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Flexi WCDMA BTS and Module Overview

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Flexi WCDMA BTS and Module Overview

After completing this module, the participant will be able to:

Theory:

• List the New Units of the NSN Flexi WCDMA BTS RU10 level
• List the units of the NSN Flexi WCDMA BTS
• Describe the main function of each unit in the NSN Flexi WCDMA BTS
• Describe the installation configuration options for the NSN Flexi WCDMA BTS
• List optional option of Flexi WCDMA BTS

Changes in Flexi WCDMA BTS hardware products RAS 06

New

Flexi Mast Head RF Module 2100 50W (FRGE)
Stand-alone transceiver module with integrated antenna filters and combiners.

System External GPS Mediator (FSEG)
Used for providing IP55 protected area for powering and connecting the GPS module to the BTS system.

Flexi RF Module 2100 Dual 50 W (FRGJ)
Stand-alone transceiver module with integrated antenna filters.

Flexi RF Module 2100 Single 50 W (FRGK)
Stand-alone transceiver module with integrated antenna filters.

Flexi RF Module 2100 Dual 50 W (FRGL)
Stand-alone transceiver module with integrated antenna filters.

Flexi RF Module 2100 Single 50 W (FRGM)
Stand-alone transceiver module with integrated antenna filters.

Flexi Pole Kit (FPKA)
Used for installing 3U modules and Mast Head RF Modules on poles between 60 mm (2.4 in.) and 120 mm (4.7 in.) in diameter.

Flexi Pole Installation Kit (FPIA)
Used for installing the auxiliary units FSEB, FSEC, and FSEG to a pole.

Changes in Flexi WCDMA BTS hardware products RU10

Flexi RF Module 2100MHz Triple 70W (FRGF) 471483A	**A stand-alone transceiver module with integrated antenna filters.**
Flexi RRH 2100 Single 70W (FRGG) 471882A	**A stand-alone transceiver module with integrated antenna filters.**
System Module (FSMC) 471401A	**A module that hosts the telecom control, system operation and maintenance, baseband application, transmission, and power distribution functionality.**
System Module (FSMD) 471402A	**A module that hosts the telecom control, system operation and maintenance, baseband application, transmission, and power distribution functionality.**
Transmission sub-module Transport PDH/Ethernet (FTIB) 471720A	**A sub-module that provides the physical Iub interface to the radio network controller (RNC) or I-HSPA Adapter.**
Transmission sub-module Transport PDH E1/T1 High Density (FTHA) 471522A	**A sub-module that provides the physical Iub interface to the radio network controller (RNC) or I-HSPA Adapter.**

NSN Flexi WCDMA BTS Capacity

There are three HW variants of System Module
- FSMB: 240 Channel Elements BB Capacity
- FSMC: 250 Channel Elements HW, 180 CE for traffic use
- FSMD: 500 Channel Elements HW, 396 CE for traffic use
- Extension System Module needed for capacity upgrade
- Flexi BTS Multimode System Module (FSMC & FSMD HW) is also prepared for LTE evolution with a SW upgrade (subject to 3GPP standardization).

There are three HW variants of RF module
- 1, 2 or 3 Power Amplifier versions
  - each PA contains one dual carrier

BTS configurations
- 1+0+0 up to 2+2+2 or 2+2+2+2+2+2 / 4+4+4

1 System Module can be connected to 3 RF Modules
- **Size**
  - 133 mm (3 U) X 447 mm X 422 mm without covers (H x W x D) (560 mm with front and back covers)
- **Weight**
  - 19-25 kg per Module

Whole site installation possible by one person

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Property	System Module FSM	Two PA RF Module FRGA	One PA RF Module FRGB	Power Module FPMA
High ambient air temperature limit [°C]	+50			
High ambient air temperature limit with sun radiation heat load [°C]	+45			
Nominal DC voltage [V]	48			
Permitted DC operating voltage fluctuation (external supply range)[V]	40.5 … 57			
Optional Nominal DC voltage with DC- DC Module [V]	+24 (with Release 2 HW module FPDA)			
Optional Permitted 24 V DC operating voltage fluctuation (external supply range) [V]	+ 18 … + 32 (with Release 2 HW module FPDA)			
Nominal AC voltage with optional AC Module [V]	240 (US 1-phase) 230 (EU 1-phase) 202 (Japan delta)			
Optional Permitted AC operating voltage and freq. fluctuation (external supply range) [V] [Hz]	184 … 276 V 45 … 66 Hz 0 … 184 V , 5…20 minutes when using FPBA with FPAA (time depends on AC Voltage input)			

OBSAI (Open Base Station Architecture Initiative) interfaces
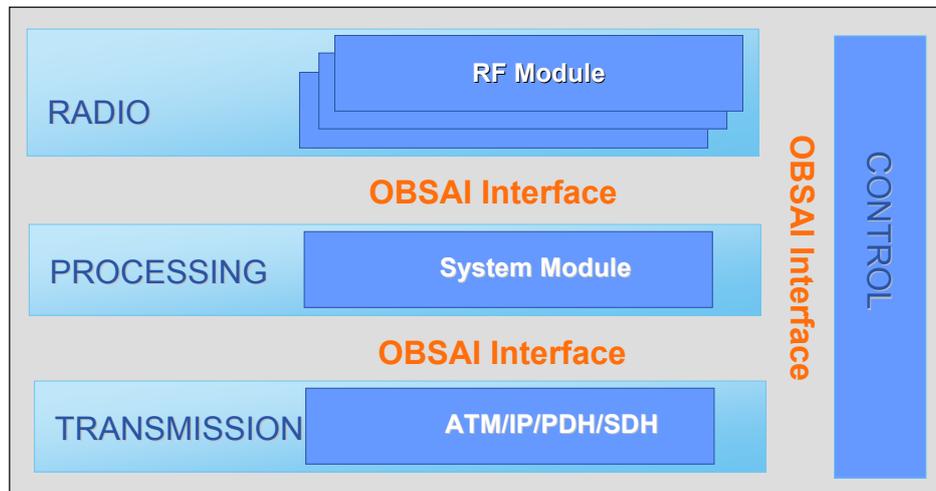
The OBSAI family of specifications provides the architecture, function descriptions and minimum requirements for integration of a set of common modules into a base transceiver station (BTS).

As a minimum, the BTS will have the capability to be configured from a set of common modules in order to support one or more current or future wireless network access standards.

The technical requirements contained in the OBSAI family of specifications form an interface specification to ensure compatibility and interoperability among and between the set of common modules.

The requirements do not address the quality or reliability of service of the access standards, nor do they cover measurement procedures.

HW Unit comparison between platforms

NSN Flexi WCDMA BTS

NSN UltraSite/MetroSite(50) WCDMA BTS

RF modules:	

• FRxy Flexi RF Module Dual 50 W
• FRxy Flexi RF Module Single 50 W
   • Frequency variant
   (x):
   C = 850, D= 900, E =1700 or 1800,
   F = 1900, G=2100, I = 1700/2100
   • Number of carriers per RF module (y):
   A = 2 carriers, dual 50W
   B = 1 carrier, single 50W
   C = 2 carriers, dual 50W / 2100
   D = 1 carrier, single 50W / 2100
	• WAFA/B/I/J/H/G/M/N/T/W
	• WPAI/J/C/D/H/K/M, WMPA/C/M
	• WTRB/C/D/G
	• WICA
	• WFCA/B/C/D, WUCM/A/B
	• Bias-T

System modules:	**Baseband units:**
FSMB/C/D System module	• WAMA, WSMB, WSCA, WSPC, WMCM, WPSE, IFUG
Transmission sub-modules:	**Transmission units:**
• FTOA, FTPB, FTEB, FTFA, FTIA/B, FTJA, FTHA	• AXUA/B, AXCC/D, IFUA, IFUC, IFUD, IFUE, IFUF, TOPA

Modular BTS, installation options

For indoor/outdoor use > IP 55

Installation options:

Floor

Wall, Multiple units on wall

Rack

Stand or pole

Cabinet
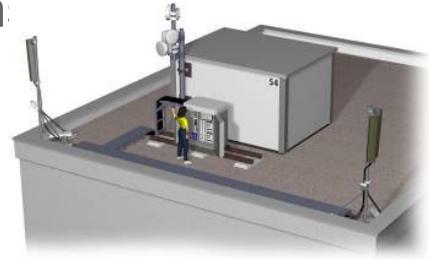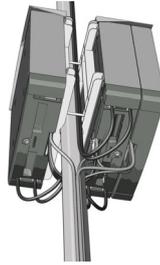
The Distributed Site Solution

- RAS05: 190 m
- RAS05.1: 15km
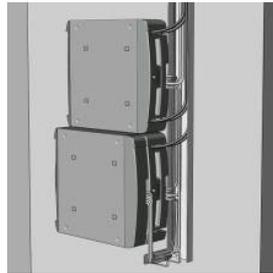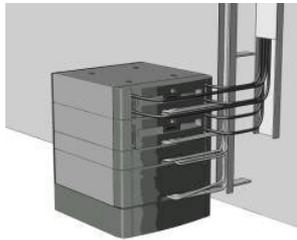
The Distributed Site Solution

Site concept where the distance up to 15 km can be between the System Module and RF Modules.

The single mode cables and single mode tranceivers need to be used to connect System Module to RF Module optically.

Benefits for the operator

The operators are able to utilise new site solutions by using long optical cables between the Flexi Rf and System Modules.

Functional description

Rf modules can be installed 15km (75us delay) from system module by utilising single mode lasers and optical cables.
When installing RF modules to same system module Rf modules should locate 3km from each others when RF modules are adjacent cells in network.

NSN Flexi WCDMA BTS Modules

133 mm
3 HU

422 mm
without covers

560 mm
with covers

447 mm
for 19 inch rack installation

Weight: 19-25 kg

All NSN Flexi WCDMA modules are outdoor capable hermetically sealed and IP 55 class protected.

The number of modules is minimised, e.g. for typical a 1+1+1 configuration only 3 modules are needed.

NSN Flexi WCDMA BTS module mechanic parts

Module core

The Core mechanics with optional front and back covers shield the module against water, snow, and solid foreign objects and makes the module IP 55 weatherproof.

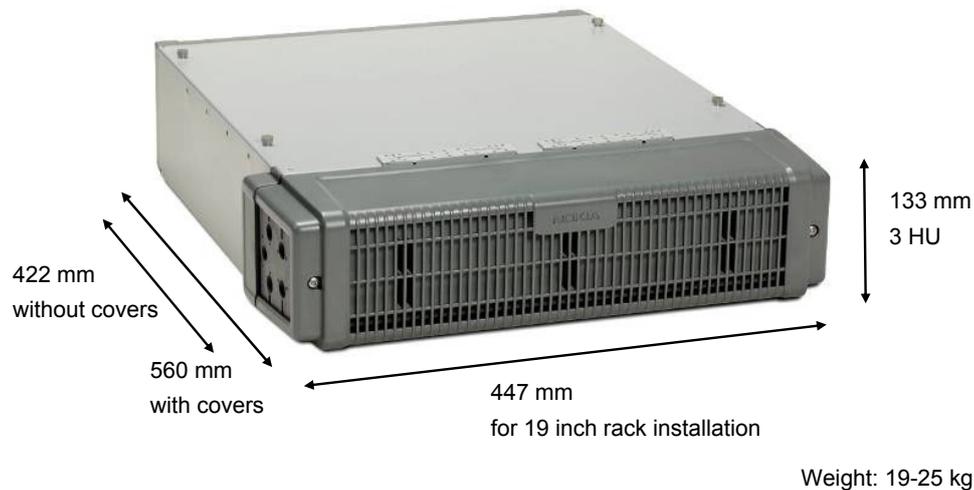The Core mechanics provide EMC shielding.

All connectors are at front with weather protecting covers.

Module casing

Casing supports the pile of modules.

Module Core can be changed even the module is at the bottom of the module stack.

Fan sub-module

Fan sub-module provides the fresh air cooling to module.

The module controls the   fan according to temperature information.

Two redundant fans enable module operation in normal temperature even with one fan.

The Fan sub-module can be changed in operational module at site where back access is provided.

Optional Front and Back covers for BTS site installations without cabinet or **Optional Outdoor Cabinet**

The outdoor cabinet includes door lock and door alarm switch.

NSN Flexi WCDMA BTS Mechanics

Core
(can be pulled out for replacement)

Casing(enables pulling out the core)

Optional front
cable cover

Cover and Fan

(can be replaced on site)

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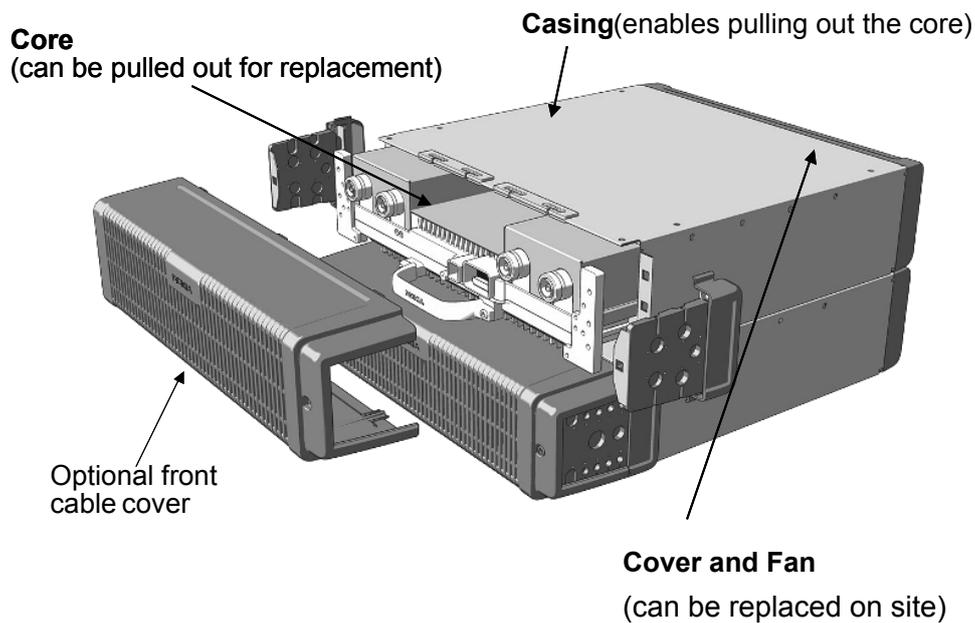The module controls the   fan according to temperature information.

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The outdoor cabinet includes door lock and door alarm switch.

NSN Flexi WCDMA BTS architecture

RF MODULE:
- Modulator
- Channelizer
- Analog RF processig
- Power Amplifier (integr.)
- Antenna filter (integr.)

Optical interfaces between the modules

Optional Outdoor cabinet

Two PA RF Module

Two PA RF Module

Two PA RF Module

Optional Extension System Module (RAS05.1 ED)

BTS System Module

AC -> DC   BBU

AC (Optional)
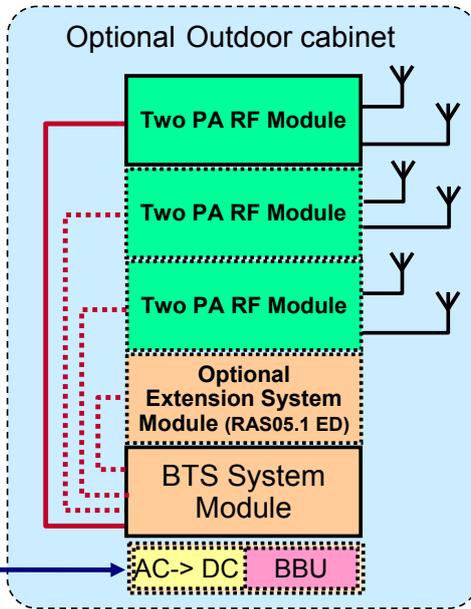
SYSTEM MODULE:
- C-plane processing
  + centralised timing
- U-plane processing
  + multiplexing & summing
- Ethernet switching
- Transport processing
- External interfaces
- Power Distribution

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NSN Flexi BTS System Module

The Flexi System Module hosts the

- telecom control
- system operation and maintenance
- baseband application
- transmission
- power distribution

functionality.

- The System Module can also act as a System Extension Module operating in a baseband extension mode.

The following versions of the System Module are available:

- System Module FSMB (rel. 1)
- Multimode System Module FSMC (rel. 2)
- Multimode System Module FSMD (rel. 2)
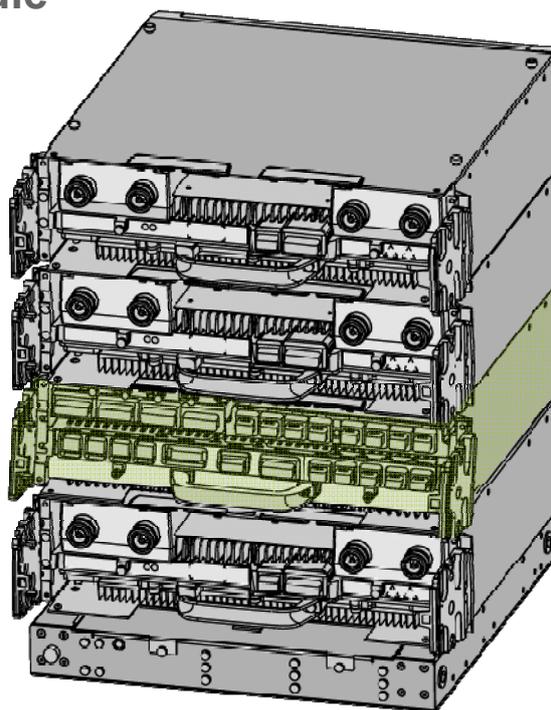
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The System Module can be used, for example, for the following software functionalities:

- BTS level O&M processing (BTSOM)
- resource management
- node B server
- NBAP handler
- user plane management

Exploded view of System Module

Casing

Back cover

Cable support plate

Fan carrier

Module core and transmission

External cable entry

Front cover
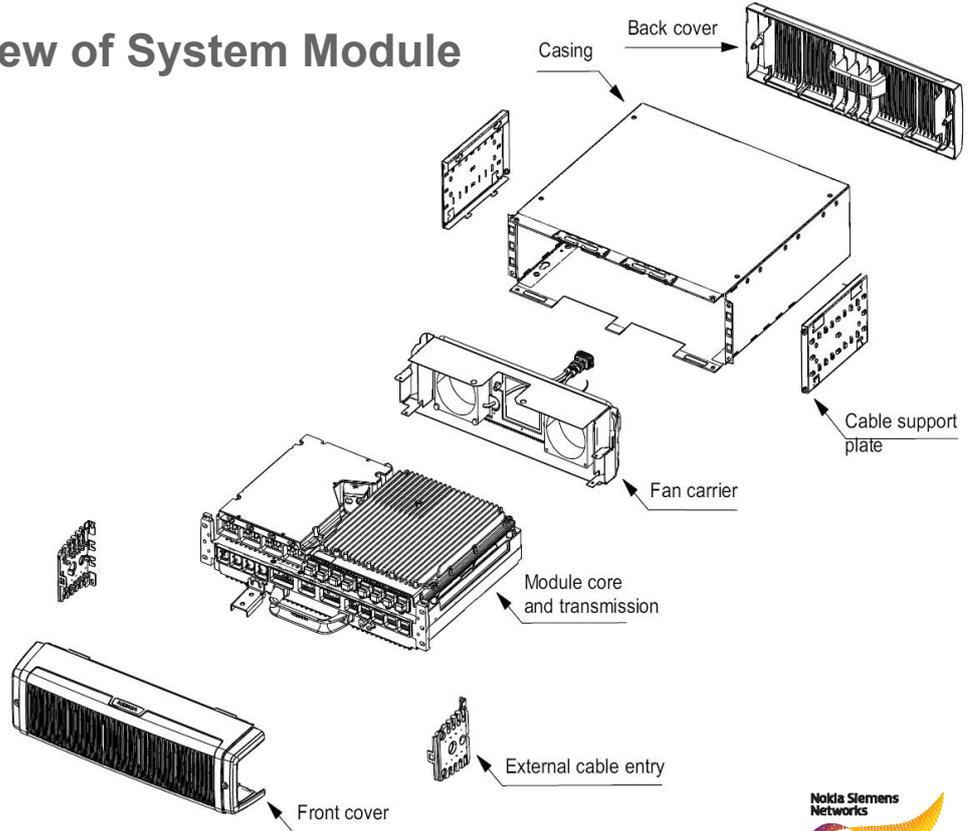
FSMB SYSTEM MODULE INTERFACES 1/3

The System Module is equipped with the following interfaces:

The System Module provides the following BTS external interfaces:

. BTS Site Element Manager

. transmission interfaces

. three external interfaces towards RF

. site support system interface (for example, battery back-up)

. auxiliarity interface (customer-specific Ethernet port with overvoltage protection)

. auxiliarity interface Ethernet for future expansions

. external alarms and controls interface (customer-specific alarms)

. external synchronisation input interface

. external synchronisation output interface

. baseband extension interface

FSMC/D SYSTEM MODULE INTERFACES 2/3

The System Module is equipped with the following interfaces:

The System Module provides the following BTS external interfaces:

. BTS Site Element Manager

. transmission interfaces

. three external interfaces towards RF

. site support system interface (for example, battery back-up)

. auxiliarity interface (customer-specific Ethernet port with overvoltage protection)

. auxiliarity interface Ethernet for future expansions

. external alarms and controls interface (customer-specific alarms)

. external synchronisation input interface

. external synchronisation output interface

. baseband extension interface

SYSTEM MODULE INTERFACES 3/3

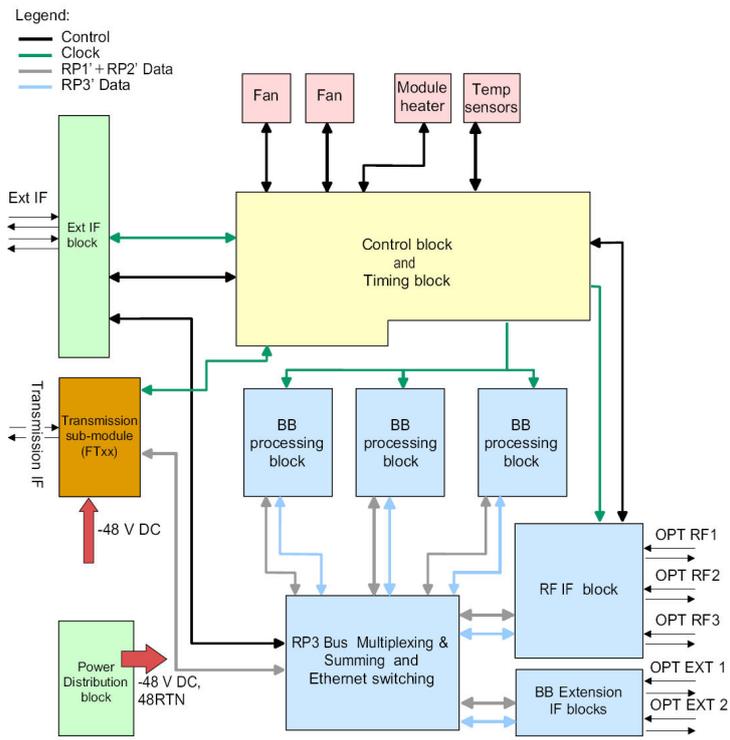| Connector	Type	Purpose
Power supply RF module 1	Multi-beam XL power supply connector	Power delivery to RF1. Fuse rating 20A.
Power supply RF module 2	Multi-beam XL power supply connector	Power delivery to RF2. Fuse rating 20A.
Power supply RF module 3	Multi-beam XL power supply connector	Power delivery to RF3. Fuse rating 20A. Recommended for I-HSPA use. Can be used for GPS mediator (FSEG).
Power supply System Extension Module operating in BB-ext mode	Multi-beam XL power supply connector	Power delivery to System Extension Module operating in BB-ext mode and to the main fuse for System Modules. Fuse rating 25A. Can be used for I-HSPA and GPS mediator (FSEG).
Transmission interfaces	8 x RJ-48/16 x SMB/2 x TNC/1 x duplex LC connector 2 x RJ-45 connector 1x GE via SFP transceiver	Variable transmission interfaces
10/100 Eth LMP	RJ-45 connector	For local management tool
10/100 Eth FPMA	RJ-45 connector	Site support control over IP/site support hard-wired alarms
10/100 Eth OVP[1]	RJ-45 connector	Control and location data transfer
1000 Eth ETP	RJ-45 connector	External transport equipment interface (for I-HSPA Adapter)
EAC	MDR36 connector	External alarms and controls
Sync out	MDR14 connector	BTS synchronization output interface
Sync in	MDR26 connector	BTS synchronization input interface (for external sources)
OPT-RF 1	Duplex LC connector	Interface for RF Module 1
OPT-RF 2	Duplex LC connector	Interface for RF Module 2
OPT-RF 3	Duplex LC connector	Interface for RF Module 3
OPT-EXT 1	Duplex LC connector	System and baseband extension interfaces
OPT-EXT 2	Duplex LC connector	System and baseband extension interfaces
DC input	TX25 screw terminals for 8 … 25 mm^2 cable	Power feed
Grounding	Screw M5	Grounding

Table: System Module connectors

The 10/100 Eth OVP cable fulfils overvoltage surge protection standard GR-1089 Core Intrabuilding.

The overvoltage protected OD fast Ethernet cable is for indoor and outdoor usage.

FSMB Functional Block

Legend:
— Control
— Clock
— RP1' + RP2' Data
— RP3' Data

Fan | Fan | Module heater | Temp sensors

Ext IF

Ext IF block

Control block and Timing block

Transmission sub-module (FTxx)

Transmission IF

-48 V DC

BB processing block

BB processing block

BB processing block

RF IF block

OPT RF1
OPT RF2
OPT RF3

Power Distribution block

-48 V DC, 48RTN

RP3 Bus Multiplexing & Summing and Ethernet switching

BB Extension IF blocks

OPT EXT 1
OPT EXT 2

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Control MCU and clock generation: This includes the NBAP termination, telecom and overall BTS control functionality, system O&M functionality, external site support system and other equipment control. It generates system reference clock and frequency reference for synchronising with other BTS.

External interface block: This block facilitates the external interface for external equipment control.

Summing and multiplexing functionality: This functional block is used for data routing between the radio modules and the baseband.

RF Module interface: This logical functional block is responsible for providing output/input interface to or from a maximum of three RF Modules.

Baseband extension interface: This logical functional block is responsible for providing output/input interface to or from the System Extension Module.

FSMC/D Functional Block

Legend:
- Control
- Clock
- RP1' + RP2' Data
- RP3' Data

Fan | Fan | Module heater | Temp sensors

Ext IF

Ext IF block

Control block and Timing block

Transmission sub-module (FTxx)

Transmission IF

-48 V DC

BB processing block

BB processing block (FSMD only)

RF IF block

OPT RF1
OPT RF2
OPT RF3
OPT EXT 1
OPT EXT 2

Power Distribution block

-48 V DC, 48RTN

RP3 Bus Multiplexing & Summing and Ethernet switching

BB Extension IF blocks
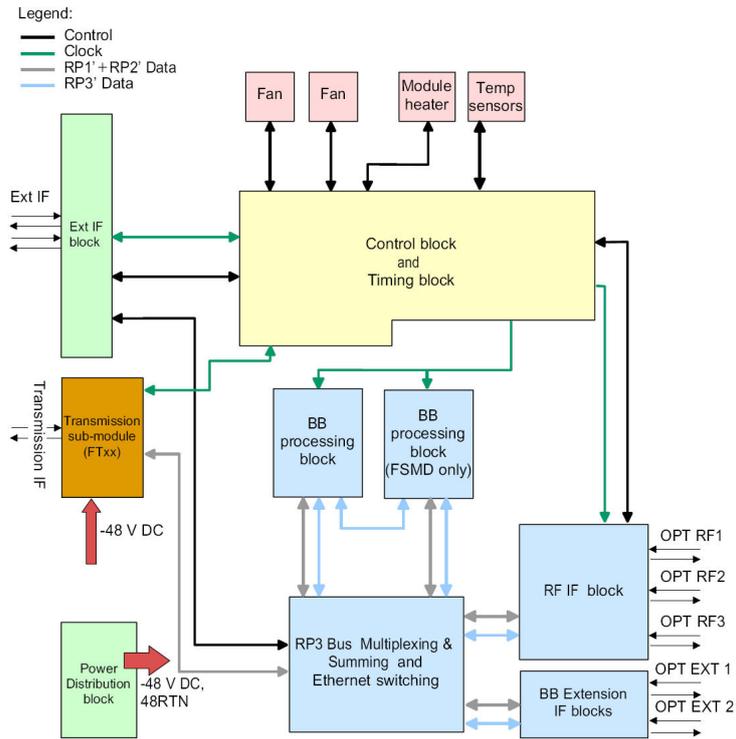
Flexi WCDMA BTS signal processing

The Flexi Signal Processor terminates the Iub user plane and is responsible for L1 processing of the air interface.

The new FSMC includes one signal processor, the WSPD has two.

Power distribution and fuses module (FPFA/B)

DC Input Connector

FPFA / B

Type label
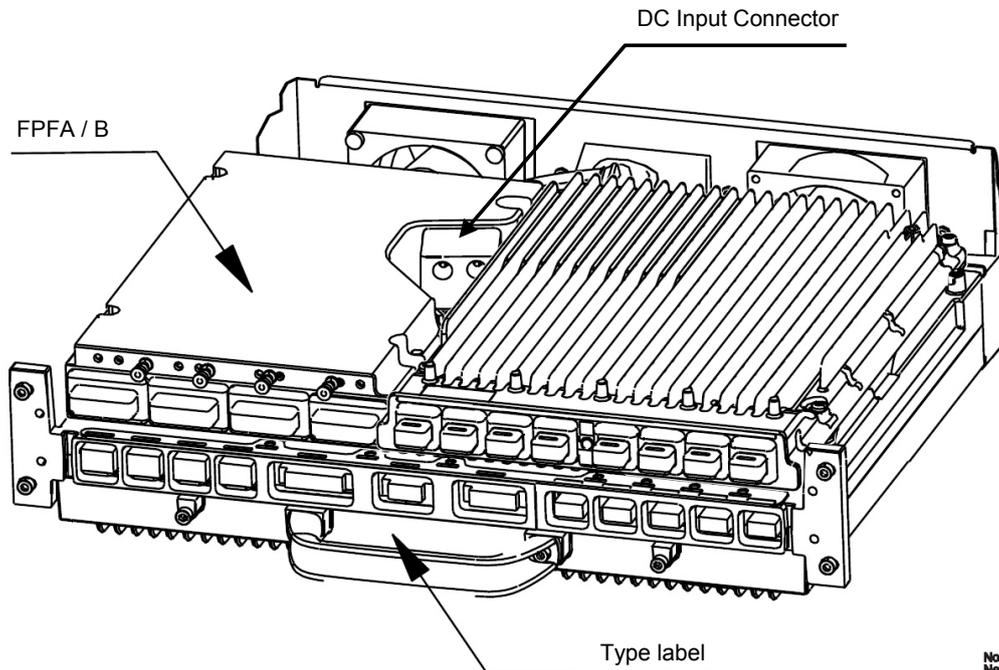
Power is distributed from Flexi Power Distribution and Fuses (FPFA and FPFB) to the System Module. The FPFA is used with System Module rel. 1, whereas in System Module rel. 2 it is replaced with the FPFB, which gives more power feeding capacity to RF Modules. The FPFB is compatible with both System Module releases.

FPFA Interfaces

LED RF1 LED RF2   LED RF3 LED EXT

DC input connector for
System Module and
Extension Module

RF1 RF2   RF3   EXT

Connector to System Module
(located on the bottom)

Circuit
breakers: RF1 / RF2 / RF3

Extension Module/
System Module

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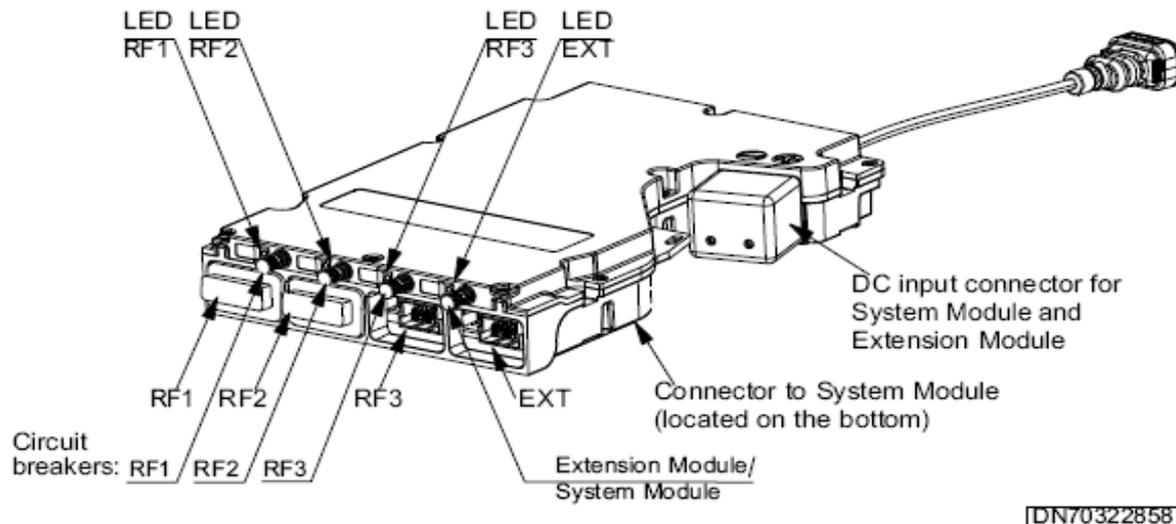
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FPFA version A101

Extension module power supply comes through the circuit breaker and extension module power can be switched off via the circuit breaker. This must be done if the extension module is connected to the System Module to avoid hot-plug connection. This also required when disconnecting from the System Module.

When pulling the EXT circuit breaker switch to off position, switch off the power supply to the extension module. Power feed to the System Module is still on.

FPFA version A102, A103 or later

FPFA versions A102, A103 or later have a common power supply via the same circuit breaker for the System Module and the System Extension Module. This means that the same circuit breaker switch can be used to switch on and off the power to the System Module and the System Extension Module.

Note The System Module and extension modules are reset by pulling the EXT circuit breaker on/off switch on the front panel.

When connecting the extension module to the System Module, switch off the circuit breaker to avoid hot-plug connection to extension modules. After that, switch off the System Module.

This is also required when disconnecting the extension module from the System Module.

The fuse rates for the FPFA are:

A.101: RF1-3 20.0A, EXT 25.0A

A.102 or later: RF1-3 20.0A, EXT 25.0A (System Module supplied via EXT circuit breaker)

FPFB Interfaces
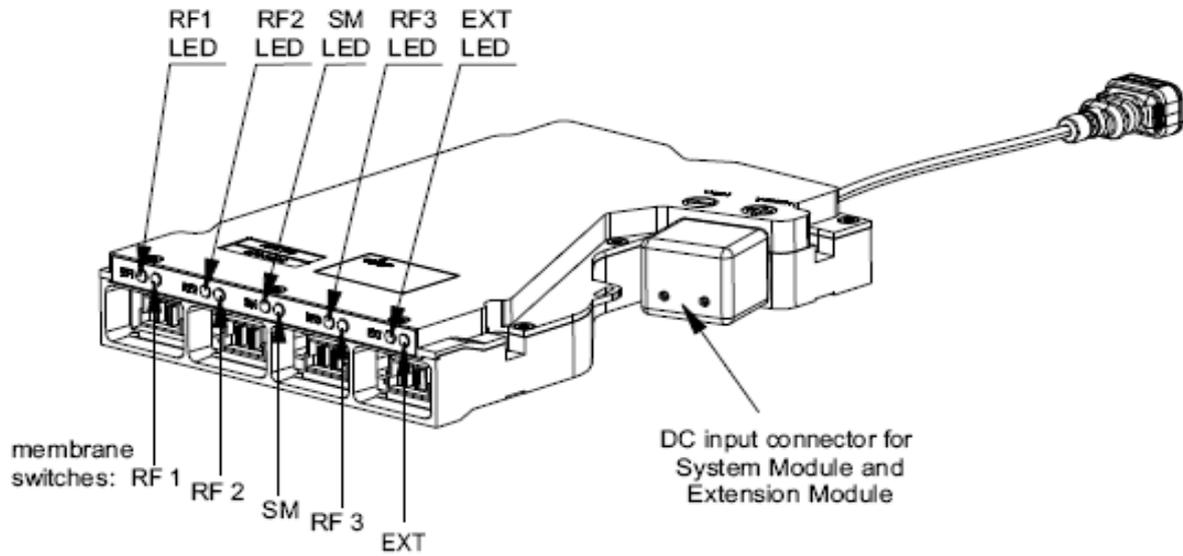
The FPFB does not have any circuit breakers but instead electrical fuses and a dedicated power switch for the System Module.

There are five membrane switches on the FPFB front panel for the outputs. The switches control power control circuits and have two states: On and Stand-by.

This allows to individually connect or disconnect the power supply from each of the max 5 modules:

- RF Module / RRH 1
- RF Module / RRH 1
- RF Module / RRH 1
- System Module
- Extension System Module

The fuse rates for the FPFB are:

RF1-3 31.0A (+/-2A), EXT 25.0A (+/- 4.5A)

FPFA/B LED Indication

FPFA LED indication:

LED on:
- Load connected to FPFA output and CB has tripped
- Load connected to FPFA output and CB switch pulled to off position

LED off:
- Load not connected at all
- Load connected to FPFA output and the power supply is on (CB has not tripped)

FPFB LED indication:

note: all outputs are active by default (e.g. after a DC break)

LED colour	Indication
Yellow	Stand-by, output disabled manually
Green	Normal operation, output enabled
Red	Fault, output disabled
Yellow, blinking	Remote controlled, output disabled

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Baseband Extension for Flexi WCDMA BTS

- BTS capacity and be upgrade by adding second System Module
- When the System Module is used as a System Extension Module operating in a baseband extension mode, a transmission sub-module is not installed. Instead, a dummy transmission sub-module is installed to provide IP protection. This item is also included in Flexi System Extension Kit (FSKA).
- The only connectors that can be used are DC input and optical interfaces from the System Module.
- Synchronisation is provided by the System Module
- No commissioning required to integrate FSKA to System Module. FSKA will detected automatically

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The System Extension Kit (FSKA) delivery contains the following items:

Cable set assembly

> 2 x optical cable
>
> 1 x power cable
>
> 4 x optical transceiver

Transmission dummy panel

The System Module can be used as a System Extension Module operating in a baseband extension mode to add channel capacity. In this case, it is connected to the System Module by connecting two optical cables and a DC cable. These items are provided with Flexi System Extension Kit (FSKA).

When the System Module is used as a System Extension Module operating in a baseband extension mode, a transmission sub-module is not installed. Instead, a dummy transmission sub-module is installed to provide IP protection. This item is also included in Flexi System Extension Kit (FSKA).

When the System Module is used as a System Extension Module operating in a baseband extension mode, external synchronisation input connectors cannot be used. Synchronisation is provided by the System Module. For installation instructions, see the *Installing Optional Items* document. For commissioning instructions, see the *NSN Flexi WCDMA BTS Commissioning* document.

When integrating the System Extension Module to Flexi WCDMA BTS, no commissioning is required. Once the System Extension Module has been connected to the System Module and powered up, the auto detection functions of Flexi WCDMA BTS detect the System Extension Module and connect the System Extension Module to the normal operation of the BTS. As for software requirements, the auto detection requires that WN4.0 BTS SW exists and is active both in the System Module and System Extension Module to be connected to.

The System Extension Module provides a basic capacity of 32 CE without the channel capacity licence. Enabling more CE capacity of the System Extension module for service requires that the channel capacity licence (RAN912 Channel Capasity LK) with sufficient capacity is downloaded to the BTS.

NSN Flexi BTS transport sub-module

• FTM is the integrated transmission module of the FlexiBTS

• It is mechanically and electrically connected to the **System Module** of the FlexiBTS
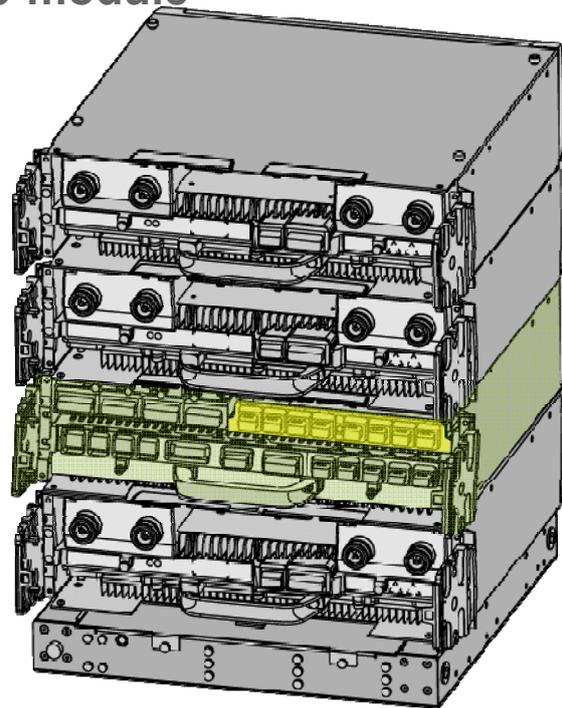
Flexi System Module + Transport sub-module
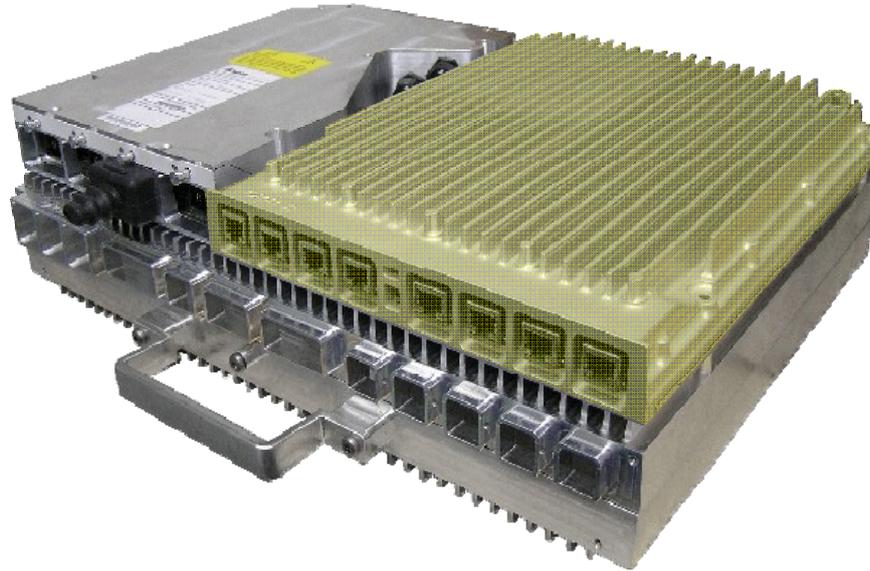
FTPB - PDH (E1,T1, JT1) card

- Interfaces: 8 x E1/T1/JT1 balanced
- Connector type: 1 x RJ48 per IF
- Basic functionality:
  - 2 ports activated
- Licensed features:
  - activation of additional ports, granularity: 2 ports
  - IMA

FTEB - PDH (E1) card

- Interfaces: 8 x E1 unbalanced
- Connector type: 2 x SMB per IF
- Basic functionality:
    - 2 ports activated
- Licensed features:
    - activation of additional ports, granularity: 2 ports
    - IMA

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FTFA 1/2; Flexbus card

• Interfaces: 2 x Flexbus
• Flexbus capacity selectable by SW to
    • 2 x 2 Mbit/s
    • 4 x 2 Mbit/s
    • 8 x 2 Mbit/s
    • 16 x 2 Mbit/s
• Connector type: 1 x TNC per IF
• Accessed through *NSN Flexi Hub Manager*
• Basic functionality:
    • 1 Flexbus activated
• Licensed features:
    • activation of the second Flexbus
    • IMA

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FTFA 2/2; **Flexbus card**

The Flexbus interface is used to:

- operate
  NSN FlexiHopper

- operate NSN
  MetroHopper

- or to connect to another Indoor Unit like:
  - FTFA
  - FIU19(E)
  - FXC RRI
  - IFUE

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FTIA/B - PDH / Ethernet

- Interfaces:
    - 4 x E1/T1/JT1 balanced
    - 2 x 10/100 Mbit Ethernet
    - 1 optional Gbit Ethernet interface SFP
    - (Small Formfactor Pluggable),
- Connector types:
    - E1: 1 x RJ 48 per IF
    - Ethernet; RJ 45
- Basic functionality:
    - 2 x E1/T1/JT1 ports activated
- Licensed features:
    - Timing over packet (FTIB only)
    - Activation of Ethernet Port
    - Activation of E1/T1/JT1 ports 3 & 4
    - IMA

SFP slot

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FTJA - PDH / Ethernet

- Interfaces:
  - 4 x E1 balanced
  - 2 x 10/100 Mbit Ethernet (available later)
  - 1 optional Gbit Ethernet interface SFP
  - (available later)
- Connector types:
  - E1: 2 x SMB per IF
  - Ethernet; RJ 45
- Basic functionality:
  - 2 x E1 ports activated
- Licensed features:
  - Activation of Ethernet Port
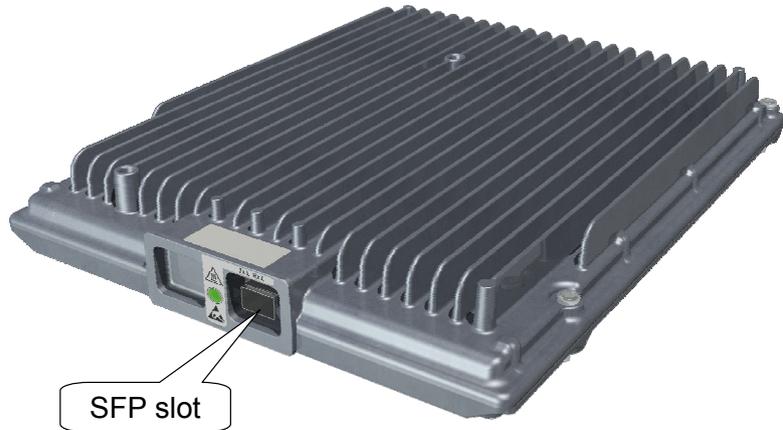 - Activation of E1/T1/JT1 ports 3 & 4
  - IMA

SFP slot

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FTOA – Optical SDH

- Interfaces: 1 x STM-1 / OC3
- Capacity limited
    - 72448 cps up to RAS06
    - 144896 cps in RU10
- Connector type: 2 x LC per IF

SFP slot

FTHA – E1/T1

- Interfaces:
  - 16 x E1/T1
- Connector types:
  - 2x MDR68 connectors
- This high-density E1/T1 unit is intended for operators that are not using costly leased lines and therefore need to backhaul the high HSPA throughputs via a high number of E1 interfaces

- The unit offers the possibility to have an IMA group with up to 16xE1/T1 IMA links in a BTS

FTHA protects investments in legacy MWR equipment, PWE3 equipment and SDH ADMs all offering 16 or more E1/T1 interfaces. Operators of this camp can still offer high speed HSPA services

FTHA provides up to 16 E1 or T1 interfaces via 2 MDR68 high density connectors. The 75 Ohm variant via a configuration change and commercially available patch panels with coax connectors of the operator's choice are supported.

Transport Sub-modules

Module name	Interfaces	Availability	Remarks
FTPB	8 x E1/T1/JT1	RAS05.1	120/110/100 Ω, RJ48c
FTEB	8 x E1 coaxial	RAS05.1	75 Ω, SMB
FTOA	1 x STM1/OC3	RAS05.1 ED	1 x SFP, LC equipped
FTFA	2 x Flexbus	RAS05.1	TNC
FTIA	4 x E1/T1/JT1 2 x Fast Ethernet, 1 x GE	RAS05.1 Ethernet supported in RAS06	Optional Gigabit Ethernet interface (SFP) RJ48C, RJ45, SFP (LC)
FTIB	4 x E1/T1/JT1 2 x Fast Ethernet, 1 x GE	RU10	Support Timing over Packet
FTHA	16 x E1/T1	RU10	2 x MDR68 connectors
FTJA	4 x E1 coaxial 2 x Fast Ethernet, 1 x GE	RAS06	Optional Gigabit Ethernet interface (SFP) SMB, RJ45, SFP (LC)

RF Module
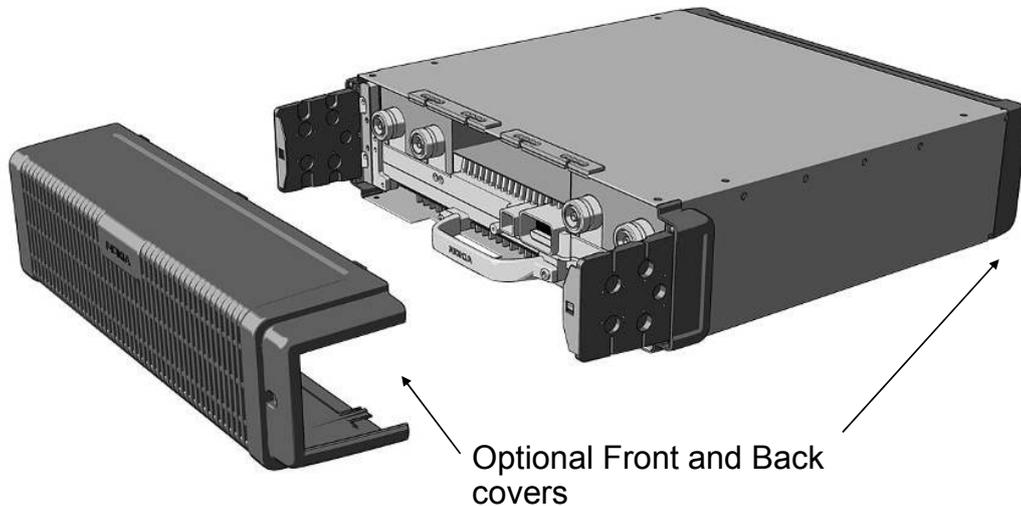
Optional Front and Back covers

The RF Module and Remote Radio Head (RRH) are stand-alone fully operational transceiver modules with integrated antenna filters. The RF Module and RRH are able to support one or two sectors in a Flexi WCDMA base station.

They host the RF functionality and provide control and power supply to the Flexi Antenna Line. Radio-related signal processing is performed in the RF Module.

The RF Module has integrated fans and Bias-Ts. The RRH does not have fans.
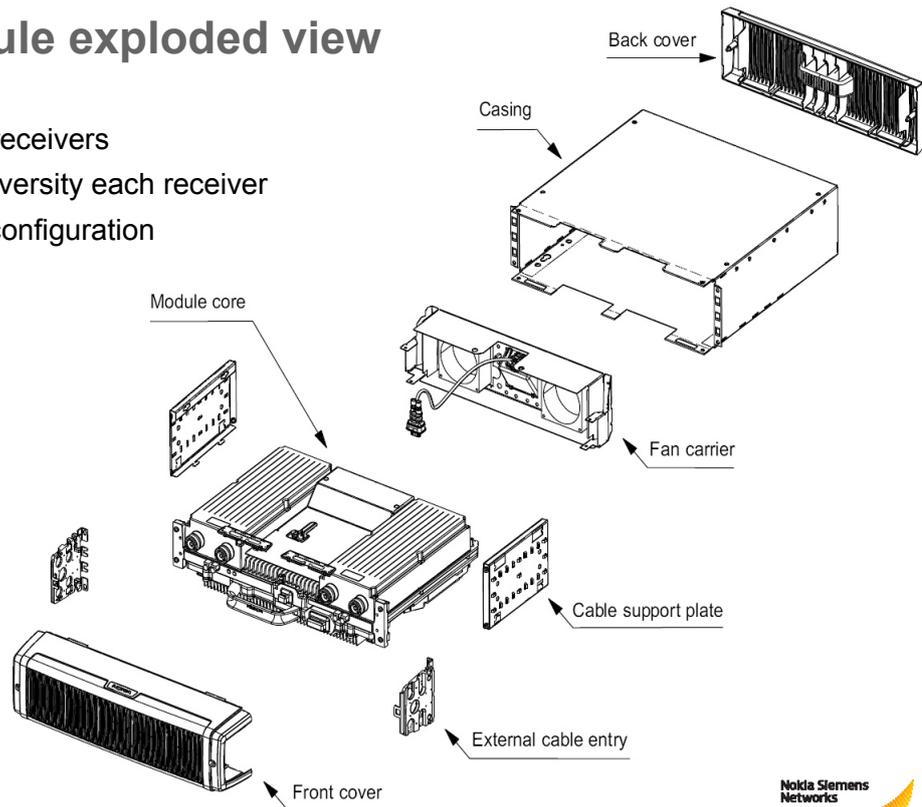
The RF Module can support one to three sectors with the following integrated components:

• Transceivers with TX for two carriers (three transceivers in the Triple RF Module, two in the Dual and one in the Single RF Module)

• Transceivers with RX for two carriers with diversity (the carriers must be adjacent) (three transceivers in the Triple RF Module, two in the Dual and one in the Single RF Module)

• Linear power amplifiers (three in the Triple RF Module, two in the Dual and one in the Single RF Module)

• RF filters with main and div branch (three in the Triple RF Module, two in the Dual and one in the Single RF Module)

• 48 V DC input power supply

• Masthead amplifier and 3GPPAntenna tilt power feed and control for up to three sectors

• Interface to the System Module

• Interface for chaining System Modules (Triple RF Module only)

• Integrated fan assembly (two fans)

• Full operational bandwidth support

• Antenna connector interfaces

• Prepared for AISG2.0

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Dual RF Module exploded view

- Four dual carrier receivers
- Two way uplink diversity each receiver
- Support multiple configuration

Back cover

Casing

Module core

Fan carrier

Cable support plate

External cable entry

Front cover

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RF Module operation

Dual version of the RF Module can support one or two sectors with the following integrated components:

•Two transceivers with TX for two carriers and RX for two carriers with diversity (the carriers must be adjacent)

•Two linear power amplifiers

•Two RF filters with main and div branch

•48 V DC input power supply

•Masthead amplifier and 3GPP Antenna tilt power feed and control for two sectors

•Interface to the System Module
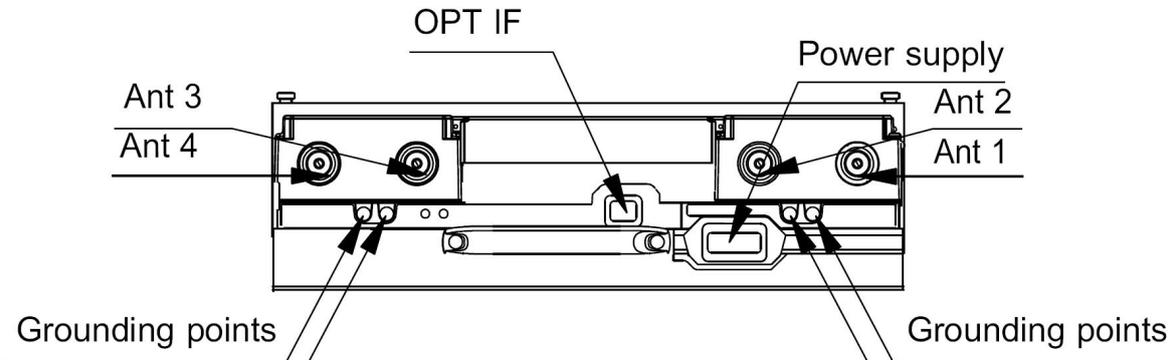
•Integrated fan assembly (2 fans)

The Dual RF Module has four dual carrier receivers that facilitate two dual carrier receivers with 2-way uplink diversity and it can therefore support multiple configurations.

The Single RF Module is a half capacity version of the Dual RF Module. It has one TX output that supports a maximum of two TX carriers (two carriers per TX chain). There is one RX output connector as well.

The main and diversity branches include Bias-Ts with lightning strike protectors (Single and Dual RF Module). The main branch Bias-T is used for Flexi Antenna Line and MHA support. The diversity branch Bias-T is only used for MHA support. The main branch also includes an Antenna Line VSWR Monitor (power meter for forward and reflected voltage ratio measuring). The operating voltages fed via main antenna line are 0 V DC/+12 V DC/+28.5 V DC and via diversity antenna line 0 V DC/+12 V DC.

The VSWR monitoring system is used for producing alarms for the antenna line condition against alarm threshold (RRH, Single and Dual RF Module). As a default setting, the minor alarm will be generated when the VSWR is 1.9 and major alarm (cell down) will be generated when the VSWR is 2.6. However, it is possible to adjust both minor and major alarm threshold between 1.5-3.5. The antenna line does not provide any alarms without a valid licence (Line Supervision RAN907LK).

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Dual RF Module Interfaces
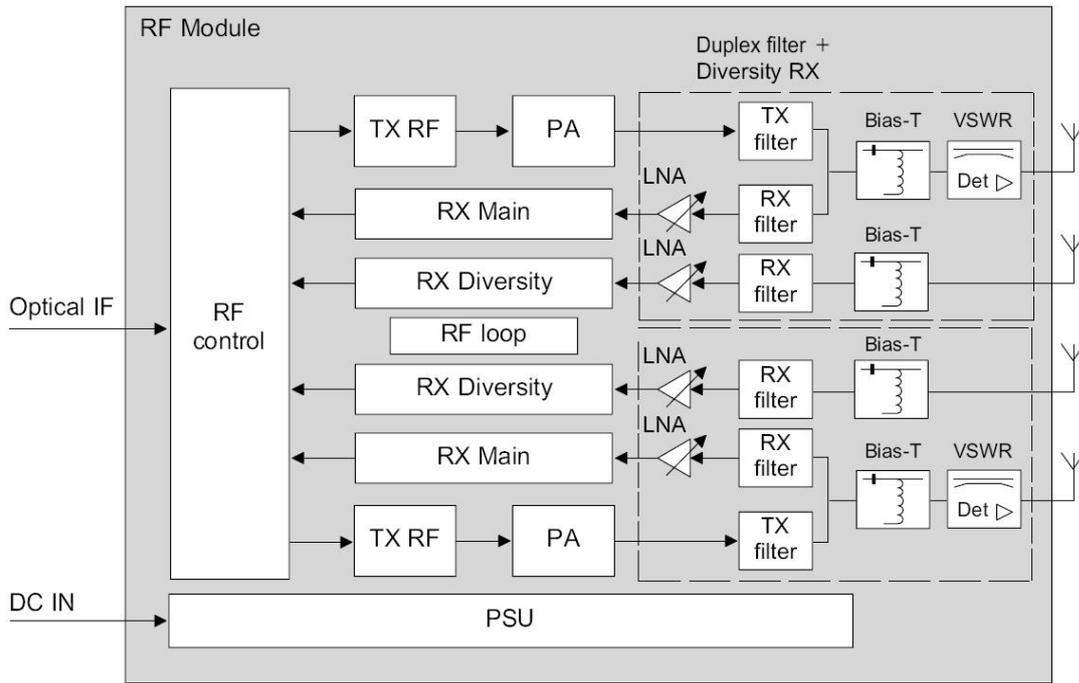
OPT IF

Power supply

Ant 3
Ant 4

Ant 2
Ant 1

Grounding points

Grounding points

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Front panel connectors

Connector	Connector type	Purpose
Power supply	Screw terminal	Power delivery
Grounding	Screw terminal	Grounding
Operational state visual indication	2 x tri-colour LED	Operational state and fan status indication
Antenna connector 1	7/16 type, female	RF signal interface to antenna
Antenna connector 2	7/16 type, female	RF signal interface to antenna
Optical interface	Duplex LC connector	Control interface to the System Module

Dual RF Module functional block

RF Module

Duplex filter + Diversity RX

TX RF → PA → TX filter — Bias-T — VSWR (Det ▷) — Y

LNA

RX Main ← LNA ← RX filter — Bias-T — Y

RX Diversity ← LNA ← RX filter — Bias-T — Y

Optical IF → RF control

RF loop

RX Diversity ← LNA ← RX filter — Bias-T — Y

RX Main ← LNA ← RX filter — Bias-T — VSWR (Det ▷) — Y

TX RF → PA → TX filter

DC IN → PSU

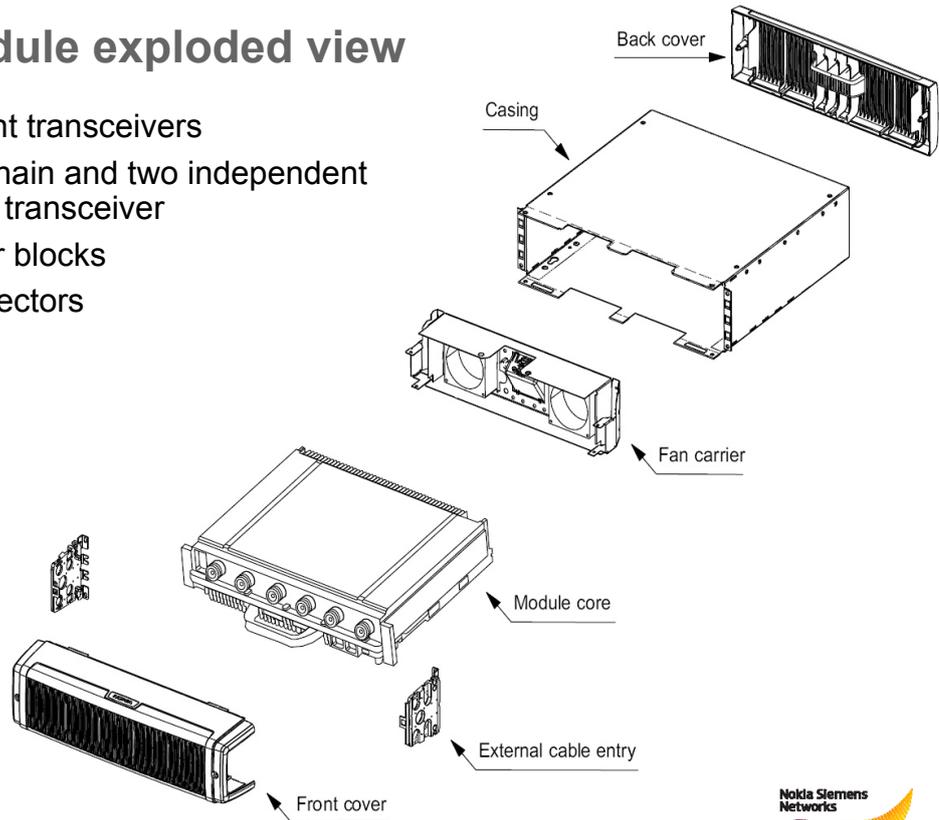39   © Nokia Siemens Networks   RA45406EN05GLA0

RF Module delivery content

- RF Module sales item includes following 5 components to connect it to System Module
- RF Module (including casing and fan subassembly)
- 2.0 meter long IP55 protected outdoor cable for 48 V DC
- 2.0 meter long IP55 protected outdoor multimode optical system cable
  - 4 Gbps OBSAI optical RP3-01
  - UL & DL in the same cable pair
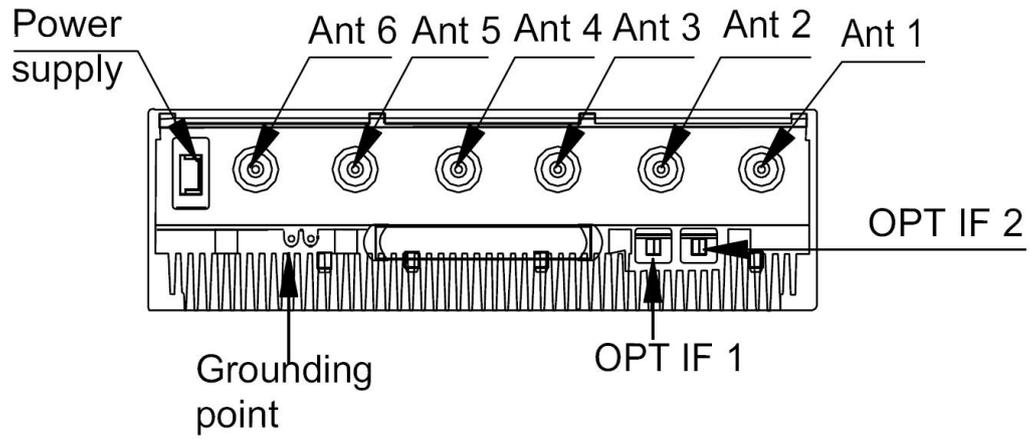- Two pluggable SFP optical transceivers, one to System and other one to RF Module

4.) SFP optical transceiver (2pcs)
(SFP=Small Form factor Pluggable)

1.)

2.) DC cable, 2m

3.) Optical cable, 2m

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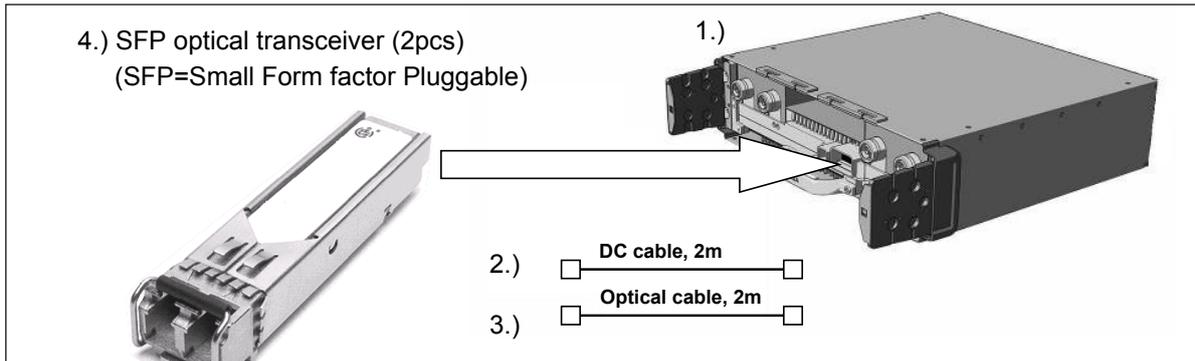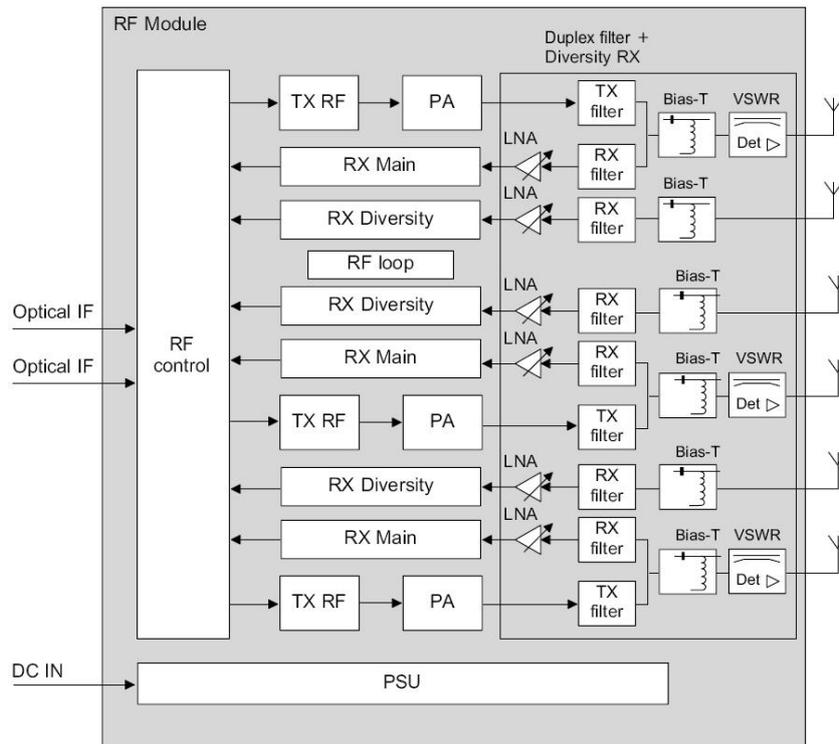
Triple RF Module exploded view

- Three independent transceivers
- One transmitter chain and two independent uplink chain each transceiver
- Three duplex filter blocks
- Six antenna connectors

Back cover

Casing

Fan carrier

Module core

External cable entry

Front cover

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Triple RF Module Interfaces

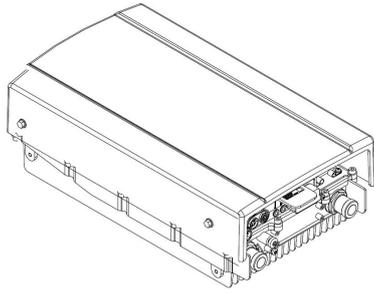Power supply · Ant 6 · Ant 5 · Ant 4 · Ant 3 · Ant 2 · Ant 1 · OPT IF 2 · OPT IF 1 · Grounding point

Triple RF Module functional block

Remote Radio Head (FRGG)

There are three versions of the Remote Radio Head application available:

• RRH 2100 70W FRGG (RU10)

• RRH 2100 40W FRGE (RAS06)

• RRH 2100 40W FRGN (RAS06)

The Remote Radio Head hosts the RF functionality and provides control and power supply to Flexi Antenna Line. The Remote Radio Head has the following properties:

• Optional external AC/DC converter module

• DC power supply for 48 VDC

• Integrated Over Voltage Protection (OVP)

• External alarms

The functionality of the RRH is similar to the functionality of the Single RF Module with the exception that the RRH does not have any fans. The RRH supports the VSWR monitoring system and is AISG2.0 compatible. The RRH has one TX output that supports a maximum of two TX carriers (two carriers per TX chain).

	FRGG
# TX/RX connectors	1
# RX connectors	1
# carriers	2 (3 HW prepared)

Remote Radio Head Interfaces (FRGG)
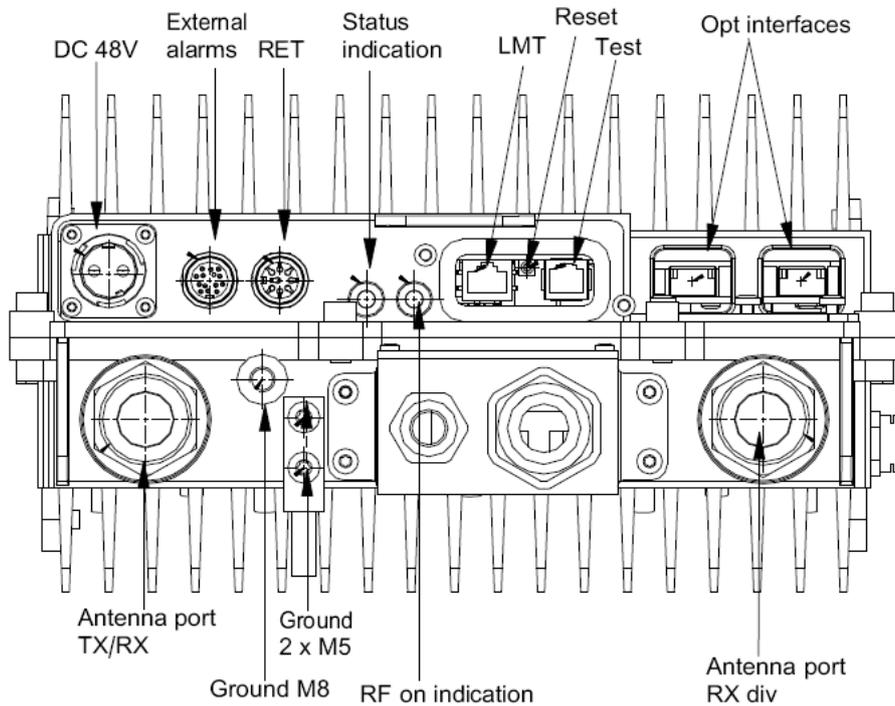
Connector	Connector type	Purpose
Power supply	ITT Cannon 2 pin + screw terminal	Power delivery
Grounding	M8, 2 x M5	Grounding
Operational state visual indication	2 x LED	Operational state indication (Status: 3-colour LED, RF on: 2-colour LED)
Antenna connector 1	7/16 type, female	RF signal interface to antenna(s)
Antenna connector 2	7/16 type, female	RF signal interface to antenna(s)
Optical interface	Multi-mode (200 m w OBSAI) or single mode fibre (up to 40 km) interface	Control interface to the System Module
EAC connector	Amphenol C 091 D series (14 pin)	External alarm
RET	Amphenol C 091 D series (8 pin)	Remote electrical tilt
LMT	RJ-45 (LAN)	Local maintenance

Remote Radio Head FRGG block diagram
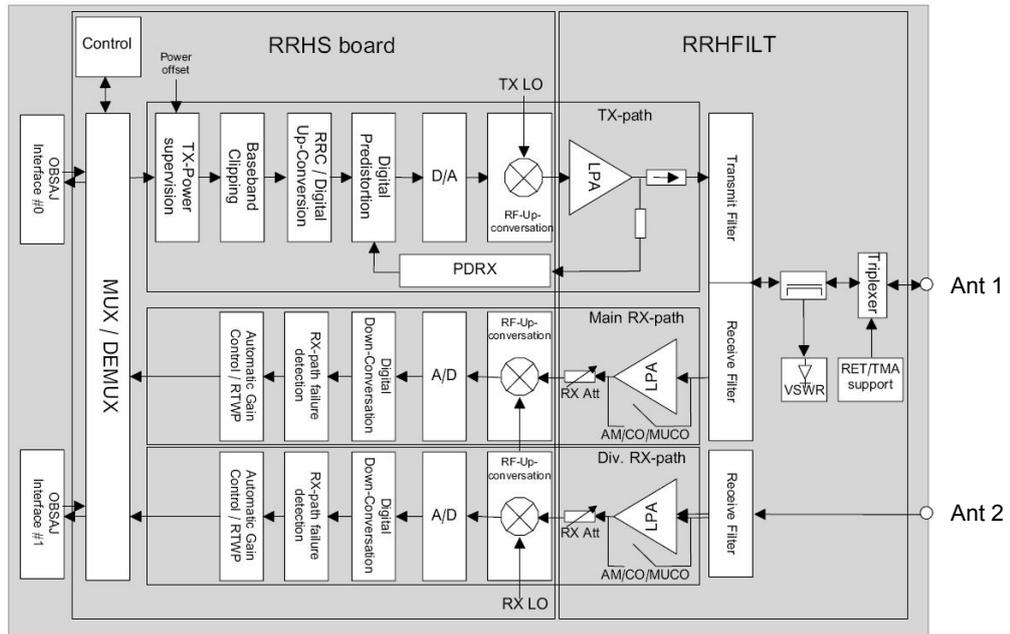
The functionality of the RRH is similar to the functionality of the Single RF Module with the following exceptions:

the RRH does not have fans, MHA or Bias-Ts.

The RRH has one TX output that supports a maximum of two TX carriers (two carriers per TX chain).

There is one RX output connector as well.

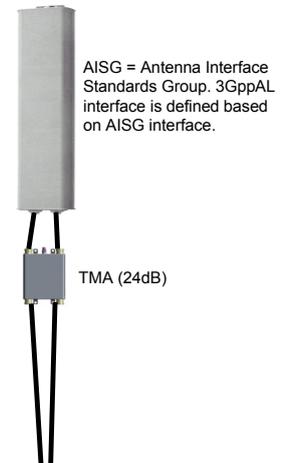The RRH supports VSWR monitoring system.

RF Module / Remote Radio Head Versions

Version	Description
FRIA	Dual 50 W 1700/2100
FRIB	Single 50 W 1700/2100
FRGC	Dual 50 W 2100
FRGD	Single 50 W 2100
FRGJ	Dual 50 W 2100
FRGK	Single 50 W 2100
FRGL	Dual 50 W 2100
FRGM	Single 50 W 2100
FRCA	Dual 50 W 850
FRCB	Single 50 W 850
FRDA	Dual 50 W 900
FRDB	Single 50 W 900
FRFA	Dual 50 W 1900
FRFB	Single 50 W 1900
FRJA	Dual 50 W 2000
FRJB	Single 50 W 2000
FRGF	Triple 70 W 2100

New WCDMA Flexi BTS variants (FRGJ/K) support Siemens TMAs and Antennas

• New WCDMA Flexi BTS variants (FRGJ/K) will be used in the installation cases with Siemens TMAs and Antennas (Andrew, Kathrein and Powerwave)

– FRGJ/K HW supports high gain TMA (24 dB), alarm handling by Motorola interface and AISG1.1/2.0

– FRGJ/K SW support available RAS06 (WN4.0 CD1)

– FRGJ: Dual RF module,

– FRGK: Single RF module.

– Both 2.1 GHz

AISG = Antenna Interface Standards Group. 3GppAL interface is defined based on AISG interface.

TMA (24dB)

New WCDMA Flexi BTS variants (FRGJ/K) support ex-Siemens TMA's with RET (3GPP Antenna Tilt Support)

• New WCDMA Flexi BTS variants (FRGJ/K) will be used in the installation cases with Siemens RET. Siemens TMA's with RET require AISG1.1

- FRGJ/K HW ramp-up planned from 04/2008 onwards
- FRGJ/K SW support ex-Siemens RET available in top of RAS06 (BTS release WN4.0 CD2), 06/2008

0° tilt

14° tilt
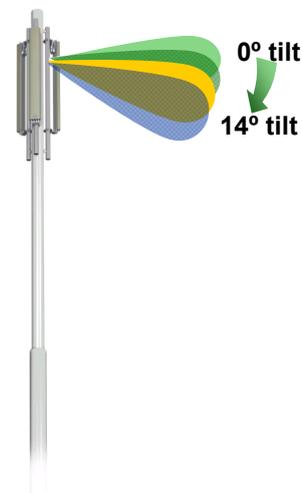
"A type" sector/ antenna configuration

"A type" supports configurations like:

- COC (Cost Optimized Configuration)
- 1+1+1 (max. 40W), 1xFRxA/C & 1xFRxB/D or 3xFRxB/D or 2xFRxA/C
- 2+2+2 (max. 20W), 3xFRxA/C
- 2+2+2+2+2+2 (max. 20W), 3xFRxA/C
- In A-type same block is used for TX and RX / sector

RX only

RX only

TX/RX   **TX/RX**

ANT 4   **ANT 3**   **ANT 2**   **ANT 1**
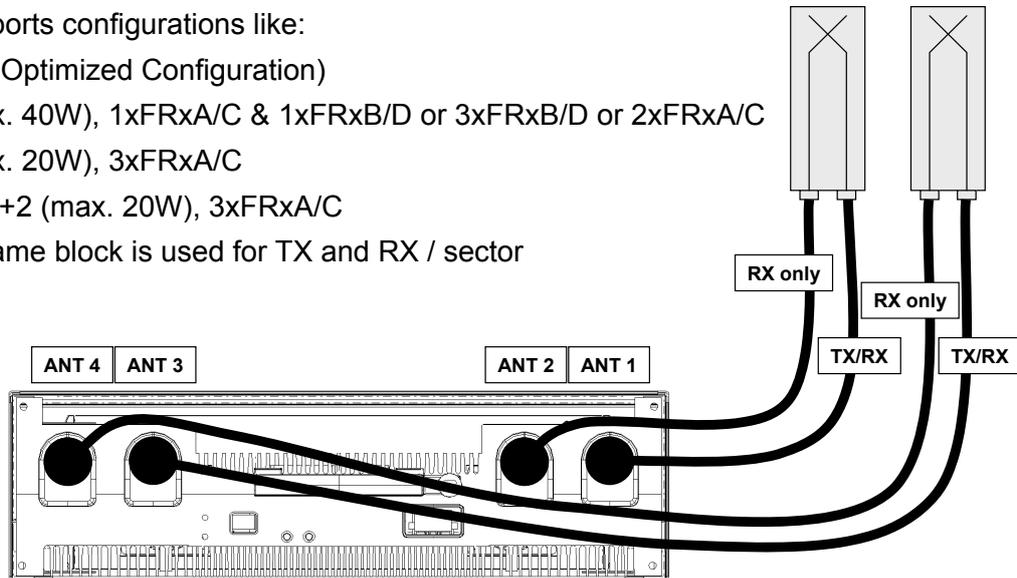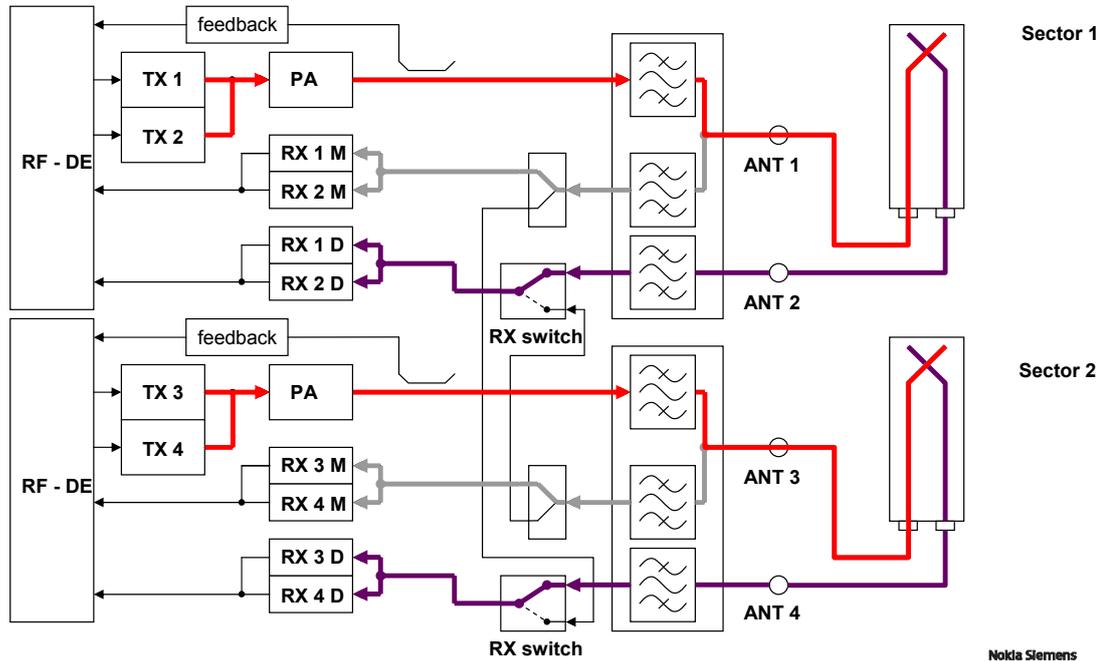
RF signal path options: "A type" configuration

"B type" sector/ antenna configuration

"B type" supports configurations like:

• UOC (Upgrade Optimized Configuration)

• 1+1+1 (max. 40W), 3x FRxA/C, easily upgradeable to

• 2+2+2 (max. 40W), 3xFRxA/C

• 4+4+4 (max. 20W), 3xFRxA/C

• In B-type both blocks are used for TX and for RX / sector

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RF signal path options: "B type" configuration

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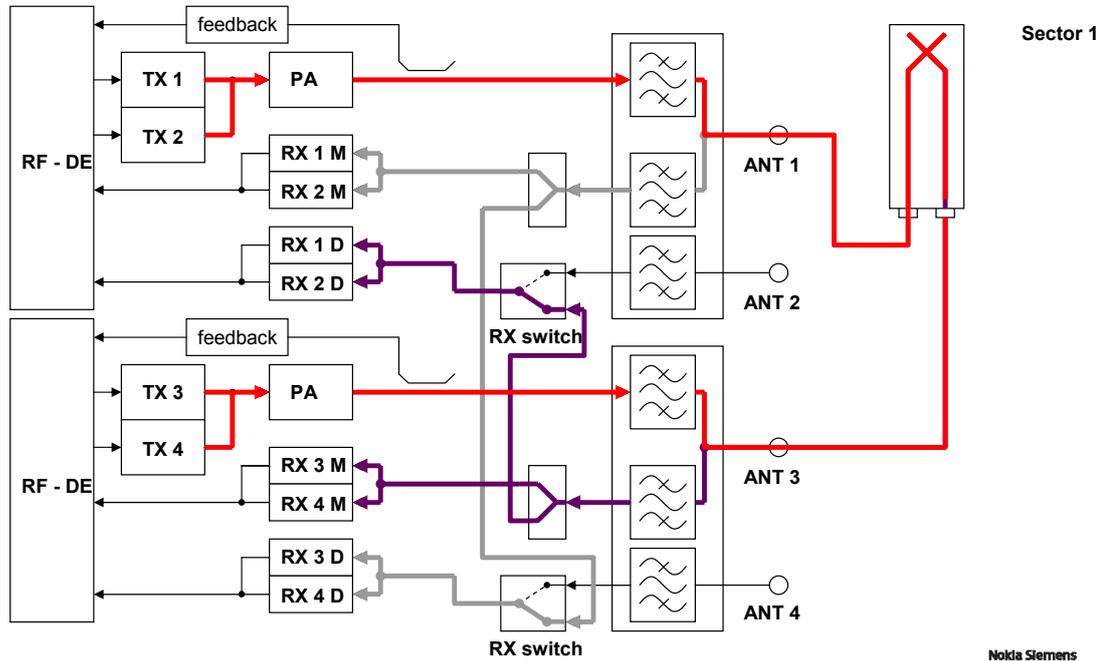
1+1+1 FRGC/FRGD COC

"A type" supports configurations like:

• 1+1+1 (max. 40W), 1xFRxC & 1xFRxD or 3xFRxD or 3xFRxC

• 2+2+2 (max. 20W), 3xFRxC

• 2+2+2+2+2+2 (max. 20W), 3xFRxC
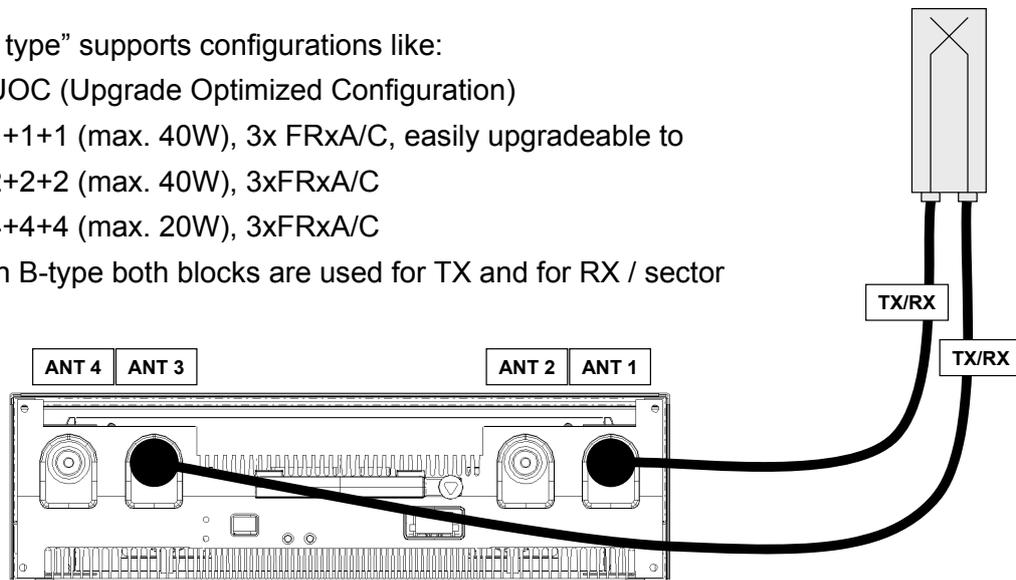
• In A-type same block is used for TX and RX / sector

| sector 1 | sector 2 | sector 3 |

ANT 2 | ANT 1

ANT 4 | ANT 3 | ANT 2 | ANT 1
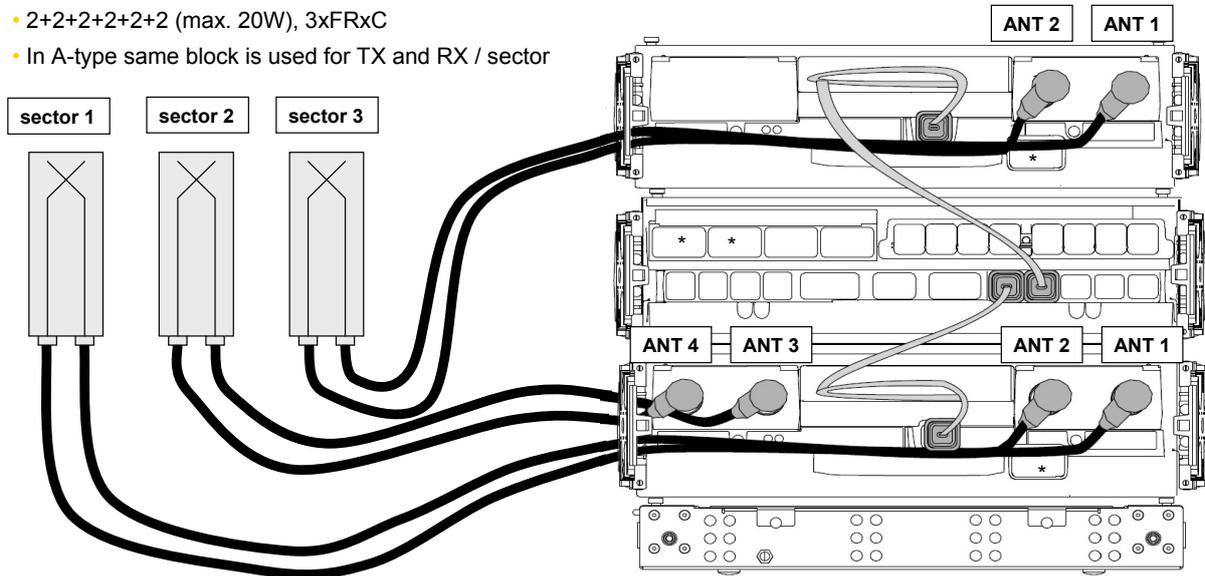
* power supply cabling not shown for clarifivcation

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"C type" sector/ antenna configuration

Supported (3xC-Type) configurations

- 2+2+2 (20/30/40/60W)
- 3+3+3 (20/30W)
- 4+4+4 (20/30W)
- In a C-Type configuration, a sector can be build using two PAs from different Triple PA modules.
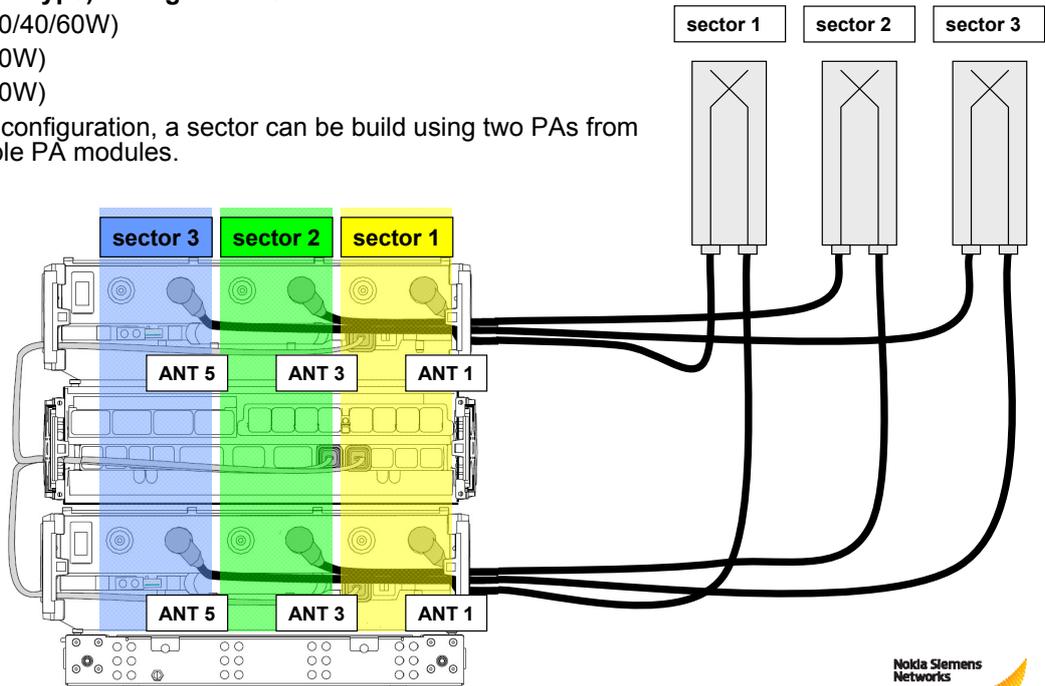
In a C-Type configuration

Flexi Power Module FPMA

Example configuration with:

1 x Flexi Power Module FPMA

- 3 Flexi Power AC/DC sub-modules FPAA (230VAC -> 48VDC)
- 1 Flexi Power Battery FPBA

AC input cabling to FPMA
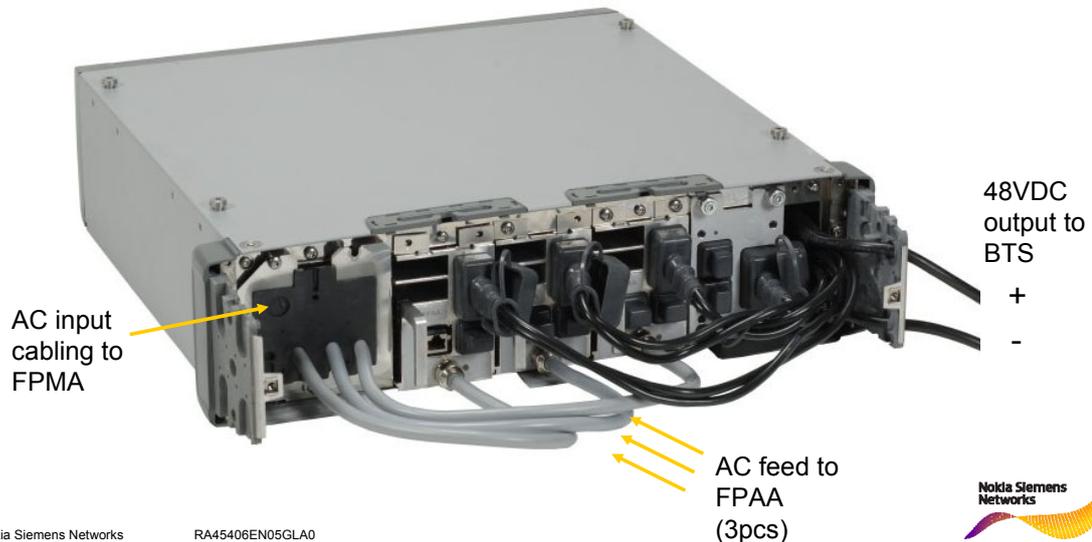
48VDC output to BTS

+

-

AC feed to FPAA (3pcs)

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The figure above shows fully equipped Flexi Power Module (FPMA) with AC/DC converters (FPAA) and Batteries (FPBA).

FPMA is the casing, AC and DC cable connector box and support frame for actual power sub-modules FPAA, FPBA and FPDA.

Flexi Power AC-DC Sub-Module (FPAA)

The main function of FPAA is to provide 48 V DC power from AC to be used by the BTS modules. FPMA can house from one to three AC/DC rectifiers. Output power of each AC-DC rectifier is 1 kW.

Flexi Power Battery Sub-Module (FPBA)

FPBA is a separate optional sub-module to be used together with AC-DC Module (FPAA). FPMA can house up to three Battery sub-modules.

Battery sub-module provides up to 10 minutes battery back-up time when the Flexi BTS site AC power mains is down. FPBA is maintenance free Lithium Ion battery bringing significant savings in operaover 10 years of Li-Ion battery life time.

Flexi Power Module (FPMA) and sub-module (FPAA and FPBA)

- FPMA mechanics
- AC and DC interfaces
- Four slot for power sub-modules (FPAA and FPMA)
- Support 1-phase and 3-phase AC input
- Maximum output power is 4kw (4 FPAA)

Type label
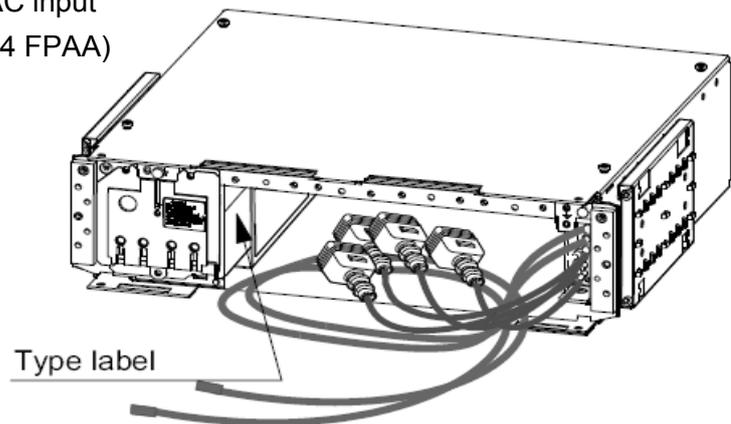
FPAA and FPBA

FPAA

- Provide nominal 48 V DC power from an AC supply.
- Maximum DC output power of one FPAA module is 1000 W
- Integrated self-controlled fan

FPBA :

- Used together with the FPAA.
- Lithium ion battery.
- The maximum DC output power from one FPBA module is 1000 W

FPAA

FPBA

LED

LED
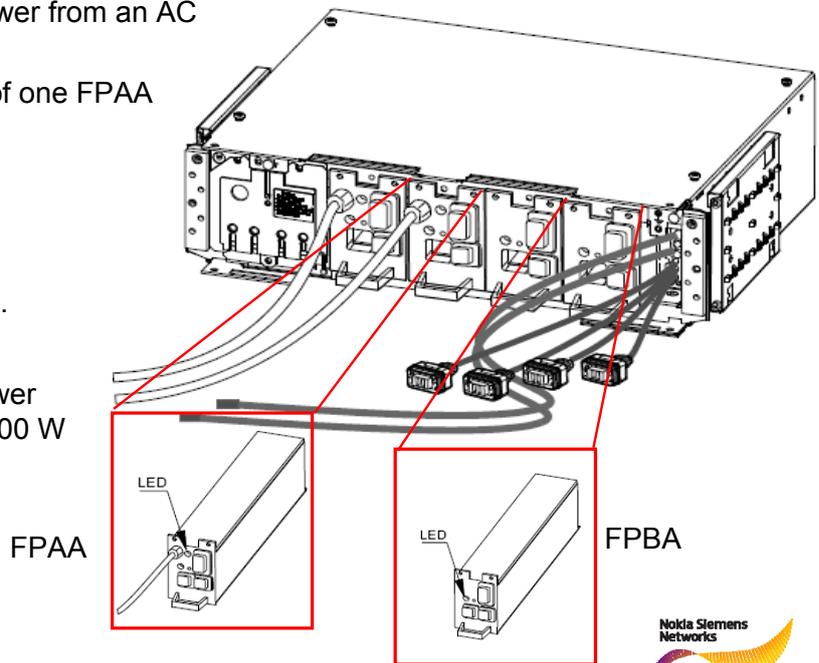
Flexi Power DC/DC Module (FPDA)

Converts nominal 24 V DC input voltage 53-55 V DC output voltage

A maximum of two FPDA modules can be connected in parallel

Integrated self-controlled fan

Maximum DC output power is 2 kw

DC Input cabling   Alarm cabling   DC Output cabling

LED

GND
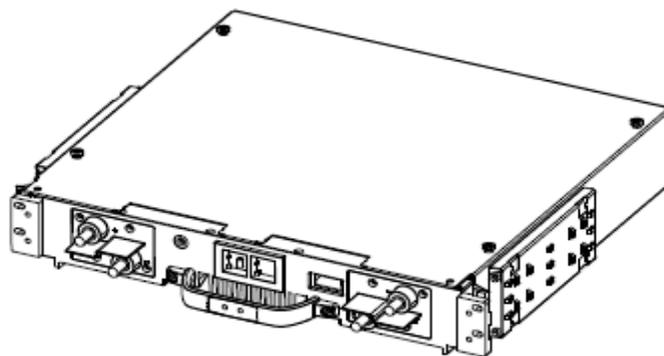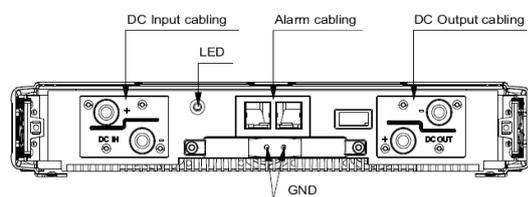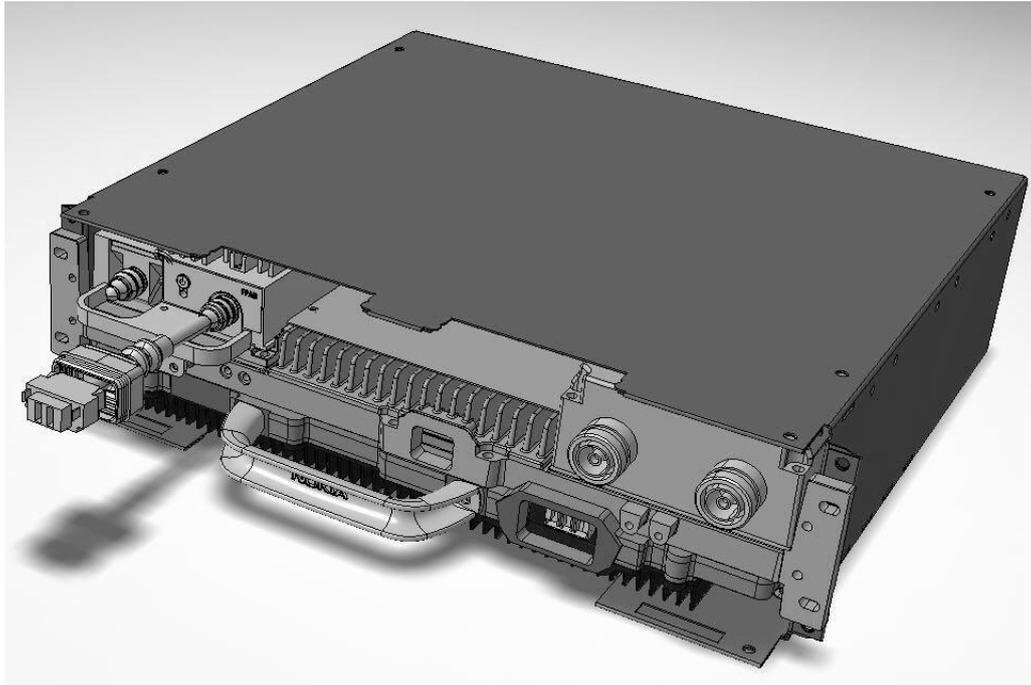
FPAB

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Flexi Power AC/DC Module (FPAB)

Flexi Power AC/DC sub-module 100/240V (FPAB) is a rectifier assembly that converts AC input voltage to DC output voltage (56 V DC).

The main application for the FPAB is to operate as an AC/DC converter for the single RF Module of the Flexi WCDMA BTS.
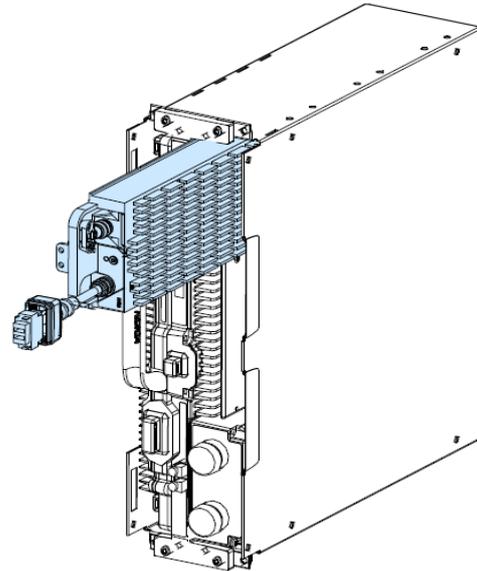
Flexi Power AC/DC Module (FPAB)
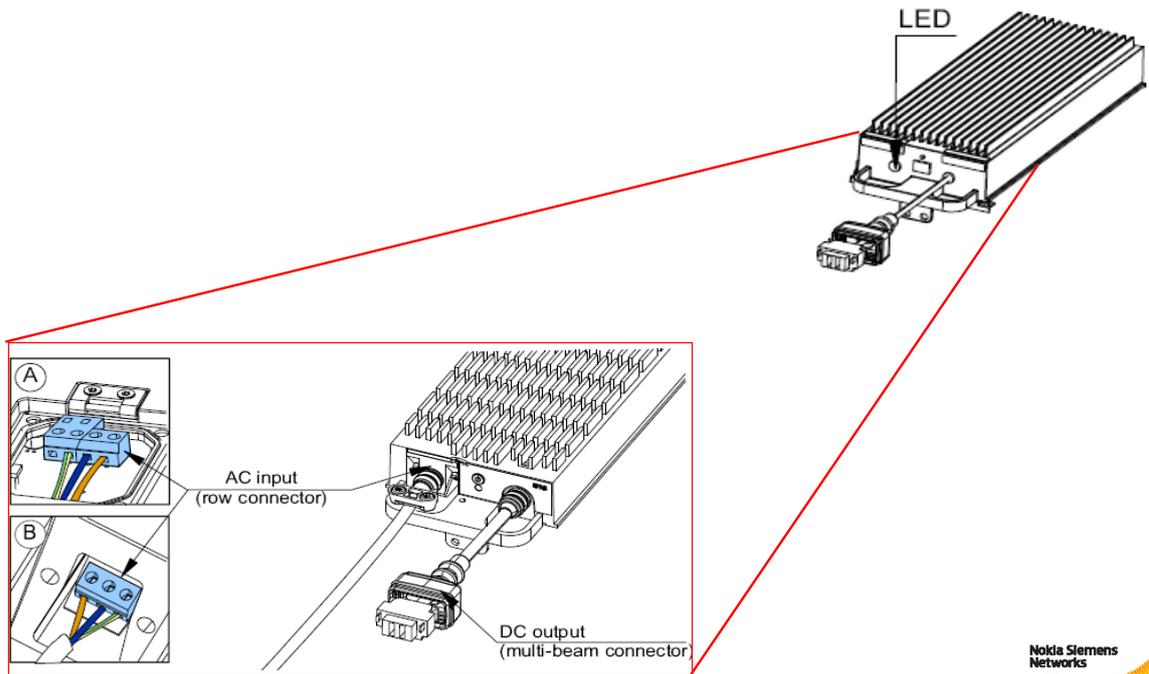
NSN Flexi WCDMA BTS power consumption

Flexi WCDMA BTS with FRGC/FRxA & FRGD/FRxB & FSMB & FTEB/FTPB trs sub-module @ W per carrier	Power consumption [W] 48 VDC input at 23 □C Estimate		Estimate of Typical BBU time (23 □C) with typical 50 % load and new batteries		
	Typical 50 % load	Worst Max 100 % load	92 Ah separate Battery with MIBBU	62 Ah separate Battery with MIBBU	FPMA & FPBA with FPAA (Note 1)
1 carrier omni @ min. 20 W	250	300	16 h	11 h	up to 120 minutes (3 FPBA) … up to 40 minutes (1 FBPA)
1+1+1 @ min. 20 W	510	630	7 h 30 min	5 h	up to 59 minutes (3 FPBA) … up to 20 minutes (1 FBPA)
1+1+1 @ min 40 W	660	850	5 h 30 min	4 h	up to 46 minutes (3 FPBA) … up to 15 minutes (1 FBPA)
2+2+2 @ min. 20 W	660	850	5 h 30 min	4 h	up to 46 minutes (3 FPBA) … up to 15 minutes (1 FBPA)
2+2+2 @ min 40 W per carrier	1180	1530	3 h 15 min	2 h 15 min	up to 17 minutes (2 FPAA+ 2 FPBA)
4+4+4 @ min 20 W per carrier	1180	1530	3 h 15 min	2 h 15 min	up to 17 minutes (2 FPAA+ 2 FPBA)

Note 1:
• One FPAA can support 1 kW of 48 DC power.
• One FPBA can support 1 kW of 48 V DC for about ten minutes at normal operational conditions.
• FPBA charging : min 5 W, typical max 55 W , absolute max 110 W (with empty FPBA)

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New approach for power and backup
Flexi Rectifier Module 6000 (FRMA, FRMB, FRMC)
Available 2Q/2008

FRMA/B/C

UltraSite Multimode BTS

Flexi Outdoor Cabinet

FRMx installed on top of the cabinet

Rectifier capacity up to 6kW by scalable with 2kW rectifiers

DC connection points for 3 battery strings which means up to 465 Ah capacity

DC connection points for two Base Stations

FRMA: Indoor (by Eltek)
FRMB: Outdoor (by Eltek)
FRMC: Indoor/Outdoor (by Astek)

30U space for FRMx, battery string and 8 Flexi modules

Space for FCSA (with FRMx and 4HU LTE space), battery string and 6 Flexi modules

FRMx

FCSA

Space for GSM 900 2+2+2 and WCDMA 900 1+1+1 40W

FRMx is inside FCSA

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New approach for power and backup
Flexi Rectifier Module 6000 (FRMA, FRMB, FRMC)
Available 2Q2008

WCDMA 900 MHz
1+1+1 40W installed
next to antennas
Zero Footprint Site

Battery box
with 124 Ah

FRMB/C connected
to external "battery
box" mounted on the
pole or the wall

WCDMA 900   1+1+1
40W   Stack
Installation

Battery box
with 465 Ah

FRMA/B/C
connected to
external "battery
box" sitting next
to Flexi
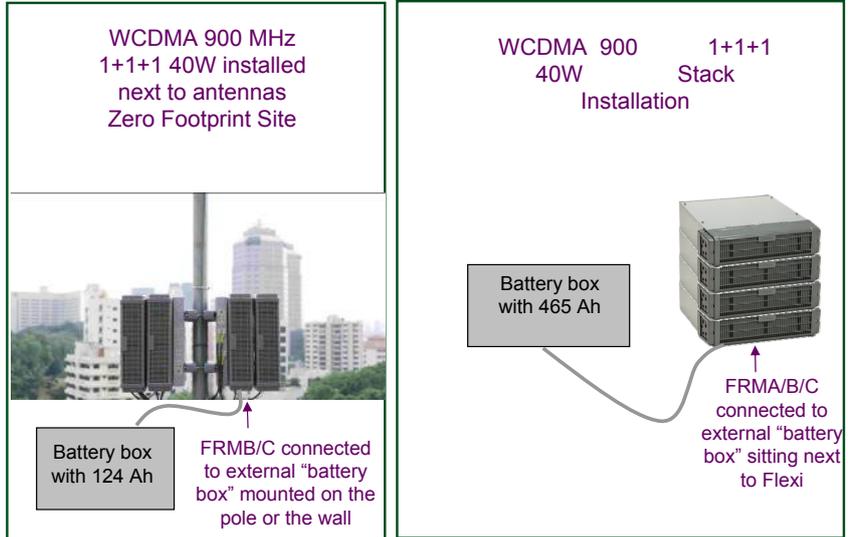
New Approach for Power and Backup

	Open air	Cabinet	Flexi Rectifier Module 6000
Backup time short	With FPMA — OR — Flexi Rectifier Module 6000 part of Flexi BTS stack. Battery box with 92 Ah	Micro BBU: Flexi Rectifier Module 6000 inside. Battery String 92 Ah. Forced air cooling	Rectifier capacity up to 6kW by scalable with 2kW rectifiers
Backup time long	Battery box with 310 Ah	Macro BBU: Flexi BTS inside. Battery capacity 310 Ah. Complete heat management system	DC connection points for 3 battery strings which means up to 465 Ah capacity. DC connection points for two Base Stations

Abbreviations

General policy for abbreviations:

1st letter   **F** for Flexi

2nd letter

         A for Antenna Equipment and Same Band Combiner

         D for Diplexers

         R for Radio Modules

         S for System Modules

         B for Baseband Extension Modules

         T for Transport Modules, Sub modules and Cables

         P for Power Supply Modules and Sub modules

         M for Mounting Kits

         C for Cabinet and Cabinet Accessories

         L for low noise Mast Head Amplifier

3rd Application or usage or frequency band (RF and Mast Head Amplifiers)

4th for version A is the first one, future B, C...

|	
FACA	Same Band combiner with TX summing for 850
FADA	Same Band combiner with TX summing for 900
FAEA	Same Band combiner with TX summing for 1800
FAFA	Same Band combiner with TX summing for 1900
FCDA	Flexi Cabinet Smoke Detector
FCFA	Flexi Cabinet Air Filter
FCHA	Flexi Cabinet Heater
FCIA	Flexi Cabinet for Indoor (Epsilon program design item)
FCOA	Flexi Cabinet for Outdoor
FCSA	Flexi Cabinet Site Support Module
FDIA	Diplexer for 1.7/2.1/1900
FLIA	Dual Wide band Mast Head Amplifier
FMCA	Flexi 3U Mounting Covers front and back
FMCB	Flexi 2U Mounting Covers front and back (Epsilon program design item)
FMFA	Flexi Mounting Kit for Floor and wall and pole
FMUA	Flexi Mounting Kit Vertical for 2G
FMUB	Flexi Mounting Kit Horisontal for 2G
FPAA	Flexi Power AC/DC sub-module 230 V
FPAB	Flexi Power AC/DC sub-module 230V
FPBA	Flexi Power Battery sub-module
FPDA	Flexi Power DC/DC Module 24 V (Epsilon program design item)
FPMA	Flexi Power Module

Abbreviations

FR__	Flexi RF Module codes **A** = 400 MHz **B** = 700 MHz **C** = 850 MHz **D** = 900 MHz **E** = 1800 MHz and 1700MHz **F** = 1900 MHz **G** = 2100 MHz **H** = 2500 MHz **I** = 1700/2100 MHz
FREA	Flexi RF Module 1.8/1.7 Dual 50 W
FREB	Flexi RF Module 1.8/1.7 Single 50 W
FRIA	Flexi RF Module 1.7/2.1 Dual 50 W
FRIB	Flexi RF Module 1.7/2.1 Single 50 W
FRGC	Flexi RF Module 2100 Dual 50 W
FRGD	Flexi RF Module 2100 Single 50 W
FSKA	Flexi System Extension Kit
FSMA	Flexi System Module 1 FSP
FSMB	Flexi System Module 3 FSP
FTCA	Outdoor Cable RJ48C – TQ-M/0 120ohm 5m
FTCB	Outdoor Cable RJ48C 120 ohm 15m
	FTCC = next possible length
FTCD	Outdoor Cable SMB-F/0 - BT43-F/0 75ohm 5m
FTCE	Outdoor Cable SMB-F/0 75 ohm 15m
	FTCF = next possible length
FTCH	OD CableLC SM 1310 15 m
	FTCG, FTCI = next possible lengths
	FTCJ,FTCK, FTCL= next possible lenghts

FTEA	Flexi Transport E1 Asymmetric sub-module, version A
FTEB	Transport E1 Asymmetric sub-module
FTFA	Flexi Transport Flexbus sub-module, version A
FTIA	Transport PDH symm. / Ethernet Hybrid sub-module
FTJA	Transport PDH Asymm. / Ethernet Hybrid sub-module
FTOA	Flexi Transport Optical STM-1/OC-3 sub-module, version A
FTPA	Flexi Transport PDH E1/T1/JT1 symmetric sub-module, version A
FTPB	Transport PDH E1/T1/JT1 symm sub-module
WMHC	UltraSite MHA WCDMA 2.1GHz (----? program design
WMPB	Pole Mounting Kit (Jade program design)
WPMB	Wideband Power Unit (Doris program design)
WPMC	Wideband Power Unit (Doris program design)
WPUB	Power Distribution Unit (Doris program design)
WPUC	Power Distribution Unit (Doris program design)
CS-code	Powersafe batt. 48V, 4x12V92F 92Ah/10h
CD code	Powersafe batt. 4x12V62F 48V-62Ah

Appendix

Optional Item Description

 RA45406EN05GLA0

Flexi mounting kit for floor, wall and pole (FMFA)
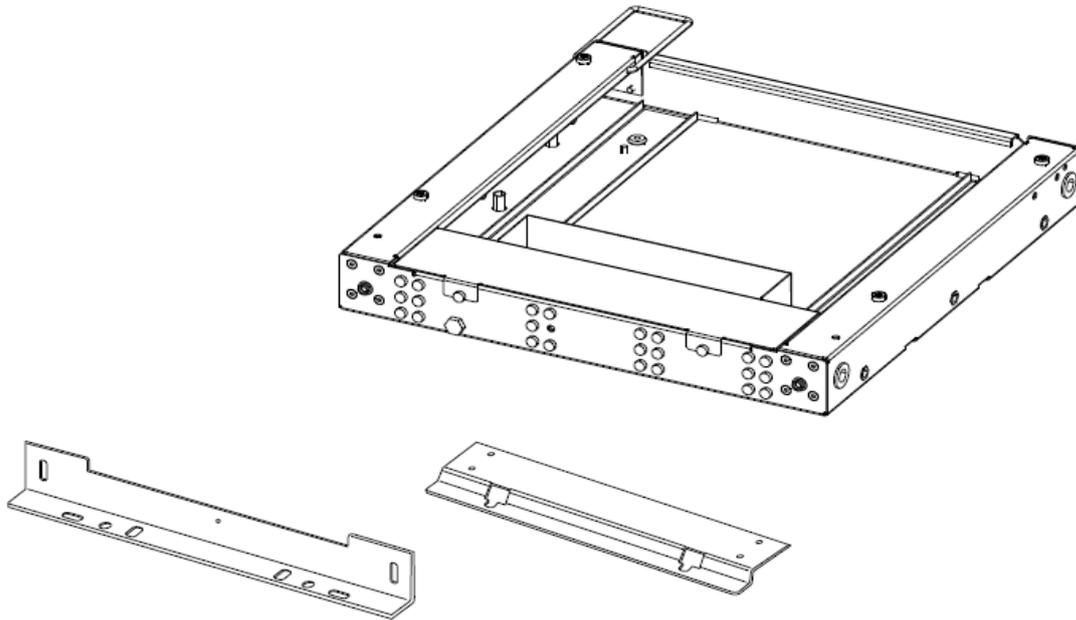
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Flexi External Alarm Box (FSEB)
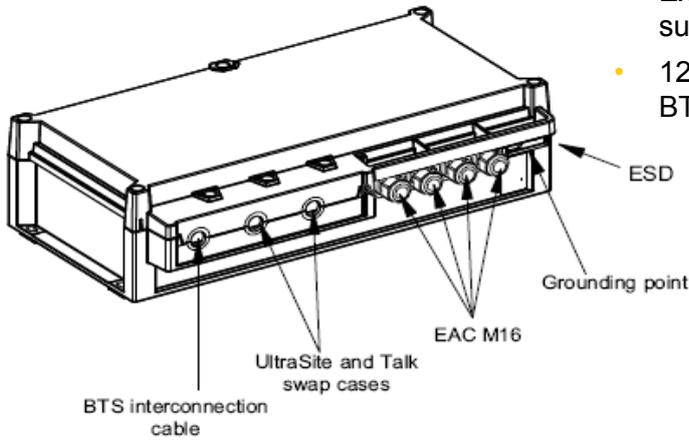
- Extending the Flexi BTS alarm connector to support up to 24 alarm interfaces.
- 12 alarms are supported for Flexi WCDMA BTS.

ESD

Grounding point

EAC M16

UltraSite and Talk swap cases

BTS interconnection cable

- Support for the fire detector
- IP55 protection

ESM

EACX-II(D37)

EACX-I(D37)

Smoke-Detector Power X4114

EACX-S screw terminals X4104 to X4113

grounding

Not in use

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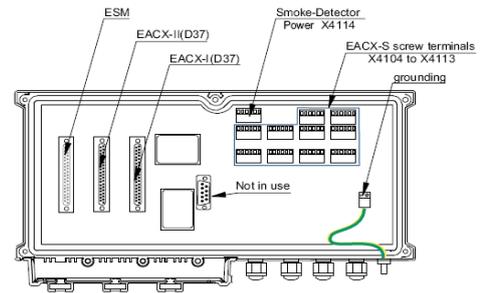
GPS for Flexi BTS: WiMAX, WCDMA, I-HSPA

Flexi BTS RF Modules

Flexi BTS System Module

-48VDC   PPS

Mediator
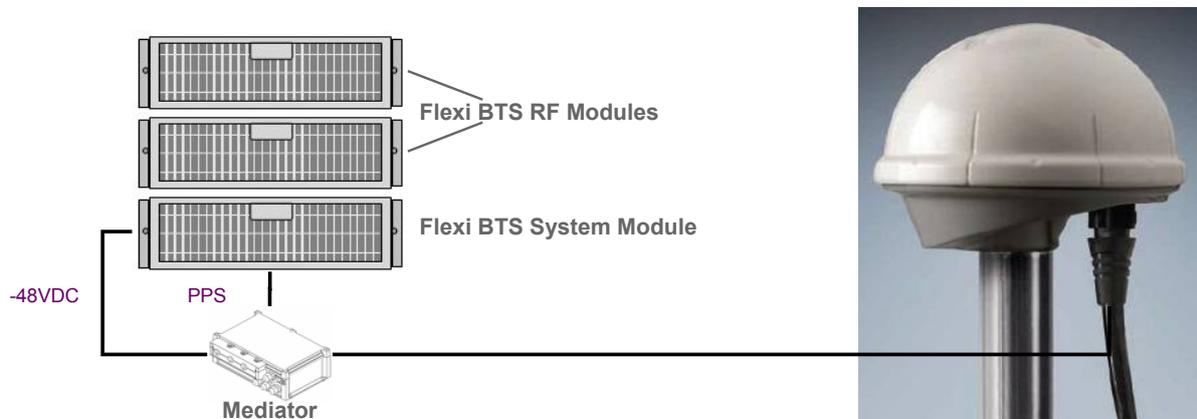
- Trimble Acutime Gold: GPS antenna with inbuilt receiver
- Available with Flexi WiMAX BTS, Flexi WCDMA BTS, Flexi I-HSPA BTS
- Power, sync signal and data connection to BTS System Module

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Flexi System External **GPS** Mediator (FSEG) is used for providing IP55 protected area for powering and connecting the **GPS** module (**GPS** Antenna Kit FYGA) to the BTS system. The FSEG is only used with the FSMB when **GPS** synchronisation is needed. No specific software is needed for running the FSEG.

The FSEG has the following functionalities:

transforming operating voltage to FYGA (from -48VDC to +12VDC)

mediating GPS clock signal from FYGA to the BTS system

overvoltage protection

The FSEG can be installed in the following ways:

On a wall (vertical or horizontal position)

On a pole using brackets (horizontal or vertical position) (optional Flexi Pole Installation Kit FPIA)

On stack installations using brackets (horizontal or vertical position) (optional Flexi Mounting Auxiliary Brackets FMAA)

On the FCIA or FCOA roof (horizontal position only)

In outdoor applications, the FSEG can be attached to the outdoor cabinet roof (the maximum of one item can be installed next to the FSEG). There are fixing points for the FSEG in the outdoor cabinet. In indoor applications, the FSEG can be attached to the indoor cabinet roof. In stacked applications, the FSEG is attached in the proximity of the BTS.

The FSEG can be installed either horizontally (cable lead-ins on the side) or vertically (cable lead-ins facing down). The FSEG can be attached to a pole (using FPIA brackets) or to a wall (screw holes).

For installation instructions, see section Installing Flexi System External GPS Mediator (FSEG).

Flexi system external GPS mediator (FSEG)

The FSEG has the following
functionalities:

• Transforming operating voltage to
FYGA (from -48VDC to +12VDC)

• Mediating GPS clock signal from
FYGA to the BTS system

• Over voltage protection

12V DC

30 (FYHA) or
100m (FYHB)

BTS/Iub

48V DC

AC in

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Networks

The FSEG can be installed in the following ways:

. On a wall (vertical or horizontal position)

. On a pole using brackets (horizontal or vertical position) (optional

Flexi Pole Installation Kit FPIA)

. On stack installations using brackets (horizontal or vertical position) (optional Flexi Mounting
Auxiliary Brackets FMAA)

. On the FCIA or FCOA roof (horizontal position only)

Flexi Cabinet for Indoor (FCIA)

- Made of an aluminium chassis enclosed with aluminium doors and sides.
- Does not carry any electrical functionality
- No traditional backplanes or electronics. The cable entries are located at the top of the cabinet.
- External cables are connected directly to the Flexi modules inside the cabinet

The following optional modules can be mounted to the FCIA cabinet:

- Integrated long term battery backup solution (MIBBU)
- Flexi Rectifier Module (FRMx)
- EAC connection box (FSEB)
- Overvoltage protection box (FSEC)

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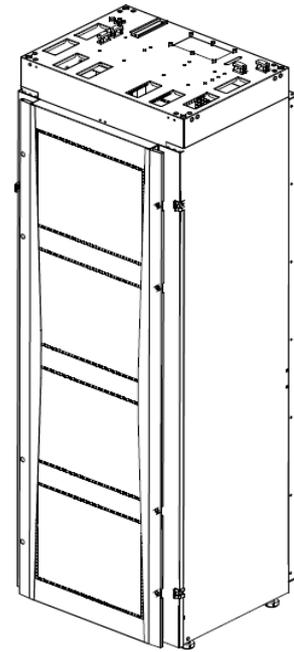
Flexi Cabinet for Outdoor (FCOA)

- Made of an aluminium chassis enclosed with aluminium covers.
- Triangle door-open key.
- Does not have any electrical functionality
- Does not increase Flexi BTS site power consumption

The cabinet has the following functions:

- Provides the base station and cables protection against external damage and foreign objects

- It supports earthquake protection

- It houses the Flexi cabinet site support module (FCSA) that provides long-term battery back-up and a 4U-high IP55-protected space for Line Terminal Equipment (LTE)

- Together with Flexi cabinet air filter (FCFA), protects the BTS in extremely dirty conditions
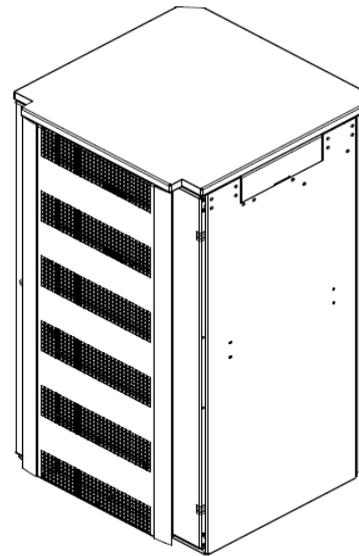
Air Filter (FCFA)

The optional air filter (FCFA) can be added in case of extremely dirty environment (for fresh air cooled modules) to provides cover for extremely dirty conditions by over-pressurizing the cabinet.

It consists of a filter element, 8 x diagonal fans, a pressure sensor, a control logic, and back wall mechanics
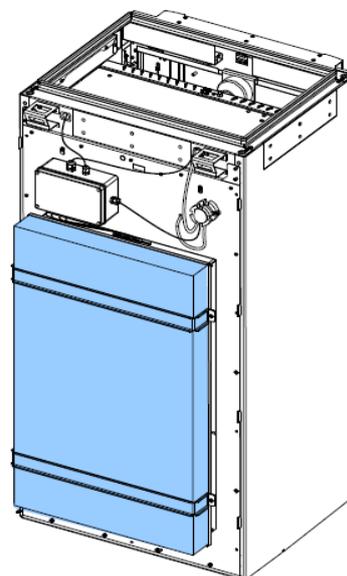
Site Support Module (FCSA)

Provide long-term battery back-up time for the Flexi WCDMA BTS and a space for installing Line Terminal Equipment (LTE) units.

IP55 protected installation space for the PDU unit, IBBU AC interface box, rectifier units, LTE equipment, control card, heat

exchanger, and fans.

Batteries are fixed and cabled using Flexi Mounting Kit for Batteries (FMBA).

Heat Exchanger

MIBBU

Control card

LTE Space

Batteries

FMBA
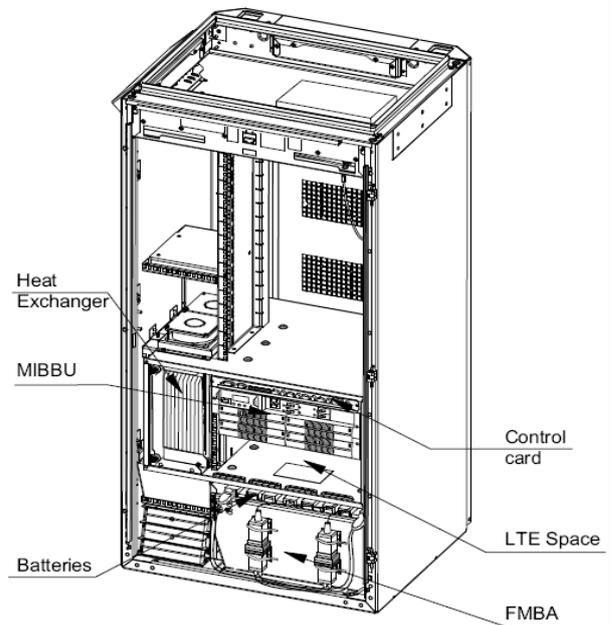
Flexi Mounting Shield (FMSA/B)

Flexi Mounting Shield (FMSA/FMSB) is an outdoor cabinet for a stacked Flexi BTS. Used instead of the plastic front and rear covers, it provides protection against solar load, large insects and slight vandalism. Flexi Mounting Kit Floor/Wall/Pole (FMFA) is required in both cabinets.

6U FMSA

18U FMSB

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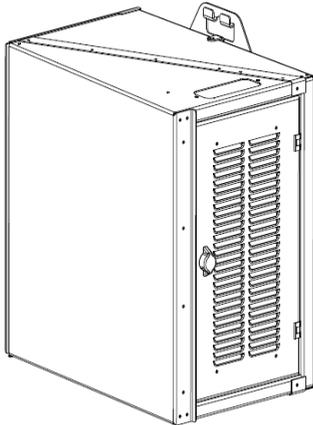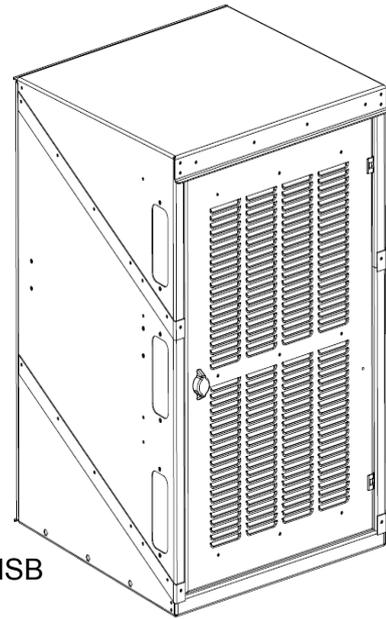
Flexi mounting kit vertical for 2G (FMUA)

To enable Flexi BTS Modules to be installed on existing GSM/EDGE UltraSite sites :

- UltraSite EDGE BTS (CRMA)
- UltraSite Indoor cabinet (IDCA 101)
- UltraSite Outdoor cabinet (ODCA 101)

2G

System Module

1 U free space
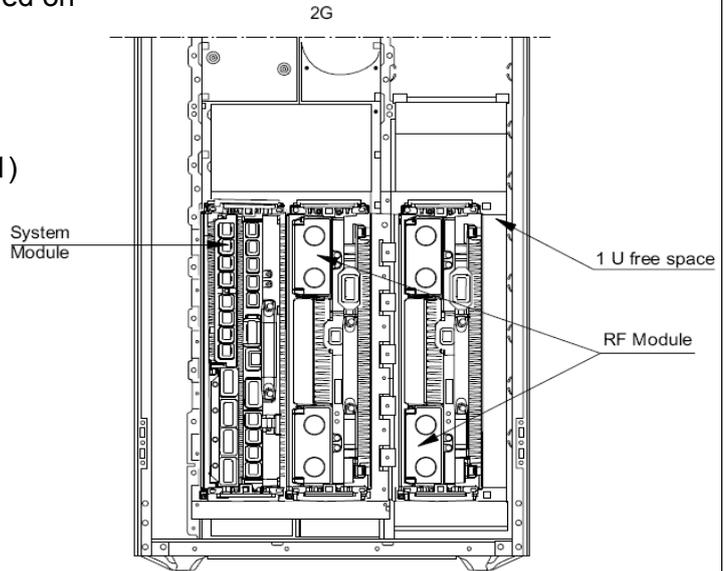
RF Module

Flexi mounting kit horizontal for 2G (FMUB)

To enable Flexi BTS Modules to be installed on existing GSM/EDGE UltraSite sites :

- UltraSite Indoor cabinet (IDCA) v.202 or newer
- UltraSite Outdoor cabinet (ODCA) v.202 or newer
- UltraSite EDGE Outdoor cabinet (ODCF)

The mounting kit consists of a rack in which, for example, one WCDMA System Module, up to three WCDMA RF Modules and one FPMA or System Extension Module or FPDA are installed, and cables. The space requirement for 5 x 3U modules is 15U.
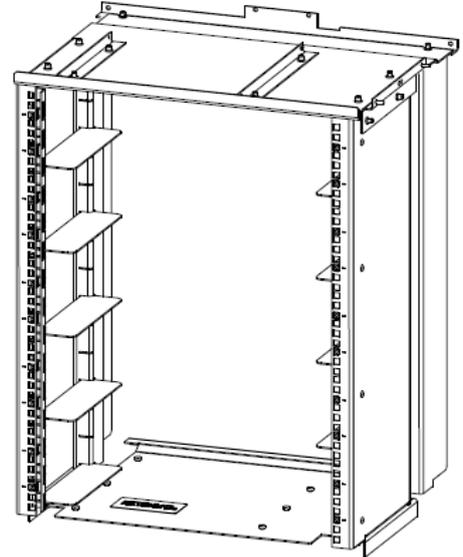
i-HSPA Adapter

Designed as a 1U high 19-inch rack element

To be installed in any BTS cabinet

Flexi BTS indoor and outdoor cabinets

UltraSite GSM/EDGE cabinet, with either horizontal or vertical fixing kit

Standard 19-inch equipment racks.

81

i-HSPA Adapter view
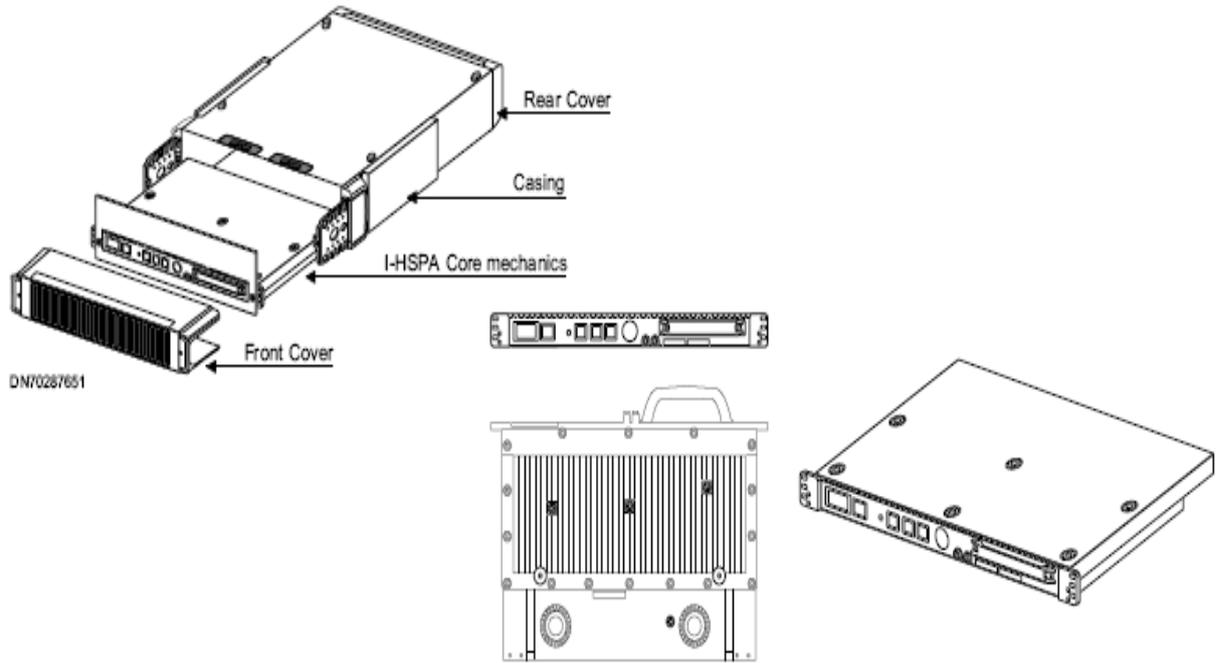
i-HSPA Adapter Interfaces
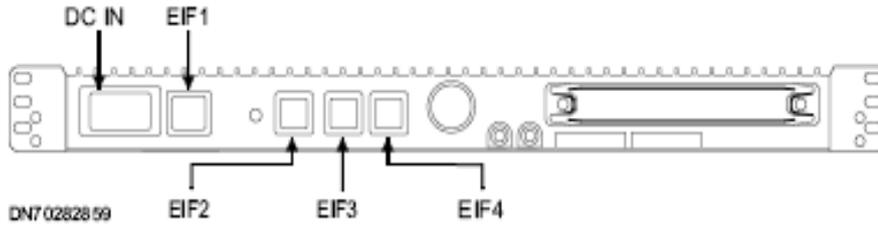
Front panel identifier	Purpose	Interface type	Connector Type
EIF1 (SFP TRS)	External transport	Optical for Ethernet (reserved for future use)	SFP, SFP cage
EIF2 (TRS/LMT)	External transport/ Local Management Terminal	10/100/1000 Base-T Ethernet	RJ45 shielded
EIF3 (TRS)	External transport	10/100/1000 Base-T Ethernet	RJ45 shielded
EIF4	BTS interface	10/100/1000 Base-T Ethernet	RJ45 shielded
DC IN	48VDC Power Input		Multi-Beam XL RA 2 pin

Appendix

Distributed RF modules

RA45406EN05GLA0

Feederless BTS Site power option 1: AC

Feederless 2+2+2 @ 20 W AC site

System Module AC powered
- optional battery back up
- FPMA + FPAA + 1…3 FPBA

1-sector 2 carrier RF Module AC powered
- optional FPAB inside 3U RF Module casing

50 W RF FPAB AC

50 W RF FPAB AC

50 W RF FPAB AC

OBSAI RP3-01 optical

Max 200 m (RAS05.1)

Max 15 km (RAS05.1ED)

System Module

AC B B B

FPMA+FPAA+1…3 FPBA

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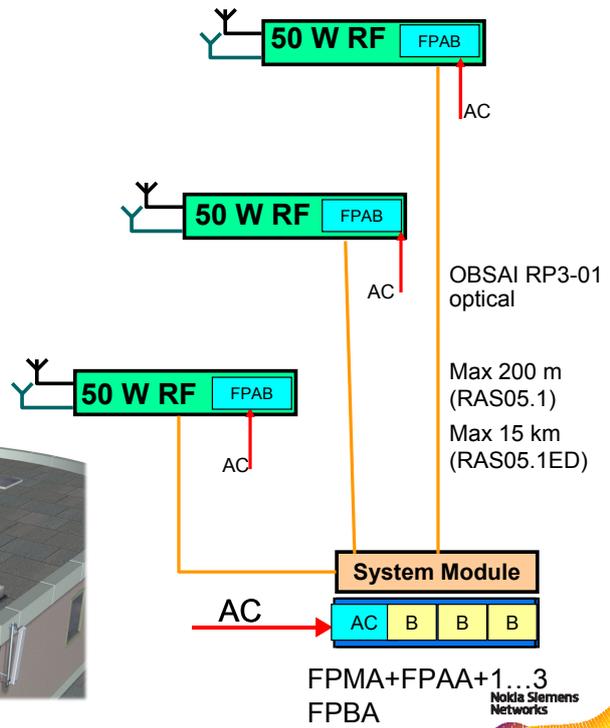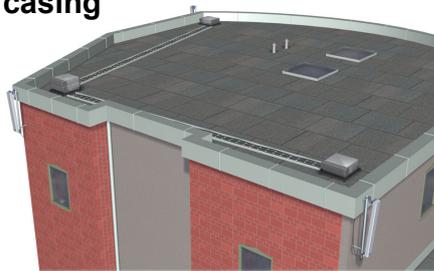
Feederless BTS Site power option 2: AC with full BBU

Feederless 2+2+2 @ 40 W AC site
Feederless 4+4+4 @ 20 W AC site

System Module AC powered
- **optional battery back up**
- **FPMA + FPAA + 1…3 FPBA**
- **up to 3 hours with 3 FPBAs**

RF Module AC powered
- **1 sector 2 carrier RF Module**
- **1/2 sector 4 carrier RF Module**
- **optional battery back up**
  - **FPMA + FPAA + 1…3 FPBA**
  - **up to 2 hours with 3 FPBAs**
    (1 sector RF Module typical)

1 or 2 sector RF Module

AC | B | B | B

AC

FPMA + FPAA + 1…3 FPBA

1 or 2 sector RF Module

AC | B | B | B

AC

1 or 2 sector RF Module

AC | B | B | B

AC

OBSAI RP3-01 optical

Max 200 m (RAS05.1)

Max 15 km (RAS05.1ED)

System Module

AC | B | B | B

AC

FPMA+FPAA+1…3 FPBA

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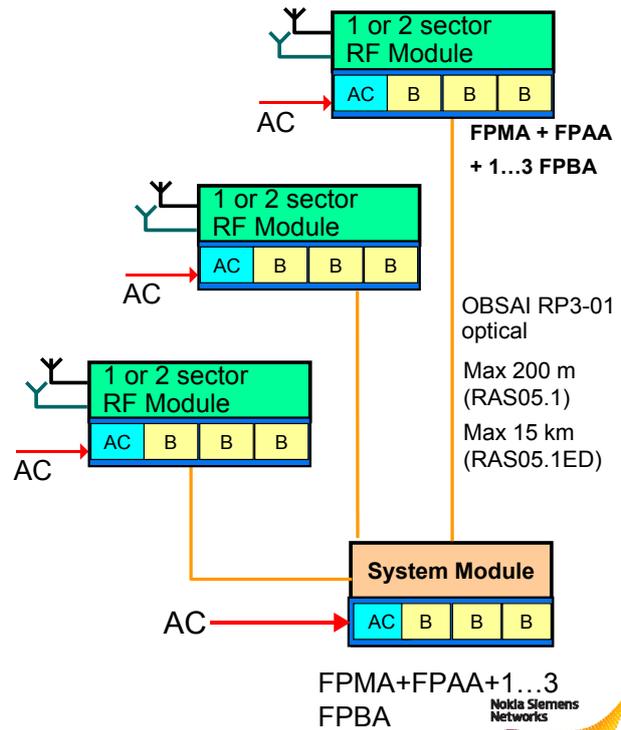
Feederless BTS Site power option 3a: DC with BBU from System Module

Feederless 2+2+2 @ 40 W

Feederless 4+4+4 @ 20 W

RF Module DC input from System Module

Max distance is 100 m

System BBU time with FPMA+ 2 FPAAs+ 2 FPBAs about 10 minutes with typical 2+2+2 @ 20 W

1 or 2 sector RF Module

1 or 2 sector RF Module

1 or 2 sector RF Module

DC

DC

DC

DC max 200 m.

DC

System Module

| AC | B | B | B |

AC

FPMA+FPAA+1…3 FPBA

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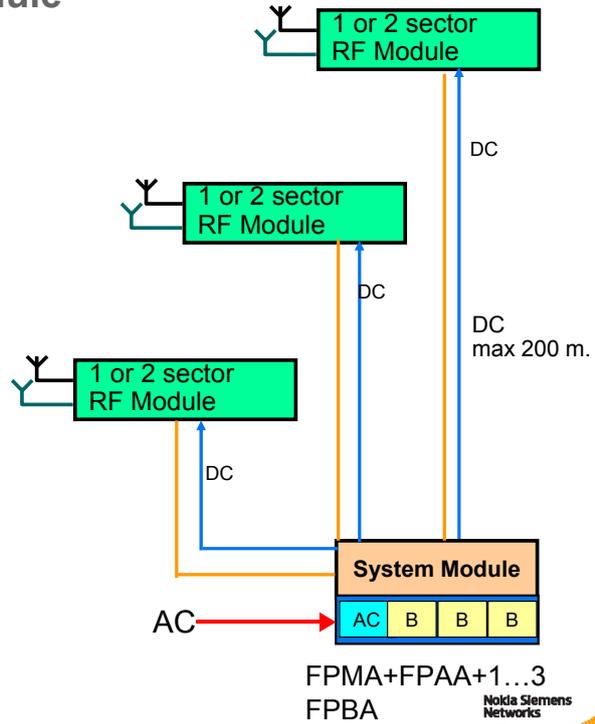
Feederless BTS Site power option 3b:
DC with long term BBU from System Module

Feederless 2+2+2 @ 40 W

Feederless 4+4+4 @ 20 W

RF Module DC input from System Module

Max distance is 100 m

System BBU time with 92 Ah 5 hours with typical 2+2+2 @ 20 W

1 or 2 sector RF Module

1 or 2 sector RF Module

1 or 2 sector RF Module

DC

DC

DC

DC max 200 m.

D C

Outdoor cabinet

System Module

Site Support Module

AC-DC

62 /92 Ah battery

A C

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Feederless BTS Site power option 3

FRIB/FRGD

Uses Flexi outdoor 2 m DC cables with IP55 connectors

DC cable e.g. 2x16 + 16 shield

DC

Shield is grounded

System Module

AC

FPMA+FPAA+(FPBA)

Feederless BTS Site power option 3

FRIB/FRGD

OVP IP55 box

DC

Must use Flexi 2 m DC cables with IP55 connectors
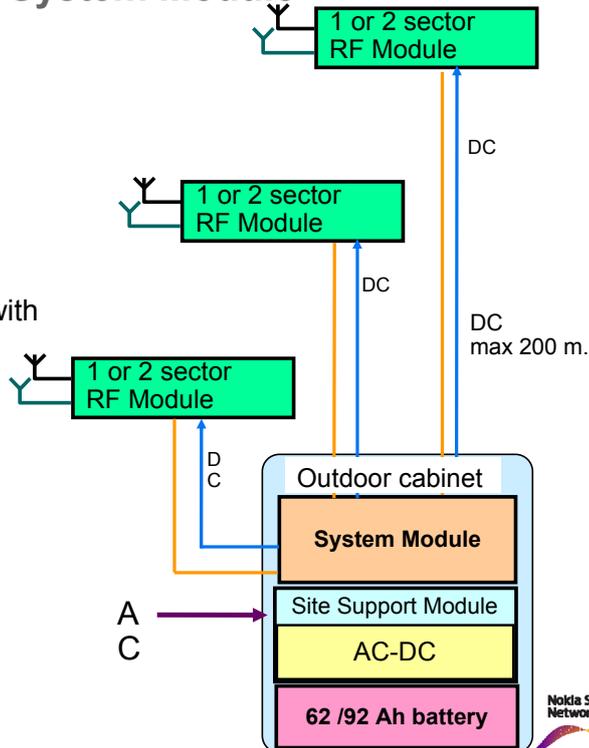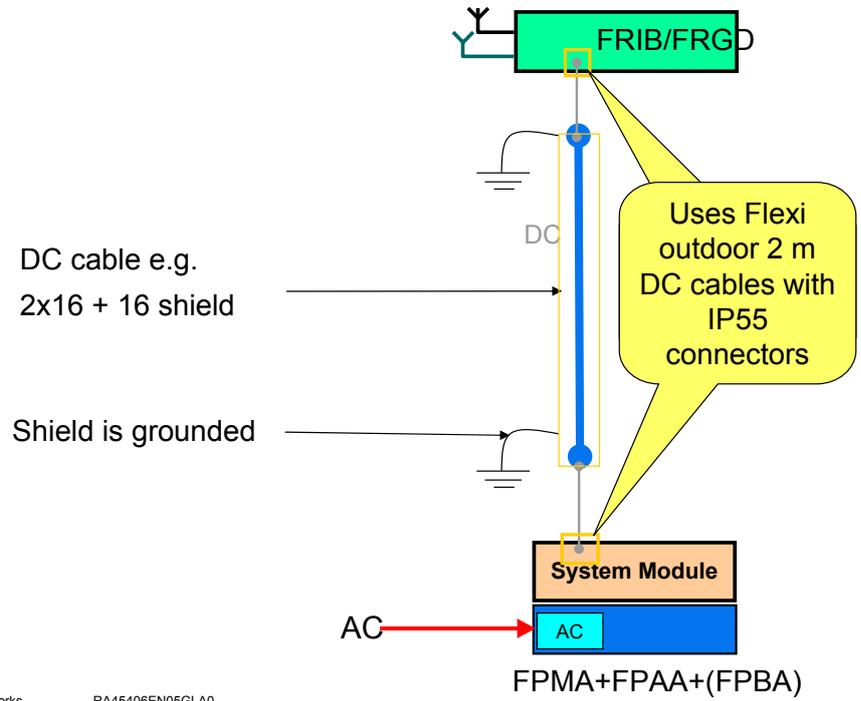
Overvoltage (OVP) & connection box

    - overvoltage protectors Class II / I max. 40kA,

    Class III / I max. 500A

    - optional lightning protectors

    - all in IP55 class sealed box

OVP IP55 box

System Module

AC

AC

FPMA+FPAA + (FPBA)

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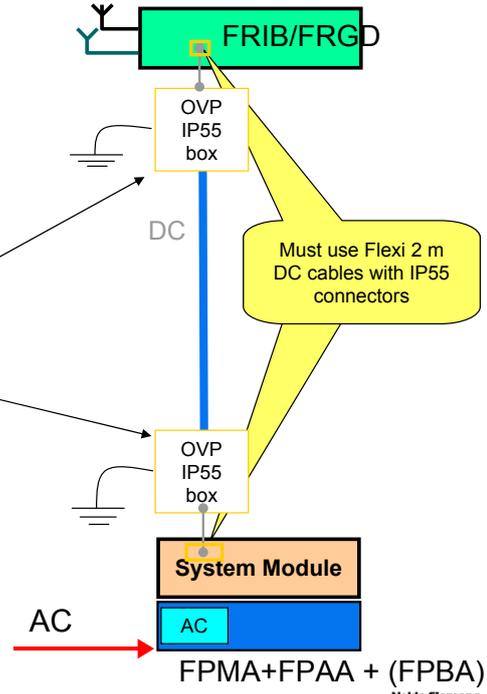
Optical fibre connection

1) Alternative
Nokia IP55 Optical
Multimode Cable

2) Alternative
Cutting
And
Splicing

3) Alternative
Use of
MultiMode
adapter

RF Module Single

RF Module Single

RF Module Single

AC/DC
Converter
(optional)

SFP

SFP

SFP (included in basic sales item)

IP55 box

(optional)

MultiMode
Adapter

(included in optional
Sales items)

IP55 box

(optional)

IP55   SFP

IP55   SFP

IP55   SFP

System Module

System Module

System Module

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Appendix

RF Configurations

Configuration rules

The main Flexi WCDMA BTS configurations are presented in the following tables.

SM1 = FSMB

SM2 = FSMC, FSMD

- It is possible to use the Extension System Module with all configurations. The Extension System Module is mandatory in certain hardware combinations with larger than six-cell configurations.
- The following Master - Extension System Module combinations are supported:
  - Master System Module + Extension System Module = SM1 + SM1 = FSMB + FSMB (max 3+3+3)
  - Master System Module + Extension System Module = SM1 + SM2 = FSMB + FSMC or FSMD (max 3+3+3)
  - Master System Module + Extension System Module = SM2 + SM2 = FSMC or FSMD + FSMC or FSMD (max 4+4+4)

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RA45406EN05GLA0

Single and Dual RF modules 1/2

Cell configuration	Output power per cell (carrier)	Sector configuration type	No. of Single RF modules	No. of Dual RF modules	System Module version *
1	8W/20W/40W	A	1		SM1, SM2
1	40W	B		1	SM1, SM2
2	20W	A	1		SM1, SM2
2	20W/40W	B		1	SM1, SM2
3	20W	B		1	SM2
1+1	20W/40W	2xA	2		SM1, SM2
1+1	8W/20W/40W	2xA		1	SM1, SM2
1+1	40W	2xB		2	SM1, SM2
2+2	20W	2xA	2		SM1, SM2
2+2	20W	2xA		1	SM1, SM2
2+2	20W/40W	2xB		2	SM1, SM2
3+3	20W	2xB		2	SM2
4+4	20W	2xB		2	SM2
1+1+1	20W/40W	3xA	3		SM1,SM2
1+1+1	20W/40W	3xA	1	1	SM1,SM2
1+1+1	40W	3xA		2	SM1,SM2
1+1+1	40W	3xB		3	SM1,SM2

* Version information defines the System Module version that acts as the master System Module in the configuration.

** According to the master System Module version defined in the column, the following Master - Extension System Module combinations are supported:

Master System Module + Extension System Module = SM1 + SM1 = FSMB + FSMB (max 3+3+3)

Master System Module + Extension System Module = SM1 + SM2 = FSMB + FSMC or FSMD (max 3+3+3)

Master System Module + Extension System Module = SM2 + SM2 = FSMC or FSMD + FSMB or FSMD (max 4+4+4)

Single and Dual RF modules 2/2

Cell configuration	Output power per cell (carrier)	Sector configuration type	No. of Single RF modules	No. of Dual RF modules	System Module version *
2+2+2	20W	3xA	3		SM1,SM2
2+2+2	20W	3xA	1	1	SM1,SM2
2+2+2	20W/40W	3xB		3	SM1,SM2
2+1+1	20W	3xA	3		SM1,SM2
2+1+1	20W	3xA	1	1	SM1,SM2
2+1+1	40W	B+2xA	2	1	SM1,SM2
2+1+1	40W	3xB		3	SM1,SM2
2+2+1	20W	3xA	3		SM1,SM2
2+2+1	20W	3xA	1	1	SM1,SM2
2+2+1	40W	2xB+1xA	1	2	SM1,SM2
2+2+1	40W	3xB		3	SM1,SM2
3+3+3	20W	3xB		3	SM1,SM2
3+3+3	20W/40W	3xB		3	SM1,SM2
4+4+4	20W	3xB		3	SM2
1+1+1+1	20W/40W	4xA		2	SM1, SM2
1+1+1+1+1+1	20W/40W	6xA		3	SM1, SM2

* Version information defines the System Module version that acts as the master System Module in the configuration.

** According to the master System Module version defined in the column, the following Master - Extension System Module combinations are supported:

Master System Module + Extension System Module = SM1 + SM1 = FSMB + FSMB (max 3+3+3)

Master System Module + Extension System Module = SM1 + SM2 = FSMB + FSMC or FSMD (max 3+3+3)

Master System Module + Extension System Module = SM2 + SM2 = FSMC or FSMD + FSMB or FSMD (max 4+4+4)

RRH 70 W 2100 (FRGG)

Cell configuration	Output power per cell (carrier)	Sector configuration type	No. of Remote Radio Heads 60W (FRGG)	System Module version
1+1+1	20W/40W	A	3	SM2
2+2+2	20W	A	3	SM2

Dual band configurations

Cell configuration	Cell band 1	Cell band 2	Output power per cell (carrier)	Sector configuration type	No. of Single RF Modules	No. of Dual RF Modules	No. of Triple RF Modules	System Module version
1+1+1+1+1+1	1+1+1	1+1+1	20W/40W	A	1	1	1	SM2
1+1+1+1+1+1	1+1+1	1+1+1	40W/60W	A	1	1	1	SM2

Band 1 = 2100 Triple

Band 2 = 850/900/1900 Single + Dual

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Triple RF Module

Cell configuration	Output power per cell (carrier)	Sector configuration type	No. of Triple RF Modules	System Module version
1	40W/60W	A	1	SM2
2	20W	A	1	SM2
2	20W/40W	B	1	SM2
3	20W/30W	B	1	SM2
1+1	20W/40W/60W	2xA	1	SM2
2+2	20W/30W	2xA	1	SM2
1+1+1	20W/40W/60W	3xA	1	SM2
2+2+2	20W/30W	3xA	1	SM2
2+2+2	20W/30W/40W/60W	3xC	2	SM2
3+3+3	20W/30W	3xC	2	SM2
4+4+4	20W/30W	3xC	2	SM2
2+2+2+2+2+2	20W/30W	6xA	2	SM2
1+1+1+1+1+1	20W/30W/40W/60W	6xA	2	SM2