



Telecom Implementation Guideline-Flexi Multi Radio

Site Solutions

Flexi Multi Radio BTS



Min GSM hardware configuration
1/1/1 to 6/6/6 with 2 modules*



Max GSM configuration/BCF
36 TRX, 3 modules*

Migrating to Flexi Multiradio BTS

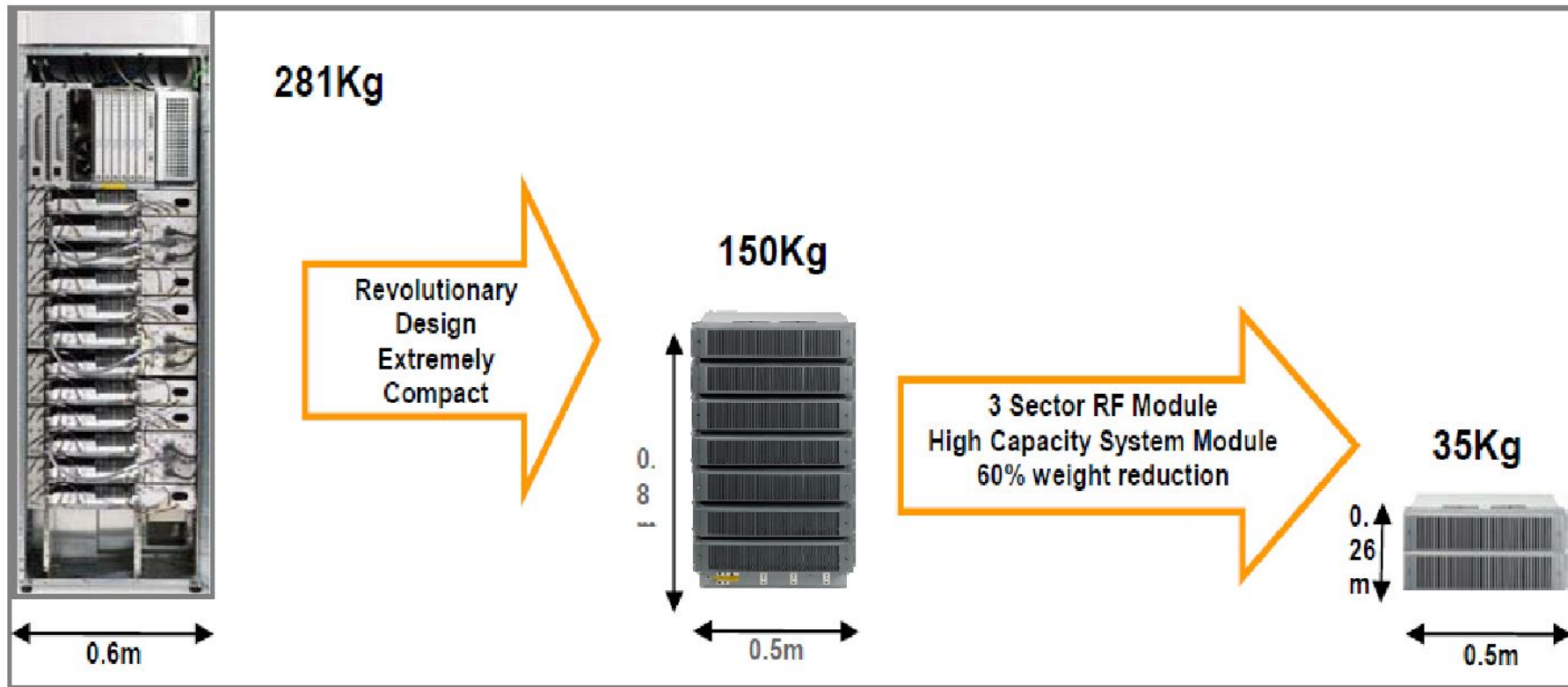


Figure 4: Evolution in Integration density

Flexi Multiradio BTS offers highest capacity, smallest weight and dimensions and features three technologies in one radio module enabling smooth evolution to future technologies

Multi Radio BTS

Flexi Multi Radio BTS: is a base transceiver station that is part of the Nokia Siemens Networks Flexi BTS platform for GSM/EDGE, WCDMA, and LTE networks. It is a multi radio or multicarrier BTS that can use all these network technologies either in dedicated or concurrent mode of operation.

- The Flexi Multiradio GSM/EDGE System Module provides baseband capacity for 18 or 36 GSM/EDGE TRXs depending on the version (ESMB or ESMC respectively).
- The traffic capacity of Flexi Multiradio BTS depends on the radio capacity of the radio module, the baseband capacity and the transport capacity. The baseband capacity of GSM/EDGE and WCDMA/LTE are independent of each other as each technology uses separate System Modules and transport.
- There are 3 radio branches in one Flexi Multiradio Radio Frequency module (FXxx). The TRX capacity of Flexi Multiradio BTS can be modified based on the traffic by increasing or decreasing the number of TRXs within a Radio Module branch, or by increasing the number of radio modules. Each radio module branch supports up to 6 GSM/EDGE TRXs.
- The Radio module can be split into separate cells for multi-operator BTS.
- Flexi Multiradio modules can be installed on a mast or a pole reducing the antenna feeder line length and thus increases the RF performance.

Changes from flexi BTS

- Flexi Multiradio brings the following changes when compared to Flexi EDGE Base Station:-

The radio technology is changed from single carrier power amplifiers to multi carrier power amplifiers. No external combiners are needed to combine the different TRX outputs to a common antenna line.

Baseband processing is now centralized to the system module instead of distributed to the radio modules as in Flexi EDGE BTS.

The interconnection between the system module and the radio module is changed from Ethernet based electrical connection as in the Flexi EDGE BTS to optical OBSAI connection as in Flexi WCDMA BTS. Thus Flexi Multiradio Supports Feederless sites without optical optional converter modules.

Key Features

Multicarrier radios for various frequency bands, capable to support up to 6 GSM/EDGE carriers in GSM dedicated mode, up to 4 WCDMA carriers in WCDMA dedicated mode and up to 20MHz LTE carrier in LTE dedicated mode with one radio branch. In concurrent mode of operation, combination of all three radio technologies is supported with single radio branch.

Radio module (RFM) capable to serve 3 sectors with Multicarrier radios of up to 60W output power/branch.

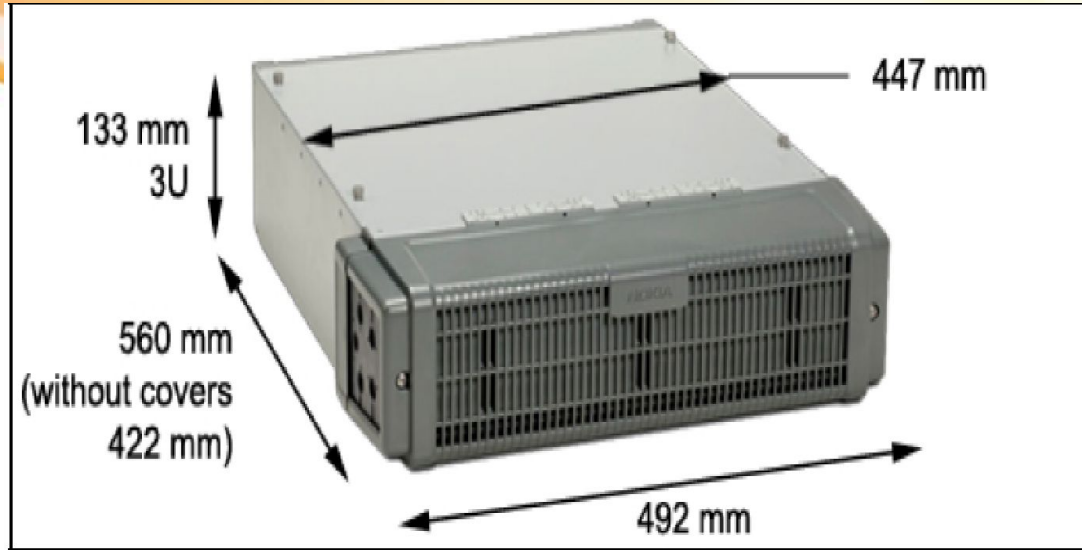
MIMO ready remote radio head (RRH) capable to serve 1 sector with Multicarrier radios of up to 40W output power/branch

GSM/EDGE system modules with integrated baseband processing for up to 18 or 36 TRX capacities and optical OBSAI radio module interfaces.

Flexi Multimode System Module supporting up to 750CE in WCDMA or LTE 3 cells@20MHz each with MIMO

Cost optimized GSM/EDGE configuration supporting up to 6 sectors with 36 carriers maximum BTS configuration (one BCF object).

Dimensions and Weight



Module	Width (mm) (*)	Height (mm / U)	Depth (mm) (**)	Target Weight (kg)
Flexi EDGE 18/36 TRX System Module (ESMB/ESMC)	447 / 492	133 / 3 U	422 / 560	10
Transport sub-modules	262	40	165	0.34
Flexi RF Module Triple 70W 850/900/1800/1900 (FXxA)	447 / 492	133 / 3 U	422 / 560	25

Power consumption

GSM Configuration	WCDMA Configuration	Target Power Consumption
4/4/4@15W/TRX (40% load)	NA	670W
4/4/4@20W*/TRX (40%Load)	NA	675W
4/4/4@15W/TRX (40% load, DTX active)	NA	560W
4/4/4@15W/TRX (40% load, DTX active, HR AMR**)	NA	445W
NA	1/1/1@20W (50% load)	400W
NA	1/1/1@20W (40% load)	360W
4/4/4@10W/TRX (40% load, HR AMR, DTX active)	1/1/1@20W (50% load)	690W
4/4/4 @ 20W/TRX (40% load, HR AMR, DTX active)	1/1/1@20W (50% load)	1075W**

System Module

System Module

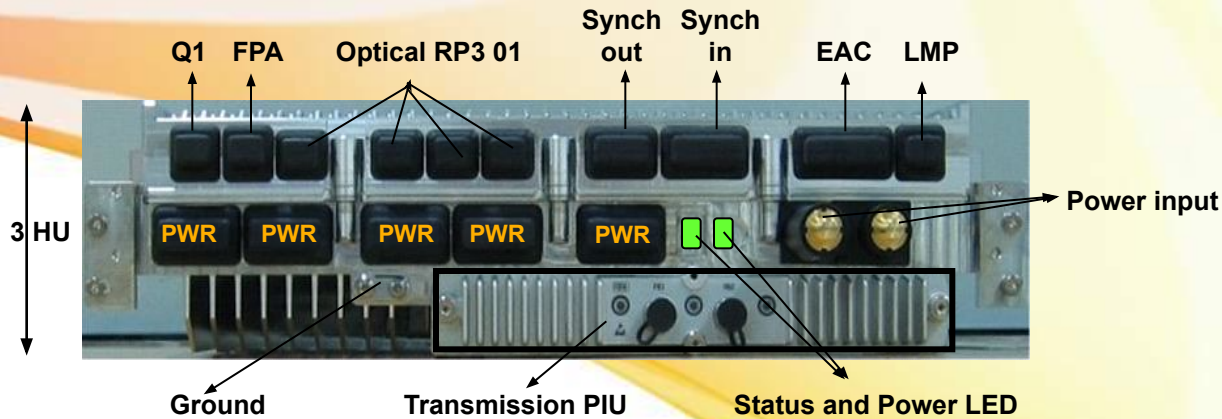
- ❑ GSM/EDGE BTS Operation and Maintenance
- ❑ Abis interfacing
- ❑ Open Base Station Architecture Initiative connectivity
- ❑ Power distribution to other modules
- ❑ GSM/EDGE baseband
- ❑ BTS synchronization



Two Version of System Modules :

- ❖ ESMB - 18 TRX Capacity
- ❖ ESMC - 36 TRX Capacity

Flexi EDGE 18/36 TRX System Module Construction and Interfaces



- 4 optical SFPs. OBSAI RP3-01 interface (3Gbps). (3 for RF modules, 1 for 3G/LTE system module connection or ESMB/ESMC chaining or alternatively all 4 for RF modules)
- 48VDC BTS power input terminals
- 5 Power distribution I/Fs (4 for co-located RFMs, and 1 extra for any additional modules)
- A slot for Integrated transport sub-module (various interface options available)
- Ports for Power Module Alarms, Local Management and Q1
- External Alarm Control port with 12 inputs and 6 outputs, or connectivity to EAC Ext. Module
- Two ports for external synch. input or synch. extension to other co located base stations
- Status-LED, Power LED and Power Push Button
- Grounding terminal

Flexi EDGE 18/36 TRX System Module

ESMB/ESMC has an integrated transport unit which provides the physical transmission interfaces and the transport functionality of the BTS. Six different network interface alternatives are offered: E1 symmetrical, E1 unsymmetrical, T1, Fast Ethernet, Gigabit Ethernet and Flexbus.

These transport interface variants are same as with Flexi EDGE System Module ESMA.

Flexi Multiradio BTS has Q1 support for legacy networks, e.g. Talk-family BTS replacement, where network management is embedded in BSS using Q1. Up to 34 Q1 devices can be polled with Flexi Multiradio BTS.

ESMx provides the OBSAI optical connectivity to the radios and to the other radio technology system module. It has 4 OBSAI RP3-1 interfaces. The OBSAI interfaces on both system modules can be used for radio connections in case of concurrent operation of several radio technologies.

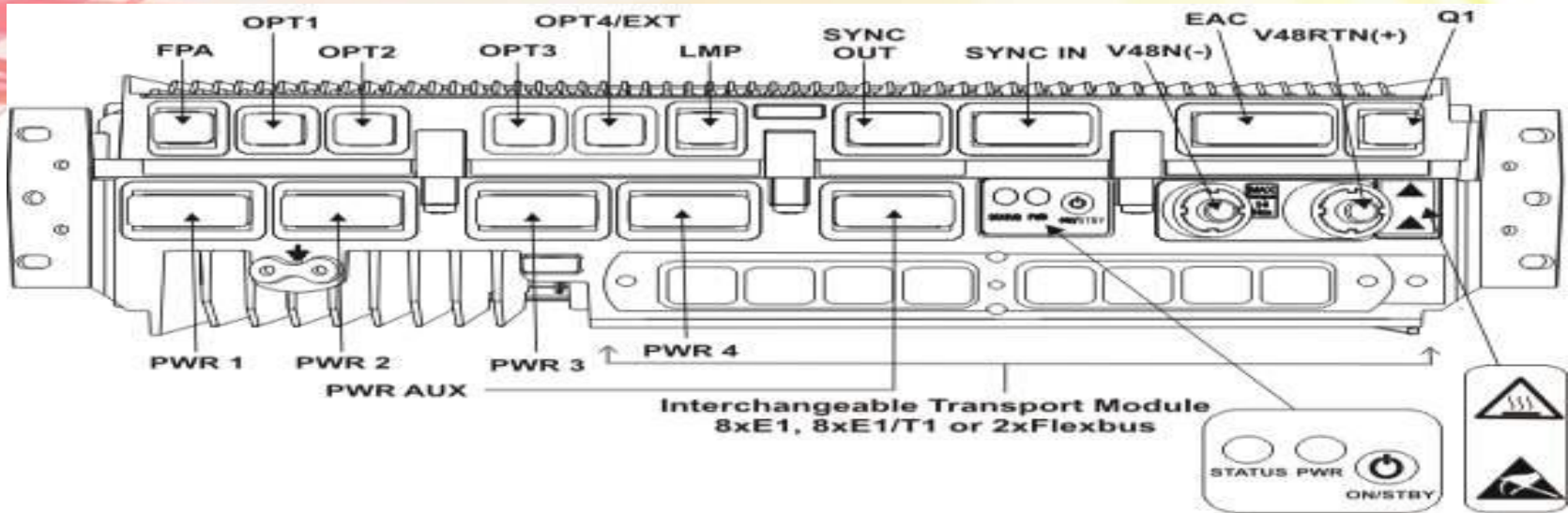
Flexi EDGE 18/36 TRX System Module

The operating power can be supplied to the radios from ESMx. It has capability to distribute the 48VDC power for up to 4 radios and one auxiliary device. The Flexi WCDMA system module can distribute the power for more radios in concurrent configurations. ESMx has an AUX power output (40.5...57 VDC, 5A) for the site equipment like MWR ID units etc

ESMB/ESMC has 12 integrated alarm inputs and 6 control outputs. The number of the external alarm inputs can be increased to 24 using optional Flexi alarm extension module (FSEB). The radios have also External alarm and control interfaces for Feederless or distributed site applications. RRH has 2 alarm inputs and RFM 4 alarm inputs and 4 control outputs that are compatible with the system module alarm interface.

It also has an **Element Manager Interface** to connect the BTS to a Laptop computer, **Flexi power alarm Interface** which provides a Nokia Siemens Networks specific power alarm interface for the integrated power modules (FPMA, FPDA, MIBBU, iPSU). And a **Q1 interface** for managing legacy Nokia Siemens Networks equipment

ESMB/C Module Interface

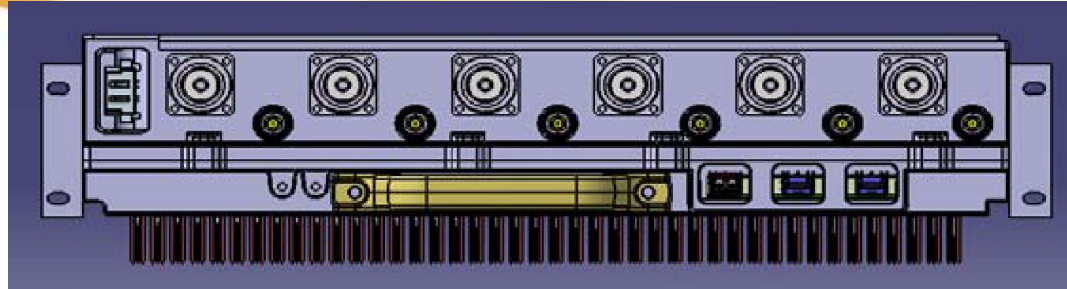


The System Module is equipped with the following interfaces:

- ❖ Front panel connectors
- ❖ DC input connector (in the centre of the module)
- ❖ The System Module is connected to the System Extension Module with a DC cable and two optical cables.
- ❖ The System Module is connected to the RF Module with a DC cable and One optical cable.

RF Module

Triple RF Module



Flexi RF Module Triple 70W 850/900/1800/1900

The unit is 3U high, fits into Flexi 3U casing as well as any 19" rack and is available in 850 MHz, 900 MHz full band and J band 1800 MHz and 1900 MHz frequency bands.

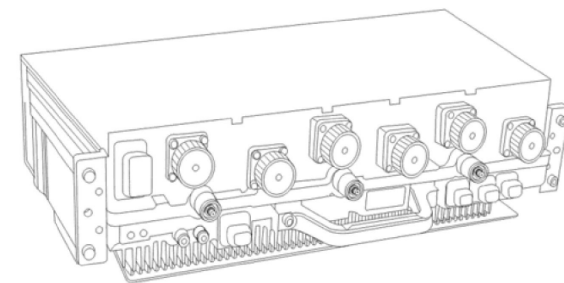
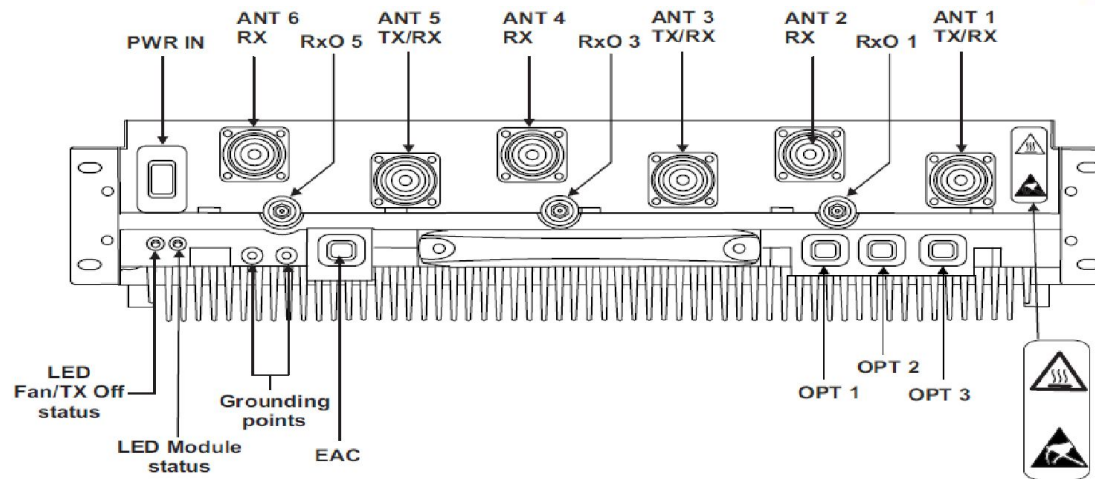
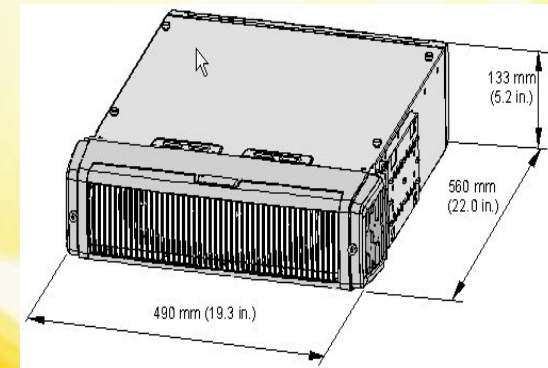
Triple RF Module

Dimension

- ❖ Dimension : 492 mm (W) X 560 mm (D) X 133mm (H) (With Covers)
- ❖ Dimension : 447 mm (W) X 422 mm (D) X 133mm (H) (Without Covers)
- ❖ Rack Unit Height : 3U
- ❖ Weight: 25 KG

Triple RF Module.

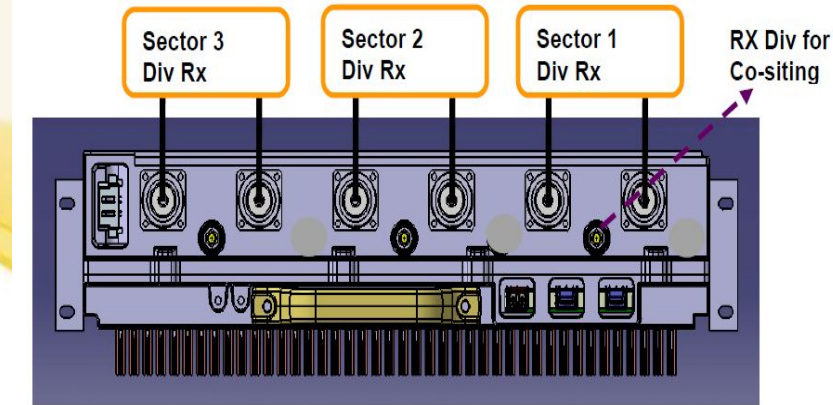
- ❖ Supports up to 6+6+6



RF module Functions

Each branch consists of a transmitter, two receiver chains, and front end software tunable filters (STuF). FXxx is a 3U high module with an integrated, replaceable 3-fan assembly for module cooling. The supported functions are:

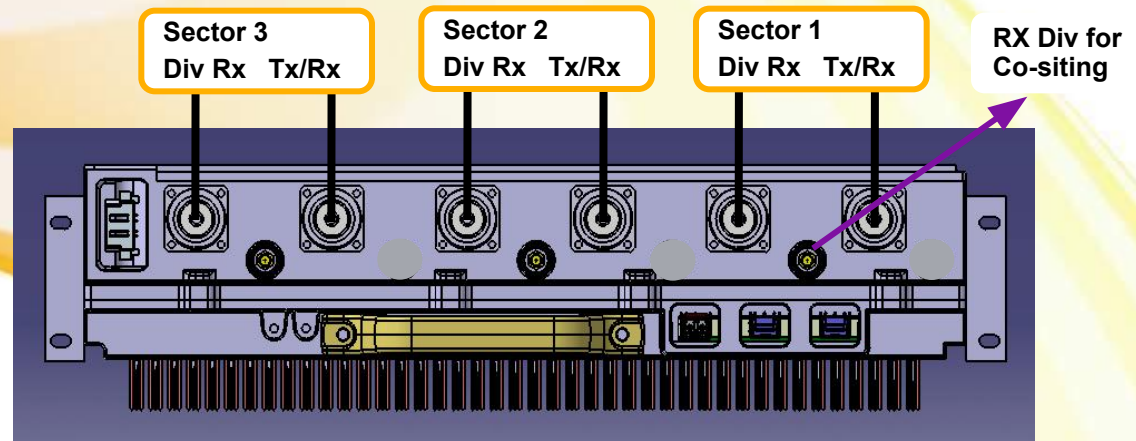
- chaining up to three RF Modules with OBSAI RP3_01
- 2-way receive diversity in the receiver chains
- integrated antenna line supervision
- MHA, EGPRS2, and VAMOS support
- digital and control circuitry, optical interface, DC/DC power conversion, and other necessary functionalities



Version	Description
FXDA	GSM 900 full band (E-GSM)
FXDJ	GSM 900 J-band (P-GSM for CDMA co-siting)
FXEA	GSM 1800 full band
FXCA	GSM 850 full band
FXFA	GSM 1900 full band

Flexi Multiradio 3-Sector RF Module Triple 70W

- < 25 liters
- < 25 kg
- 3 height units
- IP65
- -35 to +55 °C



- 1 RF module for 3-sector site, 18 carrier (3x6) capacity with integrated Duplex Filters
- 3 x 60W at antenna connector
- Compliant to MC BTS Class 2 specification, with reduced capacity (3x3) to class 1 specification
- Available in 850 MHz, 900 MHz full band, J band, 1800 MHz and 1900 MHz band
- Active bandwidth software tunable for 20MHz@ 900*/1800/1900 MHz, and 15MHz@850MHz
- 3 RP3 01 OBSAI Interfaces, for System Module connectivity and RFM chaining
- 3 TX/RX Antenna Interfaces, 3 RX Diversity Antenna Interfaces** (see notes)
- 3 RX outputs for diversity sharing with co-sited BTS (Ultrasite/Flexi EDGE/BS2xx)
- Support for AISG 2.0 (only for 3G), Bias-T's and VSWR measurement
- 48V DC input

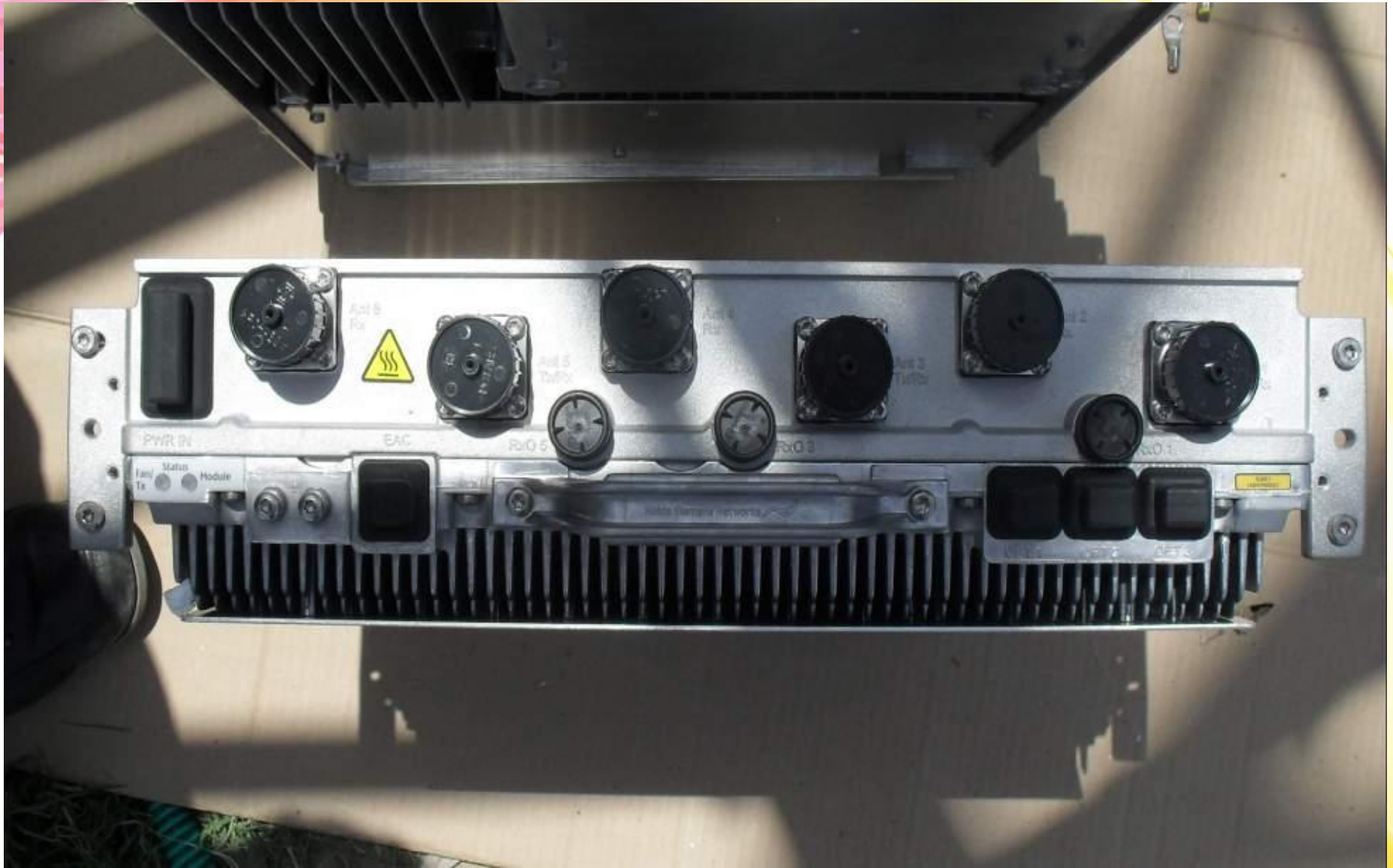
* 12.5MHz for 900 J Band

RF Module power requirements and output power

Property	Value
Nominal system voltage	48 V DC
Input voltage range	40.5 - 57 V DC

TX power of GSM configurations

Configuration	Number of RF Modules	Output power per TRX	Antenna branches
2+2+2	1	30W	2/2/2
3+3+3	1	20W	2/2/2
4+4+4	1	15W / 20W*	2/2/2
6+6+6	1	10W / 15W*	2/2/2
8+8+8	2	15W / 20W*	2/2/2
12+12+12	2	10W / 15W*	2/2/2
4+4+4 4+4+4**	2	15W / 20W*	2/2/2 2/2/2
4+4+4 2+2+2**	3	30W	2/2/2 2/2/2



Flexi Remote Radio Head (FHxA)

Remote Radio Head is a 2-branch MCPA unit optimized for single sector usage with 2-way diversity. It consists of two individual branches designed to transmit and receive Multicarrier signals of multiple radio technologies concurrently.

Each branch contains the transmitter and receiver chains and the front end filters. Each branch contains one receiver chain in the RRH. The front end filters are fixed filters covering the whole band. FHxA contains integrated antenna line supervision.

Just like 3 sector RF module, RRH contains the necessary common functionality like the necessary digital and control circuitry, OBSAI interface and the needed DC/DC power conversion. RRH uses natural convection cooling, i.e. it does not have cooling fans. There is a common baseband part for



Flexi Remote Radio Head (FHxA)

BTS external and internal interfaces provided by FHxA are:
48 VDC input, integrated class 2 OVP

External Alarm Interface

Optical OBSAI RP3-1 Interface to System Module and RRH
Chaining

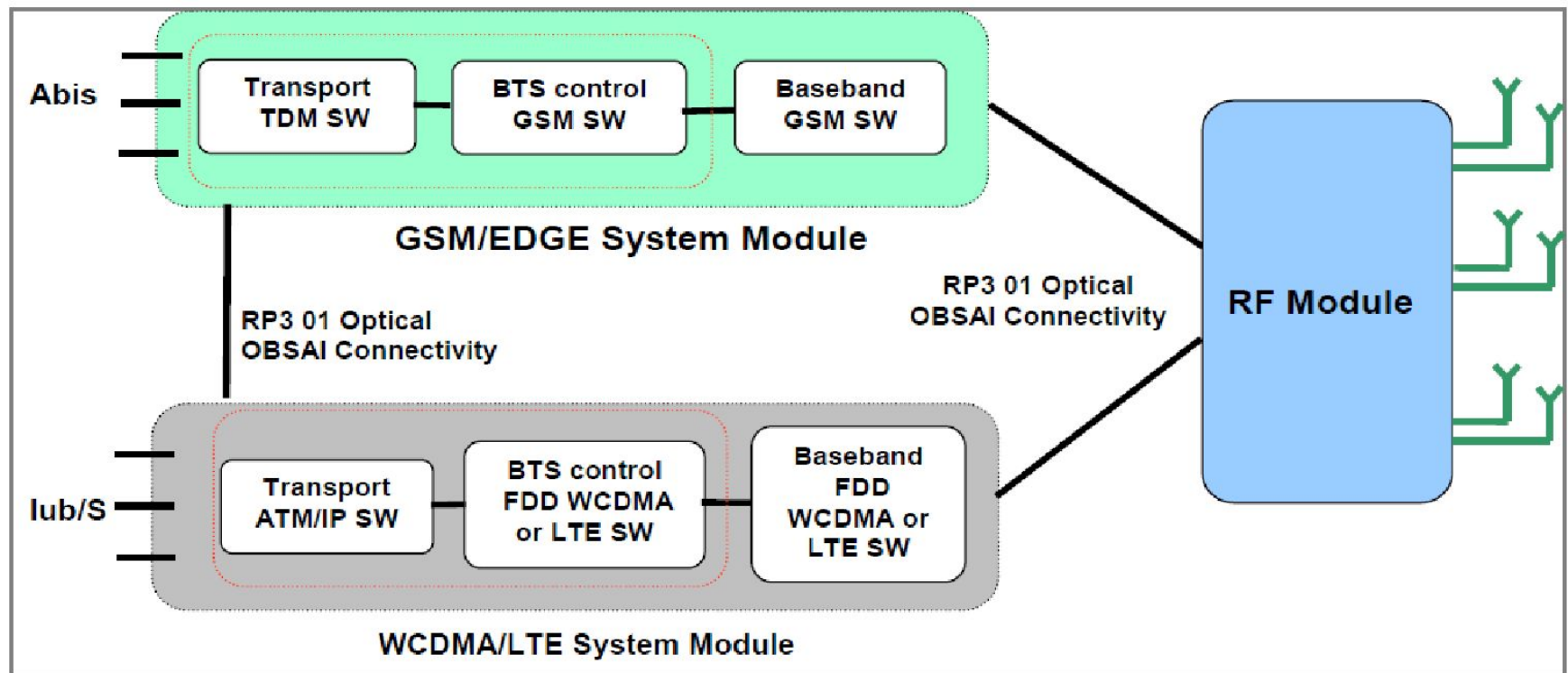
Duplexed Antenna interfaces

Flexi Multiradio BTS RRH is available in 900 and 1800 bands

FHDA, Flexi RRH 2TX 900

FHEA, Flexi RRH 2TX 1800

Flexi Multiradio BTS Architecture



Flexi Multiradio BTS is a Multiradio BTS capable for GSM/EDGE, WCDMA and LTE dedicated or concurrent operation

Configurations

RP3 Configurations

Optical OBSAI RP3-1 is used for the inter connection between the system module and the radio. There can be several radios simultaneously in a BTS configuration and they can be of different frequency band. The radios can be both 3-sector radio modules and remote radio heads. The radios can be used in dedicated or in concurrent mode.

GSM/EDGE and WCDMA/LTE have separate system modules ESMx and FSMx which can have common or independent connectivity to Radio Modules

Configurations

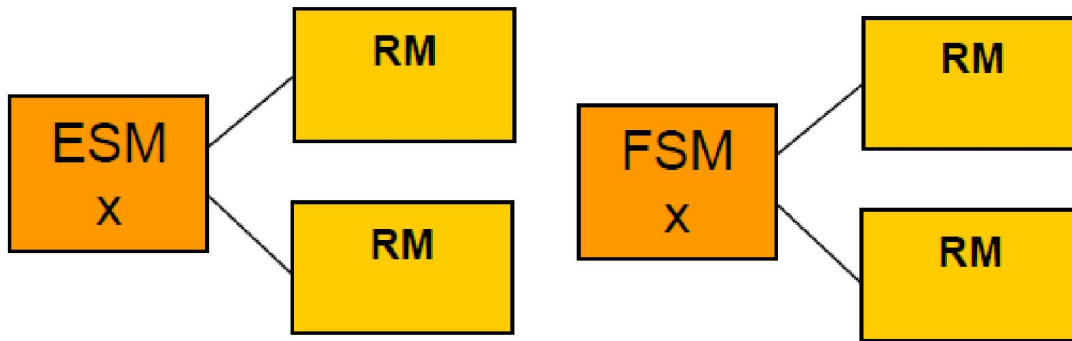
System module interconnection

It is possible to inter connect the GSM/EDGE and the WCDMA/LTE system modules in concurrent configuration using RP3-1 connection. The connection can be used for synchronization only as well as for user and control data.

an have an extension system module, which is another FSMx. The system modules are interconnected using RP3-1. The system modules within a BTS configuration are co located

Dedicated Radio Connection

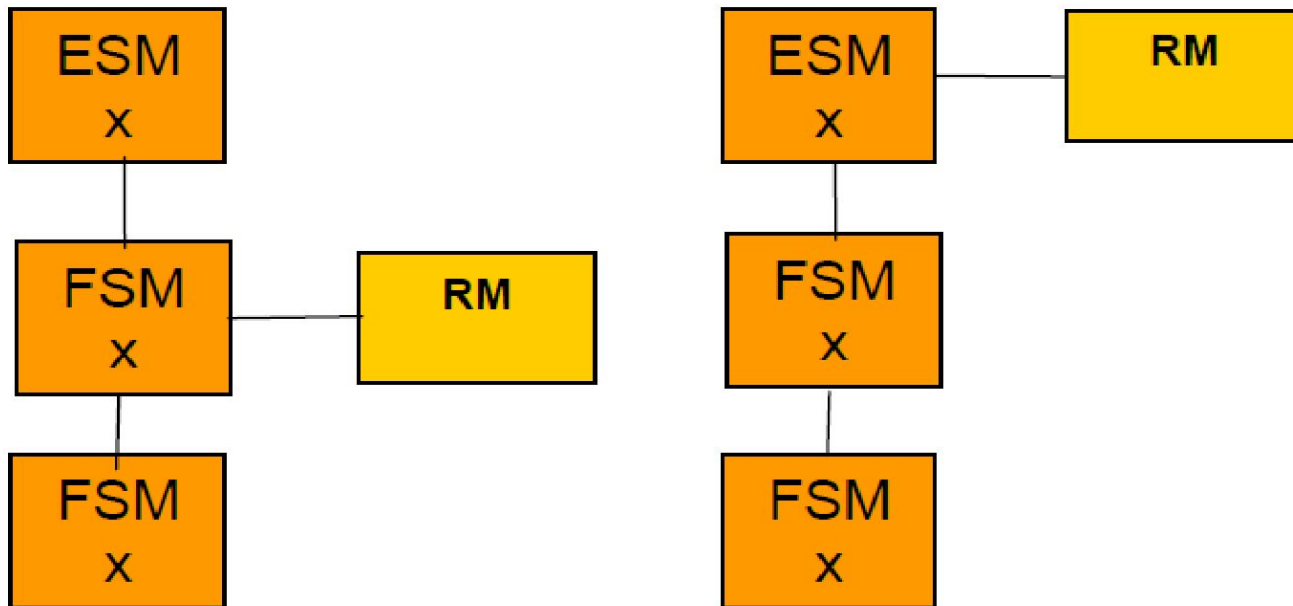
The radios may be dedicated when they have separate RP3-1 connections to the system modules (RM in the following figures indicates 3 sector RFM or 2TX RRH). If there are two system modules this means that the radio technologies have dedicated radios in use.



System Module Chaining

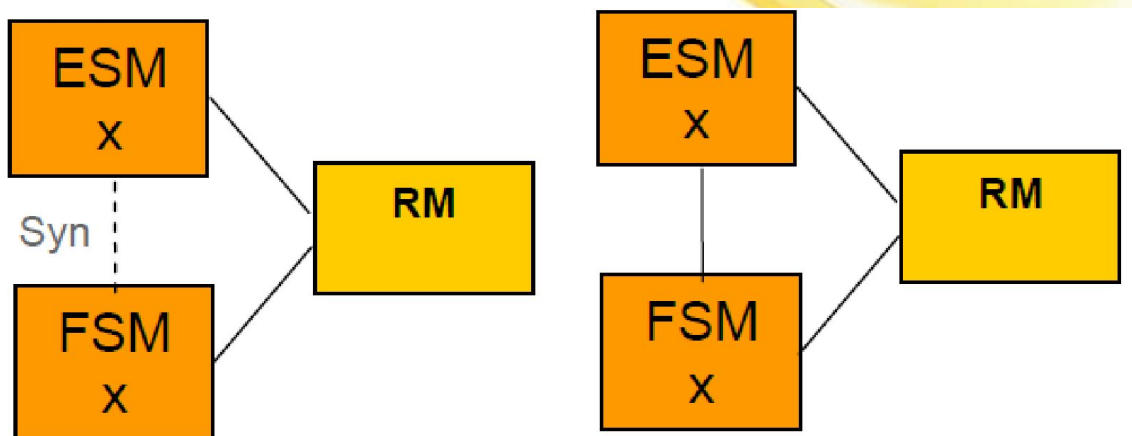
Flexible RP3 configuration allows connection just from one system module to the radios if they are shared between different radio technologies. This requires a RP3-1 traffic connection between the system modules. This reduces the number of optical cables that are needed for the radios and enables easy expandability to new radio technology without a need to install new cabling to the radios.

An example of a RP3-1 configuration with a radio connected to FSM or to ESMx, which is further connected to an Extension FSM and to ESMx or FSM is presented below



Shared Radio Connection

It is possible to have separate dedicated RP3-1 connections from both system modules to the radios if they are shared between different radio technologies. This can be used also for link redundancy in the RP3-1 connections if the system modules are interconnected



GSM/EDGE specific configurations

Following GSM/EDGE configurations are possible:

Up to 12 cells.

Up to 12 GSM/EDGE TRX/cell

Up to 36 TRX BTS (BCF) level configurations for GSM/EDGE.

Up to 108 TRX (36+36+36) site level configurations with Multi BCF/common BCCH.

- IDD (Intelligent Downlink Diversity) and 4-way UL Diversity
- Dual band configurations

All possible TRX/cell configurations can be built within these limits. In addition to symmetrical configurations like 2+2+2 between the cells also unsymmetrical combinations are supported like 1+2+3. A single radio branch can be shared between operators.

WCDMA/LTE specific configurations

The existing WCDMA and LTE configurations are supported.

WCDMA: Up to 4+4+4 (20MHz) in 900, 1800 and 1900 MHz band and 3/3/3 (15MHz) in 850 band.

LTE Bandwidth: 1.4/3/5/10/15/20 Mhz

Concurrent mode Configurations

Multiradio BTS can be concurrently used in various configurations. Also any of the supported radio technologies can be used alone. Both 3-sector RFM and RRH support GSM/EDGE, WCDMA and LTE simultaneously.

Following configurations are possible in concurrent mode:-

Up to 555 GSM+5MHz LTE or 1 WCDMA carrier

Up to 444 GSM+10MHz LTE or 2 WCDMA carriers

Up to 222 GSM +10MHz LTE+1WCDMA carrier

Up to 15MHz LTE and 2 GSM/EDGE TRXs or 1 WCDMA carrier (Supported from March 2011)

BTS Synchronization and transport solutions

The Flexi Multiradio BTS transport solution is based on the Flexi platform. It supports chaining of the sites by having adequate number of interfaces and by supporting add-drop functionality which means that one common pipe backhaul for the complete radio site. Each system module uses its own transport plug in unit. The transport interfaces in the system modules can be chained so that only one physical connection leaves the BTS site. BTS transmission topologies such as hub sites and transmission loop masters are supported at the BTS site.

The Abis and Dynamic Abis and Iub interfaces of the Flexi Multiradio BTS comply with the existing Flexi BSC and RNC. It is possible to reuse the existing BTS external transmission equipment with Flexi Multiradio BTS. The Flexi Multiradio BTS external transmission interfaces are compatible with the existing Nokia Siemens Networks products

BTS Synchronization

The Flexi Multiradio BTS is able to take its reference frequency from any of the following sources:

External reference source, such as the LMU, GPS or other BTS

- PDH terrestrial transmission input
- BTS Internal Clock Source; to be used (for limited period) if external timing reference is lost

In concurrent mode either ESMx or FSMx can be the synchronization master of Flexi Multiradio BTS while the other is a slave. The synchronization is done through RP3-1 connection between the system modules. Automatic master recovery in case of failure is supported by hardware.

2G LMU Interface

External 2G synchronization can be provided by LMU (LMUB), which is an existing separate unit within the BTS. The BTS provides an interface for 2G LMU clocks, control and power. In ESMx the interface is similar as in ESMA and the same cable can be used. The Q1 interface of ESMx is used as LMU control interface. ESMx clock input (SIN) interface is used for LMU clocks and power.

ESMx integrated transmission

The Flexi Multiradio BTS GSM/EDGE system module uses the same transport options as with existing Flexi EDGE BTS. The transport interface comes in five different types of plug in units inserted into the system module (ESMx):

FIEA : 8*E1 asymmetrical

FIPA : 8*E1/T1 symmetrical

FIFA: 2*Flexbus; TNC-type 50 Ω coaxial connector

□ FIQA: 1*SFP port, 2* Fast Ethernet, 4*E1/T1 symmetrical

FIYA : 1*SFP port, 2* Fast Ethernet; 4*E1/T1 asymmetrical

FIQB and FIYB will be supported with RG20 SW release

Mains power requirements

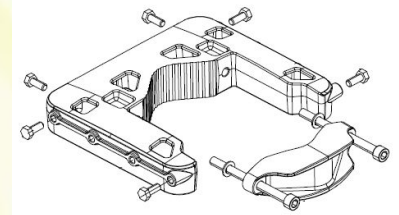
At the site there must be a main switch for disconnecting the BTS mains power. The disconnecting device shall disconnect both input supply poles simultaneously.

- ❖ The minimum cross-section of the mains power copper (Cu) conductor is following:
 - When 220-240 VAC is used, power cables shall be 1.5 - 2.5 mm².
 - When 100-110 VAC is used (split phase), power cables shall be 1.5 - 2.5 mm².
 - When 48 VDC is used, power cables shall be 10-35 Sq.mm as per consumption and breaker ratings.

NSN Multi Radio Implementation Solutions

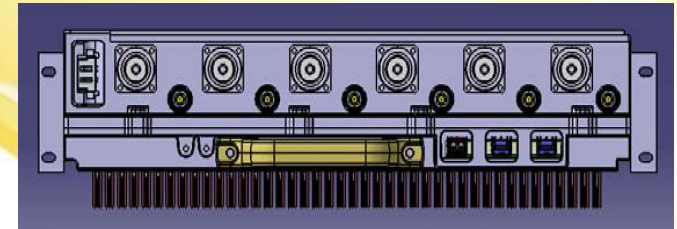


ESMB/ESMC

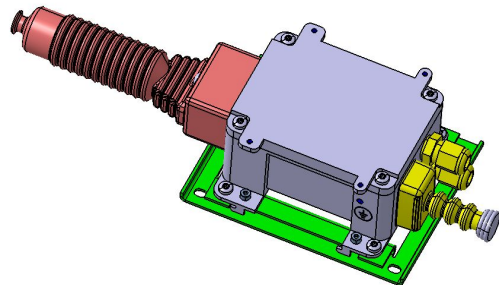


FPKA

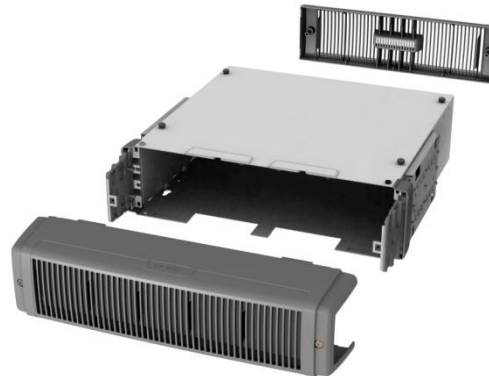
TTSL-Product overview



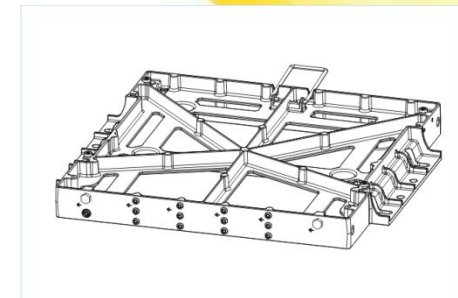
FXEA



FSEC/S

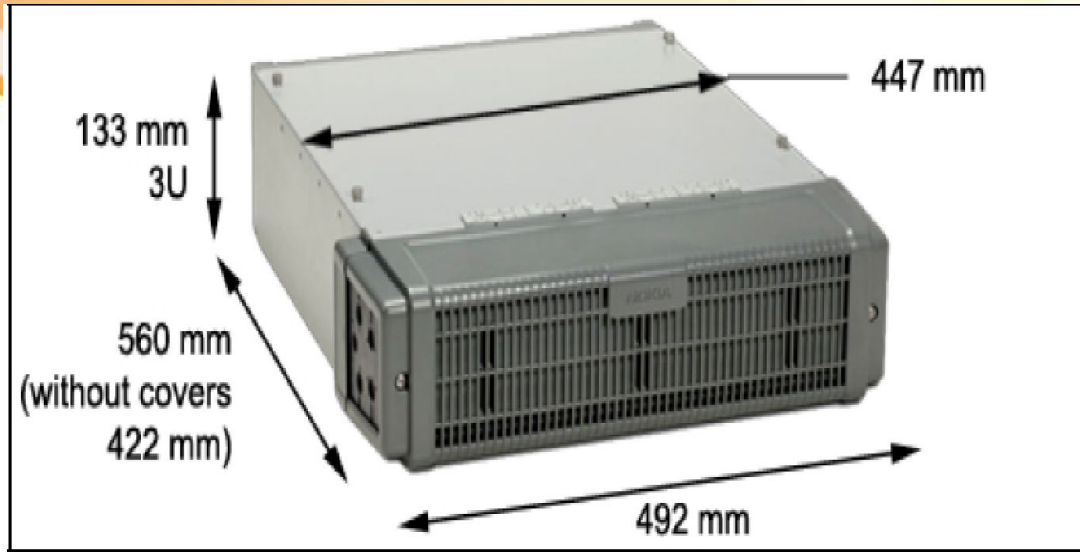


EMHA



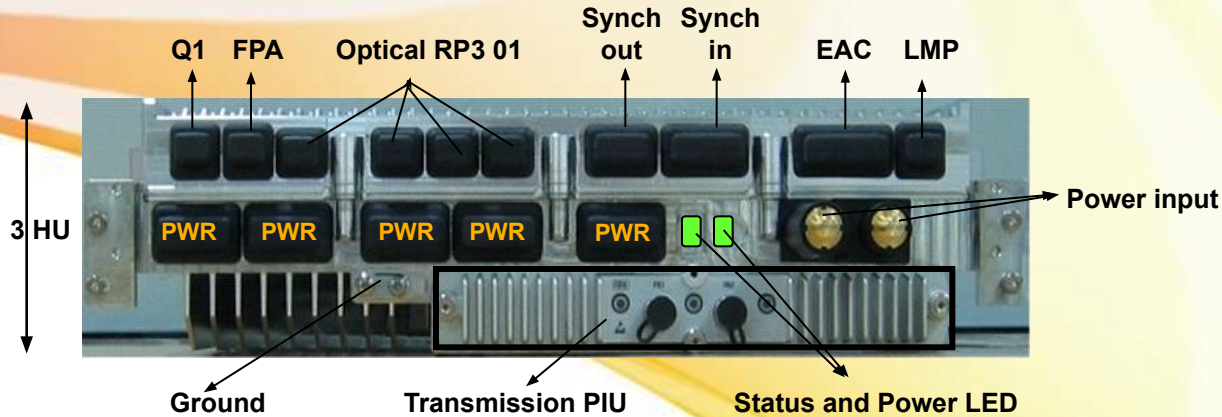
FMFA

Dimensions and Weight



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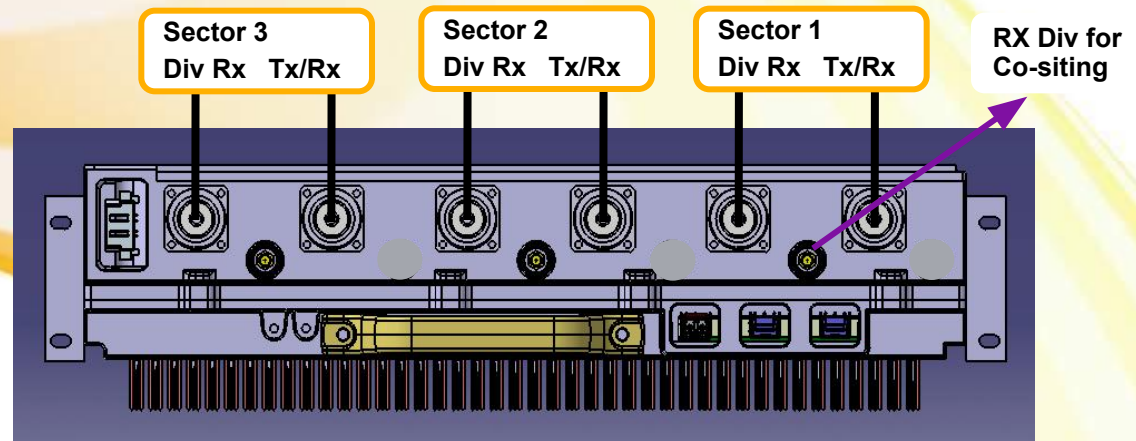
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- 48VDC BTS power input terminals
- 5 Power distribution I/Fs (4 for co-located RFMs, and 1 extra for any additional modules)
- A slot for Integrated transport sub-module (various interface options available)
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Flexi Multi Radio 3-Sector RF Module Triple 70W

- < 25 liters
- < 25 kg
- 3 height units
- IP65
- -35 to +55 °C

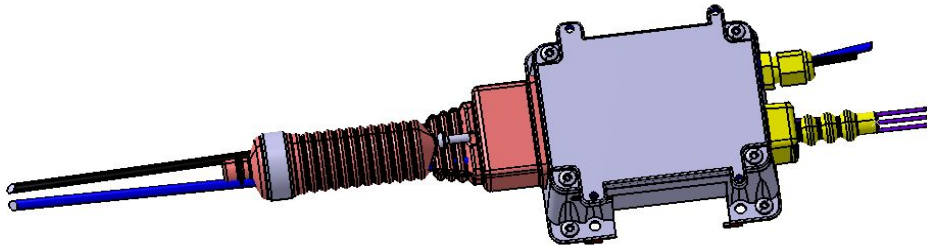


- 1 RF module for 3-sector site, 18 carrier (3x6) capacity with integrated Duplex Filters
- 3 x 60W at antenna connector
- Compliant to MC BTS Class 2 specification, with reduced capacity (3x3) to class 1 specification
- Available in 850 MHz, 900 MHz full band, J band, 1800 MHz and 1900 MHz band
- Active bandwidth software tunable for 20MHz@ 900*/1800/1900 MHz, and 15MHz@850MHz
- 3 RP3 01 OBSAI Interfaces, for System Module connectivity and RFM chaining
- 3 TX/RX Antenna Interfaces, 3 RX Diversity Antenna Interfaces** (see notes)
- 3 RX outputs for diversity sharing with co-sited BTS (Ultrasite/Flexi EDGE/BS2xx)
- Support for AISG 2.0 (only for 3G), Bias-T's and VSWR measurement
- 48V DC input

* 12.5MHz for 900 J Band

FSES overview

- FSES is an over voltage protection device. FSES is used to protect Flexi Units in case of indirect lightning strike.
 - FSES is used in DC input when the input line is more than 2 meters. This is the case in feeder less site solutions. Cabinet installations or stack installations are not the main stream for FSES.
 - FSES is used in LTE, WCDMA and GSM/EDGE
 - Protection level of FSES is 15kA.
- estimated weight of the FSES (1000g, may be slight over 1000g)
 - estimated size of the product package for FSES(160mmx160mmx200mm)



Flexi Multi Radio BTS optional items (3/5)

Cabinets and cabinet options:

- 470142A FCOA Flexi Cabinet Outdoor
- 470152A FCIA Flexi Cabinet Indoor

Mounting kits for modules:

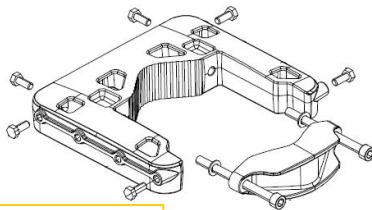
- 470316A EMHA Flexi EDGE Mech Module 3HU
- 470149A FMFA Flexi Mounting kit for Floor, Wall and Pole
- 469978A FPKA Pole Mounting kit



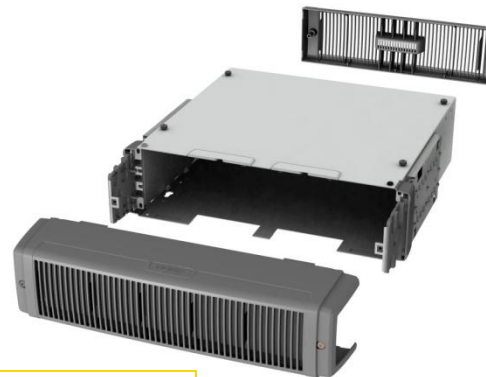
FCOA



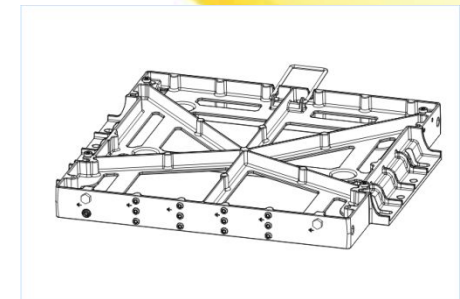
FCIA



FPKA



EMHA



FMFA

Multi Radio BTS Solution Concept

Indoor classic solution

Outdoor classic solution

Stack/wall Classic solution

Pole solution

Indoor Distributed solution

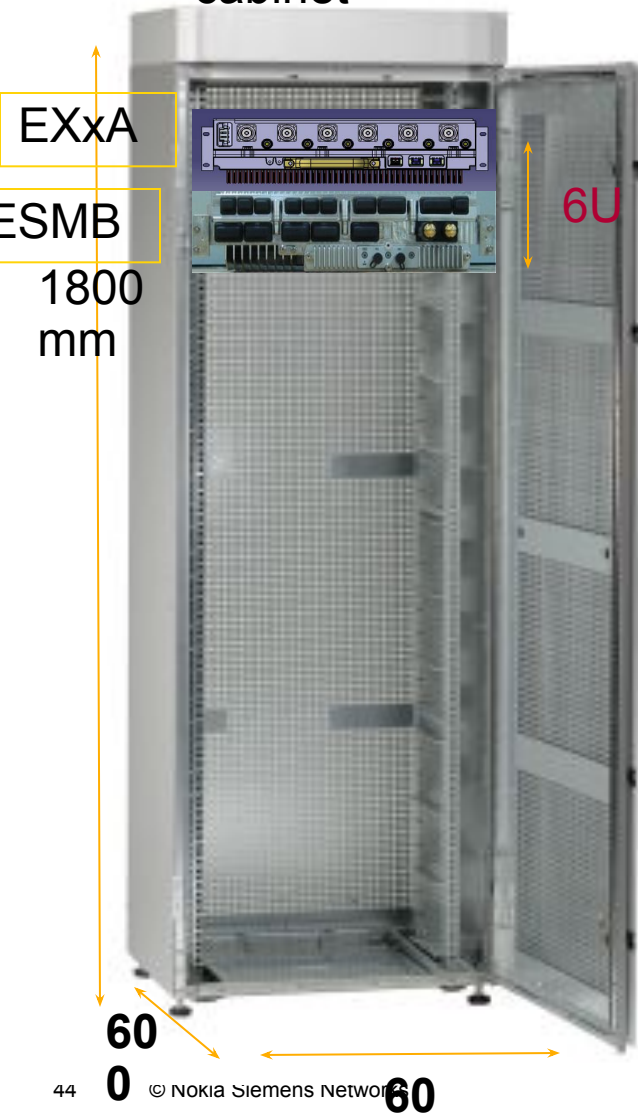
Outdoor Distributed solution

Stack/wall Distributed solution

Pole Distributed solution

Indoor Classic Solution

Indoor cabinet



- ❖ System Module and RF Module install together in Indoor Cabinet

Requirement:

- ❖ Space required for 6 feeder cable routing and feeder clamp mounting in exiting HCT & VCT
- ❖ Space required in Hatch plate for 6 feeder cable entry
- ❖ Space required for jumper cable and power cable routing in indoor cable tray
- ❖ 3GSM pole required as per TSSR
- ❖ Space required for FCIA Cabinet (600x600mm)
- ❖ Space required for Korne back mount frame and all infra Alarm patch to alarm panel
- ❖ MCB : 32A -1no. Required for power tapping (back end BB/PP/DG/AC up-gradation is IP's responsibility and they are expected to complete the same before offering the site RFI)
- ❖ 2nos Hole each with nut & bolt required in IGB & EGB and ensure earthing resistance should be less than 2ohm

NSN solution: Outdoor classic

System Module and RF Module install together in Outdoor Cabinet

Requirement:

existing OD sites-Space required on outdoor foundation for FOCA installation (800x800mm) (part of 1800*1200 OD Platform)

3GSM pole required as per TSSR

Space required for Krone back mount frame and all infra Alarm patch to alarm panel

Space required for 6 feeder cable routing and feeder clamp mounting in HCT &VCT

O/D sites-Duct or cable tray required from shelter or Power plant to existing cabinet for laying of Power & PCM cable

2nos Hole each with nut & bolt required in IGB & EGB and ensure earthing resistance should be less than 2ohm

MCB 32A-1no. 16A-1no. Required (back end BB/PP/DG/AC up-gradation is IP's responsibility and they are expected to complete the same before offering the site RFI)

Space required for 6 feeder cable routing and feeder clamp mounting in exiting HCT &VCT

Cable tray required up to OD Cabinet

Outdoor Cabinet



EXxA

ESMB/ESMC

Stack/wall Classic solution

System Module and RF Module install together in plinth

Requirement:

Space required for 6 feeder cable routing and feeder clamp mounting in existing HCT & VCT

Space required in Hatch plate for 6 feeder cable entry

Space required for jumper cable and power cable routing in indoor cable tray

3GSM pole required as per TSSR

Space required for Stack (600x600mm)

Space required for Korne back mount frame and all infra Alarm patch to alarm panel

MCB : 32A -1no. Required for power tapping (back end BB/PP/DG/AC up-gradation is IP's responsibility and they are expected to complete the same before offering the site RFI)

2nos Hole each with nut & bolt required in IGB & EGB and ensure earthing resistance should be less than 2ohm

Note: If Stack BTS plan for Outdoor site the all requirement same as OD classic



Stack solution



Wall Solution

Pole solution

System Module and RF Module install together outside shelter or Tower bottom leg

Requirement:

O/D sites-Duct or cable tray required from shelter or Power plant to existing 2G OD BTS for laying of Power & PCM cable

Space required for Korne back mount frame and all infra Alarm patch to alarm panel

Space required for 6 feeder cable routing and feeder clamp mounting in exiting HCT & VCT

3GSM pole required as per TSSR`

MCB 32A-1no. Required (back end BB/PP/DG/AC up-gradation is IP's responsibility and they are expected to complete the same before offering the site RFI)

Provisioning of 2nos Holes with nut& bolt in IGB & EGB

Additional pole(60-120 mm Dia.) required at the at the height GSM antenna for RF module

b) GSM Antenna mount in different location then cable tray required for feeder cable routing

Cable tray required up to bottom leg pole



Indoor Distributed Solution

System Module install in FCIA cabinet and RF Module on Tower Pole

Requirement:

3GSM pole required as per TSSR

Space required for FCIA Cabinet (600x600mm) in shelter

Space required for Krone back mount frame and an infra Alarm patch to alarm panel

MCB 32A-1no. 16A-1no. Required (back end BB/PP/DG/AC up-gradation is IP's responsibility as they are expected to complete the same before offering the site RFI)

Provisioning of 2nos Holes with nut & bolt in IGB & EGB

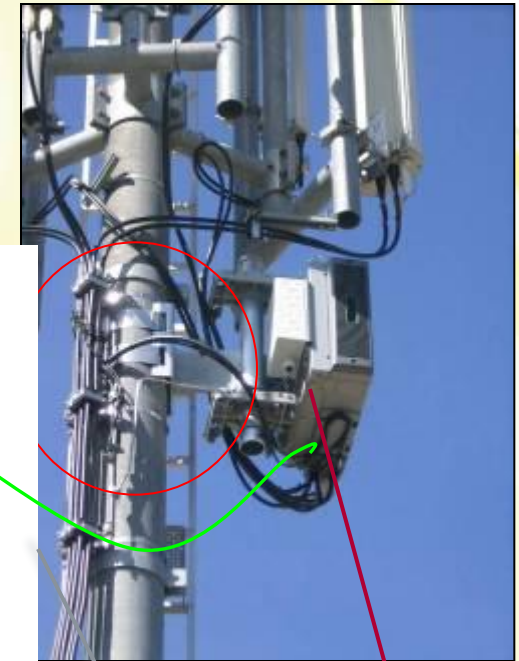
Provision of grounding in tower top

Additional GSM pole (60-120 mm Dia.) required at the height where GSM antenna are mounted. This is for mounting of RF Module

Space required for Power & OFC cable routing in HCT & VCT

Space required in Hatch plate for power and OFC cable

Indoor cabinet



Optical cable

Power cable directly connected to DCDB

Outdoor Distributed Solution

System Module install in OD cabinet and RF Module on Tower Pole

Requirement:

- existing OD sites-Space required on outdoor foundation for OD cabinet installation (800x800mm)
- O/D sites-Duct or cable tray required from shelter or Power plant to existing 2G OD BTS for laying of Power & PCM cable
- OD sites- EGB with 2 nos hole along with nut and bolt is required. Provision of grounding in tower top
- 3GSM pole required as per TSSR
- Cable tray required up to OD Cabinet
- Provisioning of 2nos Holes with nut& bolt in IGB & EGB
- 32A-1no. MCB required for power taping of (back end BB/PP/DG/AC up-gradation is IP's responsibility and they are expected to complete the same before offering the site RFI)
- Additional pole(60-120 mm Dia.) required at the at the height GSM antenna for RF module.
- Space required for Power & OFC cable routing in HCT &VCT

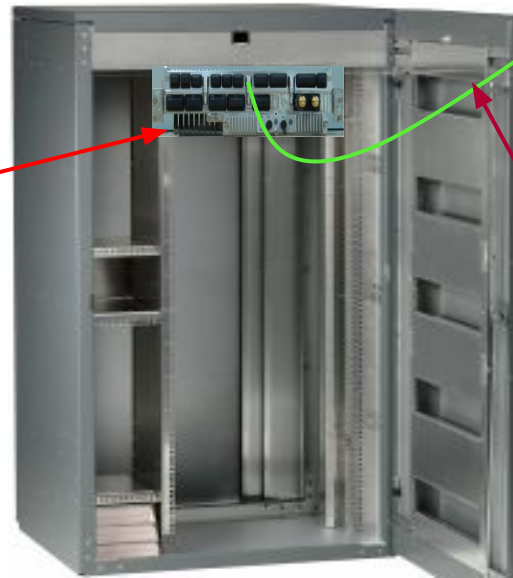


RF Module

Power cable directly connected to DCDB

Optical cable

System Module



OD cabinet

Stack Distributed Solution

System Module install in Plinth and RF Module on Tower Pole

Requirement:

3GSM pole required as per TSSR

Space required for FCIA Cabinet (600x600mm) in shelter

Space required for Krone back mount frame and all infra Alarm patch to alarm panel

MCB 32A-1no. 16A-1no. Required (back end BB/PP/DG/AC up-gradation is IP's responsibility and they are expected to complete the same before offering the site RFI)

Provisioning of 2nos Holes with nut& bolt in IGB & EGB

Provision of grounding in tower top

Additional GSM pole(60-120 mm Dia.) required at the at the height where GSM antenna are mounted. This is for mounting of RF Module

Space required for Power & OFC cable routing in HCT &VCT

Space required in Hatch plate for power and OFC cable

Note: If Stack BTS plan for Outdoor site the all requirement same as OD Distributed



RF Module

Power cable directly connected to DCDB

Optical cable



System Module ESMB

OD cabinet



Pole Distributed Solution

System Module outside shelter or Tower bottom leg and RF Module install on tower pole

Requirement:

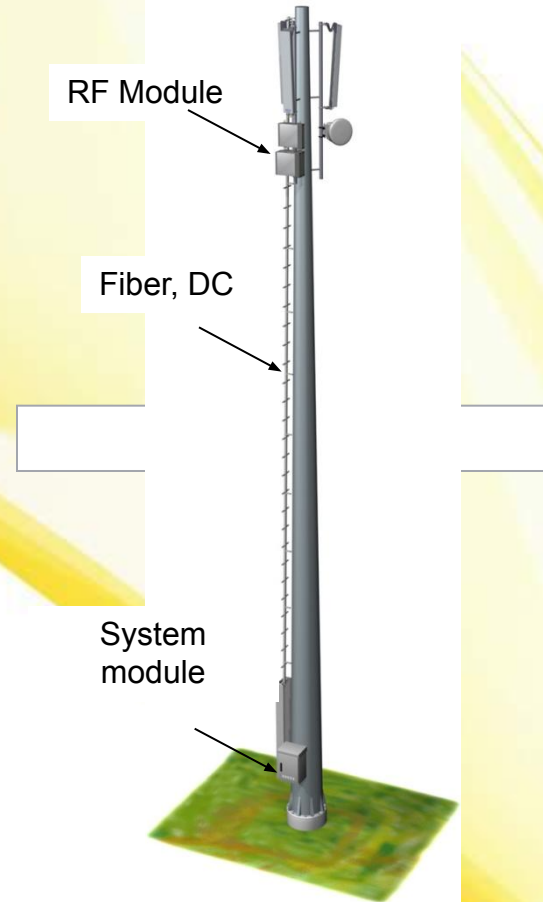
O/D sites-Duct or cable tray required from shelter or Power plant to existing 2G OD BTS for laying of Power & PCM cable

Space required for Korne back mount frame and all infra Alarm patch to alarm panel

3GSM pole required as per TSSR`

MCB 32A-1no. Required (back end BB/PP/DG/AC up-gradation is IP's responsibility and they are expected to complete the same before offering the site RFI)

Provisioning of 2nos Holes with nut& bolt in IGB & EGB
2nos Additional pole(60-120 mm Dia.) required at the at the height GSM antenna dor RF module another for System module bottem of tower leg



Site Requirements-BTS

Grounding

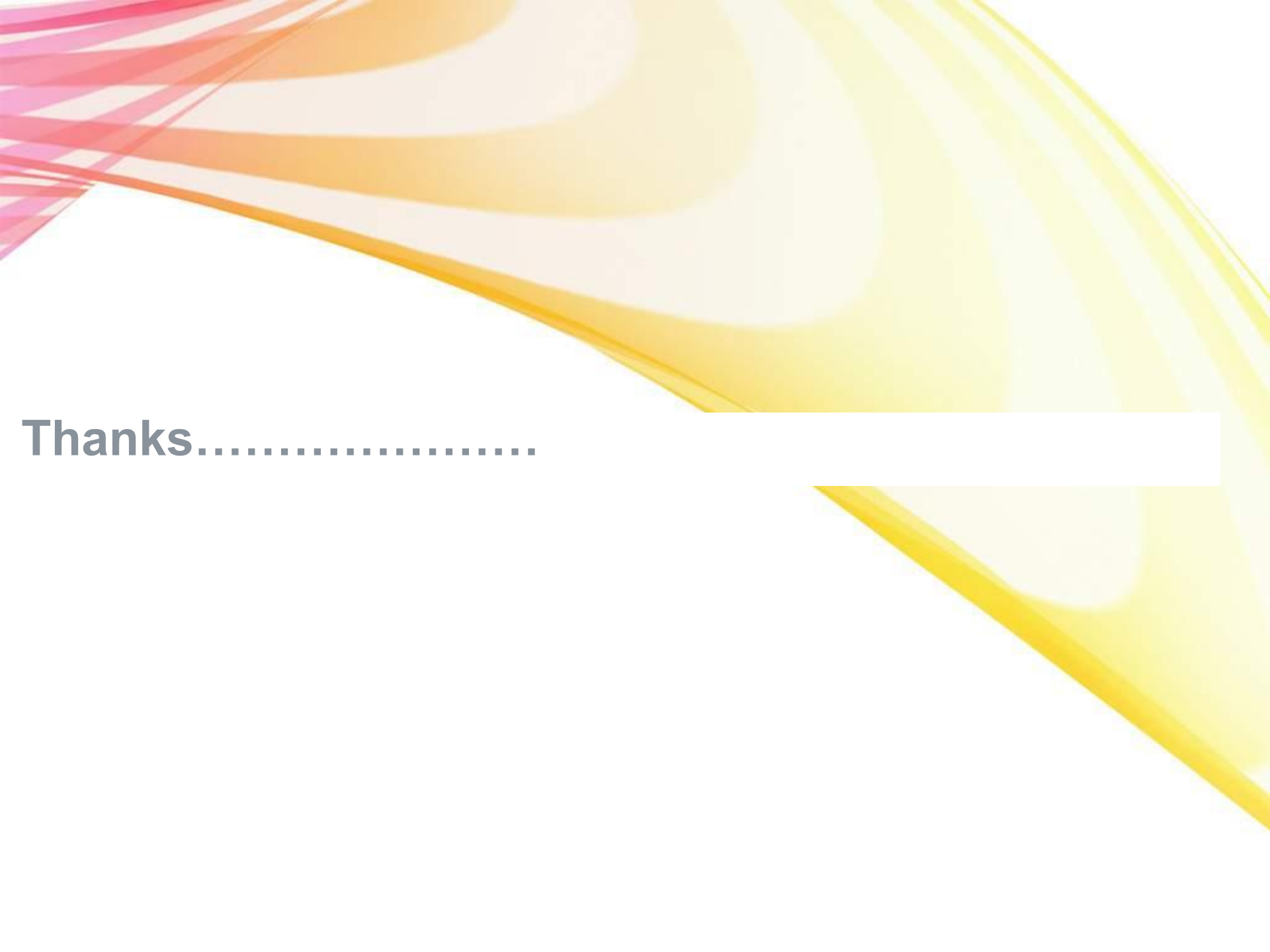
Main grounding (earthling) is tested within last 3 months.

The earthling (grounding) resistance target of the BTS site is $\leq 10 \Omega$.

The cross-sectional area of the Main Earthling Conductor shall not be smaller than live (L) and neutral never less than 6 mm².

Power

Property	Nominal operating voltage	Permitted operating voltage
DC voltage	48 VDC	40.5 to 57.0 VDC
AC voltage with optional FPMA	200 - 240 VAC	184 to 276 VAC (45 - 66 Hz)



Thanks.....

