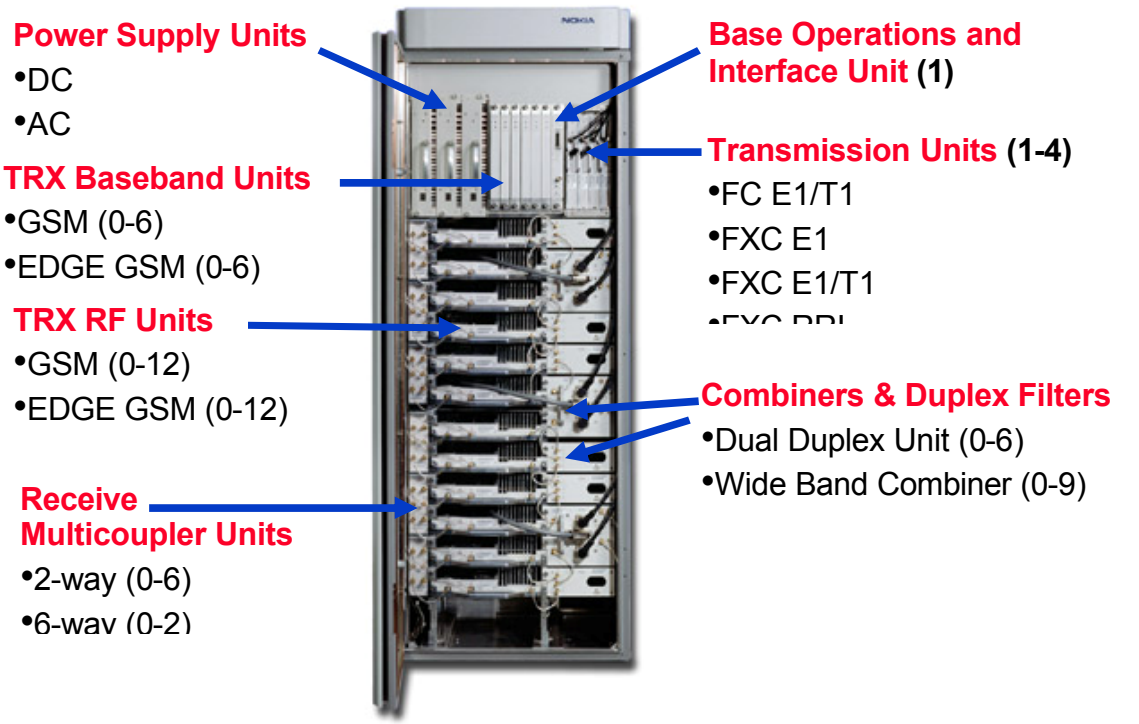
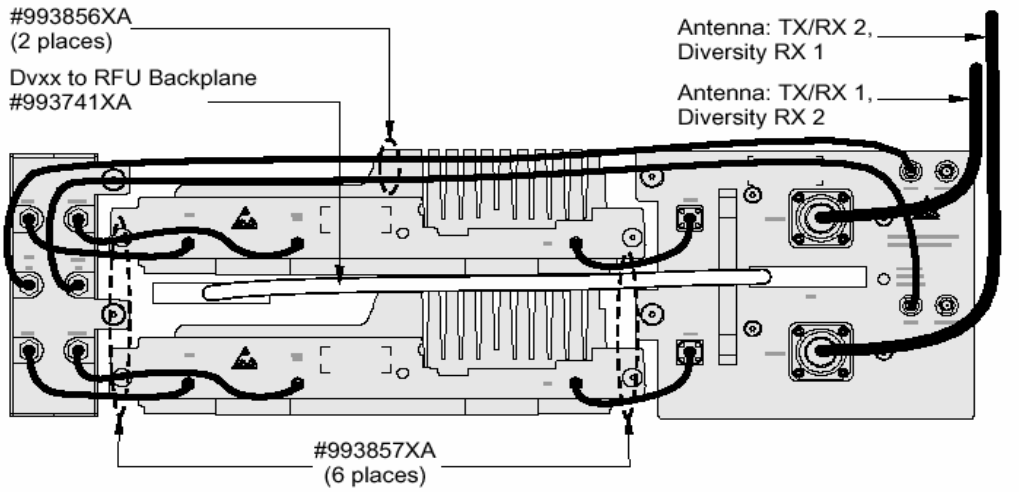
BTS OPERATION & MAINTENANCE

ULTRASITE CABINET TYPES

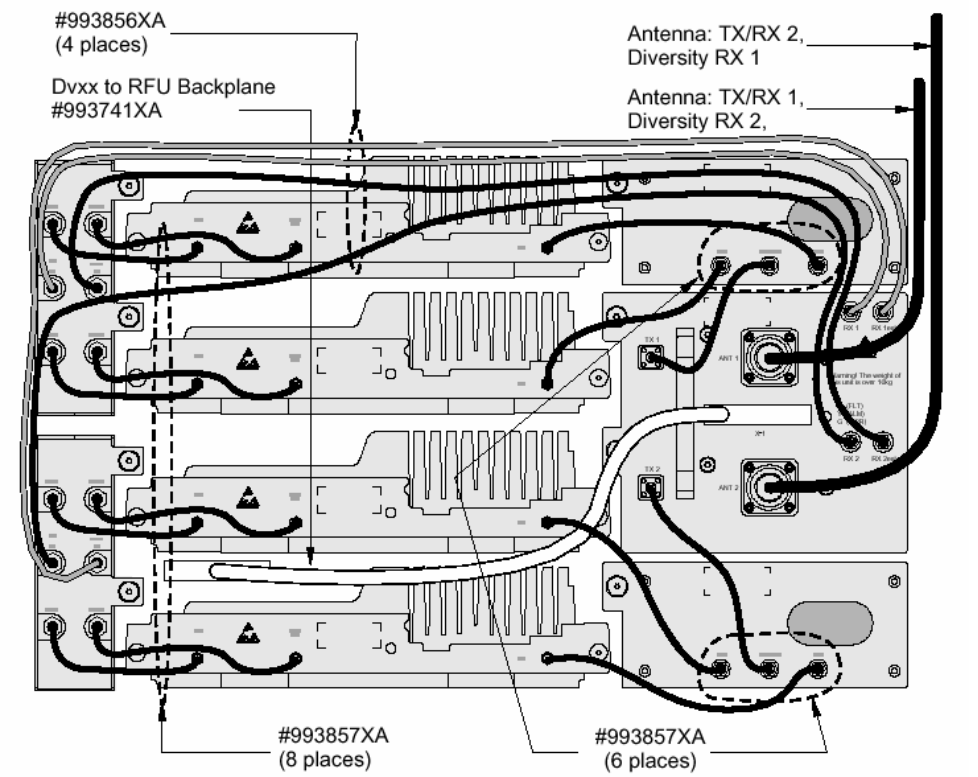


COMBINING BY-PASS CONFIGURATION CABLING



NOTE: Antenna cables may be: 993744XA,
993937XA or 993936XA, depending on Dvxx location

2-WAY WBC CONFIGURATION CABLING



NOTE: Antenna cables may be: 993744XA,
993937XA or 993936XA, depending on Dvxx location

TRANSCEIVER

- **Consists of two parts:**
  - Transceiver RF Unit
  - Transceiver Baseband Unit
- **Transceiver RF Unit (1-12 units)**
  - Consists of one transmitter, one main receiver and one diversity receiver
  - The TSxx unit performs RF modulation/demodulation and amplification for one RF carrier. This unit handles uplink signals from the Mobile Station (MS) to the BTS and downlink signals from the BTS to the MS.
  - The TSxA unit provides GSM functionality only. The TSxB unit provides both GSM and EDGE functionality.

- **Dual Baseband Unit (1-6 units)**
  - Consists of two independent Transceiver Baseband Modules
  - Each Baseband module independently supports its own Transceiver RF Unit.
  - Each module independently controls its own frequency hopping function
  - manage all speech function signalling
  - uses software downloaded from the Base Operations and Interfaces (BOIx) unit.
  - sets internal timing according to clock references from the BOIx unit
  - supports synthesised radio frequency (RF) and baseband (BB) frequency-hopping.

DUPLEX UNIT

Duplex Unit (0-6 units)

- Performs duplex operation of the TX and RX signals into a common antenna
- Provides filtering and amplification for main and diversity receive signals

COMBINER

- **Wideband Combiner (0-9 units)**
  - Combines the output of two transmitters into one antenna (with 1 WBC)
  - Combines the output of four transmitters into one antenna (with 3 WBC)

MULTICOUPLER

- Distributes RX signals to the TRX RF units.
- Performs signal splitting for both main and diversity branches
  - 2-way Receive Multicoupler (0-6 units)
    - Used in most wideband combining or combining by-pass configurations.
  - 6-way Receive Multicoupler (0-2 units)
    - Used in conjunction with the RTC configuration

TRANSMISSION UNITS

- Interconnects UltraSite BTSs
- Connects other components of the network such as BSCs, and other BTSs through the Abis interface.
- UltraSite BTS supports 16, 32,and 64 kbits/sec data rates for transceiver RF signaling via Abis interface
- O&M signaling data rate can be 16 or 64 kbits/s

FXC E1 and FXC E1/T1 (Wire line transmission)

- Provides cross-connection capability at 8 kbit/s

- Supports grooming, branching and loop protection

FXC RRI (PDH Radio Transmission)

- Connects outdoor units of the Nokia FlexiHopper and MetroHopper or to another radio indoor unit (FC, FXC RRI, RRIC, and FIU19")
- Provides 2 Flexbus interfaces per card
- Capacity of Flexbus SW selectable between 2 x 2 Mbit/s, 4 x 2 Mbit/s, 8 x 2 Mbit/s, and 16 x 2 Mbit/s
- Supports grooming, branching and loop protection
- Supports up to a distance of 300m with RG214 and 140m with RG223 for outdoor unit
- Power feed to radio via Flexbus cable
- Connector type TNC, impedance of 50 ohms

Base Operation and Interface units (1 unit)

- Responsible for the control functions common to all other units such as O&M functions, main clock functions, and external alarms collection

DC POWER SUPPLY UNIT

PWSB (1-3 units)

- Operates on DC input power and provides the DC output power voltage
- BTS can accommodate up to 3 DC power supplies
- PWSB Supports full redundancy for up to 12 TRX configuration
- Provide power feed to the MHAs

Overview of commissioning UltraSite EDGE BTS

- Preliminary task: Install Site Wizard including required Manager on PC
- Pay careful attention to all Warnings and Cautions of Commissioning Manual
- Connect the LMP cable
- Verify the Installation
- Power on the UltraSite EDGE BTS
- Set the BOIx unit 13 MHz clock
- Commission the BTS with Site Wizard
  - HW configuration
  - FXC transmission configuration
  - BTS commissioning

Powering ON UltraSite EDGE BTS

- Verify

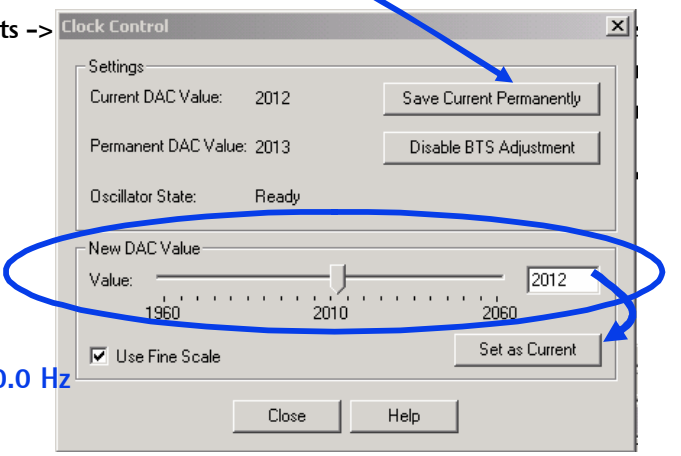
- Power ON

- Check BTS Units

Setting the Base Operation and Interfaces (BOIx) unit 13MHz clock

- Connect frequency counter to the 13 MHz test connector
- Set Measurement Period to one second
- Adjust current DAC Value
- Save current DAC value
- Adjust maximum measuring period
- Nokia BTS Manager -> Objects ->
- Repeat Step 2-4 if necessary

40.8 DAC steps equals one Hz



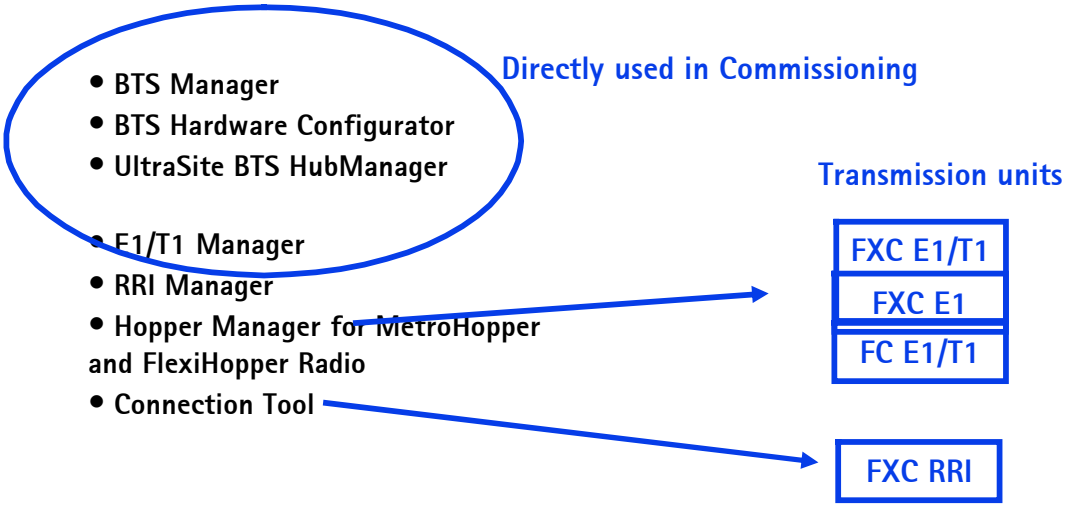
Adjust frequency to 13 000 000.0 Hz

Introduction to Nokia SiteWizard

Graphical, task oriented system interface

- Windows application package for the commissioning and maintenance
- Task oriented menus
- Reduce work and hasle during commissioning
- Includes Manager for the BTS and related transmission equipment on BTS site

SiteWizard Applications



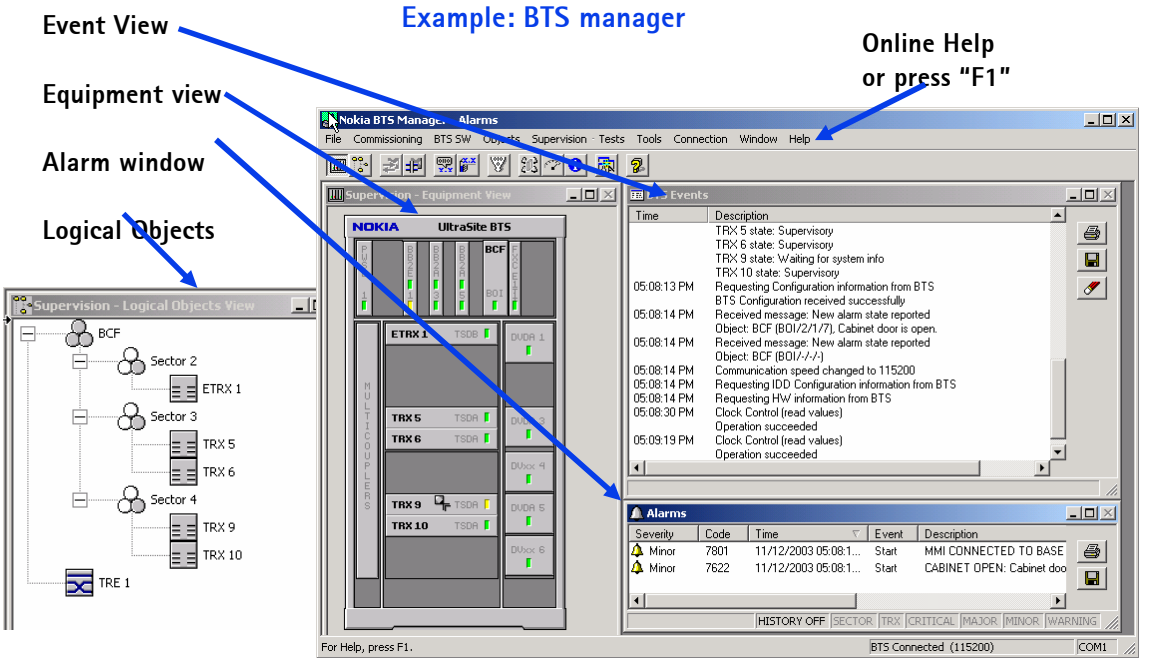
Only one application can be communicating with the BTS at a time

Nokia BTS Manager

- Connects directly to the BTS with LMP cable
- Tool for commissioning, configuring and managing UltraSite EDGE BTS and related transmission equipment
- Tool for Monitoring and Controlling the BTS operation locally or remotely from OSS

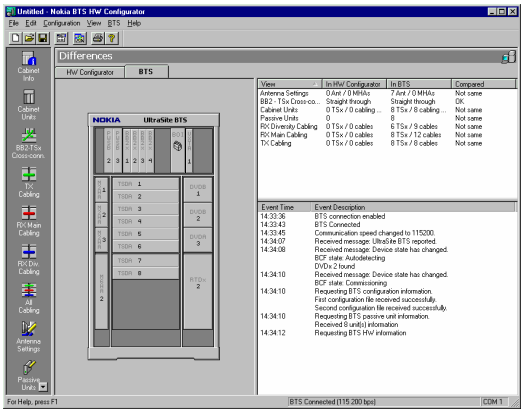
- View and manage the BTS configuration in graphical format or as logical objects
- Monitor real-time status and alarm information, with continuous and automatic updates during the BTS Manager session
- Check, load or activate the BTS software locally
- Reset, block or unblock BTS units, to replace them or for local tests
- Read new TRX Abis allocations and send them to the BTS, when adding TRXs or altering Abis settings for existing TRXs

Site Wizard Applications



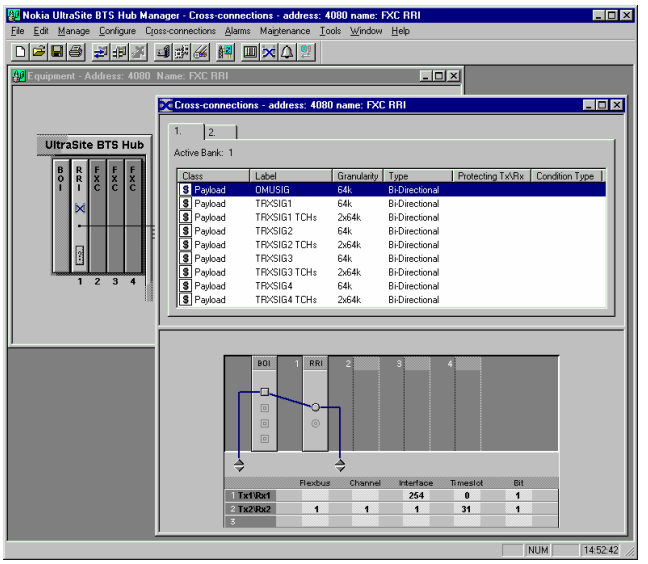
Nokia BTS HW Configurator

- Connects directly to the BTS with LMP cable
- Defines the UltraSite BTS HW Configuration based on:
  - update an existing configuration file
  - create new configuration
  - default HW configuration files delivered with the SW
- Tool for checking a certain configuration file



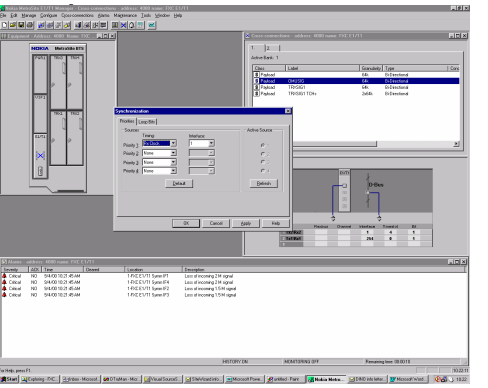
Nokia UltraSite BTS Hub Manager

- Configure and test the transmission units of the BTS and its hub node during commissioning
- Supports manual or automated commissioning based on a node file



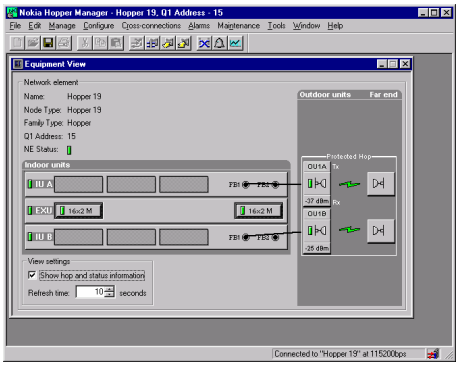
Nokia E1/T1 Manager

- Provides transmission configuration in UltraSite and MetroSite BTS environment for F(X)C E1/T1 units
- Traffic Management in BTS Environment with E1/T1 units
- Provides unit level (Fe E1T1) management in Ultra- and MetroHub for FXC E1 and FXC E1/T
- BTS Manager and MetroHub Manager compatible
- Supports
  - - FXC E1
  - - FXC E1/T1
  - - FC E1/T1



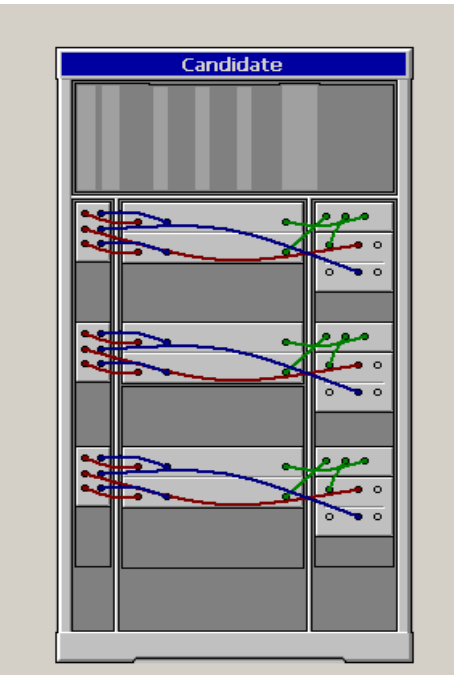
Nokia Hopper Manager

- Supports the FIU 19 and RRIC indoor units with MetroHopper and FlexiHopper outdoor units
- Serves as both a local and remote manager from NMS/2000
- Configure 2M/bit cross-connections (FIU 19 only)
- Commissioning,
  alarm and measurement monitoring,
  software downloading,
  transmission statistic viewing
- Supports:
  - - FIU 19,
  - - RRIC,
  - - FlexiHopper.



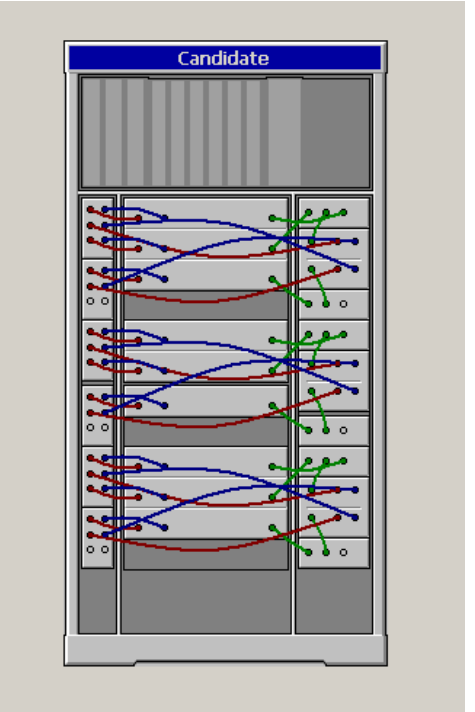
Cabling Diagram & Traffic Manager

2/2/2 Configuration



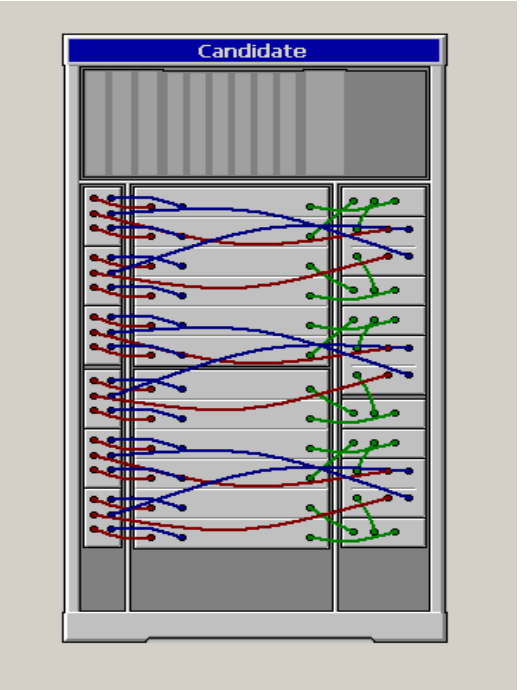
	1	2	3	4	5	6	7	8	
0	Link management								
1	TCH/1-1		TCH/1-2		TCH/1-3		TCH/1-4		**Sector1/TRX1**
2	TCH/1-5		TCH/1-6		TCH/1-7		TCH/1-8		
3	TCH/2-1		TCH/2-2		TCH/2-3		TCH/2-4		**Sector1/TRX2**
4	TCH/2-5		TCH/2-6		TCH/2-7		TCH/2-8		
5									
6									
7									
8									
9	TCH/5-1		TCH/5-2		TCH/5-3		TCH/5-4		**Sector2/TRX5**
10	TCH/5-5		TCH/5-6		TCH/5-7		TCH/5-8		
11	TCH/6-1		TCH/6-2		TCH/6-3		TCH/6-4		**Sector2/TRX6**
12	TCH/6-5		TCH/6-6		TCH/6-7		TCH/6-8		
13									
14									
15									
16									
17	TCH/9-1		TCH/9-2		TCH/9-3		TCH/9-4		**Sector3/TRX9**
18	TCH/9-5		TCH/9-6		TCH/9-7		TCH/9-8		
19	TCH/10-1		TCH/10-2		TCH/10-3		TCH/10-4		**Sector3/TRX10**
20	TCH/10-5		TCH/10-6		TCH/10-7		TCH/10-8		
21									
22									
23									
24									
25	TRXSIG16/1		TRXSIG16/2						
26	TRXSIG16/5		TRXSIG16/6						
27	TRXSIG16/9		TRXSIG16/10						
28									
29									
30	EDAP								
31	P1				MCB/LCB		OMUSIG16		

3/3/3 Connfiguration



	1	2	3	4	5	6	7	8	
0	Link management								
1	TCH/1-1		TCH/1-2		TCH/1-3		TCH/1-4		Sector1/TRX1
2	TCH/1-5		TCH/1-6		TCH/1-7		TCH/1-8		
3	TCH/2-1		TCH/2-2		TCH/2-3		TCH/2-4		Sector1/TRX2
4	TCH/2-5		TCH/2-6		TCH/2-7		TCH/2-8		
5	TCH/3-1		TCH/3-2		TCH/3-3		TCH/3-4		Sector1/TRX3
6	TCH/3-5		TCH/3-6		TCH/3-7		TCH/3-8		
7									
8									
9	TCH/5-1		TCH/5-2		TCH/5-3		TCH/5-4		Sector2/TRX5
10	TCH/5-5		TCH/5-6		TCH/5-7		TCH/5-8		
11	TCH/6-1		TCH/6-2		TCH/6-3		TCH/6-4		Sector2/TRX6
12	TCH/6-5		TCH/6-6		TCH/6-7		TCH/6-8		
13	TCH/7-1		TCH/7-2		TCH/7-3		TCH/7-4		Sector2/TRX7
14	TCH/7-5		TCH/7-6		TCH/7-7		TCH/7-8		
15									
16									
17	TCH/9-1		TCH/9-2		TCH/9-3		TCH/9-4		Sector3/TRX9
18	TCH/9-5		TCH/9-6		TCH/9-7		TCH/9-8		
19	TCH/10-1		TCH/10-2		TCH/10-3		TCH/10-4		Sector3/TRX10
20	TCH/10-5		TCH/10-6		TCH/10-7		TCH/10-8		
21	TCH/11-1		TCH/11-2		TCH/11-3		TCH/11-4		Sector3/TRX11
22	TCH/11-5		TCH/11-6		TCH/11-7		TCH/11-8		
23									
24									
25	TRXSIG16/1		TRXSIG16/2		TRXSIG16/3				
26	TRXSIG16/5		TRXSIG16/6		TRXSIG16/7				
27	TRXSIG16/9		TRXSIG16/10		TRXSIG16/11				
28									
29									
30	EDAP								
31	P1				MCB/LCB		OMUSIG16		

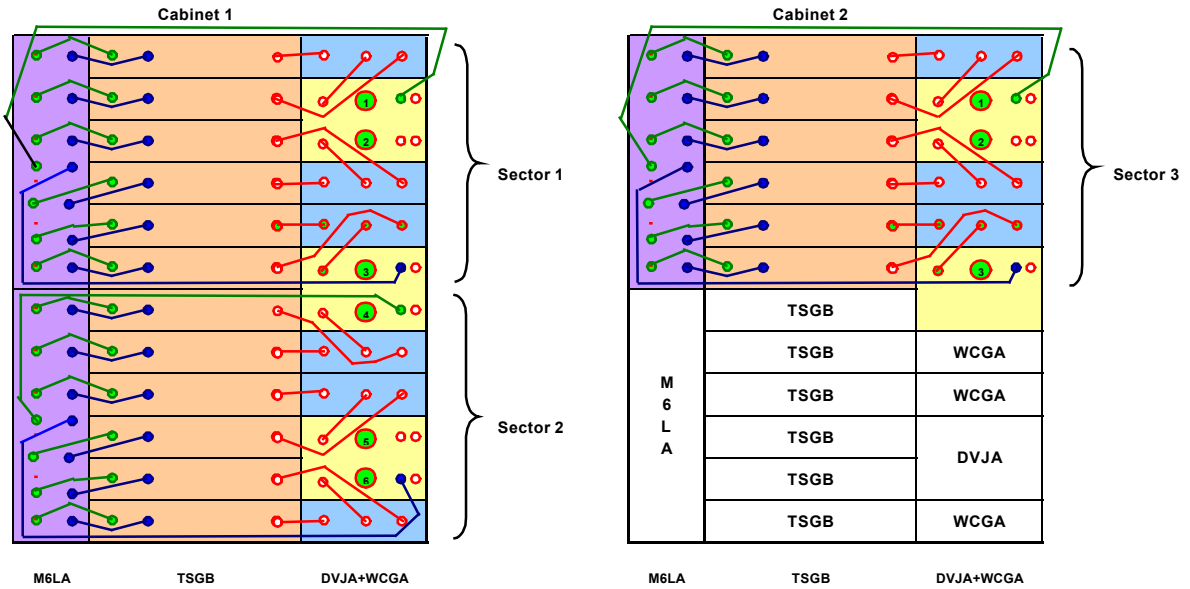
4/4/4 Configuration



	1	2	3	4	5	6	7	8	
0	Link management								
1	TCH/1-1		TCH/1-2		TCH/1-3		TCH/1-4		**Sector1/TRX1**
2	TCH/1-5		TCH/1-6		TCH/1-7		TCH/1-8		
3	TCH/2-1		TCH/2-2		TCH/2-3		TCH/2-4		**Sector1/TRX2**
4	TCH/2-5		TCH/2-6		TCH/2-7		TCH/2-8		
5	TCH/3-1		TCH/3-2		TCH/3-3		TCH/3-4		**Sector1/TRX3**
6	TCH/3-5		TCH/3-6		TCH/3-7		TCH/3-8		
7	TCH/4-1		TCH/4-2		TCH/4-3		TCH/4-4		**Sector1/TRX4**
8	TCH/4-5		TCH/4-6		TCH/4-7		TCH/4-8		
9	TCH/5-1		TCH/5-2		TCH/5-3		TCH/5-4		**Sector2/TRX5**
10	TCH/5-5		TCH/5-6		TCH/5-7		TCH/5-8		
11	TCH/6-1		TCH/6-2		TCH/6-3		TCH/6-4		**Sector2/TRX6**
12	TCH/6-5		TCH/6-6		TCH/6-7		TCH/6-8		
13	TCH/7-1		TCH/7-2		TCH/7-3		TCH/7-4		**Sector2/TRX7**
14	TCH/7-5		TCH/7-6		TCH/7-7		TCH/7-8		
15	TCH/8-1		TCH/8-2		TCH/8-3		TCH/8-4		**Sector2/TRX8**
16	TCH/8-5		TCH/8-6		TCH/8-7		TCH/8-8		
17	TCH/9-1		TCH/9-2		TCH/9-3		TCH/9-4		**Sector3/TRX9**
18	TCH/9-5		TCH/9-6		TCH/9-7		TCH/9-8		
19	TCH/10-1		TCH/10-2		TCH/10-3		TCH/10-4		**Sector3/TRX10**
20	TCH/10-5		TCH/10-6		TCH/10-7		TCH/10-8		
21	TCH/11-1		TCH/11-2		TCH/11-3		TCH/11-4		**Sector3/TRX11**
22	TCH/11-5		TCH/11-6		TCH/11-7		TCH/11-8		
23	TCH/12-1		TCH/12-2		TCH/12-3		TCH/12-4		**Sector3/TRX12**
24	TCH/12-5		TCH/12-6		TCH/12-7		TCH/12-8		
25	TRXSIG16/1		TRXSIG16/2		TRXSIG16/3		TRXSIG16/4		
26	TRXSIG16/5		TRXSIG16/6		TRXSIG16/7		TRXSIG16/8		
27	TRXSIG16/9		TRXSIG16/10		TRXSIG16/11		TRXSIG16/12		
28									
29									
30	EDAP								
31	P1				MCB/LCB		OMUSIG16		

6/6/6 Configuration

BTS Internal Connection arrangement for 666 Configuration with Duplexer ang 6way multicoupler



Blue= Div Rx Cabling
Green=Rx Cabling
Red= Tx Cabling

6/6/6 Configuration Without EDAP Pool

PCM 1

	1	2	3	4	5	6	7	8
0	Link management							
1	TCH/1-1		TCH/1-2		TCH/1-3		TCH/1-4	
2	TCH/1-5		TCH/1-6		TCH/1-7		TCH/1-8	
3	TCH/2-1		TCH/2-2		TCH/2-3		TCH/2-4	
4	TCH/2-5		TCH/2-6		TCH/2-7		TCH/2-8	
5	TCH/3-1		TCH/3-2		TCH/3-3		TCH/3-4	
6	TCH/3-5		TCH/3-6		TCH/3-7		TCH/3-8	
7	TCH/4-1		TCH/4-2		TCH/4-3		TCH/4-4	
8	TCH/4-5		TCH/4-6		TCH/4-7		TCH/4-8	
9	TCH/5-1		TCH/5-2		TCH/5-3		TCH/5-4	
10	TCH/5-5		TCH/5-6		TCH/5-7		TCH/5-8	
11	TCH/6-1		TCH/6-2		TCH/6-3		TCH/6-4	
12	TCH/6-5		TCH/6-6		TCH/6-7		TCH/6-8	
13	TCH/7-1		TCH/7-2		TCH/7-3		TCH/7-4	
14	TCH/7-5		TCH/7-6		TCH/7-7		TCH/7-8	
15	TCH/8-1		TCH/8-2		TCH/8-3		TCH/8-4	
16	TCH/8-5		TCH/8-6		TCH/8-7		TCH/8-8	
17	TCH/9-1		TCH/9-2		TCH/9-3		TCH/9-4	
18	TCH/9-5		TCH/9-6		TCH/9-7		TCH/9-8	
19	TCH/10-1		TCH/10-2		TCH/10-3		TCH/10-4	
20	TCH/10-5		TCH/10-6		TCH/10-7		TCH/10-8	
21	TCH/11-1		TCH/11-2		TCH/11-3		TCH/11-4	
22	TCH/11-5		TCH/11-6		TCH/11-7		TCH/11-8	
23	TCH/12-1		TCH/12-2		TCH/12-3		TCH/12-4	
24	TCH/12-5		TCH/12-6		TCH/12-7		TCH/12-8	
25	TRXSIG16/1		TRXSIG16/2		TRXSIG16/3		TRXSIG16/4	
26	TRXSIG16/5		TRXSIG16/6		TRXSIG16/7		TRXSIG16/8	
27	TRXSIG16/9		TRXSIG16/10		TRXSIG16/11		TRXSIG16/12	
28								
29								
30								
31	P1				MCB/LCB		OMUSIG16	

PCM 2

	1	2	3	4	5	6	7	8
0	Link management							
1	TCH/13-1		TCH/13-2		TCH/13-3		TCH/13-4	
2	TCH/13-5		TCH/13-6		TCH/13-7		TCH/13-8	
3	TCH/14-1		TCH/14-2		TCH/14-3		TCH/14-4	
4	TCH/14-5		TCH/14-6		TCH/14-7		TCH/14-8	
5	TCH/15-1		TCH/15-2		TCH/15-3		TCH/15-4	
6	TCH/15-5		TCH/15-6		TCH/15-7		TCH/15-8	
7	TCH/16-1		TCH/16-2		TCH/16-3		TCH/16-4	
8	TCH/16-5		TCH/16-6		TCH/16-7		TCH/16-8	
9	TCH/17-1		TCH/17-2		TCH/17-3		TCH/17-4	
10	TCH/17-5		TCH/17-6		TCH/17-7		TCH/17-8	
11	TCH/18-1		TCH/18-2		TCH/18-3		TCH/18-4	
12	TCH/18-5		TCH/18-6		TCH/18-7		TCH/18-8	
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25	TRXSIG16/13		TRXSIG16/14		TRXSIG16/15		TRXSIG16/16	
26	TRXSIG16/17		TRXSIG16/18					
27								
28								
29								
30								
31	P1				MCB/LCB		OMUSIG16	

6/6/6 Configuration With EDAP Pool

PCM1

	1	2	3	4	5	6	7	8
0	Link management							
1	TCH/1-1		TCH/1-2		TCH/1-3		TCH/1-4	
2	TCH/1-5		TCH/1-6		TCH/1-7		TCH/1-8	
3	TCH/2-1		TCH/2-2		TCH/2-3		TCH/2-4	
4	TCH/2-5		TCH/2-6		TCH/2-7		TCH/2-8	
5	TCH/3-1		TCH/3-2		TCH/3-3		TCH/3-4	
6	TCH/3-5		TCH/3-6		TCH/3-7		TCH/3-8	
7	TCH/4-1		TCH/4-2		TCH/4-3		TCH/4-4	
8	TCH/4-5		TCH/4-6		TCH/4-7		TCH/4-8	
9	TCH/5-1		TCH/5-2		TCH/5-3		TCH/5-4	
10	TCH/5-5		TCH/5-6		TCH/5-7		TCH/5-8	
11	TCH/6-1		TCH/6-2		TCH/6-3		TCH/6-4	
12	TCH/6-5		TCH/6-6		TCH/6-7		TCH/6-8	
13	TCH/7-1		TCH/7-2		TCH/7-3		TCH/7-4	
14	TCH/7-5		TCH/7-6		TCH/7-7		TCH/7-8	
15	TCH/8-1		TCH/8-2		TCH/8-3		TCH/8-4	
16	TCH/8-5		TCH/8-6		TCH/8-7		TCH/8-8	
17	TCH/9-1		TCH/9-2		TCH/9-3		TCH/9-4	
18	TCH/9-5		TCH/9-6		TCH/9-7		TCH/9-8	
19	TCH/10-1		TCH/10-2		TCH/10-3		TCH/10-4	
20	TCH/10-5		TCH/10-6		TCH/10-7		TCH/10-8	
21	TCH/11-1		TCH/11-2		TCH/11-3		TCH/11-4	
22	TCH/11-5		TCH/11-6		TCH/11-7		TCH/11-8	
23	TCH/12-1		TCH/12-2		TCH/12-3		TCH/12-4	
24	TCH/12-5		TCH/12-6		TCH/12-7		TCH/12-8	
25	TRXSIG16/		TRXSIG16/2		TRXSIG16/3		TRXSIG16/4	
26	TRXSIG16/5		TRXSIG16/6		TRXSIG16/7		TRXSIG16/8	
27	TRXSIG16/9		TRXSIG16/1		TRXSIG16/1		TRXSIG16/12	
28	EDAP							
29								
30								
31	P1				MCB/LCB		OMUSIG16	

PCM2

	1	2	3	4	5	6	7	8
0	Link management							
1	TCH/13-1		TCH/13-2		TCH/13-3		TCH/13-4	
2	TCH/13-5		TCH/13-6		TCH/13-7		TCH/13-8	
3	TCH/14-1		TCH/14-2		TCH/14-3		TCH/14-4	
4	TCH/14-5		TCH/14-6		TCH/14-7		TCH/14-8	
5	TCH/15-1		TCH/15-2		TCH/15-3		TCH/15-4	
6	TCH/15-5		TCH/15-6		TCH/15-7		TCH/15-8	
7	TCH/16-1		TCH/16-2		TCH/16-3		TCH/16-4	
8	TCH/16-5		TCH/16-6		TCH/16-7		TCH/16-8	
9	TCH/17-1		TCH/17-2		TCH/17-3		TCH/17-4	
10	TCH/17-5		TCH/17-6		TCH/17-7		TCH/17-8	
11	TCH/18-1		TCH/18-2		TCH/18-3		TCH/18-4	
12	TCH/18-5		TCH/18-6		TCH/18-7		TCH/18-8	
13	EDAP							
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25	TRXSIG16/13		TRXSIG16/14		TRXSIG16/15		TRXSIG16/16	
26	TRXSIG16/18		TRXSIG16/17					
27								
28								
29								
30								
31	P1				MCB/LCB		OMUSIG16	

Reading LED indicators

This chapter describes how to read the LED indicators of Nokia UltraSite EDGE BTS plug-in units. Every active unit has at least one tri-colour LED indicator as follows:
RED (major fault or alarm)

YELLOW (minor fault or stand by)

GREEN (operating status)

The LEDs are on the front of the plug-in units and quickly indicate the status or potential fault of a plug-in unit in the BTS.
The following plug-in units are equipped with LED indicators:
transceiver units

transmission units

base operations and interfaces unit

power supply units

remote tune combiners

dual variable gain duplex filter units

When powering ON plug-in units, the LEDs should not be OFF. If a LED is OFF, the plug-in unit or LED may be faulty.
When powering ON plug-in units, the LEDs should not be OFF. If a LED is OFF, the plug-in unit or LED may be faulty

Reading transceiver unit LEDs

TSxx unit LED

The TSxx has one tri-colour LED on the front panel of the unit that indicates its status. Table 1 describes the indications of the LED.

Table 1. TSxx LED indicators

LED Colour	Steady	Flashing
RED	Fault or alarm	N/A
YELLOW	In service; transceiver OFF (no calls at any time slot)	N/A
GREEN	Unit is ON and operating (call and/or BCCH)	N/A

BB2x unit LED

The BB2x has two tri-colour LEDs (A&B) on the front panel of the unit that indicate the status of each baseband section. Table 2 describes the indications of the LED.

Table 2. BB2x LED indications

LED Colour	Steady	Flashing
RED	Fault or alarm	N/A
YELLOW	No Abis LapD link	Configuring
GREEN	Unit is ON and operating	Software downloading

Reading transmission unit LEDs

FC E1/T1 LEDs

Table 3 describes the tri-colour LED on the front panel of the FC E1/T1 transmission unit that indicates the status.

Table 3. FC E1/T1 LED indications

LED Colour	Steady	Flashing
RED	Unit faulty, critical alarms, incoming signal fault (abis interface), or active test interfering with normal traffic	N/A
YELLOW	Major and minor alarms or test mode	N/A
GREEN	Unit is ON and operating	Transmission management device is currently accessing the unit

FXC E1 and FXC E1/E1 LEDs

Table 4 describes the status of the tri-colour LED on the front panel of the FXC E1 and FXC E1/T1 transmission units.

The LED of FXC transmission units that act as the Node Control Unit (DNCU) will indicate the status of both Functional Entity 0 (FE0) node and unit alarms.

Table 4. FXC E1 and FXC E1/T1 LED indicators

LED Colour	Steady	Flashing
RED	Unit faulty, critical alarms, incoming signal fault (abis interface), or active test interfering with normal traffic	N/A
YELLOW	Major and minor alarms or test mode	N/A
GREEN	Unit is ON and operating	Transmission management device is currently accessing the unit

FXC RRI LEDs

Table 5 and Table 6 describe the status of the tri-colour LED on the front panel of the FXC RRI transmission unit. Both Flexbus interfaces have a GREEN LED indicator for power feed.

Table 5. FXC RRI LED indications

LED Colour	Steady	Flashing
RED	Critical alarm active	Upon Master's command; critical alarms active
YELLOW	Major and minor alarm(s) active	Upon Master's command; major or minor alarm(s) active
GREEN	Unit is ON and operating	Upon Master's command; no alarms active

Table 6. FXC RRI units Flexbus LED

LED Colour	Steady	Flashing
GREEN	DC power feed to the outdoor unit active and TX signal active	DC power feed to outdoor cabinet active and TX signal not active
No light	No power feed or TX signal	N/A

Reading DVxx unit LEDs

The DVxx has one tri-colour LED, common for both LNAs, visible from the front panel.

Table 7. DVxx LED indications

LED Colour	Steady	Flashing
RED	Major LNA fault	N/A
YELLOW	Minor LNA alarm active	N/A
GREEN	LNA is ON and operating	N/A

Reading the BOIx unit LED

Table 8 describes the indications of the tri-colour LED on the front panel of the BOIx unit.

Table 8. BOIx unit LED indications

LED Colour	Steady	Flashing
RED	Unit faulty	N/A
YELLOW	No LAPD connection or loss of clock synchronisation (slave)	Configuring
GREEN	Unit ON and operating	SW downloading

Reading the power supply unit LED

The PWSx unit has an operating switch with two positions (ON and STAND- BY. Table 9 describes the indications of the power supply unit LED.

Table 9. PWSx LED indicators

LED Colour	Steady
RED	Unit faulty or short circuit in one of the Nokia UltraSite EDGE BTS's units and alarms Output voltage OFF because of a detected PWSx over temperature
YELLOW	Output voltage OFF, switch power unit to ON position, BTS in

	cold start mode Power shut down signal sent from the BSC or NMS/2000 Input voltage OK, switch on the power supply unit in stand-by position
GREEN	Unit ON and operating

Reading the alarms

When you receive an alarm (to BSC or to BTS Manager program) you can see wich is the faulty unit and where is located in the Base Station.

Alarm structure in BTS Manager

In Nokia BTS Manager you can check the base station workink state by looking at the Equipment view and the Alarm window.

Equipment view

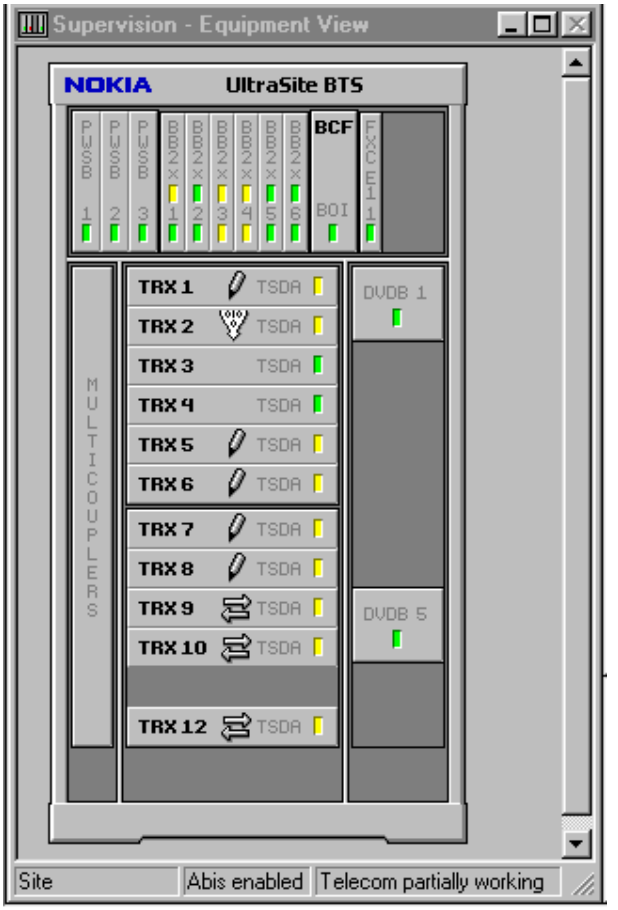


Figure 1. Equipment view

For the main boards you have a small picture that show (if present) the board status. When the Base Station is operating, you don't have any picture of these shown. You can look at these equipment:
BCF

TRX

RTC

In the bottom part of the window you can check the abis and telecom status
Abis working:
Abis connected: This means that at least the OMUSIG link has been established.

Abis not connected: The Abis link is physically disconnected or the OMUSIG link has not been established. The OMUSIG link is not established when, for example, the Disable Abis command has been given from BTS Manager.

Telecom status:

Telecom working: OMUSIG and all TRXSIGs are workingandall TRXs are unlocked at the BSCandall TRXs are in the unblocked state.

Telecom partially working: Some of the TRXSIGs are not workingorsome of the TRXs are locked at the BSCorSome of the TRXs are blocked with BTS Manager.

Telecom not working: None of the TRXSIGs are working or all TRXs are locked at the BSCorall TRXs are blocked with the BTS Manager.

BCF states

The operational state of the BCF is shown in the Equipment and Logical Object views. The following table describes the operational states of the BCF.

Table 10. BCF states

Symbol	State	Description
	Unknown	The state of the BCF is unknown. This state is possible when BTS Manager is started and the BTS has not yet reported the state of the BCF.
	Autodetecting	The BCF enters the 'Autodetecting' state after a reset. The BCF collects information on the installed units and then sends it to BTS Manager.
	Commissioning	The BCF is waiting for commissioning data (Commissioning | Wizard).
	Waiting for LAPD	The BCF is waiting for the LAPD establishment. If the BSC is not connected to the BTS, the BCF remains in this state until the Use Current command is given from BTS Manager, or until the LAPD (OMUSIG) is established. If the BSC is connected, the BCF is in this state until the LAPD link is correctly established.

	SW Loading	The BCF is loading software from the BSC or BTS Manager. The BCF determines if SW needs to be loaded from the BSC and loads it, if necessary. The BCF is in this state also during normal SW loading with BTS Manager. The BCF enters this state also after the Disable Abis command is given with BTS Manager.
	Background SW loading	The TRX is in the normal operational state and SW is being loaded on the background.
	Configuring	The BCF receives the logical (sector) configuration from the BSC. The BCF also waits for all TRXs to be configured when TRXs load the DSP SW, initialise RF parts and establish TRXSIGs.
none	Supervisory	The normal operational state of the BCF.
	Blocked	The BCF has been blocked with BTS Manager.

TRX states

The operational state of the TRX is shown in the Equipment and Logical Object views. The following table describes the operational states of the TRX

Table 11. TRX states

Symbol	State	Description
	Unknown	The state of the TRX is unknown. This state is possible when BTS Manager is started and the BTS has not yet reported the state of the TRX.
	Waiting for external input	After a reset, the slave TRX is establishing a D-bus connection to the master TRX.
	SW loading	The TRX sends HW information to the BCF and the runtime DSP SW of the TRX is loaded. The TRX remains in this state if the BSC is not connected.
	Background SW loading	The TRX is in the normal operational state and SW is being loaded on the background.
	Configuring	The configuration data is sent from the BCF to the TRXs and the RF module is initialised. If the BSC is not connected to the BTS or if the TRX is not in the logical configuration received from the BSC, the TRX remains in this state.
	Waiting for LAPD	The TRX is waiting for the LAPD establishment. When the TRXSIG is detected, the TRX enters the 'Waiting for System Information' state.If the TRX remains in this state, check that the link settings (TRXSIG) are correctly allocated.
	Waiting for	The TRX is waiting for system information from the

	system information	BSC.If the TRX remains in this state after commissioning, request a site unlock from the BSC or NMS.
None	Supervisory	The normal operational state of the TRX.
	Blocked	The TRX has been blocked with BTS Manager.

Alarm window

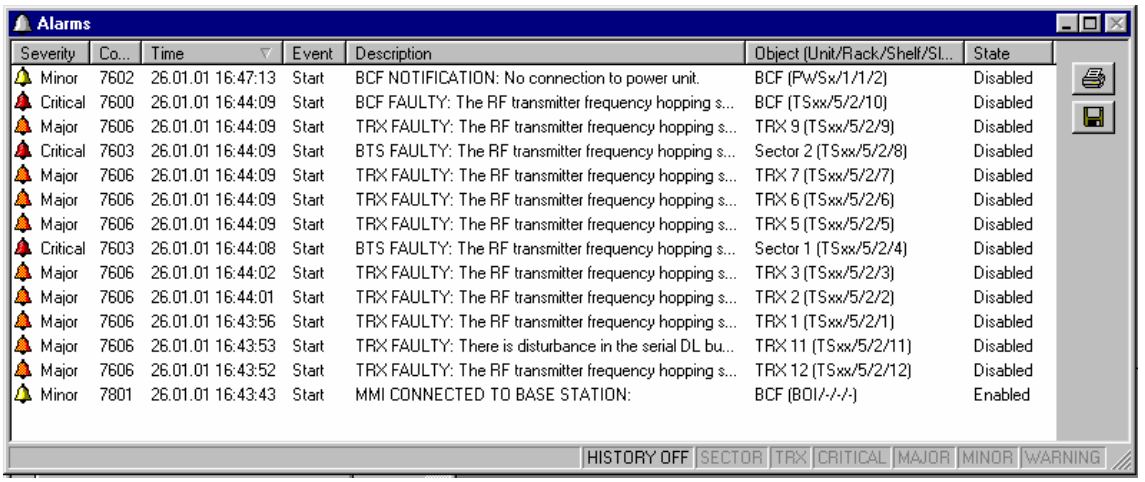


Figure 2. Alarm window

You can see in Figure 2 the alarm window. The Alarm window consist of 7 fields:
Severity: Critical / Major / Minor. Defines the severity of the alarm

Code: the code of the alarm

Time: the time when the alarm occour

Event: Start / Cancel / Transient. It show if the alarm is active or not.

Description: The cause of the alarm

Object (Unit/Rack/Shelf/Slot): The logical object related to the alarm. Refer to Figure 3 for the Rack, Shelf and the Slot.

State: Enabled / Disabled. The current state of the alarming object.

In the bottom part of the window you can also filter the alarms.

Unit position

All the boards in the base station are located in the base station by Rack, Shelf and Slot as shown in Figure 3.

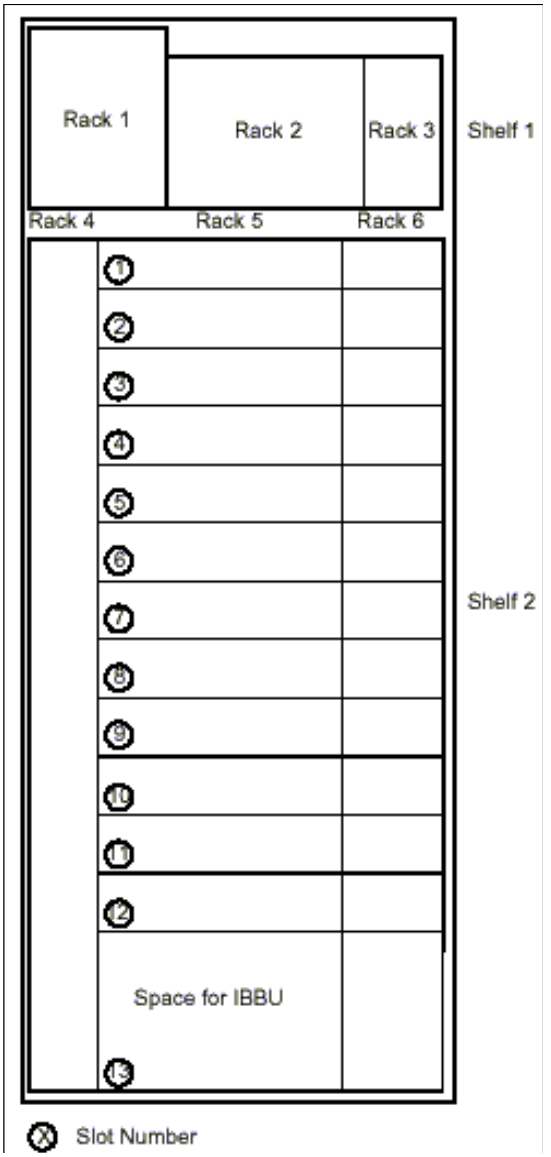


Figure 3: Unit position

Replacing units

This chapter describes how to replace the units of the Nokia UltraSite EDGE BTS.

The equipment can produce potentially lethal voltages if it is not properly shut down!

Before starting maintenance work, make sure to switch the power OFF from a disconnecting device or circuit breaker to avoid the risk of electric shock!

Handling units

Always use the antistatic wrist strap, as shown in Figure 1, when handling units marked with the ESD sign. Units carrying the ESD sign are sensitive against electrostatic discharging!

Keep the units in their protective package before installation to protect the units from humidity.

Do not use excessive force when installing units to the RFU backplane connectors.

Notify BSC or NMS/2000 personnel before replacing or adding units to Nokia UltraSite EDGE BTS.

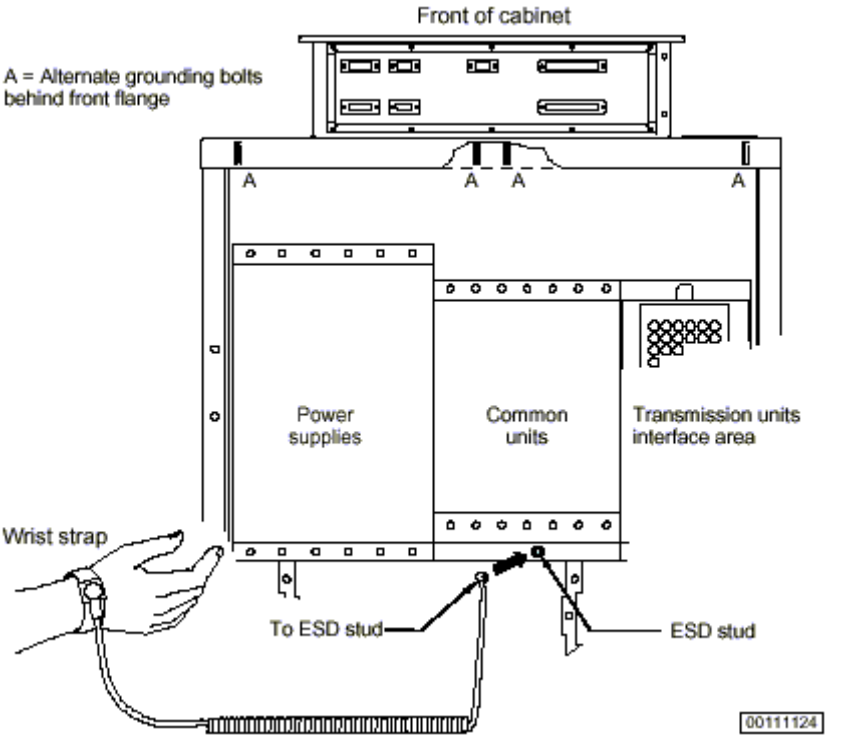


Figure 4. Connecting the antistatic wrist strap.

Replacing transceiver units

This section describes how to replace a faulty TSxx and BB2x plug-in units.

There is no master transceiver in the Nokia UltraSite EDGE BTS; the BOIx unit controls the transceivers. Figure 2 illustrates the order of the TSxx slots.

If you want to run the TRX test locally, it must be done before unblocking the site.

If you want to run the TRX test remotely, it must be done after unblocking the site.

Replacing the TSxx

This section provides detailed task instructions on how to replace a faulty TSxx. Figure 5 illustrates how to replace the TSxx unit.

To replace a TSxx plug-in unit:

Use Nokia BTS Manager to block the TRX associated with the TSxx (if the TRX is not already locked from the BSC).

Make notes of the TSxx cabling.

Disconnect the TSxx cabling.

Loosen the unit retaining screws with a T20 Torx driver to remove the unit.

Remove the faulty TSxx.

Insert the new TSxx into the cabinet slot (see Figure 2).

Tighten the TSxx retaining screws to 1.0 Nm (0.74 ft-lb) with a T20 Torx driver.

Reconnect the TSxx cabling.

Run the TRX test from Nokia BTS Manager (optional).

Use Nokia BTS Manager to unblock the TRX associated with the TSxx, if locked from the BSC or NMS/2000, unlock from the BSC or NMS/2000 (in this case the reset is automatic).

Make a test call.

If the GREEN LED is Steady after replacing the TSxx, Nokia UltraSite EDGE BTS is in service. If the LED is YELLOW or RED, check the alarms and run the TRX test from the BSC or NMS/2000.

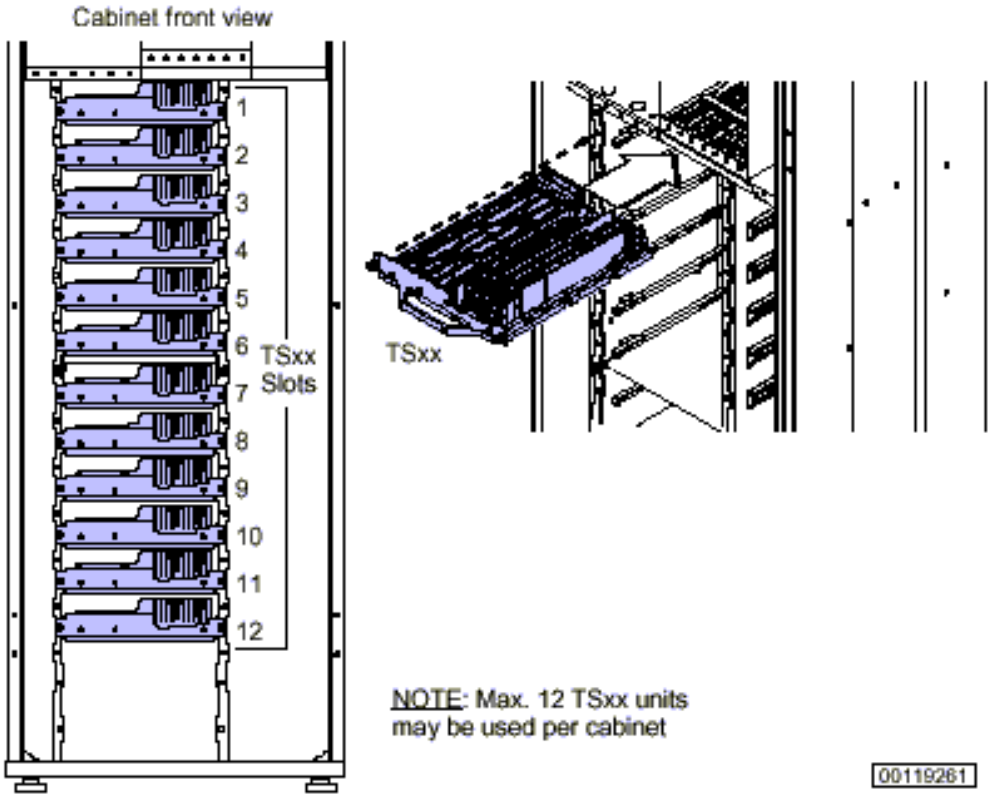


Figure 5. Replacing the TSxx units

Replacing the BB2x unit

Figure 6 illustrates how to replace the BB2x unit.

To replace the BB2x unit:

Block the TRX units associated with the BB2x with Nokia BTS Manager or request BCF lock from the BSC.

Use Nokia BTS Manager to read the BB2x or TSxx cross-connection in the BOIx to determine the TRXs to block.

Loosen the upper and lower unit retaining screws to remove the unit.

Remove the faulty BB2x unit.

Insert the new BB2x unit, pushing it toward the connector.

Tighten the unit retaining screws to 1.0 Nm (0.74 ft-lb) with a T20 Torx driver.

Run the TRX test from Nokia BTS Manager (optional).

Use Nokia BTS Manager to unblock the TRXs associated with the BB2x unit and reset both TRXs. If locked from the BSC or NMS/2000, unlock from the BSC or NMS/2000 (in this case the reset is automatic).

Make a test call.

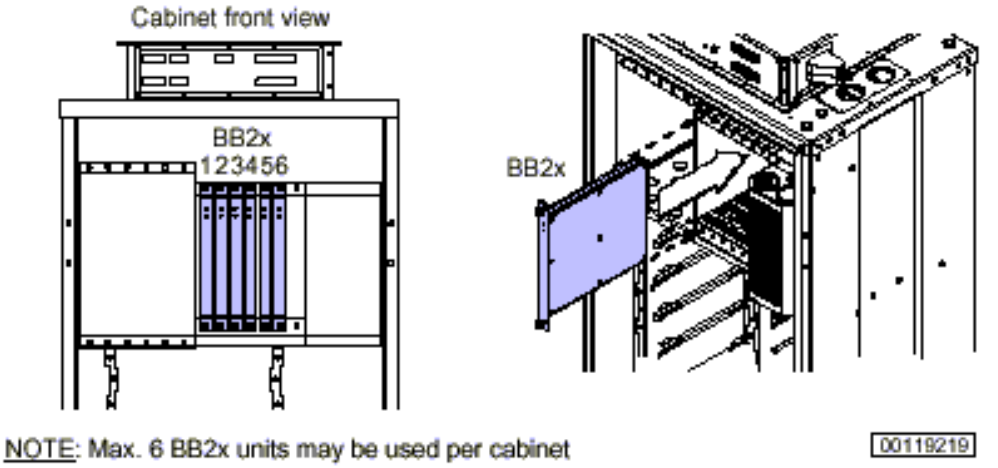


Figure 6. Installing the BB2x units

Replacing transmission units

This section describes how to replace a faulty transmission unit with the same type of transmission unit (for example, FC E1/T1 with FC E1/T1).

If replacing the FXC RRI or disconnecting the Flexbus cable, switch the Nokia UltraSite EDGE BTS power to the STANDY BY position.

Before disconnecting a transmission card, notify the network operator.

Disconnecting transmission units will drop all traffic from the Nokia UltraSite EDGE BTS and may effect other Nokia UltraSite EDGE BTSs chained or connected to the same transmission trunk line.

If replacing the FXC E1 or FC E1/T1, you can ground the outer conduct of the 75 Ω RX-connector capacitively or directly. If you remove the grounding bridge connecting the TX and RX connector, the grounding becomes capacitive.

To export cross-connection information to a file before replacing the transmission units:

Choose Open on the Transmission menu in the Nokia BTS Manager. Nokia Traffic Manager starts and connects to the transmission unit.

Choose View on the Cross-connections menu. The Cross-connections view opens on the screen.

Select the active bank.

Choose Export File on the File menu and specify a name and location for the cross-connection file.

Quit Nokia Traffic Manager. Nokia BTS Manager restarts automatically.

To replace transmission units:

Block the BCF locally with Nokia BTS Manager or request BCF lock from the BSC.

Remove the two screws from the EMC Shield box (see Figure 7).

Pull the EMC Shield box cover away from the EMC Shield box and set aside until interface cables are routed.

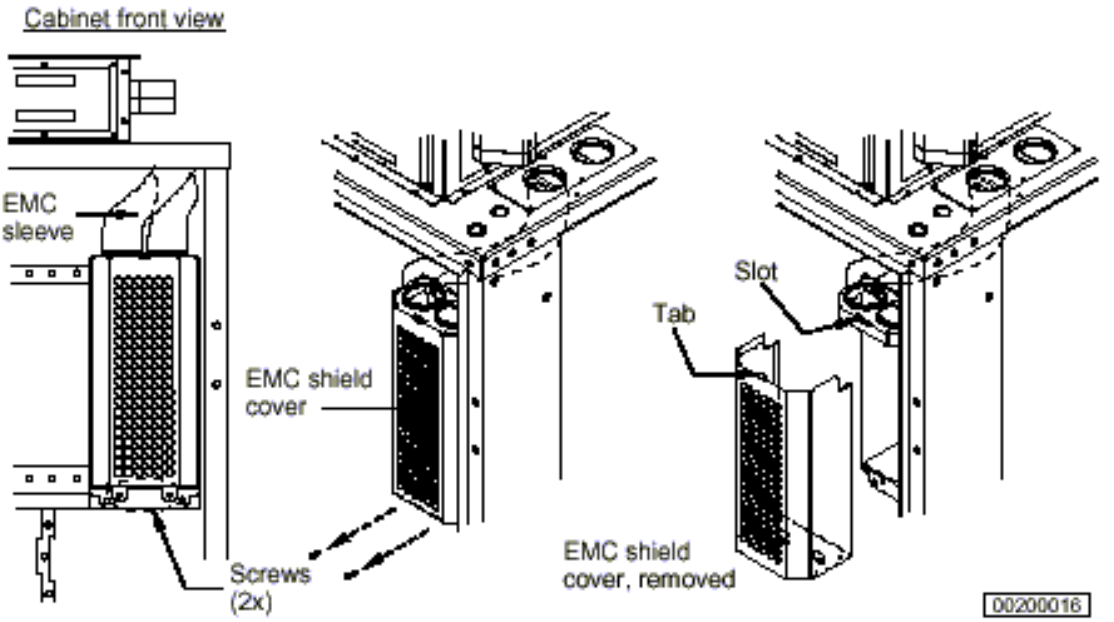


Figure 7. Removing the EMC shield box cover

Disconnect the transmission unit cables.

Loosen the upper and lower retaining screws of the unit with a T20 Torx driver to remove the unit.

Remove the transmission unit by pulling the unit out from the front.

Insert the new transmission unit into the unit slot from the front of the cabinet. Push the unit towards the connector.

Tighten the upper and lower retaining screws to 1.0 Nm (0.74 ft-lb) with a T20 Torx driver.

Reconnect the unit cables.

Replace the EMC Shield box cover on the EMC Shield box.

Reinsert the two screws from the EMC Shield box and tighten until the cover is flush on the EMC Shield Box.

Import the cross-connection information.

Unblock the BCF with Nokia BTS Manager and make BCF reset, or, if locked from the BSC or NMS/2000, unlock from the BSC or NMS/2000 (in this case the reset is automatic).

Request the BSC or NMS/2000 to run the Abis loop test.

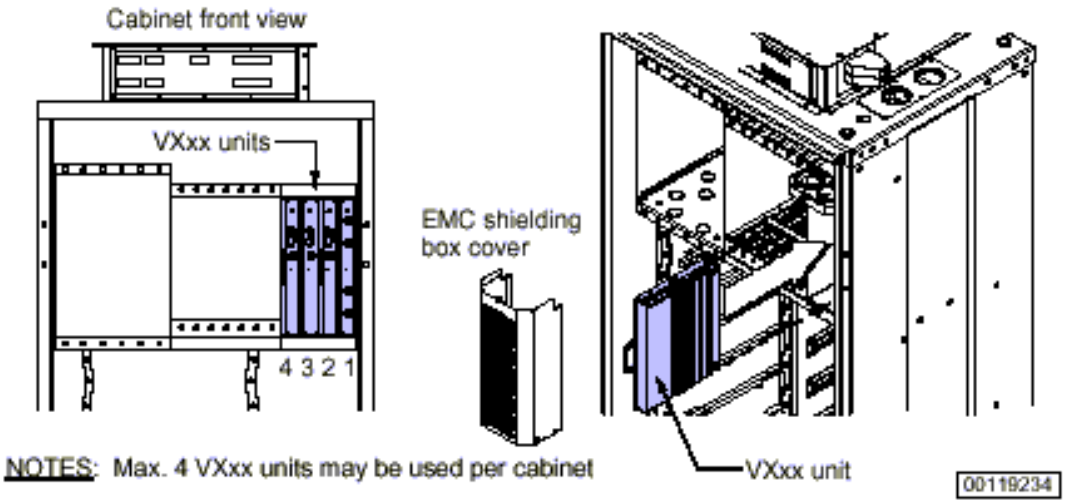


Figure 8. Replacing the transmission units

To import cross-connection information from a file after replacing the transmission units:

Choose Open on the Transmission menu in the Nokia BTS Manager. The Nokia Traffic Manager starts and connects to the transmission unit.

Choose View on the Cross-connections menu. The Cross-connections view opens on the screen.

Select the inactive bank.

Choose Import File on the File menu and select the cross-connection file.

Choose Activate on the Cross-connections | Bank submenu.

Click OK in the Activate Bank dialogue box. Answer Yes when Nokia Traffic Manager asks if you want to activate the inactive bank.

Quit Nokia Traffic Manager. Nokia BTS Manager restarts automatically.

Replacing common units

The BOIx unit takes care of the control functions common to all other units: O&M functions, main clock functions, and external alarm collection.

Figure 9 illustrates how to replace the BOIx unit.

To replace the BOIx unit:

Block the BCF locally with Nokia BTS Manager or request BCF lock from the BSC.

Loosen the upper and lower retaining screws to remove the unit.

Remove the faulty BOIx unit.

Insert the new BOIx unit, pushing it toward the connector.

Tighten the unit retaining screws to 1.0 Nm (0.74 ft-lb) with a T20 Torx driver.

Unblock the BCF with Nokia BTS Manager and make BCF reset, or, if locked from the BSC or NMS/2000, unlock from the BSC or NMS/2000 (in this case the reset is automatic).

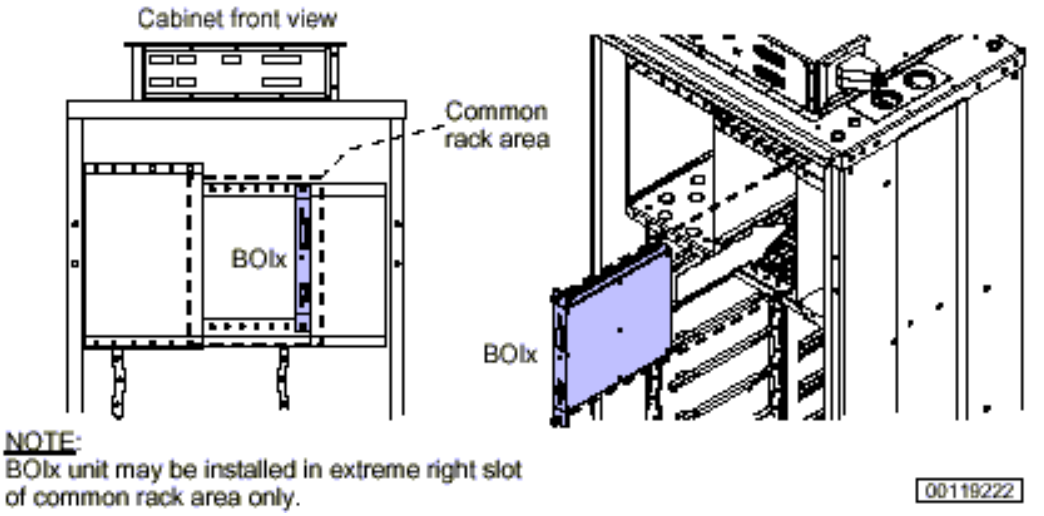


Figure 9. Replacing the BOIx unit

Replacing the power supply units

Figure 10 and Figure 11 illustrate how to replace a faulty AC or DC power supply units.

To replace a PWSx units:

Turn the PWSx unit to STAND BY position.

Loosen the PWSx unit retaining screws with a T20 Torx driver to remove the unit.

Disconnect the power supply cable.

Remove the faulty PWSx unit from the cabinet.

Insert the new PWSx unit in the unit slot from the front cabinet. Push the unit towards the connector.

Tighten the retaining screws to 1.0 Nm (0.74 ft-lb) with a T20 Torx driver.

Reconnect the power supply cable.

Ensure the new unit is in STAND BY position.

Turn the site mains power on from the main breaker.

Turn the PWSx unit ON.

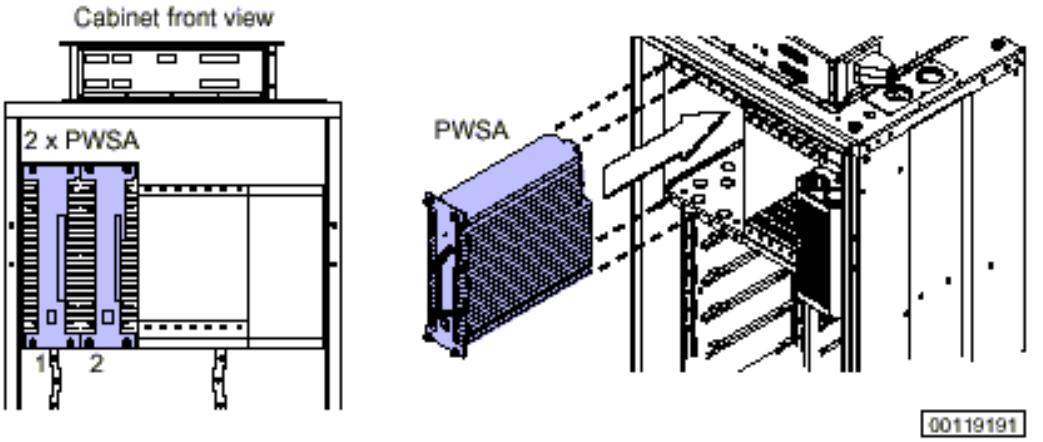


Figure 10. Replacing PWSA unit

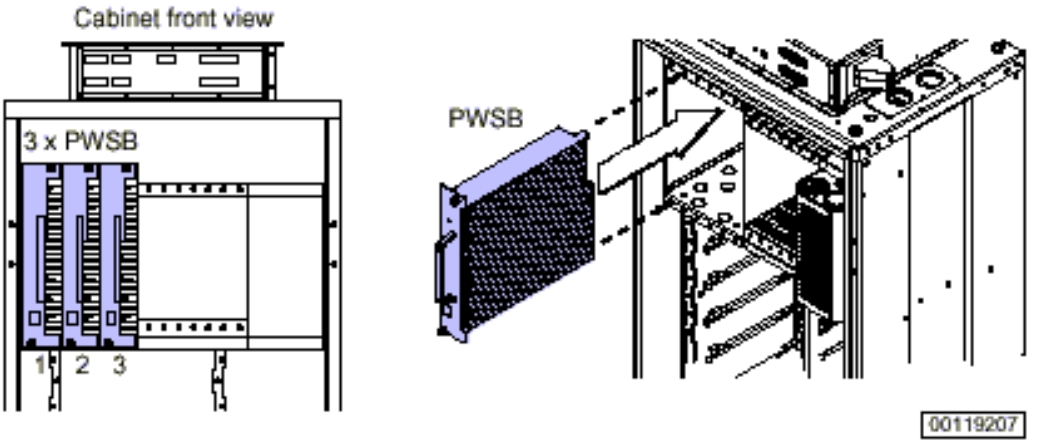


Figure 11. Replacing PWSA unit

Replacing combiner units

Replacing WCxx units

Figure 12 illustrates how to replace WCxx units.

To replace WCxx units:

Block the TRX associated with the unit with Nokia BTS Manager (if the TRXs are not already locked from the BSC).

Make notes of the unit cable configurations.

Disconnect the unit cables.

Loosen the unit retaining screws with a T20 Torx driver to remove the unit.

Remove the faulty unit.

Insert the new unit into the cabinet slot.

Tighten the unit retaining screws to 1.0 Nm (0.74 ft-lb) with a T20 Torx

driver.

Reconnect the unit cables.

Use Nokia BTS Manager to unblock the TRXs associated with the unit and reset the BCF. If locked from the BSC or NMS/2000, unlock from the BSC or NMS/2000 (in this case the reset is automatic).

Make a test call.

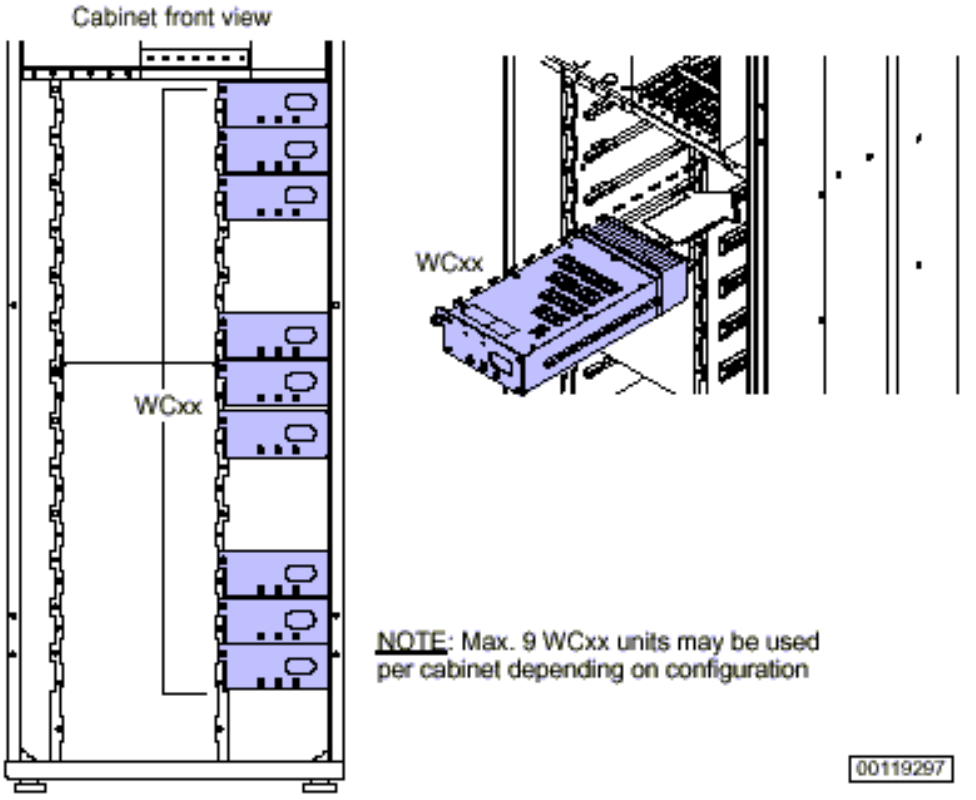


Figure 12. Replacing WCxx units

Replacing multicoupler units

Figure 13 and Figure 14 illustrate how to replace M2xx and M6xx units.

To replace multicoupler units:

Use Nokia BTS Manager to block the TRX associated with the unit (if the TRX is not already locked from the BSC).

Make notes of the unit cable configuration.

Disconnect the unit cables.

Loosen the unit retaining screws with a T20 Torx driver to remove the unit.

Remove the faulty unit.

Insert the new unit into the cabinet slot.

Tighten the unit retaining screws to 1.0 Nm (0.74 ft-lb) with a T20 Torx driver.

Reconnect the unit cables.

Run the unit test from Nokia BTS Manager (optional).

Use Nokia BTS Manager to unblock the TRX associated with the unit reset the BCF, or, if locked from the BSC or NMS/2000, unlock from the BSC or NMS/2000 (in this case the reset is automatic).

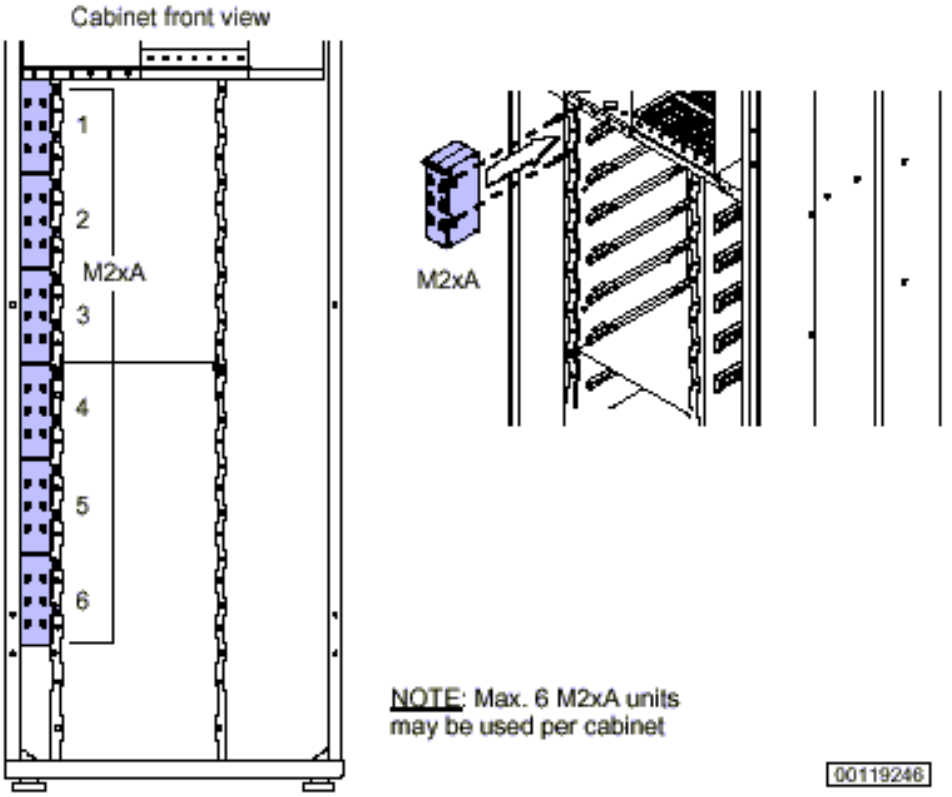


Figure 13. Replacing M2xx units

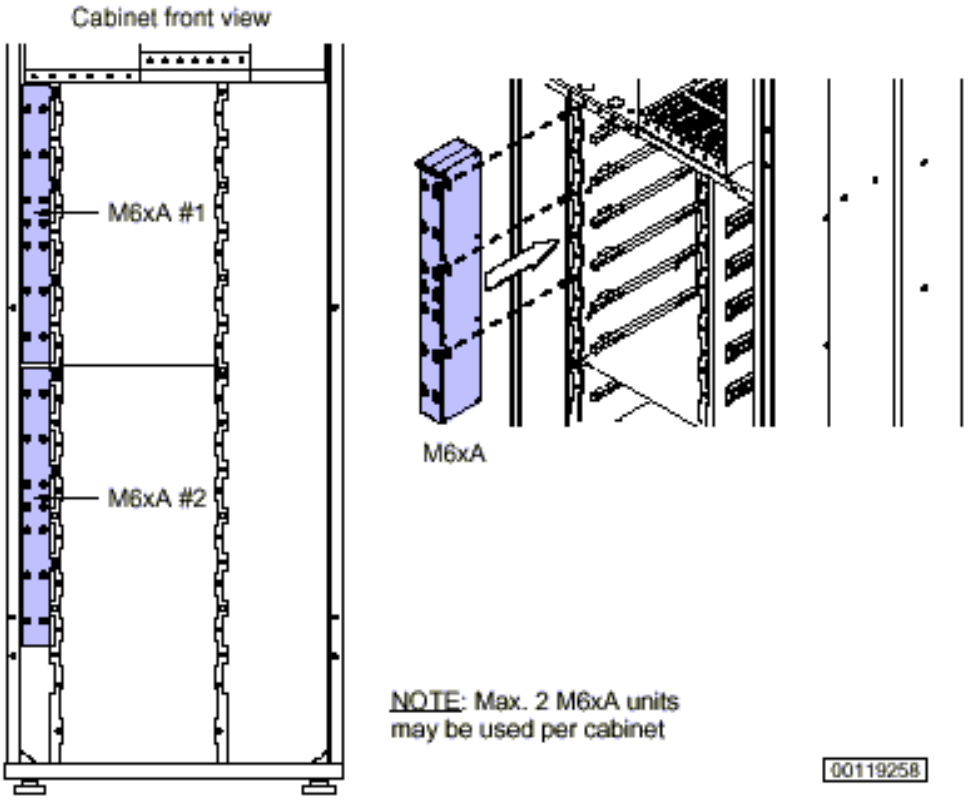


Figure 14. Replacing M6xx units

Replacing duplexer units

Figure 15 illustrates how to replace DVxx units.

To replace DVxx units:

Use Nokia BTS Manager to block the TRXs associated with the unit (if the TRX is not already locked from the BSC).

Make notes of the unit cable configurations.

Disconnect the unit cables.

Loosen the unit retaining screws with a T20 Torx driver to remove the unit.

Remove the faulty unit.

Insert the new unit into the cabinet slot.

Tighten the unit retaining screws to 1.0 Nm (0.74 ft-lb) with a T20 Torx driver.

Reconnect the unit cables.

Run the unit test from Nokia BTS Manager (optional).

Use Nokia BTS Manager to unblock the TRXs associated with the unit and reset both TRXs. If locked from the BSC or NMS/2000, unlock from the BSC or NMS/2000 (in this case the reset is automatic).

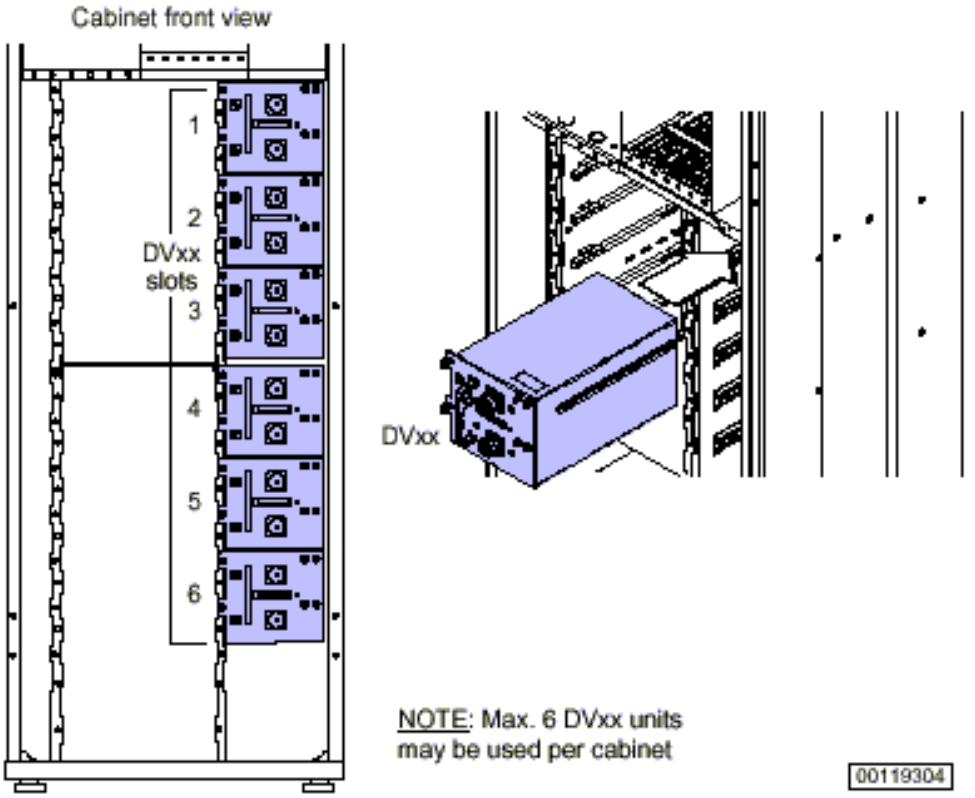


Figure 15. Replacing DVxx units

Troubleshooting and fault reporting

This chapter provides examples on how to locate eventual faults in the operation of Nokia UltraSite EDGE BTS and gives instructions on how to correct the faults.

Troubleshooting the Base Station

If a fault occurs in Nokia UltraSite EDGE BTS operation, connect the Nokia BTS Manager laptop PC to the BOIx unit. The LED indications and the alarm window can help you identify the problem.
Maintain contact with the Base Station Controller (BSC) with a mobile phone for additional information on Nokia UltraSite EDGE BTS status.

Troubleshooting the commissioning

In the case of a failure in any part of the whole commissioning procedure, an alarm will appear in the alarm window. Also, you may check the cause of a failure from the commissioning reports and the diagnostic report.
The commissioning procedure may fail, e.g. when:
the Abis cables are not properly connected (then the transmission unit LED is not green)

the pre-configuration failed at the BSC, e.g. the BCF and TRX objects were not created

the oven oscillator has not yet warmed up (then the BCF remains in the ‘Configuring’ state)

the TRXs are not unlocked at the BSC (then the TRXs do not enter the ‘Supervisory’ state)

the PCM port is not activated at the BSC.

Before starting to re-commission the BTS, first run the Undo Commissioning procedure. All damages, failures or faults must be reported to Nokia using the Failure Report Form provided by your local Nokia representative.

Troubleshooting the BTS Manager connection

Fault: The BTS is powered ON but cannot connect to the Nokia BTS Manager.

Table 12. Troubleshooting the BTS Manager connection

Potential Causes	Corrective action
Wrong BTS Manager port setting (COM1, COM2)	Correct the settings
Broken LMP cable or not properly connected	Replace/repair the cable, or check the connection
Faulty or damaged BOIx unit	Reset or replace the BOIx

Troubleshooting the power to the BTS

Fault: There is no power to the Nokia UltraSite EDGE BTS.

Table 13. Troubleshooting power to the BTS

Potential Causes	Corrective action
Power supply unit switches to STANDBY position	Turn the switch to the ON position
Site mains power supply fault (power supply LED OFF)	Check the site mains power source and fuses Replace if necessary.
Defective power cable	Replace the power cable
Cold start function activates	Close the door to allow the units to warm up to the operational temperature range of -5 C (20 F)
Defective power supply unit	Replace the power supply unit.
Short in one of the plug-in units	Pull the units out one by one until the power comes back on. Start from the TSxx units and proceed to the transmission unit, fan units and finally to the BOIx. Return the units one by one and replace the faulty unit(s).

Performing preventive maintenance for Ultra Site BTS:-

1 Checking the seals

The cabinet seals are under the roof and around the door. Check the seals periodically and clean with a cloth when necessary. Replace worn or broken seals when necessary.

2 Checking the Temperature Control System

To maintain proper air circulation and prevent overheating of the Nokia UltraSite EDGE BTS, periodically clear the BTS of debris and free air inlets and outlets of obstructions.

For additional product information, refer to Nokia UltraSite EDGE Base Station Temperature Control System Product Description.

3 Lubricating the door lock

The door lock of the Outdoor cabinet may require lubricating oil during site visits. If the Outdoor cabinet is operating in temperatures below 0° C (32° F), lubricate the lock with lubricating antifreeze oil or use both antifreeze oil and lubricating oil.

Apply lubricating oil to moving parts of the lock assembly and within the lock cylinder by applying oil to the key and inserting it in the cylinder repeatedly.

4 Checking the power supply

You should periodically check the batteries of the Integrated Battery Backup unit (IBBU).

Visually check the batteries for the following defects:

·external damage

·pressure spots

·deformities

·terminal corrosion

·acid escape

Before installing new batteries, measure the voltage to ensure that the batteries are charged.

For more information about the IBBU and Nokia UltraSite Support, refer to Nokia UltraSite EDGE Site Support User Manual.

5 Running system tests

To ensure the quality and maximum number of calls in a cell, run the Abis loop test and the TRX test remotely from the BSC or NMS/2000. The tests verify the condition of the hardware and help identify appropriate maintenance tasks.

You can run the TRX test locally with the Nokia BTS Manager, but you need to block the TRX during the test. For more information, refer to Nokia BTS Manager Online Help.

Preventive maintenance For Metro Sites:

1 Cleaning :

If needed, clean the Metro cover with a mild detergent, using a sponge or a soft brush. Strong dissolvents must not be used.

To clean the mechanics, use a clean cloth, vacuum cleaner or compressed air. If a vacuum cleaner or compressed air is used, the air flow must not be excessive. A damp cloth and a mild detergent can be used.

2 Fan :

The fan life time depends on the environment and running hours. As an alternative to this, in an extreme climate the fan is recommended to be replaced every five years.

In hot temperatures (approx. 50°C/122°F), a broken fan should be replaced within 75 minutes.

3 Transmission units :

The oscillator of the FXC RRI unit is recommended to be tuned every 10 years. The oscillator's accuracy will then always be in the range +/− 10 ppm. If tuning is not done, no traffic cuts will occur but signal jitter may increase.

The FXC RRI unit has to be sent to a Nokia service centre for tuning.

4 Lock :

Lubricate the lock with lubricating oil. If the cabinet is used in temperatures below 0°C (32°F) lubricate the lock with lubricating anti-freeze oil or use both anti-freeze oil and lubricating oil.