ZXSDR B8200 GU360
Indoor GSM&UMTS Dual Mode Baseband Unit
Radio Parameter Reference

Version 4.00.100

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Revision History

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Contents

Preface

Purpose

ZXWR OMM is the operation and maintenance module of ZTE WCDMA product series. Configuration management, fault management, topology management, performance management and security management can be performed via OMM.

This manual is a parameter reference for BS radio resource management.

What is in This Manual

TABLE 1 CHAPTER SUMMARY

Chapter	Summary
Chapter 1 Radio Parameters	Introduces parameters of radio resource management.
Chapter 2 Algorithm Overview	Introduces HSDPA/HSUPA algorithms briefly.

Intended Audience

- Maintenance engineer
- NM engineer

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Chapter 1

Radio Parameters

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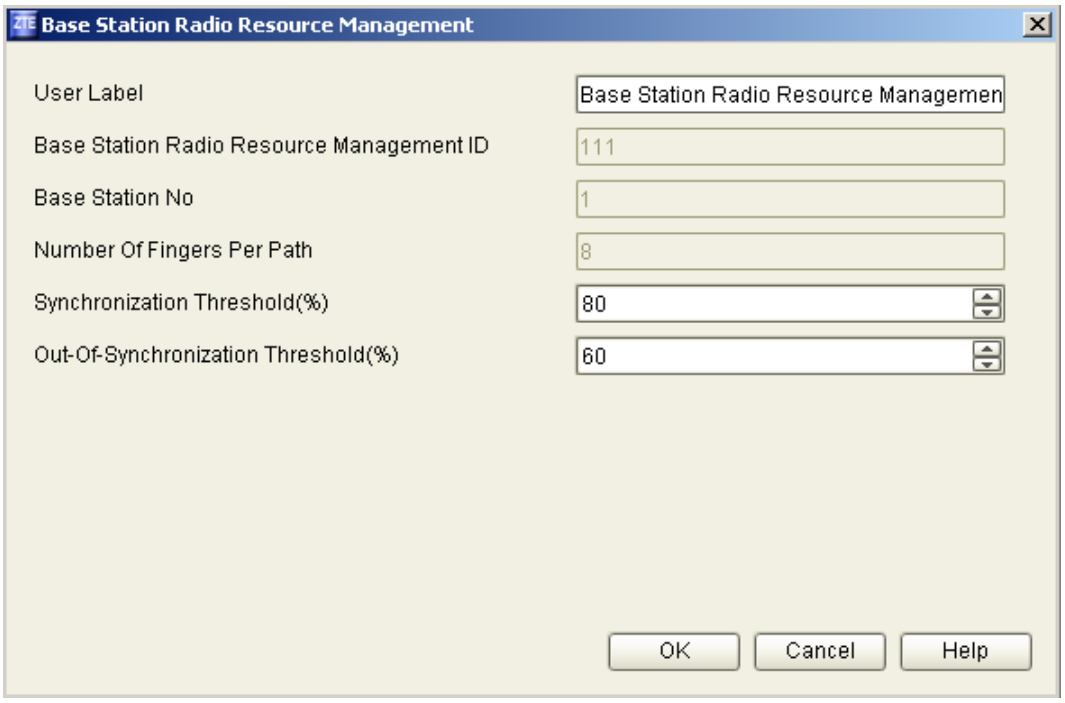
BS Radio Resource Management

Interface The related interface is shown in the figure below.

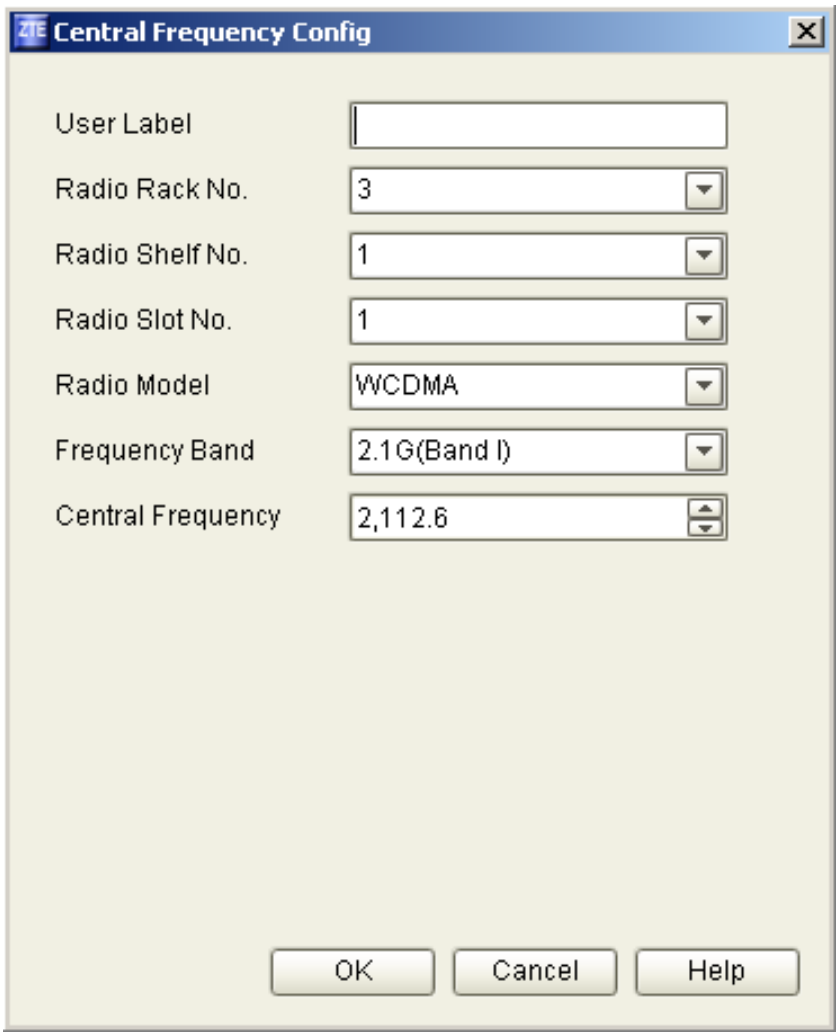


Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Base Station Radio Resource Management ID	BS radio resource management ID	-	Parameter value automatically set by the system
Base Station No	BS ID	–	Parameter value automatically set by the system
Number of Fingers Per Path	Number of fingers used per path	-	Parameter value automatically set by the system
Synchronization Threshold(%)	Threshold from radio link out-of-synchronization/establishment to synchronization (%)	[1, 100]	-
Out-Of-Synchronization Threshold(%)	Threshold from radio link synchronization to out-of-synchronization (%)	[1, 100]	-

Central Frequency

Interface The related interface is shown in the figure below.



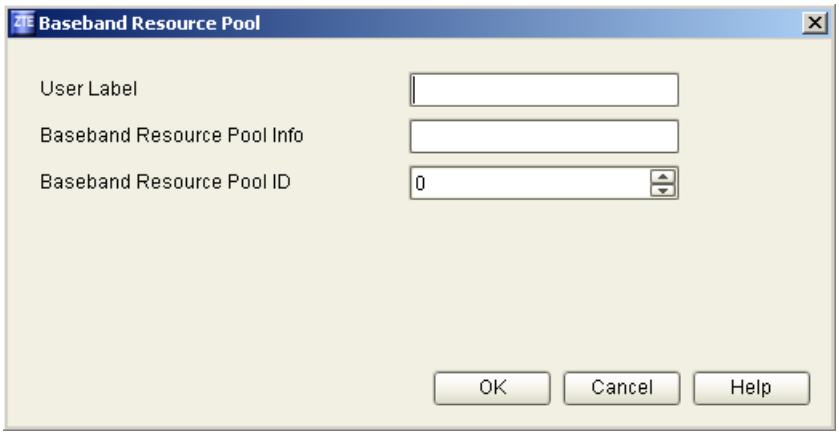
Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Radio Rack No./Radio Shelf No./Radio Slot No.	The RF unit whose central frequency is configured	Location of the RF unit	–
Radio Model	RF unit working mode	{WCDMA, GSM, WCDMA/GSM}	–
Frequency Band	In-Service frequency band of the RF unit	{2.1G(Band I), 1900M(Band II), 1800M(Band III), 850M(Band V), 900M(Band VIII)}	–
Central Frequency	Central frequency of the RF unit (downlink)	Depending on the selected frequency band	–

WCDMA Radio Resource Management

Baseband Resource Pool

Interface The related interface is shown in the figure below.

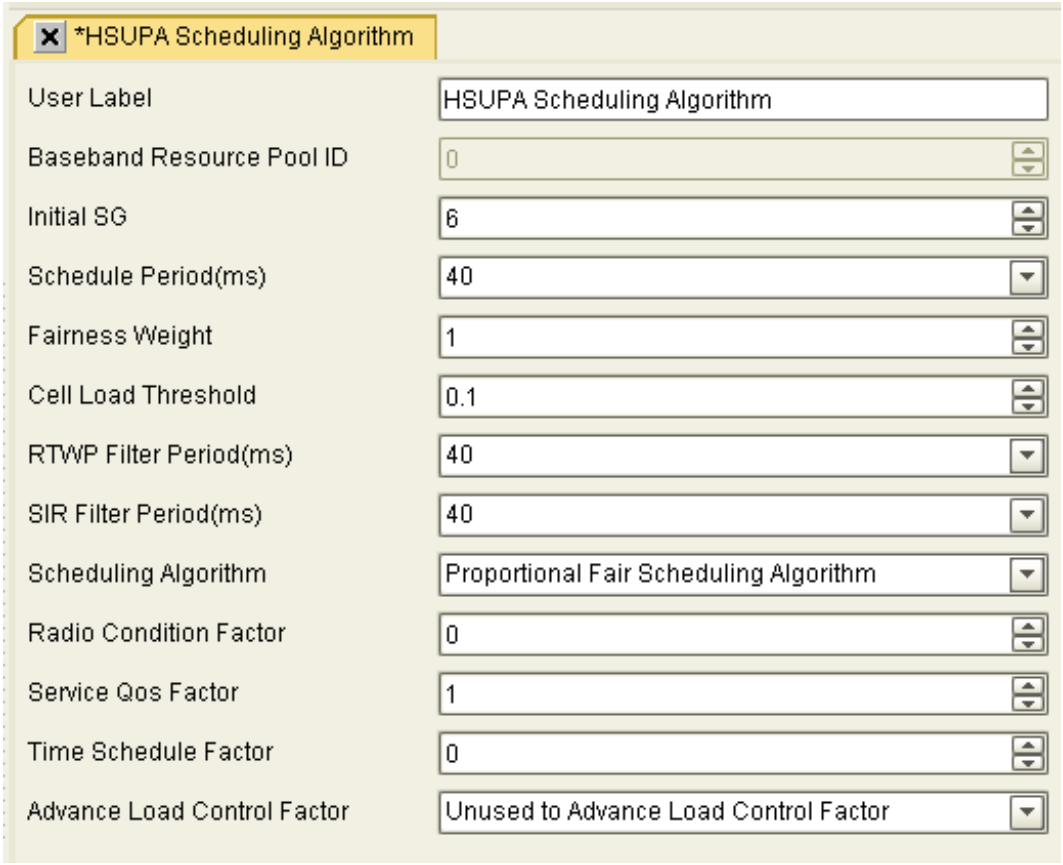


Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range
User Label	Self-Defined name	40 characters at most
Baseband Resource Pool Info	Description of the baseband resource pool	200 characters at most
Baseband Resource Pool ID	Baseband resource pool ID	[0, 35]

HSUPA Scheduling Algorithm

Interface The related interface is shown in the figure below.



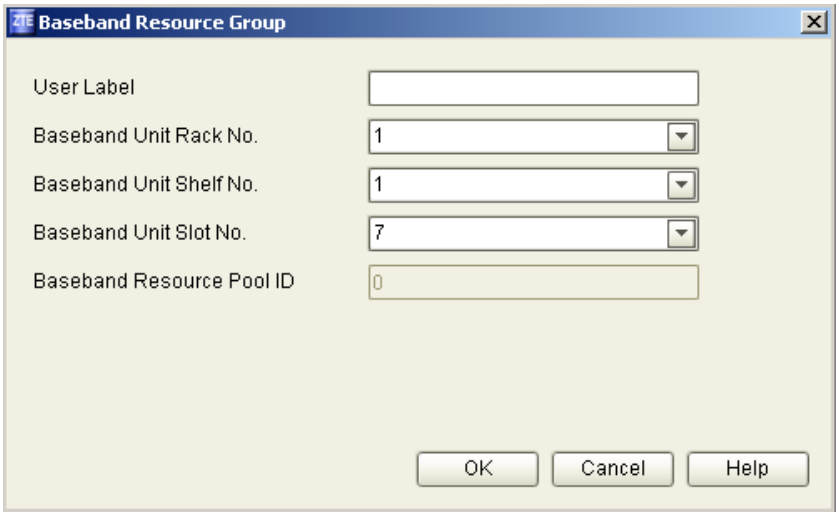
Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Baseband Resource Pool ID	Algorithm application scope (baseband resource pool)	[0, 35]	-
Initial SG	Initial SG value	[0, 38]	Algorithm parameter
Schedule Period	Scheduling period	{2ms, 10ms, 40ms, 80ms, 120ms}	Algorithm parameter
Fairness Weight	Fairness weight value	[1, 16]	Algorithm parameter
Cell Load Threshold	Cell load threshold value	[0.00, 0.10]	Algorithm parameter
RTWP Filter Period	RTWP filter period	{2ms, 10ms, 40ms, 80ms, 120ms}	Algorithm parameter
SIR Filter Period	SIR filter period	{2ms, 10ms, 40ms, 80ms, 120ms}	Algorithm parameter

Parameter	Description	Value Range	Remarks
Scheduling Algorithm	Scheduling algorithm type	{Proportional Fair Scheduling Algorithm, Max C/I Scheduling Algorithm, Round Robin Scheduling Algorithm, Fair Throughput Scheduling Algorithm}	-
Radio Condition Factor	Weight of radio channel quality in the scheduling algorithm	[0, 15]	Algorithm parameter
Service QoS Factor	Weight of service QoS in the scheduling algorithm	[0, 15]	Algorithm parameter
Time Schedule Factor	Weight of time schedule in the scheduling algorithm	[0, 15]	Algorithm parameter
Advance Load Control Factor	Type of advanced load control factor	{Unused to Advance Load Control Factor, Used to Load Control Factor base secondaryAG, The other Load Control Factor}	-

Baseband Resource Group

Interface The related interface is shown in the figure below.

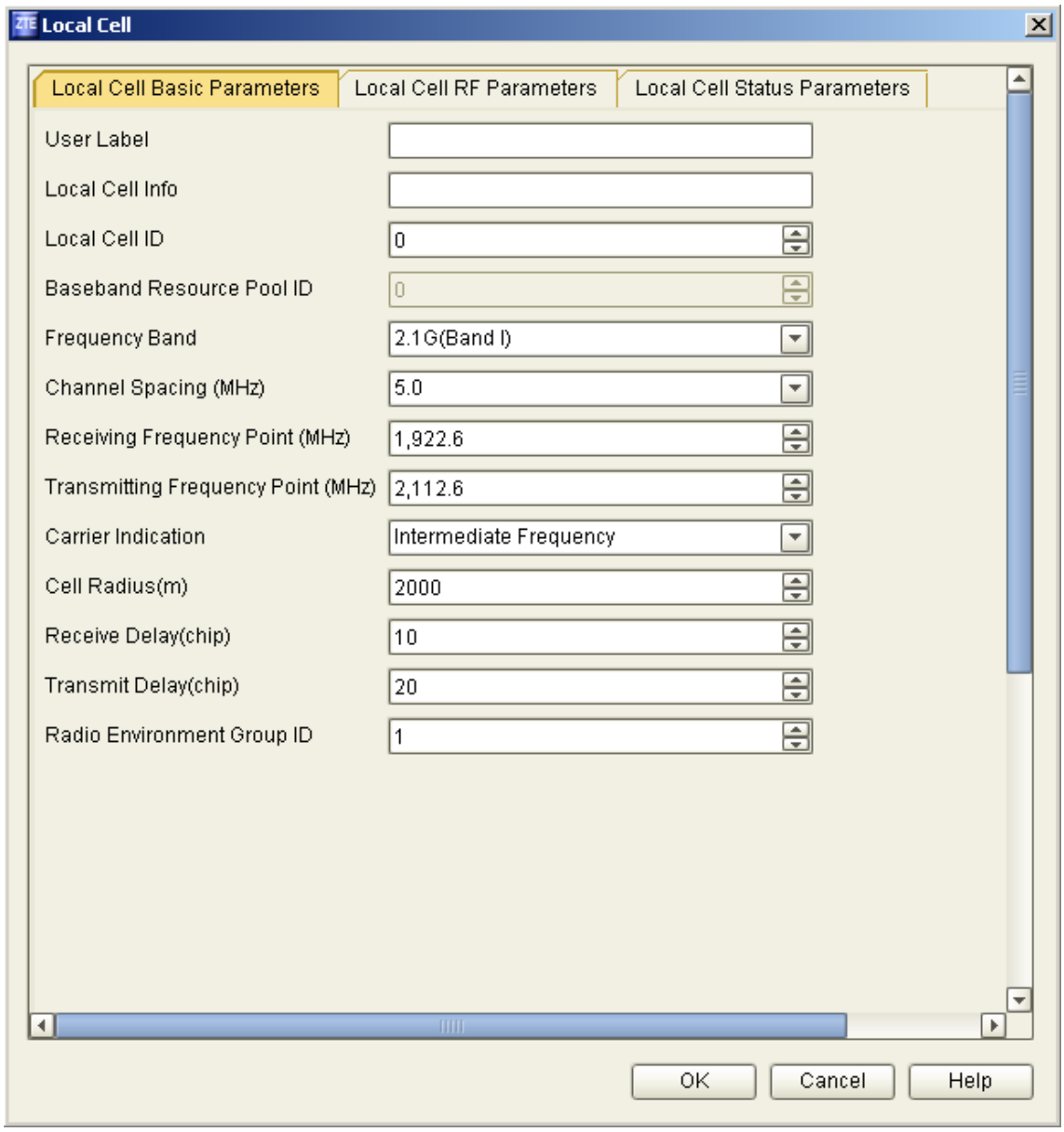


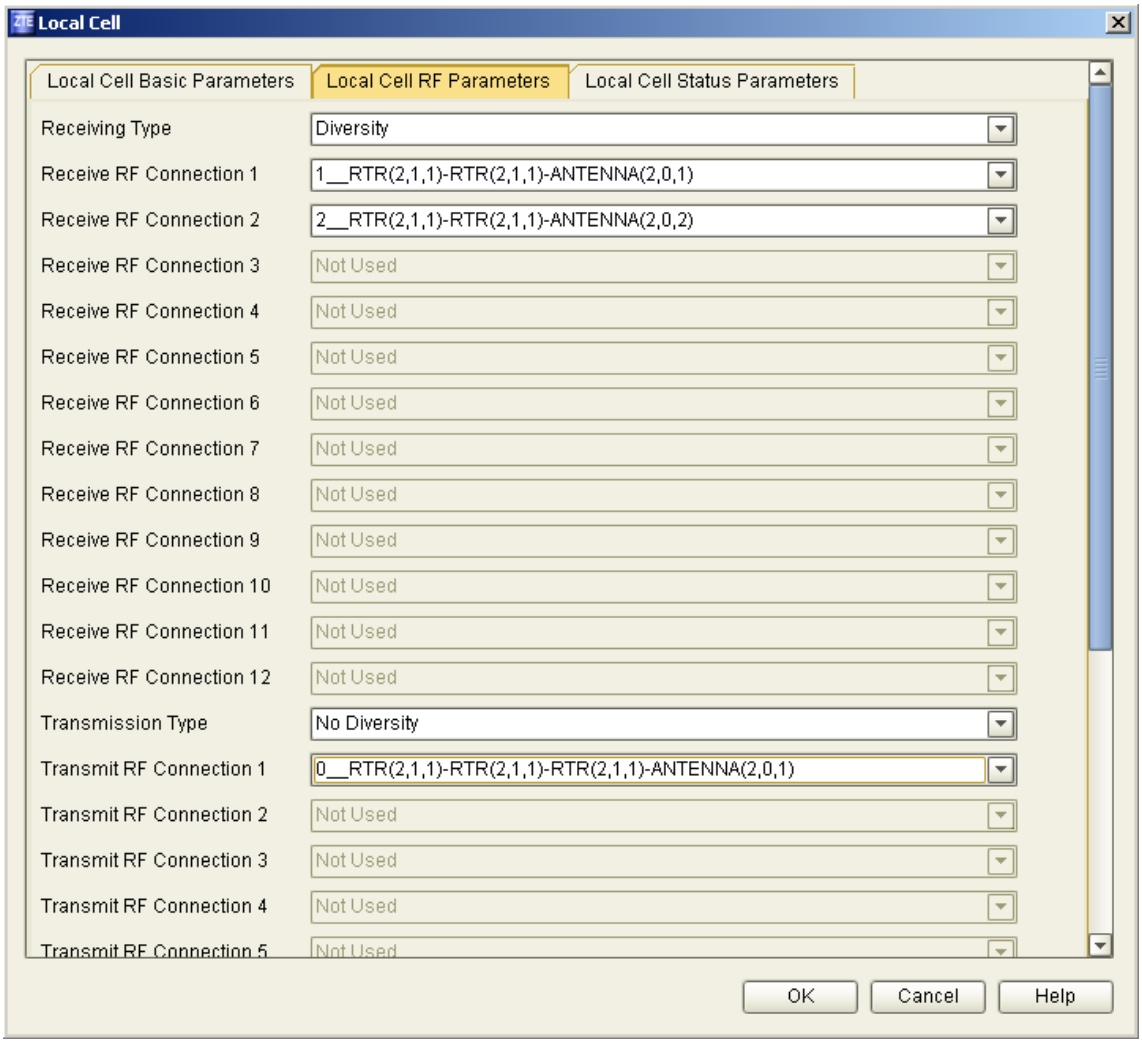
Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Baseband Unit Rack No./Baseband Unit Shelf No./Baseband Unit Slot No.	Location of the baseband processing board	-	-
Baseband Resource Pool ID	The baseband resource pool that the baseband resource belongs to	-	Parameter value automatically set by the system

Local Cell

Interface The related interface is shown in the figure below.


Local Cell
Local Cell Basic Parameters
Local Cell RF Parameters
Local Cell Status Parameters
User Label
Local Cell Info
Local Cell ID
0
Baseband Resource Pool ID
0
Frequency Band
2.1G(Band I)
Channel Spacing (MHz)
5.0
Receiving Frequency Point (MHz)
1,922.6
Transmitting Frequency Point (MHz)
2,112.6
Carrier Indication
Intermediate Frequency
Cell Radius(m)
2000
Receive Delay(chip)
10
Transmit Delay(chip)
20
Radio Environment Group ID
1
OK
Cancel
Help



Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range	Remarks
Local Cell Basic Parameters			
User Label	Self-Defined name	40 characters at most	-
Local Cell Info	Description of local cell	200 characters at most	-
Local Cell ID	Local cell ID	[0, 2^{28}-1]	-
Baseband Resource Pool ID	ID of the baseband resource pool that the local cell belongs to	-	Parameter value automatically set by the system
Frequency Band	UMTS frequency band used by the configuration	Depending on the frequency band supported by the BS	-

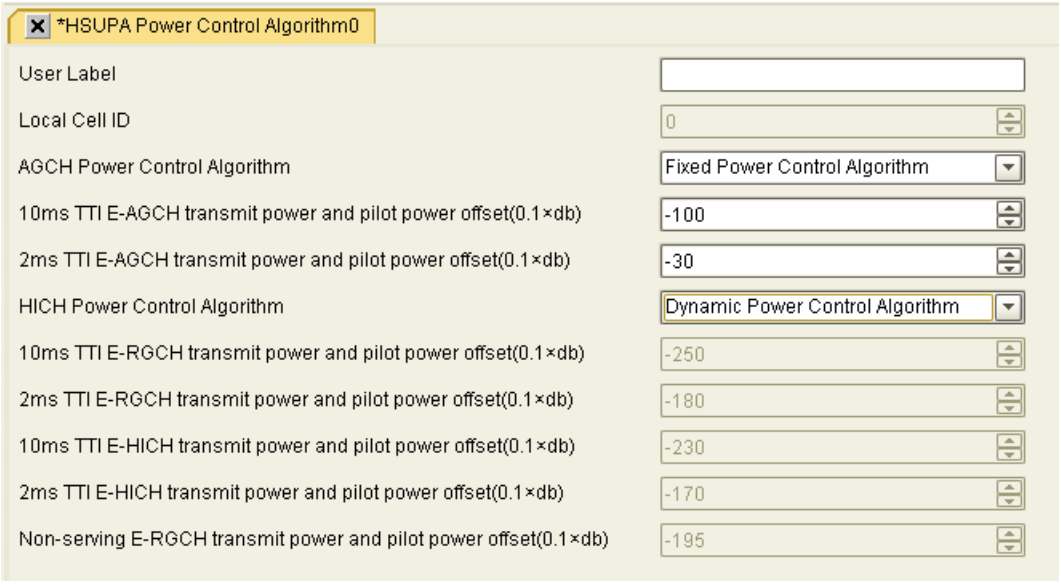
Parameter	Description	Value Range	Remarks
Channel Spacing (MHz)	Channel spacing of WCDMA frequency spectrum	{4.6, 4.8, 5.0}	-
Receiving Frequency Point (MHz)	Cell receiving frequency point (UARFCN)	Uplink frequency range permitted by UMTS frequency band	-
Transmitting Frequency Point (MHz)	Cell transmitting frequency point (UARFCN)	Downlink frequency range permitted by UMTS frequency b and	-
Carrier Indication	Carrier frequency used by the cell	{Low Frequency, Intermediate Frequency, High Frequency}	-
Cell Radius (m)	Cell coverage radius	[0, 120000]	-
Receive Delay (chip)	Receive delay	[0, 65535]	-
Transmit Delay (chip) Radio Environment Group ID	Transmit delay	[0, 65535]	-
Radio Environment Group ID	Radio environment group ID	-	System reserved parameter
Local Cell RF Parameters			
Receiving Type	Receiving type to be configured	Depending on the receiving type supported by the BS	-
Receive RF Connection 1	Receive RF connection ID to be configured	{Configured receiving RF connection}	-
Receive RF Connection 2	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 3	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 4	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 5	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.

Parameter	Description	Value Range	Remarks
Receive RF Connection 6	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 7	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 8	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 9	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 10	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 11	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Receive RF Connection 12	Receive RF connection ID to be configured	{Configured receiving RF connection}	The parameter configurability depends on the receiving type.
Transmission Type	Transmitting type to be configured	Depending on the transmission type supported by the BS	-
Transmit RF Connection 1	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	-
Transmit RF Connection 2	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 3	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 4	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 5	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.

Parameter	Description	Value Range	Remarks
Transmit RF Connection 6	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 7	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 8	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 9	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 10	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 11	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.
Transmit RF Connection 12	Transmit RF connection ID to be configured	{Configured transmitting RF connection}	The parameter configurability depends on the transmitting type.

HSUPA Power Control Algorithm

Interface The related interface is shown in the figure below.



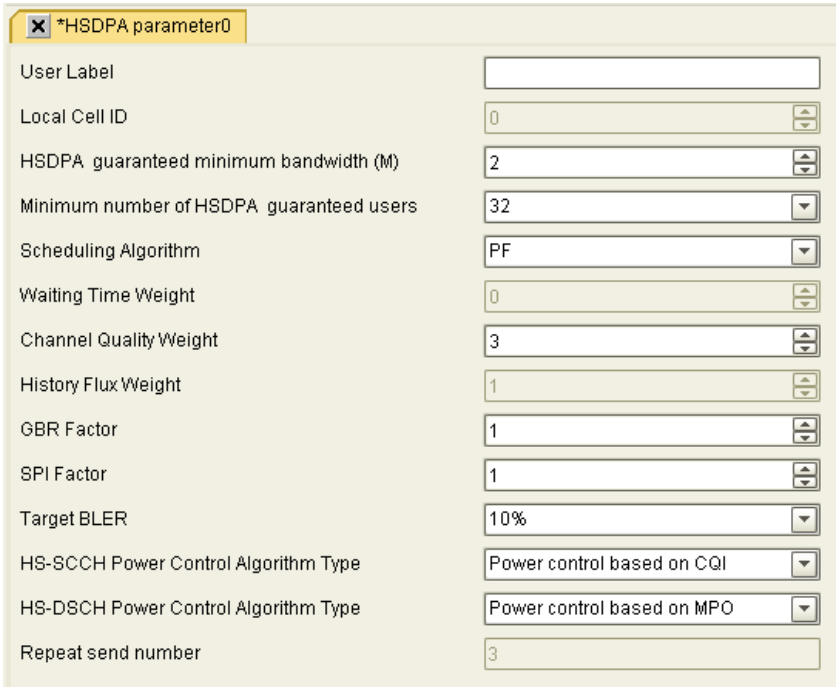
Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Local Cell ID	The local cell that is within the algorithm application scope	–	Parameter value automatically set by the system
AGCH Power Control Algorithm	AGCH power control algorithm type	{Fixed Power Control Algorithm, Dynamic Power Control Algorithm}	Algorithm parameter
10ms TTI E-AGCH transmit power and pilot power offset (0.1×db)	Offset between 10ms TTI E-AGCH transmit power and pilot power	[-280, 50]	Algorithm parameter
2ms TTI E-AGCH transmit power and pilot power offset (0.1×db)	Offset between 2ms TTI E-AGCH transmit power and pilot power	[-280, 50]	Algorithm parameter
HICH Power Control Algorithm	HICH power control algorithm type	{Fixed Power Control Algorithm, Dynamic Power Control Algorithm}	Algorithm parameter
10ms TTI E-RGCH transmit power and pilot power offset (0.1×db)	Offset between 10ms TTI E-RGCH transmit power and pilot power	[-280, 50]	Algorithm parameter
2ms TTI E-RGCH transmit power and pilot power offset (0.1×db)	Offset between 2ms TTI E-RGCH transmit power and pilot power	[-280, 50]	Algorithm parameter

Parameter	Description	Value Range	Remarks
10ms TTI E-HICH transmit power and pilot power offset (0.1×db)	Offset between 10ms TTI E-HICH transmit power and pilot power	[-280, 50]	Algorithm parameter
2ms TTI E-HICH transmit power and pilot power offset (0.1×db)	Offset between 2ms TTI E-HICH transmit power and pilot power	[-280, 50]	Algorithm parameter
Non-serving E-RGCH transmit power and pilot power offset (0.1×db)	Offset between Non-serving E-RGCH transmit power and pilot power	[-280, 50]	Algorithm parameter

HSDPA Parameter

Interface The related interface is shown in the figure below.



Parameter Parameter description is shown in the table below.

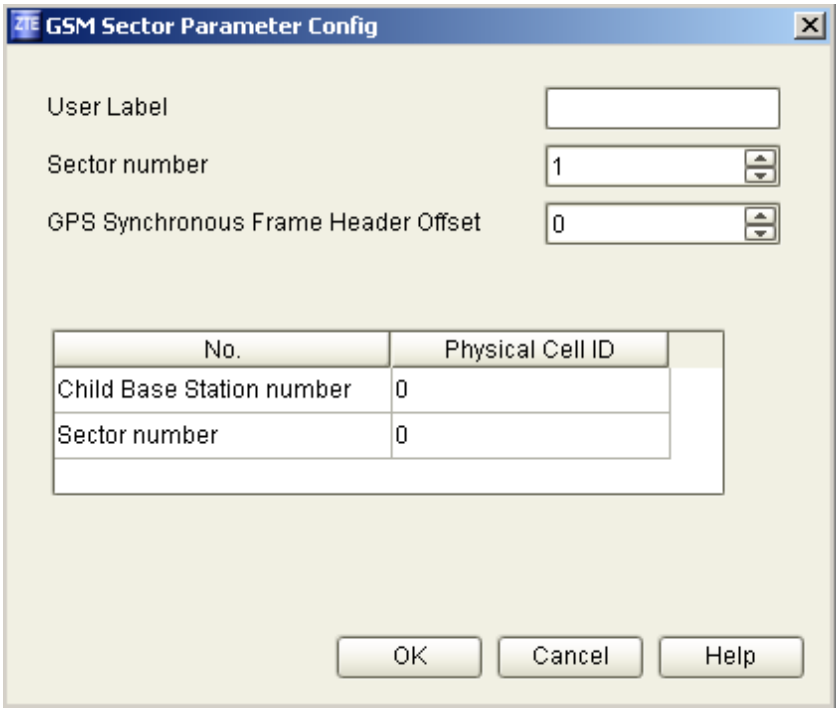
Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Local Cell ID	The local cell that is within the algorithm application scope	–	Parameter value automatically set by the system

Parameter	Description	Value Range	Remarks
HSDPA guaranteed minimum bandwidth (M)	Guaranteed minimum HSDPA bandwidth	[2, 14.4]	The lower limit of parameter value (2M) is mainly determined by minimum UE download speed of HSDPA, as the maximum download speed of HSDPA-Category-12 UE is 1.6M.
Minimum number of HSDPA guaranteed users	Guaranteed minimum number of HSDPA users	{32, 64, 96}	The maximum number of cell HSUPA UEs cannot be over 64.
Scheduling Algorithm	HSDPA scheduling algorithm	{Max-C/I, RR, PF}	-
Waiting Time Weight	Waiting time weight	[0]	Value fixed as 0; currently deactivated
Channel Quality Weight	Channel quality weight	[1, 6]	algorithm parameter; weight of channel quality in PF algorithm
History Flux Weight	History flux weight	[1]	Value fixed as 1; currently deactivated
GBR Factor	Compensation for users of Streaming service	[1, 255]	PF algorithm parameter; currently deactivated
SPI Factor	QUE priority Compensation	[1, 4]	PF algorithm parameter; currently deactivated
Target BLER	Target BLER	{10%, 15%, 20%}	Target BLER, based on which OLRC algorithm adjusts HSDSCH power
HS-SCCH Power Control Algorithm Type	HS-SCCH power control algorithm type	{Fixed power control, Power control based on CQI, Power control following DPCCH}	Algorithm parameter
HS-DSCH Power Control Algorithm Type	HS-DSCH power control algorithm type	{Power control based on MPO, Average power control}	Algorithm parameter
Repeat send number	Retransmission times	3	The maximum packet retransmission times; value fixed as 3

GSM Radio Resource Management

GSM Sector

Interface The related interface is shown in the figure below.



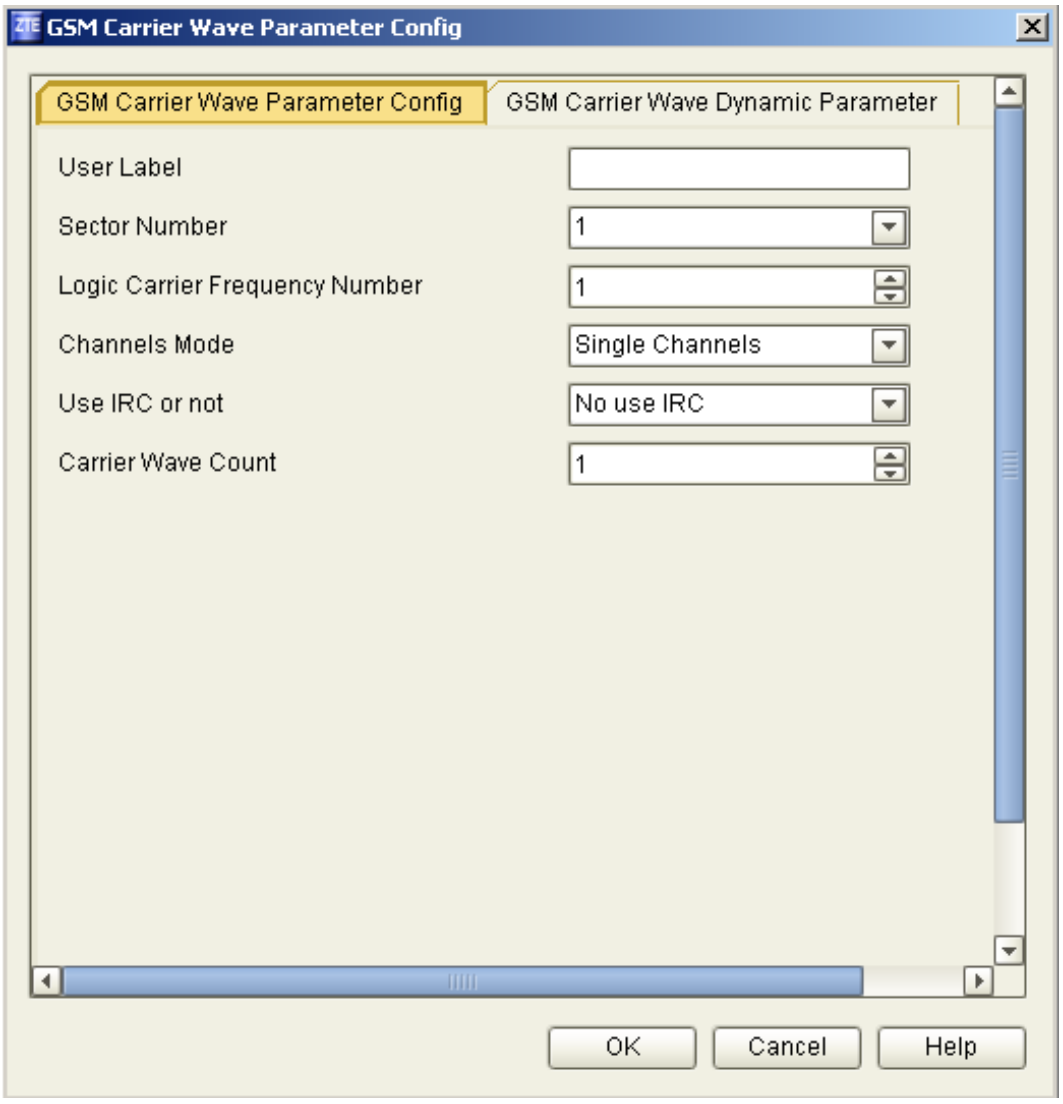
Parameter Parameter description is shown in the table below.

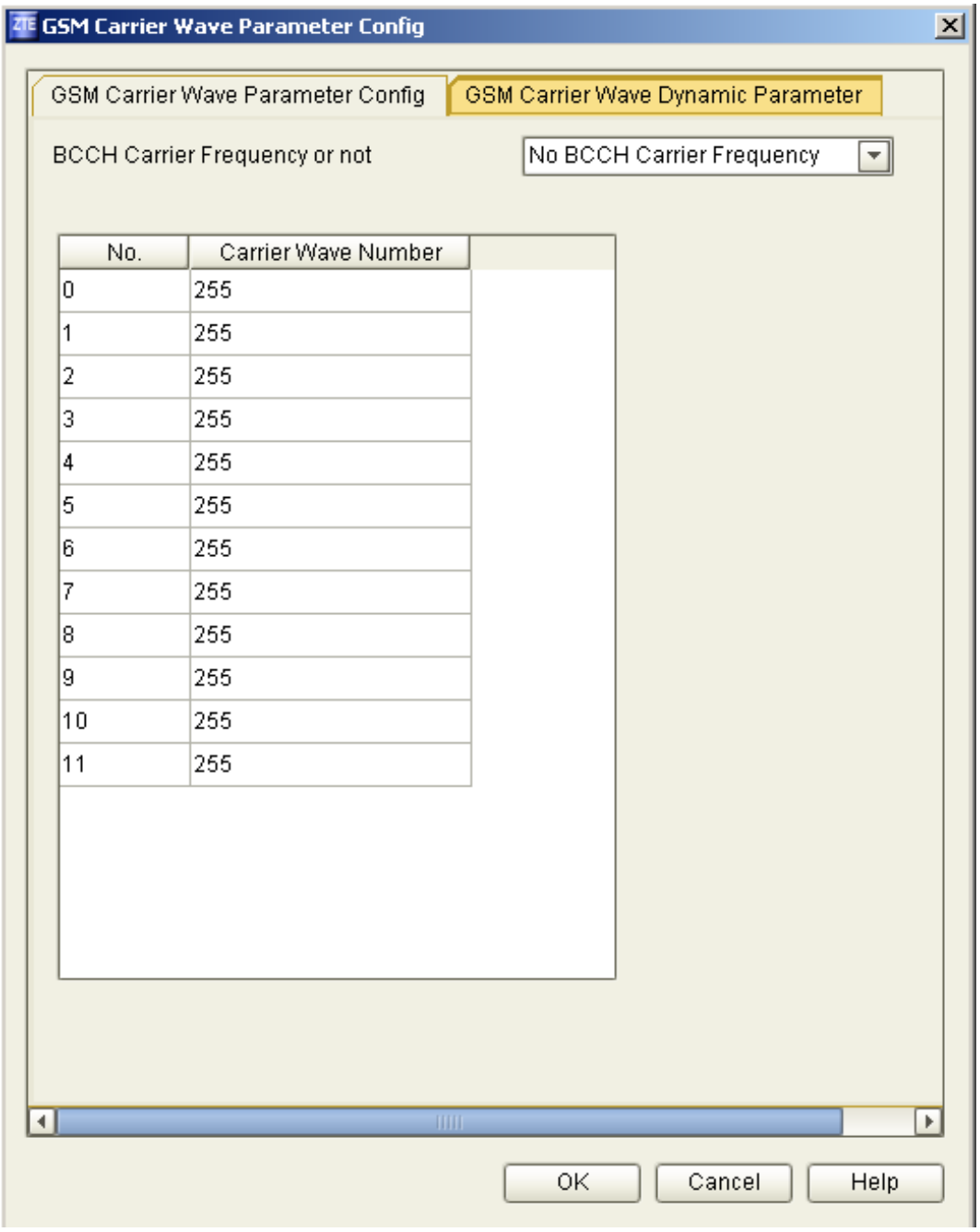
Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Sector number	Logical cell ID	1 24	–
GPS Synchronous Frame Header Offset	Configured frame number offset for each GSM cell when the SDR BSs use the same reference frame-number in whole GPS network synchronization	0 50	–
Physical Cell ID	The high five bits represent Child BS No, and the low three	0 198	The selectable sector number of GSM carrier wave is based

Parameter	Description	Value Range	Remarks
	bits represent Sector No.		on the configured sector number in this parameter.

GSM Carrier Wave

Interface The related interface is shown in the figure below.





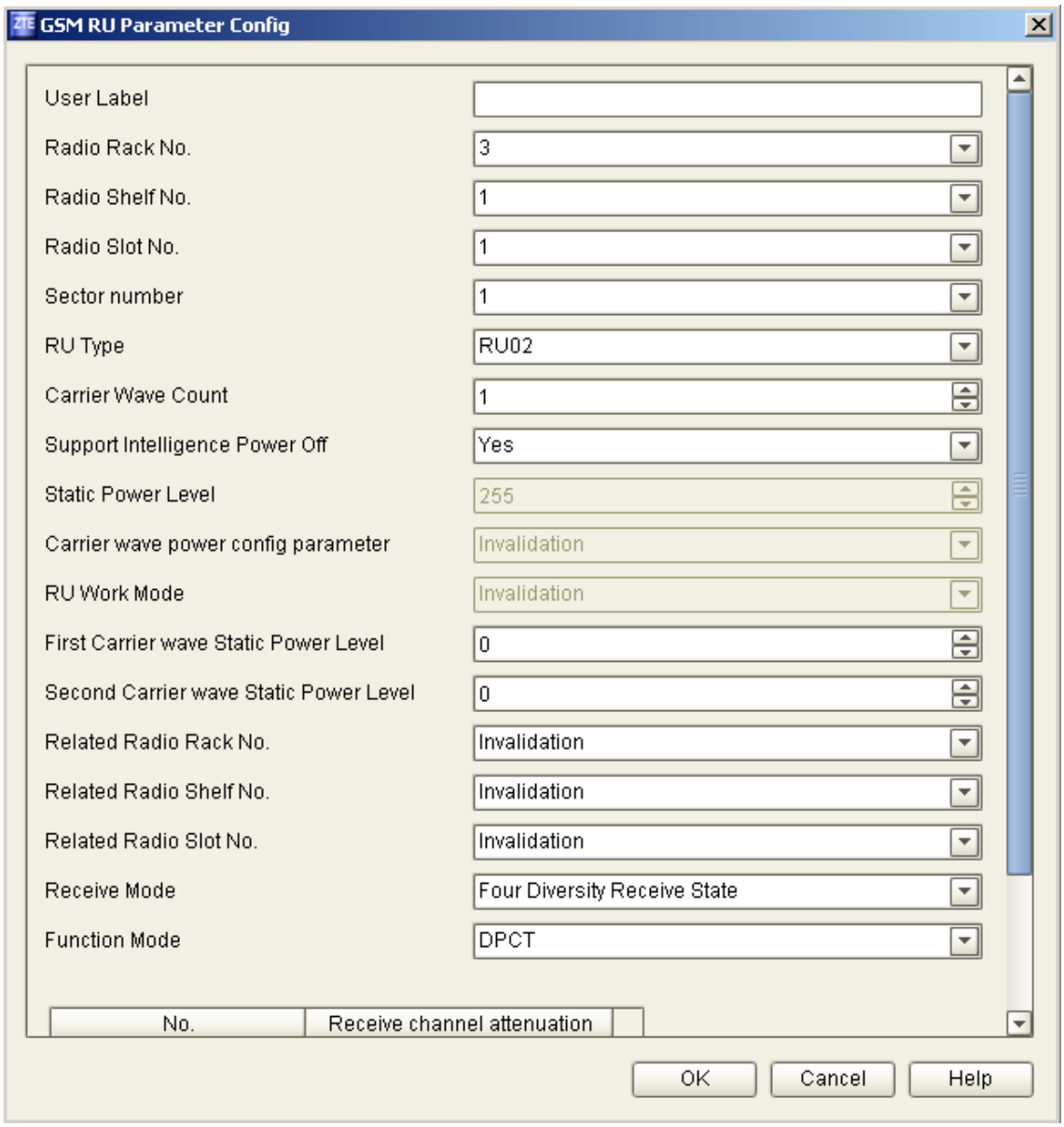
Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Sector Number	Logical cell ID	1 24	–
Logic Carrier Frequency Number	Logical ID of the carrier frequency	1 54	–

Parameter	Description	Value Range	Remarks
Channels Mode	IQ Channel indicates IQ data. Single channel means one line of IQ data used by one carrier wave; double channels means two lines of IQ data; Multiple channels means multiple lines of IQ data. Thiple channels do not exist.	{Single Channels, Double Channels, Multiple Channels}	–
Use IRC or not	Uplink noise suppression algorithm	{No Use IRC, Use IRC}	
Carrier Wave Count	The number of physical carrier waves required by the logical carrier frequency The parameter is related to the BS concurrent working mode.	1 12	
BCCH Carrier Frequency or not	Whether the carrier frequency is BCCH carrier frequency	{BCCH Carrier Frequency, No BCCH Carrier Frequency}	

GSM RU

Interface The related interface is shown in the figure below.



Parameter Parameter description is shown in the table below.

Parameter	Description	Value Range	Remarks
User Label	Self-Defined name	40 characters at most	-
Radio Rack No.	Radio rack No. Related to the RF rack No. configured in ground resource management	-	–

Parameter	Description	Value Range	Remarks
Radio Shelf No.	Radio shelf No. Related to the RF shelf No. configured in ground resource management	-	–
Radio Slot No.	Radio slot No. Related to the RF slot No. configured in ground resource management	-	–
Sector number	Related to GSM sector parameter configuration	-	–
RU Type	RU type	-	Related to the radio rack/shelf/slot No.
Carrier wave count	The number of carrier waves planned to be used by the carrier frequency	1 6	–
Support Intelligence Power Off	Whether intelligent power off is supported by the RU	{Yes, No}	-
Static Power Level	The static power level of RU60 carrier wave, altogether 10 levels The configuration is based on network planning	0 10	-
Carrier wave power config parameter	Power sharing mode of RU60 carrier wave	{60W,30W,20W,15W ,12W,10W}	1. 60 W: share one carrier wave power 2. 30 W: share the power of two carrier waves 3. 20 W: share the power of three carrier waves 4. 15 W: share the power of four carrier waves 5. 12 W: share the power of five carrier waves 6. 10 W: share the power of six carrier waves
RU Work Mode	RU60 working mode	{Independence Work Mode, Expand Work Mode}	-
First Carrier wave Static Power Level	Power level of RU02/RU02E Carrier Wave 1	0 6	-

Parameter	Description	Value Range	Remarks
Second Carrier wave Static Power Level	Power level of RU02/RU02E Carrier Wave 2	06	-
Related Radio Rack No.	-	-	-
Related Radio Shelf No.	-	-	-
Related Radio Slot No.	-	-	-
Receive Mode	RU02/RU02 diversity receiving mode	{Normal Two Multiple Diversity Receive State, Four Diversity Receive State}	-
Function Mode	RU02/RU02E function mode	{Normal Mode, DPCT, DDT, Antenna Jumper}	-
Receive channel attenuation			

Chapter 2

Algorithm Overview

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HSDPA Algorithm

Scheduling Algorithm

RR

Among the three scheduling algorithms, RR is the simplest one which lets every user to take turns to transmit in an orderly fashion. Data flow that has waited longest time is given scheduling priority.

Relative Priority = Current Time — Last Time of QUE scheduling

MAX-C/I

Packet feature in MAX-C/I Algorithm takes into consideration the QUE wait time length, QUE discard time length and QUE QoS. The formula for calculating packet feature and relative priority is as follows:

- PackFeature = (Qos × WaitTimeLength) / DiscaTimeLength
- Relative Priority = (CQI * TBSIZE) * PackFeature

PF

PF emphasizes the proportional fairness between history flux and channel quality. Relative priority of PF algorithm takes into consideration such parameters as UE channel quality (CQI), transport block size (TBSIZE), configured QUE priority weight, and channel quality weight.

Relative Priority = (Channel Quality Weight * QUE Priority Weight * CQI * TBSIZE) / (1 + History Flux)

History flux is the aggregate of past scheduled QUE data per TTI. QUE history flux is attenuated by a certain ratio at each TTI.

For example, QUE history flux is reduced by 4% after each TTI (2ms) scheduling. The sum of QUE flux successfully scheduled per TTI is history flux, whose calculation formula is as follows.

History Flux = A * (0.96^n + 0.96^(n-1) …… 0.96)

Since the amount of scheduled QUE data at each TTI might vary, A is an approximate number. If n is large enough, the calculated History Flux will be around 25A. (In a geometric sequence, when the value of geometric proportion is 0.96, the summed value of numbers in the sequence is 0.96/(1–0.96), which is about 25.)

OLRC Algorithm

OLRC algorithm is to achieve BLER control under certain HSDSCH power via quickly adjusting TBSIZE. OLRC adjustment period is 2 ms, and the algorithm is based on the ACK and NACK feedback of UE uplink HSDPCCH.

HSDPA Power Control Algorithm

Power control plays a key role in system performance, and the quality of power control algorithm directly affects the proper function of the system.

The nature of power control is to allocate sufficient power to QUE based on user demand and the condition of the currently scheduled QUE, so that data can be successfully transmitted from air interface.

HSDPA power includes HSSCCH power and HSPDSCH power. HSSCCH power control and HSDSCH power control are mainly involved in user scheduling. HSSCCH power control can be further divided into fixed power control, power control following DPCCH, and power control based on CQI, and HSPDSCH power control can be further divided into power control based on MPO and average power control.

HSUPA Algorithm

Scheduling Algorithm

RR

RR algorithm lets every active data flow (that has data packets in queue) to take turns in transferring packets on a shared channel in a periodically repeated order. RR scheduling is easy to implement. In addition, RR is insensative to channel conditions, thus ensuring radio resources are allocated to all data flows in an equal way. The shortcomings of RR are low system throughput and poor performance.

MAX-C/I

MAX-C/I algorithm prioritizes packets with the highest instantaneous data rate at each TTI. MAX-C/I is advantageous in terms of cell throughput, but poor in terms of scheduling fairness, as UEs with poor channel conditions are allocated few radio resources.

PF

The general purposes of network planning are greatest bandwidth utilization and "fairness" between different service flows. Similarly, the commonly used Min-Max principle strives to "equalize" all service flows by equalizing the normalization results of weights assigned to different service-flows.

For the next TTI, the system based on PF algorithm schedules the UE which corresponds to the calculation result of the following formula. r_n is the average throughput assigned to UE before the Nth timeslot. d_n is the instantaneous data rate of UE at the next TTI.

$$j = \arg\max_i \frac{d_n}{r_n}$$

The value of r_n at each TTI can be refreshed using the following recursive expression:

$$r_n = \begin{cases} (1-a)r_{n,old} + ad_n & \text{(when providing service to UE n)} \\ (1-a)r_{n,old} & \text{(other cases)} \end{cases}$$

$r_{n,old}$ is the former value of r_n. a is the forgetting factor, and a^{-1} is the average period of equivalent effect in multiple TTIs.

HSUPA Power Control Algorithm

Power control plays a key role in system performance, and the quality of power control algorithm directly affects the proper function of the system.

HSUPA power control algorithm mainly involves downlink signaling control channels, including E-AGCH, and E-HICH/E-RGCH.

HSUPA power control algorithm can be divided into fixed power control algorithm and dynamic power control algorithm.

Fixed power control algorithm assigns sufficient and fixed transmission power to each HSUPA UE in the cell. Although simple in power configuration, this algorithm may cause a waste of Node B power resource and unwanted interference in the cell.

Dynamic power control algorithm assigns different power offsets of downlink DPCCH pilot domain for E-AGCH and E-HICH/E-RGCH channels. During downlink inner-loop power control, the power of E-AGCH and E-HICH/E-RGCH changes with that of downlink DPCCH.

For 2ms TTI and 10ms TTI, parameter settings of downlink signaling control channel power are different.

Figures

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Tables

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List of Glossary

AGCH - Absolute Grant Channel
DPCCH - Dedicated Physical Control Channel
GSM - Global System for Mobile communication
HICH - HARQ Acknowledgement Indicator Channel
HSDPA - High Speed Downlink Packet Access
QoS - Quality of Service
RGCH - Relative Grant Channel
RTWP - Received Total Wide Band Power
SG - Serving Grant
SIR - Signal to Interference Ratio
UMTS - Universal Mobile Telecommunication System
WCDMA - Wideband Code Division Multiple Access