

# **EC25&EC21 QuecCell** **AT Commands Manual**

**LTE Module Series**

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# About the Document

## History

Revision	Date	Author	Description
1.0	2014-02-12	Jacky ZHANG	Initial
1.1	2016-09-02	Hui CHEN	Added AT+QENG="neighbourcell", AT+QCOPS, and AT+QTRYRAT

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# 1 Introduction

QuecCell is a featured function embedded in Quectel EC25/EC21 module. It can be used to scan the detailed information of base stations. This document introduces the AT commands relating to EC25/EC21's QuecCell function.

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## 2 Description of QuecCell AT Commands

### 2.1. AT+QENG Switch on/off Engineering Mode

Engineering mode is designed to report the information of serving cells, neighbouring 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
Query serving cell information 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>,<voicecodec>  OK  In the case of WCDMA mode: +QENG: "servingcell",<state>,"WCDMA",<mcc>,<mnc>,<lac>,<cellid>,<uarfcn>,<pssc>,<rac>,<rscp>,<ecio>,<phych>,<sf>,<slot>,<speech_code>,<comMod>  OK  In the case of LTE mode: +QENG: "servingcell",<state>,"LTE",<is_tdd>,<mcc>,<mnc>,<cellid>,<pcid>,<earfcn>,<freq_band_ind>,<ul_bandwidth>,<dl

\_bandwidth>,<tac>,<rsrp>,<rsrq>,<rssi>,<sinr>,<srxlev>

OK

In the case of TDSCDMA mode:

**+QENG:**

"servingscell",<state>,"TDSCDMA",<mcc>,<mnc>,<lac>,<cellid>,<pfreq>,<rssi>,<rscp>,<ecio>

OK

In the case of CDMA mode or CDMA+HDR mode:

**+QENG:**

"servingscell",<state>,"CDMA",<mcc>,<mnc>,<lac>,<cellid>,<bcch>,<rxpwr>,<ecio>,<txpwr>

**[+QENG:**

"servingscell",<state>,"HDR",<mcc>,<mnc>,<lac>,<cellid>,<bcch>,<rxpwr>,<ecio>,<txpwr>]

OK

In the case of SRLTE mode:

**+QENG:**

"servingscell",<state>,"CDMA",<mcc>,<mnc>,<lac>,<cellid>,<bcch>,<rxpwr>,<ecio>,<txpwr>

**+QENG:**

"servingcell",<state>,"LTE",<is\_tdd>,<mcc>,<mnc>,<cellid>,<pcid>,<earfcn>,<freq\_band\_ind>,<ul\_bandwidth>,<dl\_bandwidth>,<tac>,<rsrp>,<rsrq>,<rssi>,<sinr>,<srxlev>

OK

Query neighbour cells information  
**AT+QENG="neighbourcell"**

Response

In the case of GSM mode:

**[+QENG:**

"neighbourcell","GSM",<mcc>,<mnc>,<lac>,<cellid>,<bsic>,<earfcn>,<rxlev>,<c1>,<c2>,<c31>,<c32>

[...]

**[+QENG:**

"neighbourcell","WCDMA",<uarfcn>,<pssc>,<rscp>,<ecno>

>

[...]

**[+QENG:**

"neighbourcell","LTE":<earfcn>,<pcid>,<rsrp>,<rsrq>

[...]

OK

In the case of WCDMA mode:

[+QENG:"neighbourcell","WCDMA",<uarfcn>,<srxqual>,<psc>,<rscp>,<ecno>,<set>,<rank>,<srxlev>

[...]

[+QENG:

"neighbourcell","GSM",<bsic>,<rssi>,<rxlev>,<rank>

[...]

[+QENG:

"neighbourcell","LTE",<earfcn>,<cellid>,<rsrp>,<rsrq>,<s\_rxlev>

[...]

OK

In the case of LTE mode:

[+QENG:

"neighbourcell

intra","LTE",<earfcn>,<pcid>,<rsrq>,<rsrp>,<rssi>,<sinr>,<srxlev>,<cell\_resel\_priority>,<s\_non\_intra\_search>,<thresh\_serving\_low>,<s\_intra\_search>

[...]

[+QENG:

"neighbourcell

inter","LTE",<earfcn>,<pcid>,<rsrq>,<rsrp>,<rssi>,<sinr>,<srxlev>,<threshX\_low>,<threshX\_high>,<cell\_resel\_priority>

[...]

[+QENG:

"neighbourcell","GSM",<arfcn>,<cell\_resel\_priority>,<thresh\_gsm\_high>,<thresh\_gsm\_low>,<ncc\_permitted>,<band>,<bsic\_id>,<rssi>,<srxlev>

[...]

[+QENG:

"neighbourcell","WCDMA",<uarfcn>,<cell\_resel\_priority>,<thresh\_Xhigh>,<thresh\_Xlow>,<psc>,<cpich\_rscp>,<cpich\_ecno>,<srxlev>

[...]

OK

Reference

## Parameter

<b>&lt;celltype&gt;</b>	String format, get different cell information "servingcell" Get 2G/3G/4G serving cell information. "neighbourcell" Get 2G/3G/4G neighbour cell information
<b>&lt;state&gt;</b>	String format, UE state "SEARCH" UE is searching but could not (yet) find a suitable 2G/3G/4G 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 call in progress
<b>&lt;rat&gt;</b>	String format, access technology, include "GSM" "WCDMA" "LTE" "CDMA" "HDR" "TDSCDMA"
<b>&lt;mcc&gt;</b>	Number format. Mobile Country Code (first part of the PLMN code) "-" Cannot get the invalid value
<b>&lt;mnc&gt;</b>	Number format. Mobile Network Code (second part of the PLMN code) "-" Cannot get the invalid value
<b>&lt;lac&gt;</b>	Hexadecimal format. Location Area Code. The parameter determines the two bytes location area code in hexadecimal format (e.g. 00C1 equals 193 in decimal) of the cell that was scanned. Range: 0-65535 "-" Cannot get the invalid value
<b>&lt;cellid&gt;</b>	Hexadecimal format. Cell ID. The parameter determines the 16 bit (GSM) or 28 bit (UMTS) cell ID. Range: 0-0xFFFFFFFF "-" Cannot get the invalid value
<b>&lt;bsic&gt;</b>	Number format. Base Station Identification Code. Range: 0-63
<b>&lt;arfcn&gt;</b>	Number format. The parameter determines the ARFCN of the cell that was scanned. Range: 0-1023
<b>&lt;band&gt;</b>	Number format, indicate the current band is PCS1900 or DCS1800 0 DCS_1800 1 PCS_1900 "-" Other band
<b>&lt;rac&gt;</b>	Number format. Routing Area Code. Range 0-255.
<b>&lt;pfreq&gt;</b>	Primary frequency
<b>&lt;rxlev&gt;</b>	Number format. RX level value for base station selection in dB (see 3GPP 25.304). RX level range: 0-63, subtract 111 to dBm value
<b>&lt;txp&gt;</b>	Number format. MS maximum TX power in CCH
<b>&lt;rla&gt;</b>	Number format. Minimum access RX level
<b>&lt;drx&gt;</b>	Number format. Discontinuous reception cycle length

<b>&lt;c1&gt;</b>	Number format. Cell selection criterion
<b>&lt;c2&gt;</b>	Number format. Cell reselection criterion
<b>&lt;gprs&gt;</b>	Number format. Whether current cell supports GPRS or not 0                   Not support GPRS 1                   Support GPRS
<b>&lt;tch&gt;</b>	Number format. In hopping, displays 'h', otherwise displays the current ARFCN in voice call
<b>&lt;ts&gt;</b>	Number format. Timeslot number
<b>&lt;ta&gt;</b>	Number format. Timing advance for the base station. Range: 0-63
<b>&lt;maio&gt;</b>	Number format. Mobile Allocation Index Offset
<b>&lt;hsn&gt;</b>	Number format. Hopping Sequence Number
<b>&lt;rxqualsub&gt;</b>	Number format. RX quality (sub), range: 0-7
<b>&lt;rxqualfull&gt;</b>	Number format. RX quality (full), range: 0-7
<b>&lt;rxlevsub&gt;</b>	Number format. RX level (sub), range: 0-63
<b>&lt;rxlevfull&gt;</b>	Number format. RX level (full), range: 0-63
<b>&lt;voicecodec&gt;</b>	String format. Channel mode during 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
<b>&lt;uarfcn&gt;</b>	Number format. The parameter determines the UTRA-ARFCN of the cell that was scanned
<b>&lt;earfcn&gt;</b>	Number format. The parameter determines the E-UTRA-ARFCN of the cell that was scanned
<b>&lt;psc&gt;</b>	Number format. The parameter determines the primary scrambling code of the cell that was scanned
<b>&lt;rssi&gt;</b>	Number format. The parameter shows the Received Signal Strength Indication
<b>&lt;sinr&gt;</b>	Number format. Logarithmic value of SINR, and the values are only the first part 1/5 of the dB value. Range: 0-250, which translates to -20dB - +30dB
<b>&lt;rscp&gt;</b>	Number format. The parameter determines the Received Signal Code Power level of the cell that was scanned
<b>&lt;srxlev&gt;</b>	Number format. Select RX Level Value for base station in dB (see 3GPP 25.304)
<b>&lt;SF&gt;</b>	Number format. Spreading Factor, values are 4, 8, 16, 32, 64, 128, 256, 512. 0   SF_4 1   SF_8 2   SF_16 3   SF_32 4   SF_64 5   SF_128 6   SF_256

	7	SF_512
	8	UNKNOWN
<slot>	Number format. Slot Format for DPCH (0-16). Slot Format for FDPCH (0-9)	
<ComMod>	Number format. Compress mode	
	0	Not support Compress mode
	1	Support Compress mode
<c31>	Number format. GPRS cell selection criterion	
<c32>	Number format. GPRS cell reselection criterion	
<set>	Number format. 3G neighbour cell set	
	1	Active Set
	2	Sync Neighbour Set
	3	Async Neighbour Set
<rank>	Rank of this cell as neighbour for inter-RAT cell reselection	
<txpwr>	Number format. TX power level for the UE	
<is_tdd>	TDD or FDD mode	
<pcid>	Physical Cell ID	
<freq_band_ind>	E-UTRA frequency band (see 3GPP 36.101)	
<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.)	
<thresh_serving_low>	This specifies the Srxlevthreshold (in dB) used by the UE on the serving cell when reselecting towards a lower priority RAT/ frequency.	
<ecio>	Number format. Carrier to noise ratio in dB = measured Ec/Io value in dB.	
<phych>	0:DPCH 1:FDPCH	
<speech_code>	Destination number on which call is to be deflected	
<rxpwr>	Rx power value in 1/10 dBm resolution	
<ecno>	Number format. Carrier to noise ratio in dB = measured Ec/Io value in dB.	
<srxqual>	Receiver automatic gain control on the camped frequency.	
<s_rxlev>	Inter frequency cell suitable receive level.	



**AT+QENG="servingcell"**

+QENG:"servingcell","CONNECT","GSM",460,00,550A,2BB9,23,94,0,-61,5,14,4,0,0,0,h,1,0,0,33,50,52,0,0,"EFR"

OK

**AT +QENG="neighbourcell"**

[2016-08-15\_20:23:32]+QENG: "neighbourcell intra","LTE",38950,276,-3,-88,-65,0,37,7,16,6,44

[2016-08-15\_20:23:32]+QENG: "neighbourcell inter","LTE",39148,-,-,-,-,37,0,30,7,-,-,-,-

[2016-08-15\_20:23:32]+QENG: "neighbourcell inter","LTE",37900,-,-,-,-,0,0,30,6,-,-,-,-

[2016-08-15\_20:23:32]+QENG: "neighbourcell","GSM",0,3,14,50,255,0,0,-1920,0

[2016-08-15\_20:23:32]+QENG: "neighbourcell","GSM",94,3,14,50,255,0,0,-1920,0

[2016-08-15\_20:23:32]+QENG: "neighbourcell","GSM",93,3,14,50,255,0,0,-1920,0

[2016-08-15\_20:23:32]+QENG: "neighbourcell","GSM",91,3,14,50,255,0,0,-1920,0

[2016-08-15\_20:23:32]+QENG: "neighbourcell","GSM",90,3,14,50,255,0,0,-1920,0

[2016-08-15\_20:23:32]+QENG: "neighbourcell","GSM",89,3,14,50,255,0,0,-1920,0

[2016-08-15\_20:23:32]+QENG: "neighbourcell","GSM",87,3,14,50,255,0,0,-1920,0

[2016-08-15\_20:23:32]+QENG: "neighbourcell","GSM",85,3,14,50,255,0,0,-1920,0

OK

**AT+QENG="neighbourcell"**

[2016-08-15\_20:19:54]+QENG: "neighbourcell","WCDMA",10713,-723,398,-880,-155,6,-32768,-

[2016-08-15\_20:19:54]+QENG: "neighbourcell","WCDMA",10713,-723,331,-870,-155,2,-32768,-

[2016-08-15\_20:19:54]+QENG: "neighbourcell","WCDMA",10713,-723,290,-880,-165,2,-32768,-

[2016-08-15\_20:19:54]+QENG: "neighbourcell","WCDMA",10713,-723,397,-910,-190,2,-32768,-

[2016-08-15\_20:19:54]+QENG: "neighbourcell","WCDMA",10713,-723,114,-910,-195,2,-32768,-

[2016-08-15\_20:19:54]+QENG: "neighbourcell","WCDMA",10713,-723,332,-940,-220,2,-32768,-

[2016-08-15\_20:19:54]+QENG: "neighbourcell","WCDMA",10713,-723,379,-950,-230,2,-32768,-

[2016-08-15\_20:19:54]+QENG: "neighbourcell","WCDMA",10713,-723,115,-1210,-250,6,-32768,-

OK

## 2.2. AT+QCOPS Query Cell Information without SIM Card

The command is used to query the cell information without using SIM card. The format of the command is **AT+QCOPS=<interval>**, and the range of **<interval>** is from 10 to 60 which means the time (unit: s) used to scan each band of the module. For example, EC25 supports 13 bands covering 2G/3G/4G network; if the value of **<interval>** is 10, which means 10 seconds, then the module takes about 13\*10 seconds to scan all the bands supported.

### AT+QCOPS Query Cell Information without SIM Card

Test Command	Response
AT+QCOPS=?	+CREG: (10-60)

	<p><b>OK</b></p>
<p>Read Command <b>AT+QCOPS?</b></p>	<p>If successfully, response <b>+QCOPS: 10</b></p> <p><b>OK</b></p> <p>Or else, responses: <b>ERROR</b></p>
<p>Write Command <b>AT+QCOPS=&lt;interval&gt;</b></p>	<p>Response</p> <p>In the case of 2G mode: <b>+COPS:"2G",&lt;operatorname&gt;&lt;plmn&gt;,&lt;band&gt;,&lt;freq&gt;,&lt;lac&gt;,&lt;cellid&gt;,&lt;bsic&gt;,&lt;rx_lev&gt;,&lt;c1&gt;,&lt;is_gprs_supprt&gt;</b></p> <p><b>OK</b></p> <p>In the case of 3G mode: <b>+COPS:"3G",&lt;operator name&gt;&lt;plmn&gt;,&lt;band&gt;,&lt;freq&gt;,&lt;lac&gt;,&lt;cellid&gt;,&lt;psc&gt;,&lt;rsrp&gt;,&lt;ecio&gt;</b></p> <p><b>OK</b></p> <p>In the case of 4G mode: <b>+COPS:"4G",&lt;operator name&gt;&lt;plmn&gt;,&lt;band&gt;,&lt;freq&gt;,&lt;tac&gt;,&lt;cellid&gt;,&lt;rsi&gt;,&lt;rsrp&gt;,&lt;rsrq&gt;</b></p> <p><b>OK</b></p>

**Parameter**

**<interval>** Range from 10 to 60 which means the time (unit: s) used to scan each band of module.

**NOTE**

The time for this command to execute is long.

## Example

**AT+QCOPS=10**

```
+QCOPS: "2G","CHINA MOBILE","46000","GSM 900",3,550A,6D46,11,-48,49,1
+QCOPS: "2G","CHN-UNICOM","46001","GSM 1800",653,5504,44A4,32,-79,16,1
+QCOPS: "2G","CHN-UNICOM","46001","GSM 1800",653,5504,44A4,32,-80,15,1
+QCOPS: "2G","CHN-UNICOM","46001","GSM 1800",653,5504,44A4,32,-79,16,1
+QCOPS: "3G","CHN-UNICOM","46001","WCDMA 2100",10713,D5D6,8062AF1,380,65461,-7
+QCOPS: "3G","CHN-UNICOM","46001","WCDMA 2100",10713,D5D6,8062AF1,380,65461,-6
+QCOPS: "3G","CHN-UNICOM","46001","WCDMA 2100",10713,D5D6,8062AF1,380,65458,-9
```

OK

## 2.3. AT+QTRYRAT Set Priority of RAT

The command is used to set priority of RAT (radio access technology).

<b>AT+QTRYRAT Set Priority of RAT</b>	
Test Command <b>AT+QTRYRAT=?</b>	Response <b>+CREG: (0-4)</b>  <b>OK</b>
Read Command <b>AT+QTRYRAT?</b>	Response If successfully, responses: <b>+QTRYRAT: 0</b>  <b>OK</b>  Or else, responses: <b>ERROR</b>
Write Command <b>AT+QTRYRAT=&lt;interval&gt;</b>	Response If successfully, responses:  <b>OK</b>  If failed, responses: <b>ERROR</b>

## Parameter

---

<interval>	Range from 0 to 4
0	Set to default configurations
1	Set to default configurations
2	2G
3	3G
4	4G

---

## Example

```
AT+QTRYRAT=3
```

```
OK
```

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