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Flexi SRAN BTS Hardware and Configurations

SRAN 18SP

RA23320-V-18SP

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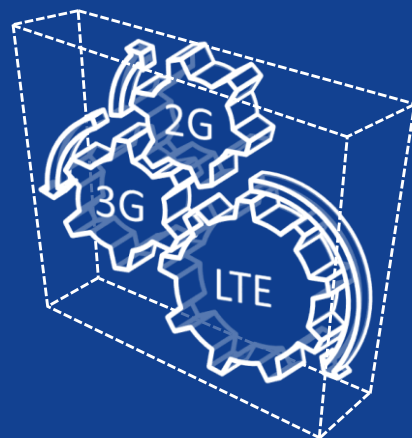
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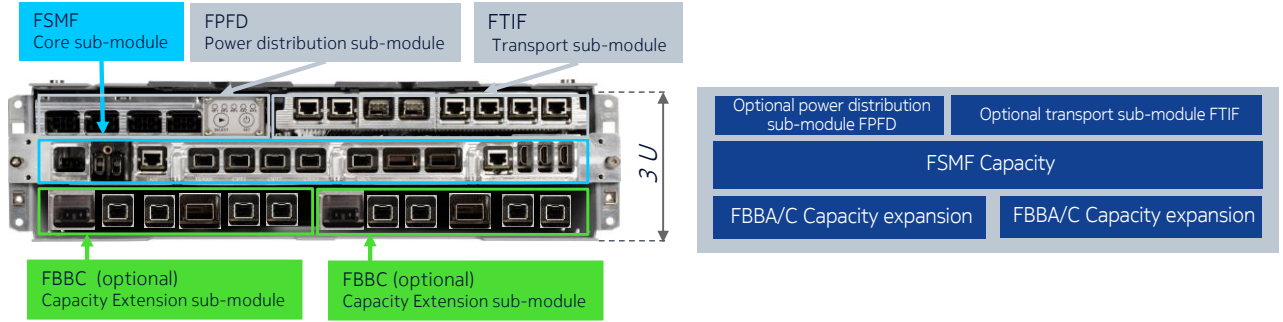
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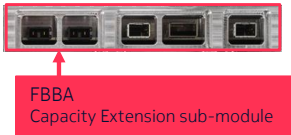


SBTS 18SP Supported Hardware System Modules

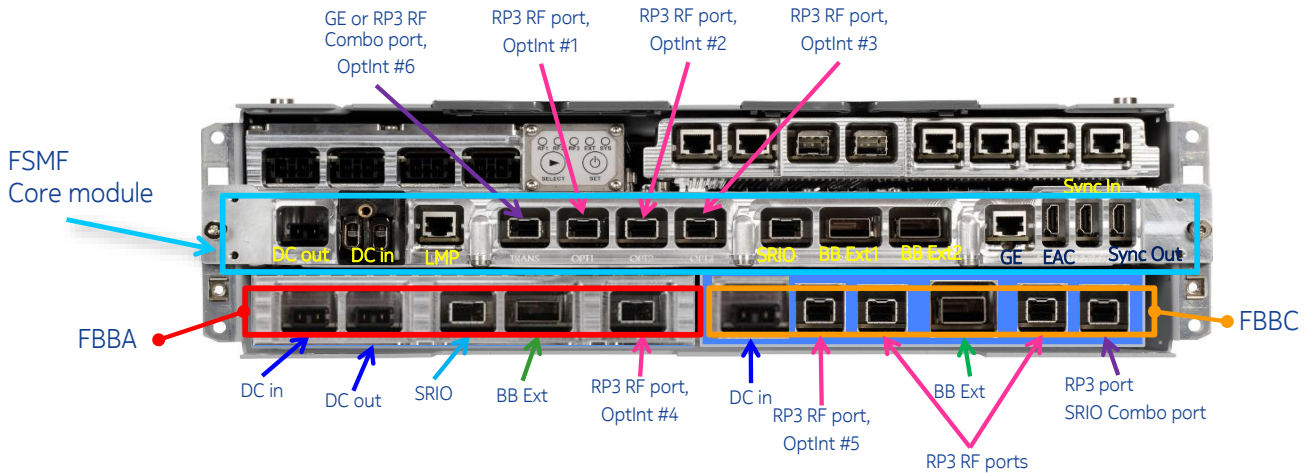
FSMF Flexi Multiradio 10 System Module - general overview



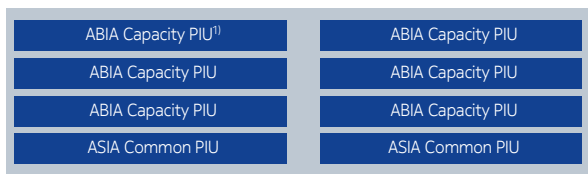
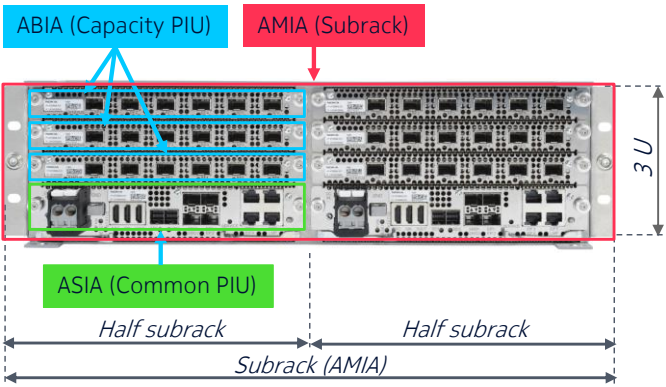
FBBA Capacity Extension sub-module can be plugged-in instead of FBBC(s):



FSMF Flexi Multiradio 10 System Module - Interfaces



AirScale System Module - general overview



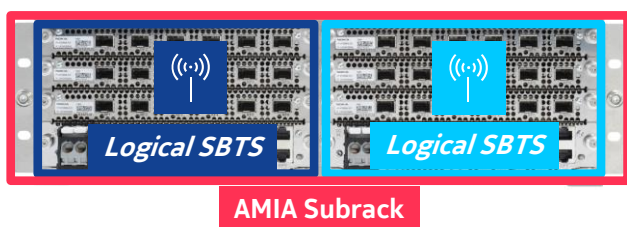
¹⁾ PIU – Plug In Unit

Plug-in (ABIA, ASIA) and subrack AMIA codes XYZ:

- A: AirScale platform products
- X: unit type (B=capacity, S=core or common functions, M=subrack)
- Y: I for indoor
- Z: describes version, end-user visible change in functionality, new letter in alphabetical order

AirScale System Module – two logical SBTSs in one AMIA Subrack

- In SBTS18 each half subrack constitutes one logical SBTS (SBTS, FDD-eNB or TDD-eNB)
- Logical SBTS is defined by unique BTS Site ID, own transport termination and own Site Configuration File (SCF)
- In SBTS 18SP full subrack configurations as one SBTS is supported.



Expandable capacity:

- Fig.1: Half Subrack (left hand side)



- Fig.2: Half Subrack (right hand side)

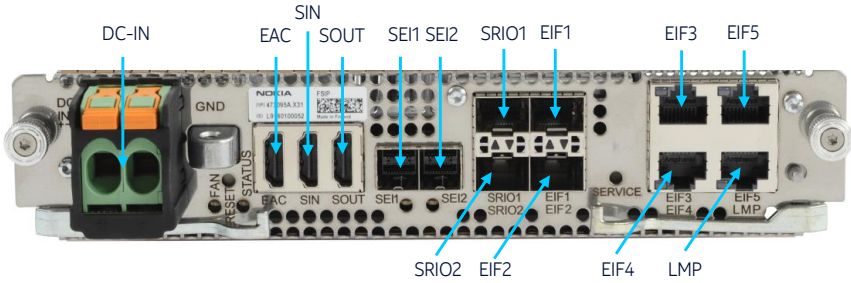


- Fig.3: Full Subrack¹⁾
One SBTS with 2xASIA or each half rack constitutes one logical SBTS



¹⁾ In SBTS18, full subrack configuration is seen as two logical SBTSs, each composed of half subrack. In 18SP, full subrack is also supported as one logical SBTS.

AirScale Common ASIA plug in unit Interfaces



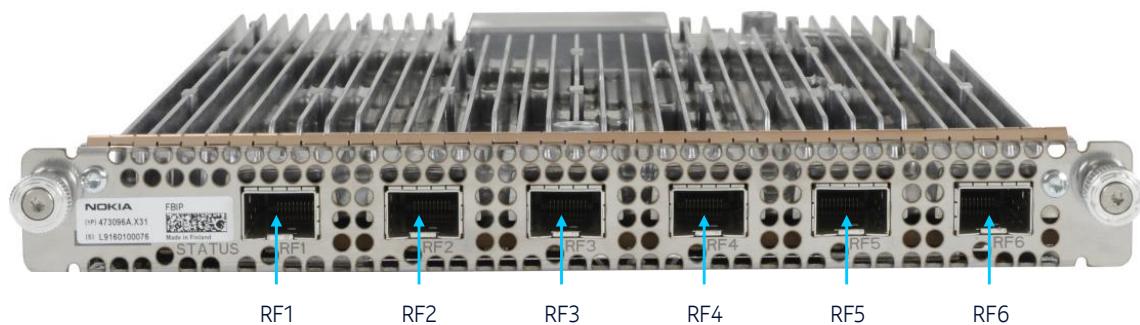
- Common plug-in unit:
- Centralized control processing
 - Up to 2 units in one Subrack for independent Base Stations or high capacity configurations
 - Integrated Ethernet transport termination per Subrack side
- Connectivity to:
- Transport (*EIF*)
 - External System Module Extension
 - AirScale SM Subrack (*SEI*)
 - Flexi Multi Radio 10 SM (*SRIO*)

Port #	Physical I/F	Usage
2	SFP+	1/10GE optical or 1GE electrical transport
3	RJ45	1GE electrical transport
2	MiniSAS-HD	Subrack extension, 2x 10GE
2	SFP+	Rapid IO connection for Flexi Multi Radio 10
1	DC terminal	-48V DC Input
1	HDMI	External alarm & control, 6 alarms, 6 alarms/ctrls
1	HDMI	Synchronization input, GPS interface
1	HDMI	Synchronization output

Port #	Physical I/F	Usage
1	RJ-45	Local management port, 1G Ethernet
14		Visual indication of status
2		Plug-in unit RESET, with several scenarios

AirScale Capacity ABIA plug in unit

Interfaces



Capacity plug in unit:

- Cell specific baseband processing
- Up to 6 PIU in Subrack for flexible expansion of BTS baseband capacity
- RF Module connectivity
 - 6 x OBSAI/CPRI up to 9.8 Gbps
 - 3 out of 6 CPRI interfaces support IQ compression

AirScale Subrack AMIA

Overview

AMIA subrack



AMIA Subrack:

- Indoor (IP20)
- Housing
- Fans
- Backplane inter connection for high-speed signals and power

AMOB Optional outdoor casing



Outdoor Casings

- IP 65 protected
- Can be used when AirScale SM Indoor is installed outdoors

SBTS 18 Supported Hardware Radio Modules

Supported RF units

New in SRAN18/18SP

Band	3GPP band number	Unit	Power	DL Bandwidth [MHz] Filter DL UL Bandwidth	Instantaneous Bandwidth [MHz]	Standalone NB-IoT support	Rel. HW family	RF type	Optical Connectivity	GSM dedicated mode	WCDMA A dedicated mode	LTE dedicated mode	GSM-WCDMA RFS	GSM-LTE RFS	WCDMA-LTE RFS	GSM-WCDMA-LTE RFS	FSM r4 Airscale (since SBTS 17A)
1800/2100	1/3	AHEGA	2x80W	75/60 75/60	75 / 60	yes	5.1_2	2T4R	CPRI	yes	yes	yes	no	yes	yes	no	yes (only)
900	8	AHDB	2x80W	26 26	26	yes	5.1_1	2T4R	CPRI	yes	yes	yes	yes	yes	yes	yes	yes
1900/2100	25/66	AHFIB	4x40W/4x40W	65/70 65/70	65/70	yes	5.1a_2	4T4R	CPRI	yes	yes	yes	yes	yes	yes	yes	yes (only)
1800	3	AHED	2x80W	55 55	55	yes	5.1_3	2T4R	CPRI	yes	no	yes	no	yes	no	no	yes
1800	3	AHEB	4x40W	75 75	75	yes	5.1_1	4T4R	CPRI	yes	no	yes	no	yes	no	no	yes
2100/1800	1/3	AHEGB	4x40W/4x40W	60/75 60/75	60/75	yes	5.1a_2	4T4R	CPRI	yes	yes	yes	no	yes	yes	no	yes (only)
1800	3	AHEC	2x80W	55 55	55	yes	5.1_3	2T4R	CPRI	yes	no	yes	no	yes	no	no	yes
700/800/900	B8/B20/B28	AHPMDA	240W	35/30/30 35/30/30	35/30/30	yes	5.1_2	2x2T2R	CPRI	yes	yes	yes	yes	yes	yes	yes	yes
2600	7	AHHB	4x40W	70 70	70	yes	5.1_1	4T4R	CPRI	no	no	yes	no	no	no	no	yes (only)
700/600	12(17)/71	AHLOA	4x60W	16(11)/35 16(11)/35	16(11)/35	no	5.1a_2	4T4R	CPRI	no	no	yes	no	no	no	no	yes (only)
1900/2100	2/66	AHFIC	4x40W/4x60W	60/70 60/70	60/70	yes	5.1a_2	2x4T4R	CPRI	no	no	yes	no	no	no	no	yes (only)
700	28	AHPB	4x80W	45 45	45	yes	5.1a_2	4T4R	CPRI	no	no	yes	no	no	no	no	yes (only)
1900/2100	2(25)/66	AHFIA	4x20W/4x20W	16(65)/70 16(65)/70	60(65)/70	yes	5.1a_2	4T4R	CPRI	no	no	yes	no	no	no	no	yes (only)
700/700	12/14	AHLBA	4x40W/4x40W	16/10 16/10	16/10	yes	5.1a_2	4T4R	CPRI	no	no	yes	no	no	no	no	yes (only)
850/700	5/13	AHBCC	4x40W/4x40W	25/10 25/10	25/10	yes	5.1a_2	4T4R	CPRI	no	no	yes	no	no	no	no	yes (only)

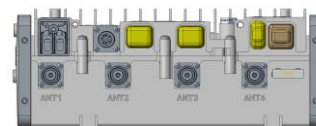
AHEB - AirScale RRH 4T4R B3 160W (LTE2784)

Technical Details

Technical description	
Name	Remote Radio Head
Variant	AHEB
Product code	473484A
Supported power levels	40 W and configurable with 0.1 dB intervals
Fr Unit Operating band	UL: 1710 - 1785 MHz DL: 1805 - 1880 MHz 3 GPP Band 3
Instantaneous Tx & Rx BW	75 MHz
MCPA nominal output power	40W
Number of pipes	4
Number of optical interfaces	2 x CPRI
Max optical link throughput	9.8 Gbps



Weight : 15 kg
-40 to +55 °C
IP65
DC- min 18/28V
AC : 90-264V
max 32/54V,



Typical configurations		
No of RMs	Antenna Cabling	No of Sectors
1 x RRH	M type (4TX&4RX)	1
3 x RRH	M type (4TX&4RX)	3

- One sector RRH is able to support up to 4*40W 4TX MIMO

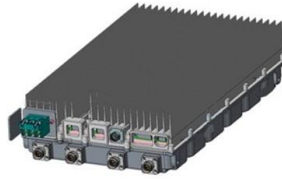
AHEGA- AirScale Dual RRH 2T4R B1/B3 240W (LTE314)

Technical Details

- HxWxD: 116*295320 mm
- Volume & Weight: 21 L max / 25 kg
- Environmental: -40 to +55 °C, cold start - 50 °C
- Protection class: IP65

Technical description

Variant / Product code	Flexi HW 5.1 AHEGA / 473995A
Operating band: multiband RRH	B1: UL (RX) 1920 - 1980 MHz DL (TX) 2110 - 2170 MHz B3: UL (RX) 1710 - 1785 MHz, DL (TX) 1805 - 1880 MHz
Nominal/Max output power	2x60 W + 2x60W or 2x80W + 2x40W in respect of each band
Supported power levels	5W-80W (one band only) or 5W-60W (multi-band), 0.1 dB steps
Tx/Rx Instantaneous bandwidth	2T4R : B1, B3 : 40MHz, 2T2R : B1 : 60MHz, B3 : 75MHz
Number of carriers and BW: LTE operation	B1, B3 : 3 carriers max (LTE only) B3 only : 1.4 MHz, 3 MHz B1, B3: 5 MHz, 10 MHz, 15 MHz, 20 MHz
Network interface	2 x optical CPRI @ 9.8 Gbit/s (Rate 7)..
RET support / AISG	AISG & BiasT control on TX/RX ports
External Alarms	4
Power supply /Consumption	740W



Connectors characteristics

RF	4 x coaxial 4.3-10
External Alarms	1 x MDR 26
AISG / IEC 60130-9 - Ed. 3.0 compliance	1 x DIN circular 8 pins
Power Supply	1 x DC Screw In Connector

- Supports one sector with output power up to **2*60W 2TX MIMO** per band
- Supports power sharing where one band can be configured up to 80W/TX while other band is 40W per TX
- Support of modulation schemes up to QAM64 (UL)
Support of modulation schemes up to QAM256 (DL)
- I/Q compression is supported for 15,20 MHz LTE; Sampling rate conversion for 20MHz only
- Integrated multiband PIM Cancellation across all bands to address triple tone and dual tone cases.

AHEGA- AirScale Dual RRH 2T4R B1/B3 240W (LTE3140)

Benefits and Gains

Band Name	Total spectrum	Uplink [MHz]	Downlink [MHz]	2TX RFM	3TX RFM			6TX RFM	2TX RRH			4TX RRH		DAS	Flexi Metro 2TX	RAS/ Active Antenna	
1	2100	2x60 MHz	1920 - 1980	2110 - 2170		FRGP	FRGT/FRGS	FRGX	FRGU		FRGQ/FRGV	FRGY	FRGB			FHGA	FASC
											UHGA	UHGB	FHGB				
											AHEGA						
											FHEA/FHEG	FHEF	FHEH			FHEI	FASC
3	1800	2x75 MHz	1710 - 1785	1805 - 1880		FXEA/FXEB	FXEE	FXEF	FXED		UHED	UHEA	UHEF			FHEE	
											UHEE	AHED	AHEGA				
													AHEB				

→ Multi band RRH

- 2x 2*60W 2TX MIMO
- IQ compression

Feature Number	Variant	System Release	3GPP Band	Max output power per TX (@ EAC)	Supported Power levels (W)	RX/TX Band (MHz)	Carriers IBW (MHz)	BB Interface
3140	AHEGA	FDD-LTE18	B1/B3	60w or 80W	5W - 60W with 0.1dB steps	B1:1920-1980 2110-2170 MHz B3: 1710-1785 1805-1880 MHz	2T4R : B1&B3 : 40MHz, 2T2R : B1 : 60MHz, B3 : 75MHz	2 x CPRI 9.8 Gbits/s

- > AirScale Dual RRH is a multiband RRH with two transmitters and four receivers for 3GPP Band 1 & 3
- > Supported radio technologies by RF HW: LTE FDD (Band 1 and 3)
- > The RRH supports one sector and two bands simultaneously with up to 2x60W output power at the antenna connector per band when equally distributed between bands.
- > Supports power sharing where one band can be configured up to 80W/TX while other band is 40W per TX

AHPMDA - AirScale RRH 2T2R 700/800/900 240W (LTE 3142)

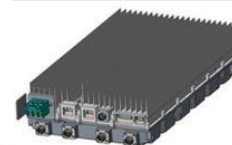
Technical Details

Technical description

Variant / Product code	Flexi HW 5.1 AHPMDA/473997A
Operating band: multiband RRH	B8: UL (RX) 880 MHz – 915 MHz, DL (TX) 925 MHz – 960 MHz B20: UL (RX) 832 MHz – 862 MHz, DL (TX) 791 MHz – 821 MHz B28: UL (RX) 703 MHz – 733 MHz, DL (TX) 758 MHz – 788 MHz
Nominal/Max output power	2x120W per band if only one band Max power 240W shared between bands
Supported power levels	0,1W- 60W with 0.1dB steps per pipe
Tx/Rx Instantaneous BW	B8: 35 MHz, B20 : 30 MHz, B28 : 30 MHz
Number of carriers and BW: LTE	B8 : max 2 carriers + 8 GSM carriers per pipe 1.4 MHz, 3 MHz, 5 MHz, 10 MHz B20, B28: max 3 carriers per pipe B20 : 5 MHz, 10 MHz, 15 MHz, 20MHz B28: 3MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
Network interface	2 x optical SFP CPRI @ 9.8 Gbit/s (Rate 7)..
RET support / AISG	AISG & BiasT communications on ANT1 & 3
External Alarms	4
Power supply /Consumption	-48 V DC /ETSI Busy Hour



- HxWxD:
- <21 liters, <20 kg
- Environmental: -35 to +55 °C, cold start -40 °C
- Protection class: IP65



Connectors characteristics

RF	4 x coaxial 4.3-10 Band 28 & 20 : Port 1 & Port 2 Band 8 : Port 3 & Port 4
External Alarms	1 x MDR 26
AISG / IEC 60130-9 - Ed. 3.0	1 x DIN circular 8 pins
Power Supply	1 x one DC Screw In Connector+ Compatible with optional FPAA power

- Support of modulation schemes up to QAM64 (UL)
- Support of modulation schemes up to QAM256 (DL)
- Supported radio technologies by RF HW: FDD LTE (Band 8,20, 28), WCDMA B8 and LTE+GSM Band 8
- I/Q compression is supported for 10 MHz LTE

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AHPMDA - AirScale RRH 2T2R 700/800/900 240W (LTE 3142) Benefits and Gains

Band Name	Total spectrum	Uplink [MHz]	Downlink [MHz]	2TX RFM	3TX RFM	6TX RFM	2TX RRH	4TX RRH	DAS	Flexi Metro 2TX	RAS/ Active Antenna
8	900	2x35 MHz	880 - 915	925 - 960	FXDA/FXDB FXJB FXDJ FXDD		FHDB FHDA AHPMDA FHDB AHPMDA			FHDG	FASC
20	800EU	2x30 MHz	832 - 862	791 - 821	FRMA FRMD	FRMC FRME FRMF FRSA	FRMB UHMA UHMB AHPMDA				FASC
28	APT700	2x25 MHz	703 - 738	758 - 794		FRPA/FRPB FRPD	FRPC FRPD AHPMDA	AHPB			FASB FASC

→ Tripleband RRH

Feature Number	Variant	System Release	3GPP Band	Max output power per TX (@ EAC)	Supported Power levels (W)	RX/TX Band (MHz)	Carriers IBW (MHz)	BB Interface
3142	AHPMDA	FDD-LTE 18	B8/B20/B28	60W	0,1 to 60W (0,1dB steps)		B12: 16 MHz B71: 35 MHz	2 x CPRI 9,8 Gbits/s

- > AHPMDA AirScale Triple band RRH 2-pipe 700/800/900 has 2 Power Amplifiers enabling it to support one sector and three bands simultaneously with up to 2x120W output power shared between bands in 2TX MIMO at the BTS antenna connectors (TX for 700 and 800 bands are combined into same TX ports, TX for 900 is separate)
- > AHPMDA is RRH optimized for distributed macro BTS installations
- > Full band operation in 3GPP FDD bands 8, 20 and 28,
- > Flexible deployment option: Mounting schemes: Pole, Wall, Book, RAS
- > Power Sharing across all three bands
- > Integrated Triple Band PIM Cancellation cancels 3rd and 5th order passive intermodulations between bands combined to the same ports.

SBTS 18 supported configurations

From profiles to cell sets

Improved BTS configuration concept

From Profiles to Cell Sets

Technical Details

SRAN 16.x

- Fixed configurations described by profiles
- Profile defines configuration on BTS level
- Profiles have (too) detailed information about the maximum system module HW, radio HW setup, OBSAI cabling, baseband allocations, RAT multiplexing rules in the fiber.
- Therefore even small configuration changes require new profile
 - Means additional test effort, often even coding effort.
 - Limited number of configurations released, while hundreds are needed.
 - Higher effort on site migration from legacy RAT to SRAN



SRAN 17 onwards

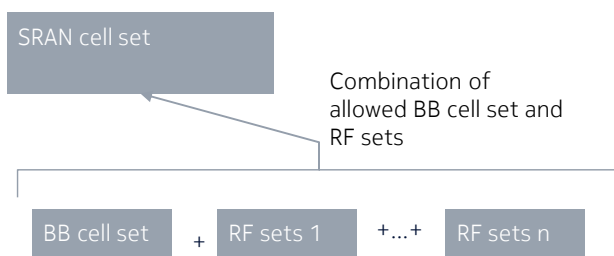
SBTS Configuration „Cell Set” approach:

- 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
- 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
- Much easier migration from single RAT to SRAN

Why we need Cell Sets? – Logic behind...

What configuration is 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, are independent and can be combined together to achieve full configuration
- There is no direct indication about particular cell sets in the SW code (like SBTS profile in SRAN16.x)
- SW has to provide capacity and performance at least as it is described by the cell sets



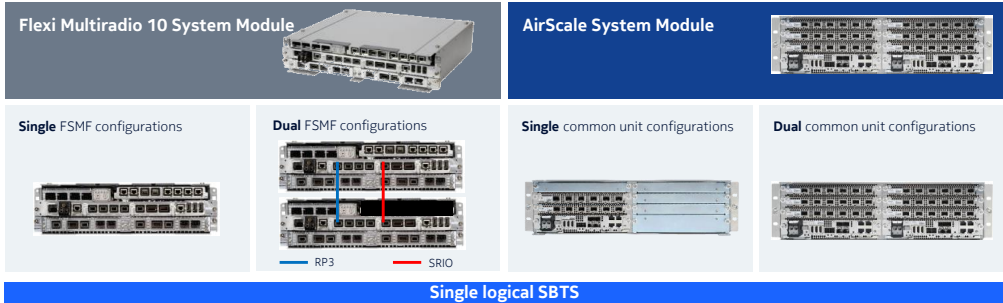
Note:

- RF set → radio configuration
- BB cell → baseband configuration

FMR10 and AirScale

SBTS 18 supported SM configurations

SBTS supported SM configurations roadmap



SRAN_SW

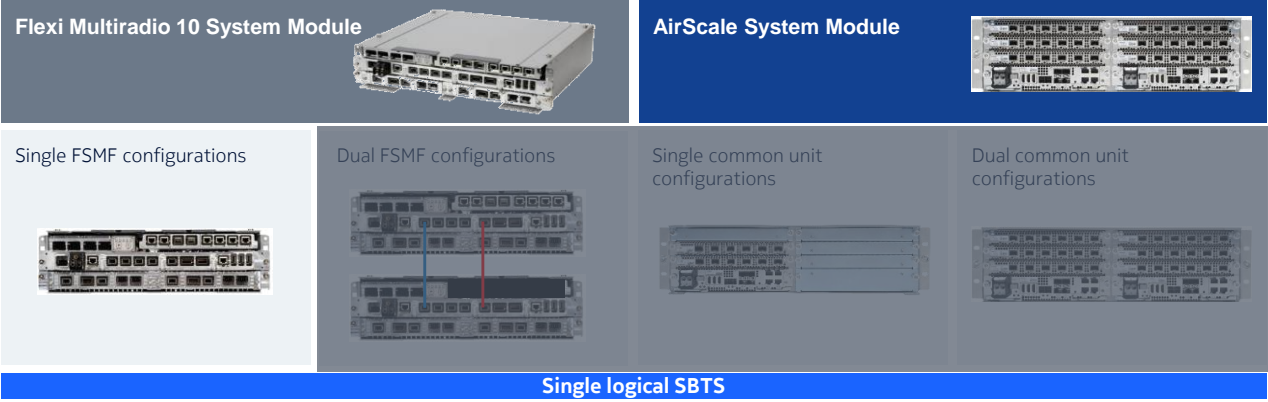
	Single logical SBTS			
16.10	✓	✓	-	-
17A	✓	-	✓	-
17A MP1	✓	✓	✓	✓
18	✓	✓	✓	-
18 SP and future	✓	✓	✓	✓

General availability (G5)

- 10/16
- 1/18
- 4/18
- 5/18
- 8/18

SBTS 18SP System Modules for supported configurations FSMF

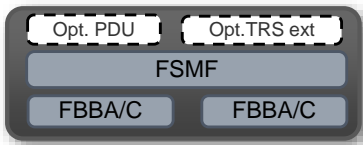
SBTS 18 SM hardware



FSMF

BB HW capabilities Single FSMF (SR001732, SR001017, SR001826)

Flexi Multiradio 10 SM:



Legend:

- FSP → Flexi Signal Processing board
- SU → Sub Units
- RCS → Reduced Cell Set
- BCS → Basic Cell Set
- ECS → Extended Cell Set

Note: BB cell sets as well as capacity figures for each RAT are defined by:

- SR001732** SRAN 17A SBTS cell sets on FSMF
- SR001017** SBTS support for 36 TRX
- SR001826** Additional cell sets for FSMF

BB capacity:

#SM	FSP	GSM*	WCDMA	LTE	GSM/WCDMA	GSM/LTE	WCDMA/LTE	GSM/WCDMA/LTE
FSMF	FSMF	36TRx	5.5SU	1BCS	24TRxs/3.5 SU 36TRxs/2.5 SU	24TRx/1RCS	-	-
	FBBA/C	-	6SU	1BCS	-	-	6SU or 1BCS	-
	FSMF+FBBA/C	36TRx	11.5SU	2BCS or 1ECS	24TRx/9.5 SU 36TRx/14.5 SU	24TRx/1RCS+1BCS	5.5SU/1BCS	24TRx/ 5.5 SU/1RCS 24TRx/3.5SU/1BCS
	FSMF+2xFBBA/C	36TRx	17.5SU	3BCS	24TRx/15.5SU	24TRx/1RCS+1ECS 36TRx/2BCS	11.5SU/1BCS 5.5 SU/2BCS	24TRx/11.5 SU/1RCS 24TRx/5.5SU/1RCS+1BCS 24TRx/3.5SU/2BCS

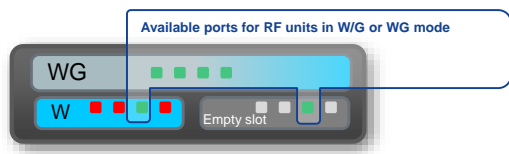
***Please note:** GSM RAT can be allocated on FSMF core card only

FSMF

Definition of SRAN BB cell set

Example of BB cell set:

B1FWG_1+B



24 TRX + 9.5SU

Note:



BB cell set characteristic

Supported RAT (baseband processing resources)	FSMF	WCDMA + GSM
	FBBC	WCDMA

Capacity	#SM	FSP	GSMT	WCDMA	LTE	GSMT/WCDMA	GSMT/LTE	WCDMA/LTE	GSMT/WCDMA/LTE
	FSMF	FSMF	36TRx	5.5SU	1BCS	24TRx/3.5 SU 36TRx/2.5 SU	24TRx/1RCS	-	-
FBBA/C		-	65U	BCS or 1ECS	-	-	65U or 1BCS	-	-
FSMF+FBBA/C		36TRx	11.5SU	3BCS	24TRx/9.5 SU 36TRx/14.5 SU	24TRx/1RCS+1BCS	5.5SU/1BCS	24TRx/5.5 SU/1RCS 24TRx/3.5SU/1BCS	-
FSMF+2xFBBA/C		36TRx	17.5SU	3BCS	24TRx/15.5SU	24TRx/1RCS+1ECS 36TRx/2BCS	11.5SU/1BCS 5.5 SU/2BCS	24TRx/11.5 SU/1RCS 24TRx/5.5SU/1RCS+1BCS 24TRx/3.5SU/2BCS	-

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 FBBA/C is installed for connectivity purposes</p>
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Parity with LTE18 new radio configurations (SR001708)

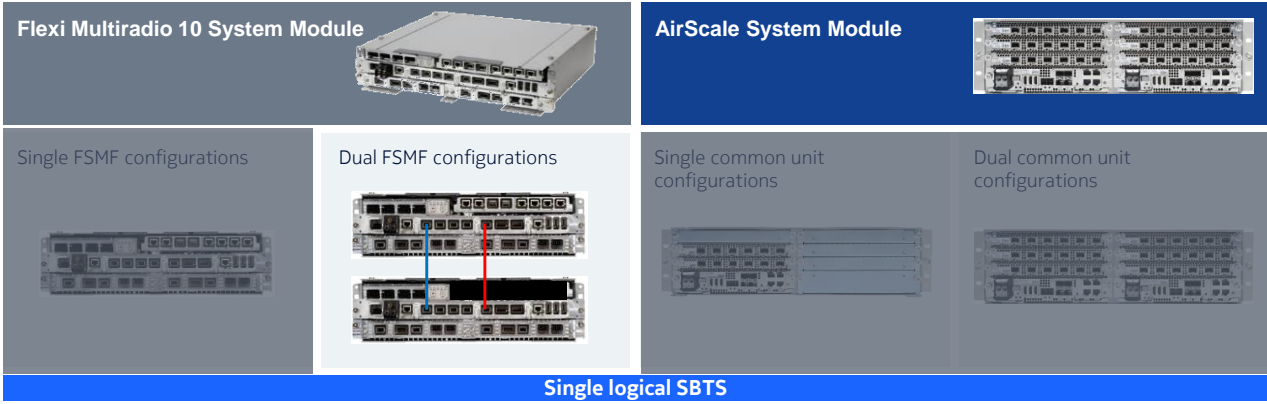
LTE3224 4Rx diversity 10 MHz optimized configurations

- Before LTE3224 LTE FSMr3 basic cell set supported up to 3 cells 2T4R 5/10MHz
- This feature allows for up to 6 2T4R LTE 5/10MHz cells support in one LTE FSMr3 basic cell set
- Consequently it's possible to have up to 3 2T4R LTE 15/20MHz cells in one FSMr3 basic cell set
- It's also possible to have up to 18 LTE cells in one Flexi Multiradio 10 System Module BTS.
- The feature is licensed and has to be activated during commissioning via [actOptimizedBbUsage](#) parameter under LNBTS manager object.

initially planned also LTE3709 AirScale Nokia CPRI Radio FDD configurations with Flexi MR 10 SM and LTE4235 FDD mixed Tx/Rx configuration with AirScale SM)

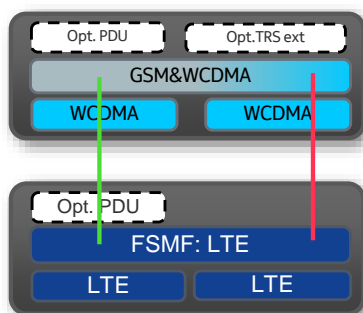
SBTS 18SP System Modules for supported configuration FSMF+FSMF

SBTS 18 SM hardware



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

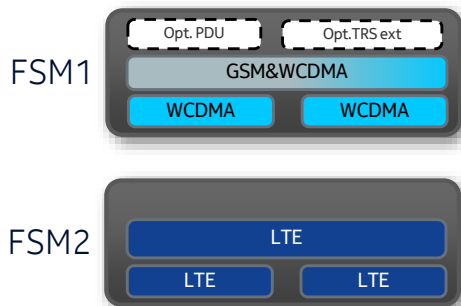
BCS=basic cell set, ECS=extended cell set, RCS=reduced cell set

The FSMFs are inter-connected via:

- one mandatory optical SRIO link (between the SRIO interface ports), supporting RP1/RP2 and low latency data interconnection;
- one optical OBSAI link (between RF/EXT ports), which is mandatory for IQ data routing if the RMs connected to the FSMF2 are used for LTE-GSM or LTE-WCDMA RAN sharing;
- one synchronization link, which can be: HDMI (connected to Sync-Out HDMI port of FSMF1, Sync-In HDMI port of FSMF2) or 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.

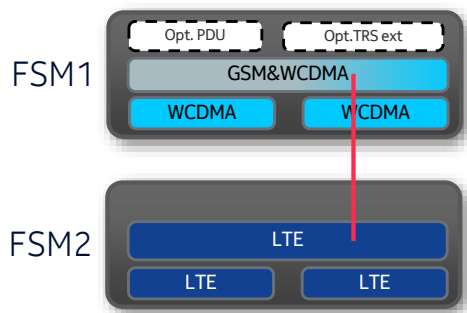
Support of FSMF + FSMF with SRAN configurations

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".

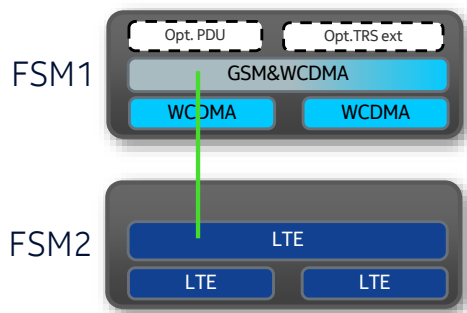
Support of FSMF + FSMF with SRAN configurations SRIO interconnection



- 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

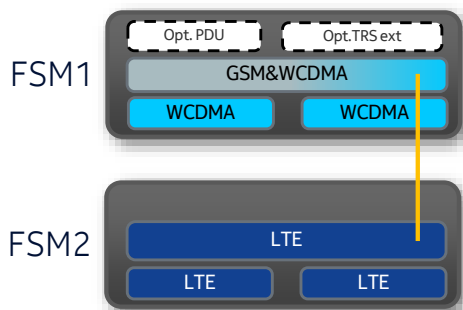


- Optical OBSAI link (between RF/EXT ports), is mandatory for IQ data routing if the RMs connected to the FSM2 are used for LTE-GSM or LTE-WCDMA RAN sharing;
- The OBSAI link, when present, may use the RF/EXT ports of the FSMF (1-3 or 6)
- Any RF set* can be combined with 2xFSMF BB cell set, by taking 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:

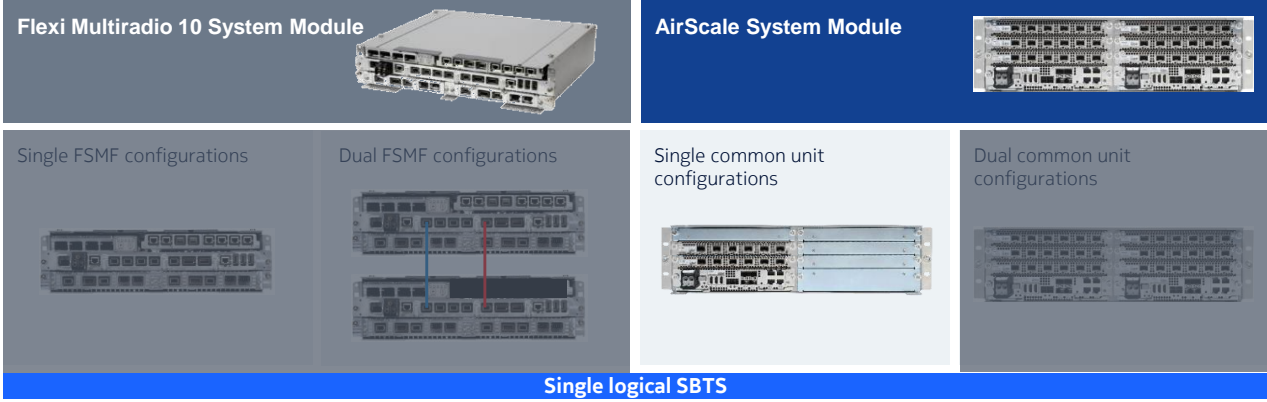
- HDMI (connected to Sync-Out HDMI port of FSMF1, Sync-In HDMI port of FSMF2)
- Optical

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 18SP System Modules for supported configuration AirScale

SBTS 18 SM hardware



AirScale

Baseband allocation with AirScale SM (SR001626, SR001827)

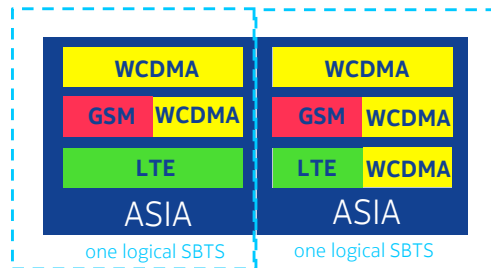
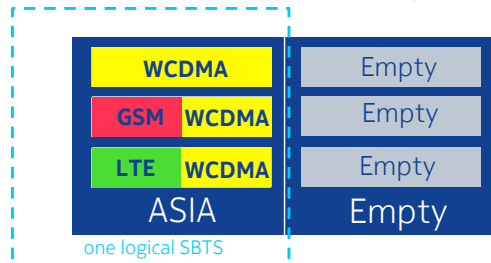
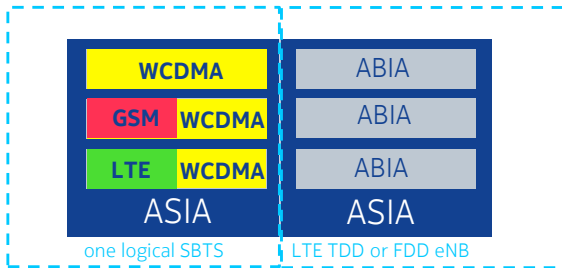
Baseband allocation examples:

AirScale System Module can be used as:

- Two logical SBTSs in full subrack
- One logical SBTS and one LBTS (LTE TDD or FDD) in full subrack
- One logical SBTS in half subrack

General rules:

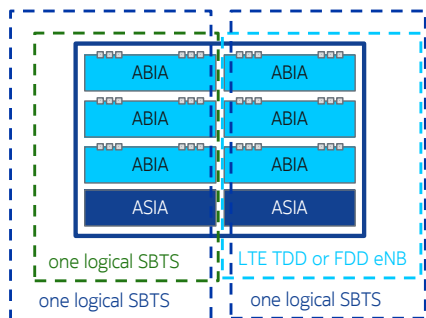
- **GSM** can be allocated only on one ABIA in whole SBTS
- One BB cell set with **WCDMA** per half subrack is possible



SR001626 SRAN 17A SBTS cell sets on Airscale

AirScale

BB HW capabilities (SR001626, SR001827)



Legend:

- FSP → Flexi Signal Processing board
- SU → Sub Units
- BCS → Basic Cell Set (e.g. up to 3x20MHz LTE 2x2 MIMO)
- ECS → Extended Cell Set (e.g. 6x20MHz LTE 2x2 MIMO)
- PCS → Packed Cell Set (e.g. 6x20MHz LTE 2x2 MIMO)
- DPCS → Dual Packed Cell Set (e.g. 6x20MHz LTE 4x4 MIMO)

Notes:

- PCS/DPCS – cell sets to be used with Baseband Pooling
- BCS/ECS – cell sets to be used without Baseband Pooling
- XL cell set (LTE) – cell set to be used without Baseband Pooling is also possible. For XL cell set 1,5 ABIA capacity is needed
- Instead of ECS, 2xBCSs are possible
- Instead of DPCS, 2xPCS are possible

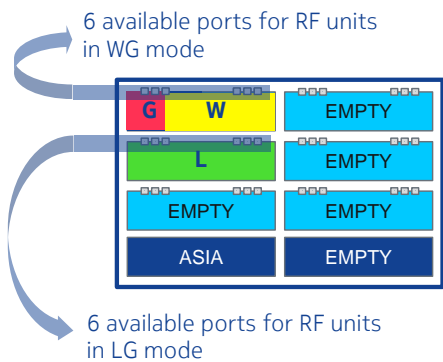
FSP	GSM	WCDMA	LTE	GSM/WCDMA	GSM/LTE	LTE/WCDMA
ABIA	24 TRXs or 36 TRXs	8 SU or 4 SU	1xBCS or 1xECS or 1xPCS or 1xDPCS	24 TRXs / 6 SU or 36 TRXs / 4 SU	24 TRXs/ 1x BCS or 24 TRXs/ 1x PCS or 36TRXs / 1x BCS or 36TRXs / 1x PCS	1x BCS / 4 SU or 1x PCS / 4 SU

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 / 1x BCS or 24 TRXs / 1x PCS or 36TRXs / 1x BCS or 36TRXs / 1x PCS
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 				

CNI-26582: Support of two logical SBTSs in AirScale full rack

Initially in scope of RP001621_2 SRAN cell sets allocation on full AirScale module – 2 logical BTSES

- Following SW versions are supported:

Sub-rack X : Sub-rack Y

SBTS17A : FL17A ----> To be supported

FL17A : SBTA17A -> To be supported

SBTS17A : SBTS17A -> To be supported

SBTS18 : FL18 -----> To be supported

SBTS18 : SBTS18 --> To be supported

SBTS17A : TL17 ----> covered by SR001624

TL17 : SBTA17A -> covered by SR001624

<https://jira3.int.net.nokia.com/browse/CNI-26582>

By shifting AS full rack support (what means one logical SBTS across 2xASIA) from SRAN17A to SRAN17A MP1 there was a need to secure two logical SBTS across 2xASIA to have possible workarounds to mitigate business impact in SRAN17A timeframe

Parity with LTE17A new CPRI related configurations (SR001904)

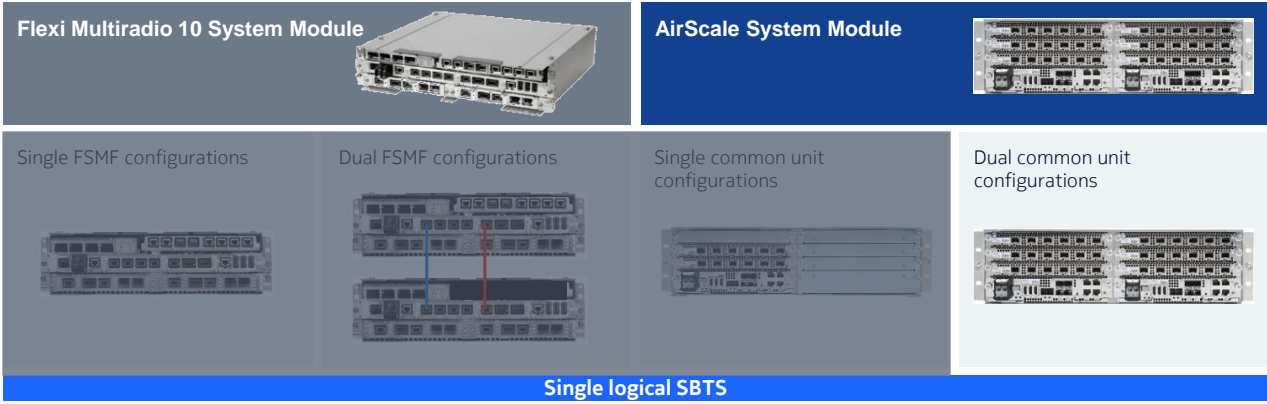
LTE2492 Support Cpri IQ Compression Function on AirScale System Module

- This feature introduces CPRI IQ compression for 15 and 20MHz LTE cells on Nokia CPRI 9.8Gbps link rate
- CPRI IQ compression calculation options are included in CPRI link calculator
- More information can be found in CPRI link calculator in Supported Configurations Excel

SBTS 18SP System Modules for supported configuration

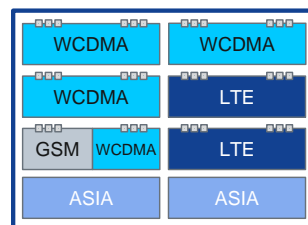
Fullrack AirScale

SBTS 18 SM hardware



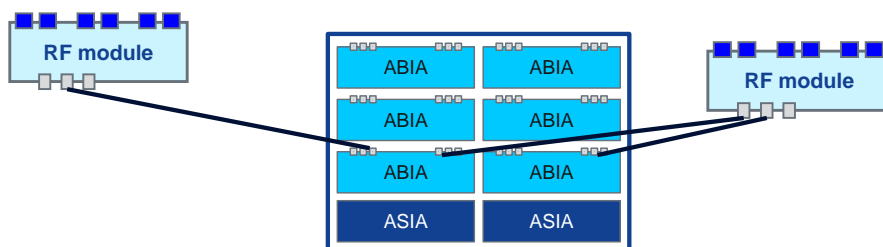
SR001621 SRAN cell sets allocation on full AirScale module

- Up to 6xABIA cards available for SRAN cell set allocation providing high capacity for sites.
- GSM can be allocated only on one ABIA unit, and this ABIA has to be connected to primary Common Unit.
- One ASIA card will be the „primary” unit
- No IQ data routing between ASIA Common Unit cards for all RATs (radio has to be connected to the ABIA on the same ASIA as its baseband resources, WCDMA PIC is not possible between two ASIA cards)



SR001621 SRAN cell sets allocation on full AirScale module

- Radios with LTE+GSM and/or WCDMA+GSM RF sharing can be connected to both halves of the AirScale at the same time which allows to process one RAT BB on the left side of AirScale and second RAT BB on the other side
- LTE+GSM and WCDMA+GSM RFs can be split;
- An RF is considered as **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.
- Each optical link will be dedicated to one RAT (WCDMA or LTE or GSM)



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RA23320-V-18SP

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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).

Radio Units

New features support with SBTS18/18SP

Support of additional dedicated LTE18 radios in SRAN (SR001695)

SRAN18 feature

LTE2784 AirScale RRH 4T4R B3 160W AHEB

LTE3140 AirScale Dual RRH 2T4R B1/3 240W AHEGA

LTE3142 AirScale Tri RRH 2T2R B8/20/28 240W AHPMDA

- Only LTE legacy configurations supported, so one band at a time despite AHEGA and AHPMDA support multiple bands at the same time.
- Feature extending configurations for AHEB/AHEGA/AHPMDA and other 5.1 HW rel. radio modules with all supported RATs is RP002054 in SRAN18SP.

CNI-26097_1: Support of SBTS-configurations with up to 23km fiber length between System Module and Radio

SRAN18 feature

- This CNI introduces support for up to 23km fiber length between System Module (FSMF or AirScale) and Radio Module from HW Rel. 2.1 onward, when actDistributedSite parameter in commissioning is set to TRUE. This applies to both dedicated RAT mode and multi-RAT radio configurations.
- Older Radio Modules still support up to 10km fiber length.
- No changes in chaining topology configurations – whole chain length can be up to 10km.

<https://jira3.int.net.nokia.com/browse/CNI-26097>

CUC requires to support fiber distances > 10km on SBTS for certain sites.

RP001548_1: SBTS support for new Radio Module Introduction

Umbrella SRAN18 feature

- This feature initially requested for Test Models/CPRI support for WCDMA&GSM/MSR mode multiband 5.1 HW rel Radio modules support, but finally it includes CPRI support only for LTE, LTE only mode for single- and multiband configurations with restrictions as in FL17A/FL18.
- Restrictions for multiband radios in SRAN18 are:
 - a. Not supporting setting VSWR major and minor thresholds per band
 - b. Not supporting handling of faults per band
 - c. Not supporting MHA

CNI-26909: CNI-23159 3.8MHz TX BW for WCDMA carrier support in SBTS for Narrow band refarming (WCDMA-GSM) inheritance to SRAN17A

SRAN18 feature

- Inheritance of CNI-23159 from SBTS17A MP1: 3.8/4.0/4.2/4.4 MHz TX/RX BW for WCDMA carrier supported in SBTS for Narrow band refarming (WCDMA-GSM) for Mera-based 850 and 900 Band modules.

<https://jira3.int.net.nokia.com/browse/CNI-26909>

CNI-23908: SRCR0027 Support of WCDMA 4.2MHz channel BW

SRAN18 feature

- FXDB and FHDB Rel2.3 MERA RF variants (900MHz band) support now WCDMA 4.2 MHz cell bandwidth in both UL and DL.
- Suboptimal use of spectrum and impact on KPIs if only 3.8MHz can be used.

<https://jira3.int.net.nokia.com/browse/CNI-23908>

The Support of 4.2Mhz carrier in WCDMA Downlink in 900Mhz bands is required by Orange for their refarming purpose.

SR002047 Parity with LTE radio configurations

SRAN18SP feature

This feature inherits LTE features related to radio configuration.

Following items are inherited:

- LTE3843 FDD LTE Basic Nokia CPRI Chaining Configuration with Airscale SM
- LTE4235 FDD mixed Tx/Rx configuration with Airscale SM
- LTE3753 Multiband Radio Configurations with AirScale System Module
- LTE3322 CDIU (CPRI-A Digital Interface Unit for CommScope DAS) integration with Nokia LTE System Module
- LTE3816 CPRI-A and Nokia CPRI support in the same ABIA for FDD LTE
- LTE3709 FDD BTS AirScale Radio configurations with Flexi MR 10 SM

Link to official icons in Nokia Brand Center:

<https://intranet.nokia.com/sites/brand/1/brandcenter/Nokia%20Brand%20Center>

Instructions:

https://intranet.nokia.com/sites/brand/1/brandcenter/nokia%20brand%20center/guidelines/nokia_graphic%20communications%20guidelines_v1.pdf

SR002039 Support of dedicated LTE radios in SRAN 18 SP

Following radios are included to SRAN in LTE only mode:

- LTE3848 AirScale Dual RRH 4T4R B5/13 160W AHBCA
- LTE3899 AirScale Dual RRH 4T4R B12/71 240W AHLOA
- LTE3421 AirScale Dual RRH 4T4R B25/B66a 160W AHFIA
- LTE3845 AirScale Dual RRH 4T4R B2/66a 320W AHFIC
- LTE3847 AirScale Dual RRH 4T4R B12/14 320W AHLBA
- LTE3849 AirScale Dual RRH 4T4R B5/13 320W AHBCC
- LTE3546 Flexi RRH 4-pipe 760 160W FRBI - (FSMF support)
- LTE3651 AirScale RRH 4T4R B28 320W AHPB
- LTE3137 AirScale RRH 4T4R B7 160W AHHB
- LTE3713 AirScale Micro 4T4R B7 20W AHHA
- LTE3708 Flexi RRH 4T4R B71 160W FHOA
- LTE3422 Flexi RRH 2T4R 2350 10W FRND
- LTE4118 AirScale RRH 2T4R B20 120W AHMA



Link to official icons in Nokia Brand Center:

<https://intranet.nokia.com/sites/brand/1/brandcenter/Nokia%20Brand%20Center>

Instructions:

https://intranet.nokia.com/sites/brand/1/brandcenter/nokia%20brand%20center/guidelines/nokia_graphic%20communications%20guidelines_v1.pdf

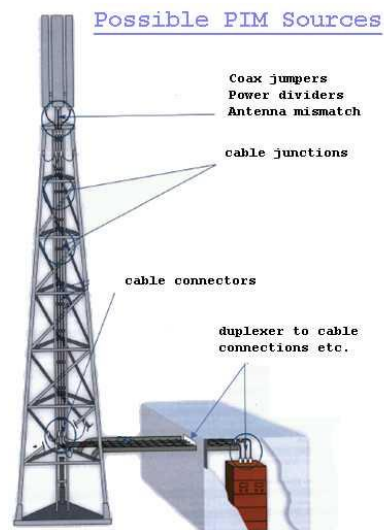
SR001928 SBTS support for LTE PIM Cancellation for AirScale 2.0 Radios

SRAN18SP feature

Passive InterModulation (PIM) is the unwanted signal or signals generated by the non-linear mixing of 2 or more frequencies in a passive (or linear) device such as a connector or cable. If those signals are falling on uplink channel/s receiver performance may suffer from major degradation. Broadband radios are vulnerable to PIM in particular with MIMO and multicarrier deployments.

PIM Cancellation algorithm correlates transmitted signal in the same antenna port with the received signal, detects the intermodulation distortion components and removes them from the received signal. PIM Cancellation is done by Digital Front End SoC so no additional BTS modules are needed.

The benefit for the operator is that standard antenna lines can be used for wide band deployments especially with RAN sharing and all the TX carriers can share the same antenna with RX.



NB-IoT configurations

Inband & Standalone modes

Inband NB-IoT cells configurations

Supported FSMF NB-IoT Inband configurations

Single HW board (either FSMF or FBBA/C)

3*5/10/15/20MHz 2Tx/2Rx cells + 3 NB-IoT cells OR
(2*15/20MHz 2Tx/2Rx cells + 2 NB-IoT cells) + 2*5/10MHz 2Tx/2Rx cell OR
3 x 5/10 MHz 4T/4R (4x2 DL MIMO) or up to 3 x 15/20 MHz 2T/4R cells hosting in-band NB-IoT cells

2 HW boards (FSMF + FBBC/A)

6*5/10/15/20MHz 2Tx/2Rx cells + 6 NB-IoT cells OR
2*15/20MHz 2Tx/2Rx cells + 2*5/10MHz 2Tx/2Rx cell + 4 NB-IoT cells OR
3 x 5/10/15/20 MHz 4T/4R (4x2 or 4x4 DL MIMO) hosting in-band NB-IoT cells

3 HW boards (FSMF + 2 FBBC/A)

9*5/10/15/20MHz 2Tx/2Rx cells + 9 NB-IoT cells OR
4*15/20MHz 2Tx/2Rx cells + 4*5/10MHz 2Tx/2Rx cell + 8 NB-IoT cells

Note (*) 1T2R cells instead of 2T2R are supported as well

Inband NB-IoT cells configurations

Supported AirScale NB-IoT Inband configurations

Inband NB-IoT configurations on AirScale without BB pooling

- 3*15/20MHz 2T2R + 3* inband NB-IoT cell per ½ ABIA
- 4*5/10MHz 2T2R + 4* inband NB-IoT cell per ½ ABIA
- 2*5/10MHz cells 2T2R plus 2*15/20MHz cells 2T2R + 4*inband NB-IOT cells per ½ ABIA
- 2 *5/10/15/20 MHz 4T/4R or 2T/4R cells + 2 inband NB-IoT cells per ½ ABIA

Inband NB-IoT configurations on AirScale with BB pooling ([LTE4415](#))

up to 8 cells per baseband pool (½ ABIA board) when NB-IoT inband cells are added to 2Tx/2Rx hosting LTE cells:

- 3* 15/20MHz cells 2T2R + 3* inband NB-IoT cells per 1/2 ABIA
- 4* 5/10MHz cells 2T2R+ 4* inband NB-IoT cells per 1/2 ABIA
- 2* 5/10MHz cells 2T2R + 2* 15/20MHz cells 2T2R + 4* inband NB-IoT cells per 1/2 ABIA

up to 4 cells per baseband pool (½ ABIA board) when NB-IoT inband cells are added to 4Tx/4Rx hosting LTE cells:

- 2* 5/10/15/20MHz cells 4T4R + 2* inband NB-IoT 4T4R cells per 1/2 ABIA

Note (*) 1T2R cells instead of 2T2R are supported as well

BB pooling improves only the capacity for regular LTE cells which are not hosts for inband NB-IoT cells – this the scope of LTE4415.

LTE 4415: NB-IoT Inband with LTE partial Baseband Pooling

Standalone NB-IoT cells configurations

Supported FSMF/AirScale configurations (allowed with [LTE3543](#) & [LTE3722](#))

Single HW board (either FSMF or FBBA/C)

6 x (5/10MHz 2Tx/2Rx(or 1Tx/2Rx) or NB-IoT standalone cells)
 2 x (15/20MHz 2Tx/2Rx (or 1Tx/2Rx)) + 2 x (5/10 2Tx/2Rx (or 1Tx/2Rx) or NB-IoT standalone cells)
 3*(5/10MHz 2Tx/4Rx or NB-IoT standalone) cells
 3*(5/10MHz 4Tx/4Rx or NB-IoT standalone) cells

FSMr3

NB-IoT standalone configuration on AirScale w/o BaseBand Pooling per ½ ABIA

4 x (5/10MHz cells 2Tx2Rx (or 1Tx/2Rx) or NB-IoT standalone cells)
 2 x (15/20MHz cells 2Tx2Rx (or 1Tx/2Rx))+ 2 x (5/10MHz cells 2Tx2Rx (or 1Tx/2Rx) or NB-IoT standalone cells)
 2*(5/10/15/20MHz 4Tx/4Rx or NB-IoT standalone) cells

AirScale

NOTE: 1Tx, 2Tx and 4Tx modes & 2Rx and 4Rx scheme are supported for Standalone NB-IoT deployment.
 For Standalone, each NB-IoT cell is considered as a 5/10MHz LTE carrier in terms of baseband dimensioning.

LTE3543 NB-IoT Standalone

LTE3722 NB-IoT: Additional configurations (4Rx, 4Tx or 1Tx eNB support)

LTE3667 NB-IoT with full Baseband Pooling (future release) will allow co-existence of BB pooling and standalone NB-IoT

LTE 18 IoT features for SRAN (SR001602)

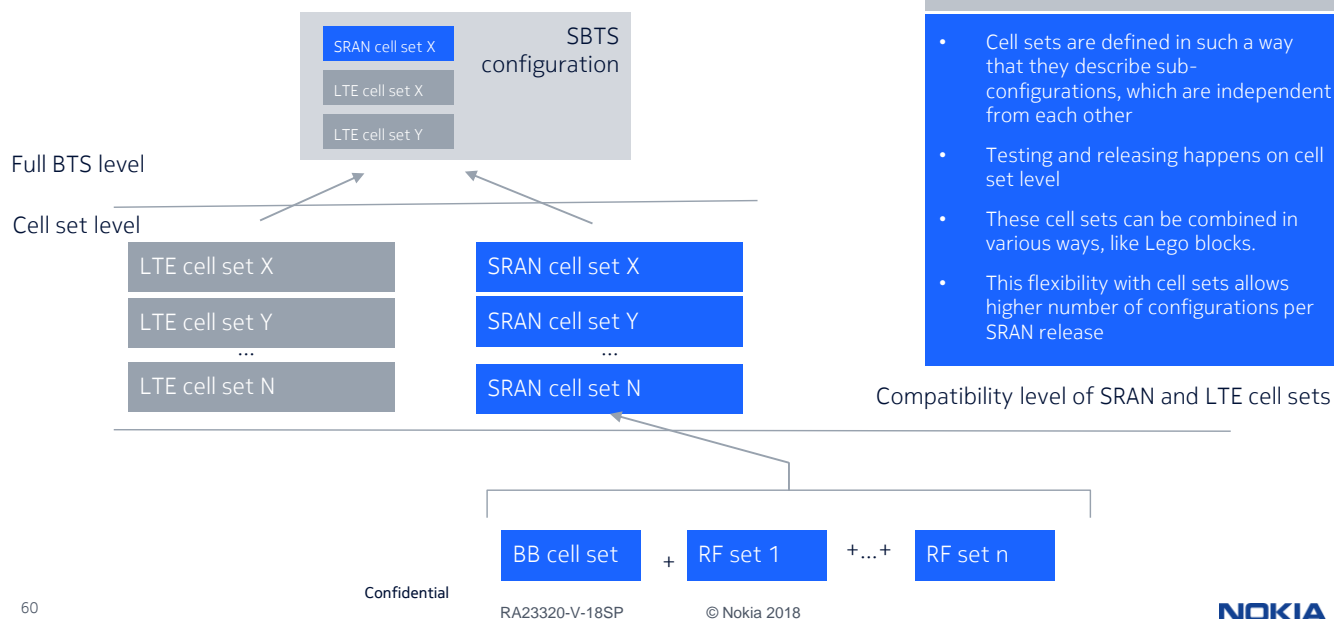
- Selected standalone NB-IoT configurations were supported in SBTS17A and SBTS17A MP1 and specified as separate RF cell sets.
- Since SR001602/SBTS18 there are no dedicated standalone NB-IoT RF cell sets defined, but the generic guideline (also for Inband NB-IoT) with rules how LTE/WCDMA/GSM cells from regular RF cell sets can be replaced with NB-IoT Standalone cells (or combined with Inband NB-IoT cells).

SRAN cell sets

Baseband, RF & SRAN 18 updates

SRAN 18 configurations

SRAN 18 to follow cell sets approach



- 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, are independent and can be combined together to achieve full configuration
- There is no direct indication about particular cell sets in the SW code (like SBTS profile in SRAN16.x)
- SW has to provide capacity and performance at least as it is described by the cell sets

SRAN BB cell sets

BB sets phasing (SR001826/SR001827)

- As a SRAN17A recovery action, verification of following BB sets have been shifted out from SBTS17A:

BAG_S
BAW+2B
BAWG_S+3B
BALW
BALWG_S
BALWG_E_S_1
BALWG_XL_S_1

- AirScale BB cell sets are under rework now, to exclude option of combining them together which should ease the interpretation and allow us to double check if all possible cablink options are listed.

AirScale BB cell sets		Supported since SBTS17A (SR001826)																								
The below BB cell sets can be used both for single and dual core configuration, please see details below the table																										
		Possible ports usage																								
BB_set_ID	No. of RAN	SBTS SM mode	No. of ABIA	SM RB deployment			ABIA x			ABIA y			ABIA z			LTE BB			WCDMA RB		GSM BB		Supported since (SW release)	History note		
				ABIA x	ABIA y	ABIA z	x	y	z	x	y	z	x	y	z	RU1	RU2	RU3	RU4	RU5	RU6	RU7	RU8			
BAG_S	1	GSM	1	GSM	empty	empty	empty	empty	empty	G	G	G	G	G	G									D-24	SBTS17A MP1, SBTS18	Officially supported since CN=22765 (SBTS17A MP1)
BAG_L	1	GSM	1	GSM	empty	empty	empty	empty	empty	G	G	G	G	G	G									25-56	SBTS17A	
BAW	1	WCDMA	1	WCDMA	empty	empty	empty	empty	empty	W	W	W	W	W	W									4	SBTS17A	
*BAW+2B	1	WCDMA	1	WCDMA	empty	empty	empty	empty	empty															4	SBTS17A	
*BAW+3B	1	WCDMA	1	WCDMA	empty	empty	empty	empty	empty															8	SBTS17A MP1, SBTS18	Officially supported since CN=22765 (SBTS17A MP1)
*BAW+4B	1	WCDMA	1	empty	empty	WCDMA	empty	empty	empty															X14	SBTS17A	
RA1_RCS	1	TF	1	TF	empty	empty	empty	empty	empty																SBTS17A	

“Future release” -- Simultaneous connection of WCDMA radios on more than 1 ABIA is still not possible. RP002085 in SRAN18 SP should support this.

SRAN18 RF cell set updates

SRAN BB cell sets

SRAN 18 updates (SR001826/SR001827)

- SRAN BB sets rules update to support WCDMA 4RX diversity
 - Existing WCDMA related SRAN BB cell sets will support WCDMA configurations with 4RX diversity according to related legacy WCDMA features.

B1FLWG_1+B	3	LWG	1	WG	LTE	WCDMA	LWG	LWG	LWG	LWG	x	x	LWG	x			LWG
B1FLWG_1_L+B	3	LWG	1	WG	LTE	WCDMA	WG	WG	WG	WG	LWG	LWG	LWG	LWG	L		WG

Detailed SRAN BB sets rules updates will be reflected in SRAN18 supported configuration file.

SRAN BB cell sets

SRAN 18 updates (SR001826/SR001827)

- SRAN BB set rules update to handle LTE 18 IoT related features introduced via SR001602 in SRAN18
 - Existing SRAN BB cell sets containing any LTE cell set inside will support enhanced BB deployment for NB-IoT according SR001602 features.

BALWG_S_1	3	LWG	2	GSM	W	WCDMA	LTE	Empty	Empty	Empty	WG	WG	WG	WG	WG	WG	LG	LG	LG	LG	LG	LG
BALWG_P_S	3	LWG	2	GSM	W	WCDMA	LTE	Empty	Empty	Empty	G	G	G	G	G	G	LWG	LWG	LWG	LWG	LWG	LWG

LTE feature ID	Feature name	HW platform
LTE3543	NB-IoT Standalone	FSMF, AirScale
LTE3125	eDRX - IDLE	FSMF, AirScale
LTE3722	NB-IoT: Additional configurations (4Rx, 4Tx or 1Tx eNB support)	FSMF, AirScale
LTE4056	Cat-M1: VoLTE Support (Phase-I)	FSMF, AirScale
LTE4222	Cat-M1: Improved Single-User Peak DL & UL Throughput with Multiple-HARQ	FSMF, AirScale
LTE4415	NB-IoT: Support on Airscale with Baseband Pooling (Phase-I, capacity unchanged for NB-IoT)	AirScale
LTE4414	NB-IoT: Intra-frequency Idle mode Mobility	FSMF, AirScale
LTE4475	NB-IoT: Multiple Coverage Levels	

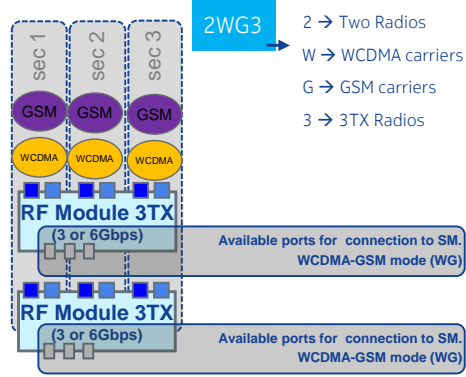
Detailed SRAN BB sets rules updates will be reflected in SRAN18 supported configuration file.

SRAN RF sets

Definition

SRAN RF set = Radio(s) & Ant. cabling + Sectors + RAT & Carriers

Example of RF set



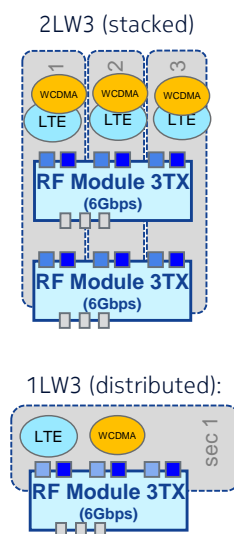
- RF set may:
 - be built on different radio variants
 - handle different carrier combinations
 - require different SM↔RU link speed
 - Handle different carrier allocations (e.g. 1TX or 2TX for WCDMA in the example)

RF set ID	RF mode	No. of RF units	Supported RF units	RF type	minimum SF 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
ZWG3	WG	2	FXCA, FXCB, FXDA, FXDI, FXDB, FXJB, FXFA, FXFB, FXFC	3TBR	3	1	3+3+3	1T/2R	C	4+4+4	1T/2R	C
ZWG3	WG	2	FXCA, FXCB, FXDA, FXDI, FXDB, FXJB, FXFA, FXFB, FXFC	3TBR	3	1	2+2+2	1T/2R	C	6+6+6	1T/2R	C
ZWG3	WG	2	FXCA, FXCB, FXDA, FXDI, FXDB, FXJB, FXFA, FXFB, FXFC	3TBR	3	1	1+1+1	1T/2R	C	7+7+7	1T/2R	C
ZWG3	WG	2	FXCB, FXDB, FXJB, FXFC	3TBR	6	1	4+4+4	1T/2R	C	6+6+6	1T/2R	C
ZWG3	WG	2	FXCA, FXCB, FXDA, FXDI, FXDB, FXJB, FXFA, FXFB, FXFC	3TBR	3	1	3+3+3	2T/2R	H	4+4+4	1T/2R	C
ZWG3	WG	2	FXCA, FXCB, FXDA, FXDI, FXDB, FXJB, FXFA, FXFB, FXFC	3TBR	3	1	2+2+2	2T/2R	H	6+6+6	1T/2R	C
ZWG3	WG	2	FXCA, FXCB, FXDA, FXDI, FXDB, FXJB, FXFA, FXFB, FXFC	3TBR	3	1	1+1+1	2T/2R	H	7+7+7	1T/2R	C
ZWG3	WG	2	FXCB, FXDB, FXJB, FXFC	3TBR	6	1	4+4+4	2T/2R	H	6+6+6	1T/2R	C

SRAN 18 updates (SR001826/SR001827)

SRAN RF sets rules update to support WCDMA 4RX diversity (1/2)

- All existing WCDMA related SRAN BB cell sets shall support WCDMA configurations with 4RX diversity according to related legacy WCDMA features.
- This functionality is introduced in SRAN17A MP1 via CNI-24573.
- Besides the cell sets introduced by CNI-24573, in the scope of SRAN18 the following cell sets were added (limited to currently known customer configurations)
- 1W3, 1LW3 for FRGP/FRGT/FRGX, with WCDMA 1T4R/2T4R and LTE 2T2T/2T4R; D, J, GD, GJ, JJ and JD sector types combinations;
- 2W3, 2LW3 for FRGP/FRGT/FRGX, with WCDMA 1T4R/2T4R and LTE 2T2T/2T4R; E, K, HE, HK, KE and KK sector types.



CUC, NOS, Ooredoo Myanmar

Related to <https://jira3.int.net.nokia.com/browse/CNI-24573>

SRAN 18 updates (SR001826/SR001827)

SRAN RF sets rules update to support WCDMA 4RX diversity (2/2)

WCDMA	Max number of RX	Max Number of cells in 1-way and 2-way RX Diversity	Max Number of cells in 4-way RX Diversity
SM rel3	36	18	9
SM rel4 - single core	48	24	12
SM rel4 - dual core	48	24	12
SM rel3 - per LCG	24	12	6
SM rel4 - per LCG	24	12	6

SRAN 18 updates (SR001826/SR001827)

Multi-carrier (MORAN) configs for 1LW2, 1LW6, 2LW3, 1LG2, 1LG3, 2LG3

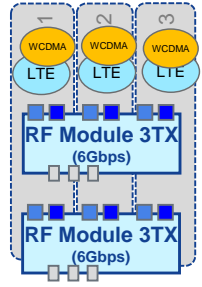
LTE-GSM RF shared mode:

- 1LG3 1xFXEF LTE 2 2T2R G/AF type ; GSM 6TRX B or AE type
- 2LG3 2xFXEF LTE 222 2T2R H or AD type 10+5; GSM 444 C or AC

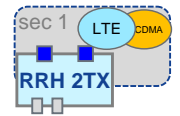
LTE-WCDMA RF shared mode:

- 1LW2_4.0a_1x6Gbps_IA: L2@10 + W4
- 1LW6_3.1_2x6Gbps_IA: L2+2+2@10MHz + W2+2+2
- 1LW6_3.1_2x6Gbps_IA: L2+2+2@5MHz + W4+4+4
- 2LW3_3.0_2x6Gbps_HC:L2+2+2@5MHz + W4+4+4
- 2LW3_3.0_2x3Gbps_HC:L2+2+2@5MHz + W1+1+1
- 2LW3_3.0_2x3Gbps_HC:L2+2+2@10+5MHz + W1+1+1

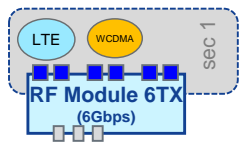
2LW3:



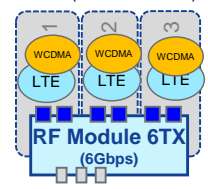
1LW2:



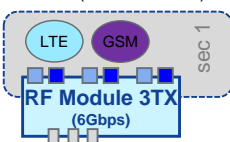
1LW6 (distributed):



1LW6 (centralized):



1LG3 (distributed):



India

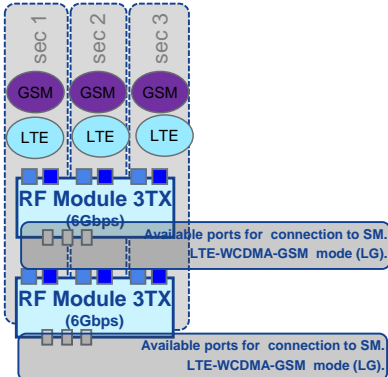
SRAN 18 updates (SR001826/SR001827)

4RX variant for 1LG3, 2LG3

LTE-GSM RF shared mode for FXEF

LTE 2T4R 111@15/20MHz + GSM 1T2R 6/4 TRX

LTE 2T4R 222@20 +5MHz + GSM 1T2R 6/4 TRX



CUC, CMCC, Cellcom ISR

SRAN 18 updates (SR001826/SR001827)

Parity to SRAN16.X gap closure

Some Radio configurations from Profiles introduced after SRAN16.10 MP3 are not automatically translated to SRAN17A+ configurations concept- RF sets.

The goal was to close this gap as fundamental and mandatory requirement of SOAM is to cover existing configurations of SRAN16.X, that's why following CNIs were ported to SRAN cell sets:

[CNI-24445](#) New network sharing SBTS-profiles for Indian projects Part 3

[CNI-24178](#) Additional profile variants of LWG38_3 for Indian markets

[CNI-21133](#) New SBTS-profiles for Indian operators due to SRAN17 mitigation P2 package

[CNI-24700](#) New network sharing SBTS-profiles for Indian projects Part 3

The exact missing cell sets were:

CNI-24445:

- 2LG3_3.3_1x6Gbps_ADAC and 1LW6_3.1_1x6Gbps_II (Profile LWG41_5),
- 1LG6_3.2_2x6Gbps_IA and 1W3_3.0_1x3Gbps_A and 3x1W2_4.0_1x3Gbps_A (Profile LWG135_8),
- 1LG6_3.2_2x6Gbps_IA and 1W3_3.0_1x3Gbps_A and 1W2_4.0_1x3Gbps_A (Profile LWG85_5)

CNI-24178:

- 1LG3_3.3_1x6Gbps_AFAE (profile LWG38_7)
- 2LG3_3.3_1x6Gbps_ADAC (profile LWG38_8)

CNI-21133:

- 2LG6_3.2_1x6Gbps_NA (LWG146),

CNI-24700 New network sharing SBTS-profiles for Indian projects Part 3 - covered by slide 27 (MORAN config)

India and CUC

SRAN 18 updates (SR001826/SR001827)

RF sets unification to their max capacity

There were RF sets not reflecting max possible capacity from RF and fiber perspective whereas needed by customers in this case.

This request was to "unify" the RF sets - what means in practice adjust current carrier capacity and required # of links to its max value for attached list of RF sets (pre-filtered) in attached Excel.



Microsoft Excel
Worksheet

India

This item was done under: <https://jira3.int.net.nokia.com/browse/CNI-27015>

SRAN 18 updates (SR001826/SR001827)

New RF set variants

- This request was to add to supported configurations the RF sets variants - means additional combinations of max carrier capacity and # cells for LTE - see attached list of RF sets (pre-filtered in attached Excel):



India

SRAN 18 updates (SR001826/SR001827)

RF sets update for SA NB-IoT shared with LTE and/or WCDMA and/or GSM

The request was to update the "NB-IoT configurations" guide from so that the supported SA NB-IoT configurations can be obtained by replacing any LTE and/or WCDMA and/or GSM cell by one SA NB-IoT cell.

Any FDD-LTE cell can host any Cat-M and/or NB-IoT inband cell according to LTE features available in SRAN18.

Available MIMO schemes for combination SA NB-IoT + FDD-LTE cell according LTE features available in SRAN18.

CMCC, Global SA-IoT

SRAN 18 updates (SR001826/SR001827)

for new RF units introduced in SRAN 18 with LTE mode (based on SR001695)

LTE2784 AirScale RRH 4T4R B3 160W AHEB

LTE3140 AirScale Dual RRH 2T4R B1/3 240W AHEGA

LTE3142 AirScale Tri RRH 2T2R B8/20/28 240W AHPMDA

List of radio modules based on the content released in LTE18 and containing only LTE RAT configurations.

SRAN 18SP RF cell set updates

SBTS 18SP additional RF cell sets SR002053

Highlights of new RF cell sets:

- Distributed 4T4R configs for 1LG6, 1LW6
- Additional WCDMA 4RX diversity configurations – generic RF sets
- LTE 10MHz support for 3RAT RF sets:
1LWG6, 1LWG3, 1LWG2, 2LWG3
- Multi-carrier configurations for 1LG2, 2LG3

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SBTS 18SP additional RF cell sets

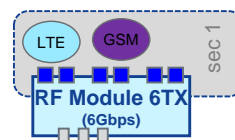
SR002053

Distributed 4T4R configs for 1LG6, 1LW6

LTE-GSM RF shared mode

i.e.: 3x 1LG6: 3x FXED/FXDD for customer example

LG1800, LTE 1+1+1 @ 20 MHz, M-type + GSM 4+4+4, A-type or I-type

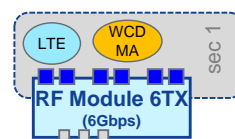


LTE-WCDMA RF shared mode

i.e.: 3x 1LW6: 3x FRGU for

LW2100, LTE 1+1+1 @ 5 MHz, M-type + WCDMA 4+4+4, A-type or D-type

LW2100, LTE 1+1+1 @ 10 MHz, M-type + WCDMA 4+4+4, A-type or D-type



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SBTS 18SP additional RF cell sets

SR002053

LTE 10MHz support for 3RAT RF sets: 1LWG6, 1LWG3, 1LWG2, 2LWG3

LTE-WCDMA-GSM RF shared mode

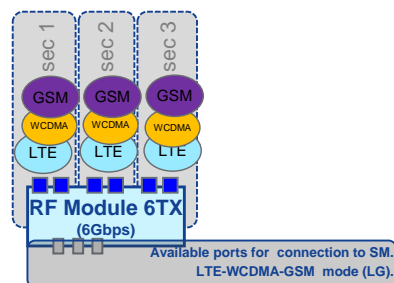
Currently created 3RAT RF sets do not provide combinations with LTE10MHz or LTE 5+5 MHz

This request is update existing 3RAT RF sets to their max capacity.

1. In example of FXDD 1LWG6_3.2_1x6Gbps_IAA currently we have only L111@5MHz, W111 and G444.

However there is a customer request to support LTE 10 MHz BW as in attached configuration.

2. existing dual carrier 5+5MHz 3RAT RF sets do not have 10MHz variant.



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SBTS 18SP additional RF cell sets

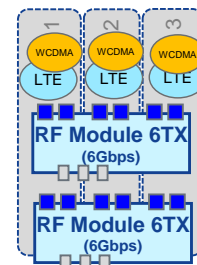
SR002053

SRAN RF sets update to support WCDMA 4RX diversity

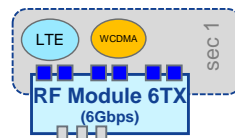
- All existing WCDMA related SRAN RF cell sets shall support WCDMA configurations with 4RX diversity. This applies for RF set family:

- 1W3, 2W3, 1W6,
- 1WG3, 2WG3, 1WG6,
- 1LW3, 2LW3, 2LW6

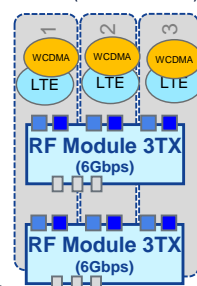
1LW6 (centralized):



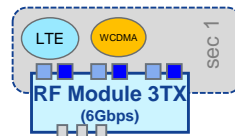
1LW6 (distributed):



2LW3 (centralized):



1LW3 (distributed):



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SBTS 18SP RF cell sets for new MSR Radios

SR002054

- SRAN RF cell sets for new MSR Radios of SRAN 18SP to be introduced via this feature
- CPRI based RF cell sets support 1 CPRI link per RF unit.
- 2 CPRI links and more per RF unit to handle bigger configurations are planned SRAN18A

Rel5.1 Radio	Band Type	Type
AHEGA(B1/B3)	Dual	2T4R
AHEB	Single	4T4R
AHEGB	Dual	4T4R
AHFIB	Dual	4T4R
AHPMDA	Tripple	2T2R
AHED(B3)	Single	2T4R
AHEC	Single	2T4R
AHDB	Single	2T4R



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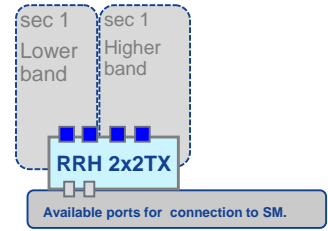
SBTS 18SP RF cell sets for new MSR Radios SR002054

SRAN RF sets – 2x2T2R triple band

AHPMDA	700/800/900	28/20/8
--------	-------------	---------

700	800	900
1L2	1L2	1L2 1W2 1G2 1LW2 1LG2 1WG2 1LWG2

Single Band Single RAT	Single Band Multi RAT	Multi Band Single RAT	Multi Band Multi RAT
1L/-/-2	1-/-/LW2	1L/L/-2	1L/-/LW2
1-/L/-2	1-/-/LG2	1L/-/L2	1L/-/LG2
1-/-/L2	1-/-/WG2	1L/-/W2	1L/-/WG2
1-/-/W2	1-/-/LWG2	1L/-/G2	1L/-/LWG2
1-/-/G2		1-/L/L2	1-/L/LW2
		1-/L/W2	1-/L/LG2
		1-/L/G2	1-/L/WG2
			1-/L/LWG2



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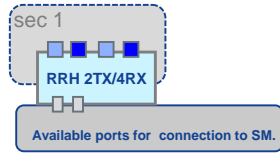
SBTS 18SP RF cell sets for new MSR Radios

SR002054

SRAN RF sets – 2T4R single band

AHDB
AHED
AHEC

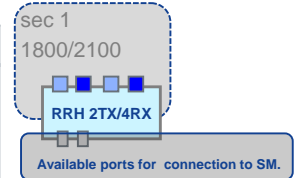
900	1800
AHDB	AHEC AHED
1L2 1W2 1G2 1LW2 1LG2 1WG2 1LWG2	1L2 1G2 1LG2



SRAN RF sets – 2T4R dual band

AHEGA

1800	2100
1L2 1G2 1LG2	1L2 1W2 1LW2



Single RAT	Single Band Mult RAT	Dual Band Multi RAT
1L--2 1G--2 1--L2 1--W2 1L-L2 1L-W2 1G-L2 1G-W2	1LG--2 1--LW2	1L-LW2 1G-LW2 1LG-L2 1LG-W2 1LG-LW2

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SBTS 18SP RF cell sets for new MSR Radios SR002054

SRAN RF sets – 4T4R dual band

AHEGB

1800	2100
1L4	1L4
1G4	1W4
1LG4	1LW4

Single RAT	Single Band Mult RAT	Dual Band Multi RAT
1L--4	1LG--4	1L-LW4
1G--4	1--LW4	1G-LW4
1--L4		1LG-L4
1--W4		1LG-W4
1L-L4		1LG-LW4
1L-W4		
1G-L4		
1G-W4		

SRAN RF sets – 4T4R dual band

AHFIB

1900	AWS(1.7 /2.1)
1L4	1L4
1W4	1W4
1G4	1LW4
1LW4	
1LG4	
1WG4	
1LWG4	

Single RAT	Single Band Mult RAT	Dual Band Multi RAT
1L--4	1LW--4	1L-LW4
1W--4	1LG--4	1W-LW4
1G--4	1WG--4	1G-LW4
1--L4	1LWG--4	1LW-L4
1--W4	1--LW4	1LW-W4
1L-L4		1LW-LW4
1L-W4		1LG-L4
1W-L4		1LG-W4
1W-W4		1LG-LW4
1G-L4		1WG-L4
1G-W4		1WG-W4
		1WG-LW4
		1LWG-L4
		1LWG-W4
		1LWG-LW4

Link to official icons in Nokia Brand Center:

<https://intranet.nokia.com/sites/brand/1/brandcenter/Nokia%20Brand%20Center>

Instructions:

https://intranet.nokia.com/sites/brand/1/brandcenter/nokia%20brand%20center/gui/delines/nokia_graphic%20communications%20guidelines_v1.pdf

SRAN RF set chaining

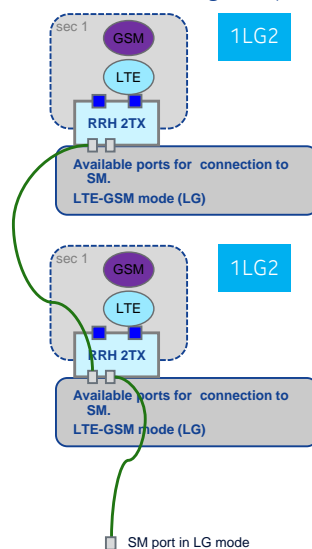
SBTS RF sharing with OBSAI RF unit chaining (SR001208)

- RF Chaining sets can be created by combining of 2 independent RF sets (up to two RFs in chain)
- There are strictly defined combinations of independent RF sets that are supported within SRAN17A

Combining of two independent RF sets may require increased SM \leftrightarrow RU link speed and/or usage of more SM \leftrightarrow RM connections
 → SM \leftrightarrow RU connections transmit data for carriers that are handled by both RF sets

OBSOLETE
With SRAN 18SP
SR002073 (next slide)

RF set chaining example:



Flexible RF cell sets' chaining

SR002073

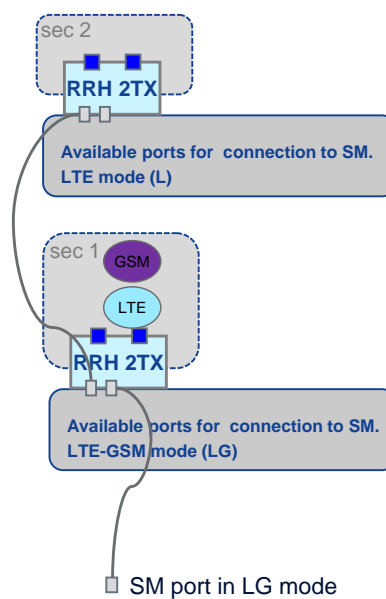
RF Chaining sets can be created by combining of 2 **any** independent **OBSAI- OBSAI** related RF sets.

When building up such configuration it is required to assure that link between System Module and first RF in chain is able to transmit data from all cells on both units.

Connection mode to System module is the combination of all RATs which cells are deployed on all chained unit.

Example on the right – 1L2 + 1LG2 RF sets.

Possible cell configuration: LTE 10MHz + LTE 10MHz + 4 TRXs



Link to official icons in Nokia Brand Center:

<https://intranet.nokia.com/sites/brand/1/brandcenter/Nokia%20Brand%20Center>

Instructions:

[https://intranet.nokia.com/sites/brand/1/brandcenter/nokia%20brand%20center/gui delines/nokia_graphic%20communications%20guidelines_v1.pdf](https://intranet.nokia.com/sites/brand/1/brandcenter/nokia%20brand%20center/gui%20delines/nokia_graphic%20communications%20guidelines_v1.pdf)

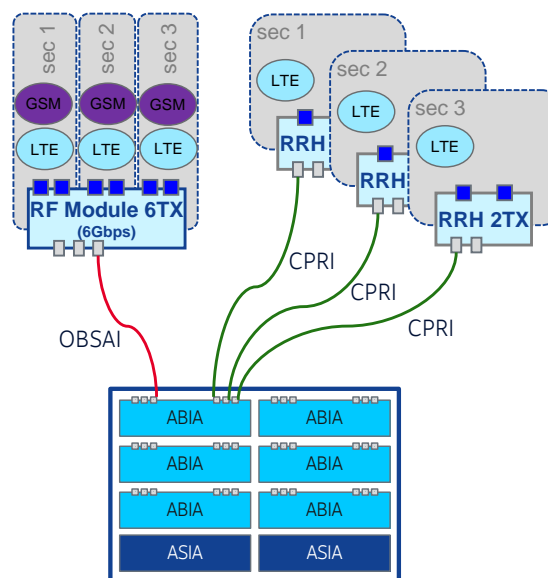
SBTS support for mixed OBSAI/CPRI step1

SR001341

Feature brings partial support to use both OBSAI and Nokia CPRI radios connected to the same system module / baseband module in one SBTS.

Support for mixed protocols is especially beneficial in terms of new 5.1 radio modules introduction: 5.1 radios (supporting only CPRI protocol) can be installed on existing sites where OBSAI radios are already utilized.

- Chained OBSAI and Nokia CPRI Radios can be connected to the same ABIA or FSMF/FBBx.
- OBSAI and Nokia CPRI Radios mixing on same ABIA/FSMF is supported only for GSM and LTE.
- All WCDMA RFs(either CPRI or OBSAI) should be connected to the same ABIA.



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- OBSAI and Nokia CPRI Radio mixing is not supported for WCDMA (all WCDMA radios in one SBTS must use OBSAI or CPRI protocol).
- OBSAI and ALU CPRI Radio mixing is not supported.
- Radio chaining with mixed protocols is not supported: all radios in one chain must be of same protocol.
- LTE BB pool can work with carriers from only one radio transmission protocol: OBSAI or Nokia CPRI. Another LTE BB pool can be used for another radio protocol.
- GSM TRX's of OBSAI and Nokia CPRI protocol must be allocated on separate DSPs. All TRX's in a sector must be mapped to same protocol

All WCDMA RFs(either CPRI or OBSAI) should be connected to the same ABIA.

Mix of WCDMA CPRI and OBSAI RFs need two separate SBTS's(2 FSMFs or separate half subtracks in the same Airscale)

How to build configuration from the Cell Sets

How to start?

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

The screenshot shows the Nokia Networks website interface. The main content area displays document details for 'Single RAN, SBTS Supported Configurations, Issue 03C Rel. SRAN 17A, Operating Documentation'. A red arrow points to the 'Downloads' section, which contains a table with the following data:

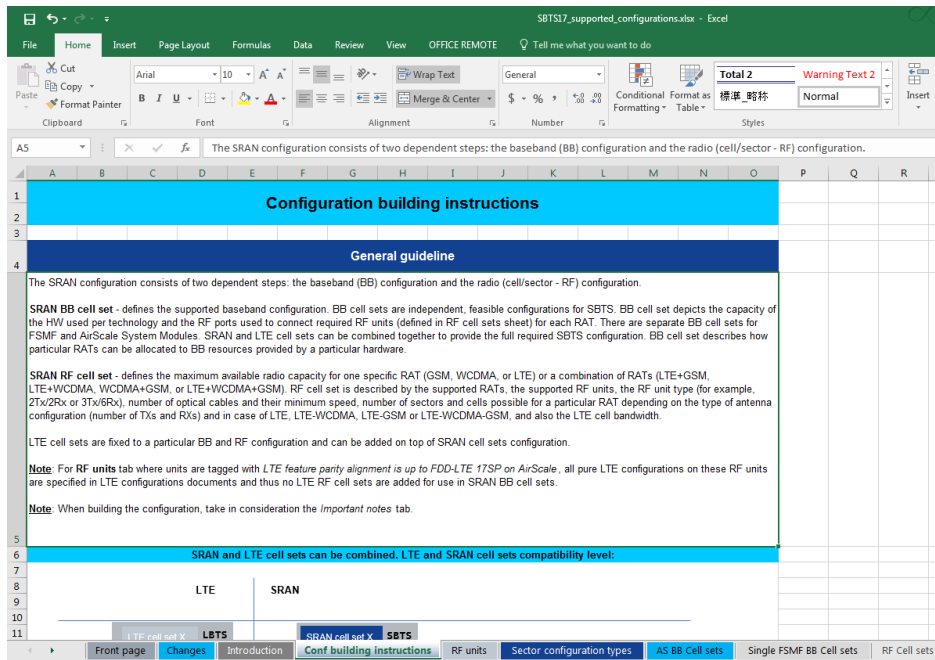
<input checked="" type="checkbox"/>	Title / File name	Size	Date
<input checked="" type="checkbox"/>	Single RAN, SBTS Supported Configurations, Issue 03C Rel. SRAN 17A, Operating Documentation	2.1MB	2018-03-06
<input checked="" type="checkbox"/>	SBTS17_supported_configurations.xlsx		

Below the table is a '+Download Selected Files' button. The right sidebar contains navigation links for 'Search documentation', 'Support', 'My preferences', 'Find products', and 'Related products'.

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
450	31	RRH	FRAA	2x40W	no	no	2Tx2Rx	473220A	OBSAI_6	no	no
700	28	RFM	FRPA	6x40W	no	no	6Tx6Rx	472703A	OBSAI_6	no	no
700	28	RFM	FRPB	6x40W	no	no	6Tx6Rx	472752A	OBSAI_6	no	no
730	12/17	RRH	FRLB	2x30W	no	yes	2Tx2Rx	472180A	OBSAI_3	no	no
800	20	RFM	FRMC	6x40W	no	no	6Tx6Rx	472655A	OBSAI_6	no	no
800	20	RFM	FRME	6x40W	no	no	6Tx6Rx	472927A	OBSAI_6	no	no
800	20	RFM	FRMF	6x60W	no	no	6Tx6Rx	472930A	OBSAI_6	no	no
850	5/6/19/25/27	RFM	FXCA	3x60W	yes	yes	3Tx6Rx	472142A	OBSAI_3	yes	yes
850	5/6/19	RFM	FXCB	3x80W	yes	no	3Tx6Rx	472678A	OBSAI_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

Note:

- "RFM" stands for "RF Module"; "RRH" stands for "Remote Radio Head".
- The number of supported frequencies may vary. Only the basic rule of HW configurations is described, more carriers can be supported.
- The modules' layouts presented below are informative only. The ordered modules' layouts may vary, though the connection rules are still the same.

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	(n)	
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.

Possible ports usage

BB_cell_set_ID	No. of RATs	SBTS SM mode	No. of ABIAs	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	I	II	III	IV	V	VI
				GSM	GSM	Empty	Empty	Empty	Empty	Empty	Empty	Empty	G	G	G	G	G	G												
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+X*B	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	Empty	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													
					RATs	mode	SMS	FSMF1	FBBA/C	FBBA/C	1.6	1.1	1.2	1.3	1	2	3X	4	1	2	3									
B1FG_1	1	GSM	1	GSM	Empty	Empty	Empty	Empty	Empty	Empty	Empty	G	G	G	G	G	G													
B1FG_2	1	GSM	1	GSM	GSM (RP3 only)	Empty	Empty	Empty	Empty	Empty	Empty	G	G	G	G	G	G													
B1FG_3	1	GSM	1	GSM	GSM (RP3 only)	GSM (RP3 only)	Empty	Empty	Empty	Empty	Empty	G	G	G	G	G	G													
B1FW_1	1	WCDMA	1	WCDMA	Empty	Empty	Empty	Empty	Empty	Empty	Empty	W	W	W	W	W	W													
B1FW_1+B	1	WCDMA	1	WCDMA	WCDMA	Empty	Empty	Empty	Empty	Empty	Empty	W	W	W	W	W	W													
B1FW_1+2B	1	WCDMA	1	WCDMA	WCDMA	WCDMA	Empty	Empty	Empty	Empty	Empty	W	W	W	W	W	W													
*B1FW+B	1	WCDMA	1	Empty	WCDMA	Empty	Empty	Empty	Empty	Empty	Empty																			
*B1FW+2B	1	WCDMA	1	Empty	WCDMA	WCDMA	Empty	Empty	Empty	Empty	Empty																			
B1FL_1	1	LTE	1	LTE	Empty	Empty	Empty	Empty	Empty	Empty	Empty	L	L	L	L	L	L													
B1FL_2	1	LTE	1	LTE	LTE	Empty	Empty	Empty	Empty	Empty	Empty	L	L	L	L	L	L													
B1FL_2_L	1	LTE	1	LTE	LTE	Empty	Empty	Empty	Empty	Empty	Empty	L	L	L	L	L	L													
B1FWG_1	2	WG	1	WG	Empty	Empty	Empty	Empty	Empty	Empty	Empty	WG	WG	WG	WG	WG	WG													
B1FWG_1+B	2	WG	1	WG	WCDMA	Empty	Empty	Empty	Empty	Empty	Empty	WG	WG	WG	WG	WG	WG													

Trainer note: Explain the tab contents,

How to start?

RP3/CPRI link calculator

A	B	C	D	E	F	G	H	L	M	N	O	P	Q	R	S
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

RP3 link capacity calculator

Fill the empty fields for the chosen technologies to see how many RP3 links are needed for a particular link speed and cell configuration.

Summary			LTE				WCDMA			RP3 1x space		GSM		
Link speed	Total RP3 cables needed	Total BW	#cells	TX / cell	RX / cell	BW	#cells	TX / cell	RX / cell	TX	RX	#cells	TX / cell	RX / cell
4	0									0	0			2
8	0									0	0			2

Link speed values must be 4 (for OBSAI 3 Gbps) and 8 (for OBSAI 6 Gbps).

CPRI link capacity calculator

CPRI link capacity calculator																				
BAND X																				
No. of GSM TRX	Max No. Of Tx/Rx	GSM bitrate	No. of WCDMA cells	Max No. Of Tx/Rx	WCDMA bitrate	No. of LTE5 cells	Max No. Of Tx/Rx	LTE5 bitrate	No. of LTE10 cells	Max No. Of Tx/Rx	LTE10 bitrate	No. of LTE15 cells	Max No. Of Tx/Rx	LTE15 IQ Compression	LTE15 bitrate	No. of LTE20 cells	Max No. Of Tx/Rx	LTE20 Compression	LTE20 bitrate	CPRI usage
	1	0.00		2	0.00		2	0.00		2	0.00		2	no	0.00		4	no	0.00	0.000
BAND Y																				
No. of GSM TRX	Max No. Of Tx/Rx	GSM bitrate	No. of WCDMA cells	Max No. Of Tx/Rx	WCDMA bitrate	No. of LTE5 cells	Max No. Of Tx/Rx	LTE5 bitrate	No. of LTE10 cells	Max No. Of Tx/Rx	LTE10 bitrate	No. of LTE15 cells	Max No. Of Tx/Rx	LTE15 IQ Compression	LTE15 bitrate	No. of LTE20 cells	Max No. Of Tx/Rx	LTE20 Compression	LTE20 bitrate	CPRI usage
	1	0.00		2	0.00		2	0.00		2	0.00		1	no	0.00		2	ds_only	0.00	0.000
BAND Z																				
No. of GSM TRX	Max No. Of Tx/Rx	GSM bitrate	No. of WCDMA cells	Max No. Of Tx/Rx	WCDMA bitrate	No. of LTE5 cells	Max No. Of Tx/Rx	LTE5 bitrate	No. of LTE10 cells	Max No. Of Tx/Rx	LTE10 bitrate	No. of LTE15 cells	Max No. Of Tx/Rx	LTE15 IQ Compression	LTE15 bitrate	No. of LTE20 cells	Max No. Of Tx/Rx	LTE20 Compression	LTE20 bitrate	CPRI usage
	1	0.00		2	0.00		2	0.00		2	0.00		1	no	0.00		1	lqc_ds	0.00	0.000

Trainer note: Explain the tab contents,

Dimensioning example

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

Dimesioning example

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 cel sets

Dimesioning example

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

Dimensioning example

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 the 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

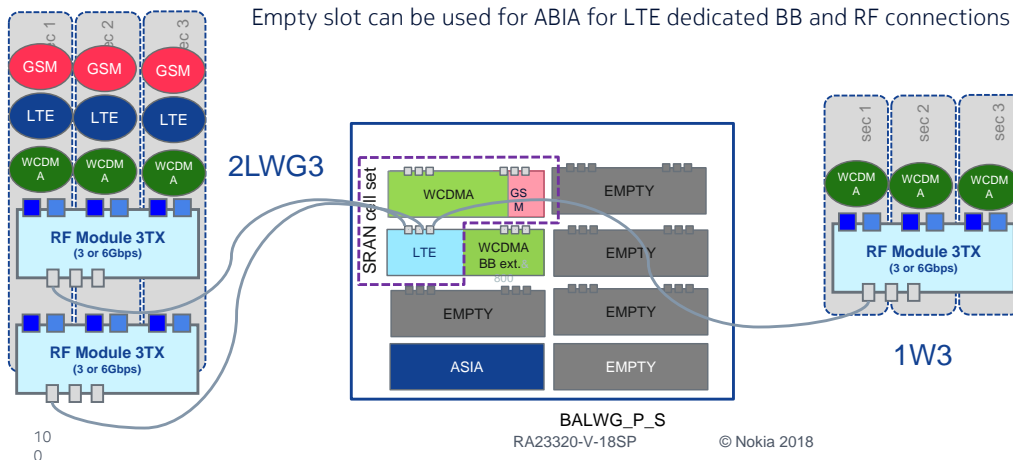
Select the proper RF cell set

1W3

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

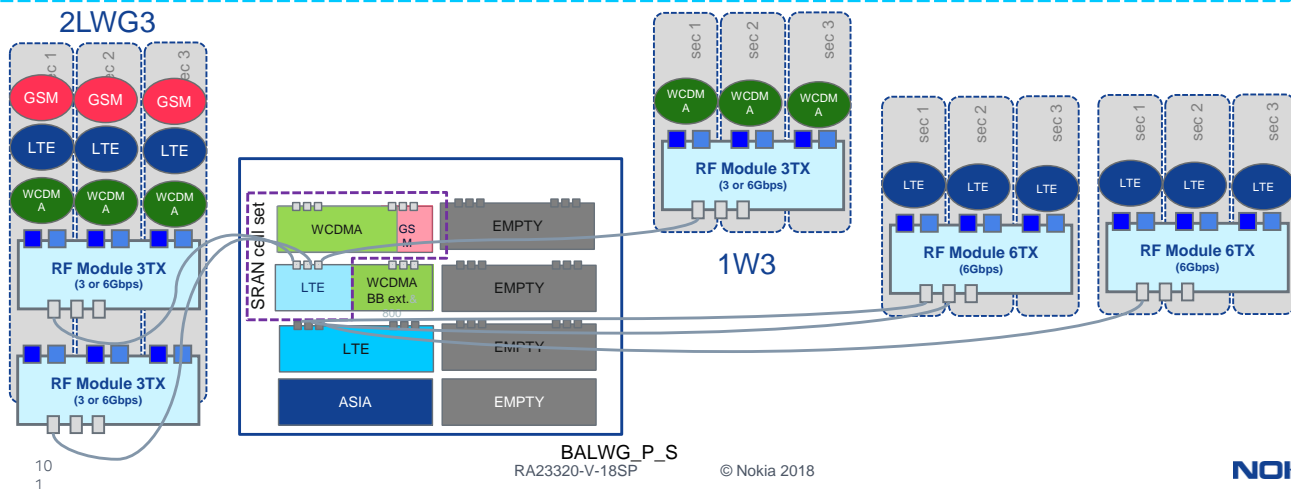
Dimesioning example

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



Dimensioning example

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



How to build configuration from the cell sets

Example 2

- Input:
(LWG107_1)

G900 5+5+5+4+4+4 x+x+x+x+x+x	G1800 5+5+5 y+y+y	L2100 (1+1+1+1+1+1) 10MHz@2T2R	W2100 (1+1+1+1+1+1) 2T2R – E-VAM 30+30 & 20+20W
FXJB/FXDJ + FXJB/FXDJ	FXEE/F	1x FRGU + UP to 3 FRGY	

- Step 1: RF set selection:
 - FXJB/FXDJ + FXJB/FXDJ → **2(1G3) (6+6+6, 1T2R,A)** → 2 ports for G
 - FXEE/F → **1G3** → 1 port G (8+8+8, 1T2R, A)
 - FRGU → **1LW6** → 1 port LW (1+1+1)
 - 3xFRGY → **3*1LW2** → 3 ports LW 3 (1)
- Step 2: BB set selection:
 - 3 RATs in SRAN cell set:
 - GSM: **36 TRX**
 - LTE: **1 BCS**
 - WCDMA: remaining BB capacity
 - RF ports needed:
 - 3** x G
 - 4** x LW
 - BB set ID → **B1FLWG_1_L+B**

Full Configuration:

- 3 1G3
- 1LW6
- 3 * 1LW2
- B1FLWG_1_L+B

How to build your own configuration

Exercise

- Ask your trainer to give one exercise if needed???

Exercise:

LTE – 111 - 20Mhz (2.1Ghz)

WCDMA – 333 (1.9Ghz)

GSM – 222 (1.9Ghz)

GSM+WCDMA in RFS

Using FSM'4 Air Scale HW

Also state your HW - RFM

Annex

Nokia AirScale System Module Baseband dimensioning rules

AirScale SM BB dimensioning

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
- Packet Cell Set - $\frac{1}{2}$ ABIA
- Dual Packet Cell Set - 1 ABIA

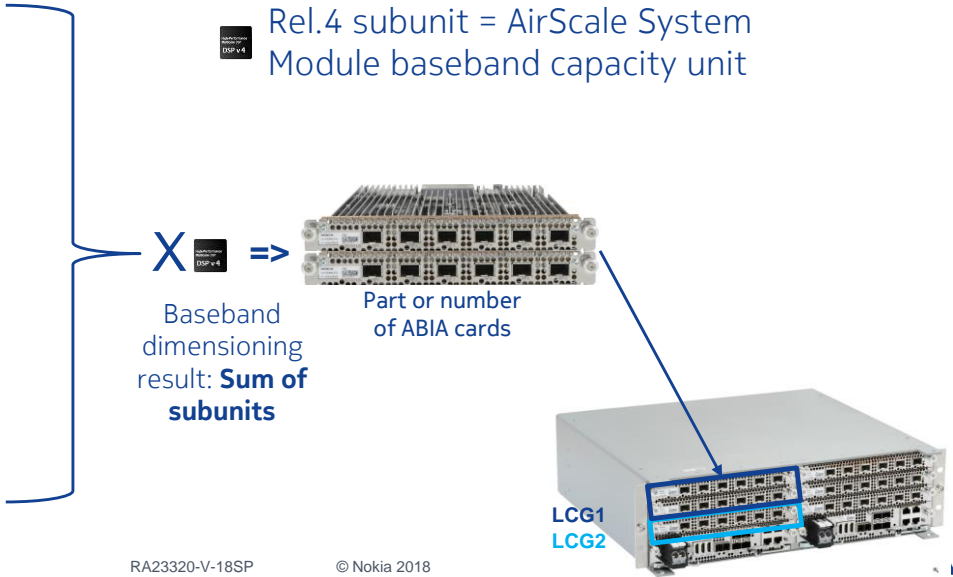


Single ABIA card handles up to 2 RATs

Fundamentals of WCDMA Baseband dimensioning

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



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6

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Nokia AirScale System Module WCDMA Baseband Capacity

WCDMA Baseband dimensioning



ASIA half-subrack



} 3 x ABIA

Note: SRAN17A main release – only one half subrack allocation possible.

Max amount of cells per logical SBTS	Max amount of LCGs per logical SBTS
24 cells	4 LCGs

← Logical SBTS

Max amount of cells per LCG	Max LCG capacity
12 cells	3x ABIA

Max amount of HSDPA users per LCG
620 HSDPA users

Max amount of HSUPA users per LCG
620 HSUPA users

← LCG

10
7

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Nokia AirScale System Module WCDMA Baseband Capacity

Typical LCG configurations and capacity



Microsoft Excel
Worksheet

Typical/exemplary WCDMA capacity allocation (1x LCG scenario)

WCDMA available capacity	Baseband capacity for pure traffic use	Max amount of HSUPA users (FDPCH)**	Max amount of HSUPA users (non-FDPCH)**	Max amount of Rel.99 CE
4 subunits (1/2x ABIA)	2,875 su	220	120	276
6 subunits (3/4x ABIA)	4,375 su	340	240	420
8 subunits (1x ABIA)	6,375 su	500	320	612
12 subunits (1,5x ABIA)	10,375 su	620*	560	996
14 subunits (1,75 ABIA)	12,375 su	620*	620*	1188
16 subunits (2x ABIA)	14,375 su	620*	620*	1380

Exemplary WCDMA capacity allocation / 1 LCG scenario / no PIC / up to 12 (non-MIMO) cells / 10km cells range / 4 signatures / 2 way Rx Div

* 620 HSPA users per single LCG

** 0,125 su not available for HSUPA allocation to avoid ping – pong effect (R99 – HSUPA dynamic baseband resources sharing)
HSUPA non-FDPCH = 2ms TTI non-FDPCH users assumed and RAN3259 activated

