

SRAN Training

Flexi BTS S-RAN Solution Overview

Presentation

Release SRAN16.2 / 16.10

MN GS/Delivery Excellence - Global Delivery Readiness
Didier TANGUY
December 2016



Agenda

- 1. Flexi BTS S-RAN Solution Overview**
- 2. Flexi BTS S-RAN Hardware Solution**
- 3. Flexi BTS S-RAN Documentation**
- 4. Flexi BTS S-RAN I&C Operations**

Introduction

Flexi BTS Single RAN Network Architecture

Key drivers for SRAN

- Simplified **management** OAM
- Simplified **backhaul transport** solution
- Simplified **data model**
- **Energy** saving
- Less **BB HW** needed
- Less **cabling** needed
- Faster **deployment** of new technology at BTS
- **Future-proof** solution

New SBTS Software

- One base station for GSM, WCDMA and LTE radio technologies
- Based on **Flexi Multiradio 10**
- Base Station **System Module**



Common BTS OAM

- **Common handling in Netact**, Simplified site creation, commissioning and config.
- Supporting **single radio**
- all **radio-and Transport SW upgrades**



Common backhaul IP transport

- One **IP host** and **interface**
- One **IP address** and **IP security**
- **No external IP transport boxes**



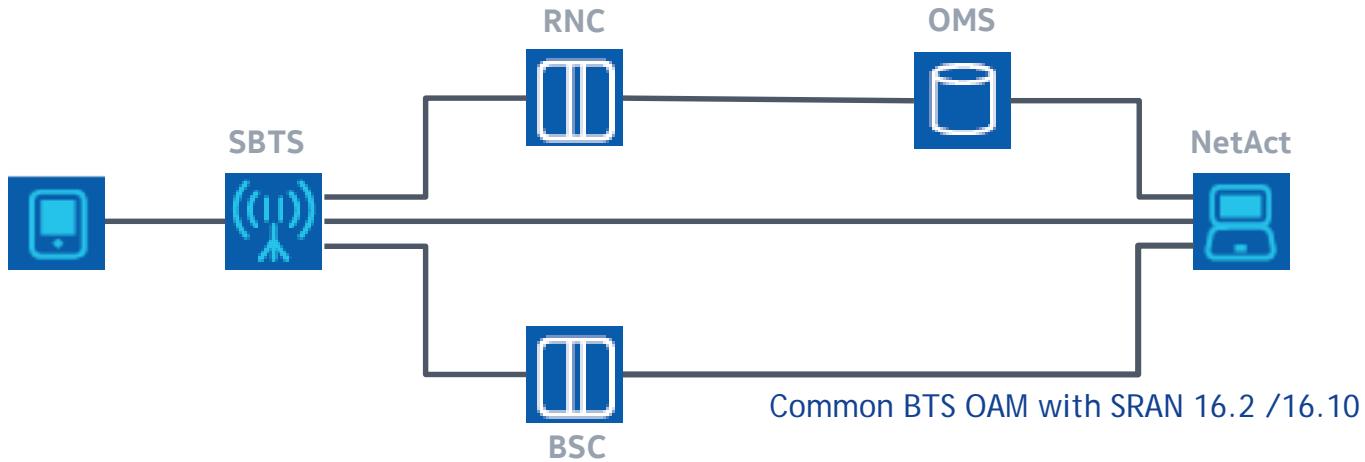
System module sharing

- Extremely **compact sites**
- **Lower energy** consumption
- **Scalable capacity**



Introduction

Flexi BTS Single RAN Network Architecture



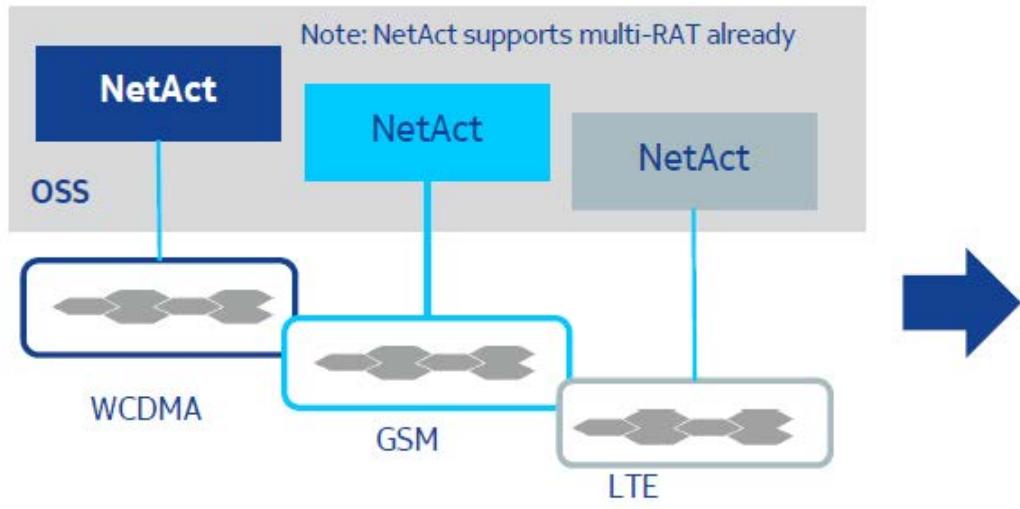
What is changing

- **Flat OAM architecture**, SBTS directly integrated to Net Act, no OMS for SBTS
- **New common OAM** for SBTS
- **New SBTS information model**
 - New root object representing SBTS.
 - Logical RNW model is assumed to be reused, changes in HW and transport model
- **Web GUI** is replacing the current BTS Site Manager
 - No need to install Nokia dedicated tool
- **New approach** to support different **BTS configurations with BTS profiles**

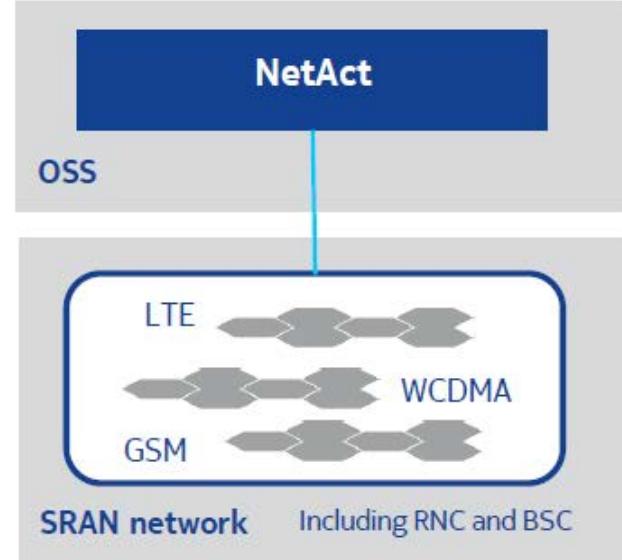
Introduction

Flexi BTS Single RAN Network – OAM Architecture

SRAN comes with consolidated Net Act



- Net Act setup **with single RAT*** networks can be **fragmented between RATs**



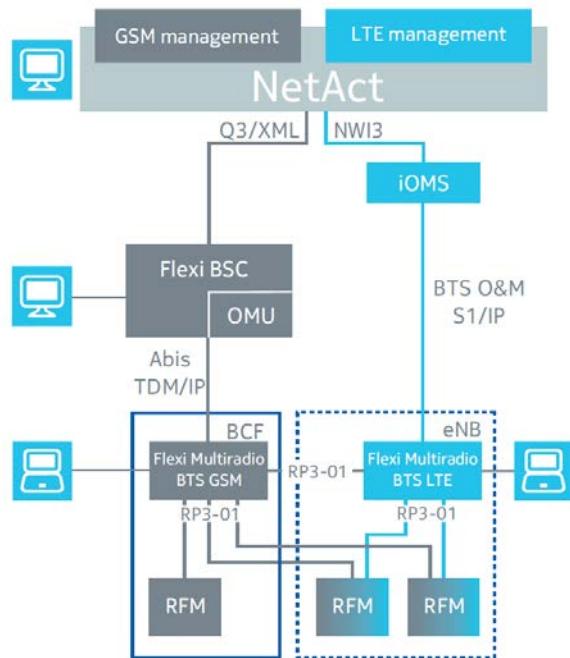
- SRAN network is operated **with one Net Act per area**
- Complete network **view in one management system**

*RAT: Radio Access Technology

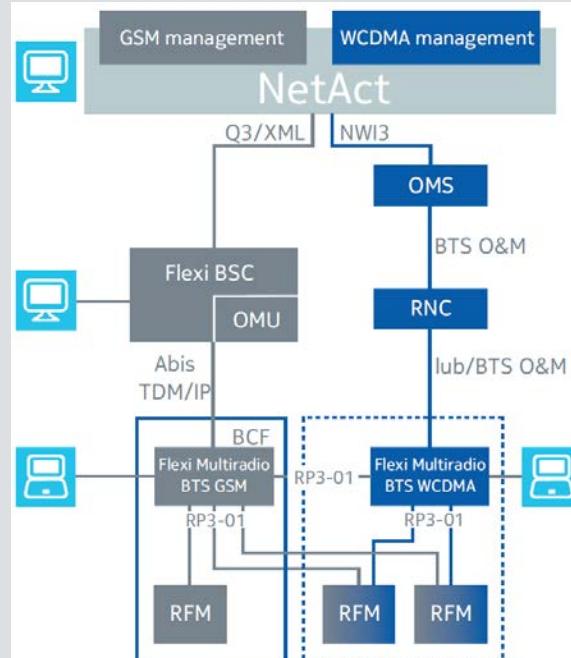
Introduction

Flexi BTS Single RAN Network Architecture Overview

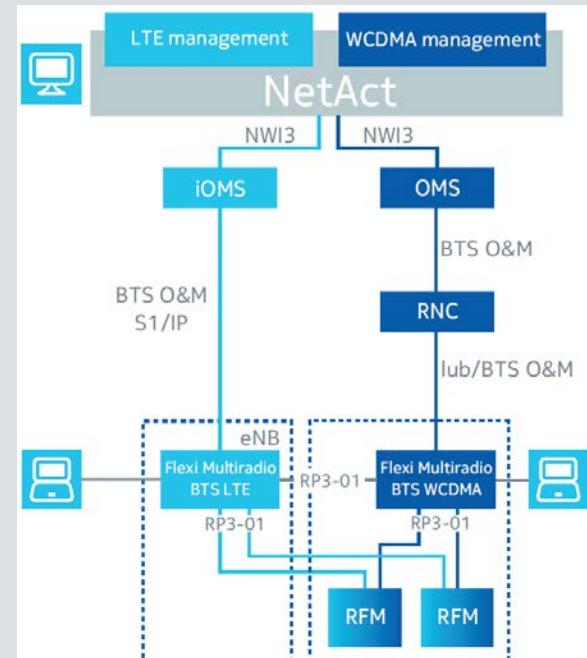
GSM-LTE RF sharing



WCDMA-GSM RF sharing



WCDMA-LTE RF sharing



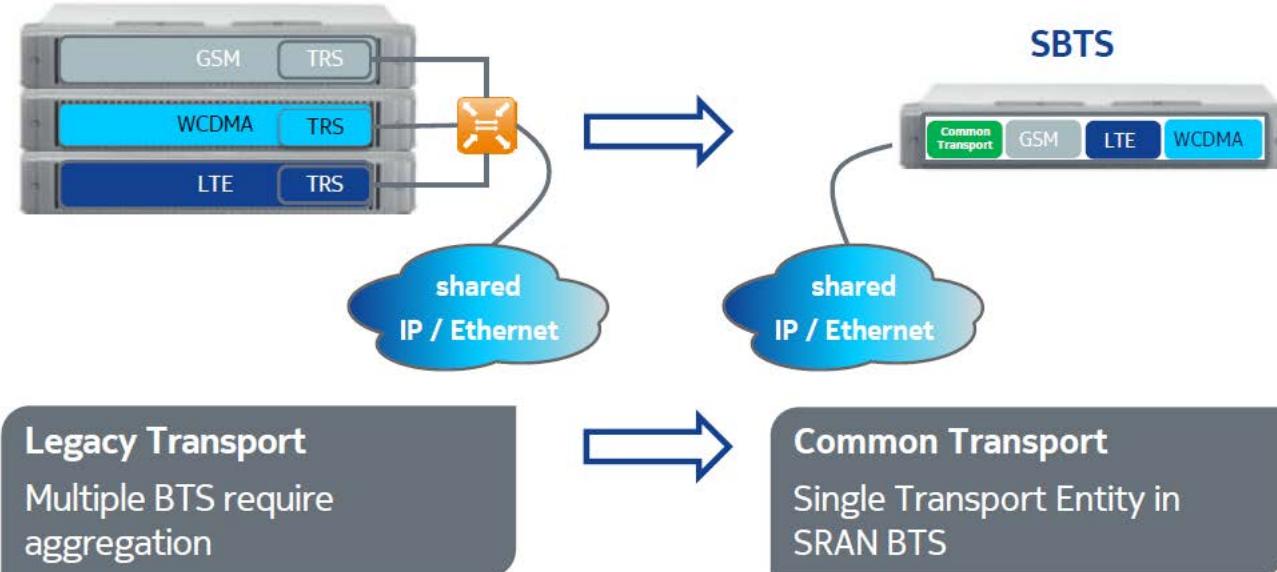
Introduction

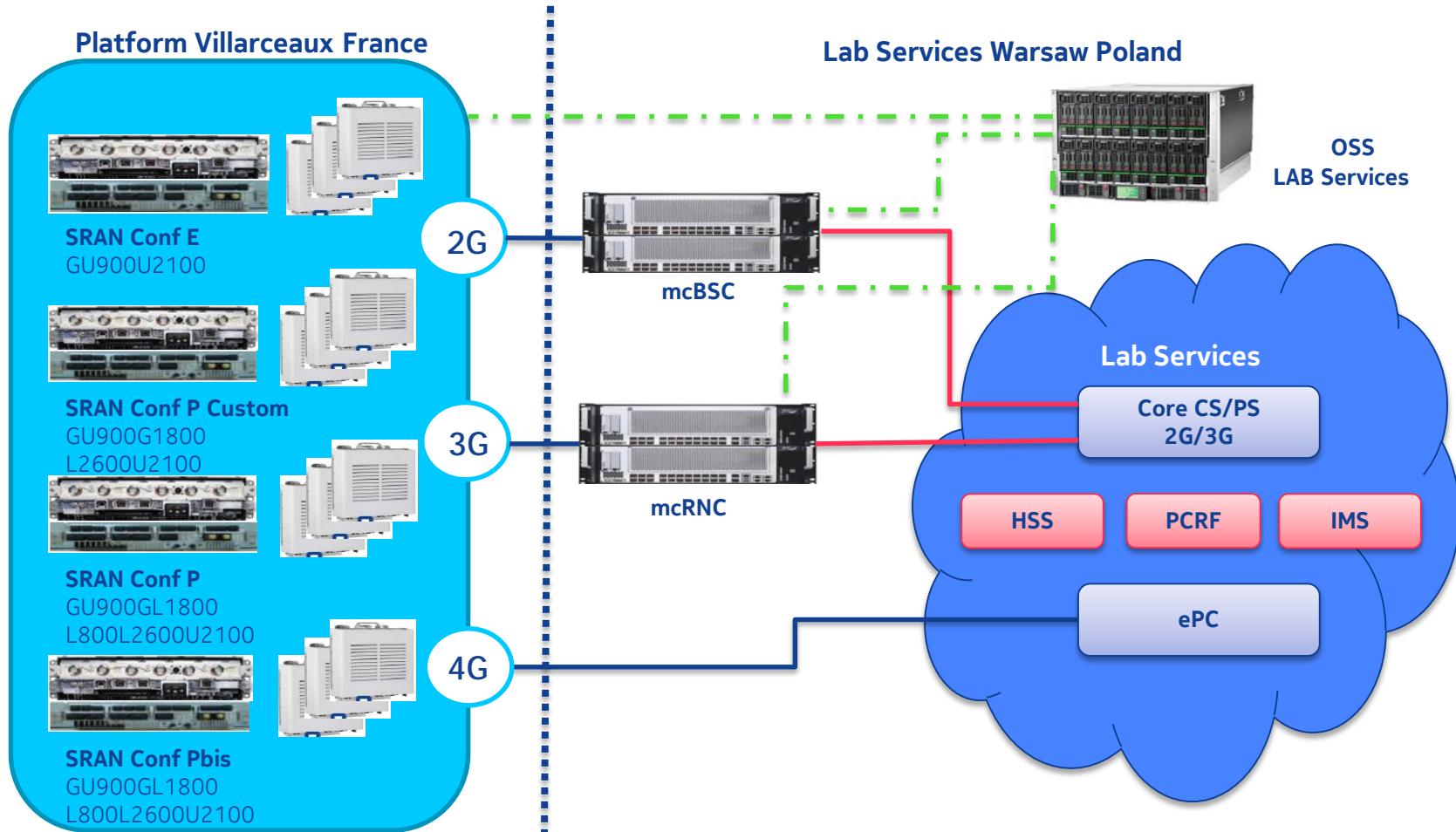
Flexi BTS Single RAN Transport Backhaul sharing

Transport backhaul sharing provides the possibility for a Single RAN site to be connected to the backhaul network with just one physical Ethernet connection.

Note that multiple Flexi Multiradio 10 BTS System Modules are required.

SBTS Common Transport - One Unified Backhaul





Configuration

Flexi BTS Single RAN Initial Configuration Naming by Type (Summary)

Configuration Type	With Radio Module:	RFM	RRH
A – Q	RFM Only	Only	N/A
A Prim – Q Prim	RFM Only • 2x RFM 900 or • 2x RFM 2100	Only + 2x RFM 900 or + 2x RFM 2100	N/A
A Bis – Q Bis	RRH except RFM 900	+ RFM 900	All other
A Bis Prim – Q Bis Prim	RRH except RFM 900 • 2x RFM 900	+ 2x RFM 900	All other
A Ter – Q Ter	RFM except RRH 2600	All other	+ RRH 2600
A Ter Prim – Q Ter Prim	RFM except RRH 2600 • 2x RFM 900 or • 2x RFM 2100	All other + 2x RFM 900 or + 2x RFM 2100	+ RRH 2600

Configuration

Flexi BTS Single RAN All Configuration Naming by Type (Summary)

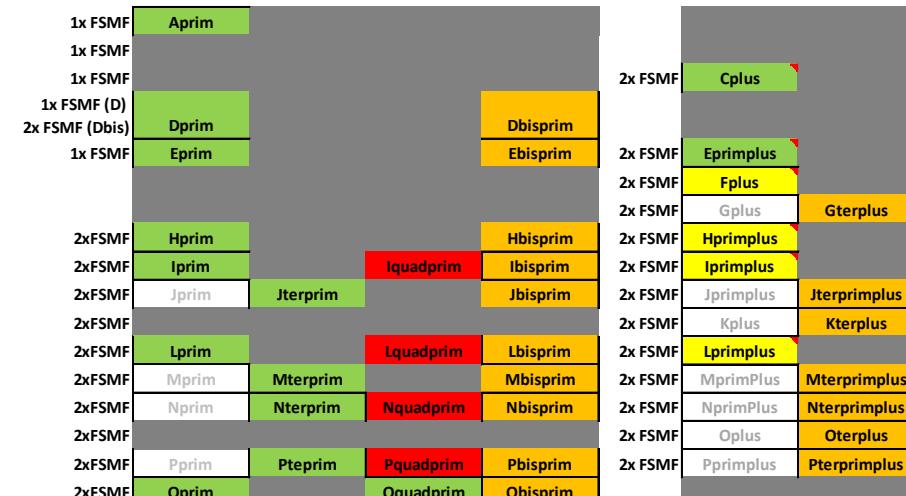
RATs and BANDs	
	900
	1800
	2100
	800
	2600

GU900	
GL1800	
U2100	
GU900 GL1800	
GU900 U2100	
GL1800 U2100	
U2100 L2600	
GU900 GL1800 U2100	
GU900 U2100 L800	
GU900 U2100 L2600	
GL1800 U2100 L2600	
GU900 GL1800 U2100 L800	
GU900 GL1800 U2100 L2600	
GU900 U2100 L800 L2600	
GL1800 U2100 L800 L2600	
GU900 GL1800 U2100 L800 L2600	
GU900 L800	

Normal 900 power (1x80W)				
Full RFM	Only 2600 in RRH	Only 2600 and 800 in RRH	RRH except 900	Full RRH
RFM	RFM	RFM	RFM	RRH
RFM	RFM	RFM	RRH	
RFM	RFM	RFM	RRH	
RFM	RFM	RRH	RRH	RRH
RFM	RRH	RRH	RRH	

Higher 900 power (2x80W)			
Full RFM	Only 2600 in RRH	Only 2600 and 800 in RRH	RRH except 900
2x RFM	2x RFM	2x RFM	2x RFM
RFM	RFM	RFM	RRH
RFM	RFM	RFM	RRH
RFM	RFM	RRH	RRH
RFM	RRH	RRH	RRH

Higher 900/ 2100 power (2x80W)	
Full RFM	Only 2600 in RRH
2x RFM	2x RFM
RFM	RFM
2x RFM	2x RFM
RFM	RFM
RFM	RRH





Agenda

- 1. Flexi BTS S-RAN Solution Overview**
- 2. Flexi BTS S-RAN Hardware Solution**
- 3. Flexi BTS S-RAN Documentation**
- 4. Flexi BTS S-RAN I&C Operations**

Introduction

Flexi Multiradio 10 System Module – Product Highlights

**Flexi Multiradio
10 BTS**

FSMF System Module

**Easy capacity
expansion**

Add-in sub-modules

Share

- LTE/GSM
- WCDMA/GSM
- LTE/WCDMA
- LTE/GSM/WCDMA

FBBA/C card

Optional sub-module
expanding SBTs
BB capacity and
connectivity



Introduction

Flexi BTS Single RAN Architecture Overview

Flexi BTS introduces a new platform

- The modular design doesn't use any backplanes
- Modules are interconnected through front panel cabling
- Modules can be installed separate from each other
(Feederless / Distributed Sites)

A Flexi BTS consists of

- 1 System Module and
- 1 optional Extension System Module

up to 6 Radio Modules or up to 6 Remote Radio Heads

- Radio Modules are available with 3 Power Amplifiers (PAs) each
 - Each PA contains one up to 20 MHz carrier
- Remote Radio Heads are optimized for 1 sector with
 - 2 PAs with up to 20 MHz bandwidth

BTS configurations

- Up to 3 cells with 20 MHz or up to 6 cells with 10MHz
- Module weight: 19-25 kg per Module

The Base Station can be installed by one person



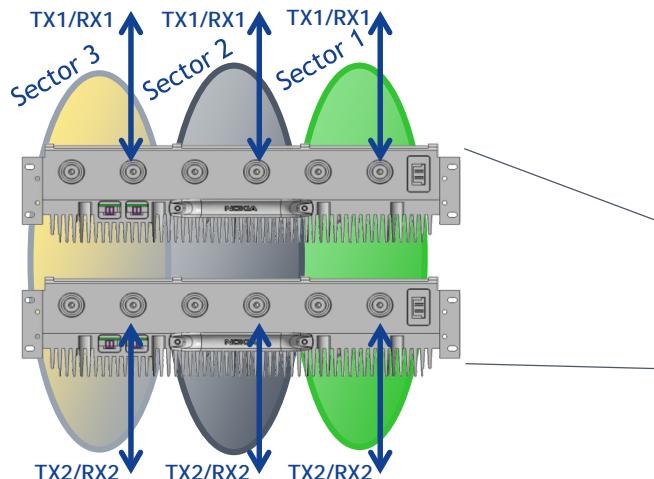
Introduction

Example Flexi BTS Single RAN Site

System Module

- Two 3-sector RF Modules for 3 sectors
- 1+1+1 @ 3 x 120 W 2TX MIMO
- Optional 4 way UL diversity
- Optional TMA/MHAs

Ultimate capacity with
3x120 W MIMO 2x2
(2TX&2RX)



Optional
TMA/MHA

Multimode
System Module

Two 3-sector
RF Modules

Optional AC/DC
+ Battery



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Flexi BTS Single RAN Installation Options

Stack installation

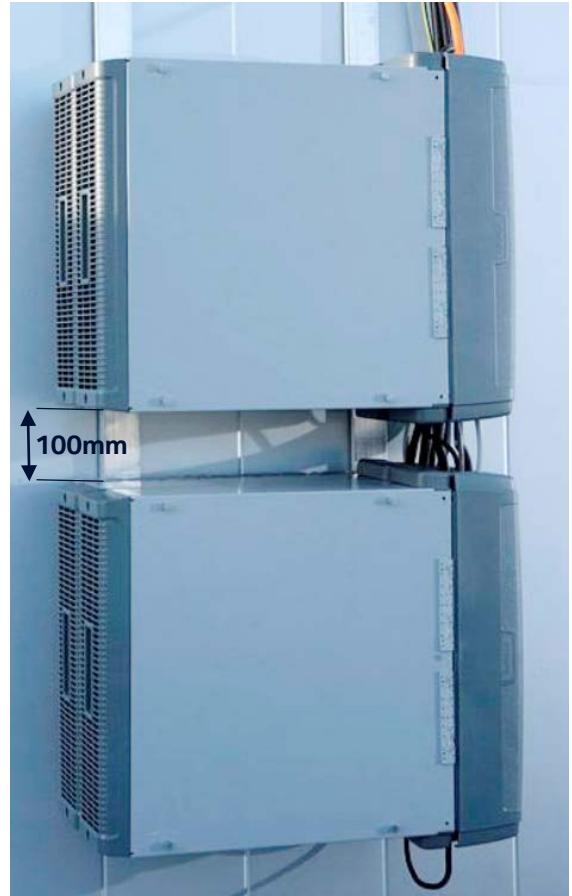
- **BTS modules** are placed **in a stack** (e.g. floor or shelves)
- **Outdoor & indoor** installations
- Modules in **casings** with back and front **covers**
- **Plinth** needed
(same plinth for all cabinet less installations: stack, pole and wall)
- **Max 22 HU (7 Casings)** per plinth for **zone 2** earthquake zones,
- **Max 15 HU (5 Casings)** for **zone 4** earthquake zones



Flexi BTS Single RAN Installation Options

Wall Installation

- **BTS modules** installed **on a wall**
- **Outdoor & indoor** installations
- Modules **in casings** with back and front covers
- **Plinth** needed
- **Up to 2 modules** per plinth
- Modules covers installed sideways
- **100 mm** space recommended **between plinths** to enable cabling (see picture)
- **Standard** Flexi BTS **clearances** apply



Flexi BTS Single RAN Installation Options

Pole Installation of Modules

- **BTS modules** installed **on a pole**
- **Outdoor & Indoor** installations
- Modules **in casings** with back and front covers
- **Plinth** and **pole mounting bracket** needed
- **Up to 2 modules** per plinth and **4 per pair of brackets**
- Modules covers installed sideways
- **Standard Flexi clearances** apply



Flexi BTS Single RAN Installation Options

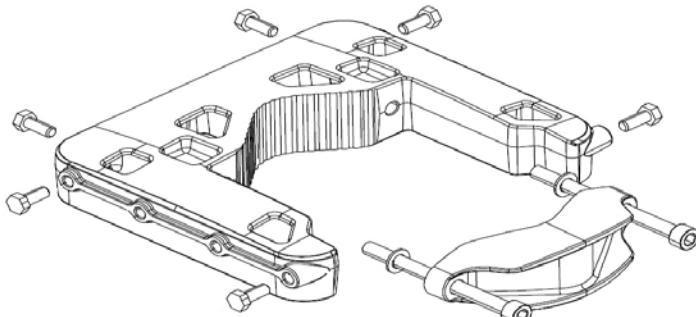
Installation Type Supported (Summary)

INSTALLATION TYPE	STACK	WALL	POLE
BTS Modules are placed	In a stack	On a wall	On a Pole
Installation	Outdoor & Indoor	Outdoor & Indoor	Outdoor & Indoor
Plinth needed (same plinth for all cabinet less installations)	Yes	Yes	Yes and with pole mounting bracket
Flexi BTS Clearance to apply	<ul style="list-style-type: none">Standard Flexi BTS clearances	<ul style="list-style-type: none">Standard Flexi BTS clearances.100 mm space recommended between plinths to enable cabling	<ul style="list-style-type: none">Standard Flexi BTS clearances
Max HU (Casings) per plinth for Zone 2 earthquake zones	22HU (7 casings)	<ul style="list-style-type: none">Up to 2 Modules (Casings) per plinthWith added rear bracket	<ul style="list-style-type: none">Up to 2 modules (Casings) per plinth and4 per pair of bracketsWith added rear bracket
Max HU (Casings) per plinth for Zone 4 earthquake zones	15HU (5 casings) With added rear bracket		
Modules covers	Installed in back and front casing	installed sideways	Installed in back and front casing

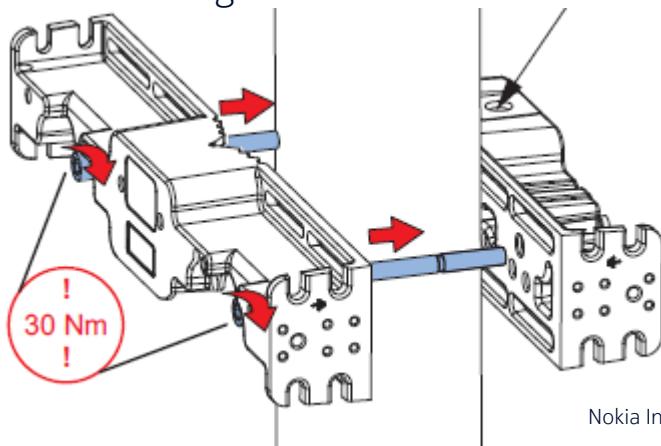
Flexi BTS Single RAN Installation Options

Pole installation of Remote Radio Heads (RRH)

- up to 3 RRHs fit around one pair of FPKA pole mounting brackets.



- Or using FPKC mounting kit



Flexi BTS Single RAN Installation Options

Flexi Cabinet Installation

- Cabinet can simultaneously house LTE, GSM/EDGE, LTE/HSPA and BBU modules
 - There are no limitations on how to mix LTE, GSM and WCDMA in one cabinet
- Optional Flexi Cabinets for indoor and outdoor installations
 - Open 19" mechanics with 1 HU fixing steps for flexible module installations
 - No motherboards or electronics (fans etc)
 - Not part of EMC shielding
 - Only front cabling
 - Module casings and covers are not used
 - Cooling fans remain in modules
 - Modules are grounded via rack
 - Same footprint and cabinet fixing points as with UltraSite and Talk Family
 - **Outdoor:** 1550 x 770 x 770 (H x W x D), space for 38HU
 - **Indoor:** 1800 x 600 x 600 (H x W x D), space for 36HU

Flexi BTS
Outdoor Cabinet
FCOA



Flexi BTS
Indoor Cabinet
FCIA





Flexi BTS Single RAN Modules

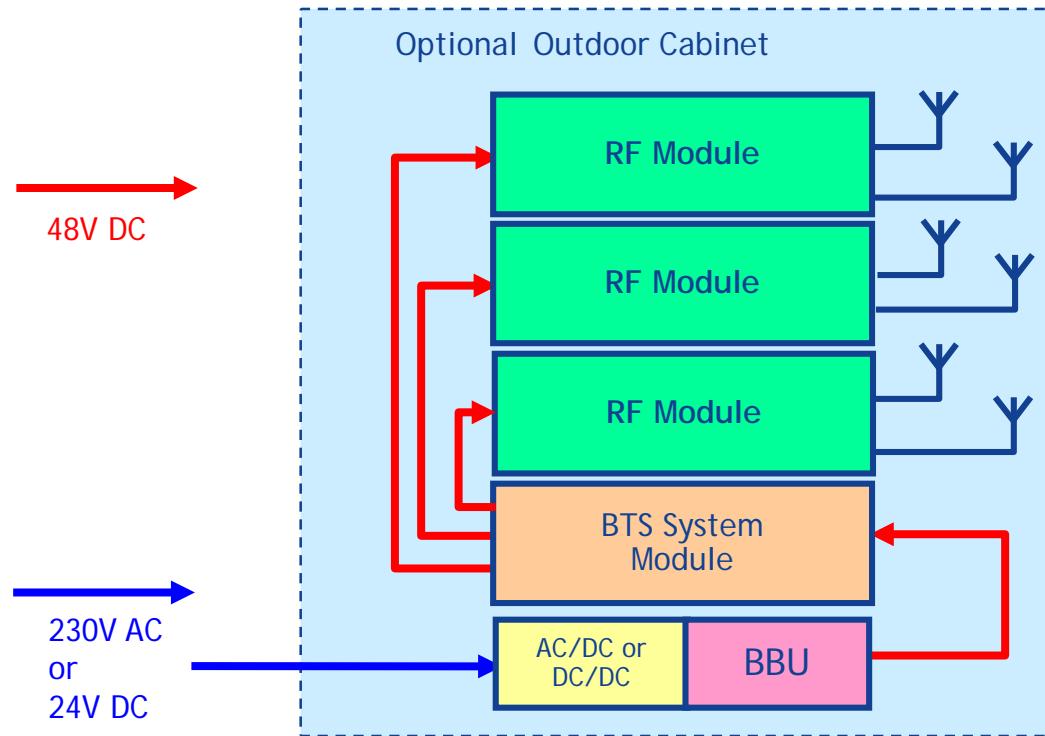
Flexi BTS Module Dimensions





Flexi BTS Single RAN Installation Options

Power Supply Architecture





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- 2. Flexi BTS S-RAN Hardware Solution – System Module**
- 3. Flexi BTS S-RAN Documentation**
- 4. Flexi BTS S-RAN I&C Operations**

Flexi BTS S-RAN Hardware Solution

Flexi Multiradio System Module Release 3 - Overview

Flexi Multiradio System Module Release 3 is:

- fully **OBSAI***-compatible
- has **all the control** and **baseband functions** for the supported **Radio Access Technologies**.

The System Module can be installed:

- in **stack**, in **pole**, in **wall**, in **indoors** or in **outdoors**.

The architecture of Flexi Multiradio System Module Release 3 enables utilization of several System Module and sub-module variants.

The **System Module** consists of a casing with the following baseband modules:

- **1 core module** and
- up to **2 optional capacity extension** sub-modules.

Additionally, some variants can be enhanced with :

- Optional **power distribution** and
- **Transmission** sub-modules.

The following Flexi Multiradio System Modules Release 3 are available:

- **FSMF** - high capacity GSM/WCDMA/LTE System Module (indoor/outdoor)
- **FSIH** - high capacity TD-LTE System Module (indoor)

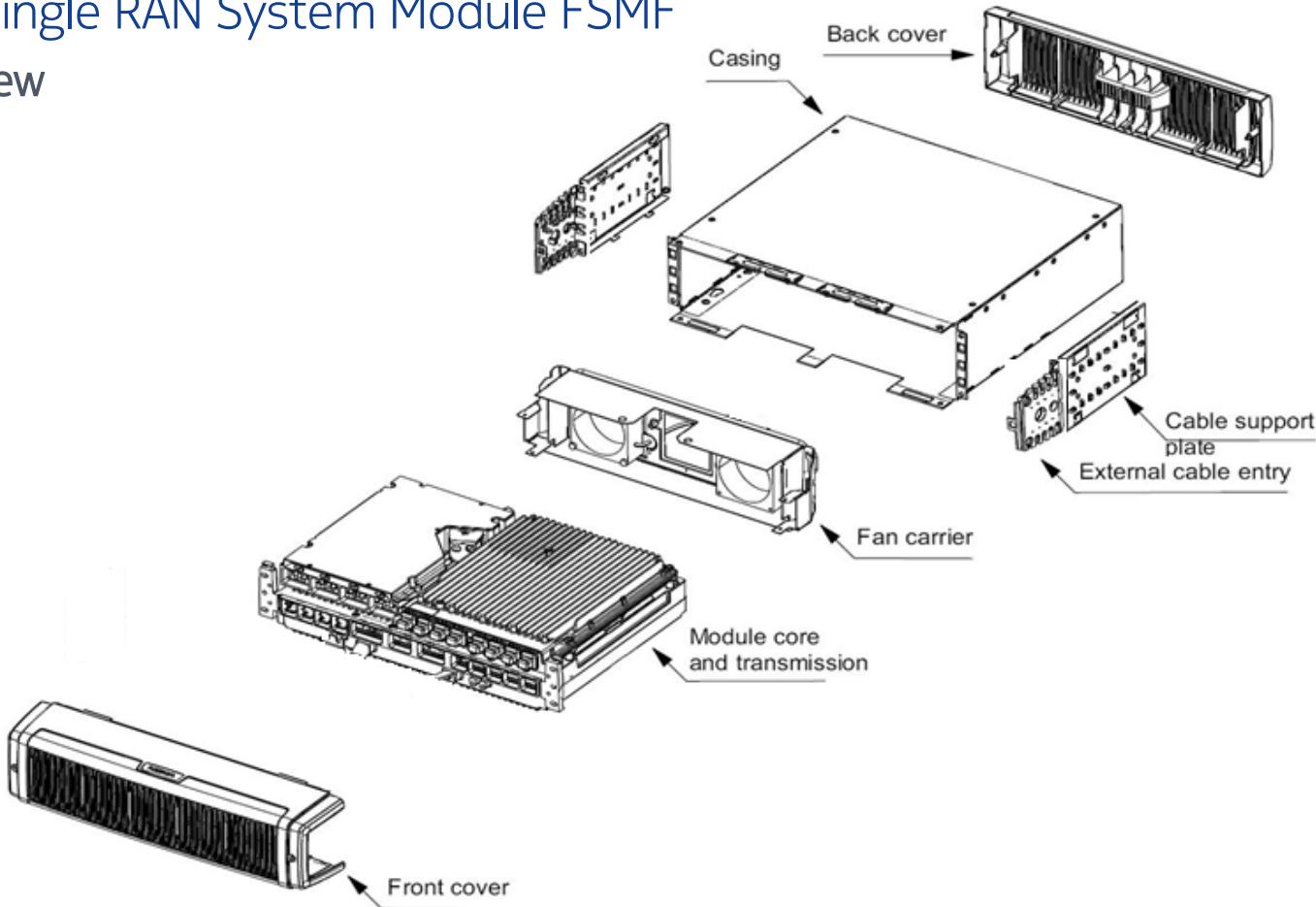


For more detailed information on the Rel.3 System Module, see Flexi Multiradio 10 Base Station System Module Description.

*OBSAI: Open Base Station Architecture Initiative

Flexi BTS Single RAN System Module FSMF

Exploded view



Flexi BTS S-RAN Hardware Solution – Optional Items

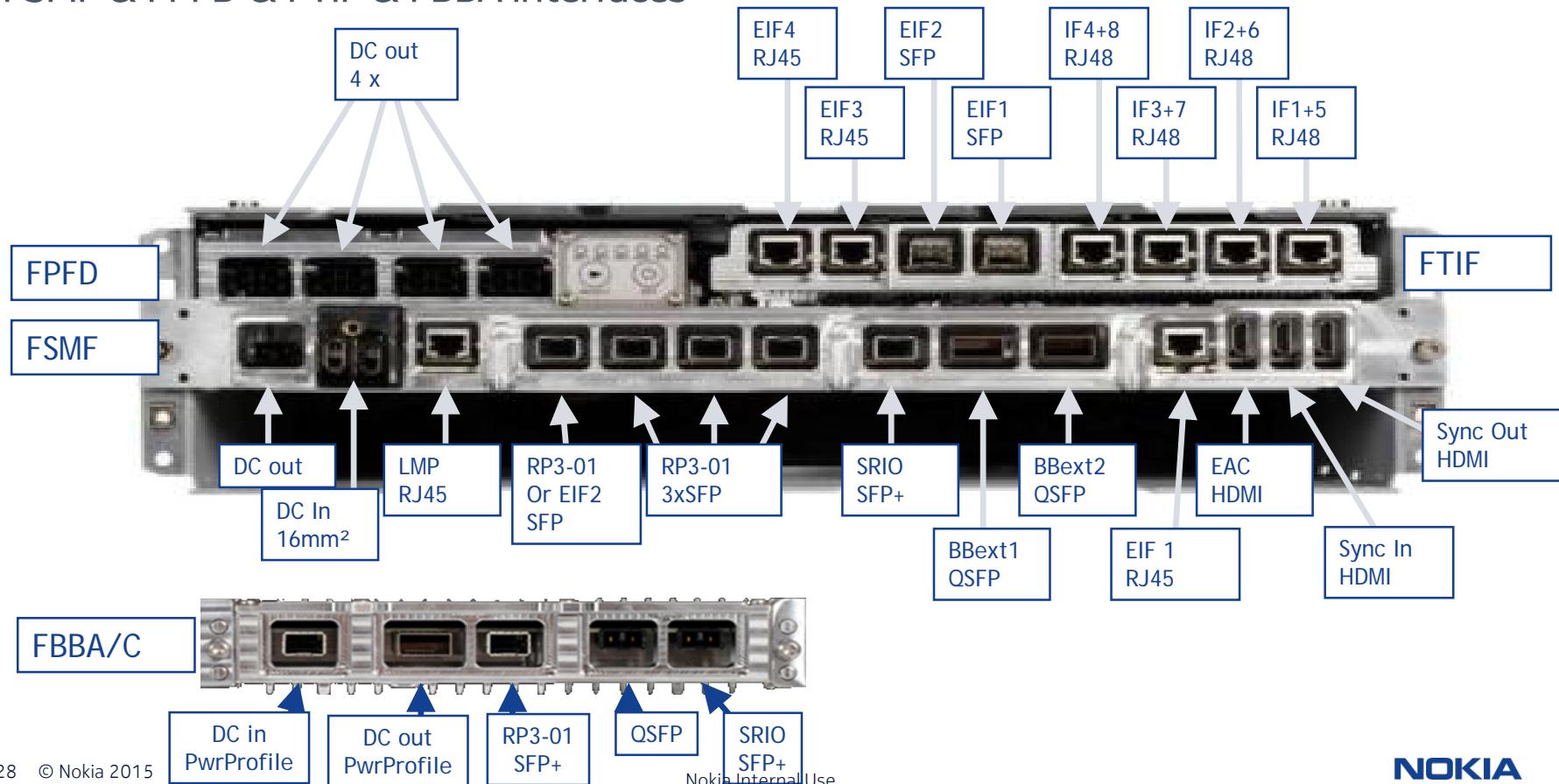
Capacity Extension Sub-Module (FBBA or FBBC) - Overview

FBBA	FBBC
Provides additional capacity extension sub-module for Flexi Multiradio 10 BTS Outdoor (FSMF).	Provide a high capacity extension sub-module for Flexi Multiradio 10 BTS Outdoor (FSMF).
1 FBBA brings additional 576 CEs for WCDMA .	It increases both baseband capacity and RF connectivity of Flexi Multiradio 10 BTS System Module.
HSPA performance is 756 Mbps for downlink and 208 Mbps for uplink .	BTS equipped with 2 FBBC sub-modules provides up to 12 optical RP3-01 6 Gbit/s connections towards RF units.
When dedicated for LTE (FDD or TDD) , it supports capacity of 3x20 MHz (or 6x10 MHz) with MIMO enabling 450 Mbps downlink and 150 Mbps uplink data speeds.	FBBC provides the same baseband capacity as FBBA .
Up to 2 FBBA s are supported per 1 Flexi Multiradio System Module.	Up to 2 FBBC s are supported per 1 Flexi Multiradio System Module.



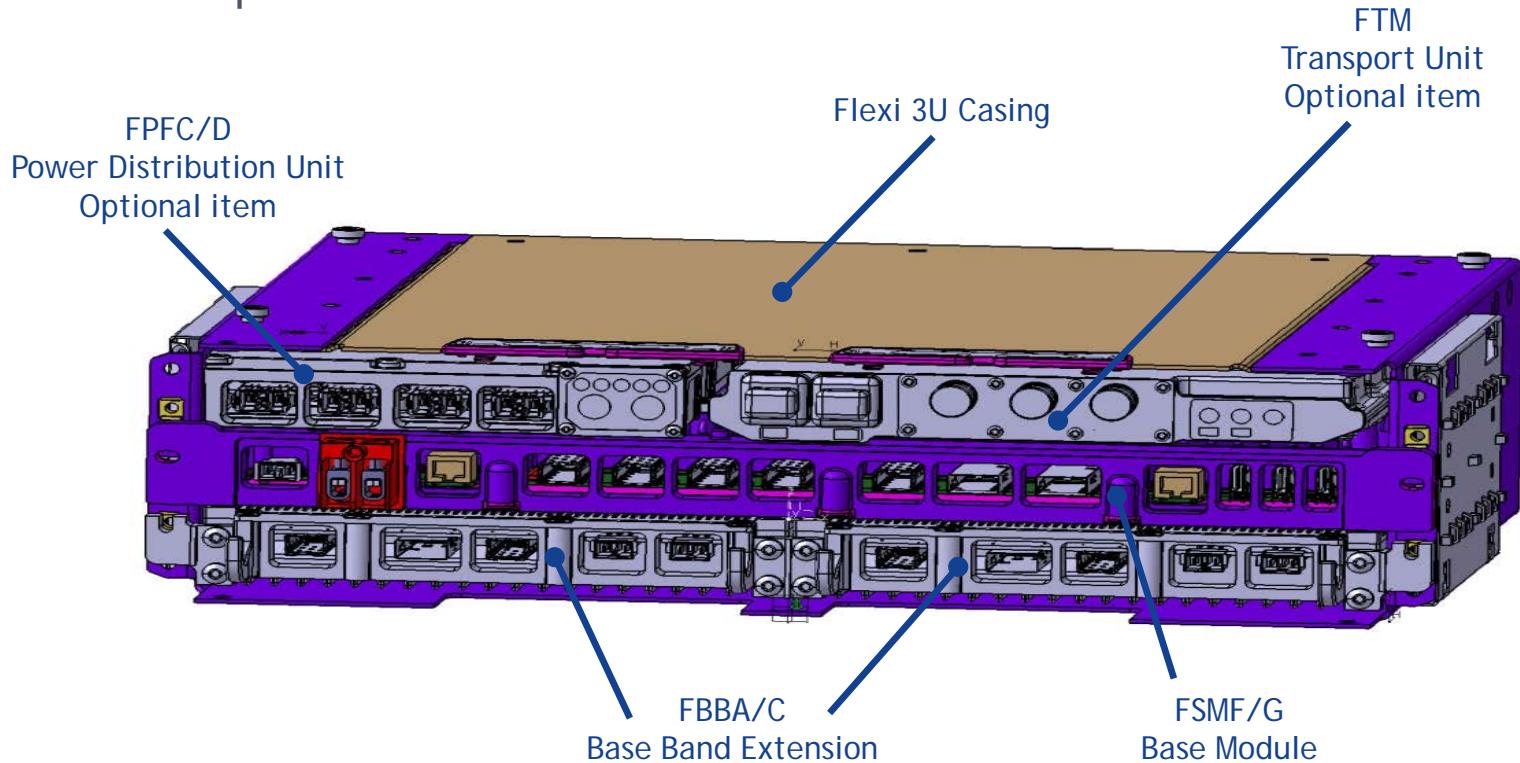
Flexi BTS Single RAN System Module FSMF

FSMF & FPFM & FTIF & FBBA Interfaces



Flexi BTS Single RAN System Module FSMF

Hardware Concept Outdoor



Flexi BTS Single RAN System Module FSMF

Hardware Concept Outdoor

Flexi Multiradio 10 Base Station **System Module FSMF** is equipped with

- 2 integrated transport interfaces:**
 - Electrical **Gigabit Ethernet** (GE) interface (EIF1) and
 - **Optical** interface (EIF2/RF/6).

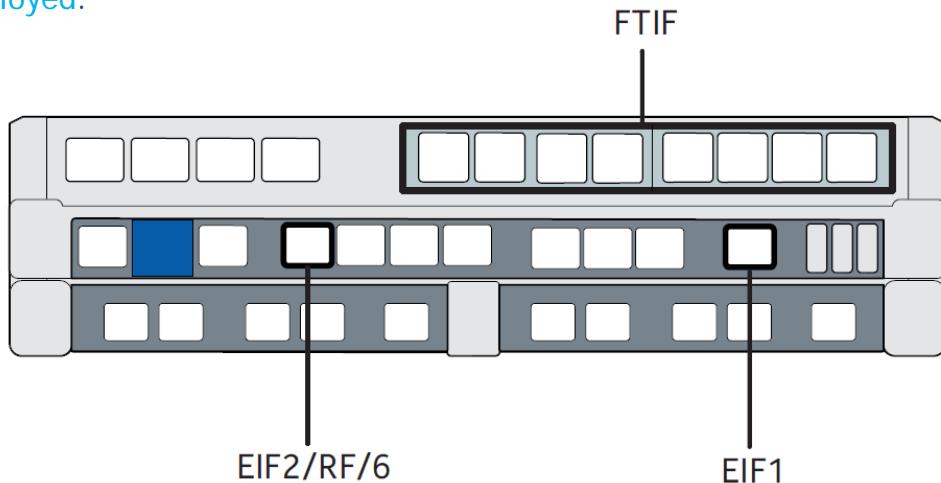
Note: In **WCDMA and LTE** the optical interface (**EIF2/RF/6**) is available as transport interface EIF2 if not used for RP3-01 connection.

Note: In **GSM** the optical interface (**EIF2/RF/6**) is available as transport interface EIF2 if the optional transmission sub-module (**FTIF**) is not deployed.

Note: for all the technologies (GSM, WCDMA, FD-LTE and TD-LTE)

There is a possibility to install an optional transmission sub-module (**FTIF**) to extend Flexi Multiradio 10 Base Station transport capabilities.

The FTIF transmission sub-module is needed, for example: for **GSM legacy Abis support**.

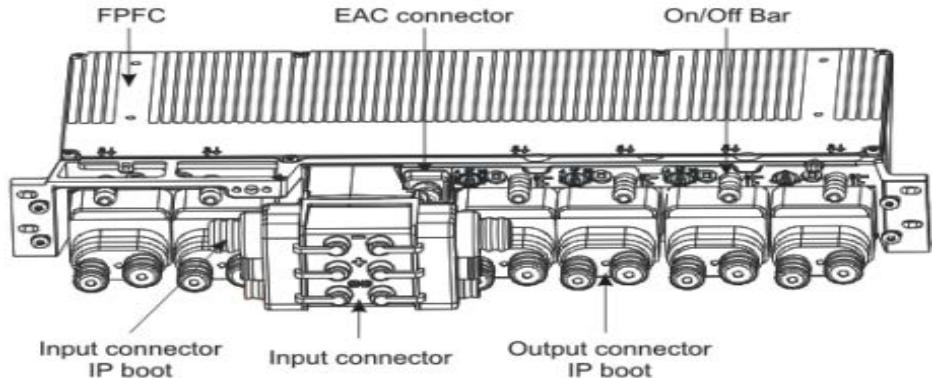


Flexi BTS Single RAN System Module FSMF

DC Power Distribution Options

- **Outdoor (FPFC)**

- Optional outdoor module
- **19", 2HU height**
- **6 DC power outputs** and fuses
- Is used to connect power supply **for RF Modules/RRHs** for **distributed sites**



- 90 x 447 x 420/550 mm (H x W x D)
- Outdoor: -35 to +55 °C, IP65



Flexi BTS S-RAN Hardware Solution – Optional Items

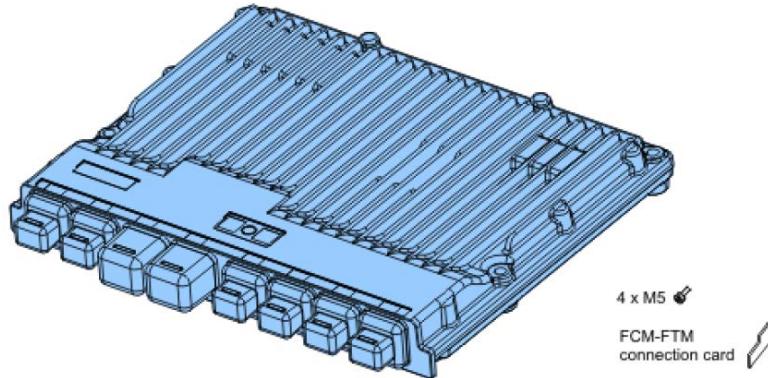
Transmission Sub-Module (FTIF) - Overview

FTIF

Provide 8 E1/T1/JT1 interfaces

Provide 2 Gigabit Ethernet Combo ports.

Internal connections between the core module and FTIF go through an internal connector.



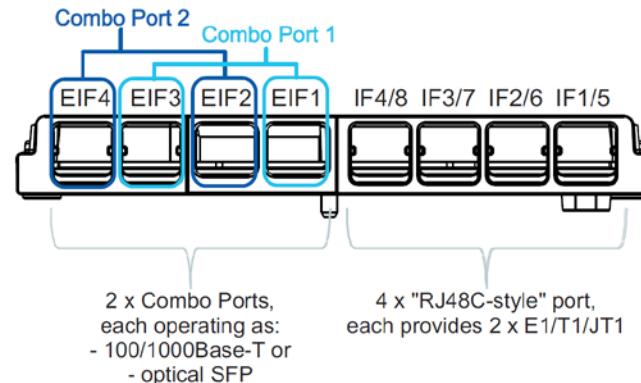


Flexi BTS Single RAN System Module FSMF

FTIF - PDH / Ethernet Option

Optional Transport Sub-Module FTIF extends capabilities of Flexi Multiradio 10 System Module by

- **2x Combo Ethernet ports** supporting following combinations of use:
 - **2x electrical** 1000/100/10BaseT or
 - **2x optional optical Gigabit** Ethernet SFP slots or 1x 1000/100/10BaseT and 1x optional optical GE SFP
 - **8x E1/T1/JT1** (twisted pair)
- Ethernet Switching across up to 3 interfaces (with System Module)
- Synchronization Hub function using Synchronous Ethernet as input





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Flexi BTS Single RAN RF Module

RF Modules and Remote RF Heads (RRH)

Remote RF Heads
(RRH)

RF Modules



Flexi BTS S-RAN Hardware Solution

Flexi Multiradio Radio Frequency Module - Overview

There are **different types of RF Modules** available.

RF Modules can be **installed** : in **stack, pole, wall , indoors or outdoors**.

They can be easily **installed outdoors close to antennas**.

RF Module can support **up to 3 sectors** with the following features:

- high output power at antenna connectors: 3TX 3x60 W, 3TX 3x80 W, 6TX 6x40 W, 6TX 6x60 W
- 6 linear power amplifiers
- 6 RF filters for TX/RX
- 2-way RX diversity
- wide bandwidth support:
 - **up to 6 GSM carriers** with 400 kHz minimum carrier separation
 - **up to 4 WCDMA carriers** with 3.8 MHz minimum carrier separation
 - **LTE signal** with 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz, and 30 MHz carrier bandwidth
 - **Multi RAT operation with combination of GSM, WCDMA, and LTE**
- 48 V DC power input
- efficient fans
- several OBSAI links, each supporting either 32 "slots" (3Gbps) or 64 "slots" (6Gbps)
- low total wind load and weight

Note that some variants might not be available in all releases.

For more detailed information on the RF Modules, see Flexi Multiradio BTS Radio Module and Remote Radio Head Description.

Flexi BTS S-RAN Hardware Solution

Flexi Multiradio Radio Frequency Module - Overview

In RED all
RFM used
for Swap

Flexi RFM	3TX RF Modules	Flexi RFM	6TX RF Modules
(FRKA)	3-pipe 1500 180 W (FRKA)	(FRPA) (FRPB)	6TX 700 (FRPA) 6TX 700 (FRPB)
(FRMA) (FRMD)	3TX 800 (FRMA) 3TX 800 (FRMD)	(FRMC) (FRME) (FRMF)	6TX 800 (FRMC) 6-pipe 800 240 W (FRME) 6-pipe 800 360 W (FRMF)
(FXCA) (FXCB)	3-pipe 850 180 W (FXCA) 3TX 850 (FXCB)		
(FXDA) (FXDJ) (FXDB) (FXJB)	3TX 900 (FXDA) 3TX 900 (FXDJ) 3TX 900 (FXDB) 3-pipe 900 240 W (FXJB)		
(FXEA) (FXEB) (FXEE)	3TX 1800 (FXEA) 3TX 1800 (FXEB) 3-pipe 1800 240 W (FXEE)	(FXED)	6-pipe 1800 360 W (FXED)
(FXFB) (FXFC)	3TX 1900 (FXFB) 3TX 1900 (FXFC)		
(FRGP) (FRGT) (FRGS) (FRGX) (FRIE)	3TX 2100 (FRGP) 3TX 2100 (FRGT) 3TX 2100 (FRGS) 3-pipe 2100 240 W (FRGX) 3TX 1700/2100 (FRIE)	(FRGU)	6-pipe 2100 360 W (FRGU)
(FRHA)	3TX 2600 (FRHA)	(FRHC) (FRHF)	6TX 2600 (FRHC) 6TX 2600 (FRHF)

Flexi BTS Single RAN RF Module

RF Module Delivery Content

RF Module sales item includes following 5 components to connect it to System Module

- 1) RF Module (including **casing** and **fan** subassembly)
- 2) **2 meters** long IP55 protected outdoor cable **for 48 V DC**
- 3) **2 meters** long IP55 protected outdoor multimode **optical system cable**
 - 4 Gbps OBSAI optical RP3-01
 - UL & DL in the same cable pair
- 4) **2 optical transceivers SFP** pluggable, **1 to System Module** and other **1 to RF Module**

4 SFP* optical transceiver (2pcs)



2 DC cable, 2m
3 Optical cable, 2m



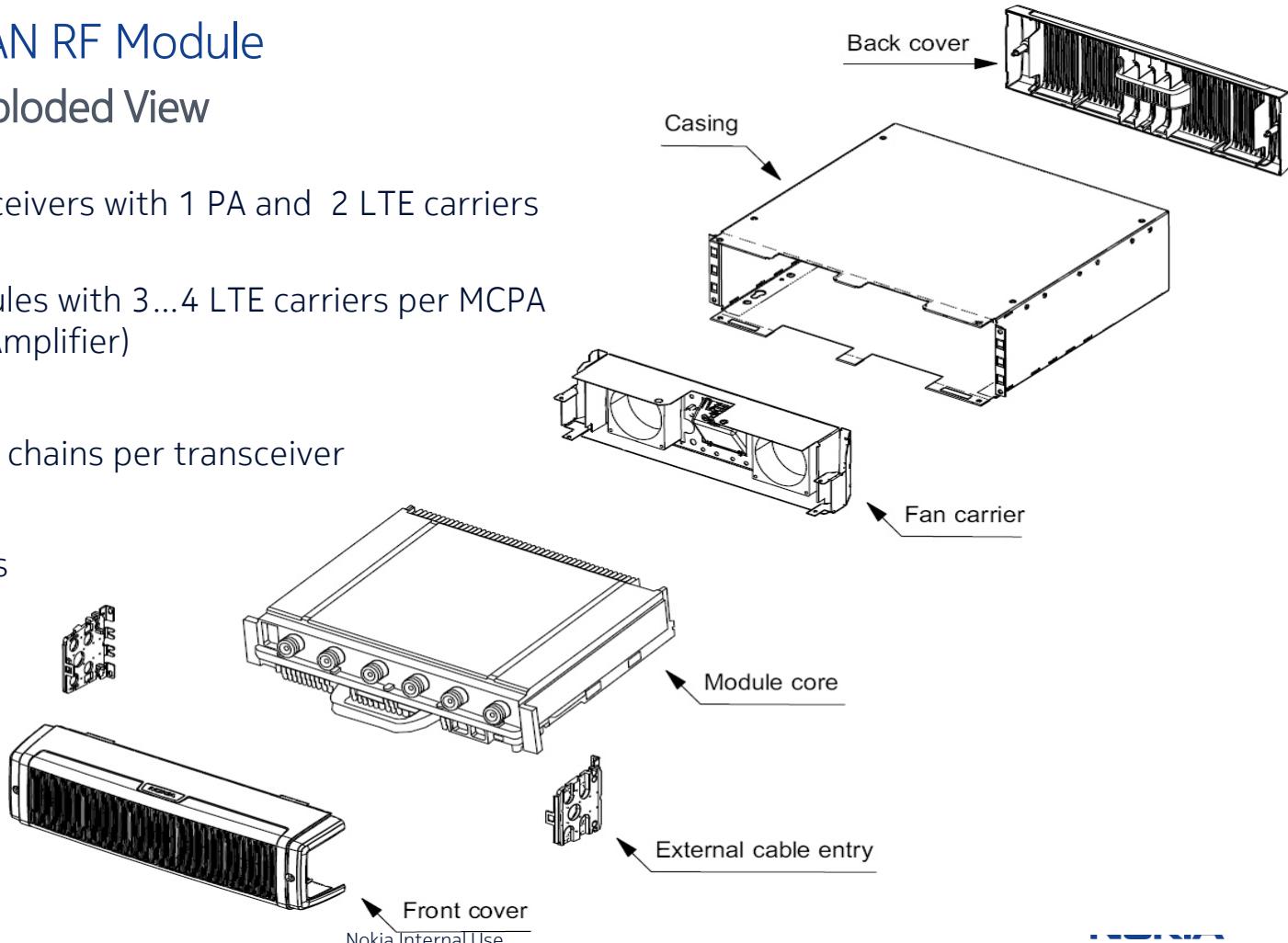
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(*SFP = Small Form factor Pluggable)

Flexi BTS Single RAN RF Module

Triple RF Module Exploded View

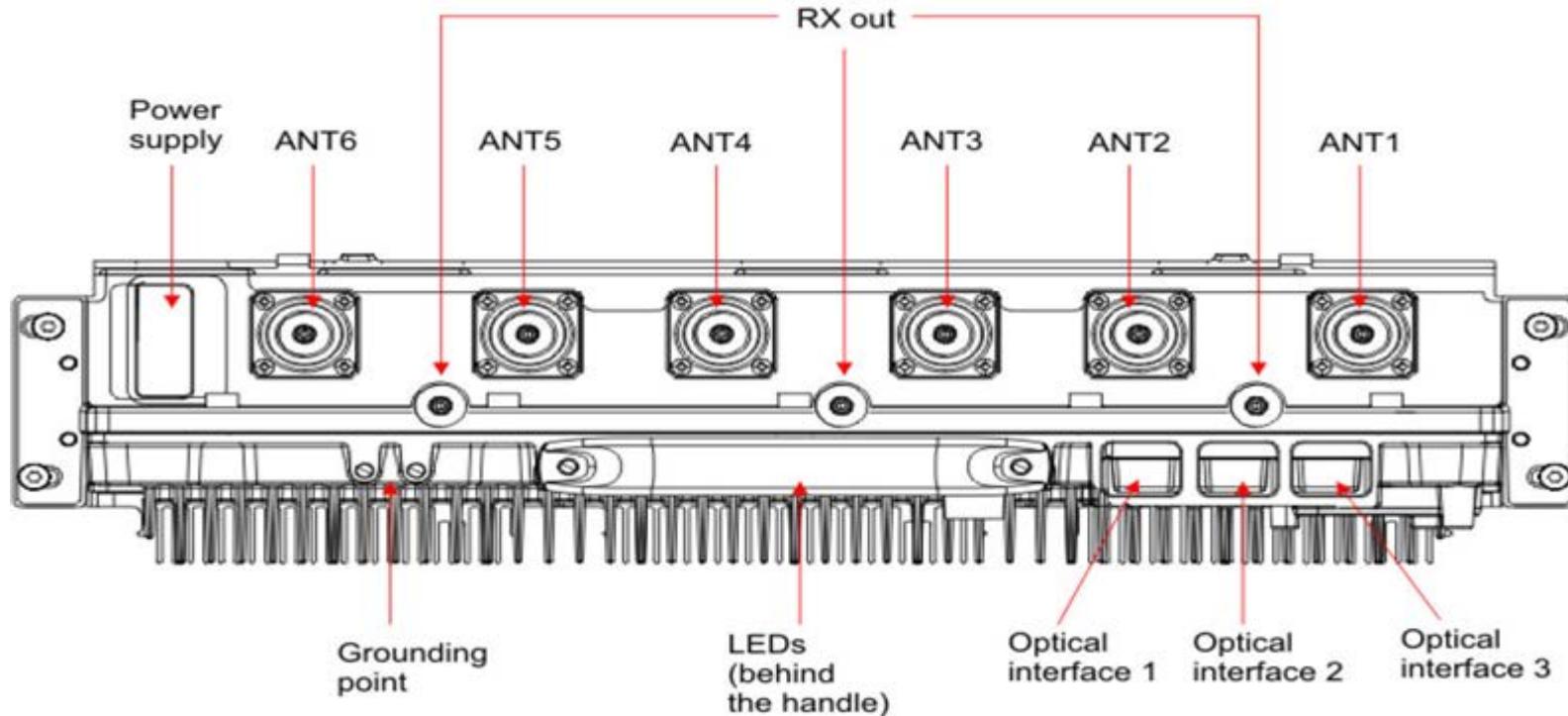
- 3 independent transceivers with 1 PA and 2 LTE carriers each
- New Multimode Modules with 3...4 LTE carriers per MCPA (Multi Carrier Power Amplifier)
- 1 transmitter chain
- 2 independent uplink chains per transceiver
- 3 duplex filter blocks
- 6 antenna connectors



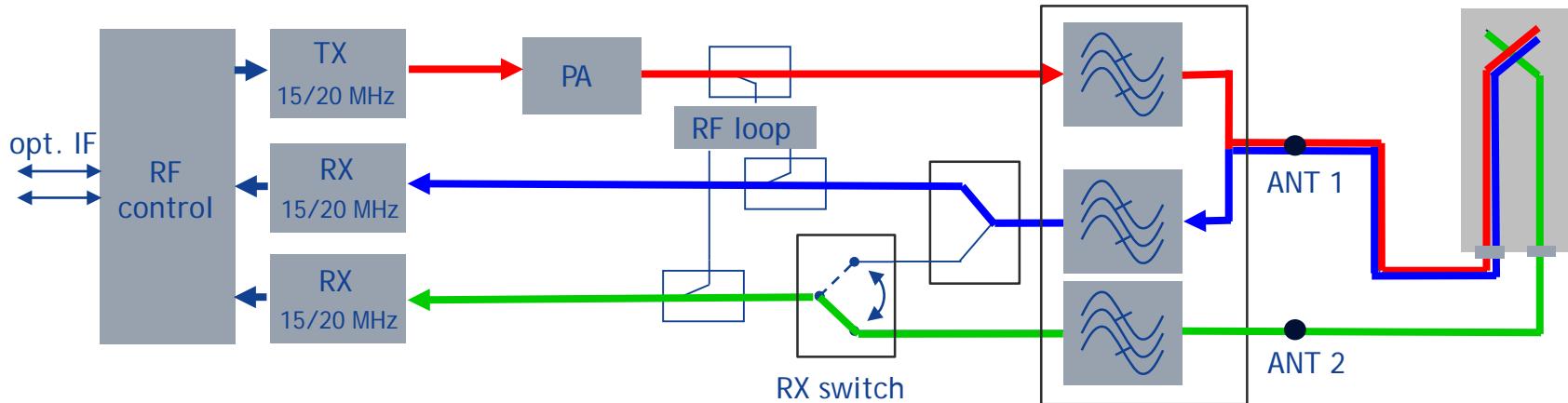


Flexi BTS Single RAN RF Module

RF Modules Body Structure FRGP, FRIE, FRMA, FRBB



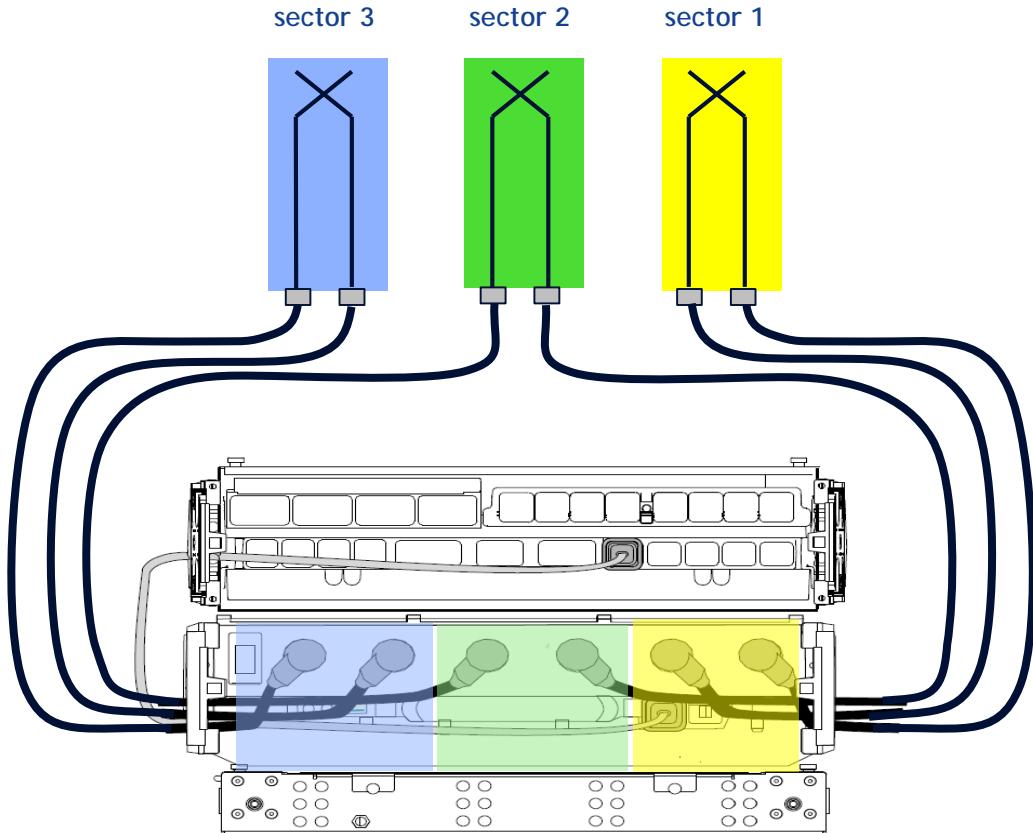
Flexi BTS Single RAN Triple PA RF Module signal path options: “A type” configuration (only 1 PA branch shown)



Flexi BTS Single RAN

“A-Type“ Configurations

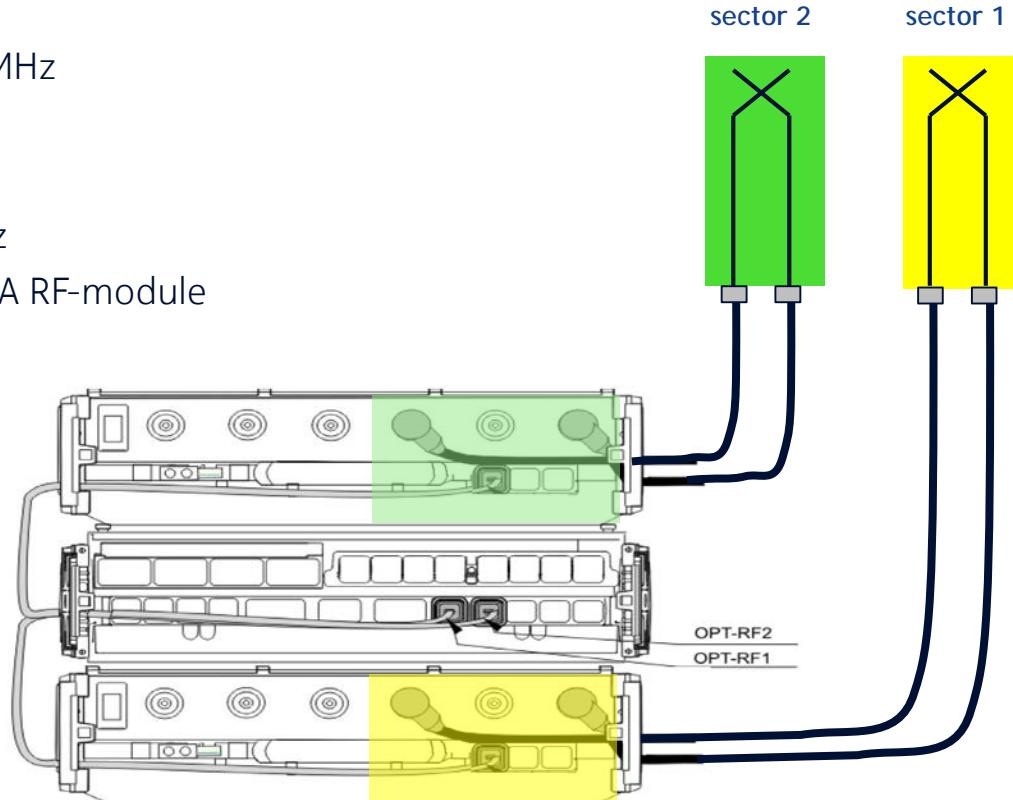
- Up to 1+1+1 with 60W and 20 MHz
- RL30:
- Up to 6x1 with 60W and 10 MHz
- Without MIMO



Flexi BTS Single RAN RF Module

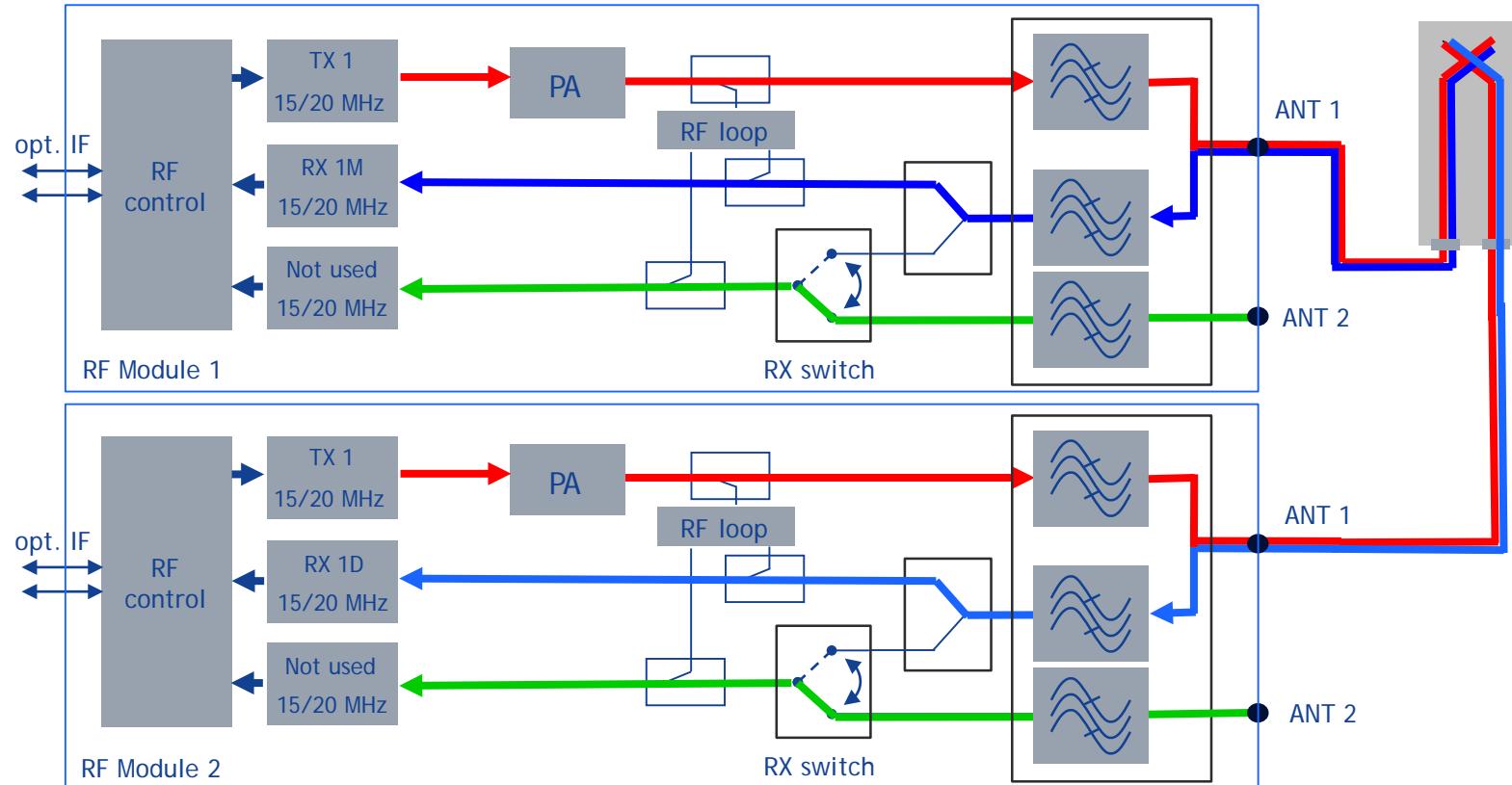
“G-Type“ Configurations (1+1+0 example)

- Up to 1+1+1 with 2x60W at 20MHz
- MIMO supported
- RL30:
- Up to 6x1 with 2x60W at 10MHz
- A sector is build from 1 Triple PA RF-module



Flexi BTS Single RAN Triple PA RF Module signal path options:

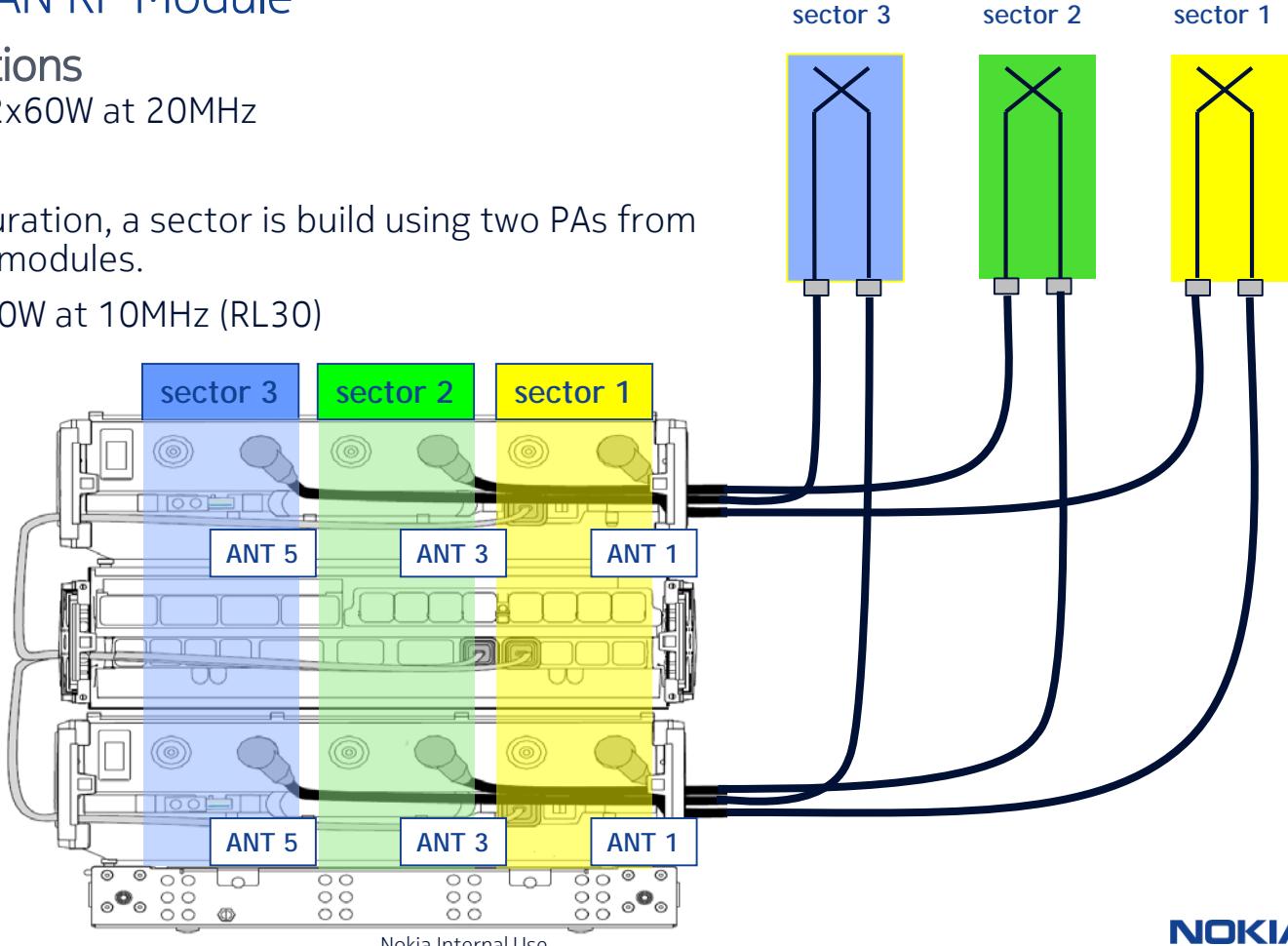
“H type” configuration 2x2 MIMO (only 1 PA branch of each Triple PA Module shown)



Flexi BTS Single RAN RF Module

“H type” Configurations

- Up to 1+1+1 with 2x60W at 20MHz
- MIMO supported
- In a H-Type configuration, a sector is build using two PAs from different Triple PA modules.
- Up to 6x1 with 2x60W at 10MHz (RL30)



Flexi 3-sector RF Modules

In RED all
RFM used
for Swap

Radio Frequency Module – HW Characteristics

RF Modules HW Characteristics				
Version	Description Flexi RF Module - 3 sectors	RF Bandwidth		Comment
		TX	RX	
FRMF	RF Module 800 6 pipe (360W)	30 Mhz	30 Mhz	6 x 60W FDD-LTE (2TX)
FXDB	RF Module 900 3TX	35 MHz	35 MHz	3 x 80W GSM, WCDMA, FDD-LTE
FXED	RF Module 1800 6 pipe (360W)	40 / 60 Mhz	75 Mhz	6 x 60W GSM, FDD-LTE (2TX)
FRGU	RF Module 2100 6 pipe (360W)	60 Mhz	60 Mhz	6 x 60W WCDMA, FDD-LTE (4TX)
FRHC	RF Module 2600 6TRX	40 Mhz	55 Mhz	6 X 40W FDD-LTE (2TX)
FRMA	RF Module 800EU	20 MHz	20 MHz	
FRMD	RF Module 800EU	10 MHz	10 MHz	Sub-band version of FRMA
FXCA	RF Module 850	20 MHz	20 MHz	
FXDA	RF Module 900	20 MHz	20 MHz	LTE: 10 MHz limitation 3GPP UE
FXEA	RF Module 1800	20 MHz	30 MHz	
FXEB	RF Module 1800	35 MHz	75 MHz	3 x 80 Watts
FRGP	RF Module 2100	20 MHz	20 MHz	
FRHA	RF Module 2600	20 MHz	20 MHz	

Flexi 3-sector RF Modules

Radio Frequency Module – HW Characteristics

FRMF (6 pipe 800 (360W))

Height:
115 mm

Width:
492 mm

Depth:
560 mm

Weight:
24 kg

Power Consumption
Mode: FDD-LTE

Config: 1/1/1

Output power/carrier: 20+20

Typical: 466W

Maximum: 665W

Config: 1/1/1

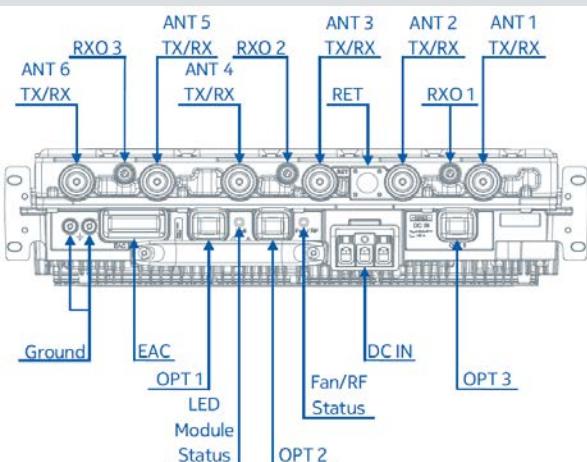
Output power/carrier: 60+60

Typical: 755W

Maximum: 1362W

AISG supported:

ANT1, ANT3, ANT5 (25V),
RET (25V): AISG 2.0



Interface	Label on the HW	Number of interfaces	Connector type
Power connector	DC IN	1	3-pole screw terminal
Antenna connector	ANT	6	7/16
RF output connector	RxO	3	QMA
Remote Electrical Tilt	RET	1	8-pin circular
External Alarm Connection	EAC	1	MDR36
Optical interface	OPT	3	SFP 3 or 6 Gbps

RF Modules Interfaces

FXDB (3TX 900)

Height:

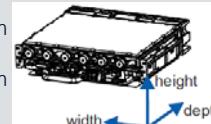
115 mm

Width:

492 mm

Depth:

560 mm



Weight: 25kg

Power Consumption

Mode: GSM, FDD-LTE,
WCDMA, MSR

Config: 1/1/1

Output power/carrier: 20

Typical: 331W

Maximum: 453W

Config: 1/1/1 2T2R

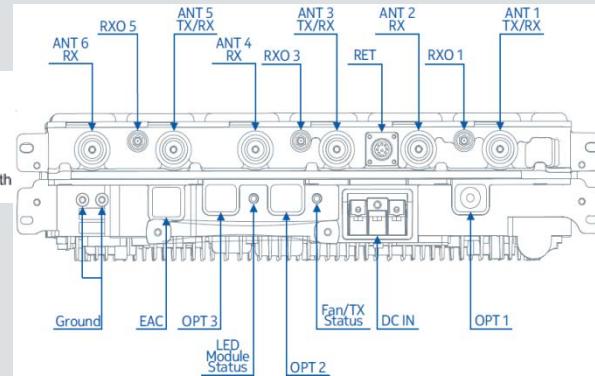
Output power/carrier: 80+80

Typical: 1098W

Maximum: 1939W

AISG supported:

ANT1, ANT3, ANT5 (25 or 13V)
ANT2, ANT4, ANT6 (13V)
RET (25V): AISG 2.0
CWA



Interface	Label on the HW	Number of interfaces	Connector type
Power connector	DC IN	1	Screw-terminial
Antenna connector	ANT	6	7/16
RF output connector	RxO	3	QMA
Remote Electrical Tilt	RET	1	8-pin circular
External Alarm Connection	EAC	1	RJ45
Optical interface	OPT	3	SFP 3 or 6 Gbps

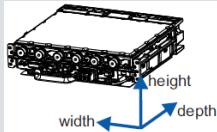
Flexi 3-sector RF Modules

Radio Frequency Module – HW Characteristics

RF Modules Interfaces

FXED(6 pipe 1800 (360W)

Height:
115 mm
Width:
492 mm
Depth
560 mm



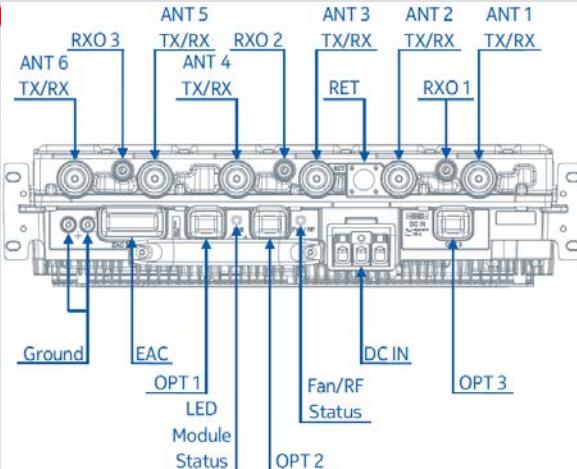
Weight: 24kg

Power Consumption
Mode: GSM FDD-LTE

Config: 1/1/1 2T2R LTE
Output power/carrier: 20+20
Typical: 415W
Maximum: 634W

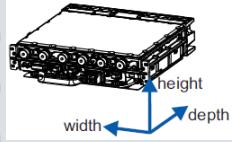
Config: MSR
GSM 4/4/4 LTE 1/1/1 2T2R
Output power/carrier: 20 20+20
Typical: 802W
Maximum: 1410W

AISG supported:
ANT1, ANT3, ANT5 (25 or 12V),
ANT2, ANT4, ANT6 (12V)
RET (25V): AISG 2.0
CWA



FRGU (6 pipe 2100 (360W)

Height:
115 mm
Width:
492 mm
Depth
560 mm



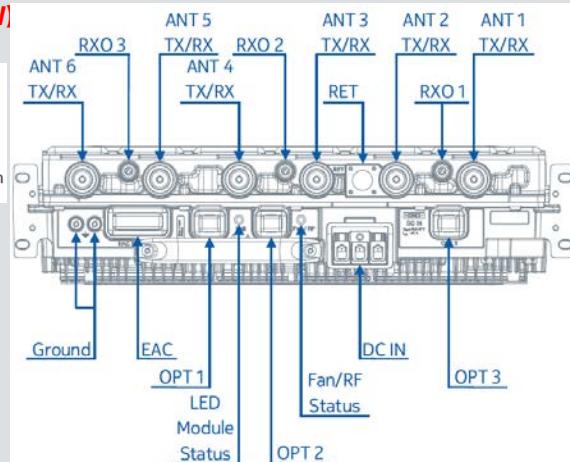
Weight: 24kg

Power Consumption
Mode: WCDMA, FDD-LTE

Config: 1/1/1 (WCDMA)
Output power/carrier: 20
Typical: 282W
Maximum: 386W

Config: 1/1/1 (LTE)
Output power/carrier: 60+60
Typical: 739W
Maximum: 1377W

AISG supported:
ANT1, ANT3, ANT5 (25 or 12V),
ANT2, ANT4, ANT6 (12V)
RET (25V): AISG 2.0
CWA



Interface	Label on the HW	Number of interfaces	Connector type
Power connector	DC IN	1	3-pole screw terminal
Antenna connector	ANT	6	7/16
RF output connector	RxO	3	QMA
Remote Electrical Tilt	RET	1	8-pin circular
External Alarm Connection	EAC	1	MDR36
Optical interface	OPT	3	SFP 3 or 6 Gbps

Flexi 3-sector RF Modules

Radio Frequency Module – HW Characteristics

RF Modules Interfaces

FRHC (6TRX 2600)

Height:

115 mm

Width:

492 mm

Depth

560 mm



Weight:

24kg

Power Consumption

Mode: FDD-LTE

Config: 1/1/1 2T2R

Output power/carrier: 20+20

Typical: 476W

Maximum: 769W

Config: 1/1/1 2T2R

Output power/carrier: 40+40

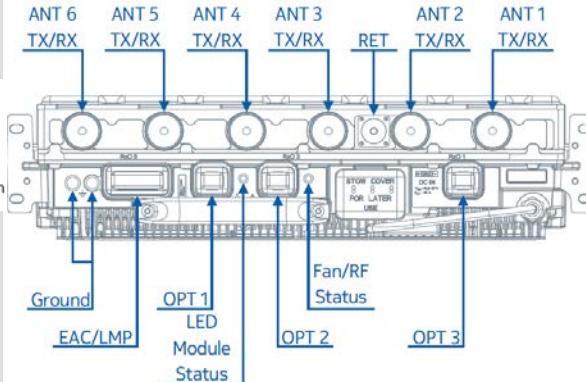
Typical: 641W

Maximum: 1142W

AISG supported:

ANT1, ANT3, ANT5 (25V),

RET (25V): AISG 2.0



Interface	Label on the HW	Number of interfaces	Connector type
Power connector	DC IN	1	Screw-terminal
Antenna connector	ANT	6	7/16
Remote Electrical Tilt	RET	1	8-pin circular
External Alarm Connection	EAC	1	MDR36
Optical interface	OPT	3	SFP

3 or 6 Gbps

Flexi BTS S-RAN Hardware Solution

Flexi Multiradio Remote Radio Head - Overview

There are different types of **Remote Radio Heads (RRH)** available:
(1TX/2RX, 2TX/2RX, 4TX/4RX, 8TX/8RX).

RRH are **mainly used in outdoor pole** installations where support for 1 sector is needed.

The **RRH can support 1 sector** with the following integrated features:

- high output power at antenna connectors
- linear power amplifiers
- RF filters for TX/RX
- RX diversity
- wide bandwidth support (up to 65 MHz depending on 3GPP band RF variant)
- 48 V DC or 100 V AC input power supply
- no fans
- OBSAI/CPRI optical interfaces

For more detailed information on a particular Remote Radio Head, see: - Flexi Multiradio BTS Radio Module and Remote Radio Head Description.

Flexi BTS S-RAN Hardware Solution

Flexi Multiradio Remote Radio Head - Overview

In RED all
RRH used
for Swap

Flexi RRH	1TX / 2TX	Flexi RRH	4TX
(FRGG)	1TX 2100 (FRGG)	(FRAA)	2-pipe 450 80 W (FRAA) Rel. 4.0
(FRLB) (FHPC)	2TX 730 (FRLB) 2-pipe 700/840 100 W (FHPC)	(FRBG) (FRBE) (FRBF)	4-pipe 720/730 160 W (FRBG) Rel. 4.0 4-pipe 720/750 160 W (FRBE) Rel. 4.0 4-pipe 760 160 W (FRBF) Rel. 4.0
(FRMB) (FHCA) (FRCC) (FRCG)	2TX 800EU (FRMB) 2TX 850 (FHCA) 2-pipe 850 80 W (FRCC) Rel. 4.0 2-pipe 850 120 W (FRCG) Rel. 4.0	(FHED) (FHEH)	4-pipe 1800 160 W (FHED) Rel. 4.0 4-pipe 1800 160 W (FHEH) Rel. 4.0
(FHDA) (FHDB)	2-pipe 900 80 W (FHDA) 2TX 900 (FHDB)	(FHFB)	4-pipe 1900 160 W (FHFB) Rel. 4.0
(FHEA) (FHEB) (FHEF) (FHEG)	2TX 1800 (FHEA) 2TX 1800 (FHEB) 2-pipe 1800 120 W (FHEF) 2-pipe 1800 120 W (FHEG)		
(FRGQ) (FRGY)	2TX 2100 (FRGQ) 2-pipe 2100 120 W (FRGY) Rel. 4.0	(FRNC) (FRIG) (FHGB)	4-pipe 2300 120 W (FRNC) Rel. 4.0 4TX 1700/2100 (FRIG) 4-pipe 2100 120 W (FHGB)
(FRHB)	2TX 2600 (FRHB)	(FRHD) (FRHE) (FRHG)	4TX 2600 (FRHD) 4TX 2600 (FRHE) 4-pipe 2600 160 W (FRHG) Rel. 4.0



Flexi BTS Single RAN RF Module

Remote Radio Head

- 2 x 40 W at the antenna connector
- Optimized for single sector deployment and MIMO
- Convectional cooling



Flexi RF Module

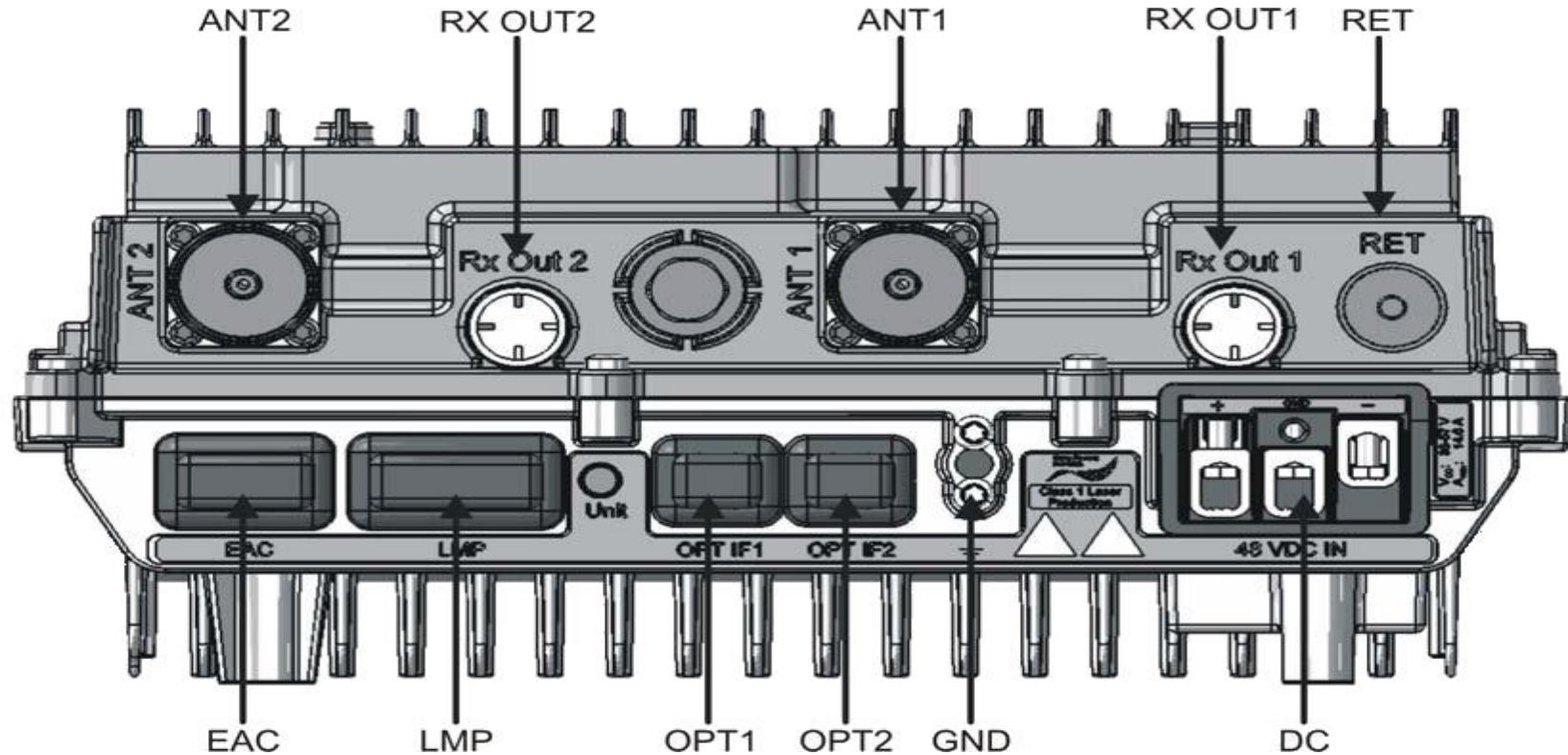
RRH Interfaces



NOKIA

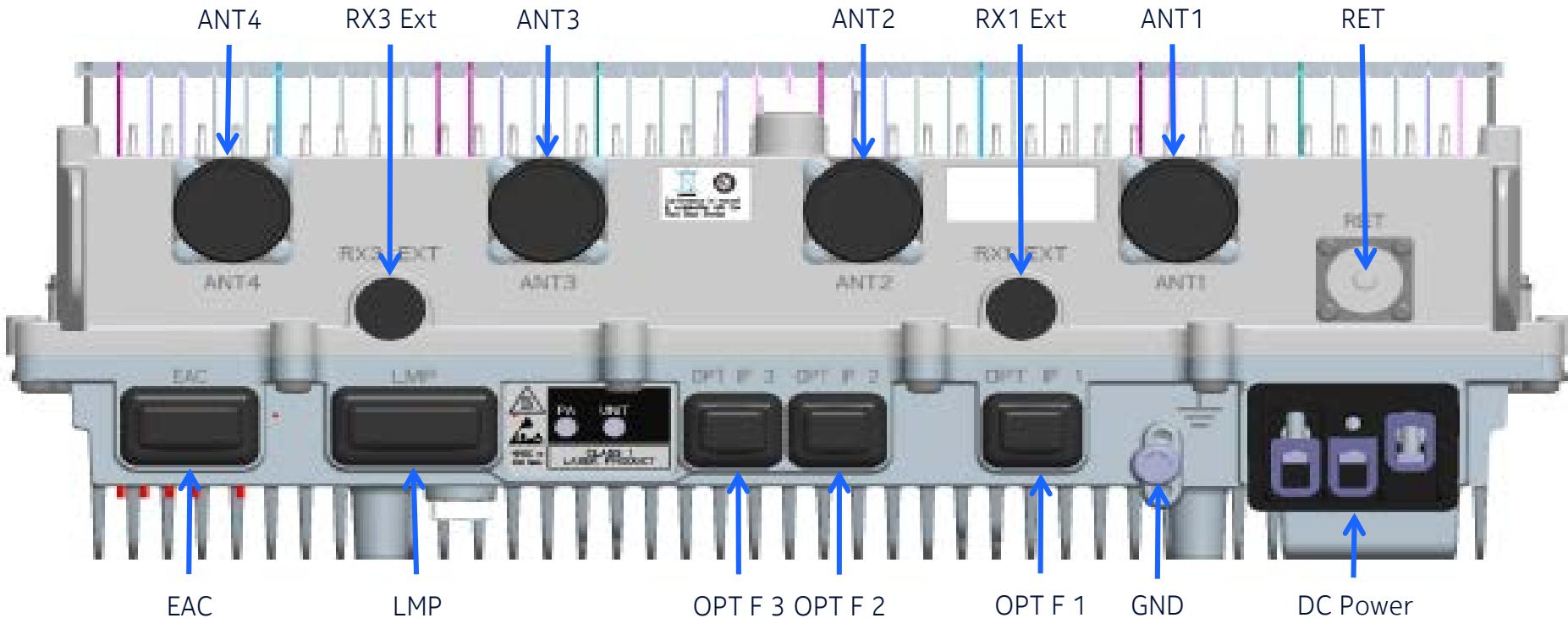
Flexi BTS Single RAN RF Module

FRMB / FRHB interfaces



Flexi BTS Single RAN RF Module

Remote Radio Head (4xTX and 4xRX) (FRIG)



Flexi 3-sector RF Modules

Remote Radio Heads – HW Characteristics

In RED all
RRH used
for Swap

RRH Modules HW Characteristics				
Version	Description Flexi RRH	RF Bandwidth		Comment
		TX	RX	
FRMB	Flexi RRH 2TX 800EU	20 MHz	30 MHz	2x40W FDD-LTE
FHEB	Flexi RRH 2TX 1800	35/40 /60 Mhz	75 Mhz	2x60W GSM, FDD-LTE
FRGY	Flexi RRH 2 pipe 2100 120W	60Mhz	60Mhz	2x60W WCDMA, FDD-LTE
FRHG	Flexi RRH 4 pipe 2600 160W	65Mhz	70Mhz	4x40W FDD-LTE
FRLB	Flexi RRH 2TX 730 MHz	12/18 MHz	12/18 MHz	
FHCA	Flexi RRH 2TX 850	15 MHz	15 MHz	
FHEA	Flexi RRH 2TX 1800	20 MHz	20 MHz	
FRIG	Flexi RRH 2TX 1700/2100	20 MHz	45 MHz	4xTX & 4xRX
FRGV	Flexi RRH 2TX 2100	20 MHz	20 MHz	
FRGQ	Flexi RRH 2TX 2100	20 MHz	20 MHz	
FRHB	Flexi RRH 2TX 2600	20 MHz	20 MHz	

Flexi 3-sector RF Modules

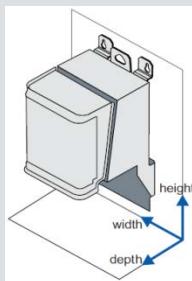
Remote Radio Heads – HW Characteristics

RRH Modules Interfaces

FRMB (2TX 800)

Height:
514 mm
Width:
326 mm
Depth
148 mm

Weight:
17.3kg

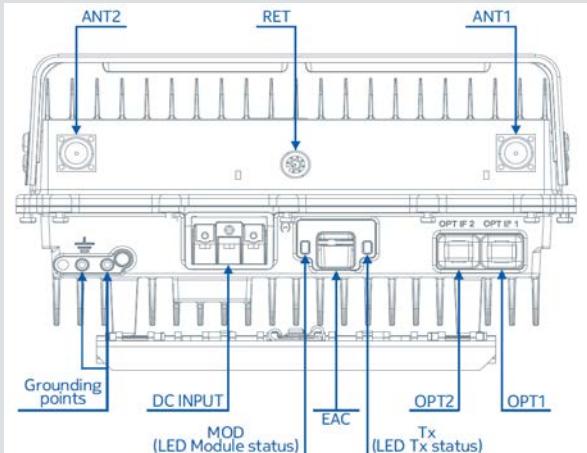


Power Consumption
Mode: FDD-LTE

Config: 1/1/1 2T2R
Output power/carrier: 20+20
Typical: 486W
Maximum: 667W

Config: 1/1/1 2T2R
Output power/carrier: 40+40
Typical: 750W
Maximum: 1170W

AISG supported:
ANT1(14.5V),
RET (14.5V): AISG 2.0

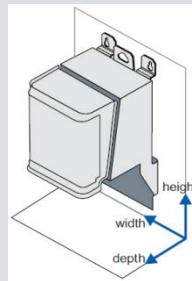


Interface	Label on the HW	Number of interfaces	Connector type
Power connector	DC IN	1	3-pole screw terminal
Antenna connector	ANT	2	7/16
RF external connector	Rx EXT	2	SMA
Remote Electrical Tilt	RET	1	8-pin circular
External Alarm Connection	EAC	1	D-sub MDR14
Optical interface	OPT	2	SFP 3 Gbps
Local Management Port	LMP	1	2x15 pin header

FHEB (2TX 1800)

Height:
621 mm
Width:
260 mm
Depth
324 mm

Weight:
17.3kg

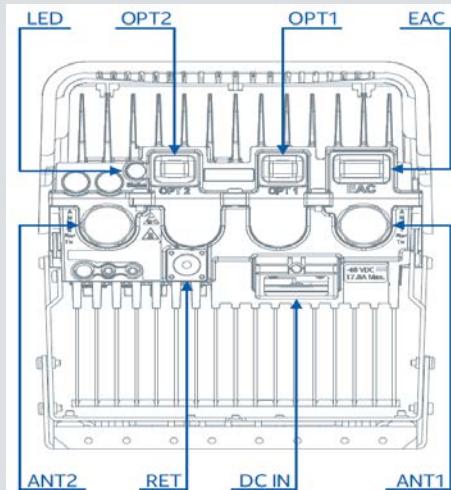


Power Consumption
Mode: GSM, FDD-LTE

Config: 1/1/1 2T2R
Output power/carrier: 20+20
Typical: 553W
Maximum: 789W

Config: 8/8/8
Output power/carrier: 15
Typical: 973W
Maximum: 1521W

AISG supported:
ANT1 (14.5V),
RET (14.5V): AISG 2.0



Interface	Label on the HW	Number of interfaces	Connector type
Power connector	DC IN	1	3-pole screw terminal
Antenna connector	ANT	2	7/16
Remote Electrical Tilt	RET	1	8-pin circular
External Alarm Connection	EAC	1	D-sub MDR14
Optical interface	OPT	2	SFP 6 Gbps

Flexi 3-sector RF Modules

Remote Radio Heads – HW Characteristics

RRH Modules Interfaces

FRGY (2 pipe 2100 120W)

Height:
721 mm
Width:
302 mm
Depth
215 mm

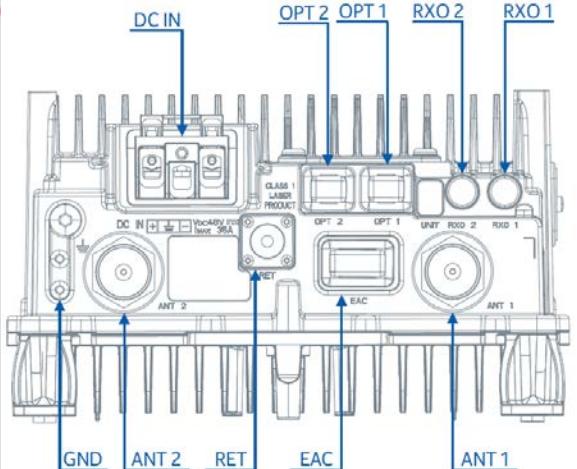
Weight:
16.2kg

Power Consumption Mode: WCDMA, FDD-LTE

Config: 1/1/1 (WCDMA)
Output power/carrier: 20
Typical: 324W
Maximum: 452W

Config: 1/1/1 (LTE)
Output power/carrier: 60+60
Typical: 800W
Maximum: 1536W

AISG supported:
ANT1(14.5V),
RET (14.5V): AISG 2.0



Interface	Label on the HW	Number of interfaces	Connector type
Power connector	DC IN	1	3-pole screw terminal
Antenna connector	ANT	2	7/16
RF external connector	RXO	2	QMA
Remote Electrical Tilt	RET	1	8-pin circular
External Alarm Connection	EAC	1	D-sub MDR14
Optical interface	OPT	2 (6 Gbps, OBSAI)	SFP
Grounding	Ground symbol	1	M8 or dual M5 screws

FRHG (4 pipe 2600 160W)

Height:
888 mm
Width:
331 mm
Depth
200 mm

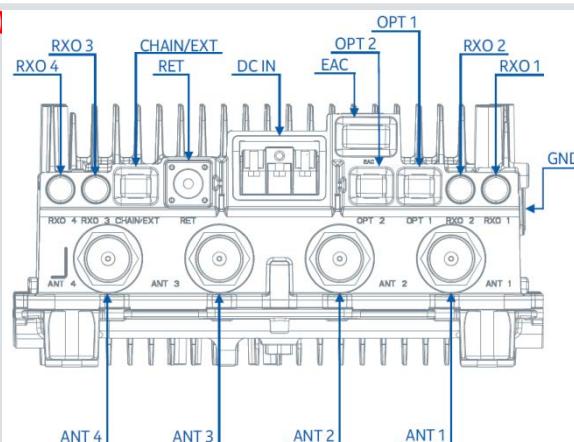
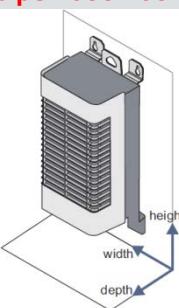
Weight:
26kg

Power Consumption Mode: LTE

Config: 1/1/1 2T2R
Output power/carrier: 2x20
Typical: 626W
Maximum: 884W

Config: 1/1/1 4T4R
Output power/carrier: 4x40
Typical: 1160W
Maximum: 2141W

AISG supported:
ANT1/ANT3 (14.5V),
RET (14.5V): AISG 2.0



Interface	Label on the HW	Number of interfaces	Connector type
Power connector	DC IN	1	3-pole screw terminal
Antenna connector	ANT	4	4.3-10
RF external connector	RXO	4	QMA
Remote Electrical Tilt	RET	1	8-pin circular
External Alarm Connection	EAC	1	D-sub MDR14
Optical interface	OPT1, OPT2, CHAIN/EXT	3	SFP (6 Gbps, OBSAI)
Grounding	Ground symbol	1	M8 or dual M5 screws



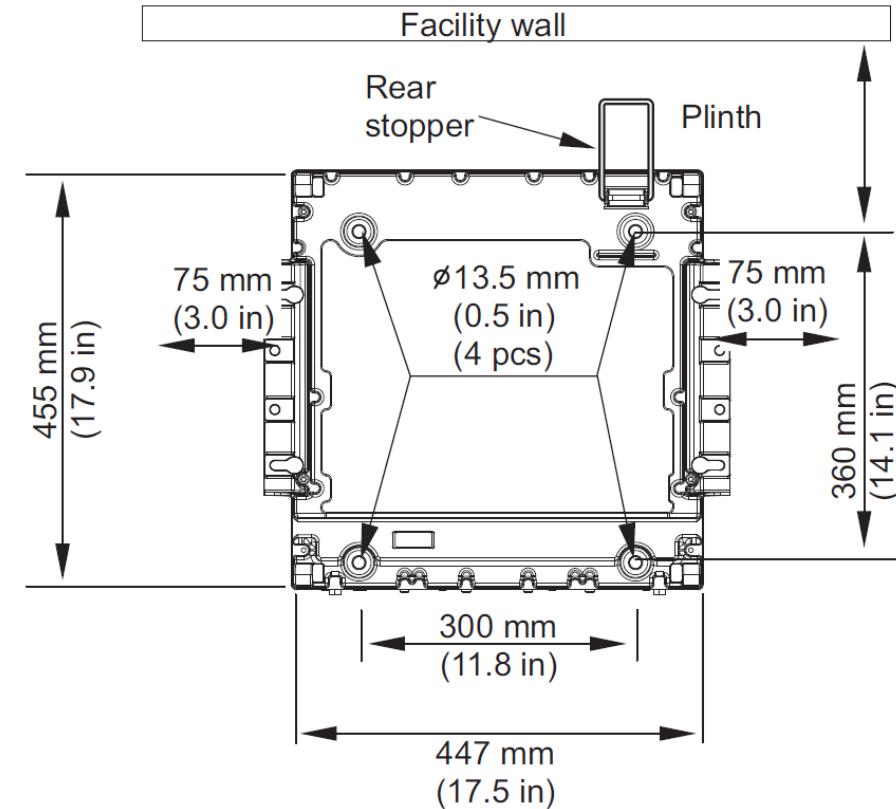
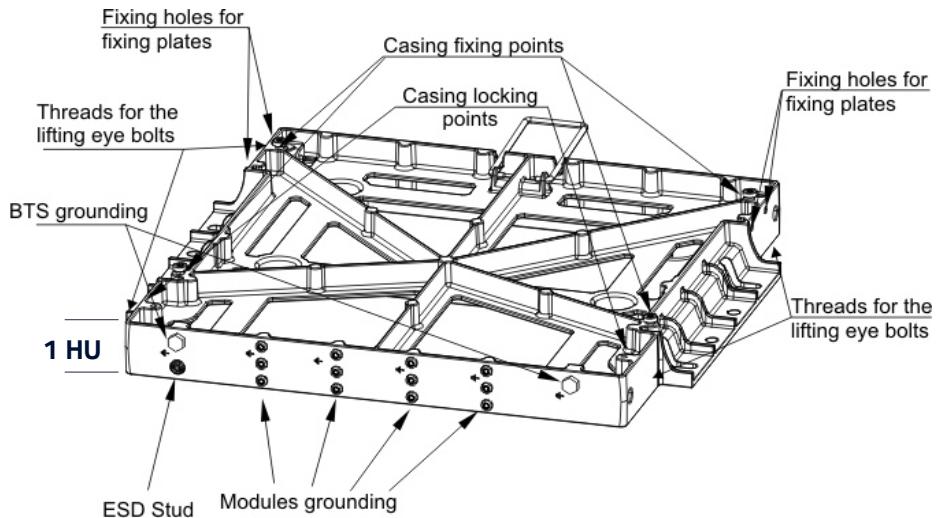
Agenda

- 1. Flexi BTS S-RAN Solution Overview**
- 2. Flexi BTS S-RAN Hardware Solution - Optional Module**
- 3. Flexi BTS S-RAN Documentation**
- 4. Flexi BTS S-RAN I&C Operations**

Flexi BTS Single RAN – Mounting Kit Module

Mounting Kit Floor, Wall and Pole (FMFA)

Plinth FMFA 104



Flexi BTS Single RAN - Optional Module

Alarm Box and OVP options

**Flexi System
External Alarm
(FSEB)**



**Flexi System
External OVP
(FSEC)**



**Flexi System
External OVP
(FSES)**



Flexi BTS Single RAN - Optional Module

Flexi External Alarms Connected Through FSMF

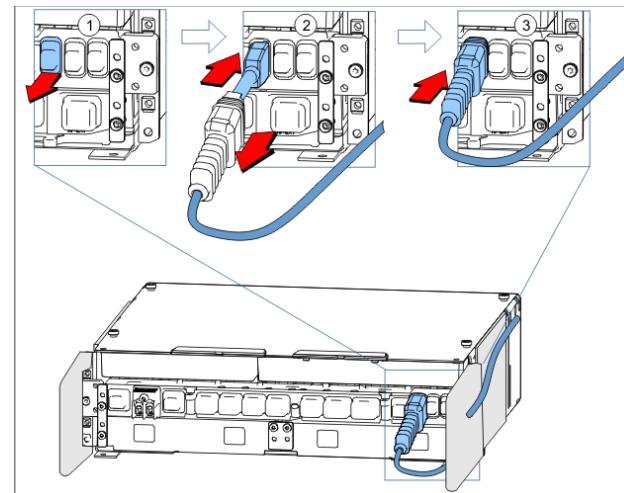
The external alarms are connected to the FSMF through the EAC cable (FSAH)

Up to 12 alarms are managed through this Module

Note that in case 2xFSMF are used in an SRAN configuration ,
only one module can support the EAC cable for the 12 external alarm.



Radio site External Alarms



Alarm directly connected to FSMF (HDMI)
FSAH cable (15 m) with open wires towards WAGO

TBD with Customer Need

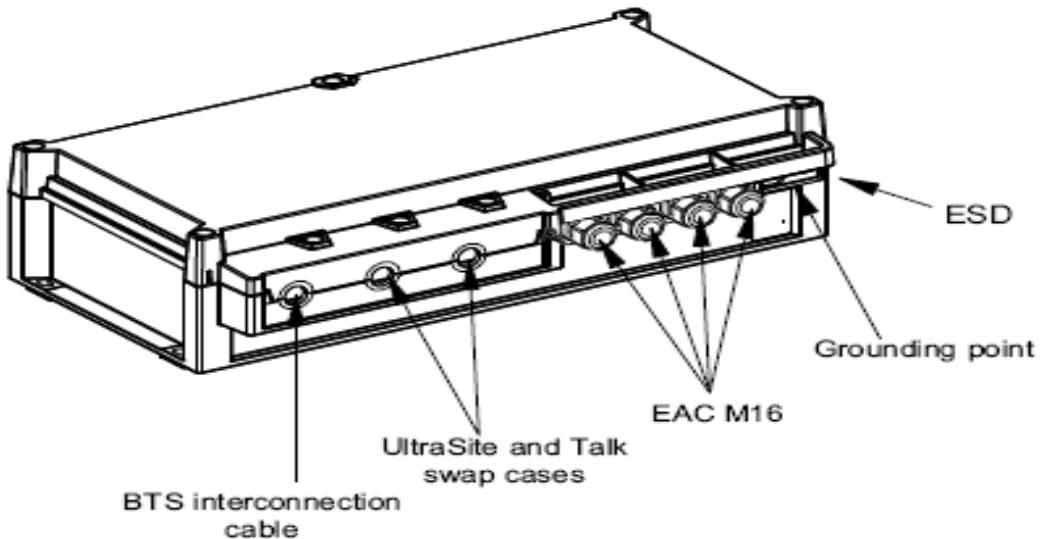
FSAH/FTSI cable

Conn. 1 (HDMI) Pin no.	Conn. 2 (D37) Pin no.	Pair: wire color	Description
1	7	1: Black	EXT_AL0_H
2	8	2: Brown	EXT_AL1_H
3	9	1: White/Black	EXT_AL2_H
4	10	2: White/ Brown	EXT_AL3_H
5	11	3: Red	EXT_AL4_H
6	12	4: Orange	EXT_AL5_H
7	1 + 13	3: White/Red	EXT_CTRL0_EXT_AL6_H
8	2 + 14	4: White/Orange	EXT_CTRL1_EXT_AL7_H
9	3 + 15	5: Yellow	EXT_CTRL2_EXT_AL8_H
10	4 + 16	6: Green	EXT_CTRL3_EXT_AL9_H
11	5 + 17	5: White/Yellow	EXT_CTRL4_EXT_AL10_H
12	6 + 18	6: White/Green	EXT_CTRL5_EXT_AL11_H
13	19	7: Blue	P5V0_EAC
14	20	7: White/Blue	P5V0_EAC
15	23	8: Violet	PROT_CAN_H_P5V_EAC
16	27	9: Grey	GND
17	24	8: White/Violet	PROT_CAN_L_P5V_EAC
18	25	10: Pink	GND
19	28	9: White/Grey	GND

Flexi BTS Single RAN - Optional Module

Flexi External Alarm Box (FSEB)

TBD with Customer Need



- Extending the Flexi BTS alarm connector to support up to 24 alarm interfaces.
- 12 alarms are supported for Flexi BTS.
- Support for the fire detector
- IP55 protection



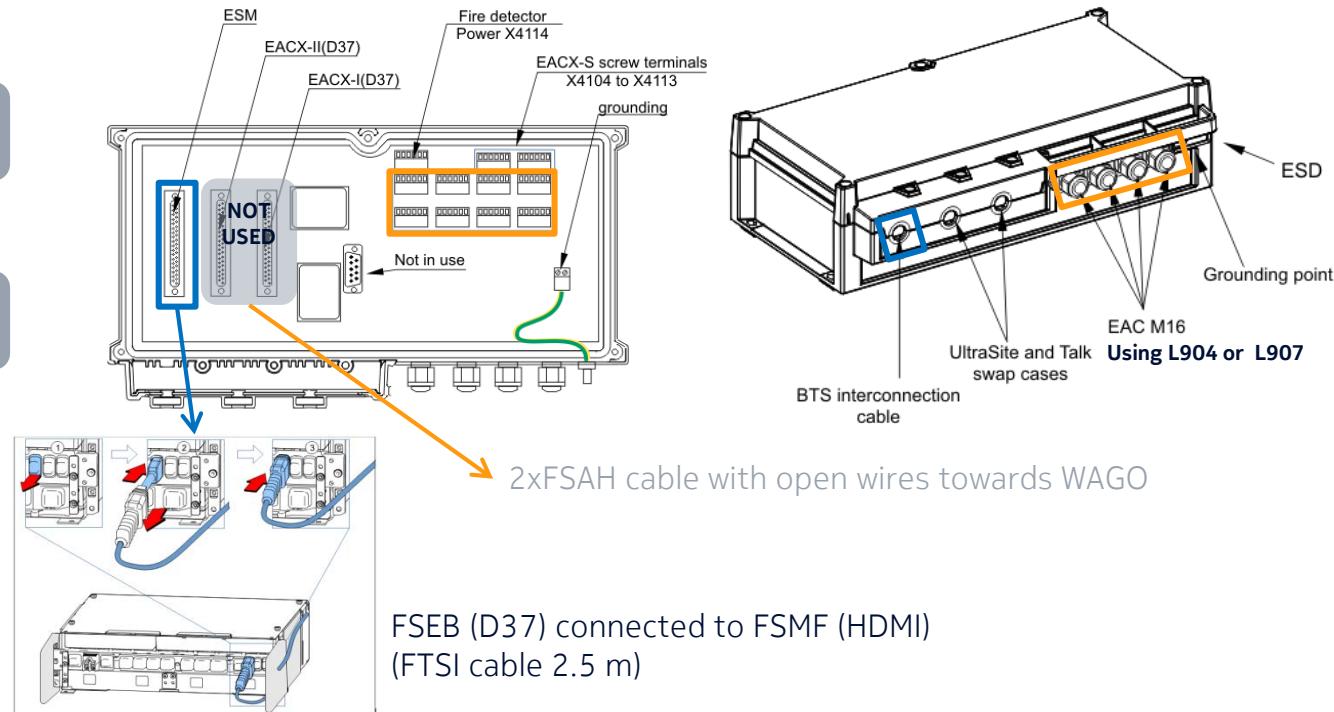
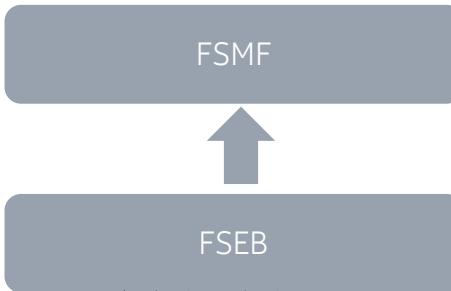
Flexi BTS Single RAN - Optional Module

Flexi External Alarm Connected Through Box (FSEB)

TBD with Customer Need

The external alarms are connected to the FSEB through the 2xEAC cable

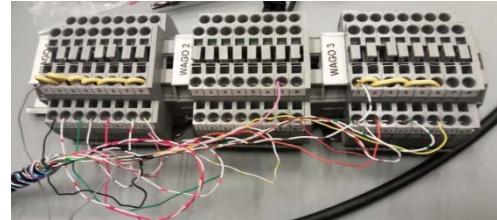
Up to 24 alarms are managed through FSEB (12 alarms direct signal + 12 alarms on CAN bus)



Flexi BTS Single RAN - Optional Module

Mapping for 16 (24) External Alarms

Mapping for 24 external alarms case (two EAC cables)



Équipement Environnement Technique	Manque secteur	IM energie 48V	ID energie 48V	Défaut Température	Disjoncteur Alim	Aircom	MHA/RET	Réenclencheur	Parafoudres
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ALARME Numéro	1	2	3	4	5	6	7	8
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L9078 N°1	BLANC	BLEU	JAUNE	BRUN	NOIR	ROUGE	VERT	BLANC
	GRIS	VIOLET	GRIS	VIOLET	GRIS	VIOLET	GRIS	VIOLET

Équipement Environnement Technique	IM Remote Radio	ID Remote Radio	Climatisation	Réserve	Réserve	Eblink haut	Eblink bas
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ALARME Numéro	9	10	11	12	13	14	15	16
---------------	---	----	----	----	----	----	----	----

L9078 N°2	BLANC	BLEU	JAUNE	BRUN	NOIR	ROUGE	VERT	BLANC
	GRIS	VIOLET	GRIS	VIOLET	GRIS	VIOLET	GRIS	VIOLET

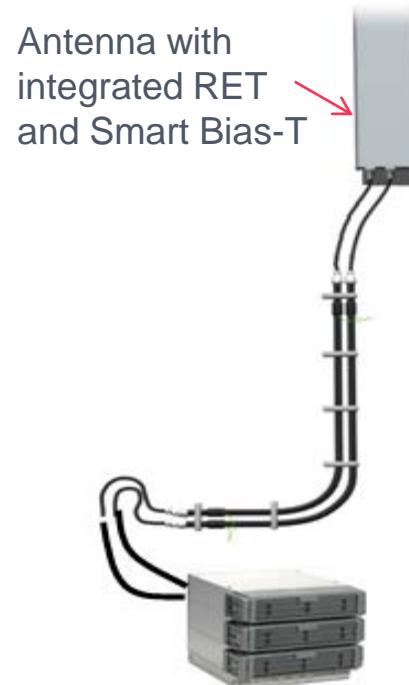
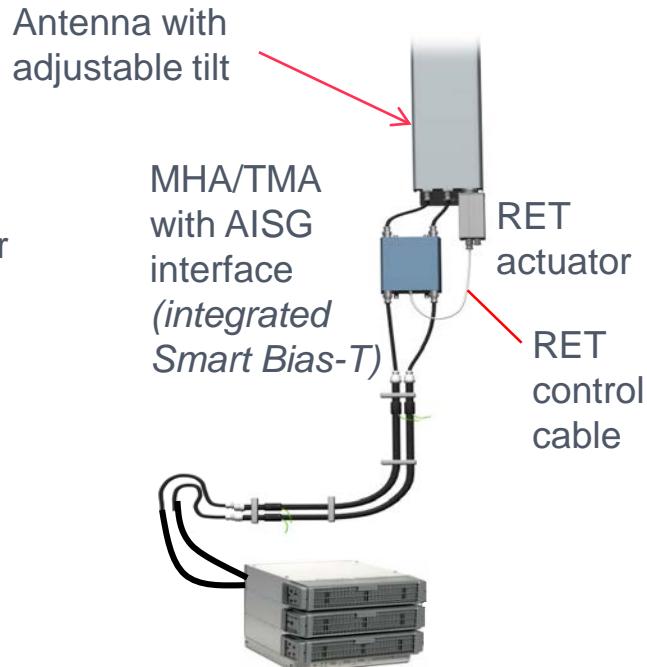
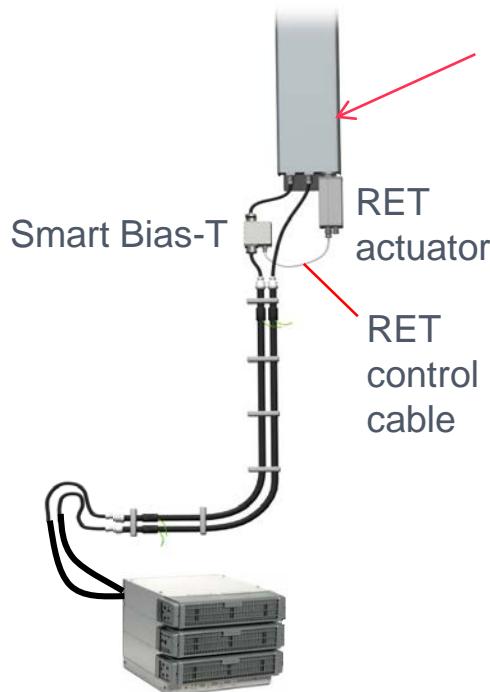
Équipement Environnement Technique	Intrusion	Incendie	Centrale Incendie	Balise pylone	Détection eau	LNA	Réserve	Réserve
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ALARME Numéro	17	18	19	20	21	22	23	24
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L9078 N°3	BLANC	BLEU	JAUNE	BRUN	NOIR	ROUGE	VERT	BLANC
	GRIS	VIOLET	GRIS	VIOLET	GRIS	VIOLET	GRIS	VIOLET

Flexi BTS Single RAN – Optional Module

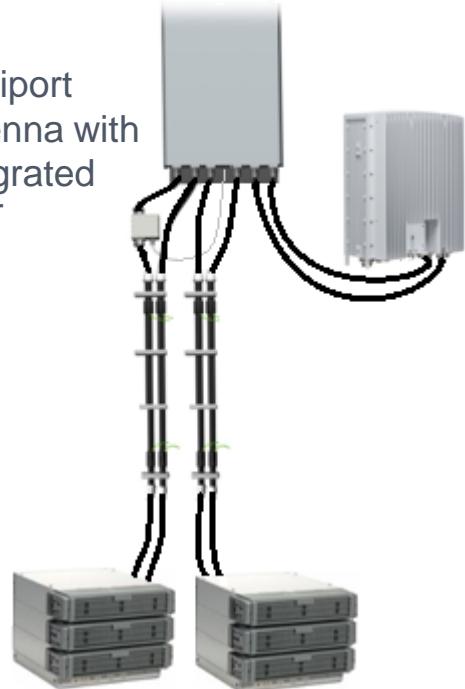
RET signal feed alternatives with RF Modules



Flexi BTS Single RAN – Optional Module

RET signal feed alternatives with RRH

Multiport
antenna with
integrated
RET



RRH with an AISG interface
(RET power and AISG signal fed with
a separate RET cable)

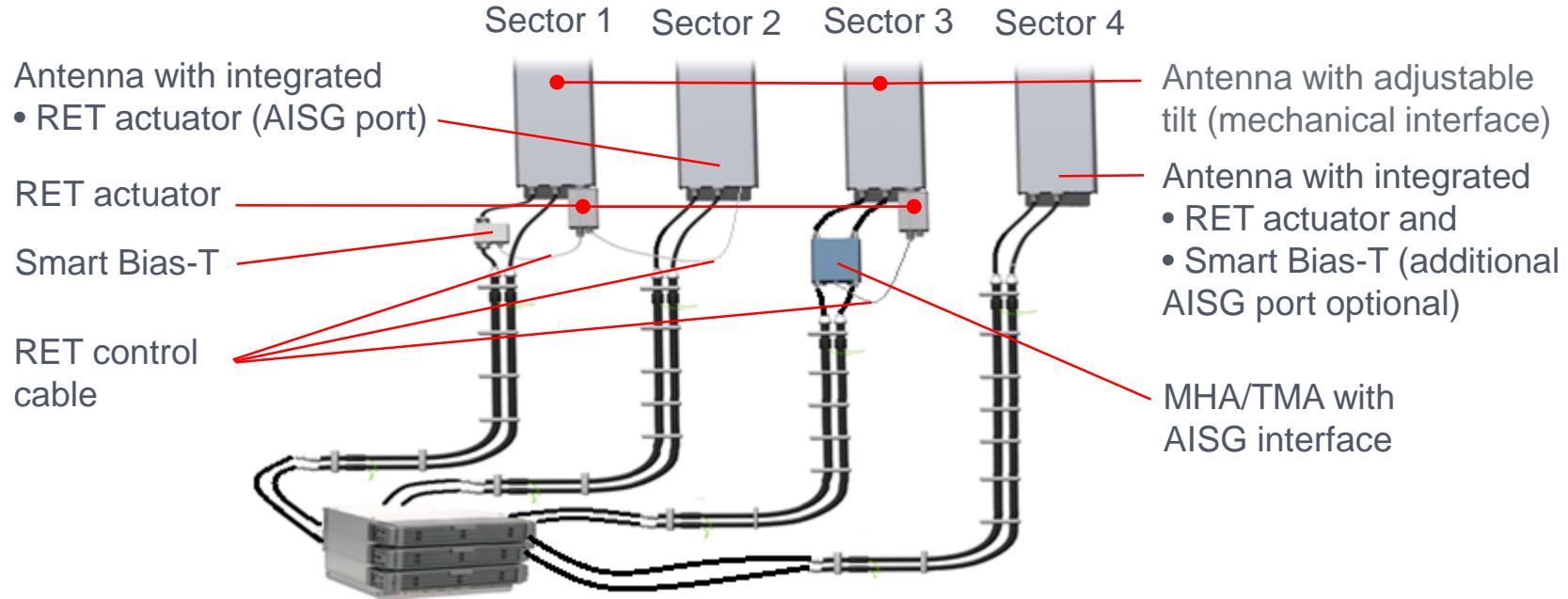


RRH where RET power and AISG
signal fed via the feeder



Flexi BTS Single RAN – Optional Module

RET signal feed alternatives



The AISG signal and DC power is fed in the RF-feeder and extracted with a Smart Bias-T or MHA

Flexi BTS Single RAN – Optional Module

ALD – RET – TMA

RET-1

Technology: All Functions: All Show only edited parameters

Object	Parameter	Abbreviation	Value
All	Filter...	Filter...	Filter...
RET-1	Path: SBTS-1/RET-1 Technology:		
> ALD logical subunit number	subunitNumber	1	
> Reference to antenna line device	aldRef	ALD-1	
> Minimum supported tilt angle	minAngle	0	
> Maximum supported tilt angle	maxAngle	6	
> Antenna model number	antModel	742265-2.1	
> Antenna serial number	antSerial	123456-5432	
> Installation date	installDate	200315	
> Installer ID	installerID	DTY2	
> Base station ID	baseStationID	Lab GPEC Villarceaux TRDU80	
> Sector ID	sectorID	s-02 Ant=742265 Band=2100MHz	
> Antenna bearing	antBearing	0	
> Antenna band list[0]	antBandList		
> Antenna beamwidth	antBeamwidth	63	
> Antenna operating frequency band	antOperFreqBand	Band 3	
> Antenna operation gain	antOperGain	10.3	
> Antenna band list[1]	antBandList		
> Antenna beamwidth	antBeamwidth	65	
> Antenna operating frequency band	antOperFreqBand	Band 2	
> Antenna operation gain	antOperGain	10.2	
> Antenna band list[2]	antBandList		
> Antenna beamwidth	antBeamwidth	67	
> Antenna operating frequency band	antOperFreqBand	Band 1	
> Antenna operation gain	antOperGain	17.8	
> Mechanical angle	mechanicalAngle	8	
> Tilt angle	angle	3	
> Remote electrical tilt subunit identifier	retid	1	

Hardware

FRGU 1 ● 2100

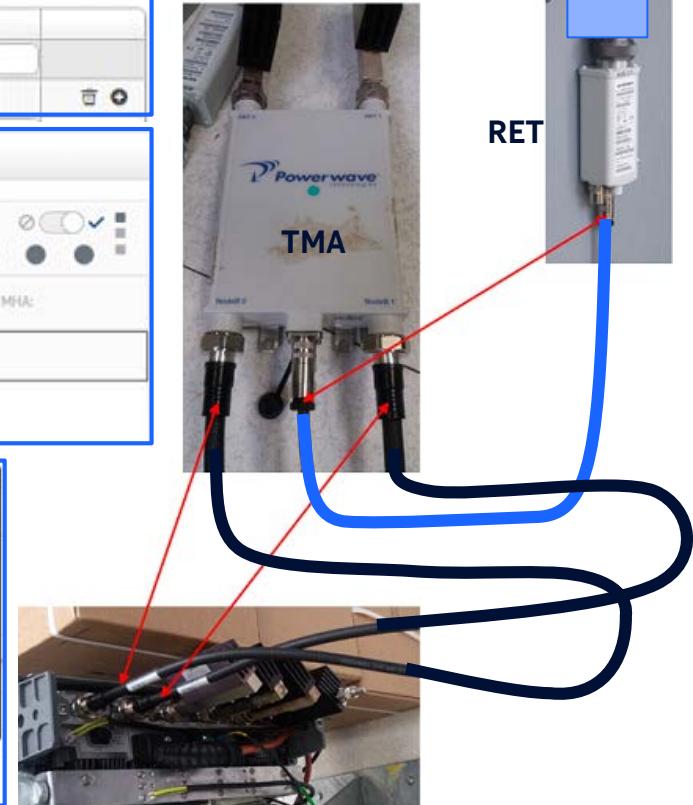
RET: MHA: Unassigned RET: 1

RET 1 ● 3°

Product code: 86010025
 Serial number: CS64207706
 Manufacturer: KA
 SW version: FW_V02.02.30_BL_V02.02.30
 Detected from: FR-1/ANT1
 Subunit number: 1
 Operational state: Enabled
 Availability status: Online
 ALD reference: ALD-1
 Min angle: 0
 Max angle: 6
 Tilting state: Idle

Edit RET 1 parameters...

RET 1 ● 3°



Flexi BTS Single RAN – Optional Module

ALD – RET – TMA

ANTENNA

RET



Object	Parameter	Abbreviation	Value
All	Filter...	Filter...	Filter...
ANTL-1 Path: SBTS-1/ANTL-1 Technology:			
> Additional antenna line RX (UL) gain	additionalRxGain		0
> Antenna connector	antennaConnector		1
> Antenna round trip delay	antennaRoundTripDelay		10
> Current window alarm threshold	cwaThreshold		165
Antenna line DC voltage towards ALDs	dcVoltage	AUTO	
> Antenna feeder loss of RX signal (UL)	feederLoss		0
> Reference to Flexi radio	frRef		FR-1
> HDLC communication on antenna line	hdlcCommunicationAllowed		true
> Antenna line uplink delay	ulDelay		0
> VSWR major alarm threshold	vswrMajorThreshold		3
> VSWR minor alarm threshold	vswrMinorThreshold		2.6
> Antenna line identifier	antId		1
Y Results: 174 Total: 827 Parameters			
Page: 1 / 15 13 Rows per page			

Object	Parameter	Abbreviation	Value
All	Filter...	Filter...	Filter...
ANTL-2 Path: SBTS-1/ANTL-2 Technology:			
> Additional antenna line RX (UL) gain	additionalRxGain		0
> Antenna connector	antennaConnector		2
> Antenna round trip delay	antennaRoundTripDelay		10
> Current window alarm threshold	cwaThreshold		165
Antenna line DC voltage towards ALDs	dcVoltage	AUTO	
> Antenna feeder loss of RX signal (UL)	feederLoss		0
> Reference to Flexi radio	frRef		FR-1
> HDLC communication on antenna line	hdlcCommunicationAllowed		true
> Antenna line uplink delay	ulDelay		0
> VSWR major alarm threshold	vswrMajorThreshold		3
> VSWR minor alarm threshold	vswrMinorThreshold		2.6
> Antenna line identifier	antId		2
Y Results: 174 Total: 827 Parameters			
Page: 2 / 15 13 Rows per page			

WARNING!

SBTS reset needed for following parameters (ANTL):

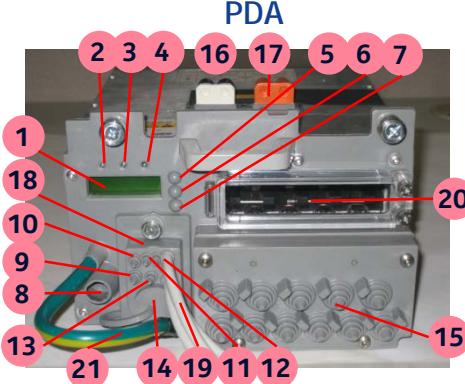
> Antenna connector	antennaConnector	1
> Antenna round trip delay	antennaRoundTripDelay	10
> Reference to Flexi radio	frRef	FR-1



NOKIA

Flexi BTS Single RAN – Optional Module

FPRB Flexi Power Rectifier



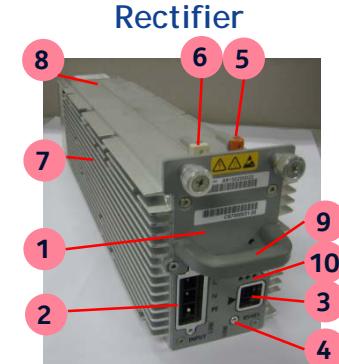
- (1) LCD
- (2) Red LED
- (3) Yellow LED
- (4) Green LED
- (5) Up button
- (6) Middle button
- (7) Down button
- (8) AC cable inlet
- (9) Alarm Out
- (10) Alarm In
- (11) To PSU
- (12) From PSU
- (13) Temperature
- (14) Ethernet interface
- (15) DC grommet
- (16) BR bus bar
- (17) -54V bus bar
- (18) Drawer
- (19) RS 485 cable
- (20) Window of the breakers
- (21) PE of the PDA

Temporary Solution

General view of the FPRB



Back view of the FPRB



- (1) Rectifier front panel
- (2) AC input connector
- (3) RS485 interface
- (4) Connector screw hole
- (5) -54V bus bar
- (6) BR bus bar
- (7) Case
- (8) Fan cover
- (9) Handle
- (10) LED

Flexi BTS Single RAN – Optional Module

FPRB Flexi Power Rectifier



2kW Rectifier
(IP65 Version - Black handle)



3kW Rectifier
(IP65 Compliant - Gray handle)

Table 14 – LEDs on the rectifier front panel		
LED Mark	Status	Indication
Yellow (amber) / Message	ON	Minor EAC alarm (refer to Table 12)
Green / Normal	ON	<ul style="list-style-type: none">Rated mains voltage (refer to Table 6)System OK
Red / Alarm	ON	<ul style="list-style-type: none">Rectifier failureFan failureAC input phase voltage less than 80VLow output voltage

Flexi BTS Single RAN – Optional Module

FPBC Flexi Battery Power



FPBC power considerations

Property	Value
Initial capacity	>30 Ah (Output power 1500 W)
Nominal voltage	52 V
Charge voltage	Maximum -57 V
Max. discharge current	30 A
Discharge cut-off voltage	-42 V

FPBC loads and back-up times (new battery pack)

Property	Value
250 W	≥ 360 minutes
500 W	≥ 180 minutes
750 W	≥ 120 minutes
1500 W	≥ 60 minutes

Flexi Power Battery (FPBC) is a Lithium Iron Phosphate (LiFePO4) technology battery installed inside a Flexi casing. It is used as battery backup on BTS sites when there is a mains failure. The FPBC is connected to Flexi Power Rectifier (FPRB) at the battery input circuit breaker.

DC output to the BTS equipment is then provided from the FPRB DC output circuit breaker.

- Energy-efficient Lithium Battery in a Nokia 3U Flexi casing
- Can be mounted on a pole, wall or plinth using applicable mounting kits (such as FMFA or FPKA)
- Designed for outdoor use (IP65 rated)
- Modular and chainable (up to 3 units with 1 FPRB and 9 units with 3 FPRBs)
- Same operating temperatures as for FPRB and System Modules
- Filterless
- Fast charging (from 0 % to 100 % in 90 minutes)
- Long cycle life

Flexi BTS S-RAN Hardware Solution – Optional Items

Flexi Multiradio 10 BTS Power Distribution Sub-Module (FPFD) - Overview

FPFD

It is a **size optimized power distribution unit** that has basic overvoltage protection (type approval level with 2 kV/1 kV)

It is **designed to be used for stacked configurations**, but it can also be used for distributed BTS configurations in the same way as the existing Flexi BTS integrated power distribution sub-module with an optional FSEP or FSES (ext OVP).

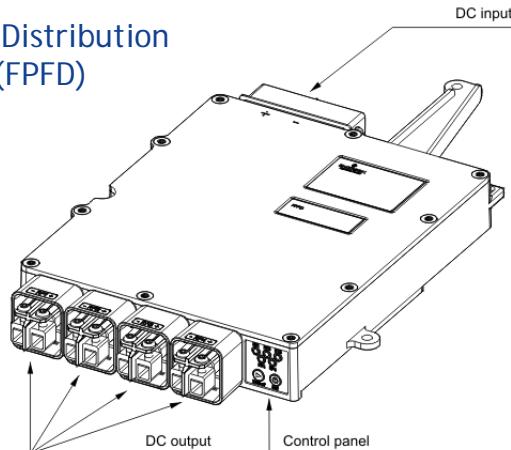
It is **installed inside an outdoor 3U casing**, and internal connections between the core module.

It goes through an internal connector.

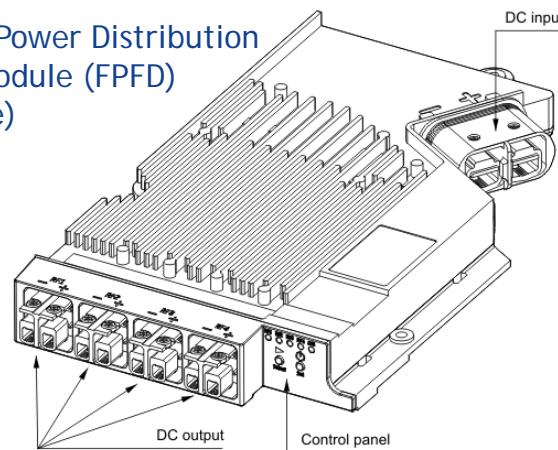
It **provides 4 external 48V DC outputs** for Flexi Modules (RF Module, RRH, and extension System Module) or any standard 48 V DC device at the site.

It also powers the core module.

Flexi Power Distribution Submodule (FPFD)
(Artesyn)



Flexi Power Distribution Submodule (FPFD)
(Efore)



Flexi BTS S-RAN Hardware Solution – Optional Items

Flexi Power Distribution Sub-Module (FPFD) - Overview

FPFD

It is a **stand-alone, general-purpose outdoor PDU module** with Class II overvoltage protection with a 15 kA protection level.

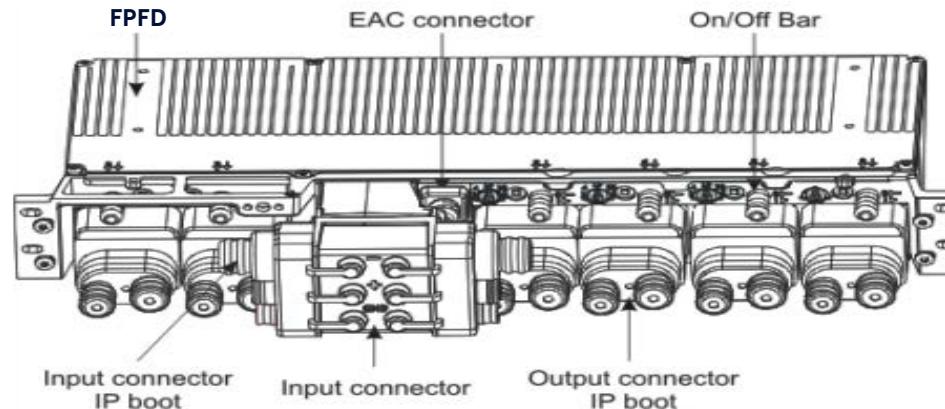
It **feeds 48 V DC power** to distributed Flexi RF Modules or Remote Radio Heads without an external protection unit (FSEP or FSES). (ext OVP).

It is a **stand-alone external 19-inch wide 2U** high outdoor module.

It **provides 6 outputs** for Flexi Modules (RF Modules, RRHs, and extension System Module) or any standard -48 V DC device at the site.

It can also be used, for example, up in the tower **to divide one main DC line to several RFM/RRHs**.

It has one external alarm to indicate OVP condition.



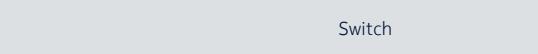
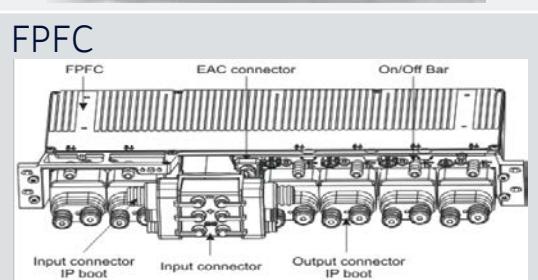


Agenda

- 1. Flexi BTS S-RAN Solution Overview**
- 2. Flexi BTS S-RAN Hardware Solution - Modules description summary**
- 3. Flexi BTS S-RAN Documentation**
- 4. Flexi BTS S-RAN I&C Operations**

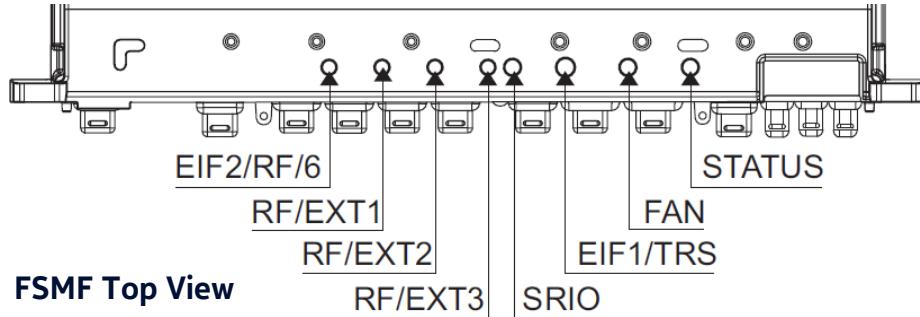
Optional Items	Description			Characteristic
FSMF (System Module)	Connector	Type	Description	Power consumption
<p>* Note : This is the default configuration. Alternatively, it can be SW configured as additional optical interface that provides RP3-01 (OBSAI) or CPRI interfacing to RF Module or RRH.</p>	DC IN	Power input	Power distribution to System Module	Typical: 125W Maximum:180W
	DC OUT	Power output	Power sharing to one optional baseband capacity extension sub-module	
	LMP	Ethernet interface	• Element Manager or • Site Support equipment (ex: battery backup module)	
	EIF2/RF/EXT6	Ethernet interface	External transport *	
	BB EXT1-2	Interface	Interconnecting capacity extension sub-module and System Module	
	SRIO	Interface	External baseband extension (ex: additional System Module)	
	Sync In			
FBBC	Connector	Type	Description	Power consumption
	DC IN	Power input	Power distribution to Module	Typical: 100W Maximum:147W
	RF1/RF2/RF3	Optical	Optical OBSAI RP3-01 (up to 6 Gbit/s) interfaces towards RF units	
	BB EXT	Interface	interconnecting capacity extension sub-module and System Module.	
	SRIO/RF4	Interface	Dual mode combo port which can be configured either as SRIO or as RP3 interface	
FPFD	Connector	Type	Description	Power consumption
<p>* Note: FPFD v. 204: 4 x DC output fixed to 40A 1 x internal output for direct feeding to System Module</p>	DC IN	Power input	One -48 V DC input	Typical: 1W Maximum:1W
	DC OUT	Power output	4 external -48 V DC outputs	
Dimensions & weight	H x W x D: (FSMF casing 3U) 133 mm x 447mm x 420mm Weight: 11.5kg			
Dimensions & weight	H x W x D: 42 mm x 220mm x 363mm Weight: 3,35kg			
Dimensions & weight	H x W x D: 35mm x 190mm x 360mm Weight: 2kg			

Optional Items	Description			Characteristic
FTIF	Connector	Type	Description	Power consumption
<p>2 x Combo Ports, each operating as: - 100/1000Base-T or - optical SFP</p> <p>4 x "RJ48C-style" port, each provides 2 x E1/T1/JT1</p>	DC IN	Power input	Power distribution to System Module	Typical: 10W Maximum: 10W
	DC OUT	Power output	Power sharing to one optional baseband capacity extension sub-module	
	LMP	Ethernet interface	<ul style="list-style-type: none"> • Element Manager or • Site Support equipment (ex: battery backup module) 	
	EIF2/RF/EXT6	Ethernet interface	External transport *	
	BB EXT1-2	Interface	Interconnecting capacity extension sub-module and System Module	
	SRIO	Interface	External baseband extension (ex: additional System Module)	
<p>* Note : This is the default configuration. Alternatively, it can be SW configured as additional optical interface that provides RP3-01 (OBSAI) or CPRI interfacing to RF Module or RRH.</p>				Dimensions & weight
				H x W x D: 37,5 mm x 244.55mm x 196.73mm Weight: 1.69kg

Optional Items		Description			Characteristic
		Connector	Type	Description	
 		RS485 in	RS485 com port	RS485 Communication input	Power consumption Typical: 250W Maximum: 1500W
		RS485 out	RS485 com port	RS485 Communication output	
		Alarm in	RJ45 Terminal	Alarm in port	
		Alarm out	RJ45 Terminal	Alarm out port	
		Address	Address	To set the address for parallel connection of FPBC	
		LED	LED	Display the operating status of the battery	
		Switch	Switch	For power ON/OFF	
		DC power -48V	DC power	+ Battery positive connection port - Battery negative connection port	
		Connector	Type	Description	Power consumption
		DC IN	Power input	Power distribution to Module	Typical: 100W Maximum: 147W
		RF1/RF2/RF3	Optical	Optical OBSAI RP3-01 (up to 6 Gbit/s) interfaces towards RF units	
		BB EXT	Interface	interconnecting capacity extension sub-module and System Module.	
		SRIO/RF4	Interface	Dual mode combo port which can be configured either as SRIO or as RP3 interface	
		Connector	Type	Description	Power consumption
		DC IN	Power input	One -48 V DC input	Typical: 0W Maximum: 0W
		DC OUT	Power output	6 external -48 V DC outputs	
		EAC	Power output	One -48 V DC output	
					Dimensions & weight
					H x W x D: 72,5 mm x 482,5mm x 265mm Weight: 5,5kg

Flexi BTS S-RAN Hardware Solution – Optional Items

LEDs of System Module (FSMF)



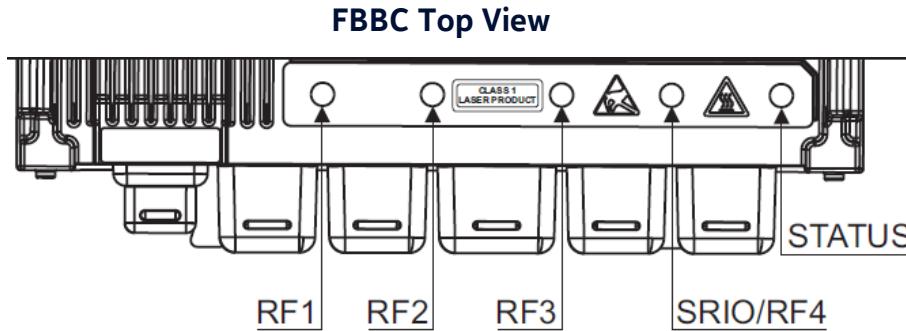
FSMF Top View

LED name	LED description	Color
EIF2/RF/6	RF/EXT link 6 status or transport interface 2 status	<ul style="list-style-type: none">Red: no connectionGreen: connection OKYellow: not in use
RF/EXT1	RF link 1 status	<ul style="list-style-type: none">Red: no connectionGreen: connection OKYellow: not in use
RF/EXT2	RF link 2 status	<ul style="list-style-type: none">Red: no connectionGreen: connection OKYellow: not in use
RF/EXT3	RF link 3 status	<ul style="list-style-type: none">Red: no connection

LED name	LED description	Color
		<ul style="list-style-type: none">Green: connection OKYellow: not in use
SRIO	SRIO connection status	<ul style="list-style-type: none">Red: connection is faulty/ no link detectedRed, blinking: connection is degradedGreen: connection OK/ link detectedno color: port is not in use
EIF1/TRS	transport interface 1 status	<ul style="list-style-type: none">Red: no connectionGreen: connection OKYellow: not in use
FAN	fan status	<ul style="list-style-type: none">Red: fan faultGreen: fan OK
STATUS	system module status	<ul style="list-style-type: none">Red: module self-test or reset (LED red for < 5 seconds) or major alarm or critical alarmRed, blinking: minor alarmYellow: stand-by or blockedYellow, blinking: SW download or configuration ongoing, module non-operationalGreen: module operational (the cell can be locked in the RNC)Green, blinking: module is loading software or parameters or local maintenance access when modules are operational

Flexi BTS S-RAN Hardware Solution – Optional Items

LEDs of the Capacity Extension Sub-Module (FBBC)



LED name	LED description	Color
RF1/ RF2/ RF3	RF link status	<ul style="list-style-type: none">Red: no connectionGreen: connection OKYellow: not in use
SRIO/RF4	RF4 link status or SRIO interface status	<ul style="list-style-type: none">Red: no connectionGreen: connection OKYellow: not in use
STATUS	operational status	<ul style="list-style-type: none">Red: module self-test or reset (LED red for < 5 seconds) or major alarm or critical alarmRed, blinking: minor alarmYellow: stand-by or blockedYellow, blinking: SW download or configuration ongoing, module non-operationalGreen: module operationalGreen, blinking: module is loading software or parameters or local maintenance access when modules are operational



- 1. Flexi BTS S-RAN Solution Overview**
- 2. Flexi BTS S-RAN Hardware Solution**
- 3. Flexi BTS S-RAN Documentation**
- 4. Flexi BTS S-RAN I&C Operations**

Documentation

How to retrieve the Flexi BTS S-RAN Documentation

Documentation	Documentation
RF Sharing Operability	FPRB FPBC Alarm Connection with System Module
Configuring RF Sharing	FPRB User Manual
Flexi Multiradio BTS RF Sharing Released Configurations (Excel)	FPRB_Installation_Manual
flexi_rfmodule_rrh_description	User Manual Flexi Power Battery
flexi_multiradio_10_base_station_transmission_description	Flexi BTS S-RAN Installation and Upgrade Guide
flexi_multiradio_10_base_station_quick_guide	
flexi_multiradio_10_base_station_product_description	
creating_sbts_configurations050716	
flexi_multiradio_base_station_installation_site_requirements	
managing_remote_electrical_tilt	
Orange France - Radio Modernization - SRAN Configuration profile	
Configurations Modernisation Radio Orange	



- 1. Flexi BTS S-RAN Solution Overview**
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- 4. Flexi BTS S-RAN I&C Operations**

Feederless / Distributed Site concept introduction

- Standard Flexi Multiradio BTS modules support the **Feederless BTS site** application where :
 - **one 3-sector RF Module** or Remote Radio Head, or
 - the entire Flexi BTS is installed close to the antennas.
 - For a feederless site traditional long antenna feeders or
 - Mast Head Amplifiers are not needed,to optimize the BTS site RF performance in both uplink and downlink.
- A standard IP65 outdoor Flexi **3-sector RF Module can be installed close to an antenna** leading to:
 - **Best RF performance** because no downlink and uplink feeder losses
 - **Easiest installation** because only one optical and DC cable to tower
 - **No long antenna feeders** (typically six for a three-sector site)
 - **No mast head amplifiers/** tower-mounted amplifiers
 - **Lowest total wind load and weight**
 - **Lowest total power consumption**
- Flexi 3-sector **RF Module can be software-activated** and configured to support one, two or three sectors, or one sector with 2TX MIMO with optional four-way uplink diversity.
- In the **Distributed solution**, 3-sector RF Module(s) or Remote Radio Head(s) **are located up to 20 km away** from the main Flexi System Module site. Typically, an existing optical fibre infrastructure is used.

Feederless BTS Site example



- Radio Module(s) / RRH is located remote from the System Module.
- Avoids feeders with their losses and noise.
- Optical fibre connection between Radio and System Module.

I&C Operations

Feederless BTS Site power option 2: DC with/without short term BBU from System Module

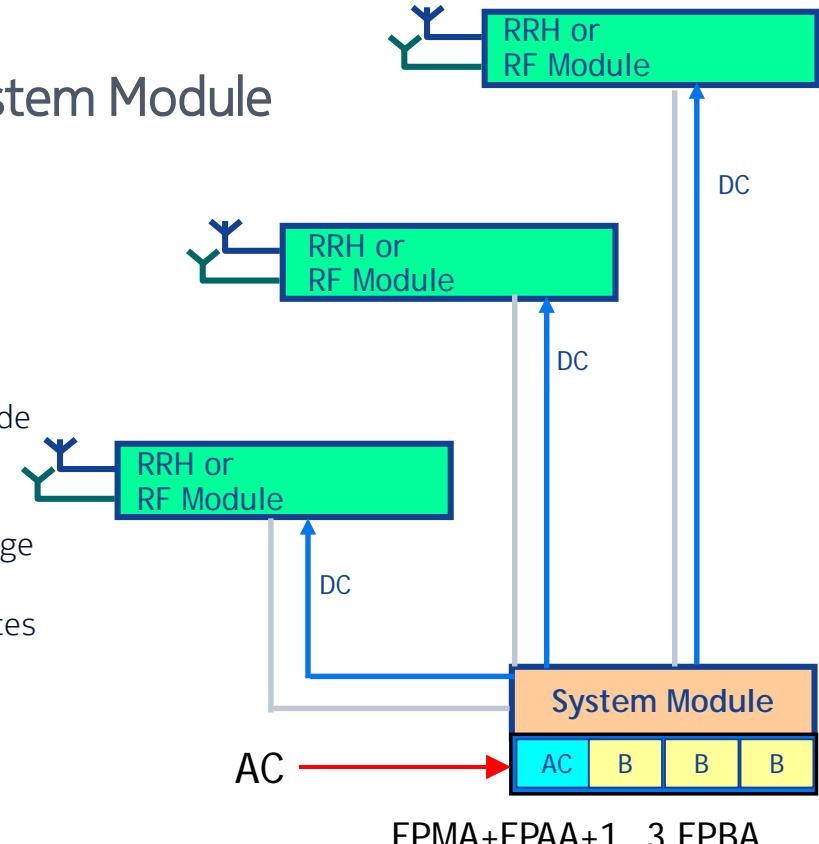
- RF Module DC input from System Module

- Max. Length of the optical cable with Multimode SFPs is **200 m**

- Max. DC cable length is 200m*, when DC voltage at the FSMx side is 48V.

*In case of full support for battery operation,
the max. DC cable may only be 145m due to the lower input voltage
to the FSMx.

- System BBU time with FPMA+ 2 FPAAAs+ 2 FPBAs about 10 minutes
with typical 1+1+1 @ 40 W



I&C Operations

Feederless BTS Site power option 1: AC with full BBU

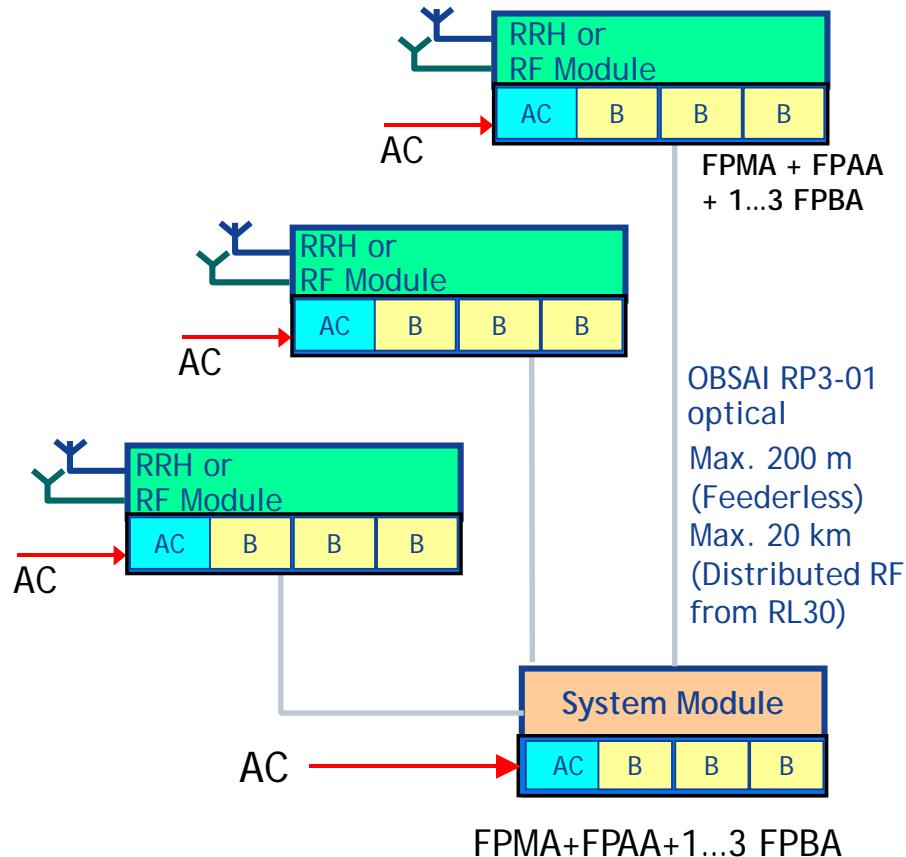
Feederless

System Module AC powered

- Optional battery back up
- FPMA + FPAA + 1...3 FPBA
- up to 3 hours with 3 FPBAs

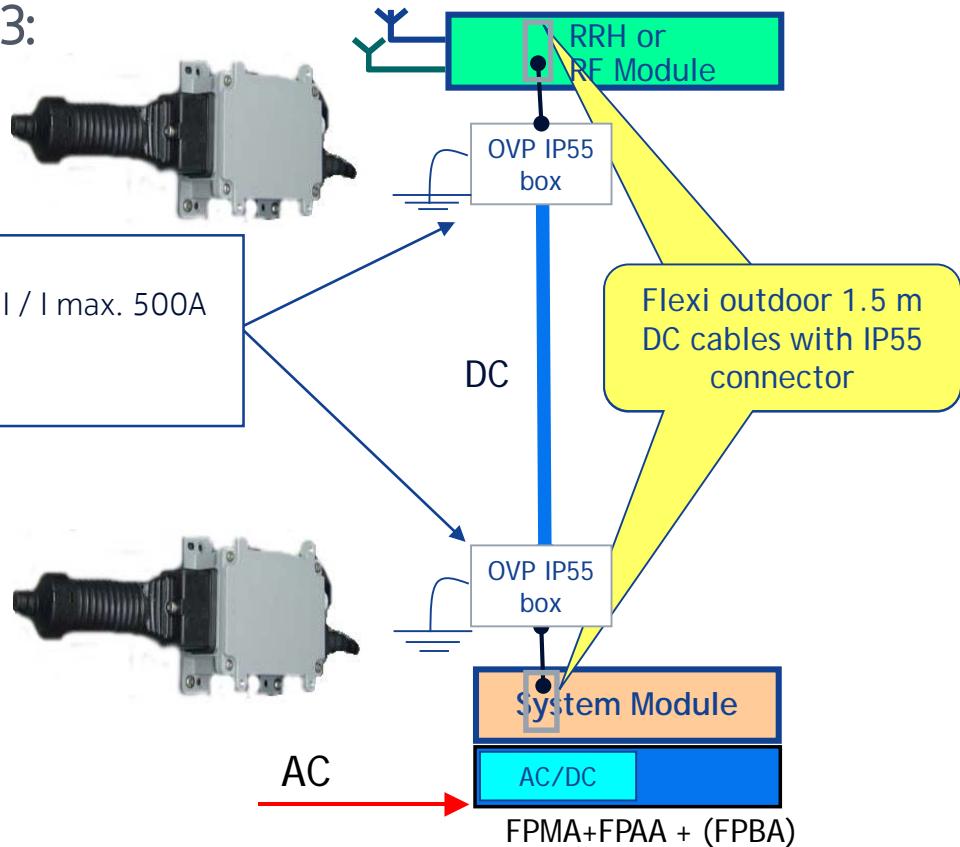
RF Module/RRH AC powered

- 1 or 3 sector RF Module
- Optional battery back up
 - FPMA + FPAA + 1...3 FPBA
 - Up to 2 hours with 3 FPBAs
(1 sector RF Module typical)



I&C Operations

Feederless BTS Site power option 3:





Agenda

- 1. Flexi BTS S-RAN Solution Overview**
 - 2. Flexi BTS S-RAN Hardware Solution**
 - 3. Flexi BTS S-RAN Documentation**
 - 4. Flexi BTS S-RAN I&C Operations**
- Naming Convention**

Flexi BTS S-RAN Hardware Solution – Naming Convention

Naming Convention - Overview

Letter		Description	Letter	Description	
1st letter	F __	Flexi family	2nd letter	_ C __	Cabinet and Cabinet Accessories The general naming is FCxy, where x indicates: <ul style="list-style-type: none"> • <i>I</i> - indoor version • <i>O</i> - outdoor version
2nd letter	_ A __	Antenna Equipment and Same Band Combiner The general naming is FAxy, where x indicates: <ul style="list-style-type: none"> • <i>A</i> - 400 MHz • <i>B</i> - 700 MHz upper • <i>C</i> - 850 MHz • <i>D</i> - 900 MHz • <i>E</i> - 1800 MHz and 1700 MHz • <i>F</i> - 1900 MHz • <i>G</i> - 2100 MHz • <i>H</i> - 2600 MHz • <i>J</i> - 2000 MHz 	_ D __	Repeater Interface Modules	
			_ L __	Diplexers	
			_ M __	Low-noise Mast Head Amplifiers	
			_ O __	Mounting Kits	
			_ P __	Optical distribution unit	
			Power supply modules and sub-modules or installation kits		
	_ B __	Baseband Extension Modules			

Flexi BTS S-RAN Hardware Solution – Naming Convention

Naming Convention - Overview

Letter	Description	Letter	Description		
2nd letter _H__ _R__ _X__ _Z__	<p>Radio Modules/Remote Radio Heads</p> <p>The general naming is:</p> <ul style="list-style-type: none"> • FHx_ - Flexi Remote Radio Head • FRx_ - Flexi RF Module • FXx_ - Flexi RF Multiradio • FZx_ - Flexi TD-LTE RF Module <p>Where x indicates:</p> <ul style="list-style-type: none"> • A - 400 MHz • B - 700 MHz upper • C - 850 MHz • D - 900 MHz • E - 1800 MHz and 1700 MHz • F - 1900 MHz • G - 2100 MHz • H - 2600 MHz • I - 1700 Mhz and 2100 MHz • J - 2000 MHz • K - 1500 MHz • L - 700 MHz lower • M - 800 MHz EU • N - 2300 MHz 	2nd letter _S__	<p>System Modules</p> <p>The general naming of the System Modules is FSxy :</p> <p>Where x indicates:</p> <ul style="list-style-type: none"> • I - indoor version • M - outdoor version <p>Where y indicates:</p> <ul style="list-style-type: none"> • B, C, D, E - Flexi Multiradio BTS • F, H - Flexi Multiradio 10 BTS <p>Flexi System External Alarm, Flexi System External OVP</p> <p>The general naming of the modules is FSEx :</p> <p>Where x indicates:</p> <ul style="list-style-type: none"> • B - Flexi System External Alarm • C,S - Flexi System External OVP 	_T__	Transport modules, sub-modules and cables.

Flexi BTS S-RAN Hardware Solution – Naming Convention

Naming Convention - Overview

Letter	Description	Letter	Description
2nd letter	_ I __	2nd letter	_ Y __ Global Navigation Satellite System (GNSS) receiver Flexi GPS Surge Protection Kit
	The general naming of the transport modules is Fxyz , where: <ul style="list-style-type: none"> • <i>x</i> indicates version of the Flexi Multiradio System Module: <ul style="list-style-type: none"> - <i>T</i> - outdoor - <i>I</i> - indoor • <i>y</i> indicates the module and interface type: <ul style="list-style-type: none"> - <i>P</i> - PDH module with 8 E1/T1/J1 interfaces. - <i>I</i> - Hybrid module with PDH symmetrical and Ethernet interfaces. - <i>J</i> - Hybrid module with PDH asymmetrical and Ethernet interfaces. - <i>O</i> - Optical interface module with STM1/OC3 interface. - <i>F</i> - MWR IDU module with FlexBus interfaces. • <i>z</i> indicates the module version: <ul style="list-style-type: none"> - <i>A, B, C...</i> - Flexi Multiradio BTS transport sub-modules. - <i>F, G...</i> - Flexi Multiradio 10 BTS transport sub-modules. 	3rd letter	_ _ X _ Application, usage, or frequency band for example: <ul style="list-style-type: none"> • RF Module, • RRH, • AAS, • Mast Head Amplifiers.
		4th letter	___ X Indicates the version <ul style="list-style-type: none"> - <i>A</i> is the first one, - <i>B, C...</i> the next ones.

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