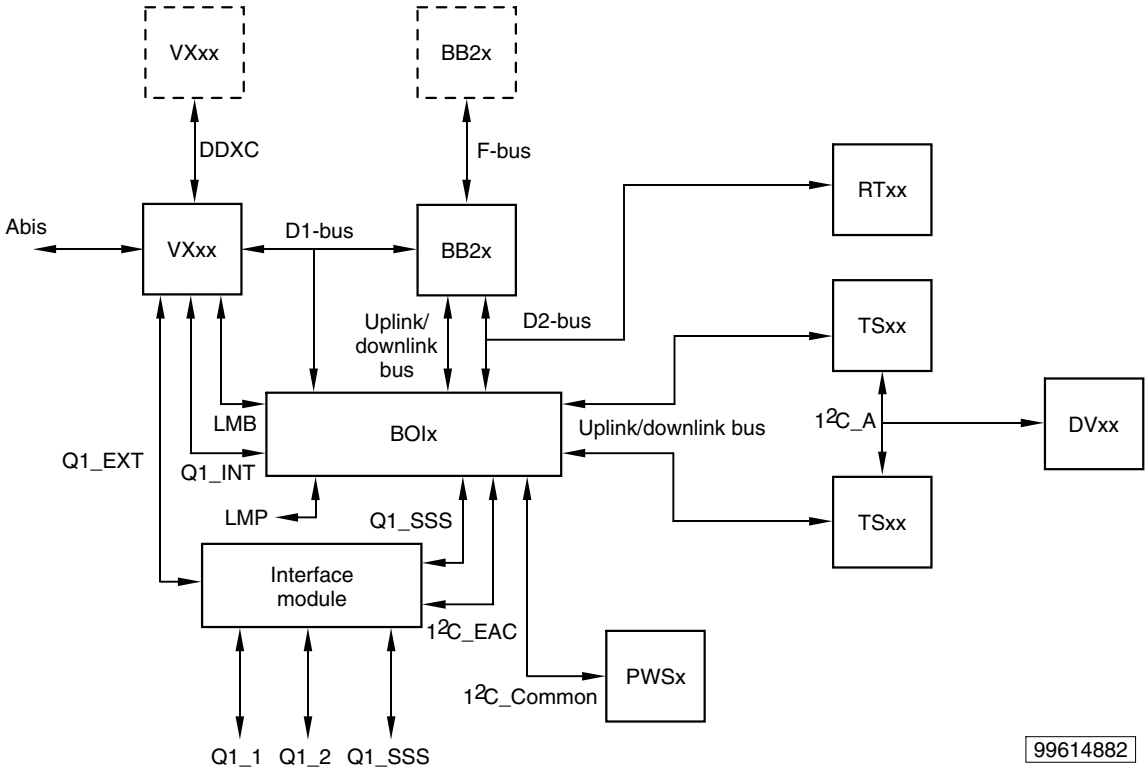

Figure 4. Internal bus architecture

2.2 Transmission

Nokia UltraSite EDGE BTS provides scalable, high-capacity access transmission for large-capacity networks and data services. Nokia UltraSite EDGE BTS supports 16, 32, and 64 kbit/s telecom signalling through the Abis interface. The O&M signalling speed can be 16 or 64 kbit/s.

This section provides information about:

- Transmission media
- Network configurations
- Cross connections
- Protection

2.2.1 Transmission media

Nokia UltraSite EDGE BTS supports the following transmissions:

- radio-link
- wireline

The signals are multiplexed and cross-connected to a level of 8 kbit/s in the BTS using either the Plesiochronous Digital Hierarchy (PDH) or Synchronous Digital Hierarchy (SDH).

Radio-link transmission

The FXC RRI unit is the radio-link transmission unit for Nokia UltraSite EDGE BTS. The unit has two Flexbus interfaces for connecting:

- one or two microwave radio outdoor units
- two FXC RRI units in different BTS cabinets or transmission nodes

The proprietary Nokia Flexbus is a coaxial cable that:

- carries power for the radio outdoor unit
- carries a maximum of 16 x 2 Mbit/s in both directions
- has a maximum cable length of 300 metres
- is compatible with Nokia FlexiHopper Microwave Radio and Nokia MetroHopper Radio

Wireline transmission

Cellular access networks are based mainly on the E1 (ETSI) and T1 (ANSI) standards. E1 capacity is 2 Mbit/s; T1 capacity is 1.5 Mbit/s. Nokia UltraSite EDGE BTS supports these standards with the following wireline transmission units:

- FC E1/T1 – 120 Ω twisted pair for E1 or 100 Ω twisted pair for T1, 75 Ω coaxial for E1
- FXC E1 – four 75 Ω coaxial for E1
- FXC E1/T1 – four 120 Ω twisted pair for E1 or 100 Ω twisted pair for T1

2.2.2 Network configuration

The choice of network configuration depends mainly on the requirements for transmission media and availability. The loop network configuration is the most reliable, providing excellent protection against equipment failures and radio-link fading.

Nokia UltraSite EDGE BTS directly supports all network configurations — loop, chain, star, point-to-point, and mesh. Separate transmission nodes are unnecessary, because the Nokia UltraSite EDGE BTS cabinet can hold up to four integrated transmission units.

Each BTS cabinet uses the FXC transmission units to add or drop capacity to other sites. The integrated transmission can groom traffic and serve as a PDH loop master. Cross-connections to 8 k granularity and grooming at the BTS further optimise transmission capacity.

Figure 5 illustrates the loop configuration.

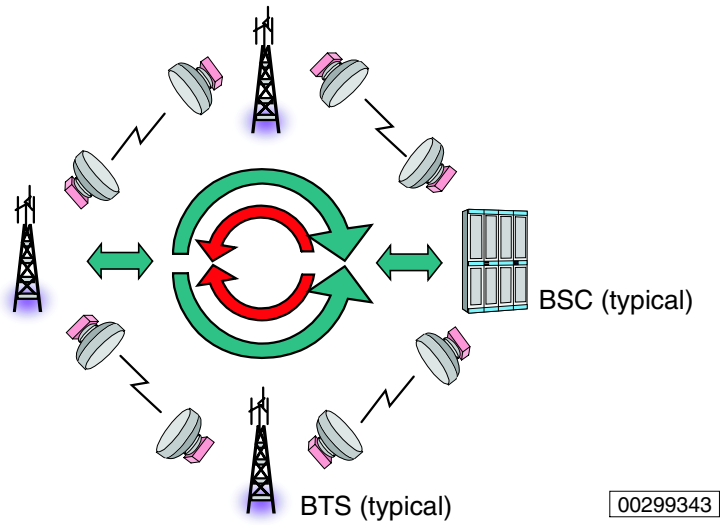

Figure 5. Nokia UltraSite loop configuration

Figure 6 illustrates the star and chain configurations.

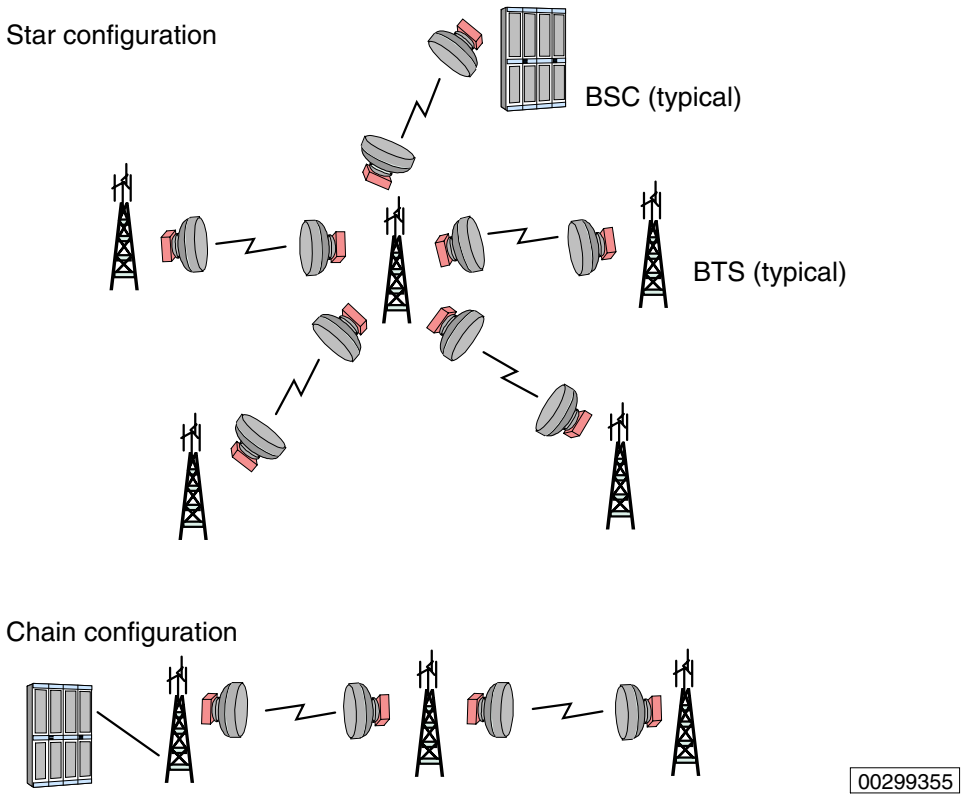

Figure 6. Nokia UltraSite star and chain configurations

The BTS uses the following transmission units:

- FXC RRI
- FXC E1
- FXC E1/T1

FXC RRI unit

With two radio-link Flexbus connections per unit, the FXC RRI unit operates as a repeater and interconnects Nokia UltraSite EDGE BTS cabinets and the BSC using loop, chain, star, and point-to-point network configurations. With up to four FXC RRI transmission units per cabinet, a maximum of eight Flexbus connections is supported in a single-cabinet and 20 connections in a three-cabinet site. A three-cabinet site with four FXC RRI units per cabinet has an add or drop capacity of 16 x 2 Mbit/s.

FXC E1 or FXC E1/T1 unit

With four wireline connections per unit (E1 has 2 Mbit/s capacity, and T1 has 1.5 Mbit/s capacity), the FXC E1 or FXC E1/T1 unit operates as a branching point and interconnects Nokia UltraSite EDGE BTS cabinets and the BSC using the loop, chain, star, and point-to-point network configurations. With up to four FXC E1 or FXC E1/T1 units per cabinet, a single cabinet supports a maximum of 16 wireline connections. The FC E1/T1 unit can be used as a termination point in a chain, star, or point-to-point network configuration, because it has one wireline connection and only one FC E1/T1 unit per BTS cabinet.

Co-located Nokia Talk-family and E1/T1 interface

A co-located Nokia Talk-family BTS can connect to Nokia UltraSite EDGE BTS using the integrated E1/T1 interface or Flexbus. During the upgrade phase, the Nokia Talk-family transmission interface to the BSC is the Abis for Nokia UltraSite EDGE BTS. This configuration, however, limits the capacity and expandability of the BTS; therefore, the Abis interface is connected through Nokia UltraSite EDGE BTS.

2.2.3 Cross-connections

Different transmission nodes support different cross-connection granularities and connection types in GSM transmission networks. The BTS access networks normally use 16 kbit/s for signalling and traffic. To fill higher-level transmission pipes, the nodes must be able to make cross-connections on the 16 kbit/s level. Nokia UltraSite EDGE BTS can handle the following cross-connection granularities:

- 8 kbit/s, needed when monitoring Abis traffic
- n x 64 kbit/s
- 1.5 Mbit/s, corresponding to the T1 interface
- 2 Mbit/s, corresponding to the E1 interface

Note

VC-12 – virtual container inside VC-4 with a capacity of 2 Mbit/s

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2.2.4 Protection

This section describes the following types of protection against transmission problems, such as cable cuts, radio-link fading, and equipment faults:

- equipment protection
- path protection
- loop protection

Equipment protection

Equipment protection provides redundancy at the equipment level. The Hot Stand-by (HSB) equipment protection for Nokia FlexiHopper Microwave Radio involves using either one (FIU19, FXC RRI) or two (FIU19 only) indoor units. In the case of a fault in the operating unit or a forced switch by the management function, the redundant unit becomes the primary unit.

Path protection

Path protection provides diverse traffic paths that protect against faults. Nokia UltraSite EDGE BTS supports 1+1 path protection where the traffic is sent in two paths simultaneously, and protection switching occurs entirely at the receiving end. Nokia UltraSite EDGE BTS does not support 1:1 and 1:N path protection methods. The SDH multiplexing structure enables efficient path protection schemes. Single multiplexer sections, as well as VC paths over several multiplexer sections, can be protected independently. The multiplexer sections may contain several regenerator sections.

Loop protection

Loop or ring network structures provide an efficient way to protect against transmission path and equipment failures. A Nokia principle implements the PDH loops with Nokia elements that use specially configured pilot bits to select the transmission direction of the loop. The pilot bits are configured to be used as any bit in the 2 Mbit/s signal. The loop master sends the pilot bits, and thus, controls the transmission direction of the loop.

SDH equipment provides efficient ADMs without separate up and down multiplexing. The ADMs can be used efficiently to provide automatically protected transmission loops.

2.3 Related software

The following Nokia software applications relate to Nokia UltraSite EDGE BTS:

- Network Management System (NMS) and BSC software
- Nokia SiteWizard
- BTS software

2.3.1 NMS and BSC software

Nokia NMS/2000 software manages the entire GSM network, including Nokia UltraSite EDGE BTS, using the BSC. This remote software minimises the need for on-site BTS management. Nokia NMS/2000 software incorporates a full range of functions — from fault, performance, and configuration management to transmission, trouble, and security management. For more information, refer to Nokia NMS documentation.

NMS/2000 software T11 and T12 and BSC software S9 support BTS software PU1.1. NMS/2000 software T12 and BSC software S10 support BTS software PU1E and CX3.0. PU1E provides GSM functionality with EDGE hardware. Complete EDGE software functionality will be supported in CX3.0.

2.3.2 Nokia SiteWizard

Nokia SiteWizard is a collection of software used to manage Nokia UltraSite EDGE BTS on site. The applications run under Windows NT 4.0, Windows 95, or Windows 98.

Nokia SiteWizard consists of the following applications:

- Nokia BTS Manager for managing Nokia UltraSite EDGE BTS
- Nokia E1/T1 Manager for FC E1/T1, FXC E1, and FXC E1/T1 transmission units
- Nokia RRI Manager for FXC RRI transmission unit
- Nokia Hopper Manager for Nokia MetroHopper and FlexiHopper Radio
- Nokia UltraSite BTS Hub Manager for commissioning the FXC transmission unit in the hub part of the BTS
- Nokia BTS Hardware Configurator for configuring the Nokia UltraSite EDGE BTS cabinet

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Note

The Nokia SiteWizard software package also contains manager applications for other Nokia BTS products. These applications are not included in the previous list.

BTS Manager

Figure 7 illustrates the Nokia BTS Manager window.

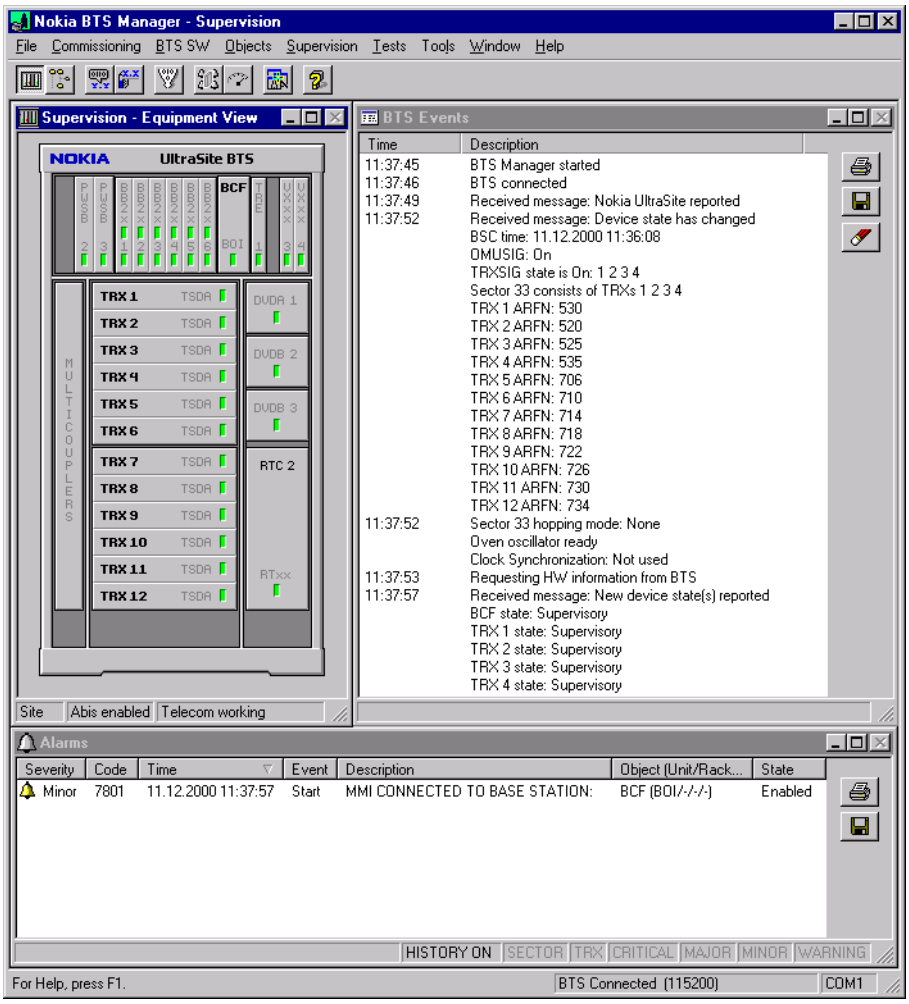


Figure 7. Nokia BTS Manager window

Nokia BTS Manager has the following main features:

- auto-detected base station hardware in a graphical Equipment view
- support for transmission configuration
- advanced BTS diagnostics and alarm management
- BTS testing
- Commissioning Wizard

2.3.3 BTS software

PU1.1 is the initial UltraSite BTS software for GSM 800, 900, 1800, and 1900. PU1E is the UltraSite BTS software that can support partial EDGE functionality. CX3.0 is the UltraSite BTS software for EDGE.

Some software features are:

- auto-detection that automatically identifies the active BTS hardware. This feature reduces the number of required system data entries.
- advanced BTS diagnostics system that considerably reduces the number of alarms. This system makes alarm information easily accessible and understandable.
- storage for two applications in memory. The software loads either locally with Nokia BTS Manager or remotely from the BSC or NMS (through the BSC). The operator downloads the software as a background operation (without interrupting the BTS operation) and activates the new software at any time.

Software updates are delivered on CD-ROM and diskette.

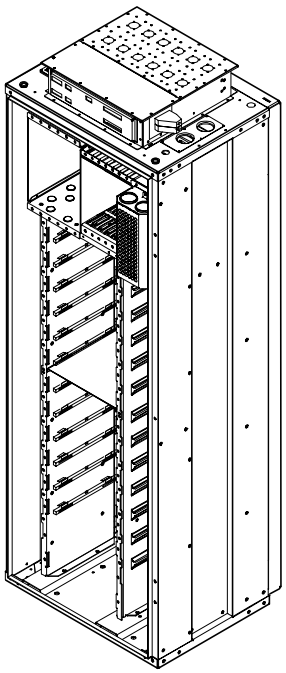
3 Cabinet construction

This chapter describes the cabinet core and application kits for Nokia UltraSite EDGE BTS. It also provides specific information, such as dimensions, weight, and operational temperatures, about the BTS.

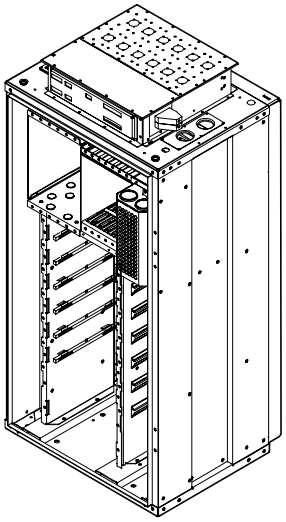
3.1 Cabinet cores

Nokia UltraSite EDGE BTS features self-standing cabinet cores with unit guides. The Nokia UltraSite EDGE BTS Outdoor and Indoor cabinets are constructed on identical cabinet cores (CRMA). The difference between the cabinets is in the external application kits.

Nokia UltraSite EDGE BTS Midi cabinets are also constructed on identical cabinet cores (CRMC). Figure 8 illustrates the two cabinet cores.



Cabinet core (CRMA)



MIDI cabinet core (CRMC) 0125888

Figure 8. Cabinet cores

3.2 Application kits

An application kit is a set of metal panels that shield the BTS from electromagnetic interference (EMI) and environmental elements. The following application kits are available for the BTS:

- Outdoor Application Kit (OAKx)
- Indoor Application Kit (IAKx)

3.2.1 Outdoor Application Kit (OAKx)

The OAKx protects the outdoor BTS against EMI, dust, water, snow, and solid foreign objects. The outdoor BTS electrical parts are weatherproof to IP 55 standards.

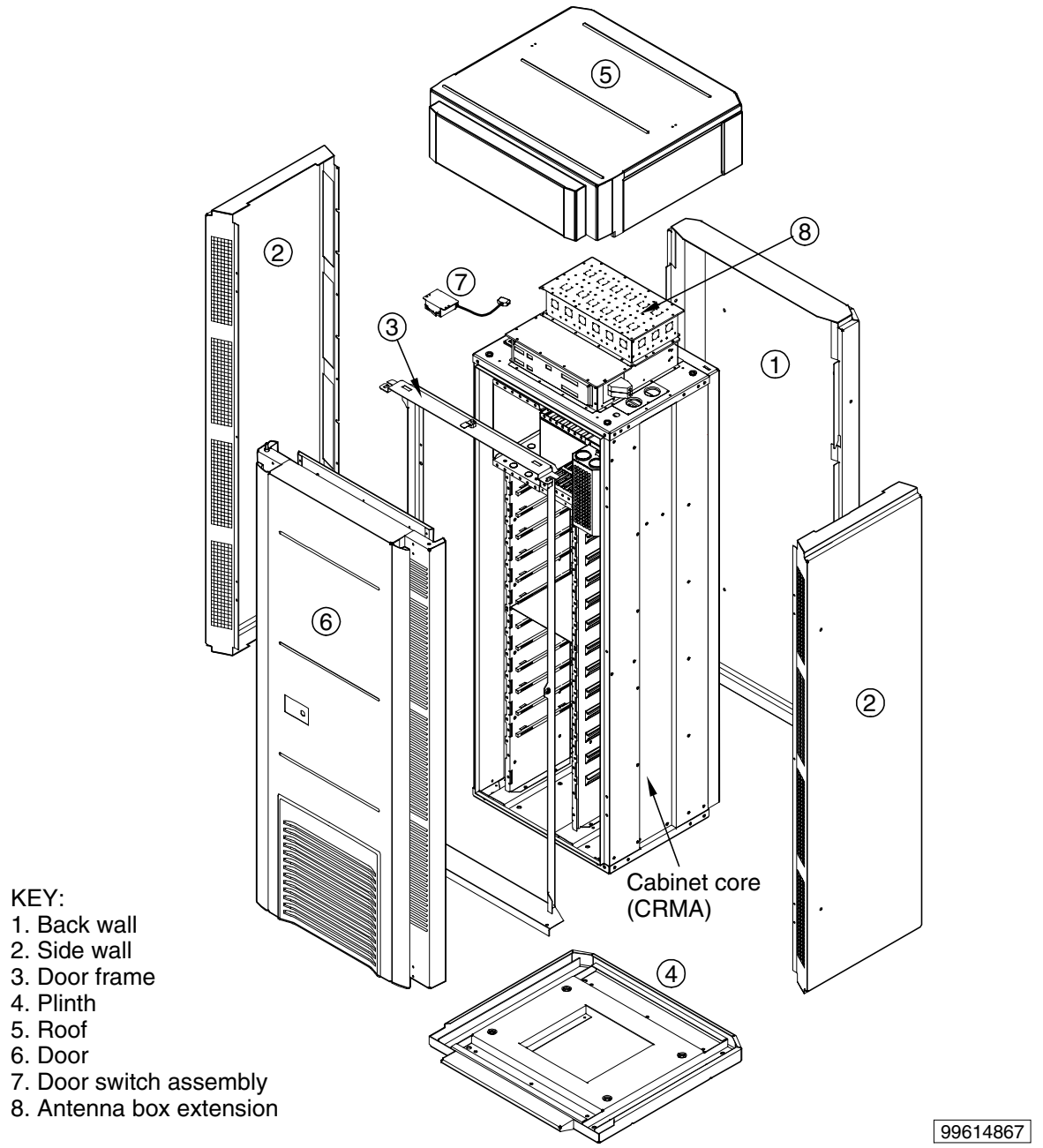
The OAKx contains the following components:

- door with cabinet cooling fan for additional cooling
- back wall
- roof
- plinth for one BTS cabinet
- two side panels
- mounting hardware
- electronics module (door switch and heater, cabinet fan, and fuse connectors)
- shielding units and connector caps

The three OAKx types are:

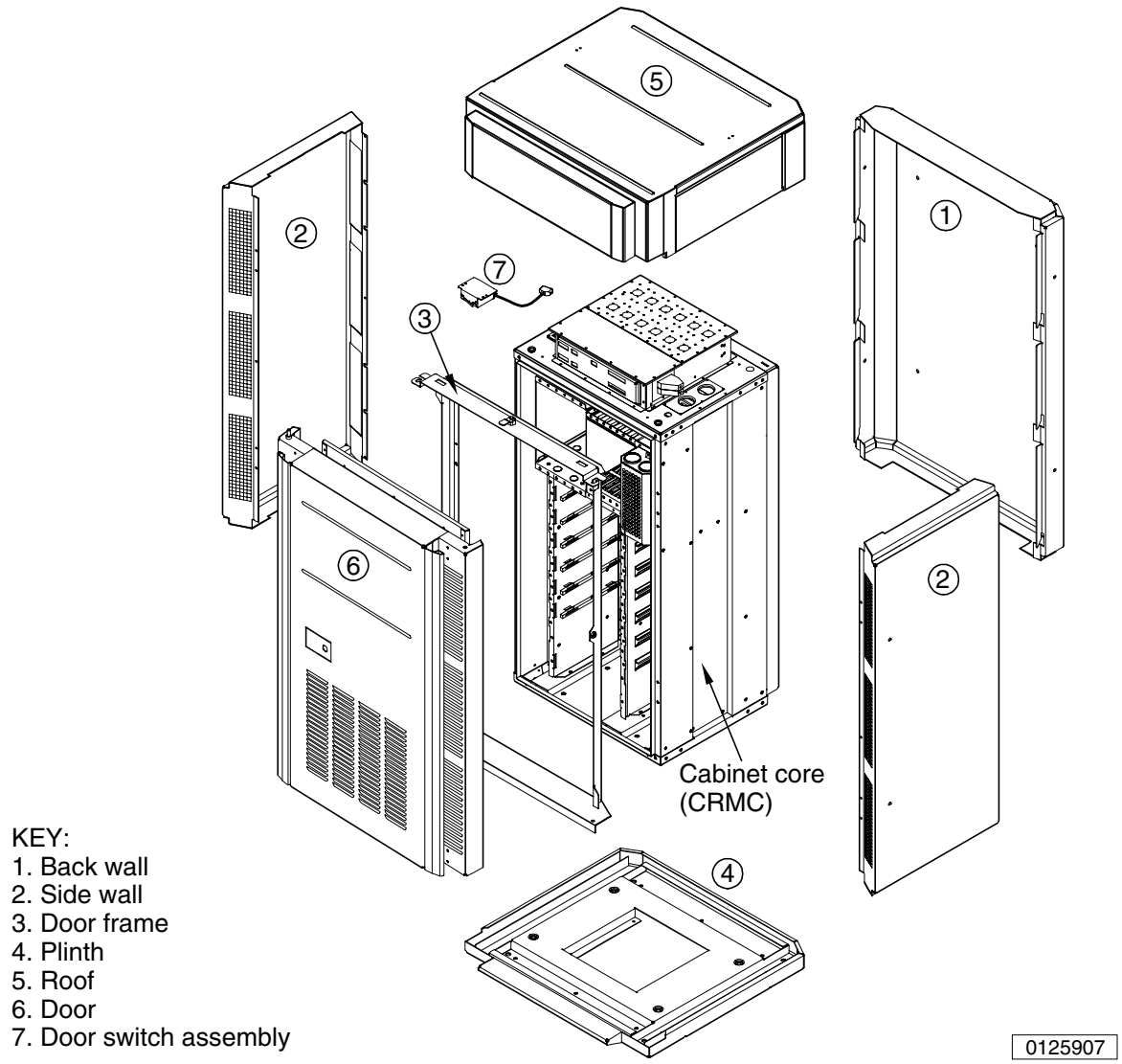
- OAKA – used for Nokia UltraSite EDGE BTS installation
- OAKB – used for Nokia Citytalk/UltraSite EDGE BTS co-siting and site support
- OAKC – used for Nokia UltraSite EDGE BTS Midi installation

Figure 9 illustrates the OAKA. Figure 10 illustrates the OAKC.



KEY:
1. Back wall
2. Side wall
3. Door frame
4. Plinth
5. Roof
6. Door
7. Door switch assembly
8. Antenna box extension

Figure 9. OAKA



KEY:
1. Back wall
2. Side wall
3. Door frame
4. Plinth
5. Roof
6. Door
7. Door switch assembly

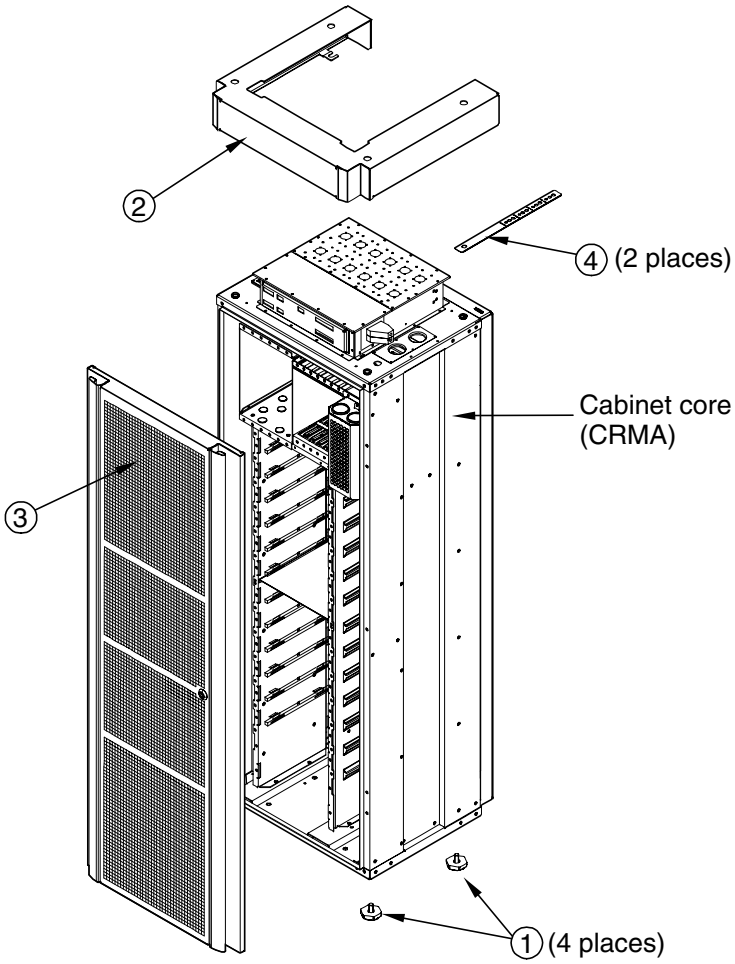
Figure 10. OAKC

3.2.2 Indoor Application Kit (IAKx)

The IAKx protects the indoor BTS against EMI, dust, and solid foreign objects. The IAKx contains the following components:

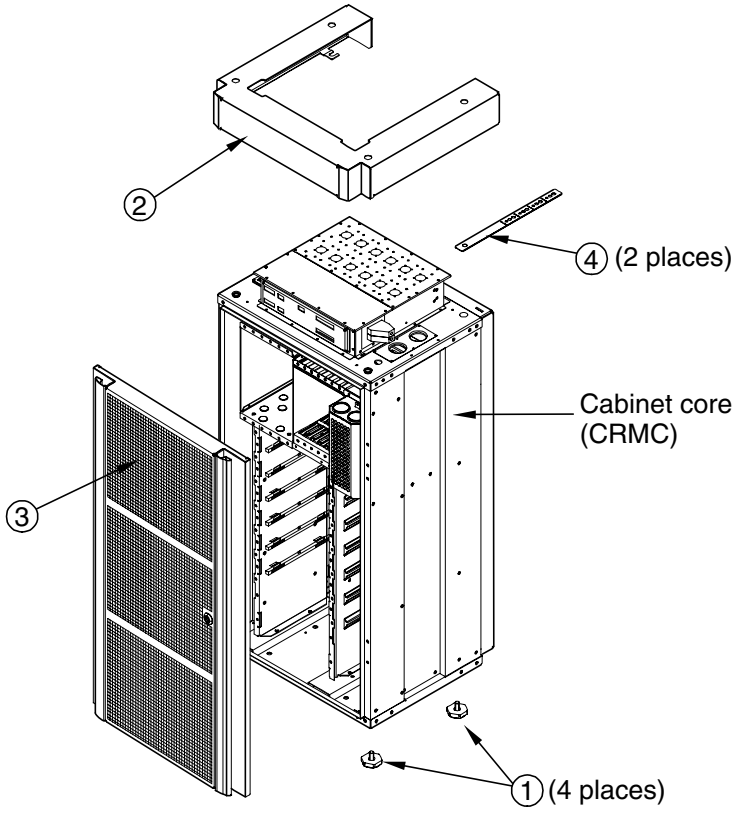
- door
- roof
- mounting hardware

Figure 11 illustrates the IAKA. Figure 12 illustrates the IAKC.



KEY:
1. Feet
2. Roof
3. Door
4. Wall brackets

Figure 11. IAKA



KEY:
1. Feet
2. Roof
3. Door
4. Wall brackets

Figure 12. IAKC

3.3 Physical properties

This section provides the dimensions, weights, and operational temperatures of Nokia UltraSite EDGE BTS Outdoor, Indoor, Midi Outdoor, and Midi Indoor cabinets.

3.3.1 Dimensions

Figures 13 and 14 illustrate different Nokia UltraSite EDGE BTS cabinets.

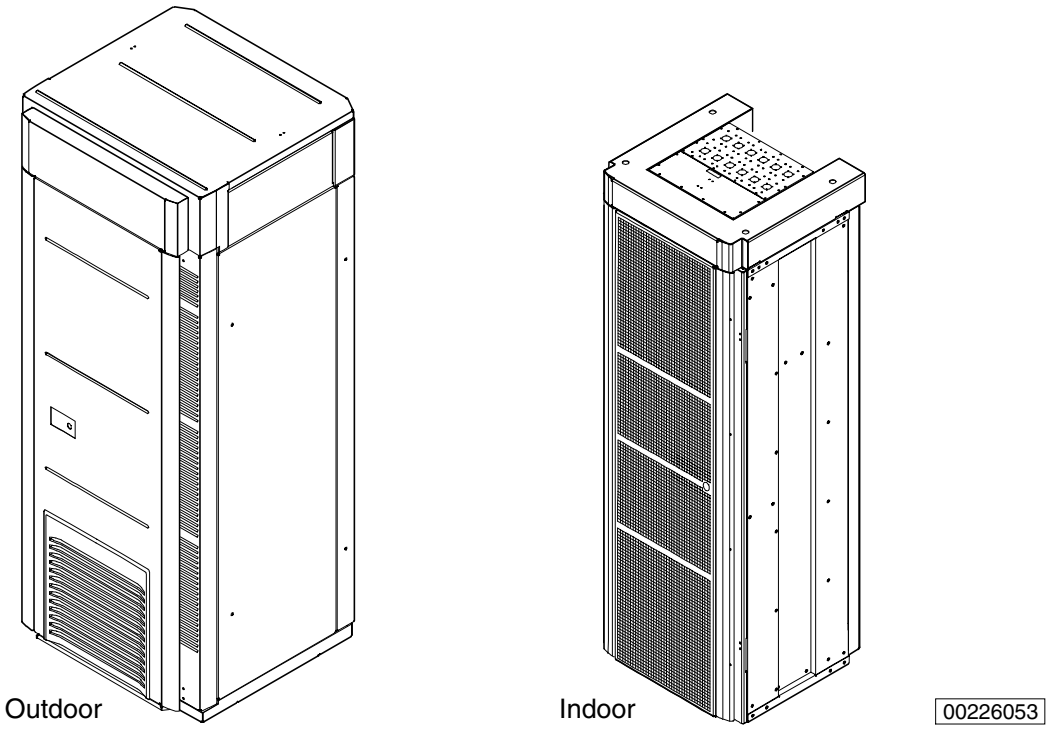


Figure 13. Nokia UltraSite EDGE BTS Indoor and Outdoor cabinets

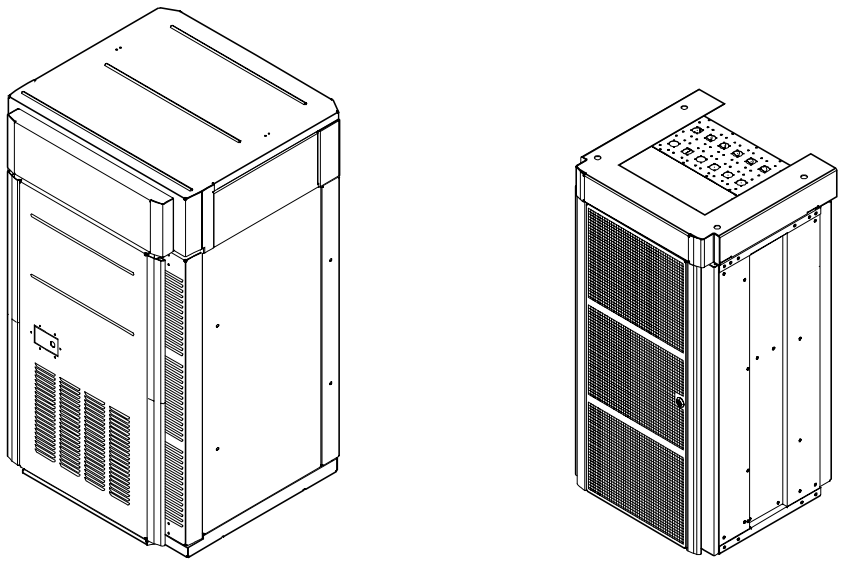


Figure 14. Nokia UltraSite EDGE BTS Midi Indoor and Outdoor cabinets

3.3.2 Weights

Table 2 shows the dimensions and weights of Nokia UltraSite EDGE BTS cabinets.

Table 2. Dimensions and weights of Nokia UltraSite EDGE BTS cabinets

Parameter	Outdoor	Indoor	Midi Outdoor	Midi Indoor
Height	1940 mm 76.4 in.	1800 mm 70.9 in.	1300 mm 51.2 in.	1180 mm 46.5 in.
Depth	750 mm 29.5 in.	620 mm* 24.4 in.	750 mm 29.5 in.	620 mm* 24.4 in.
Width	770 mm 30.0 in.	600 mm 23.6 in.	770 mm 30.0 in.	600 mm 23.6 in.
Maximum cabinet weight (with units)	350 kg 770 lb	270 kg 594 lb	233 kg 513.7 lb	170 kg 374.8 lb
Maximum cabinet weight (without units)	150 kg 330.7 lb	84 kg 185.2 lb	125.1 kg 275.7 lb	62.4 kg 137.5 lb
*Includes 52 mm behind the cabinet for the spacer part, which is required for cabinet cooling.				

3.3.3 Operating Conditions

Table 3 shows the recommended ranges and values for specific climatic conditions that affect the operation of Nokia UltraSite EDGE BTS cabinets.

Table 3. Climatic conditions for BTS operation

Climatic condition	Indoor/Midi Indoor	Outdoor/Midi Outdoor
Temperature range for operating without heater	-5° C to +50° C +23° F to +122° F	-10° C to +50° C -14° F to +122° F
Temperature range for operating with heater	Not applicable	-33° C to +50° C -27.4° F to +122° F
Change rate of temperature	0.5° C/min.	0.5° C/min.
Relative humidity	5% to 95%	15% to 100%
Absolute humidity	0.26 g/m^3 to 29 g/m^3	0.26 g/m^3 to 29 g/m^3
Air pressure	70 kPa to 106 kPa	70 kPa to 106 kPa
Movement of surrounding air	5 m/s maximum	50 m/s maximum
Solar radiation	700 W/m^2 maximum	1120 W/m^2 maximum
Rain intensity	Not applicable	6 mm/min. maximum
Low rain temperature	Not applicable	5° C minimum 41° F minimum
Water from sources other than rain	Not applicable	Splashing water
Wind driven rain, snow, or hail	Not applicable	Yes
Icing and frosting	Yes	Yes
Condensation	Yes	Yes

4 BTS units

This chapter describes the required and optional BTS units delivered with each Nokia UltraSite EDGE BTS cabinet.

4.1 Required and optional units

Table 4 shows the required (R) and optional (O) units for each Nokia UltraSite EDGE BTS cabinet. N/A indicates that the unit is not applicable for that cabinet.

Table 4. BTS units

Unit	Outdoor	Indoor	Midi Outdoor	Midi Indoor
Cabinet core mechanics (CRMx)				
• CRMA	R (1)	R (1)	N/A	N/A
• CRMB	R (1)	N/A	N/A	N/A
• CRMC	N/A	N/A	R (1)	R (1)
Base Operations and Interfaces (BOIx)				
• BOIA (GSM/EDGE)	R (1)	R (1)	R (1)	R (1)
Dual Band Diplex Filter (DU2x)				
• DU2A (GSM/EDGE)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)
Transceiver Baseband (BB2x)				
• BB2A (GSM)	R (1 to 6)	R (1 to 6)	R (1 to 3)	R (1 to 3)
• BB2E (GSM/EDGE)	R (1 to 6)	R (1 to 6)	R (1 to 3)	R (1 to 3)
Dual Variable Gain Duplex Filter (DVxx)[a]				
• DVTB (GSM/EDGE 800 Full Band)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)
• DVGA (GSM/EDGE 900 Full Band)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)

Table 4. BTS units (Continued)

Unit	Outdoor	Indoor	Midi Outdoor	Midi Indoor
• DVHA (GSM/EDGE 900 H Band)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)
• DVJA (GSM/EDGE 900 J Band)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)
• DVDA (GSM/EDGE 1800 A Band)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)
• DVDB (GSM/EDGE 1800 B Band)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)
• DVDC (GSM/EDGE 1800 Full Band)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)
• DVPA (GSM/EDGE 1900 Full Band)	O (0 to 6)	O (0 to 6)	O (0 to 3)	O (0 to 3)
Masthead Amplifier (MNxx)				
• MNGA (GSM/EDGE 800/900 Full Band)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
• MNDA (GSM/EDGE 1800 A Band)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
• MNDB (GSM/EDGE 1800 B Band)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
• MNPA (GSM/EDGE 1900 A Band)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
• MNPB (GSM/EDGE 1900 B Band)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
• MNPC (GSM/EDGE 1900 C Band)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
Bias Tee (BPxx)				
• BPGV[b] (GSM/EDGE 800/900)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
• BPDV (GSM/EDGE 1800/1900)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
• BPDN[c] (GSM/EDGE 800/900/1800/1900)	O (0 to 12)	O (0 to 12)	O (0 to 6)	O (0 to 6)
Receiver Multicoupler[d] (2-way and 6-way)				
• M2LA (2-way) (GSM/EDGE 800/900)	R (1 to 7)	R (1 to 7)	R (1 to 3)	R (1 to 3)
• M2HA (2-way) (GSM/EDGE 1800/1900)	R (1 to 7)	R (1 to 7)	R (1 to 3)	R (1 to 3)
• M6LA (6-way) (GSM/EDGE 800/900)	R (1 to 2)	R (1 to 2)	R (1)	R (1)
• M6HA (6-way) (GSM/EDGE 1800/1900)	R (1 to 2)	R (1 to 2)	R (1)	R (1)
Power Supply (PWSx)				
• PWSA (230 VAC)	R (1 to 2)	R (1 to 2)	R (1 to 2)	R (1 to 2)
• PWSB (-48 VDC)	R (1 to 3)	R (1 to 3)	R (1 to 3)	R (1 to 3)
• PWSC (+24 VDC)	R (1 to 2)	R (1 to 2)	R (1 to 2)	R (1 to 2)
Remote Tune Combiner (RTxx)[e]				
• RTGA (GSM/EDGE 900 Full Band)	O (0 to 2)	O (0 to 2)	O (0 to 1)	O (0 to 1)

Table 4. BTS units (Continued)

Unit	Outdoor	Indoor	Midi Outdoor	Midi Indoor
• RTHA (GSM/EDGE 900 H Band)	O (0 to 2)	O (0 to 2)	O (0 to 1)	O (0 to 1)
• RTJA (GSM/EDGE 900 J Band)	O (0 to 2)	O (0 to 2)	O (0 to 1)	O (0 to 1)
• RTDC (GSM/EDGE 1800 Full Band)	O (0 to 2)	O (0 to 2)	O (0 to 1)	O (0 to 1)
• RTDA (GSM/EDGE 1800 A Band)	O (0 to 2)	O (0 to 2)	O (0 to 1)	O (0 to 1)
• RTDB (GSM/EDGE 1800 B Band)	O (0 to 2)	O (0 to 2)	O (0 to 1)	O (0 to 1)
• RTPA (GSM/EDGE 1900 Full Band)	O (0 to 2)	O (0 to 2)	O (0 to 1)	O (0 to 1)
Temperature Control System (TCS)				
• Unit cooling fans (included in cabinet core mechanics)	R (11)	R (11)	R (7)	R (7)
• Heater (HETA) (optional in Outdoor Application Kit)	O (1)	N/A	O (1)	N/A
• Cabinet cooling fan (included in Outdoor Application Kit)	R (1)	N/A	R (1)	N/A
Transceiver (TSxx)				
• TSGA (GSM 900)	R (1 to 12)	R (1 to 12)	R (1 to 6)	R (1 to 6)
• TSDA (GSM 1800)	R (1 to 12)	R (1 to 12)	R (1 to 6)	R (1 to 6)
• TSPA (GSM 1900)	R (1 to 12)	R (1 to 12)	R (1 to 6)	R (1 to 6)
• TSTB (GSM/EDGE 800)	R (1 to 12)	R (1 to 12)	R (1 to 6)	R (1 to 6)
• TSGB (GSM/EDGE 900)	R (1 to 12)	R (1 to 12)	R (1 to 6)	R (1 to 6)
• TSDB (GSM/EDGE 1800)	R (1 to 12)	R (1 to 12)	R (1 to 6)	R (1 to 6)
• TSPB (GSM/EDGE 1900)	R (1 to 12)	R (1 to 12)	R (1 to 6)	R (1 to 6)
Transmission (VXxx)				
• VXEA (FC E1/T1)	R (1 to 4)	R (1 to 4)	R (1 to 4)	R (1 to 4)
• VXTA (FXC E1)	R (1 to 4)	R (1 to 4)	R (1 to 4)	R (1 to 4)
• VXTB (FXC E1/T1)	R (1 to 4)	R (1 to 4)	R (1 to 4)	R (1 to 4)
• VXRA (FC RR1)	R (1 to 4)	R (1 to 4)	R (1 to 4)	R (1 to 4)
• VXRB (FXC RR1)	R (1 to 4)	R (1 to 4)	R (1 to 4)	R (1 to 4)
Wideband Combiner (WCxA)[f]				
• WCGA (GSM/EDGE 800/900)	O (0 to 9)	O (0 to 9)	O (1 to 4)	O (0 to 4)
• WCDA (GSM/EDGE 1800)	O (0 to 9)	O (0 to 9)	O (1 to 4)	O (0 to 4)

Table 4. BTS units (Continued)

Unit	Outdoor	Indoor	Midi Outdoor	Midi Indoor
• WCPA (GSM/EDGE 1900)	O (0 to 9)	O (0 to 9)	O (1 to 4)	O (0 to 4)
Indoor Application Kit (IAKx)				
• IAKA (Indoor BTS)	N/A	R (1)	N/A	N/A
• IAKC (Midi Indoor BTS)	N/A	N/A	N/A	R (1)
Outdoor Application Kit (OAKx)				
• OAKA (Outdoor BTS)	R (1)	N/A	N/A	N/A
• OAKB (Outdoor Site Support)	O (0 to 1)	N/A	N/A	N/A
• OAKC (Midi Outdoor BTS)	N/A	N/A	R (1)	N/A
Outdoor Entry Kit (OEKA)	O (0 to 3)	N/A	O (0 to 1)	N/A
Outdoor Bridge Kit (OBKA)	O (0 to 1)	N/A	O (0 to 1)	N/A
AC Filter Unit (ACFU)	O (0 to 1)	O (0 to 1)	O (0 to 1)	O (0 to 1)
Air Filter Kit (OFKA)	O (0 to 1)	O (0 to 1)	O (0 to 1)	O (0 to 1)
Integrated Battery Backup (IBBU)[g]	O (1)	O (0 to 1)	O (1)	O (0 to 1)
• Rectifier) Unit (BATA)	R (1 to 6)	R (1 to 6)	N/A	N/A
• Battery Unit for Integrated Battery Backup (BBAG)	R (0 to 1)	R (0 to 1)	N/A	N/A
• AC/DC Unit for Integrated Battery Backup (ADUA) (with cabinet control unit)	R (0 to 1)	R (0 to 1)	N/A	N/A

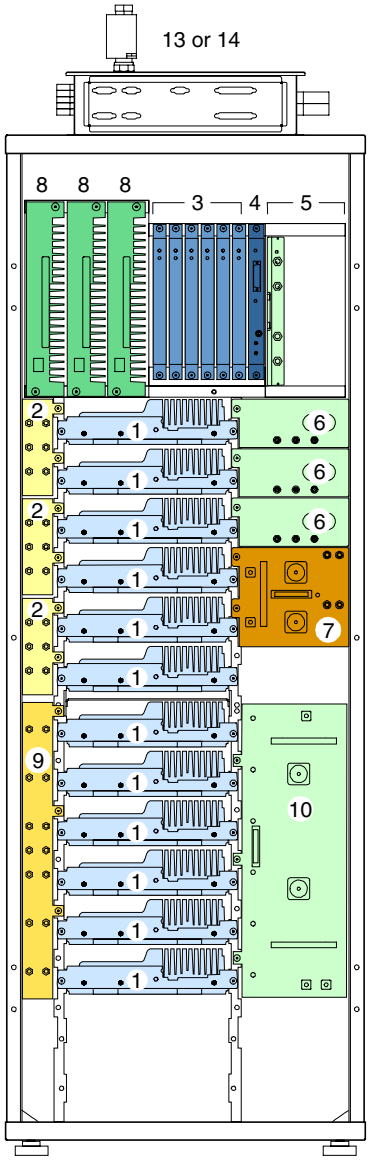
a. DVxx eliminates RTxx unit for that antenna.
b. BPxV (with VSWR antenna monitoring) can be used with or without MNxx.
c. BPxN (without VSWR antenna monitoring) can be used only with MNxx.
d. M2xA and M6xA can be used together as cabinet space allows.
e. RTxx in Midi Indoor eliminates WCxA and DVxx units.
f. WCxA in Midi Indoor eliminates RTxx unit.
g. IBBU replaces lower six TSxx units.

Figure 15 illustrates the Nokia UltraSite EDGE BTS units without an IBBU.

Note

In Figures 15 and 16, you can use the PWSA, PWSB, and PWSC units in either cabinet.

KEY:
1 Transceiver unit (TSxx)
2 2-way Receiver Multicoupler unit (M2xA)
3 Transceiver Baseband unit (BB2x)
4 Base Operations and Interfaces unit (BOIx)
5 Transmission unit (VXxx)
6 Wideband Combiner unit (WCxA)
7 Dual Variable Gain Duplex Filter unit (DVxx)
8 DC/DC Power Supply unit (PWSB)
9 6-way Receiver Multicoupler unit (M6xA)
10 Remote Tune Combiner unit (RTxx)
11 AC/DC Power Supply unit (PWSA)
12 DC/DC Power supply unit (PWSC)
13 Bias Tee unit (BPxx)
14 Dual Band Diplex Filter unit (DU2A)
NOTE: Items 13 and 14 are not plug-in units



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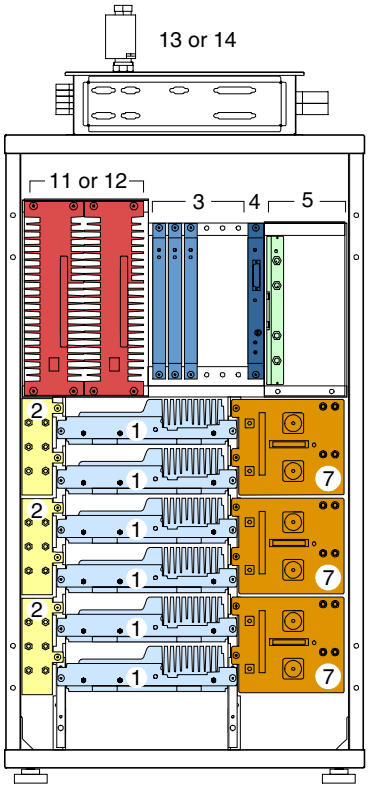
UltraSite cabinet core



UltraSite MIDI cabinet core

Figure 15. Nokia UltraSite EDGE BTS units (without IBBU)

Figure 16 illustrates Nokia UltraSite EDGE BTS units with an IBBU.

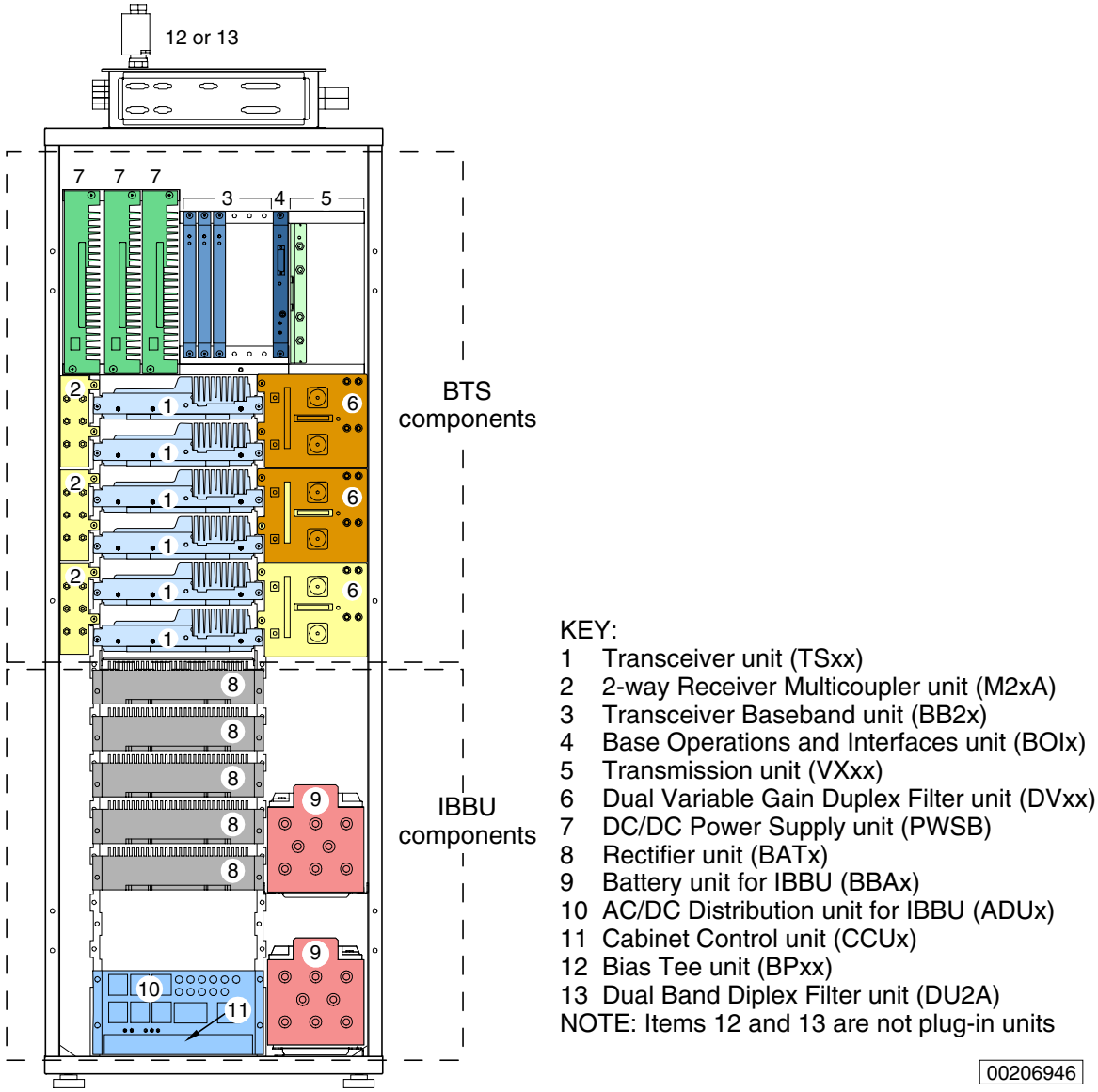


Figure 16. Nokia UltraSite EDGE BTS units (with IBBU)

4.2 Unit descriptions

This section describes the units of Nokia UltraSite EDGE BTS. For detailed information about a particular unit, refer to the unit description in this manual.

4.2.1 Base Operations and Interfaces unit

The BOIx unit handles the control functions common among other units in the BTS. These functions include:

- BTS initialisation and self-testing
- configuration
- O&M signalling
- software download
- main clock functions
- timing functions
- collection and management of external and internal alarms
- message delivery to the BSC (through the VXxx unit)
- cabinet control

4.2.2 Dual Band Diplex Filter unit

The DU2A unit combines output from GSM 800/900 and 1800/1900 DVxx or RTxx units into one antenna feeder. The DU2A unit is mounted on top of the BTS cabinet.

4.2.3 Transceiver Baseband unit

The BB2x unit is a digital signal processing board, consisting of two independent baseband modules. Each module functions independently for its own TSxx unit. The BB2x also controls frequency hopping.

The BB2x unit has two versions: GSM and GSM/EDGE.

4.2.4 Dual Variable Gain Duplex Filter unit

The DVxx unit performs duplex operation of TX and RX signals through a common antenna and filters and amplifies main and diversity receiver signals before they pass through the M2xA or M6xA unit to the TSxx unit.

The DVxx unit contains a variable-gain LNA for optimal amplification of the receive signal, with or without the optional Masthead Amplifier (MNxx) unit. The high-gain LNA is fixed and used without the optional MNxx. The low-gain LNA is variable and used only with the MNxx unit; the low-gain LNA is set according to antenna cable attenuation values.

4.2.5 Masthead Amplifier and Bias Tee units

This section describes the following two units:

- Masthead Amplifier
- Bias Tee

Masthead Amplifier unit

Nokia has an MNxx unit specifically designed for Nokia UltraSite EDGE BTS to deliver:

- 33 dB RX gain in GSM 1800 and 1900 units and 32 dB RX gain in GSM 800 and 900 units
- low RX noise figure (improved RX sensitivity and signal-to-noise ratio)
- low TX loss in a compact, low-volume, lightweight, sealed enclosure.

To use the MNxx unit, the BPxx unit is required.

Bias Tee unit

The BPxx unit provides DC power to the MNxx using an RF cable. The BPxx unit is available in two versions:

- BPxV — Bias Tee with Voltage Standing Wave Ratio (VSWR) antenna monitoring checks the condition of the antenna line and gives an alarm if the VSWR value exceeds the limit. The BPxV unit can be used with or without the MNxx unit.
- BPxN — Bias Tee without VSWR antenna monitoring is used solely with the MNxx unit.

4.2.6 Receiver Multicoupler unit

The M2xA or M6xA unit distributes RX signals to TSxx units. The 2-way unit (M2xA) is used in most WCxA or combining bypass configurations. The 6-way unit (M6xA) is always used with the RTxx unit and some WCxA unit configurations. One unit performs signal splitting for both main and diversity branches.

4.2.7 Power Supply unit

The PWSx unit converts input AC or DC voltage to the DC voltages required for Nokia UltraSite EDGE BTS. The PWSx unit distributes the appropriate voltages through the backplane to the units — except for the optional Heater unit (HETA), which receives its voltage from the AC mains through the AC filter unit. The PWSx unit also supplies power for the MNxx unit.

Nokia UltraSite EDGE BTS can hold one or two AC Power Supply units (PWSA - +230 VAC), three DC Power Supply units (PWSB - -48 VDC), or one or two DC Power Supply units per cabinet (PWSC - +24 VDC). The PWSA and PWSC support full redundancy for as many as six TSxx units. The PWSB supports full redundancy for as many as 12 TSxx units.

4.2.8 Remote Tune Combiner unit

The functions of the RTxx are:

- combines up to six TRX outputs into one antenna.
- filters and amplifies main and diversity receive (RX) signals before they pass through the M2xA or M6xA unit to the TSxx unit.
- contains a variable-gain LNA for optimal amplification of the receive signal. The high-gain LNA is fixed and used without the optional MNxx unit. The low-gain LNA is variable and used only with the MNxx unit. The low-gain LNA is set according to antenna cable attenuation values.
- has a duplexer built into it, so no external duplexing is required.

4.2.9 Temperature Control System

This section describes the following units of the TCS:

- Cabinet cooling fan
- Unit cooling fans
- Heater unit

Cabinet cooling fan

The cabinet cooling fan is a door-mounted fan that is part of the Outdoor Application Kit (OAKx).

Unit cooling fans

The unit cooling fans are included in the cabinet core mechanics (CRMx). The BOIx unit controls the fan rotation speed using temperature information from the other units. To maintain cooling, adjust the rotation speed of the fans. Smooth speed variations minimise the noise generated by the fan units.

Heater unit

The optional HETA unit is needed in Nokia UltraSite EDGE BTS Outdoor to cold start the BTS when operating in temperatures between -10 and -33° C (+14 to -27° F). It also maintains interior cabinet temperature during extreme cold operation.

4.2.10 Transceiver unit

The TSxx unit contains:

- one transmitter
- one main receiver
- one diversity receiver

The TSxx unit performs RF modulation/demodulation and amplification for one RF carrier to handle the following signals:

- uplink signals from the Mobile Station (MS) to the BTS
- downlink signals from the BTS to the MS

The TSxA unit provides GSM functionality only. The TSxB unit provides GSM and EDGE functionality.

Nokia UltraSite EDGE BTS can utilize TSxA and TSxB units within the same cabinet.

The following three frequency bands are available in the TSxA units:

- TSGA for GSM 900
- TSDA for GSM 1800
- TSPA for GSM 1900

The following four frequency bands are available in the TSxB units:

- TSTB for GSM/EDGE 800
- TSGB for GSM/EDGE 900
- TSDB for GSM/EDGE 1800
- TSPB for GSM/EDGE 1900

4.2.11 Transmission unit

The VXxx unit connects Nokia UltraSite EDGE BTS to the rest of the network.

The VXxx units are available for the following media:

- radio-link
- wireline

Radio-link transmission

The FXC RRI unit is the radio-link transmission unit for Nokia UltraSite EDGE BTS. The FXC RRI supports:

- two Flexbus connections (coaxial cable), 16 x 2 Mbit/s each
- grooming
- branching
- loop protection
- cross-connection on 8 kbit/s level

Flexbus connects FXC RRI transmission units to Nokia FlexiHopper Microwave Radio or Nokia MetroHopper Radio. Multiple BTS cabinets located at the same site can also be connected together using a Flexbus between FXC RRI units in each cabinet.

The FXC RRI transmission unit operates as a repeater and interconnects Nokia UltraSite EDGE BTS and the BSC using loop, chain, star, and point-to-point network configurations.

For more information on UltraSite compatible radios, refer to *Nokia FlexiHopper Microwave Radio Product Overview* and *Nokia MetroHopper Radio Product Overview*.

Wireline transmission

The wireline transmission units for Nokia UltraSite EDGE BTS are:

- FC E1/T1 – 1 x 2 Mbit/s (E1) or 1 x 1.5 Mbit/s (T1) PCM connection, one coaxial 75-ohm TX and one coaxial 75-ohm RX connector for E1 use, one twisted pair 120-/100-ohm TX/RX interface connector for either E1 or T1 use
- FXC E1 – 4 x 2 Mbit/s (E1) PCM connections, four coaxial 75-ohm TX and four coaxial 75-ohm RX connectors for E1 use, grooming, branching, and loop protection support, cross-connection down to 8 kbit/s level
- FXC E1/T1 – 4 x 2 Mbit/s (E1) or 4 x 1.5 Mbit/s (T1) PCM connections, four twisted pair 120-/100-ohm TX/RX interface connectors for either E1 or T1 use, grooming, branching, and loop protection support, cross-connection down to 8 kbit/s level. Interfaces can be configured independently either E1 or T1 mode

The FC E1/T1 transmission unit operates as the termination point in a chain, star, and point-to-point topology network. The FXC E1 and FXC E1/T1 transmission units operate as branching points and interconnect Nokia UltraSite EDGE BTS cabinets and the BSC using loop, chain, star, and point-to-point network configurations.

4.2.12 Wideband Combiner unit

The WCxA unit combines two transmitter outputs into one. When using the WCxA, the DVxx unit is required.

4.2.13 Indoor Application Kit

The IAKx protects the indoor BTS against EMI, dust, and solid foreign objects. The IAKx contains the following components:

- door
- roof
- mounting hardware

4.2.14 Outdoor Application Kit

The OAKx protects the outdoor BTS against EMI, dust, water, snow, and solid foreign objects. The OAKx contains the following components:

- door with cabinet cooling fan for additional cooling
- back wall
- roof
- plinth for one BTS cabinet
- two side panels
- mounting hardware
- electronics module (door switch and heater, cabinet fan, and fuse connectors)
- shielding units and connector caps

4.2.15 Outdoor Entry Kit

The OEKx provides an environmental seal for cables entering the cabinet. The kit contains:

- six pairs of cable entry blocks
- 24 pairs of cable bushings

4.2.16 Outdoor Bridge Kit

The OBKA provides a protected channel for cables routed between adjoining UltraSite Outdoor cabinets.

4.2.17 AC Filter Unit

The AC Filter Unit is necessary when AC Power Supply or HETA units are installed.

4.2.18 Outdoor Application Kit for UltraSite-Talk Co-Site

The OAKB is similar to the standard UltraSite Outdoor Application Kit (OAKA), except that the co-siting version replaces one of the side panels with a co-siting outdoor application panel and provides a new co-siting cable entry for the roof assembly.

4.2.19 Integrated Battery Backup

The optional IBBU ensures a continual power supply if the main AC power fails. The IBBU can produce power for as many as 18 TSxx units in two BTS cabinets. It occupies the lower half of one Nokia UltraSite EDGE BTS.

The IBBU consists of the following units:

- Rectifier unit
- Battery unit
- AC/DC Unit (with cabinet control unit)

For more information about the IBBU, refer to *Nokia UltraSite Support User Manual*.

Rectifier unit

The BATx unit generates the float charging voltage to the batteries and supplies the DC power to the BTS. The BATx unit is also able to boost charge the batteries.

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.

Battery Unit for Integrated Battery Backup

The batteries are configured into strings that comprise four batteries connected in a series. The battery capacity is determined according to the required backup time and desired power load. The available battery capacity depends on the configuration of the Nokia UltraSite EDGE BTS. In the IBBU, the number of battery strings is limited to one, so the maximum battery capacity of the BBAx unit is limited to 40 Ah.

AC/DC Unit

The ADUx provides power to all loads in the BTS and is located at the bottom of the IBBU. 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 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

5 Technical data

This chapter provides the following technical data for Nokia UltraSite EDGE BTS 800, 900, 1800, and 1900:

- electrical properties
- RF properties
- external hardware interfaces

5.1 Electrical properties

Table 5 shows the electrical properties for Nokia UltraSite EDGE BTS 800, 900, 1800, and 1900.

Table 5. Electrical properties for Nokia UltraSite EDGE BTS 800, 900, 1800, and 1900

Property	12 TSxx RF unit Indoor	6 TSxx RF unit Midi Indoor	12 TSxx RF unit Outdoor	6 TSxx RF unit Midi Outdoor
Nominal voltage (50/60 Hz)	230 VAC -48 VDC +24 VDC	230 VAC -48 VDC +24 VDC	230 VAC -48 VDC +24 VDC	230 VAC -48 VDC +24 VDC
Permitted operating voltage fluctuation[a]	184 to 276 VAC -36 to -60 VDC +18 to +32 VDC	184 to 276 VAC -36 to -60 VDC +18 to +32 VDC	184 to 276 VAC -36 to -60 VDC +18 to +32 VDC	184 to 276 VAC -36 to 60 VDC +18 to +32 VDC
Cabinet maximum power demand[b]	4.7 kW VAC 4.5 kW VDC 4.8 kW VDC	1.8 kW VAC 1.5 kW VDC 2.6 kW VDC	4.9 kW VAC 4.7 kW VDC 5.0 kW VDC	2.0 kW VAC 1.6 kW VDC 2.9 kW VDC

a. External supply range (45 to 66 Hz)
b. Power demand calculations for Indoor and Outdoor cabinets include 1.4 kW for the optional BATA installation

5.2 RF properties

This section provides the values for the RF properties of Nokia UltraSite EDGE BTS 800, 900, 1800, and 1900.

5.2.1 Nokia UltraSite EDGE BTS 800

Table 6 shows the values for the RF properties of Nokia UltraSite EDGE BTS 800.

Table 6. RF properties of Nokia UltraSite EDGE BTS 800

Property	**Value**
TX frequency range	869 - 894 MHz
RX frequency range	824 - 849 MHz
Channel spacing	200 kHz
Available radio channels	174
Minimum Frequency Spacing in combiners	
• WBC	600 kHz
• RTC	800 MHz
TX output power at antenna connector (guaranteed level)	
• Combining by-pass	42.5 dBm
• 2:1 Wideband Combiner	39.0 dBm
• 4:1 Wideband Combiner	35.5 dBm
• RTC	39.5 dBm
Dynamic power control	
• GMSK	30 dB
• 8PSK (EGPRS)	18 dB
RX sensitivity	
Single branch (static)	-110.5 dBm
Single branch (static) w/UltraSite MNxx	-111 dBm

5.2.2 Nokia UltraSite EDGE BTS 900

Table 7 shows the values for the RF properties of Nokia UltraSite EDGE BTS 900.

Table 7. RF properties of Nokia UltraSite EDGE BTS 900

Property	Value
TX frequency range	A: 925 to 960 MHz H: 942.5 to 960 MHz J: 935 to 960 MHz
RX frequency range	A: 880.0 to 915 MHz H: 897.5 to 915 MHz J: 890.0 to 915 MHz
Channel spacing	200 kHz
Available radio channels	174
Minimum Frequency Spacing in combiners • WBC • RTC	 200 kHz 600 kHz
TX output power at antenna connector (guaranteed level) • Combining by-pass	 44.5 dBm
• 2:1 Wideband Combiner • 4:1 Wideband Combiner • RTC	41.0 dBm 37.5 dBm 42.0 dBm
Dynamic power control	30 dB (15 steps in 2 dB increments)
RX sensitivity	
Single branch (static)	-110.5 dBm

Table 7. RF properties of Nokia UltraSite EDGE BTS 900 (Continued)

Property	Value
Single branch (static) w/UltraSite MNxx	-111.0 dBm
2-way diversity (static)	Theoretical 3 dB improvement for single branch case. Link budget improvement depends on fading profiles used in network planning.
4-way diversity (static)	Theoretical 6 dB improvement for single branch case. Link budget improvement depends on fading profiles used in network planning.

5.2.3 Nokia UltraSite EDGE BTS 1800

Table 8 show the values for the RF properties of Nokia UltraSite EDGE BTS 1800.

Table 8. RF properties of Nokia UltraSite EDGE BTS 1800

Property	Value	
TX frequency range	A: 1805-1850 MHz B: 1835-1880 MHz Full-band: 1805-1880 Mhz	
RX frequency range	A: 1710-1755 MHz B: 1740-1785 MHz Full-band: 1710-1785 MHz	
Channel spacing	200 kHz	
Available radio channels	374	
Minimum frequency spacing in combiners		
• WBC	200 kHz	
• RTC	800 kHz	
TX output power at antenna connector (guaranteed level)	*Sub-banded units*	*Full-banded units (estimated values)*
• Combining bypass	+44.5 dBm	+44.5 dBm
• 2:1 Wideband Combiner	+41.0 dBm	+40.3 dBm
• 4:1 Wideband Combiner	+37.5 dBm	+36.6 dBm
• RTC	+42.0 dBm	+41.3 dBm

Table 8. RF properties of Nokia UltraSite EDGE BTS 1800 (Continued)

Property	Value	
Dynamic power control	30 dB (15 steps in 2 dB increments)	
RX sensitivity		
Single branch (static)	-111.0 dBm	
Single branch (static) w/UltraSite MHA	-112.0 dBm	
2-way diversity (static)	Theoretical 3 dB improvement for single branch case. Link budget improvement depends on fading profiles used in network planning.	
4-way diversity (static)	Theoretical 6 dB improvement for single branch case. Link budget improvement depends on fading profiles used in network planning	

5.2.4 Nokia UltraSite EDGE BTS 1900

Table 9 shows the RF properties of Nokia UltraSite EDGE BTS 1900.

Table 9. RF properties of Nokia UltraSite EDGE BTS 1900

Property	Value	Notes
TX frequency range	1930-1990 MHz	
RX frequency range	1850-1910 MHz	
Channel spacing	200 kHz	
Available radio channels Blocked channels	281 5	• Blocked Channels: 586, 611, 686, 711, 736 • Power levels 0-3 not used.
Reduced power	12	• Reduced Power Channels: 512, 585, 587, 610, 612, 685, 687, 710, 712, 735, 737, 810
Minimum frequency spacing in combiners		

Table 9. RF properties of Nokia UltraSite EDGE BTS 1900 (Continued)

Property	Value	Notes
WBC RTC	200 kHz 800 kHz	
TX output power at antenna connector (guaranteed level) • Combining bypass • 2:1 WBC • 4:1 WBC • RTC	 +44.5 dBm +41.0 dBm +37.5 dBm +42.0 dBm	
Dynamic power control	30 dB (15 steps in 2 dB increments)	
RX sensitivity		
Single branch (static)	-111.0 dBm	
Single branch (static) w/UltraSite MHA	-112.0 dBm	
2-way diversity (static)	Theoretical 3 dB improvement for single branch case. Link budget improvement depends on fading profiles used in network planning.	
4-way diversity (static)	Theoretical 6 dB improvement for single branch case. Link budget improvement depends on fading profiles used in network planning	

5.3 External hardware interfaces

Table 10 shows the external hardware interfaces of Nokia UltraSite EDGE BTS 800, 900, 1800, and 1900.

Table 10. External hardware interfaces of Nokia UltraSite EDGE BTS 800, 900, 1800, and 1900

Interface	Value	Connector Type
Antenna connectors	6 (standard) + 6 (optional)	7/16
AC supply	184 to 276 VAC	Screw latch 0.5-16 mm
DC supply	-36 to -60 VDC	Screw latch 16-50 mm
Grounding		Two grounding alternatives: two 5 mm screws or one 8 mm screw M6 cable shoe (ground lug) is recommended for 2-point grounding with 5 mm screws.
ESD stud		
External alarms and controls	• TTL/open collector • 24 external alarms • 6 controls	D-37
Frame number, frame clock, mains and Nokia UltraSite Support alarm input	RS-485	D-15
Frame number, frame clock, mains and Nokia UltraSite Support alarm output	RS-485	D-15
Abis	2 Mbit/s (E1) or 1.5 Mbit/s (T1) PCM	TQ for 120 Ω E1 TQ for 100 Ω T1 BT 43 for 75 Ω E1
RRI	RRI Flexbus Radiolink I/O and power output (55 VDC)	TNC
Optical interfaces	• ITU-T G.957, S-1.1, short-haul, 1300 nm, ALS	LC Duplex
Q1 interface	RS-485	D-9
LMP for BTS Manager/ SiteWizard	RS-232	D-9

Table 10. External hardware interfaces of Nokia UltraSite EDGE BTS 800, 900, 1800, and 1900 (Continued)

Interface	Value	Connector Type
13 MHz test clock		SMB female
Test FCLK		SMB female
Test/monitor interface		D-25