

AT Commands

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Summary

AT commands ("AT" meaning 'attention') are instructions used to control a modem. The command set consists of a series of short text strings which can be combined to produce commands for operations such as dialing, managing SMS functions, and changing the parameters of the connection. Many of the commands that are used to control wired dial-up modems, such as ATD (Dial), ATA (Answer), ATH (Hook control) and ATO (Return to online data state), are also supported by GSM/GPRS modems and mobile phones. This section is an overview of some AT commands that can be used with RUT routers.

gsmctl commands

gsmctl is a set of shell commands that can request information from or perform operations on a modem. In other words, gsmctl is a way to use AT commands in shell form. You can use them via SSH or [CLI](#), the command line interface that can be used via the router's WebUI.

SSH

To log in to a RUT router via SSH, download the free **PuTTY** app if you're using Windows; if you're using a Linux based OS, just use the Terminal app. In both cases you will need to know three things: the router's LAN IP address, user name and password. The default LAN IP address for all RUT routers is **192.168.1.1**; the default log in information is username: **root**; password: **admin01** (NOTE: the user name used for SSH connections (i.e., root) is not the same as the user name used to log in to the router's WebUI (i.e., admin)).

If you're using PuTTY, enter the router's LAN IP address into the **Host Name (or IP address)** field, select SSH Connection type and click **Open**. After this you will be prompted to enter the user name and password.

If you're using Linux, open a Terminal and type this command:

```
# ssh root@192.168.1.1
```

If you made changes to LAN IP address or log in name, replace the relevant data in the command above so that it is correct for your specific case. After executing this command you will be prompted to enter the router's admin password.

Usage

The syntax for a `gsmctl` command is **gsmctl OPTIONS**. A list of possible **gsmctl** options is provided below:

-e, --bsent <INTERFACE>	Get number of bytes sent
-r, --brecv <INTERFACE>	Get number of bytes received
-j, --connstate	Get mobile connection state
-P, --psstate	Get package domain service state
-g, --netstate	Get network link state
-C, --cellid	Get cell id parameter
-o, --operator	Get name of operator used
-f, --opernum	Get operator number
-t, --conntype	Get data carrier type
-F --network	Get network information
-K --serving	Get serving cell information
-I --neighbour	Get neighbour cell information
-v, --volte_state	VoLTE state status
-b, --band	Print current band
-q, --signal	Get signal levels

modem commands:

-A, --at <cmd>	Execute AT command.
-i, --imei	Get device IMEI
-a, --serial	Get modem serial number
-J, --iccid	Get SIM ICCID
-m, --model	Get device model
-w, --manuf	Get device manufacturer
-y, --firmware	Get device revision number
-x, --imsi	Get IMSI
-z, --simstate	Get SIM card state
-u, --pinstate	Get PIN state
-H, --modemtime <1/2>	Get operator station time(1 - GMT, 2 - LOCAL)
-c, --temp	Get module temperature in 0.1 degrees Celsius
-B, --pincount	Get pin/puk count
-E, --info	Get modem info in json format
-U --ussd <command>	The command allows control of the Unstructured Supplementary Service Data. (response saved in /tmp/ussd file)
-Y --switch	Switch sim card for modem
-Q, --reboot	Reboot the modem

sms managing options:

```
-S -r, --sms --read          <INDEX> Read SMS by index
-S -R, --sms --pdu_read     <INDEX> Read PDU by index
-S -l, --sms --list        <TYPE> List SMS by type [all, read, new]
-S -t, --sms --total       Print SMS memory usage
-S -d, --sms --delete      <INDEX> Delete SMS by index
-S -Z, --sms --pdu_delete  <INDEX> Delete PDU by index
-S -s, --sms --send        "<NUMBER> <TEXT>"Send SMS. IMPORTANT! Number
and text must be within quotes
```

auxiliary options:

```
-O, --modem <USB_ID>       Set MODEM by USB_ID(3-1, 1-1.4 etc.)
-N, --num <MODEM_NUM>     Set MODEM by modem number(0 - 12)
-D, --debug                Enable debug information
```

You can view this list via terminal by typing **gsmctl -h** or **gsmctl --help**.

For example, try using *gsmctl -q* to get the current signal levels value in dBm. You can also combine options. For example, *gsmctl -oqt*:



Unlike **gsmctl -q**, **gsmctl -oqt** returns three options: operator's name, signal levels, carrier, and operator type, as you can see in the example above.

AT command usage

To use a specific AT command via SSH, you can use the *gsmctl -H*. After this your console will enter shell mode where you can then just type AT commands in their regular format. Or you can use *gsmctl -A <AT_COMMAND>* to execute AT commands one at a time. Continuing from the example above, lets say you want to find out the RSSI value. While there are quite a few commands that can be used to achieve this goal, lets use the **AT+CSQ** that is used when executing *gsmctl -q*:



As you can see this time the command returns two values instead of one, and they don't directly represent the RSSI value as with *gsmctl -q*. The reason for this is that AT+CSQ indicates the received signal strength **<rssi>** and the channel bit error rate **<ber>** and the numbers returned are not the direct values but rather the representation of the direct values.

```
<rssi>
0          -113dBm or less
1          -111dBm
2...30    -109dBm... -53dBm
31        -51dBm or greater
99        Not known or not detectable
100       -116dBm or less
101       -115dBm
102...190 -114dBm...-26dBm
191       -25dBm or greater
199       Not known or not detectable
```

100~199	Extended to be used in TD-SCDMA indicating received signal code power (RSCP)
<ber>	Channel bit error rate (in percent)
0...7	As RXQUAL values in the table in 3GPP TS 45.008 subclause 8.2.4
99	Not known or not detectable

So the response above indicates that the RSSI value is **-75 dBm** (because that's what 19 represents since it falls in the 2..30 range) and the channel bit error rate is **Not known or not detectable** (because that's what 99 represents).

As another example, lets try to get network operator information. For this task you can use either **gsmctl -o** or **AT+COPS?**. For this example we'll use them both and analyze the differences:



As you can see, *gsmctl* returns a more user friendly value while *AT+COPS?* returns raw data. The response format of the *AT+COPS?* is **+COPS: <mode>[,<format>[,<oper>][,<Act>]]**. Explanations for individual values are provided below.

<oper>	Operator in format as per <mode>
<mode>	
0	Automatic mode. <oper> field is ignored
1	Manual operator selection. <oper> field shall be present and <Act> optionally
2	Manually deregister from network
3	Set only <format> (for AT+COPS? Read Command), and do not attempt registration/deregistration (<oper> and <Act> fields are ignored). This value is invalid in the response of Read Command
4	Manual/automatic selection. <oper> field shall be presented. If manual selection fails, automatic mode (<mode>=0) is entered
<format>	
0	Long format alphanumeric <oper> which can be up to 16 characters long
1	Short format alphanumeric <oper>
2	Numeric <oper>. GSM location area identification number
<Act>	Access technology selected. Values 3, 4, 5 and 6 occur only in the response of Read Command while MS is in data service state and is not intended for the AT+COPS Write Command.
0	GSM
2	UTRAN
3	GSM W/EGPRS
4	UTRAN W/HSDPA
5	UTRAN W/HSUPA
6	UTRAN W/HSDPA and HSUPA
7	E-UTRAN

Instead of the operator's name, *AT+COPS?* returns operator's code, in this case, **24602**, while `gsmctl` converts the code into the name of the operator (LT BITE GSM).

External links

PuTTY download - <https://www.putty.org/>