

NOKIA

NokiaEDU

SRAN Dimensioning

SRAN radio planning and dimensioning topics [SRAN19]

RA23500-V-19

© Nokia 2019

Copyright and confidentiality

The contents of this document are proprietary and confidential property of Nokia. This document is provided subject to confidentiality obligations of the applicable agreement(s).

This document is intended for use of Nokia's customers and collaborators only for the purpose for which this document is submitted by Nokia. No part of this document may be reproduced or made available to the public or to any third party in any form or means without the prior written permission of Nokia. This document is to be used by properly trained professional personnel. Any use of the contents in this document is limited strictly to the use(s) specifically created in the applicable agreement(s) under which the document is submitted. The user of this document may voluntarily provide suggestions, comments or other feedback to Nokia in respect of the contents of this document ("Feedback"). Such Feedback may be used in Nokia

products and related specifications or other documentation. Accordingly, if the user of this document gives Nokia Feedback on the contents of this document, Nokia may freely use, disclose, reproduce, license, distribute and otherwise commercialize the feedback in any Nokia product, technology, service, specification or other documentation.

Nokia operates a policy of ongoing development. Nokia reserves the right to make changes and improvements to any of the products and/or services described in this document or withdraw this document at any time without prior notice.

The contents of this document are provided "as is". Except as required by applicable law, no warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to the accuracy, reliability or contents of this document. NOKIA SHALL NOT BE

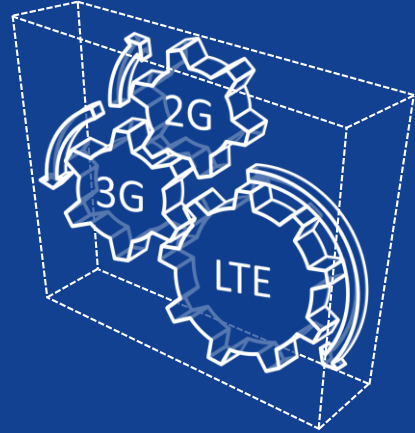
RESPONSIBLE IN ANY EVENT FOR ERRORS IN THIS DOCUMENT or for any loss of data or income or any special, incidental, consequential, indirect or direct damages howsoever caused, that might arise from the use of this document or any contents of this document.

This document and the product(s) it describes are protected by copyright according to the applicable laws.

Nokia is a registered trademark of Nokia Corporation. Other product and company names mentioned herein may be trademarks or trade names of their respective owners.

Content

- **SRAN 19 Supported Hardware**
- **SRAN 19 Supported configurations**
 - From profiles to cell sets
 - FMR10 and Air Scale Configurations
 - SRAN cell sets
 - BB Sets
 - RF Sets
- **How to build configuration from the cell sets**



SRAN 19 Supported Hardware System Modules

SBTS supported SM configurations roadmap



	Single FSMF configurations	Dual FSMF	ASIA + FSMF	Single common unit configurations	Dual common unit configurations
SRAN_SW	SRAN 17A	●		●	
	SRAN 17A MP1	●	●	●	●
	SRAN 18	●	●		●
	SRAN 18SP	●	●		●
	SRAN 18A	●	●		●
	SRAN 19	●	●	●	●

Cell set concept

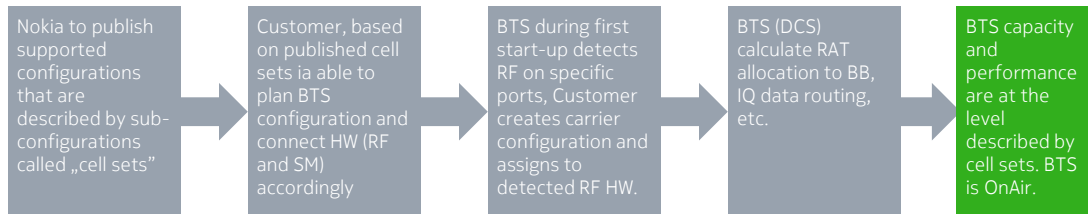
SRAN 17.x onwards

SBTS Configuration „Cell Set” approach:

- Cell sets defined on sub-baseband module level are combined as independent building blocks to build an SBTS configuration
- System module – Radio Module connection topology is auto detected. Commissioning rules, Baseband allocation and data routing are calculated based on detected topology.
- **LTE** cell sets to be supported in SBTS
- New **SRAN cell sets** for shared operation (LTE-WCDMA, LTE-GSM, GSM-WCDMA) and dedicated RAT operation for GSM and WCDMA are defined.
- **LTE and SRAN** cell sets can be flexibly combined to build target configuration.

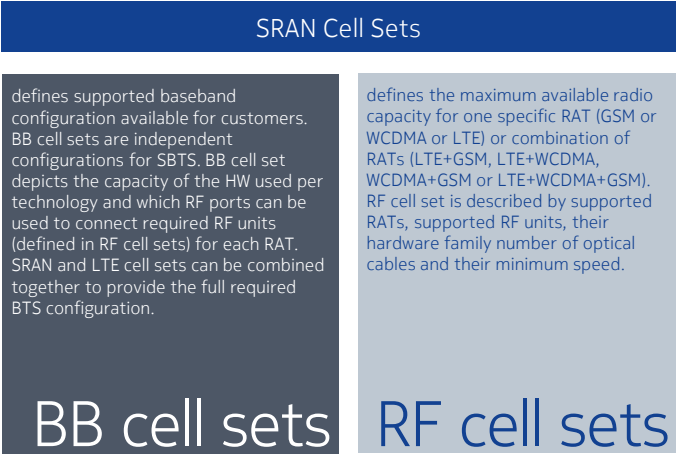


Why do we need cell sets What configurations are supported?

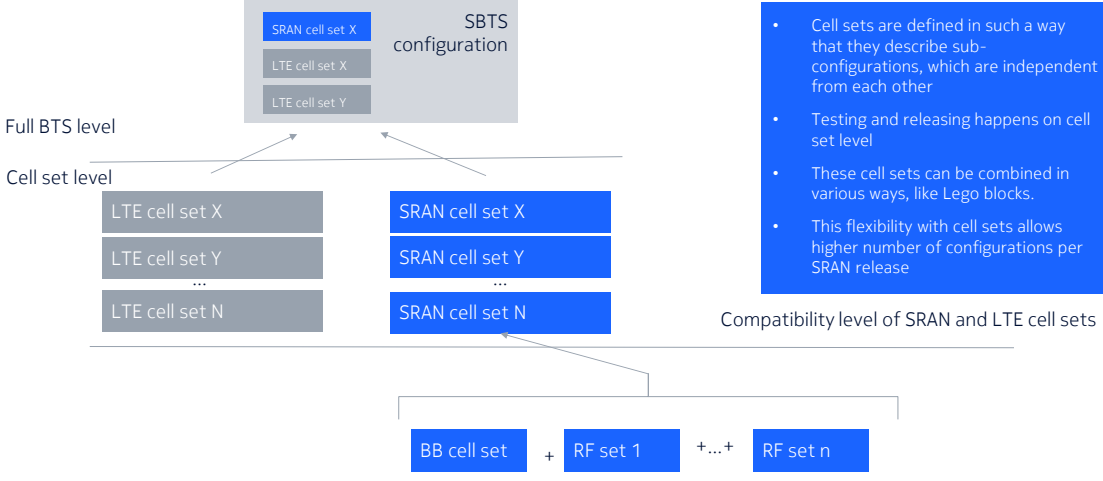


- Cell sets is a way to describe supported configurations towards customer
- Customer plans and dimensions configurations based on the cell sets provided by Nokia
- Cell sets are described on sub-baseband level and can be combined together to achieve full configuration.
- There is no direct indication about particular cell sets in the SW code
- SW has to provide capacity and performance at least as it is described by the cell sets

SRAN cell sets
SBTS



SBTS configurations LTE and SRAN cell sets



Cell Set - description of building blocks:

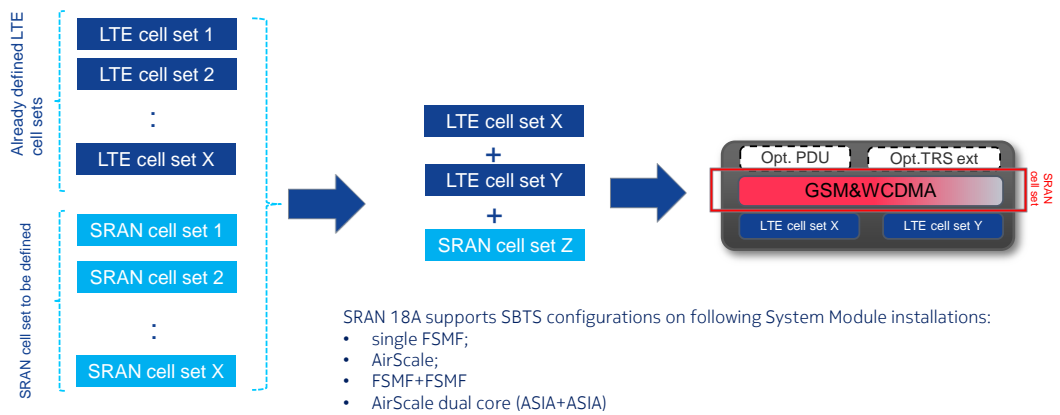
- LTE cell sets
 - Pure LTE configurations from LTE SW to be supported in SRAN as part of parity with LTE
- SRAN cell sets:
 - GSM, WCDMA, RAT shared building blocks (LTE-GSM, WCDMA-GSM, LTE-WCDMA)

- Cell sets are defined in such a way that they describe sub-configurations, which are independent from each other
- Testing and releasing happens on cell set level
- These cell sets can be combined in various ways, like Lego blocks.
- This flexibility with cell sets allows higher number of configurations per SRAN release

Compatibility level of SRAN and LTE cell sets

Cell set idea

Combination of LTE & SRAN cell sets to build target configuration



SRAN profiles vs SRAN cell set concept with sample spectrum

800	900	1800	2100	2600
<ul style="list-style-type: none"> - 2xFRMA - 1xFRMC - 3xFRMB 	<ul style="list-style-type: none"> - 2xFXDB GSM - 2xFXDB 2T2R@LTE-GSM - 2xFXDB 2T4R@LTE-GSM - 3xFHDB2T2R@LTE-GSM - 2xFXDB 2T4R@LTE-GSM 	<ul style="list-style-type: none"> - 1xFXED 2T2R@LTE - 2xFXED 4T4R@LTE - 3xFHED 2T2R@LTE - 3xFHED 4T4R@LTE 	<ul style="list-style-type: none"> - 1xFRGU - 3xFRGY 	<ul style="list-style-type: none"> - 2xFRHA - 1xFRHC - 3xFRHB - 3xFRHG

SRAN16:
 BTS profiles – predefined BTS configuration:

- BTS level configuration definition
- HW
- Cabling
- BB allocation
- Cell amount
- Antenna Configuration type

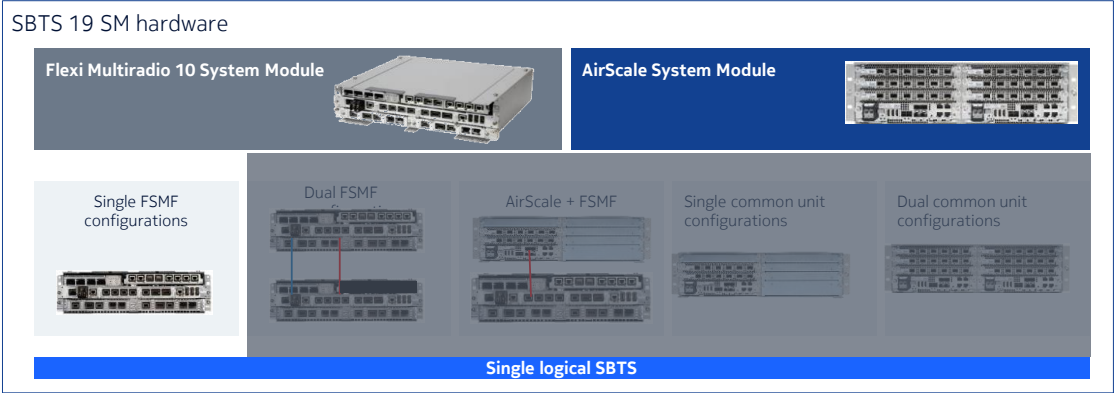
3x5x4x2x4 = 480 profiles

SRAN17:
 Cell sets - description of building blocks:

- LTE cell sets:
 - Pure LTE configurations from LTE SW to be supported in SRAN 17
 - Part of SRAN17 parity with LTE
- SRAN cell sets:
 - GSM, WCDMA, RAT shared building blocks (LTE-GSM, WCDMA- GSM, LTE-WCDMA)

3+4+4 = 11 LTE cell sets
 5+2 = 7 SRAN cell sets

SBTS 19 System Modules for supported configurations FSMF



SRAN 19 supported SBTS configurations

Flexi Multiradio 10 configurations

- SRAN 19 BB capacity
 - Support of single FSMF configurations
 - The same RAT/BB allocation rules as in SRAN16.X
 - 36TRX option for GSM
- Coverage of existing profiles in SRAN 19
 - Each existing single FSMF profile are covered by combination of SRAN and LTE cell sets as of SRAN 19

SRAN Baseband Capabilities

SBTS support for GSM



Example:

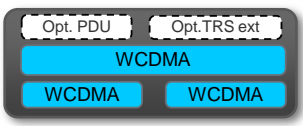
System Module Rel.3	Capacity Extension Submodule	GSM capacity
FSMF	-	24 TRX
FSMF	-	36TRX

SBTS support for GSM 36 TRX

SRAN Baseband Capabilities SBTS support for WCDMA



Example:



System Module Rel.3	Capacity Extension Submodule	Number of Subunits
FSMF	-	5,5
FSMF	FBBA/C	11,5
FSMF	2xFBBA/C	17,5

❑ For details check Dimensioning WCDMA RAN: Flexi BTS Baseband **DN981084**

There is no one way to describe WCDMA capacity in SBTS (as in WCDMA)

WCDMA capacity depends on many factors like

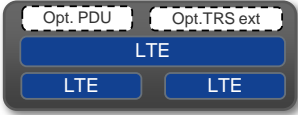
- ❑ Common Control Channel (CCCH) dimensioning with 1-4 Local Cell Groups
- ❑ 2-Way/4-Way RX Diversity
- ❑ cell range
- ❑ Rel.99 vs. HSDPA vs. HSUPA capacity allocation
- ❑ Parallel Interference Cancellation (PIC)
- ❑ DC-HSDPA and DB-HSDPA
- 16 ❑ Local Cell Grouping

RA23500-V-19

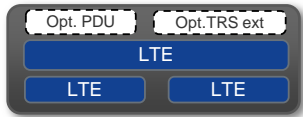
© Nokia 2019

SRAN Baseband Capabilities

SBTS support for LTE



Example:



System Module Rel.3	Capacity Extension Submodule	LTE BB allocation
FSMF	-	1x BCS
FSMF	FBBC	2xBCS or 1.5xBCS+0.5xBCS or 1xECS
FSMF	2xFBBC	3xBCS or 1xBCS+1.5xBCS+0.5xBCS or 1xECS+1xBCS

Basic cell set (BCS)

- up to 6x10MHz LTE 2x2 MIMO in **FSMF** or **FBBC**
- up to 3x10MHz LTE 4TX/4RX 4x2 DL MIMO in TM4 in **FSMF** or **FBBC**
- up to 3x20MHz LTE 2x2 MIMO in **FSMF** or **FBBC**

Extended cell set (ECS)

- FSMF+FBBA/C** is required for the 3x20MHz LTE with 4TX/4RX 4X4 DL MIMO capability

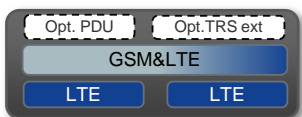
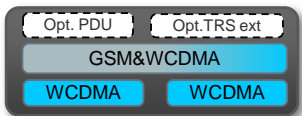
0.5 Basic cell set

- up to 3x10MHz LTE 2x2 MIMO in **FSMF** or **FBBC** - **supported on SBTS only**; it's only used together with 1xBSC to form 1.5xBCS **AND** in the combination 0.5xBCS+1.5xBCS

1.5 Basic cell set

Is a combination of 1xBSC+0.5xBCS which can be configured on a RF set and which requires the allocation on one BB card plus half of another BB card (FSMF or FBBC) which hosts another 0.5xBCS. This will result in a 0.5xBCS+1.5xBCS BB cell set deployed on two BB cards

Flexi Multiradio 10 BTS: System Module Sharing 2-RAT modes



Reduced cell set (RCS)

- up to 3x10MHz LTE 2x2 MIMO with CoMP in FSMF
- up to 4x10MHz LTE 2x2 MIMO without CoMP in FSMF

BCS=basic cell set, ECS=extended cell set, RCS=reduced cell set

System Module Rel.3	Capacity Extension Submodule	WCDMA BB: No. of Subunits	GSM BB
FSMF	-	3.5	24 TRX
FSMF	FBBA/C	9.5	24 TRX
FSMF	2xFBBA/C	15.5	24 TRX
FSMF	2xFBBA/C	14.5	36 TRX

System Module Rel.3	Capacity Extension Submodule	LTE BB	GSM BB
FSMF	-	1xRCS	24 TRX
FSMF	FBBC	1xRCS + 1xBCS	24 TRX
FSMF	2xFBBC	1xRCS + 2x BCS or 1xRCS+1.5xBCS+0.5xBCS	24 TRX
FSMF	2xFBBC	1xRCS + 1xECS	24 TRX

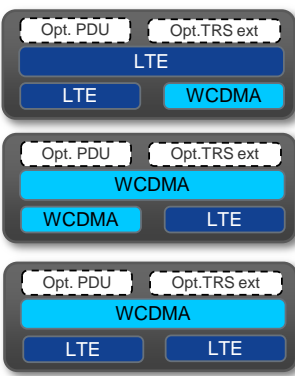
Inband NB-IoT cells

- up to 3 x 5/10/15/20 MHz FDD LTE 2T2R cells hosting inband NB-IoT cells and possibly with CAT-M enabled, per FSMF or FBBC

Standalone NB-IoT cells

- up to 6x (5/10MHz 2T2R or NB-IoT standalone) cells, or,
- up to 2x 15/20MHz 2T2R + 2x (5/10MHz 2T2R or NB-IoT standalone) cells
- per FSMF or FBBC © Nokia 2019

Flexi Multiradio 10 BTS: System Module Sharing 2-RAT modes



System Module Rel.3	Capacity Extension Submodule	WCDMA BB: No. of Subunits	LTE BB
FSMF	2xFBBC	5.5	1 x ECS

System Module Rel.3	Capacity Extension Submodule	WCDMA BB: No. of Subunits	LTE BB
FSMF	2xFBBA/C	11.5	1 x BCS

System Module Rel.3	Capacity Extension Submodule	WCDMA BB: No. of Subunits	LTE BB
FSMF	2xFBBA/C	5.5	1.5+0.5 x BCS
FSMF	2xFBBA/C	5.5	2xBCS or 1xECS

Flexi Multiradio 10 BTS: System Module Sharing 3-RAT modes

Opt. PDU Opt. TRS ext

FSMF: GSM<E

WCDMA WCDMA

System Module Rel.3	Capacity Extension Submodule	WCDMA BB: No. of Subunits	LTE BB	GSM BB
FSMF	2xFBBA/C	11.5	1 x RCS	24 TRX

Opt. PDU Opt. TRS ext

FSMF: GSM&WCDMA

WCDMA LTE

System Module Rel.3	Capacity Extension Submodule	WCDMA BB: No. of Subunits	LTE BB	GSM BB
FSMF	2xFBBA/C	9.5	1 x BCS	24 TRX
FSMF	2xFBBA/C	8.5	1 x BCS	36 TRX

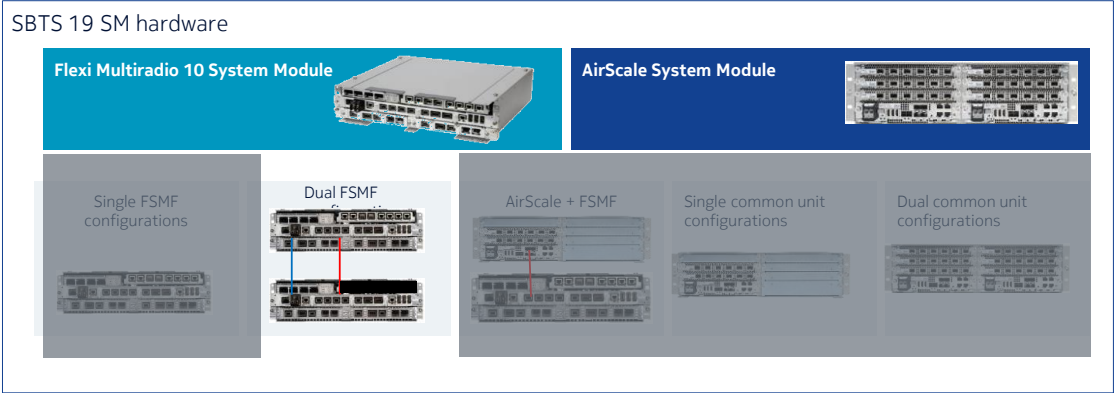
Opt. PDU Opt. TRS ext

FSMF: GSM&WCDMA

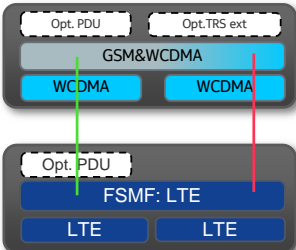
LTE LTE

System Module Rel.3	Capacity Extension Submodule	WCDMA BB: No. of Subunits	LTE BB	GSM BB
FSMF	2xFBBA/C	3.5	2 x BCS	24 TRX
FSMF	2xFBBA/C	2.5	2 x BCS	36 TRX

SBTS 19 System Modules for supported configuration
FSMF+FSMF



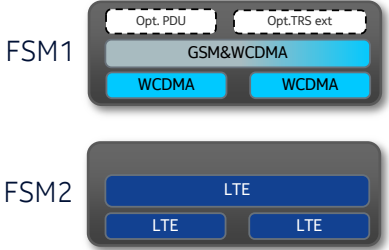
Support of FSMF + FSMF with SRAN configurations (SR001498)
 Inheritance from SBTS17A MP1



System Module Rel.3	Capacity Extension Submodule	WCDMA BB: No. of Subunits	LTE BB	GSM BB
2xFSMF	4xFBBA/C	15.5	3 x BCS	24 TRX
2xFSMF	4xFBBA/C	14.5	3 x BCS	36 TRX
2xFSMF	4xFBBA/C	15.5	1 x BCS + 1 x ECS	24 TRX
2xFSMF	4xFBBA/C	14.5	1 x BCS + 1 x ECS	36 TRX

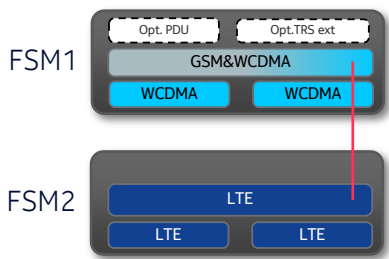
BCS=basic cell set, ECS=extended cell set, RCS=reduced cell set

Support of FSMF + FSMF with SRAN configurations FSMF numbering



- The two FSMFs are numbered as:
 - **FSM1** - the one having the termination point of transport link
 - **FSM2** - no transport termination.
- By default, FSM1 plays the "primary core" role and FSM2 is the "secondary core".

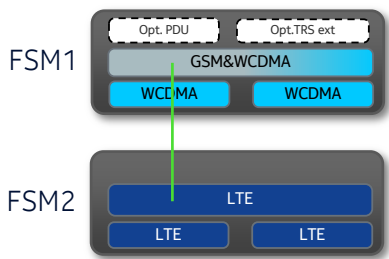
Support of FSMF + FSMF with SRAN configurations
SRIO interconnection



- The FSMFs are inter-connected via one mandatory optical SRIO link (between the SRIO interface ports), used i.e. for
 - supporting RP1/RP2 and low latency data interconnection;
 - NTP (RTC, timestamp in logs)

Support of FSMF + FSMF with SRAN configurations

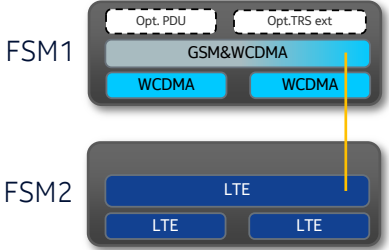
OBSAI interconnection



- Optical OBSAI link (between RF/EXT ports), is mandatory for IQ data routing if the RMs connected to the FSM2 are used for LTE-GSM or LTE-WCDMA RAN sharing;
- The OBSAI link, when present, may use the RF/EXT ports of the FSMF (1-3 or 6)
- Any RF set* can be combined with 2xFSMF BB cell set, by taking care that there are enough available ports for RF connections
- the inter-FSMF OBSAI link introduces additional capacity limitations for the GSM and WCDMA RFs connected to the secondary core - details are in the SBTS supported configurations excel file

*3RAT RF cell sets are not supported in FSMF+FSMF configuration due to SW limitations

Support of FSMF + FSMF with SRAN configurations Synchronization link

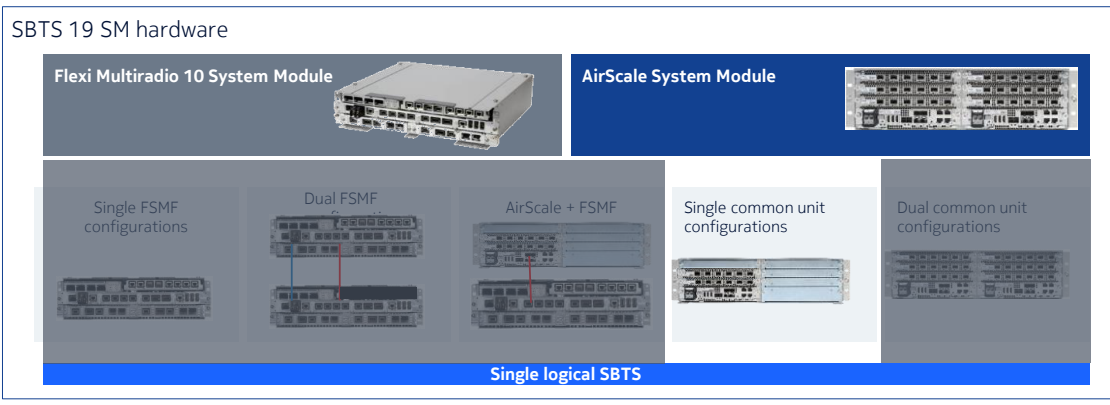


- One synchronization link is required, which can be:
- HDMI (connected to Sync-Out HDMI port of FSMF1, Sync-In HDMI port of FSMF2)
 - Optical

The choice relies on the following rules:

- when IQ data routing is required, thus optical OBSAI link is present, the synchronization can be done on the same optical fiber or, optionally, HDMI link can be used;
- when IQ data routing is not required, either HDMI cable or optical fiber can be used.

SBTS 19 System Modules for supported configuration AirScale



AirScale Configurations

Baseband capacity

AirScale BB dimensioning

SRAN 19 Rel

SBTS follows dedicated LTE BB dimensioning:

- Basic Cell Set
- Extended Cell Set
- XL Cell Set
- Packed Cell Set
- Dual-Packed Cell Set
- NB-IoT dimensioning rules

LTE

SRAN WCDMA BB dimensioning calculated based on available #SU (similar as FSMF)

WCDMA

GSM dimensioning presented in #TRXs

GSM

Nokia AirScale System Module

Baseband dimensioning rules

GSM

- Up to 24 TRXs $\frac{1}{4}$ ABIA
- Up to 36 TRXs $\frac{1}{2}$ ABIA

WCDMA

- Up to 24 cells per SM
- Up to 4 Local Cell Groups per SM
- ABIA = 8 subunits
- Min LCG capacity: 4 subunits ($\frac{1}{2}$ ABIA)
- Max LCG capacity: 24 subunits (3 ABIA)

FDD-LTE

- BB allocation granularity $\frac{1}{2}$ ABIA
- FDD-LTE maximum capacity for AirScale HW platform presented in the upcoming slides



Single ABIA card handles up to 2 RATs

Nokia AirScale System Module

GSM Baseband Capacity dimensioning rules

GSM is a complementary RAT for AirScale product offering mainly for SRAN site solutions

GSM RAT SW use BB resources as follows:

GSM BB is allocated to $\frac{1}{4}$ or $\frac{1}{2}$ ABIA

- 24 TRX GSM capacity with $\frac{1}{4}$ ABIA
- 36 TRX capacity with $\frac{1}{2}$ ABIA

Nokia AirScale System Module

WCDMA Baseband Capacity dimensioning rules



One (or two*)
logical SBTS
* Each half-subrack can be configured as separate logical SBTS

ASIA half-subrack



3 x ABIA

Up to 3x ABIA -> 24 subunits
Up to 24 WCDMA cells
Sharing with LTE / GSM possible

Max amount of cells per logical SBTS
24 cells

Max amount of LCGs per logical SBTS
4 LCGs

← Logical SBTS

Max amount of cells per LCG
12 cells

Max LCG capacity
3x ABIA

Max amount of HSDPA users per LCG
620 HSDPA users

Max amount of HSUPA users per LCG
620 HSUPA users

← LCG

Nokia AirScale System Module

WCDMA Baseband Capacity dimensioning rules

ABIA card BB capacity = 8 Rel.4 subunits



From WCDMA BB capacity dimensioning point of view Rel.4 subunit is equal to Rel.3 subunit (it provides same users' capacity i.e # 96 Rel.99 CE / HSPA users)

- **Minimum** LCG capacity is **4 subunits** (half ABIA)
- **Maximum** LCG capacity is **24 subunits** (3 x ABIA)
- Note: Subunits allocation to LCG is done with **2 subunits step**



Exemplary picture 2x ABIA , WCDMA: LCG 1 (4 subunits), LCG 2 (12 subunits)

Nokia AirScale System Module WCDMA Baseband Capacity

Nokia AirScale System Module supports System Module sharing (SRAN) functionality -> Single BB card can be shared between **two RATs**.

1) WCDMA – GSM card sharing case:



6 subunits available for WCDMA. GSM supports up to 24 TRXs

2) WCDMA – LTE card sharing case:



4 subunits for WCDMA. Remaining half ABIA for LTE allocation

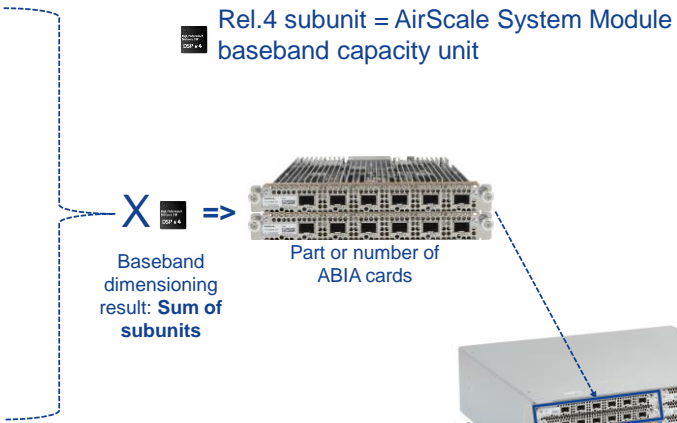
Note that WCDMA LCG can have resources also in another BB cards e.g. :



Exemplary picture LTE and WCDMA (12 subunits)

Fundamentals of WCDMA Baseband dimensioning

- Local Cell Group 1
- CCCH processing resources
- HSDPA scheduler bb resources
- Statically allocated bb resources (e.g. PIC)
- R99 bb resources
- HSUPA bb resources



Nokia AirScale System Module WCDMA Baseband Capacity

Single Rel.4 subunit allows to allocate:



- 96 Rel.99 CE or
- Up to 80 HSUPA users (FDPCH) / 56 HSUPA users (non-FDPCH) or
- HSUPA throughput up to 35Mbps* or
- 1 PIC pool (Interference Cancellation unit) providing IC for 6 cells at the same time or
- Optional CCCH processing (one CCCH pool = 0,5 subunit / two CCCH pools = 1 subunit) – if needed.

HSDPA schedulers resources automatically allocate **1,625 subunit** from each LCG baseband capacity.

Each LCG has 3x HSDPA schedulers, each scheduler is capable to support up to **240 HSDPA users** but totally max **620 HSDPA** users are supported per LCG.

HSUPA scheduler supports up to **620 HSUPA** users per LCG.

Single LCG covers up to 12 cells.

* 3x HSUPA 16QAM users (11Mbps) + 1x QPSK user (2Mbps)

Nokia AirScale System Module WCDMA Baseband Capacity

Nokia AirScale System Module does not require CCCH Processing Set license for single Basic Configuration i.e. (3 cells / 20 km cell range / 2 way RxDiv / 4 signatures or 6 cells / 10 km cell range / 2 way Rx Div / 4 signatures).

If more cells or higher cell range / Rx Div / # signatures are used then some of CCCH Processing Set LKs and baseband resources might be needed.

Single LCG covers baseband resources for 3 CCCH pools (e.g. 9 cells/20km/2way RxDiv /4 signatures).
If more resources are required then additional CCCH pools need to be allocated with 0,5 subunit granularity.

No need to allocate extra baseband for most of typical configurations:

- up to 9 cells/20km/2way RxDiv/ 4 signatures
- up to 12 cells/10km/ 2 way Rx Div / 4 signatures.

Note: Configurations mentioned above might require certain amount of CCCH Processing Sets LKs

HSUPA scheduler capacity

HSUPA scheduler is **LCG specific** and supports **up to 12 cells**.

HSUPA scheduler supports **620 HSUPA users**, however maximum amount of HSPA users might be limited by available baseband (-> amount of LCG subunits)

HSUPA baseband allocation is done with HSUPA Resource Steps

Single HSUPA Resource Step corresponds to 0,125 subunit (->1 subunit consists of 8 HSUPA Resource Steps)

Available HSUPA Resource Steps are dynamically allocated based on traffic need (# HSUPA users and current L1 throughput).

To avoid "ping-pong" effect (effect in reserving and freeing HSUPA resource steps for/from R99 traffic) 0,125 su is not available for HSUPA scheduler on top of R99 consumption.

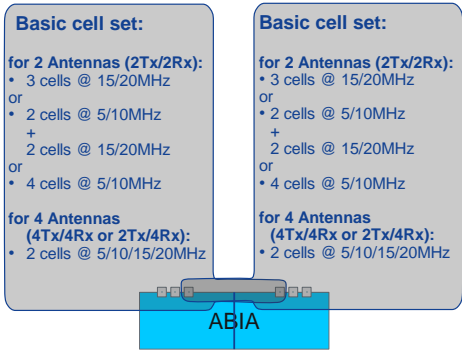
HSUPA Interference Cancellation

- Cells from the same frequency layer (LCG) should be mapped to the same PIC pool unit
- One PIC pool unit consumes one subunit capacity
- One PIC pool supports up to 6 cells – interference cancelation is performed in all 6 cells at the same time.

LTE Cell set mapping to AirScale System Module

Up to two basic cell sets per module:

- both cell sets share 6 ports
- With this feature one cell set can utilize max 4 ports, leaving 2 ports left for the other

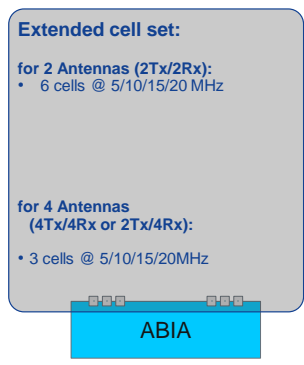


40

RA23500-V-19

One extended cell set per module:

- up to 6 ports can be used
- configurations in extended cell set are mainly defined to allow ULCoMP and SuperCell between cells



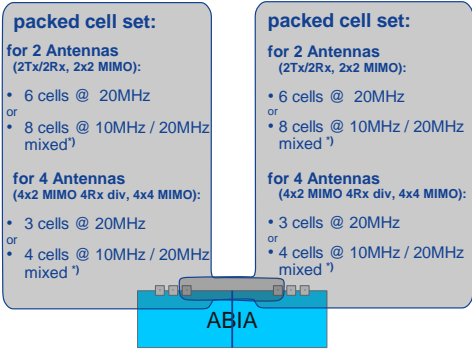
© Nokia 2019

NOKIA

LTE Cell set mapping to AirScale System Module

Feature LTE2733 Baseband pooling needed Up to two packed cell sets per ABIA module:

- both cell sets share 6 ports
- With this feature one cell set can utilize max 4 ports, leaving 2 ports left for the other

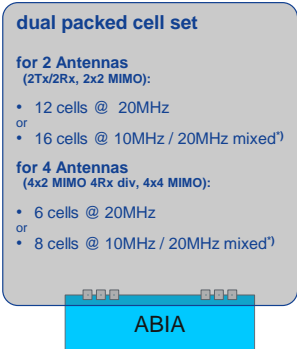


One dual packed cell set per ABIA module:

- up to 6 ports can be used
- Contains 2 baseband pools, to provide sufficient capacity for multi-carrier and chaining configurations
- UL CoMP and SuperCell possible inside each BB pool

Note about Cell numbers:

- 15 MHz instead of 20 MHz is supported as well
- 5 MHz instead of 10 MHz is supported as well
- for cases with 2 Antennas, 1.4 MHz or 3 MHz cells instead of 10MHz cell are supported as well
- *) In case of mixture of 10MHz and 20MHz cells, max 50% of the cells can be 20MHz

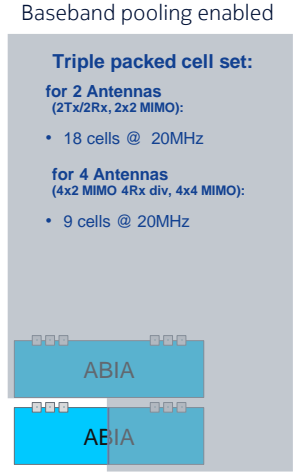


LTE Cell set mapping to AirScale System Module
1,5 ABIA usage per cell set



42

RA23500-V-19



© Nokia 2019

NOKIA

Nokia AirScale System Module

Multi RAT Sharing Dimensioning

Nokia AirScale System Module supports System Module sharing (SRAN) functionality -> Single BB card can be shared between **two RATs**.

1) WCDMA – GSM card sharing case:

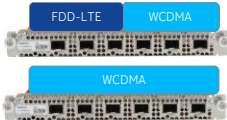


6 subunits available for WCDMA.
GSM supports up to 24 TRXs with ¼ ABIA



4 subunits available for WCDMA.
GSM supports up to 36 TRXs with 1/2 ABIA

Note that WCDMA LCG can have resources also in another BB cards e.g. :



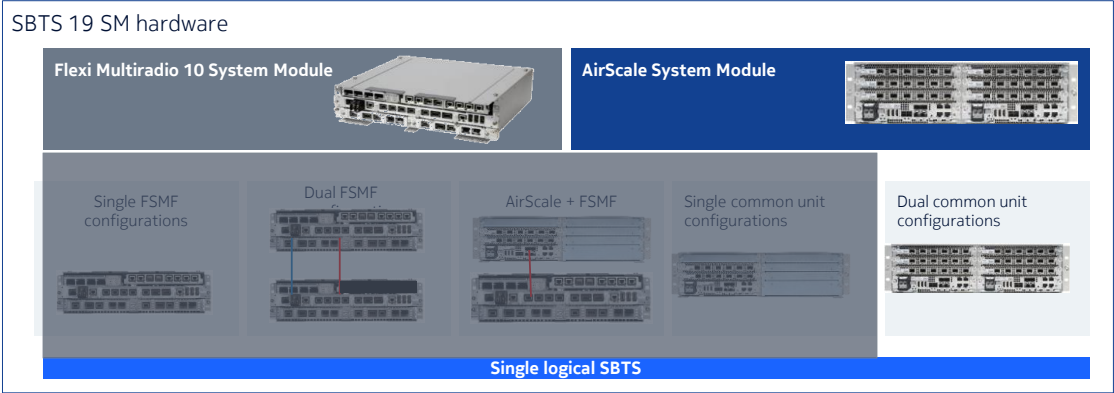
Exemplary picture LTE and WCDMA LCG (12 subunits)

2) WCDMA – LTE card sharing case:



4 subunits for WCDMA.
Remaining half ABIA for LTE allocation

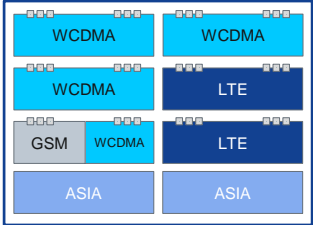
SBTS 19 System Modules for supported configuration Fullrack AirScale



Nokia AirScale System Module

SRAN cell sets allocation on full AirScale module

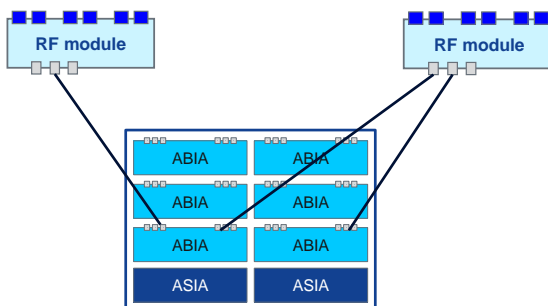
- Up to 6xABIA cards available for SRAN cell set allocation providing high capacity for sites.
- GSM ABIA has to be connected to primary Common Unit.
- One ASIA card will be the „primary” unit
- GSM can be allocated only on one ABIA in whole SBTS



Nokia AirScale System Module

SRAN cell sets allocation on full AirScale module

- SBTS shall support multi-RAT RF connection to both half-subracks at the same time in dual core AirScale configuration.
- An RF is considered as **split** between two cores (or simply split) only if it has commissioned links to both cores.
- An RF is considered as **localized** if it has commissioned link(s) to only one core.



46

RA23500-V-19

© Nokia 2019

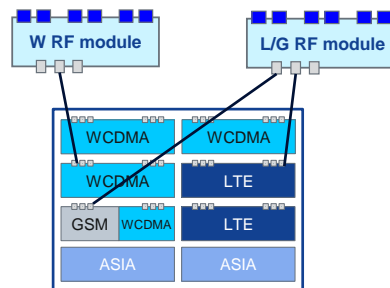
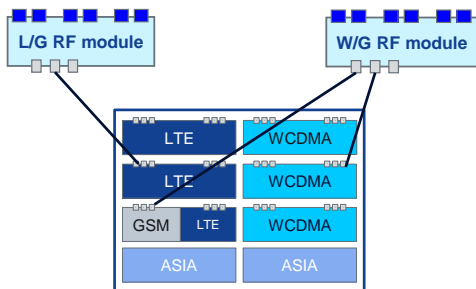
NOKIA

A localized RF can optionally have also un-commissioned link(s) to the other core, but these links will be ignored (they can serve as provision for future reconfiguration purposes, avoiding thus the need that the operator goes again on the site).

Nokia AirScale System Module

SRAN cell sets allocation on full AirScale module

- LTE+GSM and WCDMA+GSM RFs can be split;
 - In case of a split RF configured with WCDMA+GSM, WCDMA will be allocated to secondary core.
 - In case of a split RF configured with LTE+GSM, LTE will be allocated to secondary core.
- Each optical link will be dedicated to one RAT (WCDMA or LTE or GSM)

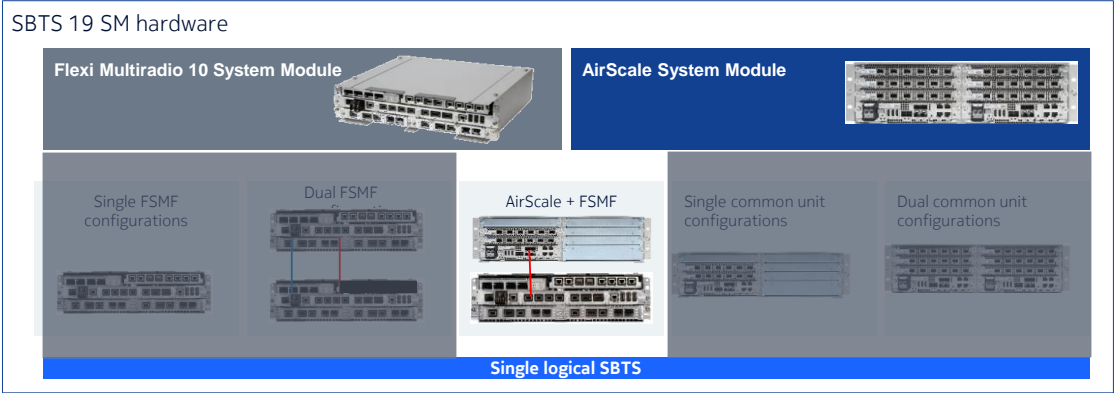


The mono-RAT, LTE+WCDMA and LTE+WCDMA+GSM RFs cannot be split, but can have un-commissioned link(s) to the other core.

The RFs configured in a chain cannot be split. The first RF of the chain can have un-commissioned link(s) to the other core.

SBTS 19 System Modules for supported configuration

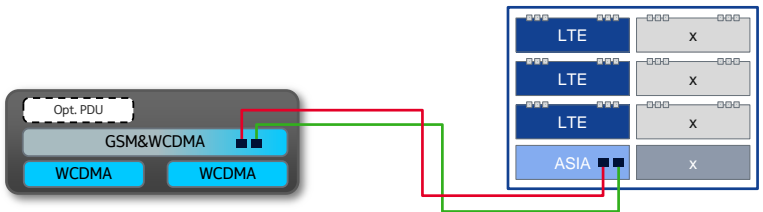
AirScale + FSMF



Single logical SBTS on Airscale + FSMF (SR001307)

SR001307

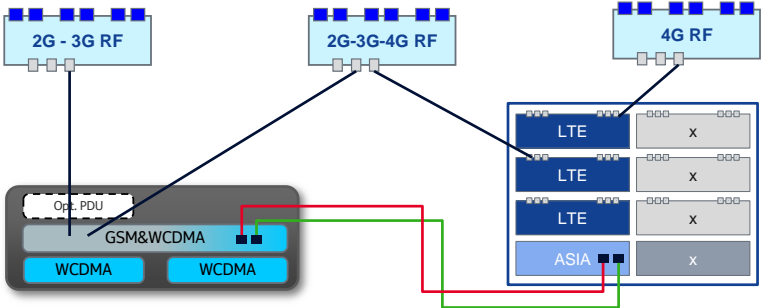
- The AirScale + FSMF works only between a single Airscale core and a single FSMF,
- Airscale is the master module, transport network is connected to it,
- LTE is processed on the Airscale,
- GSM and WCDMA are processed on the FSMF,
- Baseband allocation is done according to the existing rules,
- Modules are connected using the SRIO link
- HDMI cable has to be used to forward sync data from AS to FSMF



Single logical SBTS on Airscale + FSMF (SR001307)

SR001307

- No IQ data routing between the modules
- All RMs serving GSM and/or WCDMA connected to FSMF/FBBx
- All RMs serving LTE connected to ABIAs
- Shared RMs serving LTE-GSM, LTE-WCDMA or LTE-WCDMA-GSM have to be split between the SMs

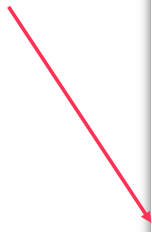


SRAN 19 Dimensioning

How to start?

How to start?

Where to find details about supported BB and RF configurations??



Document details

Product Information Center (PIC) > Radio Network > Radio Network Solutions > Single RAN: Documentation
 > Single RAN, SBTS Supported Configurations, Issue 03C Ref. SRAN 17A, Operating Documentation

« Return to document list Help ?

Title: Single RAN, SBTS Supported Configurations, Issue 03C Ref. SRAN 17A, Operating Documentation
Content type: Operating documentation
Description: This document provides details on supported SBTS configurations/cell sets. It is applicable for SRAN 17A P8 SW.
Release: SRAN 17A
Date: 2018-03-06

Downloads Help ?

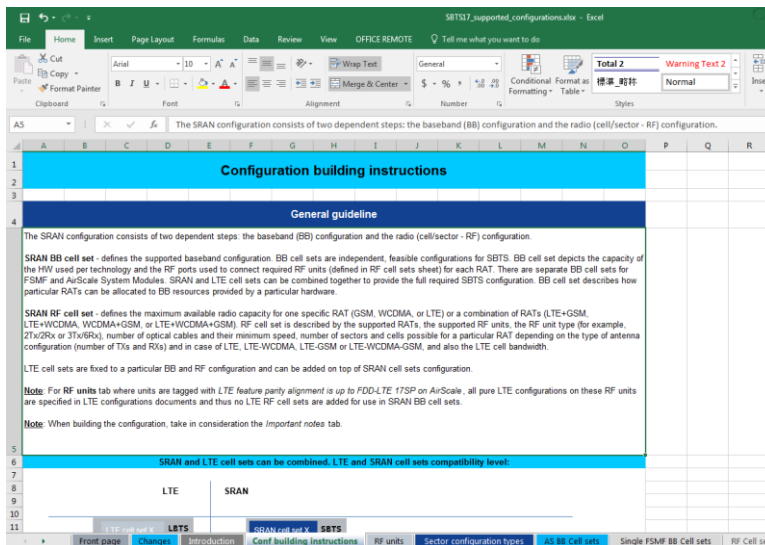
<input checked="" type="checkbox"/>	Title / File name	Size	Date
<input checked="" type="checkbox"/>	Single RAN, SBTS Supported Configurations, Issue 03C Ref. SRAN 17A, Operating Documentation SBTS17_supported_configurations.xlsx	2.1MB	2018-03-06

« Download Selected Files »

Trainer note: Demonstrate how to download the newest version of the document.

How to start?

The Excel file contains the information on how to start building the configurations.



Trainer note: open the document an, different tabs, etc, show the structure

How to start?

RF Units sheet

It holds the information about supported RF types and their properties

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	LTE Dual carrier support	RF type	Sales item code	Optical connectivity	GSM dedicated mode	WCDMA dedicated mode	
4	450	21	RRH	FR4A	2x40W	no	no	2T4GRx	472220A	OBS4_6	no	no
5	700	28	RFM	FRPA	8x40W	no	no	6T6Rx	472703A	OBS4_6	no	no
6	700	28	RFM	FRPB	8x40W	no	no	6T6Rx	472752A	OBS4_6	no	no
7	730	12/17	RRH	FRLB	2x30W	no	yes	2T4GRx	472180A	OBS4_3	no	no
8	800	20	RFM	FRMC	8x40W	no	no	6T6Rx	472655A	OBS4_6	no	no
9	800	20	RFM	FRME	8x40W	no	no	6T6Rx	472927A	OBS4_6	no	no
10	800	20	RFM	FRMF	8x40W	no	no	6T6Rx	472930A	OBS4_6	no	no
11	850	5/6/19/19C/19E/19F	RFM	FXCA	3x60W	yes	yes	3T6Rx	472142A	OBS4_3	yes	yes
12	850	5/6/19	RFM	FXCB	3x60W	yes	no	3T6Rx	472678A	OBS4_6	yes	yes

Trainer note: show how to filter different types of RF,

How to start?

Sector configurations

This sheet presents the different types of sector configurations and the deployment of cells/carriers on the antenna lines

Trainer note: explain the basic types (H,I,A,C,M,N), use whiteboard/PC tablet to draw example sites, explain here the concept of RF Sharing, power allocation

How to start?

RF Cell sets

Supported carrier configurations from single RF set perspective RF cell sets														
Symmetrical carrier configurations														
LTE carrier configuration														
WCDMA carrier configuration														
RF set ID	RF mode	No. of RF units	Supported RF units	RF type	OBSAI minimum SFP speed mode	OBSAI #fibers /RF unit	LTE configuration (Cell-sector)	Number of LTE configuration Tx/Rx	Antenna configuration type	LTE Bandwidth (max of 1.4, 3, 5, 10, 15, 20)	WCDMA configuration (cell-sector)	Tx/Rx	Antenna configuration type	
795	1LW6	LW	1	FRGU	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	10	1+1+1	1Tx	A
796	1LW6	LW	1	FXDD	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	10	1+1+1	1Tx	A
797	1LW6	LW	1	FRGU	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	10	1+1+1	2Tx	I
798	1LW6	LW	1	FRGU	6Tx/6Rx	6	2	2+2+2	2Tx/2Rx	I	10	2+2+2	2Tx/2Rx	I
799	1LW6	LW	1	FXDD	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	10	1+1+1	2Tx	I
800	1LW6	LW	1	FRGU	6Tx/6Rx	6	2	2+2+2	2Tx/2Rx	I	5+10	4+4+4	2Tx/2Rx	I
801	1LW6	LW	1	FRGU	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	5	2+2+2	1Tx	A
802	1LW6	LW	1	FXDD	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	5	2+2+2	1Tx	A
803	1LW6	LW	1	FRGU	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	5	2+2+2	1Tx	I
804	1LW6	LW	1	FXDD	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	5	2+2+2	1Tx	I
805	1LW6	LW	1	FRGU	6Tx/6Rx	6	2	2+2+2	2Tx/2Rx	I	10	2+2+2	1Tx/2Rx	A

All supported SRAN RF cell sets are listed in this sheet

Trainer note: demonstrate filtering of cell sets depending on the technology, rf type, etc

How to start?

BB Cell sets

AirScale BB cell sets																																																																																																																																																																																																																																																																																				
Supported since SBTS17A																																																																																																																																																																																																																																																																																				
The below BB cell sets are used for single configuration and the details are shown in the table.																																																																																																																																																																																																																																																																																				
BB_cell_set_ID	No. of RATs	SBTS SM mode	No. of ABIs	SM BB deployment						ABIA x						ABIA y						ABIA z																																																																																																																																																																																																																																																														
				ABIA x		ABIA y		ABIA z		I		II		III		IV		V		VI		I		II		III		IV		V		VI																																																																																																																																																																																																																																																				
				GSM	GSM	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty																																																																																																																																																																																																																																																		
BAG_L	1	GSM	1	GSM	GSM	Empty	Empty	Empty	Empty	Empty	Empty	G	G	G	G	G	G																																																																																																																																																																																																																																																																			
BAW	1	WCDMA	1	WCDMA	Empty	Empty	Empty	Empty	Empty	Empty	Empty	W	W	W	W	W	W																																																																																																																																																																																																																																																																			
*BAW+B	1	WCDMA	1	WCDMA	Empty	Empty	Empty	Empty	Empty	Empty	Empty																																																																																																																																																																																																																																																																									
*BAW+XB	1	WCDMA	1	Empty	Empty	X*WCDMA	Empty	Empty	Empty	Empty	Empty																																																																																																																																																																																																																																																																									
BAL_BCS	1	LTE	1	LTE	Empty	Empty	Empty	Empty	Empty	Empty	Empty	L	L	L	L	L	L																																																																																																																																																																																																																																																																			
BAL_ECS	1	LTE	1	LTE	LTE	Empty	Empty	Empty	Empty	Empty	Empty	L	L	L	L	L	L																																																																																																																																																																																																																																																																			
BAL_XL	1	LTE	2	LTE	LTE	LTE	Empty	Empty	Empty	Empty	Empty	L	L	L	L	L	L																																																																																																																																																																																																																																																																			
BAL_PCS	1	LTE	1	LTE	Empty	Empty	Empty	Empty	Empty	Empty	Empty	L	L	L	L	L	L																																																																																																																																																																																																																																																																			
Possible ports usage																																																																																																																																																																																																																																																																																				
<table border="1"> <thead> <tr> <th>Cell set</th> <th>RATs</th> <th>mode</th> <th>SMs</th> <th>FSMF1</th> <th>FBB/A/C</th> <th>FBB/A/C</th> <th>1.6</th> <th>1.1</th> <th>1.2</th> <th>1.3</th> <th>1</th> <th>2</th> <th>3X</th> <th>4</th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>B1FG_1</td> <td>1</td> <td>GSM</td> <td>1</td> <td>GSM</td> <td>Empty</td> <td>Empty</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B1FG_2</td> <td>1</td> <td>GSM</td> <td>1</td> <td>GSM</td> <td>GSM (RP3 only)</td> <td>Empty</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td></td> <td></td> <td></td> </tr> <tr> <td>B1FG_3</td> <td>1</td> <td>GSM</td> <td>1</td> <td>GSM</td> <td>GSM (RP3 only)</td> <td>GSM (RP3 only)</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> <td>G</td> </tr> <tr> <td>B1FW_1</td> <td>1</td> <td>WCDMA</td> <td>1</td> <td>WCDMA</td> <td>Empty</td> <td>Empty</td> <td>W</td> <td>W</td> <td>W</td> <td>W</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B1FW_1+B</td> <td>1</td> <td>WCDMA</td> <td>1</td> <td>WCDMA</td> <td>WCDMA</td> <td>Empty</td> <td>W</td> <td>W</td> <td>W</td> <td>W</td> <td>X</td> <td>X</td> <td>W</td> <td>X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>B1FW_1+2B</td> <td>1</td> <td>WCDMA</td> <td>1</td> <td>WCDMA</td> <td>WCDMA</td> <td>WCDMA</td> <td>W</td> <td>W</td> <td>W</td> <td>W</td> <td>X</td> <td>X</td> <td>W</td> <td>X</td> <td>X</td> <td>X</td> <td></td> </tr> <tr> <td>*B1FW+B</td> <td>1</td> <td>WCDMA</td> <td>1</td> <td>Empty</td> <td>WCDMA</td> <td>Empty</td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> <td>W</td> <td>X</td> <td>X</td> <td>X</td> <td></td> </tr> <tr> <td>*B1FW+2B</td> <td>1</td> <td>WCDMA</td> <td>1</td> <td>Empty</td> <td>WCDMA</td> <td>WCDMA</td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> <td>W</td> <td>X</td> <td>X</td> <td>X</td> <td></td> </tr> <tr> <td>B1FL_1</td> <td>1</td> <td>LTE</td> <td>1</td> <td>LTE</td> <td>Empty</td> <td>Empty</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B1FL_2</td> <td>1</td> <td>LTE</td> <td>1</td> <td>LTE</td> <td>Empty</td> <td>Empty</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B1FL_2_L</td> <td>1</td> <td>LTE</td> <td>1</td> <td>LTE</td> <td>LTE</td> <td>LTE</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> </tr> <tr> <td>B1FWG_1</td> <td>2</td> <td>WG</td> <td>1</td> <td>WG</td> <td>Empty</td> <td>Empty</td> <td>WG</td> <td>WG</td> <td>WG</td> <td>WG</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B1FWG_1+B</td> <td>2</td> <td>WG</td> <td>1</td> <td>WG</td> <td>WCDMA</td> <td>Empty</td> <td>WG</td> <td>WG</td> <td>WG</td> <td>WG</td> <td>X</td> <td>X</td> <td>WG</td> <td>X</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>																									Cell set	RATs	mode	SMs	FSMF1	FBB/A/C	FBB/A/C	1.6	1.1	1.2	1.3	1	2	3X	4	1	2	3	B1FG_1	1	GSM	1	GSM	Empty	Empty	G	G	G	G								B1FG_2	1	GSM	1	GSM	GSM (RP3 only)	Empty	G	G	G	G	G	G	G	G				B1FG_3	1	GSM	1	GSM	GSM (RP3 only)	GSM (RP3 only)	G	G	G	G	G	G	G	G	G	G	G	B1FW_1	1	WCDMA	1	WCDMA	Empty	Empty	W	W	W	W								B1FW_1+B	1	WCDMA	1	WCDMA	WCDMA	Empty	W	W	W	W	X	X	W	X				B1FW_1+2B	1	WCDMA	1	WCDMA	WCDMA	WCDMA	W	W	W	W	X	X	W	X	X	X		*B1FW+B	1	WCDMA	1	Empty	WCDMA	Empty					X	X	W	X	X	X		*B1FW+2B	1	WCDMA	1	Empty	WCDMA	WCDMA					X	X	W	X	X	X		B1FL_1	1	LTE	1	LTE	Empty	Empty	L	L	L	L								B1FL_2	1	LTE	1	LTE	Empty	Empty	L	L	L	L								B1FL_2_L	1	LTE	1	LTE	LTE	LTE	L	L	L	L	L	L	L	L	L	L	L	B1FWG_1	2	WG	1	WG	Empty	Empty	WG	WG	WG	WG								B1FWG_1+B	2	WG	1	WG	WCDMA	Empty	WG	WG	WG	WG	X	X	WG	X			
Cell set	RATs	mode	SMs	FSMF1	FBB/A/C	FBB/A/C	1.6	1.1	1.2	1.3	1	2	3X	4	1	2	3																																																																																																																																																																																																																																																																			
B1FG_1	1	GSM	1	GSM	Empty	Empty	G	G	G	G																																																																																																																																																																																																																																																																										
B1FG_2	1	GSM	1	GSM	GSM (RP3 only)	Empty	G	G	G	G	G	G	G	G																																																																																																																																																																																																																																																																						
B1FG_3	1	GSM	1	GSM	GSM (RP3 only)	GSM (RP3 only)	G	G	G	G	G	G	G	G	G	G	G																																																																																																																																																																																																																																																																			
B1FW_1	1	WCDMA	1	WCDMA	Empty	Empty	W	W	W	W																																																																																																																																																																																																																																																																										
B1FW_1+B	1	WCDMA	1	WCDMA	WCDMA	Empty	W	W	W	W	X	X	W	X																																																																																																																																																																																																																																																																						
B1FW_1+2B	1	WCDMA	1	WCDMA	WCDMA	WCDMA	W	W	W	W	X	X	W	X	X	X																																																																																																																																																																																																																																																																				
*B1FW+B	1	WCDMA	1	Empty	WCDMA	Empty					X	X	W	X	X	X																																																																																																																																																																																																																																																																				
*B1FW+2B	1	WCDMA	1	Empty	WCDMA	WCDMA					X	X	W	X	X	X																																																																																																																																																																																																																																																																				
B1FL_1	1	LTE	1	LTE	Empty	Empty	L	L	L	L																																																																																																																																																																																																																																																																										
B1FL_2	1	LTE	1	LTE	Empty	Empty	L	L	L	L																																																																																																																																																																																																																																																																										
B1FL_2_L	1	LTE	1	LTE	LTE	LTE	L	L	L	L	L	L	L	L	L	L	L																																																																																																																																																																																																																																																																			
B1FWG_1	2	WG	1	WG	Empty	Empty	WG	WG	WG	WG																																																																																																																																																																																																																																																																										
B1FWG_1+B	2	WG	1	WG	WCDMA	Empty	WG	WG	WG	WG	X	X	WG	X																																																																																																																																																																																																																																																																						

57

RA23500-V-19

© Nokia 2019



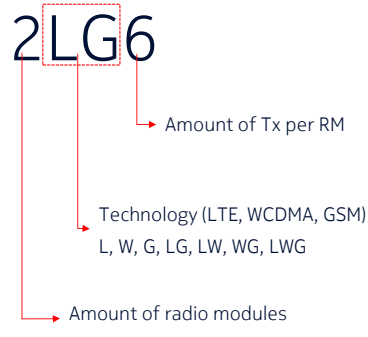
Trainer note: Explain the tab contents,

SRAN 19 Dimensioning

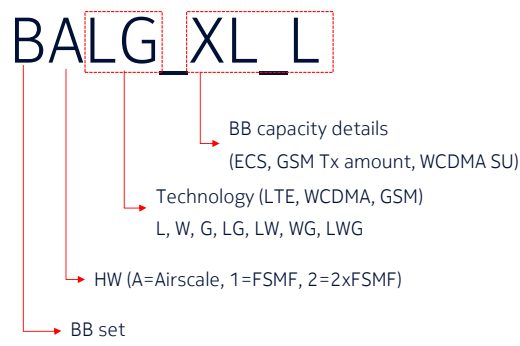
Example BB and RF cell sets

Cell Sets – naming convention

RF Set



BB Set

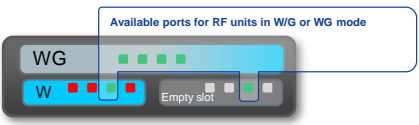


FSMF

Definition of SRAN BB cell set

Example of BB cell set:

B1FWG_1+B



24 TRX + 9.5SU

Note:



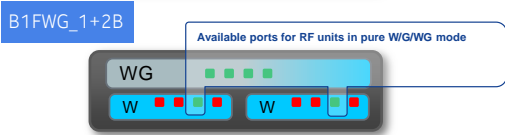
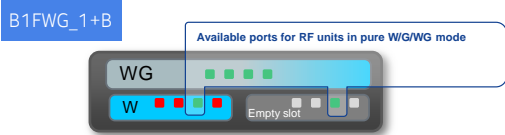
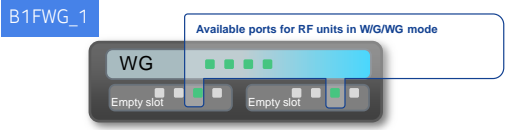
Nokia Internal Use
RA23500-V-19

Supported RAT (baseband processing resources)		FSMF	WCDMA + GSM					
		FBBC	WCDMA					
Capacity	RF	30TRx	5.5SU	18CS	24TRx/3.5 SU 36TRx/2.5 SU	24TRx/18CS	-	-
	FBBC	30TRx	6SU	18CS	-	-	6SU or 18CS	-
	FSMF+FBBC	30TRx	11.5SU	18CS or 18CS	24TRx/9.5 SU 36TRx/14.5 SU	24TRx/18CS+18CS	5.5SU/18CS	24TRx/5.5 SU/18CS 24TRx/3.5SU/18CS
	FSMF+2xFBBC	30TRx	17.5SU	18CS	24TRx/11.5 SU	24TRx/18CS+18CS 36TRx/28CS	11.5SU/18CS 9.5 SU/28CS	24TRx/11.5 SU/18CS 24TRx/5.5SU/18CS+18CS 24TRx/3.5SU/28CS
Connectivity		FSMF + FBBC	<p>5 RF ports (or 6 RF ports)</p> <ul style="list-style-type: none"> for one or more RF sets single RF set may support WCDMA or GSM or WCDMA&GSM (RF sharing) carriers <p>6 RF ports are available if second FBBC is installed for connectivity purposes</p>					

FSMF SRAN BB cell sets - Examples

WCDMA + GSM

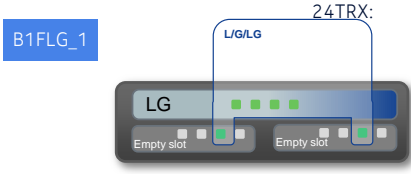
24TRX or 36TRX:



BB capacity for WCDMA + GSM:

- Up to 24TRX / 1/3 FSMF core + 3.5 SU for FSMF
- Up to 36TRX / 1/2 FSMF core + 2.5 SU for FSMF
- Additional WCDMA extensions of 1 or 1 FBBA/C
- GSM always allocated to FSMF core
- Up to 6 RF ports can be used for RF unit connectivity
 - depends on neighbor cell set port usage
- Available ports for RF units in pure GSM, WCDMA and WCDMA+GSM RF shared mode – please check supported RF sets for the details

FSMF SRAN BB cell sets - Examples LTE + GSM

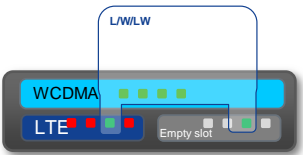


- BB capacity for LTE + GSM:**
- Up to 24TRX / 1/3 FSMF core
 - GSM always allocated to FSMF core
 - LTE: reduced cell set
 - Up to 6 RF ports can be used for RF unit connectivity
 - depends on neighbor cell set port usage
 - Available ports for RF units in LTE, GSM or LTE+GSM mode – please check supported RF sets for the details

FSMF SRAN BB cell sets - Examples

LTE + WCDMA

B1FLW_1

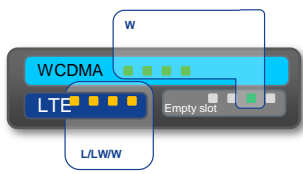


WCDMA: 5,5 SU
LTE: 1 BCS

BB capacity for LTE + WCDMA:

- WCDMA: 5,5 SU on FSMF core
- Additional WCDMA extension of 1 FBBA/C possible in empty slot
- LTE: basic cell sets
- Up to 6 RF ports can be used for RF unit connectivity
 - depends on neighborcell set port usage
- Available ports for RF units in pure WCDMA, LTE or LTE-WCDMA RF shared mode (according to picture) – please check supported RF sets for the details

B1FLW_1_L



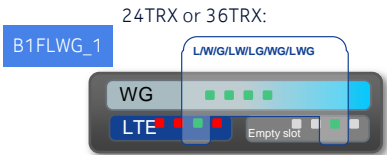
WCDMA: 5,5 SU
LTE: 1 BCS

BB capacity for LTE + WCDMA:

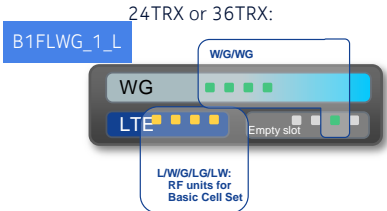
- WCDMA: 5,5 SU on FSMF core
- Additional WCDMA extension of 1 FBBA/C possible in empty slot
- LTE: basic cell sets
- Up to 9 RF ports can be used for RF unit connectivity
 - depends on neighborcell set port usage
- Available ports for RF units in pure WCDMA, LTE or LTE-WCDMA RF shared mode (according to picture) – please check supported RF sets for the details

FSMF SRAN BB cell sets - Examples

LTE + WCDMA + GSM



- BB capacity for LTE+ WCDMA + GSM:**
- Up to 24TRX / 1/3 FSMF core + 3.5 SU for FSMF
 - Up to 36TRX / 1/2 FSMF core + 2.5 SU for FSMF
 - Additional WCDMA extensions of 1 or 1 FBBA/C
 - GSM always allocated to FSMF core
 - LTE: Basic cell set
 - Up to 6 RF ports can be used for RF unit connectivity
 - depends on neighbor cell set port usage
 - Available ports for RF units in LWG and WG/LG/LW/LWG RF shared mode – please check supported RF sets for the details



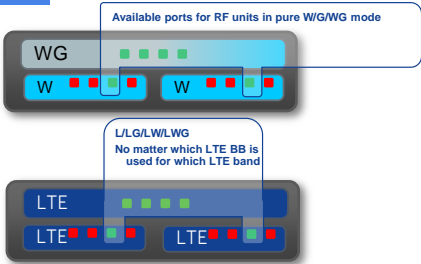
- BB capacity for LTE+ WCDMA + GSM:**
- Up to 24TRX / 1/3 FSMF core + 3.5 SU for FSMF
 - Up to 36TRX / 1/2 FSMF core + 2.5 SU for FSMF
 - Additional WCDMA extensions of 1 or 1 FBBA/C
 - GSM always allocated to FSMF core
 - LTE: Basic cell set
 - Up to 9 RF ports can be used for RF unit connectivity
 - depends on neighbor cell set port usage
 - Available ports for RF units in LWG and WG/LG/LW RF shared mode – please check supported RF sets for the details

FSMF SRAN BB cell sets

2xFSMF example: WCDMA + GSM + LTE

24TRX or 36TRX:

B2FLWG_3+2B



BB capacity for LTE+ WCDMA + GSM:

1st FSMF:

- Up to 24TRX / 1/3 FSMF core + 3,5 SU for 1st FSMF
- Up to 36TRX/ ½ FSMF core + 2,5 SU for 1st FSMF
- Additional WCDMA extensions of 1 or 2 FBBA/C
- GSM always allocated to 1st FSMF core
- Available ports in 1st SM for RF units in pure GSM, WCDMA and WCDMA+GSM RF shared mode – please check supported RF sets for the details

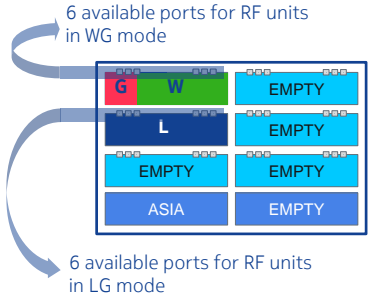
2nd FSMF:

- LTE B1: basic cell set
- LTE B2: basic cell set
- LTE B3: basic cell set
- Available ports in 2nd SM for RF units in pure LTE or LTE+WCDMA, LTE+GSM, LTE+WCDMA+GSM RF shared mode – please check supported RF sets for the details

AirScale Definition of SRAN BB cell set

Example of BB cell set:

BALWG_2P_S_1



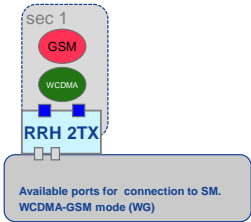
BB cell set characteristic						
Supported RAT (baseband processing resources)	ABIA#1	GSM + WCDMA				
	ABIA#2	LTE				
Capacity	FSP	GSM	WCDMA	LTE	GSM/WCDMA	GSM/LTE
	ABIA	24 TRXs or 36 TRXs	8 SU or 4 SU	1xBCS or 1xECS or 1xPCS or 1xDPCS	24 TRXs / 6 SU or 36 TRXs / 4 SU	24 TRXs / 1xBCS or 24 TRXs / 1xPCS or 36TRXs / 1xBCS or 36TRXs / 1xPCS
Connectivity	ABIA#1	6 RF ports <ul style="list-style-type: none"> for one or more RF sets single RF set may support GSM or WCDMA or GSM&WCDMA (RF sharing) carriers 				
	ABIA#2	6 RF ports <ul style="list-style-type: none"> for one or more RF sets single RF set may support LTE/GSM carriers 				

SRAN RF sets - Examples

1WG2

WCDMA-GSM RF shared mode

1x2T2R RRH

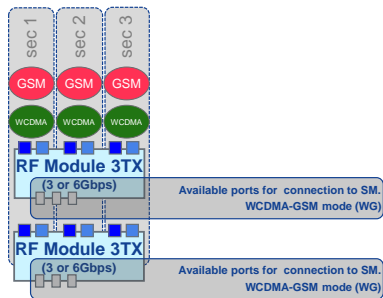


RF set ID	RF mode	No. of RF units.	Supported RF units	RF type	minimum SFP speed mode	# OBSAI fibers/RF unit	WCDMA carrier config.			GSM carrier configuration		
							WCDMA cfg (cell-sector)	Tx/Rx	Ant Cfg type	GSM cfg (max. cell-sector)	Number Tx/Rx	Ant Cfg type
1WG2	WG	1	FHDA, FHDB, FHFB	2T2R	3	1	2	1T/2R	A	6	1T/2R	A
1WG2	WG	1	FHDA, FHDB, FHFB	2T2R	3	1	2	2T/2R	I	6	2T/2R	I

SRAN RF sets - Examples

2WG3

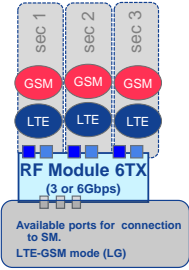
WCDMA-GSM RF
shared mode
2x3T6R RFM



RF set ID	RF mode	No. of RF units.	Supported RF units	RF type	minimum SFP speed mode	# OBSAI fibers/RF unit	WCDMA carrier config.			GSM carrier configuration		
							WCDMA cfg (cell-sector)	Tx/Rx	Ant Cfg type	GSM cfg (max. cell-sector)	Number Tx/Rx	Ant Cfg type
2WG3	WG	2	FXCA, FXCB, FXDA, FXDJ, FXDB, FXJB, FXFA, FXFB, FXFC	3T6R	3	1	3+3+3	1T/2R	C	4+4+4	1T/2R	C
2WG3	WG	2	FXCA, FXCB, FXDA, FXDJ, FXDB, FXJB, FXFA, FXFB, FXFC	3T6R	3	1	2+2+2	1T/2R	C	6+6+6	1T/2R	C
2WG3	WG	2	FXCA, FXCB, FXDA, FXDJ, FXDB, FXJB, FXFA, FXFB, FXFC	3T6R	3	1	1+1+1	1T/2R	C	7+7+7	1T/2R	C
2WG3	WG	2	FXCB, FXDB, FXJB, FXFC	3T6R	6	1	4+4+4	1T/2R	C	6+6+6	1T/2R	C
2WG3	WG	2	FXCA, FXCB, FXDA, FXDJ, FXDB, FXJB, FXFA, FXFB, FXFC	3T6R	3	1	3+3+3	2T/2R	H	4+4+4	1T/2R	C
2WG3	WG	2	FXCA, FXCB, FXDA, FXDJ, FXDB, FXJB, FXFA, FXFB, FXFC	3T6R	3	1	2+2+2	2T/2R	H	6+6+6	1T/2R	C
2WG3	WG	2	FXCA, FXCB, FXDA, FXDJ, FXDB, FXJB, FXFA, FXFB, FXFC	3T6R	3	1	1+1+1	2T/2R	H	7+7+7	1T/2R	C
2WG3	WG	2	FXCB, FXDB, FXJB, FXFC	3T6R	6	1	4+4+4	2T/2R	H	6+6+6	1T/2R	C

SRAN RF sets - Examples

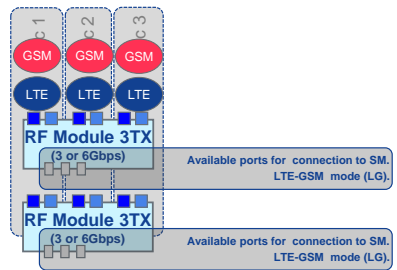
1LG6
 LTE-GSM RF shared
 mode
 1x6T6R RFM



RF set ID	RF mode	No. of RF units.	Supported RF units	RF type	minimum SFP speed mode	# OBSAI fibers/RF unit	LTE carrier configuration			GSM carrier configuration			
							LTE cfg (Cell-sector)	Number Tx/Rx	Ant Cfg type	LTE Bandwidth (max of 5,10,15,20)	GSM cfg (max. cell-sector)	Number Tx/Rx	Ant Cfg type
1LG6	LG	1	FXED., FXDD	6T6R	6	1	1+1+1	2T/2R	I	10	6+6+6	1T/2R	A
1LG6	LG	1	FXED, FXDD	6T6R	6	2	1+1+1	2T/2R	I	20	6+6+6	1T/2R	A

SRAN RF sets - Examples

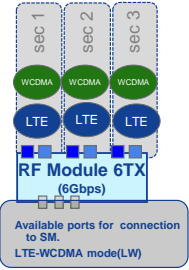
2LG3
 LTE-GSM RF shared
 mode
 2x3T6R RFM



RF set ID	RF mode	No. of RF units.	Supported RF units	RF type	minimum SFP speed mode	# OBSAI fibers/RF unit	LTE carrier configuration				GSM carrier configuration		
							LTE cfg (Cell-sector)	Number Tx/Rx	Ant Cfg type	LTE Bandwidth (max of 5,10,15,20)	GSM cfg (max cell-sector)	Number Tx/Rx	Ant Cfg type
2LG3	LG	2	FXCA, FXCB, FXDA, FXDB, FXEA, FXEB, FXFA, FXFB, FXFC, FXEE, FXEF	3T6R	3	1	1+1+1	2T/2R	H	10	8+8	1T/2R	C
2LG3	LG	2	FXCA, FXCB, FXDA, FXDB, FXEA, FXEB, FXFA, FXFB, FXFC, FXEE, FXEF	3T6R	3	2	1+1+1	2T/2R	H	20	4+4	1T/2R	C
2LG3	LG	2	FXCA, FXCB, FXDA, FXDB, FXEA, FXEB, FXFA, FXFB, FXFC, FXEE, FXEF	3T6R	3	2	1+1+1	2T/4R	K	10	6+6	1T/2R	C
2LG3	LG	2	FXCB, FXDB, FXEB, FXFB, FXFC, FXEE, FXEF	3T6R	6	1	1+1+1	2T/4R	K	10	6+6	1T/2R	C
2LG3	LG	2	FXDB, FXFB, FXFC, FXEE, FXEF	3T6R	3	2	1+1+1	2T/4R	K	20	4+4	1T/2R	C
2LG3	LG	2	FXEE, FXEF	3T6R	6	1	1+1+1	2T/2R	AD	10	6+6	1T/2R	AC

SRAN RF sets - Examples

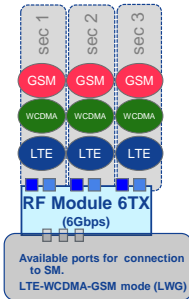
1LW6
 LTE-WCDMA RF shared mode
 1x6T6R RFM



RF set ID	RF mode	No. of RF units.	Supported RF units	RF type	minimum SFP speed mode	# OBSAI fibers/RF unit	LTE carrier configuration				WCDMA carrier config.		
							LTE cfg (Cell-sector)	Number Tx/Rx	Ant Cfg type	LTE Bandwidth (max of 5,10,15,20)	WCDMA cfg (cell-sector)	Tx/Rx	Ant Cfg type
1LW6	LW	1	FRGU, FXDD	6T6R	6	1	1+1+1	2T/2R	I	10	1+1+1	1T/2R	A
1LW6	LW	1	FRGU, FXDD	6T6R	6	2	1+1+1	2T/2R	I	20	2+2+2	1T/2R	A
1LW6	LW	1	FRGU, FXDD	6T6R	6	2	1+1+1	2T/2R	I	10	4+4+4	1T/2R	A

SRAN RF Sets - Examples

1LWG6
 LTE-WCDMA-GSM RF shared mode
 1x6T6R RFM



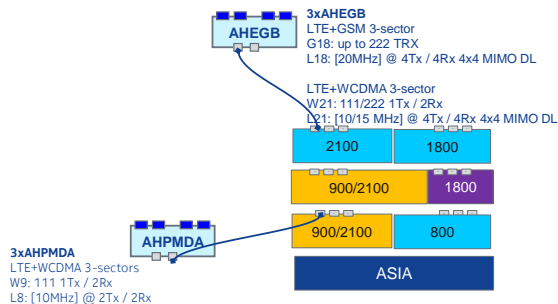
RF set ID	RF mode	No. of RF units.	Supported RF units	RF type	minimum SFP speed mode	# OBSAI fibers/RF unit	LTE carrier configuration				WCDMA carrier config.		GSM carrier configuration			
							LTE cfg (Cell-sector)	Number Tx/Rx	Ant Cfg type	LTE Bandwidth (max of 5,10,15,20)	WCDMA cfg (cell-sector)	Tx/Rx	Ant Cfg type	GSM cfg (max cell-sector)	Number Tx/Rx	Ant Cfg type
1LWG6	LWG	1	FXDD	6T6R	6	1	1+1+1	2T/2R	I	5	1+1+1	1T/2R	A	2+2+2	1T/2R	A

SRAN 18A new features

Support for configuration with WCDMA radio units connected to 2 ABIAs (SR002075)

WCDMA related RF units connected to two ABIAs

- This feature introduced functionality that allows **WCDMA** related RF units connectivity to **two ABIAs** (12 ports in total) within one half subrack
- The feature will be compatible with **PIC** only if **WCDMA** RF units are connected two **ABIAs** AND at least one **ABIA** with **WCDMA RF** connectivity is non **WCDMA BB** related (**LTE** and /or **GSM** BB allocated only)



With **SR002075** Operator using **SBTS** will be able to use up to **12** fiber ports for **WCDMA** radio connectivity within one AirScale half sub-rack

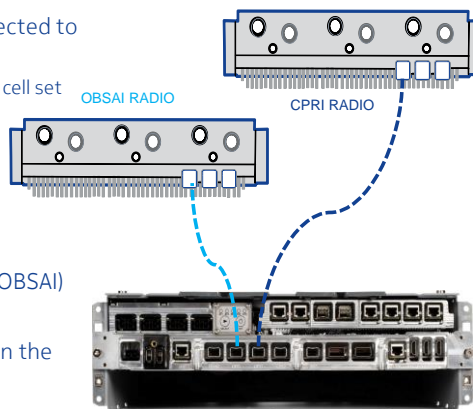
[click_1] This feature introduced functionality that allows **WCDMA** related **RF** units connectivity to two **ABIAs**, twelve ports in total, within one half subrack

[click_2] This feature will be compatible with Parallel Interference Cancellation only if **WCDMA RF** units are connected two **ABIAs** and at least one **ABIA** with **WCDMA RF** connectivity is non **WCDMA** baseband related i.e., **LTE** and / or **GSM** Baseband allocated only

SBTS support for mixed OBSAI/CPRI step 2 (SR002128)

Support for mixed OBSAI/CPRI radios on the same logical SBTS

- Radios with OBSAI and NOKIA CPRI protocols can be connected to same ABIA or FSMF/FBBx
 1. Mixing of two protocols to be supported for LTE within same BB cell set
 2. Mixing of OBSAI and CPRI to be supported for WCDMA RAT
- Radios in chaining with OBSAI and CPRI can be connected to same ABIA or FSMF/FBBx
- GSM sector should be mapped to same protocol (CPRI or OBSAI)
- Radios with ALU CPRI mixed protocols are not supported in the same ABIA/FBBx
- Radio chaining with mixed protocols is not supported



* Illustrative purposes only

75

RA23500-V-19

© Nokia 2019

NOKIA

This feature **SR002128** brings in the support to use both **OBSAI** and **CPRI** radios in standalone and chaining for **WCDMA** RAT in **SBTS**. This builds on the functionalities of **SR001341**.

[click_1] Radios with **OBSAI** and **NOKIA CPRI** protocols can be connected to same **ABIA** or **FSMF** or **FBBx**.

1. Mixing of two protocols to be supported for **LTE** within same Baseband cell set
2. Mixing of **OBSAI** and **CPRI** to be supported for **WCDMA** RAT

[click_2] Radios in chaining with **OBSAI** and **CPRI** can be connected to same **ABIA** or **FSMF** or **FBBx**

[click_3] **GSM** sector should be mapped to same protocol **CPRI** or **OBSAI**. **GSM TRX's** on **OBSAI** and **CPRI RF's** has to be allocated on different **DSP** in the System module

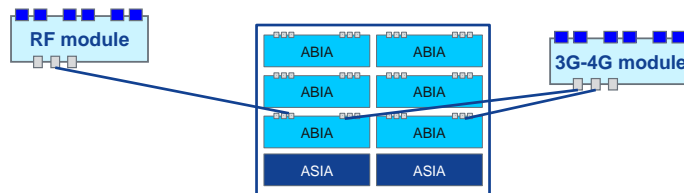
[click_4] Radios with **ALU CPRI** mixed protocols are not supported in the same **ABIA** or **FBBx**.

[click_5] Radio chaining with mixed protocols is not supported.

SR002074 LWG RF split with AirScale Full Rack configuration

Support of RF split for RF units in LW, LWG mode with AirScale full rack configuration

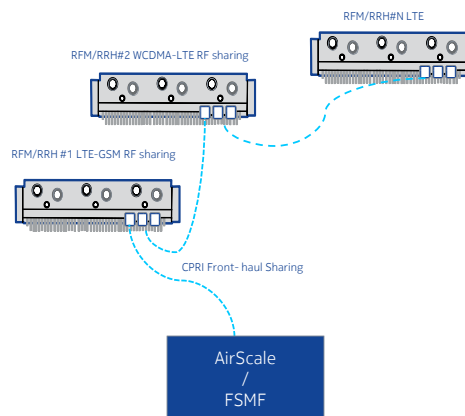
- It is possible to use **RF split** for RF units in **LW** and **LWG** mode with AirScale dual core configurations
- The mono-RAT RF units for **WCDMA** and **LTE** can be split
- The RFs configured with **GSM** must have the commissioned link(s) to the **primary core**
- **LTE & WCDMA** cells from particular RF can be allocated on both cores using **smodDN** commissioning parameter
- The RFs configured in a chain cannot be split



SR001099 SBTS Nokia CPRI Chaining and Sharing

Chaining and RF Sharing support for CPRI Radios

- Chaining of AirScale CPRI capable Radios
- Up to 4.9Gbps support for FSMF and Up to 9.8 Gbps chaining support for AirScale
- MSR Support in Radio and front-haul sharing
- Possible to connect Single or Dual band RRH in chain
- Support for same or different CPRI line rates between hops



SR001099 provides support for shared and chained Radios with Nokia **CPRI**. It is possible to share and chain the Nokia **CPRI** Radios with **FSMF** and AirScale.

[click_1] Only **CPRI-CPRI** link chaining is introduced with this feature. Scope is only Nokia **CPRI** chaining. Chaining of **OBSAI** Radios to **CPRI** Radios is not supported

[click_2] When used with **FSMF**, the maximum **CPRI** line rate possible is **4.9** Giga bits per second

[click_3] The feature support **CPRI** chaining in **MSR** Mode.

[click_4] Single band or dual-band **RRH/RFM** can be connected in one chain

[click_5] In one chain with "n" hops there can be the same or different **CPRI** line bit rates in each hop

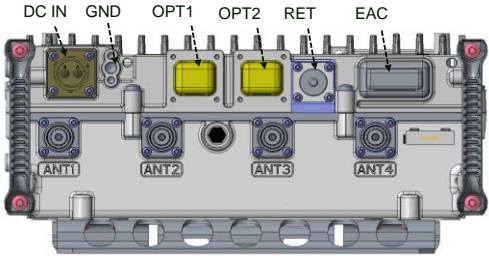
SRAN 19 new features

SR001768 SBTS support for MSR Mode for AirScale RRH 2T4R B1 120W AHGA
AHGA is a 2T4R RRH optimized for distributed macro BTS installations.

It supports 3GPP FDD band 1 with up to 60W per pipe.

- AHGA frequency supported for FDD:
 - Band 1: UL (RX) 1920 MHz - 1980 MHz, DL (TX) 2110 MHz - 2170 MHz
- AHGA supported modulation:
 - Support of modulation schemes up to QAM256 (DL)
 - Support of modulation schemes up to QAM64 (UL)

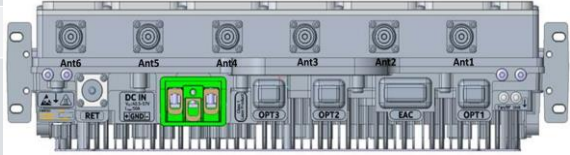
- Supported radio technologies by RF HW: FDD LTE, WCDMA and FDD LTE + WCDMA with the combinations according 3GPP Capability set CS3.
- In LTE operation following carrier bandwidths are supported: 5 MHz, 10 MHz, 15 MHz, 20 MHz and NB-IoT in stand alone, in-band and guard band modes.



SR002273 SBTS support for MSR mode for AirScale RFM 6T6R B1 480W ARGA

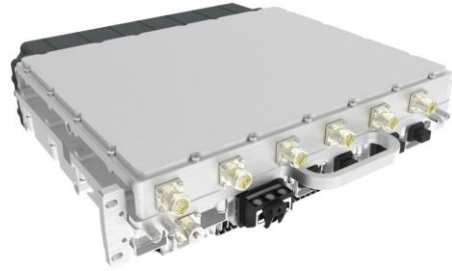
Interfaces

Interface	Label	Number of interfaces	Connector type
Power Supply In	DC IN	1	3-pole Screw terminal for 25 mm ² shielded cable
Grounding (GND Screws)	GND		2 x M5
LMI (Local Management Interface and EAC)	EAC	4 EAC input signals, 1 EAC output signal	MDR26
System Interface	OPT1,OPT2, OPT3	3	SFP + 9.8GBPS CIPRI
Antenna connectors	ANT	6 RF	4.3-10
RET connector	RET	1	AISG C485



SR002152 SBTS support for MSR mode for AirScale RFM 6T6R B5 480W ARCA HW requirements and specification

- ARCA AirScale RFM 6T6R B1 480W
- TX power accuracy < +/- 0.8 dB, +/- 0.5 dB in limited temperature range (-10 ... 40°C)
- Enhanced sensitivity of LTE ~-106.5 dBm (0.2 ... 0.4 dB lower typical Noise Figure in Radio)
- EVM < 3.5% with 256 QAM, TX power level @60W (no back offs)
- Fan cooling
- AISG3.0 Antenna tilt support (RET), Antenna Line Device (ALD) auto detection with integrated bias-T's, RET support with an external connector (RS485 based AISG interface)

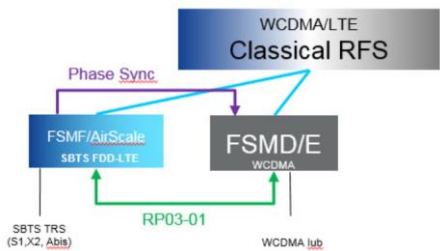


SR001291 SBTS LTE - WCDMA (FSME/D) classical RF sharing

- Solution Area: Classical RF Sharing
 - This feature introduces classical RF-sharing between Single RAN BTS (based on FSMF or AirScale), running FDD-LTE, and legacy WCDMA BTS, based on FSM Rel. 2 (FSMD/E).
 - The major use case behind this feature is to offer the possibility to modernize existing sites, having already deployed WCDMA BTS (FSM Rel.2, FSMD/E), by introducing SBTS (FSMF or AirScale), serving FDD-LTE (and GSM).
 - Feature helps to protect installed base of WCDMA FSM Rel. 2 by offering attractive site upgrade paths towards Multiradio deployment.

SR001291 SBTS LTE - WCDMA (FSME/D) classical RF sharing

- SBTS can be used together with legacy WCDMA BTS for classical WCDMA/LTE RF-sharing.
- LTE/GSM RF-sharing or GSM-only or another WCDMA-layer are supported inside SBTS as well.
- Only one WCDMA system module can be operated with one SBTS instance
- From network management point of view legacy WCDMA BTS is still operated as own, logical BTS (NetAct, EM).



SR001291 SBTS LTE - WCDMA (FSME/D) classical RF sharing

- Classical RF-sharing requires RF-sharing Master and Slave roles.
- SBTS-will take the role as RF-sharing Slave and WCDMA BTS will remain RF-sharing Master.
- Phase synchronization is provided from SBTS to WCDMA BTS via sync_out – sync_in port (Sync Hub Direct Forward), in case of SBTS, acting as the Sync (Hub) master, WCDMA BTS the Sync (Hub) Slave.
- *If WCDMA BTS is Sync master, no need to use SHDF (phase synchronization via RP3-link is sufficient) * see interdependencies

Interdependencies between the features:

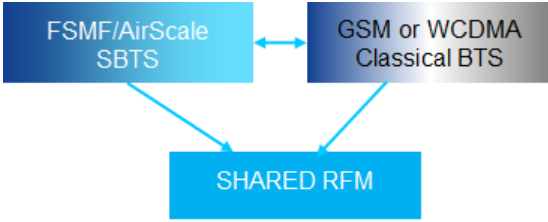
- Legacy classical LTE-WCDMA RFS and Sync Hub Forwarding features as a precondition.
- Dependency with SR002175 “Classical RF-sharing between SBTS and WCDMA BTS with WCDMA extension module support” planned for SRAN19

SR001291 SBTS LTE - WCDMA (FSME/D) classical RF sharing

- Only legacy LTE cell set, running on SBTS, as defined as of today (no support for Single RAN cell set)
- All existing classical WCDMA/LTE RF-sharing configurations, based on LTE FSMF with single WCDMA FSM Rel. 2, shall be supported.

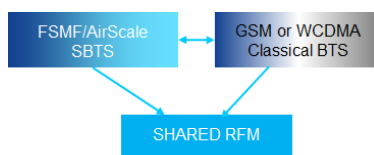
SR002251 SBTS (LTE only mode) support for classical RF sharing with legacy BTS (WCDMA or GSM)

This feature introduces classical RF-sharing between Single RAN BTS (FSMF or AirScale), running on LTE FDD only mode with legacy WCDMA and GSM BTS



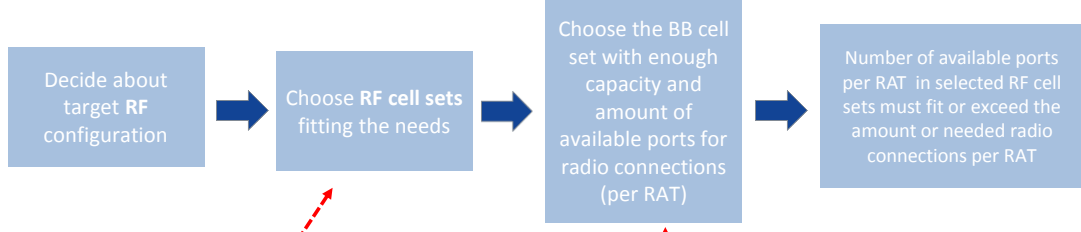
SR002251 SBTS (LTE only mode) support for classical RF sharing with legacy BTS (WCDMA or GSM)

- Synchronization between SBTS to legacy BTS is handled via RP3 or SHDF.
- One free optical port is needed at SBTS and WCDMA or GSM BTS for Inter-System Module connection (RP03-01).
- Configuration and synchronization rules defined for classical RF Sharing shall be applicable for this feature.
- SBTS LTE will assume the role of RF-sharing slave, WCDMA BTS remains RF-sharing master.
- SBTS LTE will assume the role of RF-sharing Master, GSM BTS remains RF-sharing Slave.



Configuration building

SRAN Configuration Building Instructions
Option #1



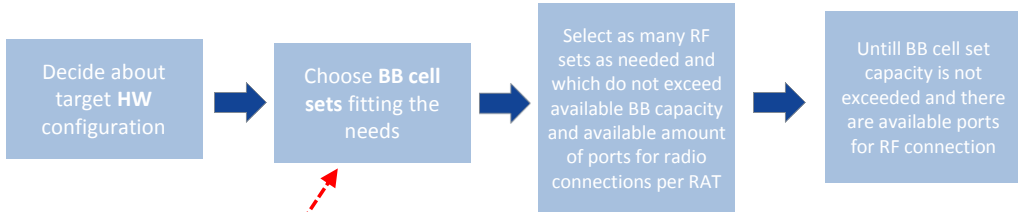
Supported carrier configurations from single RF set perspective

Carrier Config	RF Set	Carrier Config	RF Set
1	1	1	1
2	1	2	1
3	1	3	1
4	1	4	1
5	1	5	1
6	1	6	1
7	1	7	1
8	1	8	1
9	1	9	1
10	1	10	1
11	1	11	1
12	1	12	1
13	1	13	1
14	1	14	1
15	1	15	1
16	1	16	1
17	1	17	1
18	1	18	1
19	1	19	1
20	1	20	1

FSAP BB cell sets

Cell Set	FSAP	FSAA1	FSAA2	FSAA3	FSAA4	FSAA5	FSAA6	FSAA7	FSAA8	FSAA9	FSAA10	FSAA11	FSAA12	FSAA13	FSAA14	FSAA15	FSAA16	FSAA17	FSAA18	FSAA19	FSAA20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SRAN Configuration Building Instructions
Option #2



Possible ports usage																																		
ESMF cell set ID	RAT	No. of SPTS SM	No. of SMTS	SMI BB deployment			Ports								LTE BB		WCDMA BB		DDSM BB															
				FSM1	FBBAL	FBBAL	G.4	R.1	R.2	R.3	1	2	3A	4	1	2	3A	3B	3C	4	5	6												
18	GSM	1	1	GSM	FSM1	FSM1																												
19	GSM	1	1	GSM	FSM1	FSM1																												
20	GSM	1	1	GSM	FSM1	FSM1																												
21	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
22	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
23	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
24	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
25	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
26	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
27	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
28	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
29	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
30	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
31	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
32	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
33	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
34	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
35	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
36	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
37	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
38	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
39	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												
40	WCDMA	1	1	WCDMA	WCDMA	WCDMA																												

SRAN 19 dimensioning example

Scenario 1: 2 RAT site (WCDMA-LTE) with FSMF baseband

Scenario 1

Finding the RF cell sets (1/4)

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
WCDMA/LTE	900	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	2xRFM 3T6R
WCDMA/LTE	2100	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	1xRFM 6T6R



Find RF module type in the Excel file for te first RF cell set

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	LTE Dual carrier support	RF type
900	8	RFM	FXDB	3x80W	yes	yes	3Tx/6Rx

Scenario 1

Finding the RF cell sets (2/4)

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
WCDMA/LTE	900	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	2xRFM 3T6R
WCDMA/LTE	2100	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	1xRFM 6T6R



Select the proper RF cell set

RF set ID	RF mode	No. of RF units	Supported RF units	RF type	OBSAI minimum SFP speed mode	OBSAI #fibers /RF unit	LTE configuration (Cell-sector)	Number of LTE configuration Tx/Rx	Antenna configuration type	LTE Bandwidth (max of 1.4, 3, 5,10,15,20)	WCDMA configuration (cell-sector)	Tx/Rx	Antenna configuration type
2LW3	LW	2	FXCB,FXDB,FXFC,FXJB,FXJC	3Tx/6Rx	6	2	1+1+1	2Tx/2Rx	H	20	2+2+2	1Tx	C

Scenario 1

Finding the RF cell sets (3/4)

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
WCDMA/LTE	900	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	2xRFM 3T6R
WCDMA/LTE	2100	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	1xRFM 6T6R



Find RF module type in the Excel file for te second RF cell set

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	LTE Dual carrier support	RF type
2100	1	RFM	FRGU	6x60W	yes	no	6Tx/6Rx

Scenario 1

Finding the RF cell sets (4/4)

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
WCDMA/LTE	900	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	2xRFM 3T6R
WCDMA/LTE	2100	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	1xRFM 6T6R



Select the proper RF cell set

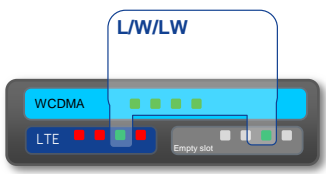
RF set ID	RF mode	No. of RF units	Supported RF units	RF type	OBSAI minimum SFP speed mode	OBSAI #fibers /RF unit	LTE configuration (Cell-sector)	Number of LTE configuration Tx/Rx	Antenna configuration type	LTE Bandwidth (max of 1.4, 3, 5,10,15,20)	WCDMA configuration (cell-sector)	Tx/Rx	Antenna configuration type
1LW6	LW	1	FRGU	6Tx/6Rx	6	1	1+1+1	2Tx/2Rx	I	10	1+1+1	1Tx	A

Scenario 1

Find the BB cell set

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
WCDMA/LTE	900	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	2xRFM 3T6R
WCDMA/LTE	2100	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	1xRFM 6T6R

Required BB capacity:
 LTE: 1 BCS
 WCDMA ~6 SU



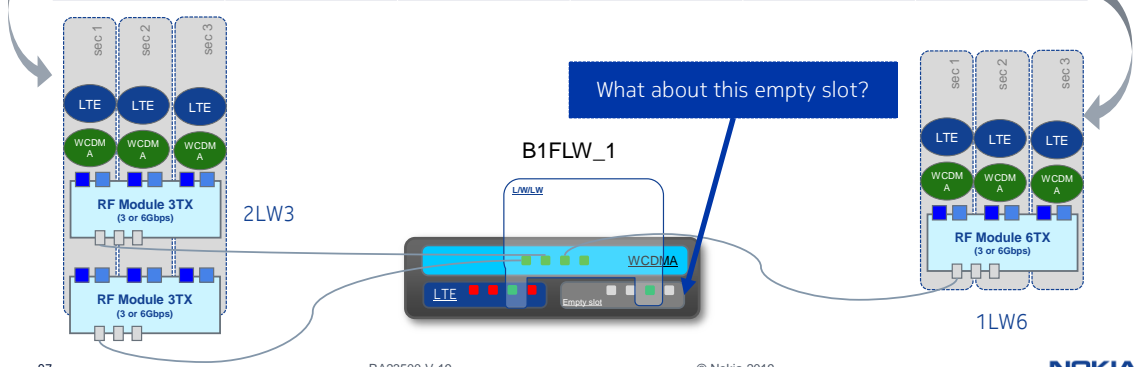
BB cell set selection

BB_cell_set_ID	No. of RATs	SBTS SM mode	No. of SMs	SM1 BB deployment			LTE BB			WCDMA BB	GSM BB
				FSMF1	FBBA/C	FBBA/C	#RCS	#BCS	#ECS	#SU	#TRXs
B1FLW_1	2	LW	1	WCDMA	LTE	Empty		1		5.5	

Scenario 1: 2 RAT site (WCDMA-LTE) with FSMF baseband

Complete configuration

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
WCDMA/LTE	900	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	2xRFM 3T6R
WCDMA/LTE	2100	1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 2T2R	1xRFM 6T6R



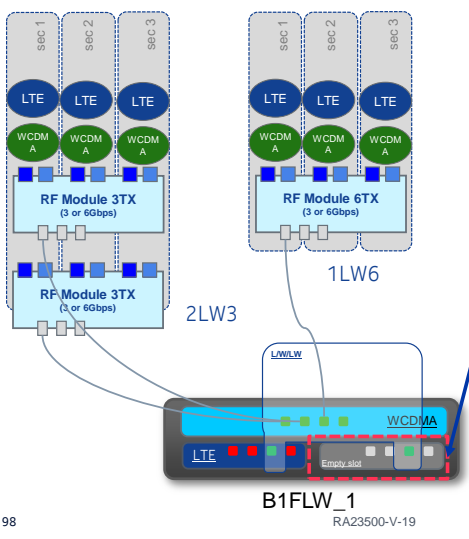
97

RA23500-V-19

© Nokia 2019

Scenario 1

Expanding site configuration (1/2)

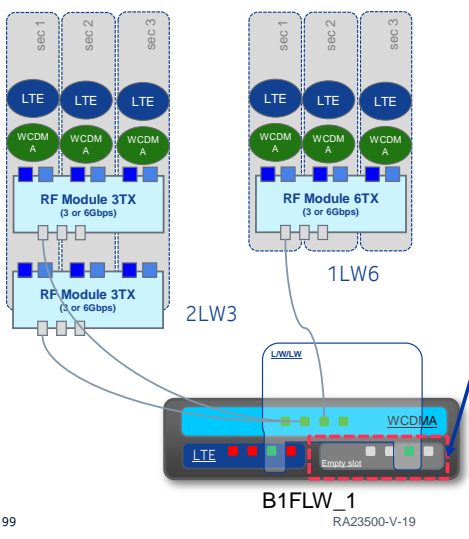


The empty slot can be used. LTE and SRAN cell sets can be flexibly combined to build target configuration. So in the empty slot we can „insert“ a SRAN BB cell set or a pure LTE cell set.

1. Adding a SRAN cell set:
 - Limited options, only one FBBx card slot free.
 - A good fit might be a situation where we use the FBBx card for additional WCDMA capacity. Then we could expand the number of cells per sector in the 1LW6 RF cell set
2. Adding a LTE cell set
 - One FBBx card can support a Basic Cell Set for LTE
 - The LTE CuDo can give us an exact definition

Scenario 1

Expanding site configuration (2/2)



Example solution
 Excerpt from LTE CuDo:
 2TX2RX up to three sectors, 1.4, 3, 5 or 10 MHz,
 centralized I-type RFMs 6TX, 1746_1b1
 basic cell set works on FSMF or any FBBC

The diagram shows an RFM 6Tx unit connected to three sectors (Sector 3, Sector 2, Sector 1). A 6 Gbps link is shown between the RFM 6Tx and an FSMF unit below it.

99

© Nokia 2019

NOKIA

Trainer note: talk about the RP3 link speeds, show the calculator in Excel file

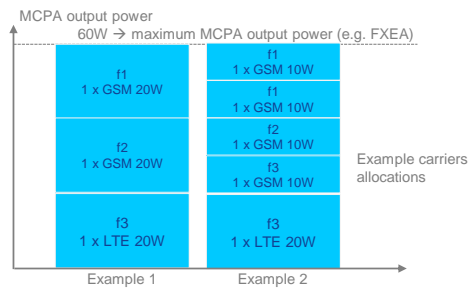
Output power levels

- Output power levels:
 - Radio Modules are equipped with a single Multi Carrier Power Amplifier (MCPA) per RF pipe
 - The MCPA amplifies simultaneously all the carriers defined within the RF bandwidth of the pipe
 - The maximum output power at the antenna connector depends on Radio Module variant
 - The maximum output power of the MCPA is shared among defined carriers that is why the maximum output power per carrier should be aligned with the number of carriers to be handled by given MCPA

Exaple Power Levels in 3-RAT RFS

RF variant	GSM	WCDMA	LTE
60W RFM	10, 12, 15, 20, 30, 40	8, 10, 15, 20, 30, 40	8, 20, 40
80W RFM	10, 12, 15, 20, 30, 40, 60	8, 10, 15, 20, 30, 40, 60	8, 20, 40, 60

Note1: sum of power assigned to carriers must stay within MCPA limit
 Note2: power back off restrictions may reduce the maximum MCPA output power, depending on the carrier combinations



SRAN 19 dimensioning example

Scenario 2: 3 RAT site (GSM-WCDMA-LTE) with FSMF baseband

Scenario 2

Finding the RF cell sets (1/4)

:

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	4+4+4/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 2T2R	2xRFM 3T6R



Find RF module type in the Excel file for te first RF cell set

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	LTE Dual carrier support	RF type
900	8	RFM	FXDB	3x80W	yes	yes	3Tx/6Rx

Scenario 2

Finding the RF cell sets (2/4)

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	4+4+4/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 2T2R	2xRFM 3T6R



Select the proper RF cell set

2LWG3

LTE configuration (Cell-sector)	Number of LTE configuration Tx/Rx	Antenna configuration type	LTE Bandwidth (max of 1.4, 3, 5,10,15,20)	WCDMA configuration (cell-sector)	Tx/Rx	Antenna configuration type	GSM configuration (maximum cell-sector)	Number Tx/Rx	Antenna configuration type
1+1+1	2Tx/2Rx	H	5	1+1+1	1Tx	C	4+4+4	1Tx/2Rx	C

Scenario 2

Finding the RF cell sets (3/4)

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	4+4+4/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 2T2R	2xRFM 3T6R



Find RF module type in the Excel file for the second RF cell set

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	LTE Dual carrier support	RF type	GSM dedicated mode	WCDMA dedicated mode	LTE dedicated mode
1800	3/9	RFM	FXEB	3x80W	yes	no	3Tx/6Rx	yes	no	yes

Scenario 2

Finding the RF cell sets (4/4)

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	4+4+4/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 2T2R	2xRFM 3T6R



Select the proper RF cell set

2LG3

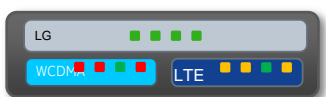
LTE configuration (Cell-sector)	Number of LTE configuration Tx/Rx	Antenna configuration type	LTE Bandwidth (max of 1.4, 3, 5,10,15,20)	WCDMA configuration (cell-sector)	Tx/Rx	Antenna configuration type	GSM configuration (maximum cell-sector)	Number Tx/Rx	Antenna configuration type
1+1+1	2Tx/2Rx	H	20				4+4+4	1Tx/2Rx	C

Scenario 2

Finding the BB cell set

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	4+4+4/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 2T2R	2xRFM 3T6R

Required BB capacity:
 LTE: 1 RCS, 1 BCS
 WCDMA: ~3 SU

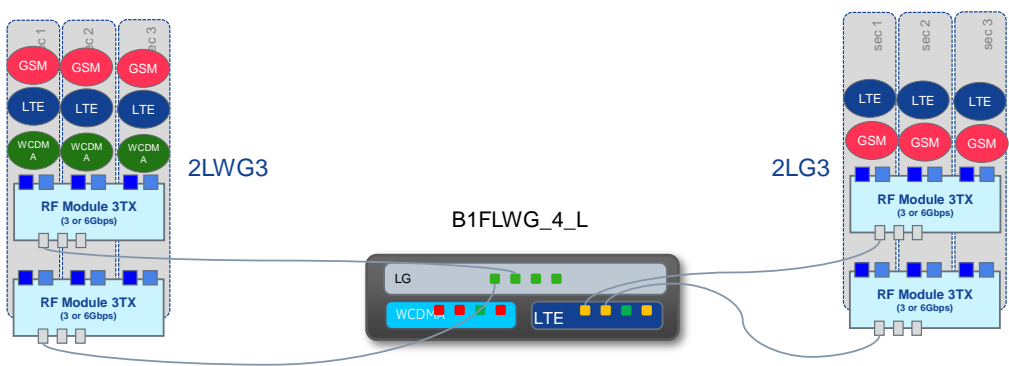


BB_cell_set_ID	No. of RATs	SBTS SM mode	No. of SMs	SM1 BB deployment			LTE BB			WCDMA BB	GSM BB
				FSMF1	FBBA/C	FBBA/C	#RCS	#BCS	#ECS	#SU	#TRXs
B1FLWG_4_L	3	LWG		LG	WCDMA	LTE	1	1		5.5	24

Scenario 2

Complete configuration

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	4+4+4/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 2T2R	2xRFM 3T6R



107

RA23500-V-19

© Nokia 2019

Trainer note: talk about the RP3 link speeds, show the calculator in Excel file

SRAN 19 dimensioning example

Scenario 3:

3 RAT site (GSM-WCDMA-LTE) with
AirScale baseband

Scenario 3

Find the complete configuration for the following site onfiguration:

SRAN cell sets

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
WCDMA	2100	2+2+2		1T2R	1xRFM 3T6R
LTE	1800	1+1+1	LTE BW: 20 MHz	2T2R	1xRFM 6T6R
LTE	800	1+1+1	LTE BW: 5 MHz	2T2R	1xRFM 6T6R

Pure LTE cell sets

Scenario 3

Find the complete configuration for the following site onfiguration:

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
WCDMA	2100	2+2+2		1T2R	1xRFM 3T6R
LTE	1800	1+1+1	LTE BW: 20 MHz	2T2R	1xRFM 6T6R
LTE	800	1+1+1	LTE BW: 5 MHz	2T2R	1xRFM 6T6R



Find RF module type in the Excel file for te first RF cell set

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	LTE Dual carrier support	RF type
900	8	RFM	FXDB	3x80W	yes	yes	3Tx/6Rx

Select the proper RF cell set

2LWG3

LTE configuration (Cell-sector)	Number of LTE configuration Tx/Rx	Antenna configuration type	LTE Bandwidth (max of 1.4, 3, 5,10,15,20)	WCDMA configuration (cell-sector)	Tx/Rx	Antenna configuration type	GSM configuration (maximum cell-sector)	Number Tx/Rx	Antenna configuration type
1+1+1	2Tx/2Rx	H	5	1+1+1	1Tx	C	4+4+4	1Tx/2Rx	C

Scenario 3

Find the complete configuration for the following site onfiguration:

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
WCDMA	2100	2+2+2		1T2R	1xRFM 3T6R
LTE	1800	1+1+1	LTE BW: 20 MHz	2T2R	1xRFM 6T6R
LTE	800	1+1+1	LTE BW: 5 MHz	2T2R	1xRFM 6T6R



Find RF module type in the Excel file for te second RF cell set

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	LTE Dual carrier support	RF type
2100	1	RFM	FRGP	3x80W	No	yes	3Tx/6Rx

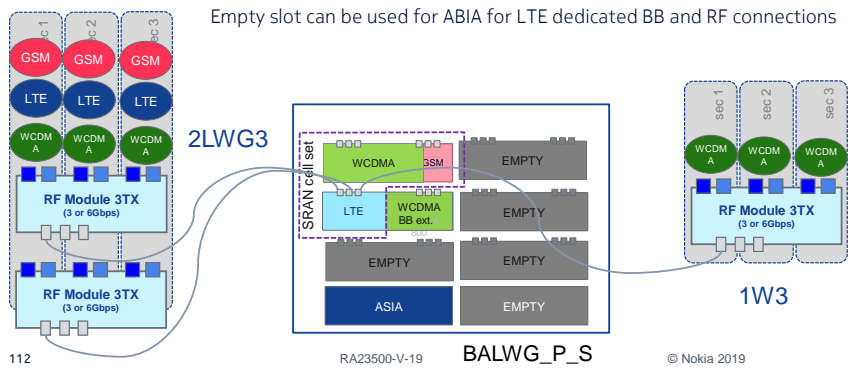
Select the proper RF cell set

1W3

RF set ID	RF mode	No. of RF units	Supported RF units	RF type	OBSAI #fibers /RF unit	WCDMA configuration (cell-sector)	Tx/Rx	Antenna configuration type
1W3	WCDMA	1	FRGS,FRGT	3Tx/6Rx	1	2+2+2	1Tx/2Rx	A

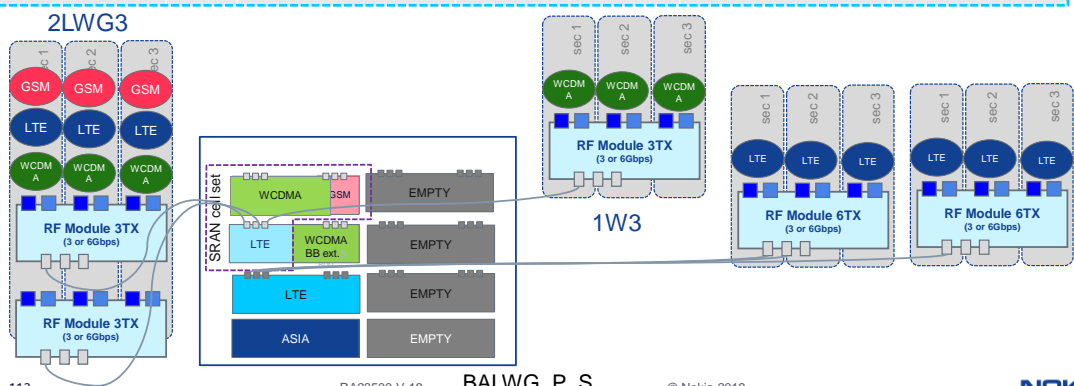
Scenario 3: 3 RAT site (GSM-WCDMA-LTE) with AirScale baseband

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
WCDMA	2100	2+2+2		1T2R	1xRFM 3T6R



Scenario 3: 3 RAT site (GSM-WCDMA-LTE) with AirScale baseband

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	2xRFM 3T6R
WCDMA	2100	2+2+2		1T2R	1xRFM 3T6R
LTE	1800	1+1+1	LTE BW: 20 MHz	2T2R	1xRFM 6T6R
LTE	800	1+1+1	LTE BW: 5 MHz	2T2R	1xRFM 6T6R



113

RA23500-V-19

BALWG_P_S

© Nokia 2019

SRAN 19 dimensioning example

Scenario 4:

3 RAT site (GSM-WCDMA-LTE) with
AirScale baseband and CPRI RRHs

Configuration building example 2

AirScale Configuration building

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
LTE	700	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
WCDMA/LTE	2100	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R/2T2R	3xRRH 2T2R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 4T4R	3xRRH 4T4R
LTE	2600	1+1+1	LTE BW: 20 MHz	4T4R	3xRRH 4T4R

This RF configuration utilises the new Nokia AHPMDA triple band RRH

Configuration building example 2

AirScale Configuration building

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
LTE	700	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
WCDMA/LTE	2100	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R/2T2R	3xRRH 2T2R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 4T4R	3xRRH 4T4R
LTE	2600	1+1+1	LTE BW: 20 MHz	4T4R	3xRRH 4T4R



Find RF module type in the Excel file for te first RF cell set

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	Standalone NB-IoT support	RF type	Optical Connectivity
700/800/900	B8/B20/B28	RRH	AHPMDA	240W	yes	yes	2x(2Tx/2Rx)	CPRI

Configuration building example 2

AirScale Configuration building

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
LTE	700	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R

3 x Find RF cell sets

RF set ID	RF mode	RF set	No. of RF units	Supported RF units	Band	CPRI usage	RF type
1LWG2	LWG	1LWG2_5.1_2_1xCPR19.8Gbps_GBB	1	AHPMDA	8	0,30	2x2Tx/2Rx
1L2	LTE	1L2_5.1_2_1xCPR19.8Gbps_G	1	AHPMDA	20	0,25	2x2Tx/2Rx
1L2	LTE	1L2_5.1_2_1xCPR19.8Gbps_G	1	AHPMDA	28	0,25	2x2Tx/2Rx

Check the CPRI link capacity requirements, the summ for all the RF sets in one RRH/RM should be below 1 (one CPRI link). If its more then additional cable is needed

Note: the CPRI link usage values in the Excel can refer to different LTE BW size, for detailed results use the CPRI link calculator in the Excel file.

Trainer note: show in the excels the details of each RF set

Configuration building example 2

AirScale Configuration building

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
LTE	700	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
WCDMA/LTE	2100	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R/2T2R	3xRRH 2T2R
LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 4T4R	3xRRH 2T2R
LTE	2600	1+1+1	LTE BW: 20 MHz	4T4R	3xRRH 4T4R

This RF configuration utilises the new Nokia AHEGB dual band RRH

Configuration building example 2

AirScale Configuration building

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
LTE	700	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
WCDMA/LTE	2100	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R/4T4R	3xRRH 4T4R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 4T4R	3xRRH 4T4R
LTE	2600	1+1+1	LTE BW: 20 MHz	4T4R	3xRRH 4T4R



Find RF module type in the Excel file for te first RF cell set

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	Standalone NB-IoT support	RF type
2100/1800	1/3	RRH	AHEGB	4x40W/4x40W	yes	yes	4Tx/4Rx

Configuration building example 2

AirScale Configuration building

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
LTE	700	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
WCDMA/LTE	2100	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R/4T4R	3xRRH 4T4R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 4T4R	3xRRH 4T4R
LTE	2600	1+1+1	LTE BW: 20 MHz	4T4R	3xRRH 4T4R



3 x Find RF cell set

RF set ID	RF mode	RF set	No. of RF units	Supported RF units	Band	CPRI usage	RF type
1LW4	LW	1LW4_5.1a_2_1xCPR19.8Gbps_MA	1	AHEGB	1	0,88	4Tx/4Rx
1LG4	LG	1LG4_5.1a_2_1xCPR19.8Gbps_MG	1	AHEGB	3	0,57	4Tx/4Rx

Configuration building example 2

AirScale Configuration building

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
LTE	700	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
WCDMA/LTE	2100	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R/2T2R	3xRRH 2T2R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 4T4R	3xRRH 2T2R
LTE	2600	1+1+1	LTE BW: 20 MHz	4T4R	3xRRH 4T4R

Find RF unit

Band	3GPP band number	RFM / RRH	Unit	Power	SBTS MSR mode	Standalone NB-IoT support	RF type	Sales Item code	Optical Connectivity
2600	7	RRH	AHHB	4x40W	no	yes	4Tx/4Rx	474252A	CPRI

Configuration building example 2

AirScale Configuration building

RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
LTE	700	1+1+1	LTE BW: 10 MHz	2T2R	3xRRH 2x2T2R
WCDMA/LTE	2100	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R/2T2R	3xRRH 2T2R
GSM/LTE	1800	2+2+2/1+1+1	LTE BW: 20 MHz	1T2R / 4T4R	3xRRH 2T2R
LTE	2600	1+1+1	LTE BW: 20 MHz	4T4R	3xRRH 4T4R

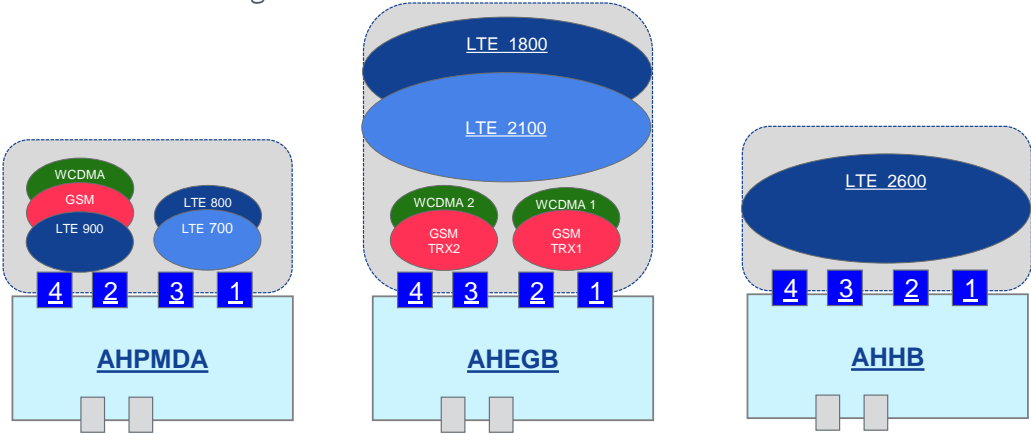


Find RF cel set

RF set ID	RF mode	RF set	No. of RF units	Supported RF units
1L4	LTE	1L4_5.1_1_2xCPR19.8Gbps_M	1	AHHB

Configuration building example 2

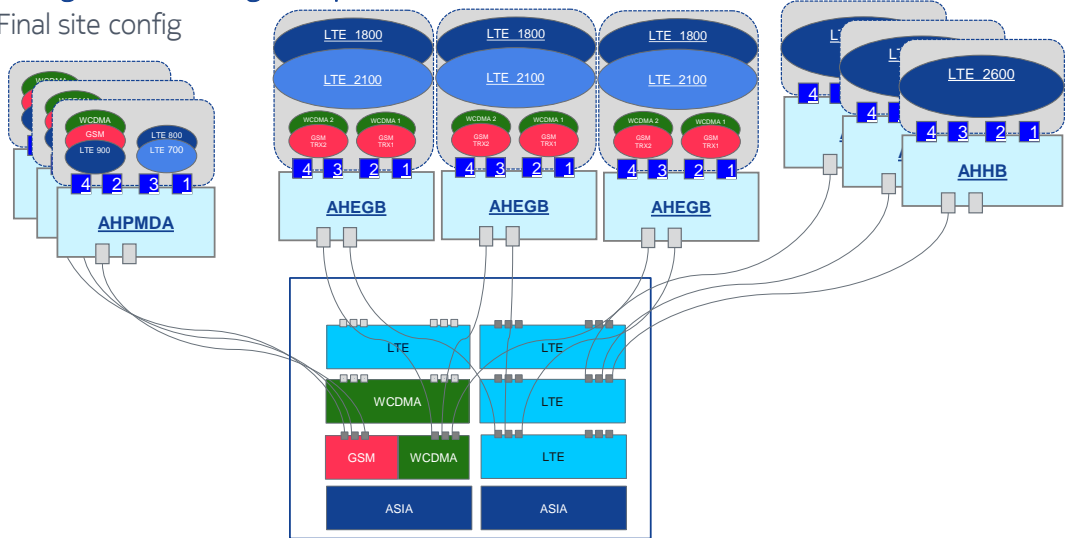
Detailed sector configuration



Note: To make the picture clearer the numbering order of antenna ports on AHPMDA has been changed.

Configuration building example 2

Final site config



EXERCISE

Trainer gives an example site configuration for which the participants have to find the BB and RF cell sets.

Example exercise:

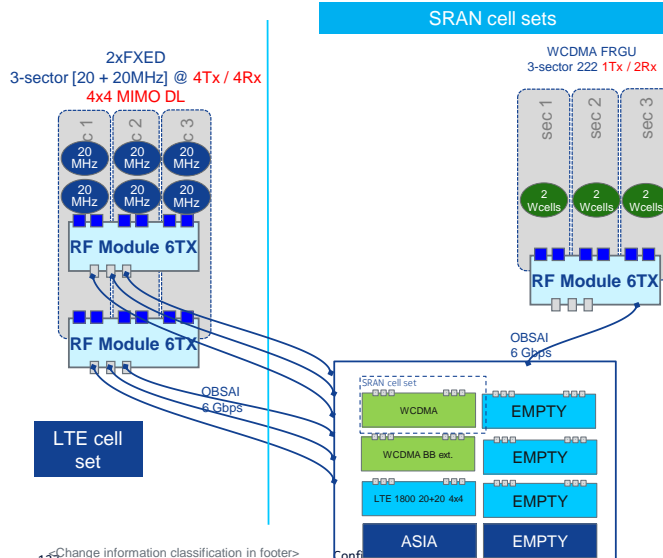
RAT	Band	Sector configuration	Sector capacity details	MIMO mode	RF type
WCDMA/LTE	2100	2+2+2/1+1+1	LTE BW: 5 MHz	1T2R/2T2R	1xRFM 6T6R
LTE	2600	1+1+1	LTE BW: 20 MHz	4T4R	3xRRH 4T4R
LTE	700	1+1+1	LTE BW: 5 MHz	2T2R	3xRRH 2x2T2R
LTE	800	1+1+1	LTE BW: 5 MHz	2T2R	
GSM/WCDMA/LTE	900	2+2+2/1+1+1/1+1+1	LTE BW: 5 MHz	1T2R / 1T2R / 2T2R	

SRAN 19

AirScale example configurations

UMTS 2100	2 carriers
LTE 1800 (20+20)	4T4R

2-RAT AirScale full configuration example

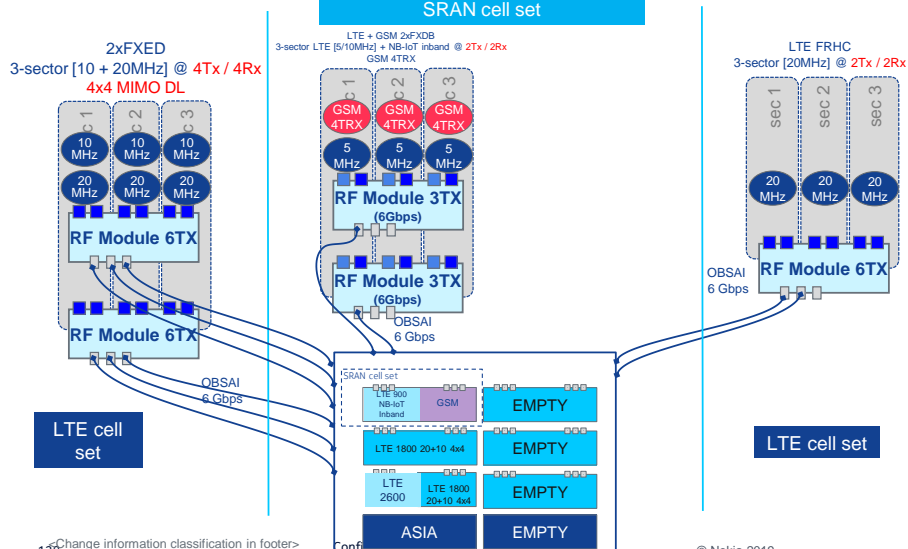


127 change information classification in footer

© Nokia 2019

2-RAT AirScale full configuration example

GSM	4TRX
LTE 900 (10)	2T2R
LTE 1800 (20+10)	4T4R
LTE 2600 (20)	2T2R

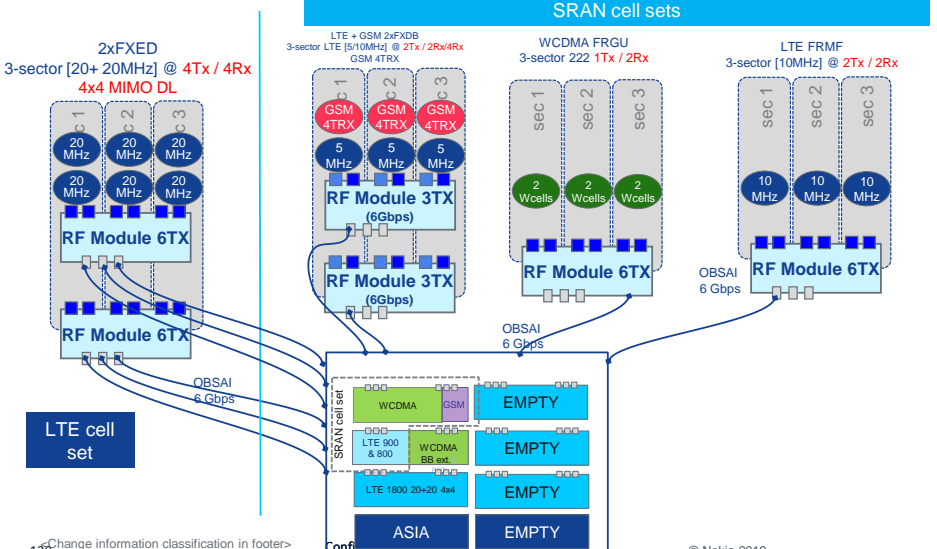


128 Change information classification in footer

© Nokia 2019

3-RAT AirScale full configuration example

GSM	4TRX
UMTS 2100	2 carriers
LTE 800 (10)	2T2R
LTE 900 (10)	2T2R
LTE 1800 (20+20)	4T4R



129 change information classification in footer-

Confidential

© Nokia 2019

A large, solid blue rectangular area occupies the upper half of the page. In the center of this rectangle, the word "NOKIA" is written in a bold, white, sans-serif font.

NOKIA