Application Note

AT Commands (AT-SMS)

# Used symbols

⚠️ Danger – Information regarding user safety or potential damage to the router.

❗ Attention – Problems that can arise in specific situations.

ℹ️ Information – Useful tips or information of special interest.

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1. AT-SMS Protocol

1.1 Introduction

AT-SMS protocol is a private set of AT commands supported by Advantech cellular routers. It can be used to access the cellular module in the router directly via AT commands, work with short messages (SMS) and cellular module state information and settings. AT commands listed here can be sent to the router via TCP or via serial line. This has to be enabled in the router configuration.

> ⚠️ Only the commands supported by Advantech routers are listed in this aplication note. For other AT commands the **OK** response is always sent. There is no support for treatment of complex AT commands, so in such a case the router sends **ERROR** response.

1.2 Enabling AT-SMS Protocol

In the Web interface of the router, navigate to *Services → SMS* in *Configuration* section. Enable AT-SMS protocol on the desired interface – serial or TCP. Click *Apply* button.
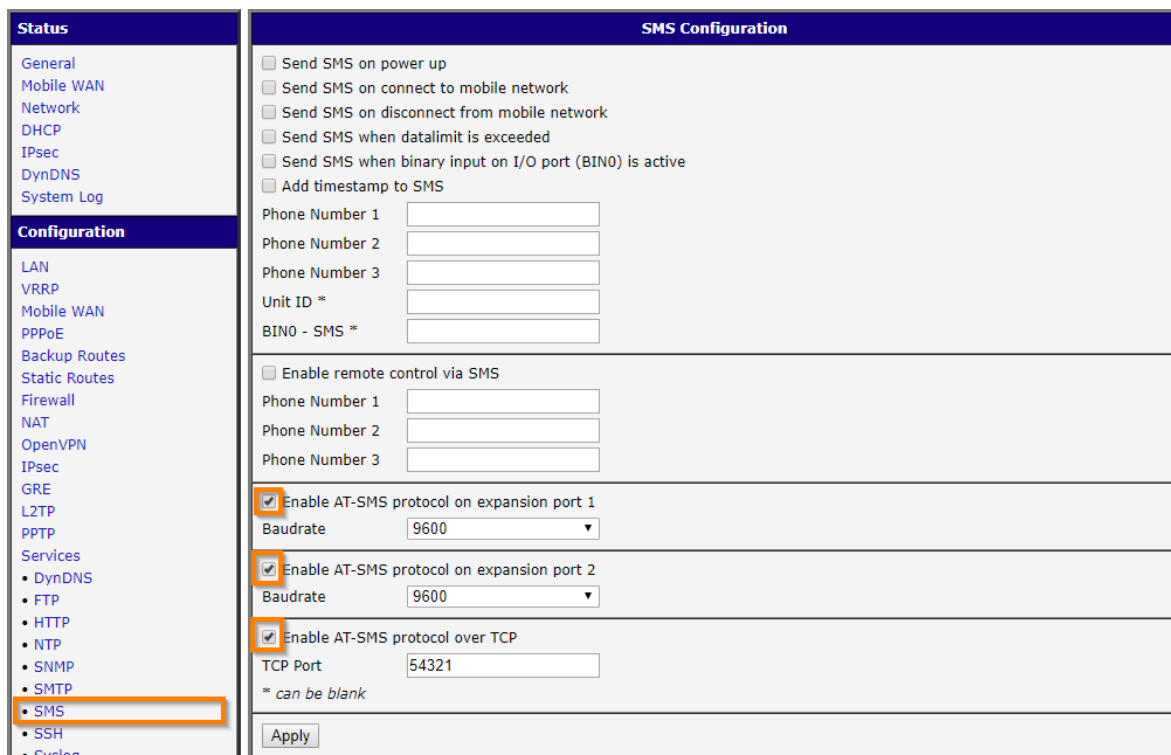
Figure 1: Enabling AT-SMS protocol in SMS Configuration

Tip: you can test the AT-SMS protocol via any TCP client (*Enable AT-SMS protocol over TCP* has to be enabled). In the Figure below there is an example of such a test, using Hercules TCP Client and configuration from Figure 1 (TCP port 54321). On AT+CMGF? request command the "0" is returned, so the SMS are in PDU mode.
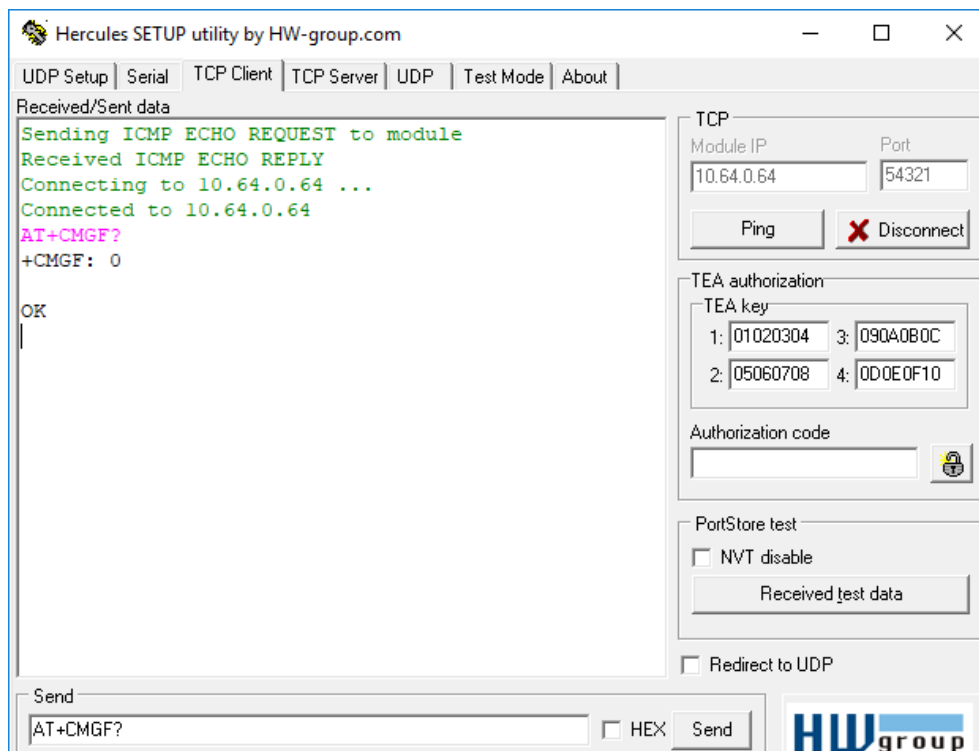
Figure 2: Example of sending AT command via TCP client

> **Note:** When the *Enable remote control via SMS* is activated in the router, received SMS are always **deleted** after being processed! (See Figure 1 just above AT-SMS protocol). This may cause a confusion when you want to use AT-SMS protocol for reading received SMS. See in detail description of remote control via SMS in *Configuration Manual* of your router – Chapter 4. If remote control via SMS is enabled, the command received in SMS is executed and then the SMS is deleted. If there is unknown command in SMS, the script /var/scripts/sms is run and then the SMS is deleted.

> Note: AT commands sent to the router's cellular module via *gsmat* and *gsmat2* commands described in *Command Line Interface* Application Note (e.g. via SSH) are not processed as AT-SMS protocol AT commands. They are general AT commands and their support may vary for different models of cellular modules.

2. Available AT Commands

2.1 ATE

ATE<value> command determines whether or not the device echoes a characters. By default this function is disabled, but it may be useful for debugging purposes.

- <value> is 0 – characters are not echoed
- <value> is 1 – characters are echoed

```
ATE1            <press Enter key>
OK
```

2.2 AT+CMGF

To set the presentation format of short messages the *AT+CMGF=<mode>* command is used.

- <mode> is 0 – PDU mode
- <mode> is 1 – text mode

```
AT+CMGF=1       <press Enter key>
OK
```

Tip: To find out what SMS format is set, run *AT+CMGF?*.

2.3   AT+CMGS

This command allows you to send a short message to an entered number. After sending the command *AT+CMGS="number"* and pressing *Enter* key wait for the character >. Behind this mark it is possible to write your message. The text string is terminated and sent by *CTRL+Z* (it takes some time). SMS writing can be canceled by pressing the *Esc* key.

```
AT+CMGS="+420465717171"                <press Enter key>
>Hello World!                          <CTRL+Z shortcut key>
OK
```

If you want to send SMS in PDU mode, you will need to convert the string of your message to PDU format first along with the receiver phone number (e.g. using some online converter).

The example below contains string "test" sent to phone number +420465717171. Sending of SMS in PDU mode is similar as text mode, but instead of phone number, the binary length of PDU message is passed to the command:

```
AT+CMGS=18                             <press Enter key>
>0011000C912440561717170000FF04F4F29C0E    <CTRL+Z shortcut key>
OK
```

2.4   AT+CMGW

This command allows you to write a short message to SIM storage. After sending the command *AT+CMGW="length"* (this parameter specifies the maximum message length in bytes) and pressing Enter key wait for the character >. Behind this mark it is possible to write your message. The text string is stored by *CTRL+Z* (it takes some time). SMS writing can be canceled by pressing *Esc* key. The response for this command is information about position, where the message was stored.

```
AT+CMGW="140"          <press Enter key>
>Hello World!          <CTRL+Z shortcut key>
+CMGW: 2
```

2.5   AT+CMSS

The *AT+CMSS* command sends a message from SIM storage location value <index>. The location correspods to value that is returned by *AT+CMGW* command. The response is a reference value.

```
AT+CMSS=2              <press Enter key>
+CMSS: 12
```

2.6   AT+CMGL

The AT+CMGL command is used to list messages of a certain status from a message storage area. If you use this command in the form *AT+CMGL="ALL"*, you get a list of all stored messages. If the status of a message is "received unread", after being retrieved by the AT+CMGL command, the status is changed to "received read".

+CMGL: <index>, <status>,<sender number>, ,<date>,<time>

SMS text

Parameters have the following meaning:

- <index> – location of the message in the message storage area
- <status> – specifies the messege status:
    - REC UNREAD – received unread
    - REC READ – received read
    - STO UNSENT – stored unsent
    - STO SENT – stored sent
    - ALL – lists all messages. **Note**: This option does not work in PDU mode. Use AT+CGML=4 in PDU mode instead.
- <sender number> – tel. number from which the message was received
- <date> – date when the message was received
- <time> – time when the message was received

```
AT+CMGL="ALL"                    <press Enter key>
+CMGL: 1,"REC UNREAD","+420465717171", ,"08/02/02, 10:33:26+04"
Hello World!
```

2.7   AT+CMGR

The *AT+CMGR* command is used to read a message from a message storage area. The location of the message to be read from the message storage area is specified by an <index> number. If the status of a message is "received unread", after being retrieved by the *AT+CMGR* command, the status is changed to "received read". Each message is displayed in this form (parameters are described in the previous command):

+CMGR: <index>,<status>,<sender number>, ,<date>,<time>

SMS text

```
AT+CMGR=1                   <press Enter key>
+CMGR: 1,"REC READ","+420465717171", ,"08/01/12, 9:48:04+04"
Hello World!
```

2.8   AT+CMGD

This command deletes a message from the location <index>.

```
AT+CMGD=1                <press Enter key>
OK
```

2.9   AT+CPMS

To select SMS memory storage types to be used for SMS reading, writing, deleting, sending or receiving, you should perform a set operation with the *AT+CPMS* command. For SIM card the "SM" is used. Expected response is a string in the following form:

+CPMS: <used1>,<max1>,<used2>,<max2>,<used3>,<max3>,

where the *used* items indicate the number of messages currently in this memory, the *max* items indicate the number of messages that can be stored.

```
AT+CPMS="SM","SM"            <press Enter key>
+CPMS: 1,10,1,10
OK
```

2.10   AT+CSCA

This command sets the short message service centre (SMSC) number to be used to send SMS text messages.

```
AT+CSCA="+491710760000"          <press Enter key>
OK
```

2.11 AT+CSCS

To change the character set the *AT+CSCS=<set>* command is used. If this command is entered in the form *AT+CSCS=?*, the response is a list of supported character sets.

```
AT+CSCS=?                       <press Enter key>
+CSCS: ("GSM","IRA","HEX")
```

```
AT+CSCS="HEX"                   <press Enter key>
OK
```

2.12 AT+CPIN

The AT+CPIN? command is used to query whether the PIN code is expected. If the response is *+CPIN: READY*, the SIM card requires no PIN code and is ready for use. In case that the SIM card requires PIN code (response is *+CPIN: SIM PIN*), it can be entered by command *AT+CPIN=<PIN>*. If the PIN code is entered incorrectly more than three times, the SIM card is blocked and the PUK code is required (response is *+CPIN: SIM PUK*).

```
AT+CPIN="2654"                  <press Enter key>
OK
```

2.13 AT+CIMI

Execution of this command causes the device to return the International Mobile Subscriber Identity number (IMSI). It is a unique identification assigned to SIM card by mobile operator. An IMSI is usually presented as a 15 digit long number. The first 3 digits are the Mobile Country Code (MCC), and is followed by the Mobile Network Code (MNC), either 2 digits (European standard) or 3 digits (North American standard). The length of the MNC depends on the value of the MCC. The remaining digits are the Mobile Subscription Identification Number (MSIN) within the network's customer base.

2.14 AT+CNUM

Execution of this command causes the device to return the phone number of the SIM card, if stored on the SIM card (by mobile operator). Note that the mobile operator usually does not save a phone number to a SIM card.

2.15   AT+CREG

Displays network registration status. After entering the *AT+CREG?* command, the response is returned in this form:

+CREG: <n>,<stat>,

where <n> corresponds to one of the following values:

- 0 – disable network registration unsolicited result code
- 1 – enable network registration unsolicited result code

and <stat> (registration status) corresponds to one of the following values:

- 0 – not registered, not searching a new operator
- 1 – registered, home network
- 2 – not registered, currently searching a new operator
- 3 – registration denied
- 4 – unknown
- 5 – registered, roaming

```
AT+CREG?          <press Enter key>
+CREG: 0,1
```

2.16   AT+COPS?

To identify the available mobile networks the *AT+COPS?* command is used. After entering and pressing *Enter*, the response is displayed in the following form:

+COPS: <mode><format><operator>,

where the <mode> parameter specifies the registration mode:

- 0 – automatic
- 1 – manual
- 2 – de-register from network
- 4 – manual/automatic (if manual selection fails, automatic mode is entered)

and the <operator> parameter shows the operator identity, within speech marks, in the format set by <format>:

- 0 – long alphanumeric format
- 1 – short alphanumeric format
- 2 – numeric format

```
AT+COPS?              <press Enter key>
+COPS: 0,0,"O2 - CZ"
```

2.17   AT+CSQ

This command returns the signal strength of the registered network. The response is in the form +CSQ: <rssi>,<ber>, where <rssi> is the received signal strength indication and has value from 0 (-113 dBm and lower) to 31 (-51 dBm and higher), or 99 if the signal strength is not known or not detectable. The <ber> parameter is channel bit error rate. It can be detected only during a call, in other cases has a value 0 or 99 according to SIM card. If this error rate can be measured, its value is from 0 to 7.

```
AT+CSQ              <press Enter key>
+CSQ: 28,99
```

2.18   ATI

Use the *ATI<value>* command to transmit the manufacturer specific information about the device. The <value> parameter is used to select between multiple types of identification information. The value of this parameter starts at zero (0 corresponds to *AT+GMM*).

2.19   AT+CGMI

Execution of this command causes the device to return the manufacturer identity of the cellular module.

```
AT+CGMI                 <press Enter key>
+CGMI: Quectel
```

(Example for router with cellular module Quectel EC25.)

2.20   AT+GMI

See the previous command *AT+CGMI*...

2.21   AT+CGMM

Execution of this command causes the device to return the manufacturer specific model identity of cellular module.

```
AT+CGMM             <press Enter key>
+CGMM: "EC25"
```

(Example for router with cellular module Quectel EC25.)

2.22   AT+GMM

See the previous command *AT+CGMM*...

2.23 AT+CGMR

Execution of this command causes the device to return the manufacturer specific model revision identity of cellular module.

```
AT+CGMR                 <press Enter key>
+CGMR: EC25EUGAR06A03M4G
```

(Example for router with cellular module Quectel EC25.)

2.24 AT+GMR

See the previous command *AT+CGMR*...

2.25 AT+CGSN

This command causes the device to return the serial number of the cellular module.

```
AT+CGSN                 <press Enter key>
+CGSN: 865546040009660
```

2.26 AT+GSN

See the command *AT+CGSN*...

2.27 AT+CGPADDR

To display the IP address of the Mobile WAN interface (ppp0/usb0), use the AT command *AT+CGPADDR*.

3. AT Commands Alphabetically

AT+SMS protocol commands listed in alphabetical order:

Item	Description
AT+CGMI	Returns the manufacturer specific identity
AT+CGMM	Returns the manufacturer specific model identity
AT+CGMR	Returns the manufacturer specific model revision identity
AT+CGPADDR	Displays the IP address of the Mobile WAN interface
AT+CGSN	Returns the product serial number
AT+CIMI	Returns the International Mobile Subscriber Identity number (IMSI)
AT+CMGD	Deletes a message from the location
AT+CMGF	Sets the presentation format of short messages
AT+CMGL	Lists messages of a certain status from a message storage area
AT+CMGR	Reads a message from a message storage area
AT+CMGS	Sends a short message from the device to entered tel. number
AT+CMGW	Writes a short message to SIM storage
AT+CMSS	Sends a message from SIM storage location value
AT+CNUM	Returns the phone number, if available (stored on SIM card)
AT+COPS?	Identifies the available mobile networks
AT+CPIN	Is used to find out the SIM card state and enter a PIN code
AT+CPMS	Selects SMS memory storage types, to be used for short message operations
AT+CREG	Displays network registration status
AT+CSCA	Sets the short message service centre (SMSC) number
AT+CSCS	Selects the character set
AT+CSQ	Returns the signal strength of the registered network
AT+GMI	Returns the manufacturer specific identity
AT+GMM	Returns the manufacturer specific model identity
AT+GMR	Returns the manufacturer specific model revision identity
AT+GSN	Returns the product serial number
ATE	Determines whether or not the device echoes characters
ATI	Transmits the manufacturer specific information about the device

Table 1: List of AT+SMS protocol AT commands

4. Related Documents

You can obtain product-related documents on the **Engineering Portal** at *icr.advantech.com*.

To access your router's documents or firmware, go to the *Router Models* page, locate the required model, and select the appropriate tab below.

Documents that are common to all models and describe specific functionality areas are available on the *Application Notes* page.

The **Router Apps** installation packages and manuals are available on the *Router Apps* page.

If you are interested in further options for extending router functionality, either through scripts or custom Router Apps, please see the information available on the *Development* page.