

BG96 QuecCell

AT Commands Manual

LTE Module Series

Rev. BG96_QuecCell_AT_Commands_Manual_V1.0

Date: 2018-08-21

Status: Released



Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.

7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local office. For more information, please visit:

<http://www.quectel.com/support/sales.htm>

For technical support, or to report documentation errors, please visit:

<http://www.quectel.com/support/technical.htm>

Or email to: support@quectel.com

GENERAL NOTES

QUECTEL OFFERS THE INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

COPYRIGHT

THE INFORMATION CONTAINED HERE IS PROPRIETARY TECHNICAL INFORMATION OF QUECTEL WIRELESS SOLUTIONS CO., LTD. TRANSMITTING, REPRODUCTION, DISSEMINATION AND EDITING OF THIS DOCUMENT AS WELL AS UTILIZATION OF THE CONTENT ARE FORBIDDEN WITHOUT PERMISSION. OFFENDERS WILL BE HELD LIABLE FOR PAYMENT OF DAMAGES. ALL RIGHTS ARE RESERVED IN THE EVENT OF A PATENT GRANT OR REGISTRATION OF A UTILITY MODEL OR DESIGN.

Copyright © Quectel Wireless Solutions Co., Ltd. 2018. All rights reserved.

About the Document

History

Revision	Date	Author	Description
1.0	2018-08-21	Walker HAN	Initial

Contents

About the Document	2
Contents	3
1 Introduction	4
2 Description of QuecCell Related AT Commands	5
2.1. AT+QENG Switch on/off Engineering Mode	5
2.2. AT+QCOPS Scan for Current Available Networks.....	10
3 Appendix A Reference.....	12

1 Introduction

QuecCell function is a feature embedded in Quectel BG96 module. It can be used to scan the detailed information of base stations. This document introduces the AT commands relating to BG96's QuecCell function.

2 Description of QuecCell Related AT Commands

2.1. AT+QENG Switch on/off Engineering Mode

The engineering mode is designed to report the information of serving cells, neighbour cells and Packet Switch parameters. The command is used to switch on/off the mode.

AT+QENG Switch on/off Engineering Mode	
Test Command AT+QENG=?	Response +QENG: (list of supported <celltype>s) OK
Write Command Query the information of serving cell AT+QENG="servingcell"	Response In the case of GSM mode: +QENG: "servingcell",<state>,"GSM",<mcc>,<mnc>,<lac>,<cellid>,<bsic>,<arfcn>,<band>,<rxlev>,<txp>,<rla>,<drx>,<c1>,<c2>,<gprs>,<tch>,<ts>,<ta>,<maio>,<hsn>,<rxlevsub>,<rxlevfull>,<rxqualsub>,<rxqualfull>,<voicemode> OK In the case of LTE Cat M1/Cat NB1 mode: +QENG: "servingcell",<state>,"rat",<is_tdd>,<mcc>,<mncc>,<cellid>,<pcid>,<earfcn>,<freq_band_ind>,<ul_bandwidth>,<dl_bandwidth>,<tac>,<rsrp>,<rsrq>,<rssi>,<sinr>,<srxlev> OK
Write Command Query the information of neighbour cells: AT+QENG="neighbourcell"	Response In the case of GSM mode: [+QENG: "neighbourcell","GSM",<mcc>,<mnc>,<lac>,<cellid>,<bsic>,<arfcn>,<rxlev>,<c1>,<c2>,<c31>,<c32> [...]] OK

	<p>OK</p> <p>In the case of LTE Cat M1/Cat NB1 mode:</p> <p>[+QENG: "neighbourcell intra","rat",<earfcn>,<pcid>,<rsrq>,<rsrp>,<rssi>,<sinr>,<srlev>,<cell_resel_priority>,<s_non_intra_search>,<thresh_serving_low>,<s_intra_search></p> <p>[...]</p> <p>[+QENG: "neighbourcell inter","rat",<earfcn>,<pcid>,<rsrq>,<rsrp>,<rssi>,<sinr>,<srlev>,<threshX_low>,<threshX_high>,<cell_resel_priority></p> <p>[...]</p> <p>OK</p>
Reference	

Parameter

<celltype>	String format. The information of different cells. "servingcell" The information of GSM/LTE Cat M1/LTE Cat NB1 serving cells "neighbourcell" The information of GSM/LTE Cat M1/LTE Cat NB1 neighbour cells
<state>	String format. UE state. "SEARCH" UE is searching but could not (yet) find a suitable cell "LIMSRV" UE is camping on a cell but has not registered on the network "NOCONN" UE is camping on a cell and has registered on the network; it's in the idle mode "CONNECT" UE is camping on a cell and has registered to the network, and a call is in progress
<rat>	String format. Radio access technologies, including: "GSM" GSM "CAT-M" LTE Cat M1 "CAT-NB" LTE Cat NB1
<mcc>	Number format. Mobile country code (the first part of the PLMN code) "_" Invalid
<mnc>	Number format. Mobile network code (the second part of the PLMN code) "_" Invalid
<lac>	Hexadecimal format. Location area code. The parameter determines the two-byte location area code in hexadecimal format (e.g. 00C1 equals 193 in decimal) of the cell that was scanned. Range: 0-65535. "_" Invalid
<cellid>	Hexadecimal format. Cell ID. The parameter determines the 16-bit (GSM) or 28-bit (LTE) cell ID. Range: 0-0xFFFFFFFF "_" Invalid

<bsic>	Number format. Base station identification code. Range: 0-63.
<arfcn>	Number format. The parameter determines the ARFCN of the cell that was scanned. Range: 0-1023.
<band>	Number format. The current GSM band. 0 DCS1800 1 PCS1900 "_" Other bands
<rxlev>	Number format. The RX level value for base station selection that is mapped from the measured signal level (see <i>3GPP 45.008</i>). Range: 0-63. Subtracting 111 from the RX level value, a dBm value will be got.
<txp>	Number format. The maximum TX power level an MS may use when accessing the system. Range: 0-31.
<rla>	Number format. The minimum received signal level at the MS required for accessing to the system. Range: 0-63.
<drx>	Number format. Discontinuous reception cycle length.
<c1>	Number format. The path loss criterion used for cell selection and reselection.
<c2>	Number format. The reselection criterion used for cell reselection only.
<gprs>	Number format. Whether the current cell supports GPRS. 0 Not support GPRS 1 Support GPRS
<tch>	Number format. In hopping, displays 'h', otherwise displays the current ARFCN in voice call.
<ts>	Number format. Timeslot number in voice call.
<ta>	Number format. Timing advance in voice call. Range: 0-63.
<maio>	Number format. Mobile allocation index offset in voice call.
<hsn>	Number format. Hopping sequence number in voice call.
<rxqualsub>	Number format. RX quality (sub) in voice call. Range: 0-7.
<rxqualfull>	Number format. RX quality (full) in voice call. Range: 0-7.
<rxlevsub>	Number format. RX level (sub) in voice call. Range: 0-63.
<rxlevfull>	Number format. RX level (full) in voice call. Range: 0-63.
<voicecodec>	String format. Channel mode during a voice call. "HR" Half rate "FR" Full rate "EFR" Enhanced full rate "AMR" Adaptive multi-rate "AMRHR" AMR half rate "AMRFR" AMR full rate "AMRWB" AMR wide band "_" Invalid
<is_tdd>	TDD or FDD mode.
<pcid>	Physical Cell ID.
<earfcn>	Number format. E-UTRA absolute radio frequency channel number.
<freq_band_ind>	E-UTRA frequency band (see <i>3GPP 36.101</i>)
<ul_bandwidth>	Number format. UL bandwidth.

	0	1.4MHz
	1	3MHz
	2	5MHz
	3	10MHz
	4	15MHz
	5	20MHz
<dl_bandwidth>	Number format. DL bandwidth.	
	0	1.4MHz
	1	3MHz
	2	5MHz
	3	10MHz
	4	15MHz
	5	20MHz
<tac>	Tracking area code (see 3GPP 23.003 Section 19.4.2.3).	
<rsrp>	Reference signal received power (see 3GPP 36.214 Section 5.1.1).	
<rsrq>	Reference signal received quality (see 3GPP 36.214 Section 5.1.2).	
<rssi>	Number format. The received signal strength indication.	
<sinr>	Number format. Logarithmic value of SINR, and the values are only the first 1/5 part of the dB value. Range: 0-250, which translates to -20dB - +30dB.	
<srlev>	Number format. Cell selection RX level value (dB) (see 3GPP 36.304)	
<c31>	Number format. The signal level threshold criterion for hierarchical cell structures (HCS). The parameter is used to determine whether prioritised hierarchical GPRS and LSA cell re-selection shall apply.	
<c32>	Number format. The cell ranking criterion which is used to select cells among those with the same priority.	
<cell_resel_priority>	Cell reselection priority. Range: 0-7.	
<s_non_intra_search>	Threshold to control non-intra frequency searches.	
<thresh_serving_low>	The threshold of <srlev> (in dB) used by the UE on the serving cell when reselecting towards a lower priority RAT/ frequency.	
<s_intra_search>	Threshold to control intra frequency searches.	
<threshX_low>	To be referenced when reselection. The suitable receive level value of an evaluated lower priority cell must be greater than this value.	
<threshX_high>	To be referenced when reselection. The suitable receive level value of an evaluated higher priority cell must be greater than this value.	

NOTE

If “-” or - is returned, it indicates the parameter is invalid under current condition.

Example

```
AT+QENG="servingcell"
+QENG: "servingcell","SEARCH"
```

OK

AT+QENG="servingcell"

+QENG:"servingcell","LIMSRV","GSM",460,01,5504,2B55,52,123,0,-67,5,14,64,30,28,0,-,-,-,-,-,-,-,-,-,-,"
_"

OK

AT+QENG="servingcell"

+QENG:"servingcell","NOCONN","GSM",460,01,5504,2B55,52,123,0,-111,5,14,64,0,0,0,-,-,-,-,-,-,-,-,-,-,"
_"

OK

AT+QENG="servingcell"

+QENG: "servingcell","NOCONN","CAT-NB","FDD",460,11,DDA1451,280,2506,5,0,0,69C9,-84,-17,-
67,8,44

OK

AT+QENG="servingcell"

+QENG: "servingcell","NOCONN","CAT-M","FDD",460,11,6935932,30,1825,3,4,4,6934,-98,-16,-65,7,
29

OK

AT+QENG="neighbourcell"

+QENG: "neighbourcell","GSM",0,3,14,50,255,0,0,-1920,0
+QENG: "neighbourcell","GSM",94,3,14,50,255,0,0,-1920,0
+QENG: "neighbourcell","GSM",93,3,14,50,255,0,0,-1920,0

OK

AT+QENG="neighbourcell"

+QENG: "neighbourcell intra","CAT-NB",2506,224,-12,-81,-68,0,59,0,50,0,50
+QENG: "neighbourcell intra","CAT-NB",2506,280,-14,-81,-67,0,47,0,50,0,50
+QENG: "neighbourcell intra","CAT-NB",2506,281,-15,-81,-66,0,58,0,50,0,50

OK

AT+QENG="neighbourcell"

+QENG: "neighbourcell intra","CAT-M",1825,30,-17,-99,-65,0,28,5,20,10,58
+QENG: "neighbourcell intra","CAT-M",1825,44,-17,-98,-72,0,29,5,20,10,58
+QENG: "neighbourcell intra","CAT-M",1825,259,-19,-99,-71,0,28,5,20,10,58
+QENG: "neighbourcell intra","CAT-M",1825,140,-20,-112,-73,0,15,5,20,10,58

OK

2.2. AT+QCOPS Scan for Current Available Networks

AT+QCOPS Scan for Current Available Networks	
Test Command AT+QCOPS=?	Response +QCOPS: (0-7),(0,1) OK
Write Command AT+QCOPS=<scan_type>,<scan_mode>	Response When <scan_mode>=0: If <rat> is "GSM", the response is: +QCOPS: <rat>,<plmn_name>,<plmn>,-,-,-,-,<rx_lev>,-,- OK If <rat> is "CAT-M" or "CAT-NB", the response is: +QCOPS: <rat>,<plmn_name>,<plmn>,-,-,-,-,<rsrp>,- OK When <scan_mode>=1: If <rat> is "GSM", the response is: +QCOPS: <rat>,<plmn_name>,<plmn>,<band>,<channel>,<lac>,<cell_id>,<bsic>,<rx_lev>,<c1>,<is_gprs_support> If <rat> is "CAT-M" or "CAT-NB", the response is: +QCOPS: <rat>,<plmn_name>,<plmn>,<band>,<channel>,<tac>,<pcid>,<rssi>,<rsrp>,<rsrq> OK If there is any error, the response is: ERROR
Reference	

Parameter

<rat>	String format. Radio access technologies, including: "GSM" GSM "CAT-M" LTE Cat M1 "CAT-NB" LTE Cat NB1
<plmn_name>	String format. Operator in string format.
<plmn>	String format. Operator in numeric format.
<band>	String format. Bands supported by the operator.
<channel>	Number format in decimal. Cell frequency.

<lac>	Number format in hex. Location area code.
<cell_id>	Number format in hex. Cell ID.
<bsic>	Number format in decimal. Base station identification code.
<rx_lev>	Number format in decimal. RX level.
<c1>	Number format in decimal. Cell selection criterion.
<is_gprs_support>	Number format in decimal. Indicate whether the current cell supports GPRS. 0 Not support GPRS 1 Support GPRS
<tac>	Number format in hex. Tracking area code.
<pcid>	Number format in decimal. Physical Cell ID.
<rssi>	Number format in decimal. Received signal strength indication.
<rsrp>	Number format in decimal. Reference signal received power.
<rsrq>	Number format in decimal. Reference signal received quality.
<scan_type>	Number format in decimal. 0 Restore the module to AUTO mode. 1 Only scan GGSM cells 2 Only scan LTE Cat M1 cells 3 Scan GSM+LTE Cat M1 cells 4 Only scan LTE Cat NB1 cells 5 Scan GSM+ LTE Cat NB1 cells 6 Scan LTE Cat M1+LTE Cat NB1 cells 7 Scan GSM+ LTE Cat M1+LTE Cat NB1 cell
<scan_mode>	Number format in decimal. 0 Only show the <rssi> value of each cell. 1 Show most cell information.

Example

AT+QCOPS=7,0

+QCOPS: "GSM","CHINA MOBILE","46000",-,-,-,-,-48,-,-

+QCOPS: "GSM","CHN-UNICOM","46001",-,-,-,-,-53,-,-

+QCOPS: "CAT-M","CHN-UNICOM","46001",-,-,-,-,-68,-,-

+QCOPS: "CAT-NB","CHN-CT","46011",-,-,-,-,-68,-,-

OK

AT+QCOPS=7,1

+QCOPS: "GSM","CHINA MOBILE","46000","GSM 900",29,550A,6D46,11,-48,49,1

+QCOPS: "GSM","CHN-UNICOM","46001","GSM 1800",653,5504,44A4,32,-66,29,1

+QCOPS: "CAT-M","CHN-UNICOM","46001","LTE BAND 3",1650,550D,F3,-34,-63,-8

+QCOPS: "CAT-NB","CHN-CT","46011","LTE BAND 3",1825,6934,1E,-36,-64,-9

OK

3 Appendix A Reference

Table 1: Terms and Abbreviations

Abbreviation	Description
ARFCN	Absolute Radio Frequency Channel Number
DCS	Digital Cellular System
DL	Downlink
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
E-UTRA	Evolved Universal Terrestrial Radio Access
FDD	Frequency Division Duplex
GPRS	General Packet Radio Service
GSM	Global System of Mobile Communication
LTE	Long-Term Evolution
LSA	Local Service Area
MS	Mobile Station
PCS	Personal Communication Service
PLMN	Public Land Mobile Network
RAT	Radio Access Technology
RX	Receive
SINR	Signal To Interference Plus Noise Ratio
TDD	Time Division Duplex
TX	Transmit
UE	User Equipment

UL

Uplink

UTRA-ARFCN

UTRA Absolute Radio Frequency Channel Number
