OnCell G2111/G2151I AT Command Set

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OnCell G2111/G2151I AT Command Set

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Technical Support Contact Information

www.moxa.com/support

Moxa Americas
Toll-free: 1-888-669-2872
Tel: +1-714-528-6777
Fax: +1-714-528-6778

Moxa Europe
Tel: +49-89-3 70 03 99-0
Fax: +49-89-3 70 03 99-99

Moxa China (Shanghai office)
Toll-free: 800-820-5036
Tel: +86-21-5258-9955
Fax: +86-21-5258-5505

Moxa Asia-Pacific
Tel: +886-2-8919-1230
Fax: +886-2-8919-1231

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Introduction

The following topics are covered in this chapter:

1.1 Scope of the document

This document describes the AT command-based messages exchanged between an application and the OnCell G2111/G2151I series modem for managing GSM related events or services.
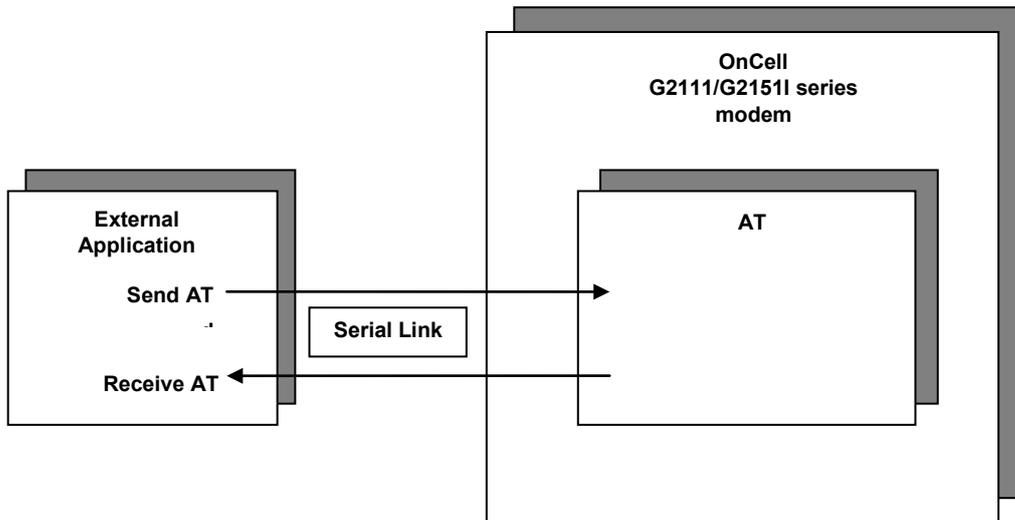
1.2 Document Conventions

Throughout this document the OnCell G2111/G2151I series is also referred to as GSM Mobile Engine or short ME, MS (Mobile Station) or Mobile Terminal (MT). In related documents the equivalent terms DCE (Data Communication Equipment), facsimile DCE or FAX modem may be found.

AT commands are used to control the G2111/G2151I series. The controlling device is referred to as Customer Application or short TE. Related documents may use the equivalent term DTE (Data Terminal Equipment).

All abbreviations and acronyms used throughout this document are based on GSM or 3GPP specifications. For additional definitions please refer to TR 100 350 V7.0.0 (1999-08), (GSM 01.04, version 7.0.0 release 1998).

1.3 Superscript notation for parameters and values

Table 1.1: Symbols used to mark the type of parameters

Parameter type	Meaning
<param>(num)	Parameter value must be numeric type
<param>(str)	Parameter value must be string type

Table 1.2: Symbols used to indicate the correlations with other commands

Parameter option	Meaning
<param>(&W)	Parameter value will be stored with AT&W
<param>(&V)	Parameter value will be displayed with AT&V
<param>(^SNFW)	Parameter value will be stored with AT^SNFW
<param>(+CSCS)	Parameter value has to be (is) coded according to current setting of <chset> (see AT+CSCS for details)

Table 1.3: Symbols used to mark different types of default values of parameters

Value option	Meaning
[x]	Default value: if the parameter is omitted, the value 'x' will be assumed

x(&F)	Factory default value, will be restored to 'x' with AT&F
x(P)	Powerup default value of a parameter which is not stored at power down
x(D)	Delivery default value of a parameter which cannot be restored automatically

1.4 AT Command Syntax

The "AT" or "at" prefix must be set at the beginning of each command line. To terminate a command line enter `<CR>`. Commands are usually followed by a response that includes "`<CR><LF>`<response>`<CR><LF>`". Throughout this document, only the responses are presented, `<CR><LF>` are omitted intentionally.

Table 1.4:   Types of AT commands and responses

AT command type	Syntax	Function
Test command	AT+CXXX=?	The mobile equipment returns the list of parameters and value ranges set with the corresponding Write command or by internal processes.
Read command	AT+CXXX?	This command returns the currently set value of the parameter or parameters.
Write command	AT+CXXX=<...>	This command sets user-definable parameter values.
Exec(ution) command	AT+CXXX	The execution command reads non-variable parameters determined by internal processes in the GSM engine.

1.4.1 Using Parameters

- Optional parameters are enclosed in square brackets. If optional parameters are omitted, the current settings are used until you change them.

- Optional parameters or sub parameters can be omitted unless they are followed by other parameters. If you want to omit a parameter in the middle of a string it must be replaced by a comma. See also example 1.

- A parameter value enclosed in square brackets represents the value that will be used if an optional parameter is omitted. See also example 2.

- When the parameter is a character string, e.g. <text> or <number>, the string must be enclosed in quotation marks, e.g. "Charlie Brown" or "+49030xxxx". Symbols in quotation marks will be recognized as strings.

- All spaces will be ignored when using strings without quotation marks.

- It is possible to omit the leading zeros of strings which represent numbers.

- If an optional parameter of a V.250 command is omitted, its value is assumed to be 0.

Example 1: Using default parameter values for optional parameters

```
AT+CFUN=7,0      Activate CYCLIC SLEEP mode, don't reset ME
OK
AT+CFUN?         Query ME mode
+CFUN: 7
OK
AT+CFUN=         Set ME back to normal (default parameters: 1,0)
OK
+CFUN: 1
OK
```

1.4.2 Concatenating AT Commands

Concatenating AT commands on the same line is possible, though not recommended because of restrictions listed below (for more details see [10]).

When concatenating AT commands you need to enter the "AT" or "at" prefix only once at the beginning of a command line. Basic commands (i.e., V.250 commands) are concatenated without delimiter. Extended commands (i.e., commands starting with AT+ or AT^) use a semicolon as delimiter.

Disadvantages and restrictions:

- There is no way to control the minimum time to wait between finishing an AT command and sending the next one. Please refer to Section 1.5, Communication between Customer Application and the G2111/G2151I series for details about timing.
- The sequence of processing the AT commands may be different from the sequential order of command input.
- Many AT commands cannot be concatenated (see list below). Concatenating these commands might end up with an error result code, or leads to an unexpected order of responses.

AT command type	Comment
V.250 commands	Cannot be concatenated with FAX commands (prefix AT+F)
GSM 7.07 commands	Cannot be concatenated with extended commands (prefix AT^S)
GSM 7.05 commands (SMS)	To be used standalone
Commands starting with AT&	To be used standalone
AT+IPR	To be used standalone

1.5 Communication between Customer Application and G2111/G2151I series

Leaving hardware flow control unconsidered the Customer Application (TE) is coupled with the G2111/G2151I series (ME) via a receive and a transmit line.

Since both lines are driven by independent devices collisions may (and will) happen. For example, if the TE issues an AT command the G2111/G2151I series starts sending a URC. This will probably cause the TE to misinterpret the URC being part of the AT command's response. To avoid this conflict the following measures must be taken:

- If an AT command is finished (with "OK" or "ERROR") the TE shall always wait at least 100 ms before sending the next one. This applies to bit rates of 9600 bps or higher (see AT+IPR). At bit rates below 9600 bps the delay must be longer: 300 ms at 1200 bps, and 500 ms at 300 bps.

  The pause between two AT commands gives the G2111/G2151I series the opportunity to the transmission of pending URCs and get necessary service.

- The TE shall communicate with the G2111/G2151I series using activated echo (ATE1), i.e. the G2111/G2151I series echoes characters received from the TE.

  Hence, when the TE receives the echo of the first character "A" of the AT command just sent by itself it has control both over the receive and the transmit paths.

Using Backspace at command line:

- As the standard GSM alphabet does not provide a backspace functionality the G2111/G2151I series is designed to use the character "08" (hex 0x08) as backspace for command line input. This allows the user to easily erase the last character when writing an AT commands. On the other hand, this solution requires entering the escape sequence \08 for writing the "ò" character in GSM character string parameters.
- If command echo is enabled (ATE1) Backspace may cause 08-32-08 (decimal) character sequences or no echo, depending on serial interface and speed of character input.

Software flow control:

- Regardless of the selected alphabet, keep in mind that, when using software flow control (AT\Q1), character values 17 and 19 (decimal) are interpreted as XON/XOFF control characters.

1.6 Supported character sets

The G2111/G2151I series supports two character sets: *GSM 03.38* (7 bit, also referred to as GSM alphabet or SMS alphabet) and *UCS2* (16 bit, refer to ISO/IEC 10646). See AT+CSCS for information about selecting the character set. Character tables can be found below.

Explanation of terms

- Escape sequence

  The escape sequence used within a text coded in the GSM default alphabet (0x1B) must be correctly interpreted by the TE, both for character input and output. To the G2111/G2151I series, an escape sequence appears like any other byte received or sent.

- TE Character Set

  The character set currently used by the Customer Application is selected with AT+CSCS. It is recommended to select UCS2 setting.

- Data Coding Scheme (DCS)

  DCS is part of a short message and is saved on the SIM. When writing a short message to the SIM in text mode, the DCS stored with AT+CSMP is used and determines the coded character set.

When you enter characters that are not valid characters of the supported alphabets the behavior is undefined. If GSM alphabet is selected, all characters sent over the serial line (between TE and ME) must be in the range from 0 to 127 (7 bit range).

Note: If the ME is configured for GSM alphabet, but the Customer Application (TE) uses ASCII, bear in mind that some characters have different code values, such as the following:

- "@" character with GSM alphabet value 0 is not displayable by an ASCII terminal program, e.g. Microsoft© HyperTerminal®.
- "@" character with GSM alphabet value 0 will terminate any C string! This is because value 0 is defined as C string end tag. Therefore, the GSM Null character will cause problems on application level when using 'C'-functions, e.g. "strlen()". Using an escape sequence as shown in the table below solves the problem. By the way, this may be the reason why even network providers sometimes replace '@' with "@=*" in their SIM application.
- Some other characters of the GSM alphabet may be misinterpreted by an ASCII terminal program. For example, GSM "ö" (as in "Börse") is assumed to be "|" in ASCII, thus resulting in "B|rse". This is because in both alphabets there are different characters assigned to value 7C (hexadecimal).

If the TE sends characters differently coded or undefined in ASCII or GSM (e.g. Ä, Ö, Ü) it is possible to use escape sequences. The ME's input parser translates the escape sequence to the corresponding GSM character value.

Table 1.5:   Examples for character definitions depending on alphabet

Character Value	ASCII Character	GSM 03.38 Character	UCS2 Character	Escape Sequence	Numeric Escape Sequence
0x5C	\	Ö	00D6	\5C	0x5C 0x35 0x43
0x22	"	"	0022	\22	0x5C 0x32 0x32
0x00	NULL	@	n/a	\00	0x5C 0x30 0x30

Usually terminal programs are not able to recognize escape sequences, and thus, handle them as normal characters.

To prevent misinterpretation of control characters or special characters it is recommended to always use USC2 alphabet and PDU mode.

1.6.1   GSM alphabet tables and UCS2 character values

This section provides tables for the GSM 03.38 alphabet supported by the OnCell G2111/G2151I series. Below any GSM character find the corresponding two byte character value of the UC 82 alphabet. The related mapping information is available at http://www.unicode.org/Public/MAPPINGSIETSI/GSM0338.TXT.

Main character table of GSM 03.38 alphabet				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@ 0040	Δ 0394	SP 0020	0 0030	¡ 00A1	P 0050	¿ 00BF	p 0070
0	0	0	1	1	£ 00A3	_ 005F	! 0021	1 0031	A 0041	Q 0051	a 0061	q 0071
0	0	1	0	2	$ 0024	Φ 03A6	" 0022	2 0032	B 0042	R 0052	b 0062	r 0072
0	0	1	1	3	¥ 00A5	Γ 0393	# 0023	3 0033	C 0043	S 0053	c 0063	s 0073
0	1	0	0	4	è 00E8	Λ 039B	¤ 00A4	4 0034	D 0044	T 0054	d 0064	t 0074
0	1	0	1	5	é 00E9	Ω 03A9	% 0025	5 0035	E 0045	U 0055	e 0065	u 0075
0	1	1	0	6	ù 00F9	Π 03A0	& 0026	6 0036	F 0046	V 0056	f 0066	v 0076
0	1	1	1	7	ì 00EC	Ψ 03A8	' 0027	7 0037	G 0047	W 0057	g 0067	w 0077
1	0	0	0	8	ò 00F2 [3]	Σ 03A3	(0028	8 0038	H 0048	X 0058	h 0068	x 0078
1	0	0	1	9	ç 00C7	Θ 0398	) 0029	9 0039	I 0049	Y 0059	i 0069	y 0079
1	0	1	0	10 /A	LF [LF] [2]	Ξ 039E	* 002A	: 003A	J 004A	Z 005A	j 006A	z 007A
1	0	1	1	11 /B	Ø 00D8	[1]	+ 002B	; 003B	K 004B	Ä 00C4	k 006B	ä 00E4
1	1	0	0	12 /C	ø 00F8	Æ 00C6	, 002C	< 003C	L 004C	Ö 00D6	l 006C	ö 00F6
1	1	0	1	13 /D	CR [CR] [2]	æ 00E6	- 002D	= 003D	M 004D	Ñ 00D1	m 006D	ñ 00F1
1	1	1	0	14 /E	Å 00C5	ß 00DF	. 002E	> 003E	N 004E	Ü 00DC	n 006E	ü 00FC
1	1	1	1	15 /F	å 00E5	É 00C9	/ 002F	? 003F	O 004F	§ 00A7	o 006F	à 00E0

Figure 1.1: Main character table of GSM 03.38 alphabet

1. This code is an escape to the following extension of the 7 bit default alphabet table.
2. This code is not a printable character and therefore not defined for the UCS2 alphabet. It shall be treated as the accompanying control character.
3. See Section 1.5, Communication between Customer Application for further details on using backspace and "b" character.

Extension character table of GSM 03.38 alphabet				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0					| 007C			
0	0	0	1	1								
0	0	1	0	2								
0	0	1	1	3								
0	1	0	0	4		^ 005E						
0	1	0	1	5							€²⁾ 20AC	
0	1	1	0	6								
0	1	1	1	7								
1	0	0	0	8			{ 007B					
1	0	0	1	9			} 007D					
1	0	1	0	10 /A	³⁾ [LF]							
1	0	1	1	11 /B		¹⁾						
1	1	0	0	12 /C				[005B				
1	1	0	1	13 /D				~ 007E				
1	1	1	0	14 /E				] 005D				
1	1	1	1	15 /F			\ 005C					

Figure 1.2: Extension character table of GSM 03.38 alphabet

1. This code value is reserved for the extension to another extension table. On receipt of this code, a receiving entity shall display a space until another extension table is defined.

2. This code represents the EURO currency symbol. The code value is the one used for the character 'e'. Therefore a receiving entity which is incapable of displaying the EURO currency symbol will display the character 'e' instead.

3. This code is defined as a Page Break character and may be used for example in compressed CBS messages. Any mobile which does not understand the 7 bit default alphabet table extension mechanism will treat this character as Line Feed.

If the Customer Application receives a code where a symbol is not represented in Figure 1.2, Extension character table of GSM 03.38 alphabet it shall display the character shown in the main default 7 bit alphabet table (see Figure 1.1, Main character table of GSM 03.38 alphabet).

1.6.2   UCS2 and GSM character coding and conversion

This section provides basic information on how to handle input and output character conversion, e.g. for SMS text mode and Remote SAT, if the character representation of ME and Customer Application differ, i.e. if the Data Coding Scheme and the TE character set use different mappings.

1.6.2.1   Output of SIM data (ME to TE)

Used character set	DCS = 7 bit GSM	DCS = 8 bit Data	DCS = 16 bit UCS2
GSM	Case 1 GSM (1:1)	Case 2 8 bit to IRA (1:2)	Case 3 UCS2 to IRA (2:4)
UCS2	Case 4 GSM to IRA (1:4)	Case 5 8 bit to IRA (1:4)	Case 6 UCS2 to IRA (2:4)

Note: The ratio of SIM bytes to output bytes is given in parentheses.

Case 1

Every GSM character is sent to the TE as it is (8-bit value with highest bit set to zero).

Example: 47'H, 53'H, 4D'H → 47'H, 53'H, 4D'H, displayed as "GSM"

Case 2

Every data byte is sent to the TE as 2 IRA characters each representing a half byte.

Example: B8'H (184 decimal) → 42'H, 38'H, displayed as "B8"

Case 3

Every 16-bit UCS2 value is sent to the TE as 4 IRA characters.

Example: C4xA7'H (50343 decimal) → 43'H, 34'H, 41'H, 37'H, displayed as "C4A7"

Problem: An odd number of bytes leads to an error because there are always two bytes needed for each USC2 character

Case 4

Every GSM character is sent to the TE as 4 IRA characters to show UCS2 in text mode.

Example: 41'H ("A") → 30'H, 30'H, 34'H, 31'H, displayed as "0041"

Case 5

Every data byte is sent to the TE as IRA representation of UCS2 (similar to case 4).

Example: B2'H → 30'H, 30'H, 42'H, 32'H, displayed as "00B2"

Case 6

Every 16-bit value is sent to the TE as IRA representation of it. It is assumed that number of bytes is even.

Example: C3x46'H → 43'H, 33'H, 34'H, 36'H, displayed as "C346"

1.6.2.2   Input of SIM data (TE to ME)

Used character set	DCS = 7 bit GSM	DCS = 8 bit Data	DCS = 16 bit UCS2
GSM	Case 1 GSM (1:1)	Case 2 IRA to 8 bit (2:1)	Case 3 IRA to 16 bit (4:2)
UCS2	Case 4 UCS2 to GSM (4:1)	Case 5 UCS2 to 8 bit (4:1)	Case 6 UCS2 to 16 bit (4:2)

Note: The ratio between the number of input characters and bytes stored on the SIM is given in parentheses.

Case 1

Every character is sent from TE to ME as GSM character (or ASCII with standard terminal emulation, e.g. HyperTerminal®).

Character value must be in range from 0 to 127 because of 7-bit GSM alphabet.

To reach maximum SMS text length of 160 characters in 140 bytes space characters will be compressed on SIM.

This must be set using the parameter `<dcs>` of `AT+CSMP` (add 64).

Example: "ABCDEFGH" typed is sent and stored uncompressed as → 4142434445464748'H (stored compressed as 41E19058341E91'H)

Case 2
Every data byte is sent as 2 IRA characters.
Maximum text length is 280 IRA characters which will be converted into 140 bytes SMS binary user data
Example: "C8" typed is sent as 43'H, 38'H → stored as C8'H

Case 3
Every 16-bit value is sent as 4 IRA characters.
Maximum text length is 280 IRA characters which will be converted into 70 UCS2 characters (16-bit each)
Number of IRA characters must be a multiple of four because always 4 half bytes are needed for a 16-bit value
Example: "D2C8" typed is sent as 44'H, 32'H, 43'H, 38'H → stored as D2C8'H

Case 4
Every GSM character is sent as 4 IRA characters representing one UCS2 character.
Example: To store text "ABC" using UCS2 character set you have to type "004100420043".
This is sent as 30'H,30'H,34'H,31'H, 30'H,30'H,34'H,32'H, 30'H,30'H,34'H,33'H → detected as IRA representation of 3 UCS2 characters, converted to GSM character set and stored as 41'H, 42'H, 43'H.
Maximum input is 640 IRA characters representing 160 UCS2 characters when compression is active. These are converted to 160 GSM 7-bit characters.
Without compression only 140 GSM characters can be stored which are put in as 560 IRA characters.
Values of UCS2 characters must be smaller than 80'H (128 decimal) to be valid GSM characters.

Number of IRA characters must be a multiple of four. Problems:
- "41"   →Error, there are four IRA characters (two bytes) needed
- "0000"→Error, not an UCS2 character
- "4142"→Error, value of UCS2 character > 7F'H
- "008B"→Error, value of UCS2 character > 7F'H

This affects the maximum input length of a string.

Case 5
Every UCS2 character is sent as 4 IRA characters and is converted into two 8-bit values. This means that the first two characters have to be '00'.
Example: UCS2 character 009F'H typed as "009F" is sent as 30'H,30'H,39'H,46'H → converted into 8-bit value 9F'H.
Maximum number of UCS2 characters is 140 which are represented by 560 IRA characters. Number of IRA characters must be a multiple of four.

Case 6
Every UCS2 character is sent as 4 IRA characters each and is converted into a 16-bit value again.
Example: UCS2 character 9F3A'H typed as "9F3A" is sent as 39'H,46'H,33'H,41'H → converted into 9F3A'H.
Maximum number of UCS2 characters is 70 which are represented by 280 IRA characters. Number of IRA characters must be a multiple of four.
Invalid UCS2 values must be prevented.

1.7 Unsolicited Result Code Presentation

URC stands for Unsolicited Result Code and is a report message issued by the ME without being requested by the TE, i.e. an URC is issued automatically when a certain event occurs. Hence, an URC is not issued as part of the response related to an executed AT command.

Typical events leading to URCs are incoming calls ("RING"), waiting calls, received short messages, changes in temperature, network registration etc.

For most of these messages, the ME needs to be configured whether or not to send a URC. Descriptions of these

URCs are provided with the associated AT command. URCs which are not user definable are described in Section 1.7.1, Common URCs. A summary of all URCs can be found in Section 21.7, Summary of Unsolicited Result Codes (URC).

To announce a pending URC transmission the ME will do the following:

- The ME activates its RING line (logic "1") for 1 second, i.e. the RING line changes to the physical "Low" level.

  This allows the TE to stay in power saving mode until a ME related event requests service.

  If several URCs occur coincidently or in quick succession each URC triggers the RING line independently, although the line will not be deactivated between each URC. As a result, the RING line may stay low for more than 1 second.

  If an incoming call is answered within less than 1 second (with ATA or if auto answering is set to ATS0=1) than the RING line will be deactivated earlier.

  The "^SHUTDOWN" URC will not activate the RING line.

- If the AT command interface is busy a "BREAK" will be sent immediately but the URC will not be issued until the line is free. This may happen if the URC is pending in the following cases:

  ➢ During the processing of an AT command (i.e. the time after the TE echoes back the first character "A" of an AT command just sent by itself until the ME responds with "OK" or "ERROR").

  ➢ During a data call.

  Please note that AT command settings may be necessary to enable in-band signaling, e.g. refer to AT+CMER or AT+CNMI.

If autobauding is enabled (as factory default mode or set with AT+IPR=0), URCs generated after restart will be output with 57600 bps until the ME has detected the current bit rate. The URCs "^SYSSTART", "^SYSSTART<text>", however, are not presented at all. For details please refer to Section 4.7.1, Autobauding. To avoid problems we recommend to configure a fixed bit rate rather than using autobauding.

1.7.1   Common URCs

This section contains all URCs not associated to a certain AT command. They cannot be defined by the user and appear automatically when the voltage conditions described below occur. Please refer to [2] for specifications regarding the minimum and maximum operating voltage limits. The automatic shutdown procedure is usually equivalent to the power-down initiated with the AT^SMSO command.

URC 1

```
^SBC: Undervoltage
```

The URC indicates that the ME is close to the under voltage threshold. The URC appears only once. If the voltage continues to decrease until it drops below the threshold a controlled shutdown will be initiated.

URC 2

```
^SBC: Overvoltage
```

The URC indicates that the ME is close to the overvoltage threshold. The URC appears only once. If the voltage continues to increase until it crosses the threshold a controlled shutdown will be initiated.

1.8 Errors and Messages

The command result codes "+CME ERROR: <err>" and "+CMS ERROR: <err>" indicate errors related to mobile equipment or network functionality.

The format of <err> can be either numeric or verbose and is selectable via AT+CMEE.

A result error code terminates the execution of the command and prevents the execution of all remaining commands that may follow on the same command line. If so, neither "ERROR" nor "OK" result codes are returned for these commands. A 30 seconds timeout will deliver "ERROR" when the input of a command is not complete.

Using the wrong command syntax may result in errors: For example, using the execute command syntax although the command has no execute format, causes "ERROR" to be returned. Likewise, using the write command syntax although the command has no write format causes "+CME ERROR: <err>" to be returned.

See also:
- Section 2.11.1, CME/CMS Error Code Overview
- Section 2.5.1, Verbose and numeric result codes
- Section 3.4, AT+CEER

1.9 Serial Interface Flow Control

Flow control is essential to prevent loss of data or avoid errors when, in a data or fax call, the sending device is transferring data faster than the receiving side is ready to accept. When the receiving buffer reaches its capacity, the receiving device should be capable to cause the sending device to pause until it catches up.

There are basically two approaches to regulate data flow: Software flow control and hardware flow control. The High Watermark (HWM) of the input/output buffer should be set to approximately 60% of the total buffer size, the Low Watermark (LWM) is recommended to be about 30%. The data flow should be stopped when the buffer capacity rises close to the High Watermark and resumed when it drops below the Low Watermark. The time required to cause stop and go results in a hysteresis between the High and Low Watermarks.

1.9.1 Software Flow Control (XON/OFF Handshake)

Software flow control can be used to control the data flow in both directions, from Customer Application to the OnCell G2111/G2151I series and vice versa, i.e. ME to TE. Software flow control uses different characters to stop (XOFF, decimal 19) and resume (XON, decimal 17) data flow. Hence, all data that represent XON or XOFF characters will be interpreted as control characters. This applies also to characters included within the data stream to be transmitted (usually plain ASCII text files do not include such characters). The only advantage of software flow control is that three wires would be sufficient on the serial interface.

1.9.2 Hardware Flow Control (RTS/CTS Handshake)

Hardware flow control sets or resets the RTS/CTS wires. This approach is faster and more reliable, and therefore, the better choice. When the HWM is reached, CTS is set inactive. When the LWM is passed, CTS goes active again. To achieve smooth data flow, ensure that the RTS/CTS lines are present on your application platform.

Configuring hardware flow control
- Hardware flow control must be set on both sides: with AT\Q3 in the ME and an equivalent RTS/CTS handshake option in the host application.
- The default setting of the ME is AT\Q0 (no flow control) which must be altered to AT\Q3 (RTS/CTS hardware handshake on). The setting is stored volatile and must be restored each time after rebooting the ME.
- AT\Q has no read command. To verify the current setting of AT\Q, simply check the settings of the active profile with AT&V.
- Often, fax programs run an initialization procedure when started up. The initialization commonly includes enabling RTS/CTS hardware handshake, eliminating the need to set AT\Q3 once again. However, before setting up a CSD call, you are advised to check that RTS/CTS handshake is set.

Buffer design considerations

- After deactivating the RTS line, the ME may still send up to 264 bytes (worst case). This can be easily handled if the buffer of the host application is sufficiently sized, and if a hysteresis is implemented regarding its Rx buffer. For host applications that are required to handle a large amount of data at high speed, a total buffer capacity of 512 bytes is recommended.

2

Configuration Commands

The AT Commands described in this chapter allow the external application to determine the G2111/G2151I series' behavior under various conditions.

The following topics are covered in this chapter:

2.1 AT&F Reset AT Command Settings to Factory Default Values

AT&F resets AT command settings to their factory default values.

Every ongoing or incoming call will be terminated.

Syntax

Exec Command
AT&F[<value>]
Response(s)
OK

Parameter Description

<value>(num)

[0]   Reset parameters to their factory default values.

2.2 AT&V Display current configuration

AT&V returns the current parameter setting. The configuration varies depending on whether or not PIN authentication has been done.

Syntax

Exec Command
AT&V[<value>]
Response(s)
ACTIVE PROFILE:
... (see Section 2.2.1, AT&V responses)
OK

Parameter Description

<value>(num)

[0]   Profile number

Notes

- The parameters of AT^SMGO can only be displayed after the SMS data from the SIM have been read success- fully for the first time. Reading starts after successful SIM authentication has been performed, and may take up to 30 seconds depending on the SIM used. While the read process is in progress, an attempt to read the parameter will result in empty values.
- The parameter of AT+CSDH will only be displayed in SMS PDU mode, see AT+CMGF.

2.2.1 AT&V responses

The following tables show four different kinds of responses depending on whether or not the PIN is entered.

Table 2.1: Current configuration on ASC0 (example)

PIN authentication done	No PIN authentication
ACTIVE PROFILE:	ACTIVE PROFILE:
E1 Q0 V1 X4 &C1 &D2 &S0 \Q0	E1 Q0 V1 X4 &C1 &D2 &S0 \Q0

S0:000 S3:013 S4:010 S5:008 S6:000 S7:060 S8:000 S10:002 S18:000 +CBST: 7,0,1 +CRLP: 61,61,78,6 +CR: 0 +FCLASS: 0 +CRC: 0 +CMGF: 1 +CSDH: 0 +CNMI: 0,0,0,0,1 +ILRR: 0 +IPR: 57600 +CMEE: 2 ^SMGO: 0,0 +CSMS: 0,1,1,1 ^SACM: 0,"000000","000000" ^SLCC: 0 ^SCKS: 0,1 +CREG: 0,1 +CLIP: 0,2 +CAOC: 0 +COPS: 0,0,"operator" +CGSMS: 3 OK	S0:000 S3:013 S4:010 S5:008 S6:000 S7:060 S8:000 S10:002 S18:000 +CBST: 7,0,1 +CRLP: 61,61,78,6 +CR: 0 +FCLASS: 0 +ILRR: 0 +IPR: 57600 +CMEE: 2 ^SCKS: 0,1 OK

2.3 AT&W Store AT Command Settings to User Defined Profile

AT&W stores the current AT command settings to a user defined profile in non-volatile memory of the G2111/G2151I series. The AT command settings will automatically be restored from the user defined profile during power-up or if ATZ is used. AT&F restores AT command factory default settings. Hence, until first use of AT&W, ATZ works as AT&F.

Syntax

Exec Command
AT&W[<value>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<value>(num)

[0]   User Profile number

2.4 ATQ Result Code Presentation Mode

ATQ controls if the G2111/G2151I series transmits any result code to the TE. Other information text transmitted as response is not affected.

Syntax

Exec Command
ATQ[<n>]
Response(s)
If <n>=0:
OK
If <n>=1:
(none)

Parameter Description

Result Code Presentation Mode.

It is not recommended to change this value.

<n>(num)(&W(&V)

[0](&F)	ME transmits result code.
1	Result codes are suppressed and not transmitted.

2.5 ATV Result code format mode

This command determines the contents of header and trailer transmitted with AT command result codes and information responses. Possible responses are described in Section 2.5.1, Verbose and numeric result codes.

Syntax

Exec Command
ATV[<value>]
Response(s)
OK
ERROR

Parameter Description

<value>(num)(&W)(&V)

[0]	Information response: <text><CR><LF>
	Short result code format: <numeric code><CR>
1(&F)	Information response: <CR><LF><text><CR><LF>
	Long result code format: <CR><LF><verbose code><CR>

2.5.1 Verbose and numeric result codes

Verbose format	Numeric format	Meaning
OK	0	command executed, no errors
CONNECT	1	link established
RING	2	ring detected
NO CARRIER	3	link not established or disconnected
ERROR	4	invalid command or command line too long
NO DIALTONE	6	no dial tone, dialing impossible, wrong mode
BUSY	7	remote station busy
NO ANSWER	8	no answer
CONNECT 2400/RLP	47	link with 2400 bps and Radio Link Protocol
CONNECT 4800/RLP	48	link with 4800 bps and Radio Link Protocol

CONNECT 9600/RLP	49	link with 9600 bps and Radio Link Protocol
ALERTING		alerting at called phone
DIALING		mobile phone is dialing

2.6 ATX CONNECT Result Code Format

ATX determines whether or not the G2111/G2151I series transmits particular result codes to the TE. It also controls whether or not the ME verifies the presence of a dial tone when it begins dialing, and if engaged tone (busy signal) detection is enabled.

Syntax

Exec Command
ATX[<value>]
Response(s)
OK
ERROR

Parameter Description

<value>(num)(&W)(&V)

[0]	CONNECT result code only returned. Dial tone and busy detection are disabled.
1	CONNECT <text> result code only returned. Dial tone and busy detection are both disabled.
2	CONNECT <text> result code returned. Dial tone detection is enabled, busy detection is disabled.
3	CONNECT <text> result code returned. Dial tone detection is disabled, busy detection is enabled.
4(&F)	CONNECT <text> result code returned. Dial tone and busy detection are both enabled.

2.7 ATZ Restore AT Command Settings from User Defined Profile

First ATZ resets the AT command settings to their factory default values, similar to AT&F. Afterwards the AT command settings are restored from a user defined profile in non-volatile memory of the G2111/G2151I series, if one was stored with AT&W before. Any additional AT command on the same command line may be ignored. A delay of 300 ms is required before next AT command is sent.

If a connection is in progress, it will be terminated.

Syntax

Exec Command
ATZ[<value>]
Response(s)
OK

Parameter Description

<value>(num)

[0]	User Profile Number

2.8 AT+CFUN Functionality Level

`AT+CFUN` controls the G2111/G2151I series' functionality level. It can be used to reset the ME, to choose one of the power save (SLEEP) modes or to return to full functionality. Intended for power saving, SLEEP mode usage reduces the functionality of the ME to a minimum and thus minimizes the current consumption. Further information, particularly power supply ratings during the various operating modes and the timing of hardware signals in SLEEP mode.

Power save (SLEEP) modes fall in two categories:

- NON-CYCLIC SLEEP mode selectable with <fun>=0
- and CYCLIC SLEEP modes selectable with <fun>= 7 or 9.

NON-CYCLIC SLEEP mode permanently blocks the serial interface. The benefit of CYCLIC SLEEP mode is that the serial interface remains accessible and that, in intermittent wake-up periods, characters can be sent or received without terminating the selected mode. This allows the ME to wake up for the duration of an event and, afterwards, to resume power saving. By setting/resetting the CTS signal the ME indicates to the application whether or not the UART is active. A summary of all SLEEP modes and the different ways of waking up the module can be found in Section 2.8.1, Wake up the ME from SLEEP mode.

For NON-CYCLIC and CYCLIC SLEEP mode both the ME and the application must be configured to use hardware flow control. The default setting of hardware flow control is `AT\Q0` which must be altered to `AT\Q3`. For use after restart you are advised to add it to the user profile saved with `AT&W`. If serial interface is connected, hardware flow control must be set in application. See notes below for further detail.

`AT+CFUN` test command returns the values of the supported parameters.
`AT+CFUN` read command returns the current functionality value.
`AT+CFUN` write command can be used to reset the ME, to choose one of the SLEEP modes or to return to full functionality.

Syntax

Test Command
AT+CFUN=?
Response(s)
+CFUN: (list of supported <fun>s) , (list of supported <rst>s)
OK
Read Command
AT+CFUN?
Response(s)
+CFUN: <fun>
OK
Write Command
AT+CFUN=[<fun>[, <rst>]]
Response(s)
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Code

`^SYSSTART`

Indicates that the ME has been started and is ready to operate. If autobauding is active (`AT+IPR=0`) the URC is not generated.

Parameter Description

`<fun>`(num)

0		NON-CYCLIC SLEEP mode:

In this mode, the AT interface is not accessible. Consequently, after setting `<fun>`=0, do not send further characters. Otherwise these characters remain in the input buffer and may delay the output of an unsolicited result code.

The first wake-up event stops power saving and takes the ME back to full functionality level `<fun>`=1.

[1]$^{(\&F)(P)}$ Full functionality (no power saving).

If the ME is in one of the CYCLIC SLEEP modes you can issue `AT+CFUN=1` to stop power saving and return to full functionality.

Keep in mind that, unlike the reset command described below, this action does not restart the ME but only changes the level of functionality. See parameter `<rst>` for details on the reset.

7   CYCLIC SLEEP mode:

In this mode, the serial interface is shortly enabled while CTS is active. If characters are recognized on the serial interface, the ME stays active for 2 seconds after the last character was sent or received.

The ME exits SLEEP mode only, if `AT+CFUN=1` is entered.

9   CYCLIC SLEEP mode:

In this mode, the serial interface is shortly enabled while CTS is active. If characters are recognized on the serial interface, the ME stays active after the last character was sent or received for at least the time, which can be configured by `AT^SCFG="PowerSaver/Mode9/Timeout",<psm9to>` (temporary wakeup). In contrast to SLEEP mode 7 assertion of RTS can also be used to temporarily wake up the ME. In this case too, activity time is at least the time set with `AT^SCFG="PowerSaver/Mode9/Timeout",<psm9to>`. RTS can be activated from serial interface.

The ME exits SLEEP mode only, if `AT+CFUN=1` is entered.

`<rst>`$^{(num)}$

The parameter can only be used if the serial interface is enabled.

Due to the command syntax, you need to enter parameter `<fun>`, followed by `<rst>`, where `<fun>` is only a placeholder and has no effect. See examples below.

[0]   Placeholder for `<fun>` as stated above.

1   ME resets and restarts to full functionality. After reset and restart, PIN1 authentication is necessary (`AT+CPIN`).

Notes

- The settings made with AT+CFUN apply to serial interfaces.
- CYCLIC SLEEP mode cannot be activated or resumed as long as data is buffered in one of the output buffers of the ME. Therefore, ensure that the following requirements be met:
  - ➢ If hardware flow control is set in the ME (AT\Q3), the host must also use hardware flow control.
  - ➢ Remember that `AT\Q3` takes effect only on the interface where the command was set. Therefore, if serial interface is connected ensure to set `AT\Q3`. However, if only one interface shall be operated ensure that, on the unused interface, `AT\Q3` is neither enabled nor stored to the `AT&W` user profile. This is necessary to avoid that URCs, outstanding AT command responses or, after restart even the `"^SYSSTART"` URC might be buffered on the unused interface without being collected by the host application.
- While a circuit-switched call is in progress, <fun>=7 or 9 can be activated without terminating the call. How- ever, setting <fun>=0 during a circuit-switched call immediately disconnects this call.
- Power saving works properly only when PIN authentication has been done. If you attempt to activate power saving while the SIM card is not inserted or the PIN is not correctly entered, the selected <fun> level will

be set, though power saving does not take effect. Furthermore, in order to accept incoming calls, SMS or network related URCs in SLEEP mode the ME must be registered when it enters the SLEEP mode.

- To check whether power saving is on, you can query the status with the read command AT+CFUN? only if the module is in full functionality mode or in CYCLIC SLEEP mode.
- Recommendation: In NON-CYCLIC SLEEP mode, you can set an RTC alarm to wake up the ME and return to full functionality. This is a useful approach because, in this mode, the AT interface is not accessible.
- When the module is powered up in Alarm Mode (see: AT+CALA) AT+CFUN=x,1 stops the 30 seconds power-off timer.

Examples

EXAMPLE 1

To check the level of functionality use the read command:

```
AT+CFUN?
+CFUN: 1          Default mode after ME was restarted
```

Remember that the AT interface is not accessible in NON-CYCLIC SLEEP mode. The read command is only useful when the ME is set to full functionality or CYCLIC SLEEP mode.

```
AT+CFUN?
+CFUN: 9          CYCLIC SLEEP mode
```

EXAMPLE 2

To set the ME to NON-CYCLIC SLEEP mode enter

```
AT+CFUN=0
OK
```

When, for example, an SMS is being received and indicated by an unsolicited result code (URC), the ME wakes up to full operation.

```
+CMTI: "SM",5     Note that the URC used in this example will appear only, if AT+CNMI=1,1 was
                  configured before.
```

After this, you may want to verify the operating status:

```
AT+CFUN?
+CFUN: 1          Indicates that ME has entered full functionality mode.
```

EXAMPLE 3

To stop CYCLIC SLEEP mode and return to full functionality:

```
AT+CFUN?
+CFUN: 9
OK AT+CFUN=1
OK
```

Remember that this approach is not applicable to the NON-CYCLIC SLEEP mode (since the serial interface is disabled). The NON-CYCLIC SLEEP mode ends with the first wake-up event.

EXAMPLE 4

To reset and restart the ME:

```
AT+CFUN=1,1       or alternatively, AT+CFUN=0,1 or 7,1 or 9,1
OK
^SYSSTART         The ^SYSSTART URC confirms that the ME has been rebooted. Note that ^SYSSTART
                  appears only if AT+IPR ≠ 0. Remember to enter the SIM PIN after restart.
```

2.8.1 Wake up the ME from SLEEP mode

A wake-up event is any event that causes the ME to draw more current. Depending on the selected mode, the wake-up event either switches the SLEEP mode off and takes the ME back to full functionality AT+CFUN=1, or activates the ME temporarily without terminating the selected SLEEP mode.

Definitions of the state transitions described in Table 2.3:

- Quit: ME exits SLEEP mode.
- Temporary: ME becomes active temporarily for the duration of the event and the mode-specific follow-up time after the last character was sent or received on the serial interface.
- No effect: Event is not relevant in the selected SLEEP mode. The ME does not wake up.

Table 2.3:   Wake-up events in NON-CYCLIC and CYCLIC SLEEP modes

Event	Selected mode: <fun>=0	Selected mode: <fun>=7 or 9
Ignition line	No effect	No effect
RTS activation	Quit	Mode 7: No effect (RTS is only used for flow control) Mode 9: Temporary
Unsolicited Result Code (URC)	Quit	Temporary
Incoming voice or data call	Quit	Temporary
Any AT command (incl. outgoing SMS, voice or data call)	Not possible (UART disabled)	Temporary
Incoming SMS (AT+CNMI is set to 0,0 (this is the default setting)	No effect	No effect
Incoming SMS (AT+CNMI is set to 1,1)	Quit	Temporary
GPRS data transfer	Not possible (UART disabled)	Temporary
RTC alarm (AT+CALA)	Quit	Temporary
AT+CFUN=1	Not possible (UART disabled)	Quit

2.9 AT^SMSO Switch Off G2111/G2151I series

AT^SMSO initiates the G2111/G2151I series' power-off procedure. Do not send any other AT command after this.

Low level of the ME's V180/V285 pins notifies that the procedure has completed and the ME has entered the POWER DOWN mode. Therefore, be sure not to disconnect the operating voltage until the V180/V285 pins are low or until the URC "^SHUTDOWN" is displayed. Otherwise, you run the risk of losing data. For further details on how to turn off the ME. Particular attention should be paid to the sections dealing with an external power indication circuit and back powering.

Syntax

Test Command
AT^SMSO=?
Response(s)
OK
Exec Command
AT^SMSO
Response(s)
^SMSO: MS OFF
OK
ERROR

Unsolicited Result Code

^SHUTDOWN

Indicates that the power-off procedure is finished and the module will be switched off in less than 1 second.

Note

• If serial interface is connected the URC appears on it.

2.10   AT+GCAP Capabilities List

AT+GCAP displays a list of basic capabilities supported by the G2111/G2151I series. This allows the TE to determine which groups of extended-syntax AT commands can be used with the ME.

Syntax

Test Command
AT+GCAP=?
Response(s)
OK
Exec Command
AT+GCAP
Response(s)
+GCAP: <name>
OK

Parameter Description

<name>(str)

e.g. +CGSM, +FCLASS

2.11   AT+CMEE Error Message Format

AT+CMEE controls the format of error result codes that indicates errors related to G2111/G2151I series functionality. Format can be selected between plain "ERROR" output, error numbers or verbose "+CME ERROR: <err>" and "+CMS ERROR: <err>" messages.

Possible error result codes are listed in Table 2.4, General "CME ERROR" Codes (GSM 07.07), Table 2.5, General "CME ERROR" Codes (proprietary), Table 2.6, GPRS related "CME ERROR" Codes (GSM 07.07) and Table 2.7, SMS related "CMS ERROR" Codes (GSM 07.05).

Syntax

Test Command
AT+CMEE=?
Response(s)
+CMEE: (list of supported<errMode>s)
OK
Read Command
AT+CMEE?
Response(s)
+CMEE: <errMode>
OK
Write Command
AT+CMEE=<errMode>
Response(s)

```
OK
ERROR
+CME ERROR: <err>
```

Parameter Description

<errMode>(num)(&W)(&V)

0(&F)(D)   Disable result code, i.e. only "ERROR" will be displayed.

1   Enable error result code with numeric values.
2   Enable error result code with verbose (string) values.

Example

To obtain enhanced error messages it is recommended to choose <errMode>=2.

```
AT+CMEE=2
OK
```

2.11.1 CME/CMS Error Code Overview

Table 2.4:   General "CME ERROR" Codes (GSM 07.07)

<err> Code	Text (if AT+CMEE=2)
0	phone failure
1	no connection to phone
2	phone adapter link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed - emergency calls only
40	network personalization PIN required
41	network personalization PUK required

42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
48	PH-SIM PUK (master phone code) required
100	unknown
132	service option not supported
133	requested service option not subscribed
134	service option temporary out of order
256	operation temporary not allowed
257	call barred
258	phone busy
259	user abort
260	invalid dial string
261	SS not executed
262	SIM blocked
263	invalid block

Table 2.5:   General "CME ERROR" Codes (proprietary)

<err> Code	Text (if AT+CMEE=2)
615	network failure
616	network is down
639	service type not yet available
640	operation of service temporary not allowed
764	missing input value
765	invalid input value
767	operation failed

Table 2.6:   GPRS related "CME ERROR" Codes (GSM 07.07)

<err> Code	Text (if AT+CMEE=2)
103	illegal MS
106	illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	location area not allowed
113	roaming not allowed in this location area
148	unspecified GPRS error
149	PDP authentication failure
150	invalid mobile class

Table 2.7:   SMS related "CMS ERROR" Codes (GSM 07.05)

<err> Code	Text (if AT+CMEE=2)
1	unassigned (unallocated) number
8	operator determined barring
10	call barred
21	short message transfer rejected
27	destination out of service
28	unidentified subscriber
29	facility rejected
30	unknown subscriber
38	network out of order

41	temporary failure
42	congestion
47	resources unavailable, unspecified
50	requested facility not subscribed
69	requested facility not implemented
81	invalid short message transfer reference value
95	invalid message, unspecified
96	invalid mandatory information
97	message type non-existent or not implemented
98	message not compatible with short message protocol state
99	information element non-existent or not implemented
111	protocol error, unspecified
127	interworking, unspecified
128	telematic interworking not supported
129	short message type 0 not supported
130	cannot replace short message
143	unspecified TP-PID error
144	data coding scheme (alphabet) not supported
145	message class not supported
159	unspecified TP-DCS error
160	command cannot be actioned
161	command unsupported
175	unspecified TP-command error
176	TPDU not supported
192	SC busy
193	no SC subscription
194	SC system failure
195	invalid SME address
196	destination SME barred
197	SM rejected-duplicate SM
198	TP-VPF not supported
199	TP-VP not supported
208	do SIM SMS storage full
209	no SMS storage capability in SIM
210	error in MS
211	memory capacity exceeded
212	SIM application toolkit busy
213	SIM data download error
255	unspecified error cause
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required

318	SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network timeout
340	no +CNMA acknowledgement expected
500	unknown error
512	user abort
513	unable to store
514	invalid status
515	invalid character in address string
516	invalid length
517	invalid character in PDU
518	invalid parameter
519	invalid length or character
520	invalid character in text
521	timer expired
522	operation temporary not allowed

2.12 AT+CSCS Character Set

AT+CSCS write command informs the G2111/G2151I series which character set is used by the TE. This enables the ME to convert character strings correctly between TE and ME character sets. Please also refer to Section 1.6, Supported character sets.

Syntax

Test Command
AT+CSCS=?
Response(s)
+CSCS: (list of supported<chset>s)
OK
Read Command
AT+CSCS?
Response(s)
+CSCS: <chset>
OK
Write Command
AT+CSCS=[<chset>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<chest>(str)

"GSM"(&F)(P)   GSM default alphabet (GSM 03.38 subclasses 6.2.1).
                     Note: This setting may cause software flow control problems since the codes used to stop
                     and resume data flow (XOFF = decimal 19, XON = decimal 17) are interpreted as normal
                     characters.

"UCS2"   16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]). UCS2 character

strings are converted to hexadecimal numbers in the range 0000 to FFFF; e.g.

"004100620063" equates to three 16-bit characters with decimal values 65, 98 and 99.

2.13   AT^SCFG Extended Configuration Settings

AT^SCFG can be used to query and configure various settings of the G2111/G2151I series.

AT^SCFG read command returns a list of all supported parameters and their current values.

AT^SCFG write command queries a configuration parameter (if no value is entered) or sets its value(s).

Input of parameter names is always coded in GSM character set, parameter values are expected to be given as specified via AT+CSCS

Syntax

Test Command
AT^SCFG=?
Response(s)
^SCFG: "Audio/AMR", (list of supported \<amr>s)
^SCFG: "Audio/Loop", (list of supported \<al>s)
^SCFG: "Call/ECC", (list of supported \<ecc>s)
^SCFG: "Call/SpeechVersion1", (list of supported \<csv1>s)
^SCFG: "GPRS/ATS0/withAttach", (list of supported \<gs0aa>s)
^SCFG: "GPRS/RingOnIncomingData", (list of supported \<groid>s)
^SCFG: "PowerSaver/Mode9/Timeout", (list of supported \<psm9to>s)
^SCFG: "Radio/Band/HandOver", (list of supported \<HandOverStatus>s)
^SCFG: "Tcp/IRT", (list of supported \<tcpIrt>)
^SCFG: "Tcp/MR", (list of supported \<tcpMr>)
^SCFG: "Tcp/OT", (list of supported \<tcpOt>)
^SCFG: "Tcp/WithURCs", (list of supported \<tcpWithUrc>)
^SCFG: "URC/CallStatus/CIEV", (list of supported \<succ>s)
^SCFG: "URC/CallStatus/SLCC", (list of supported \<sucs>s)
^SCFG: "URC/Datamode/Ringline", (list of supported \<udri>s)
^SCFG: "URC/Ringline", (list of supported \<uri>s)
^SCFG: "URC/Ringline/ActiveTime", (list of supported \<urat>s)
OK
Read Command
AT^SCFG?
Response(s)
^SCFG: "Audio/AMR", \<amr>1[, \<amr>2[, \<amr>3...[\<amr>10]]]
^SCFG: "Audio/Loop", \<al>
^SCFG: "Call/ECC", \<ecc>
^SCFG: "Call/SpeechVersion1", \<csv1>
^SCFG: "GPRS/ATS0/withAttach", \<gs0aa>
^SCFG: "GPRS/RingOnIncomingData", \<groid>
^SCFG: "PowerSaver/Mode9/Timeout", \<psm9to>
^SCFG: "Radio/Band/HandOver", \<HandOverStatus>
^SCFG: "Tcp/IRT", \<tcpIrt>
^SCFG: "Tcp/MR", \<tcpMr>
^SCFG: "Tcp/OT", \<tcpOt>
^SCFG: "Tcp/WithURCs", \<tcpWithUrc>
^SCFG: "URC/CallStatus/CIEV", \<succ>
^SCFG: "URC/CallStatus/SLCC", \<sucs>
^SCFG: "URC/Datamode/Ringline", \<udri>

^SCFG: "URC/Ringline", <uri>
^SCFG: "URC/Ringline/ActiveTime", <urat>
OK
Write Command
Adaptive Multi Rate (AMR):
AT^SCFG="Audio/AMR"[, <amr>]
Response(s)
^SCFG: "Audio/AMR", <amr>1[, <amr>2[, <amr>3...[<amr>10]]]
OK
ERROR
+CME ERROR: <err>
Write Command
Configure Audio Loop:
AT^SCFG="Audio/Loop"[, <al>]
Response(s)
^SCFG: "Audio/Loop", <al>
OK
ERROR
+CME ERROR: <err>
Write Command
Query/Configure Emergency numbers for SIM without ECC field
AT^SCFG="Call/ECC"[, <ecc>]
Response(s)
^SCFG: "Call/ECC", <ecc>
OK
ERROR
+CME ERROR: <err>
Write Command
Call/Configure SpeechVersion1
AT^SCFG="Call/SpeechVersion1"[, <csv1>]
Response(s)
^SCFG: "Call/SpeechVersion1", <csv1>
OK
ERROR
+CME ERROR: <err>
Write Command
GPRS ATS0 with automatic attach
AT^SCFG="GPRS/ATS0/withAttach"[, <gs0aa>]
Response(s)
^SCFG: "GPRS/ATS0/withAttach", <gs0aa>
OK
ERROR
+CME ERROR: <err>
Write Command
Ring on incoming GPRS IP data packets
AT^SCFG="GPRS/RingOnIncomingData"[, <groid>]
Response(s)
^SCFG: "GPRS/RingOnIncomingData", <groid>
OK
ERROR
+CME ERROR: <err>
Write Command
Query/Set timeout value for power saving mode 9
AT^SCFG="PowerSaver/Mode9/Timeout"[, <psm9to>]

Response(s)
^SCFG: "PowerSaver/Mode9/Timeout", <psm9to>
OK
ERROR
+CME ERROR: <err>

Write Command
Control Special Call Handover Setting
AT^SCFG="Radio/Band/HandOver"[, <HandOverStatus>]

Response(s)
^SCFG: "Radio/Band/HandOver", <HandOverStatus>
OK
ERROR
+CME ERROR: <err>

Write Command
Configuration of TCP parameter 'InitialRetransmissionTimeout':
AT^SCFG="Tcp/IRT"[, <tcpIrt>]

Response(s)
^SCFG: "Tcp/IRT", <tcpIrt>
OK
ERROR
+CME ERROR: <err>

Write Command
Configuration of TCP parameter 'MaxRetransmissions':
AT^SCFG="Tcp/MR"[, <tcpMr>]

Response(s)
^SCFG: "Tcp/MR", <tcpMr>
OK
ERROR
+CME ERROR: <err>

Write Command
Configuration of TCP parameter 'OverallTimeout':
AT^SCFG="Tcp/OT"[, <tcpOt>]

Response(s)
^SCFG: "Tcp/OT", <tcpOt>
OK
ERROR
+CME ERROR: <err>

Write Command
Configuration of Internet Service URCs:
AT^SCFG="Tcp/WithURCs"[, <tcpWithUrc>]

Response(s)
^SCFG: "Tcp/WithURCs", <tcpWithUrc>
OK
ERROR
+CME ERROR: <err>

Write Command
Configuration of URC "+CIEV: call" Call Status Indication
AT^SCFG="URC/CallStatus/CIEV"[, <succ>]

Response(s)
^SCFG: "URC/CallStatus/CIEV", <succ>
OK
ERROR
+CME ERROR: <err>

Write Command
Configuration of URC "^SLCC" Call Status Indication
AT^SCFG="URC/CallStatus/SLCC"[, <sucs>]
Response(s)
^SCFG: "URC/CallStatus/SLCC", <sucs>
OK
ERROR
+CME ERROR: <err>
Write Command
URC indication in datamode via Ring line:
AT^SCFG="URC/Datamode/Ringline"[, <udri>]
Response(s)
^SCFG: "URC/Datamode/Ringline", <udri>
OK
ERROR
+CME ERROR: <err>
Write Command
URC indication via Ring line:
AT^SCFG="URC/Ringline"[, <uri>]
Response(s)
^SCFG: "URC/Ringline", <uri>
OK
ERROR
+CME ERROR: <err>
Write Command
Duration of active RING line for URC indications:
AT^SCFG="URC/Ringline/ActiveTime"[, <urat>]
Response(s)
^SCFG: "URC/Ringline/ActiveTime", <urat>
OK
ERROR
+CME ERROR: <err>

Parameter Description

<amr>(str)(+CSCS)

Adaptive Multi Rate

This parameter can be used to control the usage of the feature "Adaptive Multi Rate" (AMR). It is possible to enable or disable this feature for all network operators, or to enable it for selected operators (max. 10). If the feature is enabled for all operators, any request to enable it for a specific operator will result in a "+CME ERROR: operation temporary not allowed".

Changes of this parameter become active with the next call.

Parameter is global for all interfaces, volatile and will not be reset by AT&F.

"enabled"(P)   AMR is used for every operator

"disabled"   AMR is not used for any operator.
00000...999999   Enable AMR for the specified operator (in BCD or IRA format; see AT+COPS).

<al>(str)

Audio Loop Setting

This parameter can be used to configure an audio loop for performing a simple verification of audio connections. The feature is intended for testing only.

Full audio processing will be performed. Audio parameterization capabilities remain nearly unrestricted. Microphone and loudspeaker ports can be selected with random access. Neither a SIM nor a GSM network is necessary to turn the audio loop on.

Turning the audio loop on activates audio mode 0 which cannot be selected during normal operation of the ME. Turning the audio loop off activates audio mode 1.

Audio mode 0 contains linear filters and neither echo canceller nor noise suppression are activated. It is also possible to select any other audio mode. These audio modes use the parameterization set as default during normal operation of the ME.

Activation of the audio loop turns side tone off, even if side tone is on in the selected audio mode during normal operation.

Parameter is global for all interfaces, volatile and will not be reset by AT&F.

"0"(P)   No audio loop active

"1"   Audio loop active

<ecc>(str)(+CSCS)

Emergency call numbers on non-ECC SIM

This parameter specifies emergency call numbers on SIM without ECC field. The parameter has no influence on the commonly used emergency numbers 112 and 911 which are always supported.

Please refer also to Section 7.3, ATD where you can find a list of emergency call numbers supported if no SIM is inserted.

The value range of <ecc> is "0"…"255". To select or deselect an emergency number calculate the sum of the values of all desired numbers and use the resulting value. For example, for "08" (2) and "118" (8) please enter the value (10).

Parameter is global for the ME, non-volatile and will not be reset by AT&F.

"0"(D)   No additional emergency numbers

"1"   000
"2"   08
"4"   110
"8"   118
"16   119
"32"   999
"64"   Reserved
"128"   Reserved
"255"   All additional emergency call numbers are supported.

<csv1>(str)(+CSCS)

Call Speech Version1

This parameter can be used to query or configure the speech version 1 indication in the bearer capabilities in case of voice calls (see GSM 04.08).

If you try to change this parameter as long as a circuit switched call is active, the command returns the new value and "OK", but the changes will not take effect before next call setup.

Parameter is global for the ME, volatile and will not be reset by AT&F.

"0"(P)	Full rate (FR) and half rate (HR) codecs are enabled for speech calls - full rate (FR) codec is preferred.
"1"	Full rate (FR) and half rate (HR) codecs are enabled for speech calls - half rate (HR) codec is preferred.
"2"	Half rate (HR) codec is disabled and full rate (FR) codec is enabled for speech calls.

\<gs0aa\>(str)(+CSCS)

GPRS ATS0 with Attach

This parameter can be used to control the behavior of ATS0.

Parameter is global for all interfaces, volatile and will not be reset by AT&F.

"on"(P)	When the ATS0=\<n\> (\<n\>>0) command is received, the MT will attempt to perform a GPRS attach.
"off"	When the ATS0=\<n\> (\<n\>>0) command is received, the MT will not attempt to perform a GPRS attach.

\<groid\>(str)(+CSCS)

Ring on incoming GPRS IP data packets

This parameter can be used to control the behavior of the RING line for incoming IP packets in GPRS online mode.

Parameter is local for the interface, volatile and will not be reset by AT&F.

"on"	If the ME is in power saving mode 7 or 8 or 9 (see AT+CFUN) and hardware flow control is in use (AT\Q3) and the RTS line is inactive and there are incoming IP packets for a GPRS context which is online, then the RING line will be activated once, for a time which is configured by the parameter "URC/Ringline/ActiveTime" (\<urat\>). The RING line to be used can be configured with the parameter "URC/Ringline" (\<uri\>).
"off" (P)	RING line is not activated for incoming IP packets.

\<psm9to\>(str)(+CSCS)

Power saving mode 9 timeout

This parameter can be used to query or configure the wake up time for power saving mode 9 (see AT+CFUN with parameter \<fun\>=9).

Parameter is global for the ME, volatile and will not be reset by AT&F.

5...20(P)...36000	The granularity of the timeout value is 100ms (i.e. a value of 10 equal 1 second). The minimum timeout value that can be applied is 5, but accuracy is only guaranteed for timeout values greater than 20.

\<HandOverStatus\>(str)(+CSCS)

Call Handover Status

This parameter offers a workaround to prevent problems during call handover into the 1900 MHz band, caused by non-conforming configurations of the 1900 MHz GSM network.

"0"(P)	Disable workaround.
"1"	Enable workaround. This value should be selected when handover into a 1900 MHz GSM

network fails. If required for permanent use the value needs to be set each time the ME is restarted.

`<tcpIrt>`(str)(+CSCS)

Initial Retransmission Timeout (IRT)

$1...3^{(D)}...60$	This parameter determines the time (in seconds) the TCP/IP stack will wait before starting the first retransmission of packets during the initial connection establishment phase.
	The TCP protocol ensures the retransmission of packets several times at increasing intervals until some upper limit is reached.
	This mechanism prevents packet loss and serious congestion problems. In addition, the parameters `<tcpMr>` and `<tcpOt>` can be set to further optimize this mechanism for special conditions depending on the mobile network.
	Parameter is global for the ME and non-volatile. Use of default value is recommended. If changed the new value takes effect the next time you start an Internet service with `AT^SISO`.

`<tcpMr>`(str)(+CSCS)

Maximum Number of Retransmissions (MR)

$1...10^{(D)}...30$	This parameter determines the maximum number of times to retransmit TCP packets. The value set with `<tcpMr>` will be assumed as default for the `<srvParmTag>` "tcpMR" when a new service profile is created with `AT^SISS`. In each service profile, you can set another "tcpMR" value which has precedence over the global value set with `AT^SCFG`. Existing service profiles are not affected when you change the global value via `AT^SCFG`. Parameter is global for the ME and non-volatile. Use of default value is recommended.

`<tcpOt>`(str)(+CSCS)

Overall TCP Timer for outstanding connections (tcpOT)

$1...6000^{(D)}$	This parameter specifies the number of seconds to wait before closing a connection if TCP/IP packets are not acknowledged.
	Setting the maximum value is practically equivalent to deactivating the tcpOT mechanism because the maximum time would never be reached by the TCP/ IP stack. The value set with `<tcpOt>` will be assumed as default for the `<srvParmTag>` "tcpOT" when a new service profile is created with `AT^SISS`. However, in each service profile, you can set another "tcpOT" value which has precedence over the global value set with `AT^SCFG`. Existing service profiles are not affected when you change the global value via `AT^SCFG`.
	Parameter is non-volatile. Use of default value is recommended.

`<tcpWithUrc>`(str)(+CSCS)

URC mode or polling mode for Internet service commands

This parameter enables or disables the presentation of the following URCs related to Internet service commands: "^SISR" URC, "^SISW" URC and "^SIS" URC for parameter `<urcCause>`=0 (Internet service events). "^SIS" URCs with `<urcCause>`=1 or 2 used to indicate incoming Socket connections are always enabled.   Parameter is global for the ME and non-volatile.

"on"$^{(D)}$	Enable URCs related to Internet service commands.
	Throughout the Chapter "Internet Service AT Commands" the mode is also referred to

as URC mode.

"off"   Disable URCs related to Internet service commands.

This requires the TE to employ polling techniques when using the Internet service AT commands: The TE is responsible to retrieve all status information needed to control an Internet session. The method is referred to as polling mode.

`<succ>`(str)(+CSCS)

CIEV Call Status Indication

This parameter can be used to control the behavior of URC "+CIEV: call". See also AT+CIND, AT+CMER and Section 7.1, Call Status Information.

Parameter is global for all interfaces and will not be reset by AT&F.

"restricted"[(P)]   URC "+CIEV: call" will be issued only when a Call Status transition ends in state "active" or "unknown" (see Section 7.1, Call Status Information) for a call in the list of active calls.

"verbose"   URC "+CIEV: call" will be issued when any state transition (including transitions beginning or ending in state "unknown") occurs in the list of active calls, or when a traffic channel is established.

`<sucs>`(str)(+CSCS)

SLCC Call Status Indication

This parameter can be used to control the behavior of URC "^SLCC". See also AT^SLCC and Section 7.1, Call Status Information.

Parameter is global for all interfaces and will not be reset by AT&F.

"restricted"   URC "^SLCC" will be issued only when a Call Status transition ends in state "active" or "unknown" (see Section 7.1, Call Status Information) for a call in the list of active calls

"verbose" [(P)]   URC "^SLCC" will be issued when any state transition (including transitions beginning or ending in state "unknown") occurs in the list of active calls, or when a traffic channel is established.

`<uri>`(str)(+CSCS)

URC RING line

This parameter can be used to control the behavior of the RING line to indicate URCs (both for idle interfaces and, if configured by the parameter "URC/Datamode/Ringline", if link is reserved) and, if configured, the indicator for incoming IP packets (see parameter "GPRS/RingOnIncomingData" (`<roid>`).

Parameter is local for the interface, volatile and will not be reset by AT&F.

"off"   URC is not indicated by RING.

"local"[(P)]   URC will be indicated by an activated RING line of the interface on which the URC appears

"asc0"   URC is indicated by an activated RING0 line.

`<udri>`(str)(+CSCS)

URC Datamode RING line

This parameter specifies whether RING or BREAK is used for the signaling of URCs when the ME-TE link is reserved (e.g. during circuit-switched data calls, fax connections, in GPRS data mode, in transparent TCP access mode opened with AT^SIST or during the execution of an AT command).

Parameter is global for all interfaces, volatile and will not be reset by AT&F.

"off" [(P)]   URC will be indicated by BREAK.

"on"   URC is indicated by an active RING line for a time which is configured by the parameter
                    "URC/Ringline/ActiveTime" (`<urat>`). The RING line which will be used, can be
                    configured by the parameter "URC/Ringline" (`<uri>`).

`<urat>`[(str)(+CSCS)]

URC RING line Active Time

This parameter can be used to control how long the RING line is activated to indicate URCs (both for idle
interfaces and, if configured by the parameter "URC/Datamode/Ringline" (`<udri>`), if link is reserved) and, if
configured by the parameter "GPRS/RingOnIncomingData", to indicate incoming GPRS IP data packets
(`<groid>`).

Parameter is global for all interfaces, volatile and will not be reset by AT&F.

"0"   RING line will be activated for a time between 4.6 and 9.2ms.
"1"   RING line will be activated for about 100ms.

"2" [(P)]   RING line will be activated for about 1s.

Note

- Parameters "GPRS/ATS0/withAttach" (<gs0aa>) and "GPRS/RingOnIncomingData" (<groid>) are
  available only if ME supports GPRS.

Examples

EXAMPLE 1

Usage of "Audio/AMR":

```
AT+CSCS="UCS2"                          Switch to UCS2 character set.
OK
AT^SCFG?                                Query all parameters.
...
^SCFG:"Audio/AMR","0065006E00610062006C00650064"
...
OK
AT+CSCS="GSM"
OK
AT^SCFG?
...
^SCFG:"Audio/AMR","enabled"             AMR will be used for any operator.
...
OK
AT^SCFG="Audio/AMR","disabled"
^SCFG:"Audio/AMR","disabled"            AMR is disabled for any operator.
OK
AT^SCFG="Audio/AMR","23405"
^SCFG:"Audio/AMR","23405"               AMR is disabled for any operator, but enabled for
                                        operator "23405".
OK
AT^SCFG="Audio/AMR","23203"
^SCFG:"Audio/AMR","23405","23203"       AMR is disabled for any operator, but enabled for
                                        operators "23405" and "23203".
```

```
OK
AT^SCFG="Audio/AMR"                              Query parameter "Audio/AMR"
^SCFG:"Audio/AMR","23405","23203"
OK
```

EXAMPLE 2

Usage of "URC/Ringline" and "URC/Datamode/Ringline":

`AT+CSCS="GSM"`	Switch to GSM character set.
`OK`	
`AT^SCFG?`	Query all parameters.
`...`	
`^SCFG:"URC/Datamode/Ringline","off"`	While the ME-TE link is reserved URCs will be indicated by BREAK.
`^SCFG:"URC/Ringline","local"`	URCs on this interface will be indicated by Ring line associated to the interface (e.g. RING0 for serial interface).
`...`	
`OK`	
`AT^SCFG="URC/Datamode/Ringline","on"`	
`^SCFG:"URC/Datamode/Ringline","on"`	While the ME-TE link is reserved URCs will be indicated by an activated "local" Ring line.
`OK`	
`AT^SCFG="URC/Ringline","asc0"`	
`^SCFG:"URC/Ringline","asc0"`	URCs on *this* interface will be indicated by an activated RING0 no matter whether or not the ME-TE link is reserved.
`OK`	
`AT^SCFG="URC/Datamode/Ringline","off"`	
`^SCFG:"URC/Datamode/Ringline","off"`	URCs on *this* interface will be indicated by an activated RING0 if the ME-TE link is *not* reserved and by BREAK if the ME-TE link is reserved.
`OK`	
`AT^SCFG="URC/Ringline"`	
`^SCFG:"URC/Ringline","off"`	Disable any Ring line indication for URCs on this interface.
`OK`	

2.14   AT^SM20 Set M20 compatibility mode

M20 is an earlier, widely used GSM engine. The `AT^SM20` command selects different modes of responses returned upon execution of the commands `ATD` and sms commands like e.g. `AT+CMGW`. Please note that the `AT^SM20` command has no effect on any other features and is not intended to adjust other differences between M20 and G2111/G2151I series.

Syntax

Test Command
AT^SM20=?
Response(s)
OK
Read Command
AT^SM20?
Response(s)
^SM20:<CallMode>, <CmgwMode>

OK
Write Command
AT^SM20=<CallMode>[, <CmgwMode>]
Response(s)
OK

Parameter Description

<CallMode>(num)

Call setup response mode

Applies only to voice calls.

0	Set compatibility to Cinterion Wireless Modules. ME will return "OK" immediately after attempting a call with the ATD command. In case of failure, additional call release indications, such as "NO DIALTONE, "NO CARRIER", "BUSY" will follow.
1(&F)	Default call setup mode, compatible to M20. ME will return "OK" in case of a successful connection, otherwise one of the call release indications "NO DIALTONE, "NO CARRIER", "BUSY" are indicated.

<CmgwMode>(num)

Response mode for sending and writing short messages

Applies to the sms commands like e.g. AT+CMGS and AT+CMGW command.

0	Set compatibility to Cinterion Wireless Modules. ME will return +CMS ERROR: <err> when writing or sending of short messages fails.
1(&F)	Default mode for sending and writing short messages, compatible to M20. ME will return "OK", no matter whether or not sms command was successfully executed.

3

Status Control Commands

The AT Commands described in this chapter allow the external application to obtain various status information from the G2111/G2151I series.

The following topics are covered in this chapter:

3.1 AT+CMER Common Event Reporting Configuration

AT+CMER controls details of the "+CIEV" URC presentation related to AT^SIND and AT+CIND. If registered via those commands the URCs are sent whenever a value of the related indicator changes.

In addition, AT+CMER controls "^SLCC" URCs related to AT^SLCC. For details refer to Call Status Information, AT^SLCC and AT^SCFG, parameter <sucs>.

The read command returns the URC presentation mode <mode> and among others, the indicator event reporting status <ind>.

The write command enables and disables the presentation of "+CIEV: <indDescr>, <indValue>$_1$[, <indValue>$_2$]" URCs. <indDescr> refers to the name of a "+CIEV" indicator and <indValue> is the new value of this indicator.

After AT+CMER has been switched on, initial URCs for all registered indicators will be issued. See examples provided in Section 3.2, AT+CIND and Section 3.3, AT^SIND.

AT+CNMI is a similar command to control SMS related URCs.

Syntax

Test Command
AT+CMER=?
Response(s)
+CMER: (list of supported<mode>s), (list of supported <keyp>s), (list of supported <disp>s), (list of supported <ind>s), (list of supported <bfr>s)
OK
Read Command
AT+CMER?
Response(s)
+CMER: <mode>, <keyp>, <disp>, <ind>, <bfr>
OK
Write Command
AT+CMER=[<mode>[, <keyp>[, <disp>[, <ind>[, <bfr>]]]]]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	ASC0	ASC1	☼	Last		Reference(s)
-	+	+	-	-		GSM 07.07

Unsolicited Result Code

+CIEV: <indDescr>, <indValue>$_1$[, <indValue>$_2$]

A value of an indicator has changed.

Parameter Description

<mode>(num)

0(&F)   Always discard "+CIEV" and "^SLCC" URCs.

1   "+CIEV" and "^SLCC" URCs are forwarded directly to the TE. However, if this is not possible because ME-TE link is reserved, e.g. during a data call, these URCs are discarded.

2	"+CIEV" and "^SLCC" URCs are forwarded directly to the TE. However, if this is not possible because ME-TE link is reserved these URCs are buffered and flushed to the TE afterwards.
3	"+CIEV" and "^SLCC" URCs are forwarded directly to the TE. However, if this is not possible because ME-TE link is reserved these URCs are buffered and flushed to the TE afterwards. Additionally, while ME-TE link is reserved, buffered URCs are signaled to the TE via sending a BREAK or activating the RING line, according to AT^SCFG parameters <uri>, <udri> and <urat>.

<keyp>(num)

0(&F)	Keypad event reporting is not supported by G2111/G2151I series.

<disp>(num)

0(&F)	Display event reporting is not supported by G2111/G2151I series.

<ind>(num)

0(&F)	Disable indicator event reporting.
2	Enable indicator event reporting.

<bfr>(num)

0(&F)	ME's buffer of "+CIEV" and "^SLCC" URCs is cleared when <mode> 1, 2 or 3 is entered.

<indDescr>(str)

Name of indicator; for a list of all supported indicators please refer to AT+CIND and AT^SIND.

<indValue>(num)

Value of indicator; for a list of all values for the supported indicators please refer to AT+CIND and AT^SIND.

3.2 AT+CIND Indicator control

The AT+CIND command controls the presentation of Indicator Event Reports related to various functions such as signal quality, service availability, sound generation, indication of unread short messages, full SMS storage, call in progress or roaming activities.

Use of AT+CIND has become outdated. Rather we recommend the more powerful AT^SIND command which is easier to use and provides additional indicators. All indicators provided by AT+CIND can be handled with AT^SIND as well.

AT+CIND supports two ways to get the values related to indicators:

- One approach is to query the current status of each indicator by using the read command AT+CIND? It returns the status no matter whether the indicator has been registered with the write command AT+CIND=[<mode>[,<mode>[,...]]].

- The other way is an event-driven notification based on the "+CIEV" URCs. In this case, the ME will automatically send a message to the application, whenever the value of an indicator changes. The application should be designed to react adequately when receiving a URC.
  The presentation of these URCs depends on two settings:

  ➢ The indicators must be registered with the write command AT+CIND=[<mode>[,<mode>[,...]]]. When the ME is switched on all of them are in registered mode. Any indicator can be excluded if deregistered with <mode>=0. To register or deregister an indicator the AT+CIND write command requires to type the value <mode>=1 or 0 exactly at the position where the indicator is located in the list. This is not necessary with AT^SIND which allows to specify indicators by name. See examples below.

  ➢ The presentation of the registered indicators must be enabled with AT+CMER.

Syntax

Test Command
AT+CIND=?
Response(s)
+CIND: (<indDescr>, list of supported <indValue>s)[, (<indDescr>, list of supported <indValue>s)[,...]]
OK
Read Command
AT+CIND?
Response(s)
+CIND: <indValue>[, <indValue>[, ...]]
OK
ERROR
+CME ERROR: <err>
Write Command
AT+CIND=<mode>[, <mode>[, ...]]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	ASC0	ASC1	☼	Last		Reference(s)
-	+	+	-	-		GSM 07.07

Parameter Description

<indValue>(num)

Integer type value, which shall be in range of corresponding <indDescr>

<indDescr>(str)

String values and their <indValue> ranges.

More indications are available via AT^SIND. Therefore use of AT^SIND for control of all indications is recommended.

The following indications are accessible via AT+CIND:

"battchg"	Battery charge level always equals 5, i.e. value is not relevant for G2111/G2151I series
"signal"	Signal quality (0..7) or (99) if not measurable
	The indicated value is the bit error rate of the signal received. Bit errors are estimated values. See also AT+CSQ.
"service"	Service availability (0-1)
	0: Not registered to any network

	1: Registered to home network or, if "roam"=1 then registered to another network
"sounder"	Sounder activity (0-1)
	Reports every event that causes the ME to generate a tone.
	Value 1 means for example:
	Incoming call - ME is ringing. Note that the URC "+CIEV: sounder" will be out- put only if ringing tones are activated with AT^SRTC.
	Waiting call - ME generates waiting call tone (if call waiting is enabled).
	Outgoing call - ME generates Call Progress tone.
	Outgoing call - ME generates BUSY tone.
	The value changes to 0 when the tone stops.
"message"	Unread received short message (0-1)
"call"	Call in progress (0-1). Indicator value is "1" if at least one call is in state "active" or "held". Depending on the parameter <succ> selected with AT^SCFG the indicator "call" will be issued.
	• when a state transition ends in state "active" or state "unknown", if <succ>="restricted",
	• when any state transition (including transitions beginning or ending in state "unknown") occurs in the list of active calls or when a traffic channel is established, if <succ>="verbose".
	Also refer to Section 7.1, Call Status Information.
"roam"	Roaming indicator (0-1)
	0: Registered to home network or not registered
	1: Registered to other network
"smsfull"	A short message memory storage in the MT has become full (1) or memory locations are available (0), i.e. range is (0-1)
"rssi"	Received signal (field) strength (0..5) or (99) if not measurable
	0: signal strength ≤ -112 dBm
	1-4: signal strength in 15 dB steps
	5: signal strength ≥ -51 dBm
	99: not known or not detectable
	Received signal (field) strength can also be obtained with AT+CSQ. However, the signal strength is scaled to value range 0..31 by this command.

<mode>(num)	
0	Indicator is deregistered. The indicator will not be presented as "+CIEV" URC, but can be queried with AT+CIND?
[1](&F)	Indicator is registered, indicator event report allowed.

Notes

• Due to its restrictive value range, indicator "call" does not clearly reflect specific call states (such as alerting, active, held etc.), but rather serves to trigger the application to retrieve the new call status from the list of cur- rent calls with the AT commands AT^SLCC, AT+CLCC or AT^SCNI.

• If AT^SCFG setting <succ>="verbose", indicator "call" will be issued also when a traffic channel is established, or when a call enters states "terminating" or "dropped" (see Call Status Information). In these cases, the relevant information about the cause of the display is available only from AT command AT^SLCC.

Examples

EXAMPLE 1

```
^SYSSTART
AT+CPIN=9999
OK
```

```
AT+CIND?
+CIND: 5,99,1,0,0,0,0,0        The battery is either full or no battery is connected to the ME. The
                               bit error rate of the signal quality is not available (since there is no
                               call in progress). The ME is registered to its home network.
OK
AT+CMER=2,0,0,2                Now activate the Indicator Event Report with AT+CMER.
OK
+CIEV: battchg,5
+CIEV: signal,0
+CIEV: service,1
+CIEV: sounder,0
+CIEV: message,0
+CIEV: call,0
+CIEV: roam,0
+CIEV: smsfull,0
+CIEV: rssi,5                  Full receive signal strength.
ATD0123456;                   Make a call.
OK
+CIEV: sounder,1              A set of "+CIEV" URCs is received.
+CIEV: call,1
+CIEV: sounder,0
+CIEV: call,0                 Called party hangs up.
NO CARRIER
AT+CIND=,,,0,,0              Deregister the indicators "sounder" and "call".
OK
ATD0123456;                   Dial the same call.
OK                            This time, no URCs are displayed.
NO CARRIER                    Called party hangs up.
```

EXAMPLE 2

Deactivation of indicator "sounder" via AT+CIND

```
AT+CIND?                      Query the current status of indicators.
+CIND: 5,99,1,0,1,0,0,0,4
OK
AT+CIND=,,,0                  To deactivate indicator "sounder" (= fourth item in list of indicators)

OK
```

EXAMPLE 3

Deactivation of indicator "sounder" via AT^SIND

```
AT^SIND="sounder",0           To deactivate indicator "sounder".
^SIND: sounder,0,0
OK
```

3.3 AT^SIND Extended Indicator Control

Designed for extended event indicator control AT^SIND

- offers greater flexibility than the standard command AT+CIND,
- offers several extra indicators,
- can show the current status of all indicators supported by AT+CIND and AT^SIND,
- can be used to register or deregister the indicators of both commands,
- displays all indicator event reports via "+CIEV" URCs.

Presentation mode of the generated URCs is controlled via AT+CMER.

AT^SIND read command provides a list of all indicators supported by AT+CIND and AT^SIND. Each indicator is represented with its registration mode and current value.
AT^SIND write command can be used to select a single indicator in order to modify its registration and to view the current value.

Syntax

Test Command
AT^SIND=?
Response(s)
^SIND: (<indDescr>, list of supported <indValue>s)[, (<indDescr>, list of supported <indValue>s)[, ...]], (list of supported <mode>s)
OK
Read Command
AT^SIND?
Response(s)
^SIND: <indDescr>, <mode>[, <indValue>]
[^SIND: <indDescr>, <mode>[, <indValue>]]
...
In case of <indDescr>="eons"
^SIND: "eons", <mode>, <eonsOperator>, <servProvider>
In case of <indDescr>="nitz"
^SIND: "nitz", <mode>, <nitzUT>, <nitzTZ>, <nitzDST>
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SIND=<indDescr>, <mode>
Response(s)
^SIND: <indDescr>, <mode>[, <indValue>]
In case of: <indDescr>="eons" and <mode>=2
^SIND: "eons", <mode>, <indValue>, <eonsOperator>, <servProvider>
In case of: <indDescr>="nitz" and <mode>=2
^SIND: "nitz", <mode>, <nitzUT>, <nitzTZ>, <nitzDST>
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Codes

URC 1

>   Format of the standard indicator:

>   +CIEV: <indDescr>[, <indValue>]

>   Indicator related event has occurred, e.g. value has changed.

URC 2

>   Format of the "simdata" indicator follows AT^SSTGI response:

```
+CIEV: <indDescr>, <cmdType>, <commandDetails>[, <pathLen>, <fileNum>,
<fileList>]
```

This URC is issued if G2111/G2151I series is in Remote-SAT Autoresponse mode (AT^SSTA) and the SIM sent a SAT REFRESH command (i.e. `<cmdType>`=1) indicating that the content of one or more Elementary Files has been changed.

The ME holds a limited storage available to keep numerous "simdata" events received while `AT^SIND` setting was not enabled or ME-TE link was reserved, e.g. in online data mode. In case of storage overflow a special URC "+CIEV: simdata,1,254" is issued.

URC 3

Format of the Voice Message indicator, if the number of waiting messages is delivered by the network:

```
+CIEV: <indDescr>, <indValue>, <vmCounter>
```

If the number of waiting messages is not delivered the standard indicator applies.

URC 4

Format of the "eons" indicator:

```
+CIEV: <indDescr>, <indValue>, <eonsOperator>, <servProvider>
```

One URC is issued for each new LAI (Location Area Information) broadcast by the network.

URC 5

Format of the "nitz" indicator:

```
+CIEV: <indDescr>, <nitzUT>, <nitzTZ>, <nitzDST>
```

Parameter Description

`<indDescr>`(str)

String values and their `<indValue>` ranges.

All indicators supported by `AT+CIND` are accessible with this command, too. A detailed description of these indicators can be found there.

The following indicators are accessible via `AT^SIND` only:

"audio"   Activity of the built-in audio unit
                 0   Audio unit not active.
                 1   Audio unit is active, for example:
                      MO voice call: Indicator is output with value 1 when dialing starts.
                      MT voice call: Indicator is output with value 1 when call is ringing.
"simdata"   SIM notifies of changed Elementary File data.
                 All data provided by the SIM is stored in one of many of its so-called Elementary Files. This data can be queried by the TE directly via AT+CRSM or implicitly via many AT commands presented by this document. For instance the SIM's identification number (IMSI) can be queried via AT+CIMI, but actually is stored in EFIMSI, as defined in 3GPP TS 51.011 (GSM 11.11).
                 However, be aware that this Elementary File data can be changed at any time by the network provider or an application running on the SIM. For details refer to SAT feature "Data Download to SIM" in 3GPP TS 11.14 (GSM 11.14). If this happens the TE urgently needs to refresh its internal representation (i.e. copy) of the changed data to ensure its safe and consistent use!
                 Therefore, a "+CIEV: "simdata"" URC is issued if G2111/G2151I series is in Remote-SAT Auto response mode and the SIM sent a SAT REFRESH command indicating that the content of one or more Elementary Files has been changed.

"vmwait1"   Voice Message Waiting Indication for line 1

             0   The value 0 notifies that no new voice message is available, and is provided by the service center to clear the voice message indication after the subscriber has retrieved all voice messages.

             1   The value 1 notifies the subscriber that the mailbox contains one or several messages.

             "vmwait1" and "vmwait2" indicate the receipt of a special short message with a Voice Message Waiting Indicator. The service must be provisioned by the operator.

             The numbers 1 or 2 in "vmwait1" and "vmwait2" are related to the two lines of the Alternate Line Service (ALS), also defined in CPHS Phase 2 standard. For further details refer to the AT^SALS command.

             The presentation mode of the indicator varies with the operator: If more than one message are waiting, some operators only indicate the first one, others deliver the indicator each time a new voice message is put into the mailbox.

             After the subscriber has retrieved all voice messages the service center automatically sends another message indication which provides the value 0.   Some operators may also send the number of waiting voice messages along with the indication. In this case, the number will be displayed by the G2111/G2151I series as part of the URC. For example, "+CIEV: vmwait1,1,5" notifies that five new voice messages are waiting. However, it should be noted that neither the read command AT^SIND? nor the write command AT^SIND=<mode>,2 display the number of waiting messages.

             The "vmwait" indicators do not apply if a network provider signals new voice mail(s) via standard SMS. In this case the indicator "message" will be displayed (see AT+CIND).

"vmwait2"   Voice Message Waiting Indication for line 2

             0   See description of "vmwait1".

             1   See description of "vmwait1".

"ciphcall"   Ciphering Status Change Indication

             0   Current call or SMS is not ciphered.

             1   Current call or SMS is ciphered.

             As stated in GSM specifications 02.07 and 02.09 the ciphering indicator feature allows the G2111/G2151I series to detect that ciphering is not switched on and to indicate this to the user.

             The ciphering indicator feature may be disabled by the home network operator setting data in the "administrative data" field (EFAD) in the SIM, as defined in 3GPP TS 51.011 (GSM 11.11).

             If this feature is not disabled by the SIM, then whenever a connection is in place, which is, or becomes enciphered, an indication shall be given to the user. This enables the user's decision how to proceed.

             Read command returns valid ciphering status only if a call is in progress or active.

             If EFAD setting disables the ciphering indicator feature read command always indicates a ciphered link and no URC presentation will take place.

             The following restrictions apply if the same serial channel is used for AT^SIND "ciphcall" indication and for the action triggering this URC. In general, the recommended solution is to use a dedicated channel for all status signaling via URCs.

             If an enciphered mobile originated SMS is performed, AT^SIND "ciphcall" URCs on the same serial channel will be issued after the related "OK" and indicate the ciphering state at this time. Because the SMS is already sent at this time, two URCs will be issued on this channel, but both are indicating that ciphering is enabled.

             If an enciphered mobile originated data call is performed, AT^SIND "ciphcall" URCs on the same serial channel will be issued after the interface is not longer blocked by the call (call is released or temporarily stopped) and indicate the ciphering state at this time.

"eons"   Enhanced Operator Name String (EONS) Indication

             The Enhanced Operator Name String indicator feature allows the G2111/G2151I series to output various operator names for different PLMN identities via URC. It also allows the output of a different operator name based on a subset of the registered network by using

a range of Location Area Codes (LACs) or a single LAC. The presentation of the "eons" indicator is determined by network activity. For example, the indicator appears every time a location update occurs or a NITZ information is sent, no matter whether or not the status of the EONS information has changed. This means that the same EONS information may be reported several times.

The EONS tables are stored on the SIM and will be read at power-up.

Following are the SIM Elementary Files that are affected by the introduction of EONS feature in the SIM:

EFSST (SIM Service Table) - describes which features are active.

EFOPL (Operator PLMN List) - contains the PLMN identification and location ID together with the index of the corresponding PNN record

EFPNN (PLMN Network Name) - contains the full and short form version of the network name for the registered PLMN

If the Operator Name Source is CPHS Operator Name String long and short form, refer to <indValue>, the following two SIM Elementary Files will be used:

EFONString (Operator Name String) - contains the name of the PLMN operator who issued the SIM.

EFOPShort (Operator Name Short form) - contains a short form of the name of the PLMN operator who issued the SIM.

"steerroam"	Steering-of-roaming Indication

The "steerroam" Indication supports so called "steering-of-roaming" ("SOR") techniques of some providers.

If a ME roaming within a certain country tries to register to a VPLMN (visited PLMN), the VPLMN will ask the HLR of the subscribers home operator for authorization credentials of the subscriber. Steering-of-roaming means that instead of sending those credentials, the HLR sends back an error message which will make the VPLMN send back a location update reject to the ME. This location updating procedure is described in 3GPP TS 24.008 chapter 4.4.4.9. When ME is attempting to register into a PLMN and get updating rejected with reject cause 17 then ME stays in limited service on the configured network, ME may reattempt network registration four times, and after that ME will inform the TE via Steering-of-roaming Indication URC "steerroam" that the registration attempt has failed.

When the ME is in manual PLMN selection mode (see AT+COPS) the TE has to start a new manual PLMN search to select a different network or switch to automatic PLMN selection mode.

When ME is in automatic PLMN selection mode (see AT+COPS) ME itself attempts a PLMN search to select a different network.

"nitz"	Network Identity and Time Zone indication

This indicator shows the time relevant information elements of an MM Information (MMI) or GMM Information (GMMI) message received from the network (see GSM 24.008, ch. 9.2.15a and 9.4.19). The network usually sends a NITZ indicator when the mobile attaches to the network, when it enters a location area with different time zone or when a daylight change occurs.

A NITZ indicator may consist of the following parameters: Universal Time (UT), local Time Zone (TZ), Daylight Saving Time (DST). All information elements of MMI/GMMI are optional and therefore, the presentation of the parameters <nitzUT>, <nitzTZ>, <nitzDST> varies with the network. For example, the network may send all three parameters UT, TZ, DST, or only UT and TZ or only TZ.

UT is indicated in usual date/time format and represents the current world time (GMT) at the moment when sent.

TZ is given as a positive (east) or negative (west) offset from UT in units of 15 minutes. DST shows the number of hours added to the local TZ because of daylight saving time (summertime) adjustment. Usually DST is 1 hour but it can be also 2 hours in certain locations.

Example for time and time zone with DST:

+CIEV: nitz,"04/07/23,13:39:20",-28,1

In this example TZ is -28, showing a time offset of -7 hours (west) to Universal Time/GMT (which never changes for DST). DST is 1 which indicates that one hour was added to TZ because of Daylight Saving Time. If a network does not send the DST parameter the TZ value would be -32 (8 hours west) as would be done in winter:

+CIEV: nitz,"04/11/23,13:39:20",-32

Please be aware that despite the last NITZ value can be looked up again via "AT^SIND=nitz,2" the returned values may be out of date. Especially the UT value is obsolete because there is no internal NITZ clock and therefore no continuation of UT. NITZ values are lost when the ME detaches from network. Also when a manual network selection fails and the ME automatically falls back to the previous network the NITZ values cannot be recalled. Nevertheless an indicated time zone is valid until a new MMI/GMMI will trigger another NITZ indication.

`<indValue>`(num)

Integer type value in the range stated above for the corresponding `<indDescr>`.

Notes specific to EONS feature:

If indicator is "eons", `<indValue>` is a type associated to the operator name according to GSM 22.101. This type depends on the source of the operator name.

Priority of types associated to the operator names is defined as follows (the type listed first has the highest priority). If a type cannot be indicated the next one will be used.

0	Not registered.
1	EF_{OPL} and EF_{PNN} (alphanumeric format can contain up to 24 characters.)
2	Operator Name String in long and short format according to Common PCN Handset Specification (CPHS) (alphanumeric format, can contain up to 16 characters).
3	Name information received by the NITZ service long and short form (alphanumeric format, can contain up to 16 characters). The short form will be displayed only if $EF_{OPShort}$ from CPHS is available.
4	Any operator name stored internal to the ME (alphanumeric format, can contain up to 16 characters).
5	Broadcast MCC-MNC (numeric format which consists of a 3-digit country code plus a 2- or 3-digit network code).

If the type is 2, 4 or 5, AT+COPS with the appropriate `<mode>` displays the same operator name.

`<mode>`(num)

0	Indicator is deregistered, i.e. no such indicator event report (URC) will be issued. `<mode>`=0 is power-up and factory default of indicators defined by AT^SIND only.
1	Indicator is registered.
	• Indicator event reports are controlled via AT+CMER.
	• All indicators can be registered or deregistered via AT^SIND, but different default settings apply: Power-up and factory default of the indicators sup- ported by AT+CIND is <mode>=1, while, as stated above, indicators defined by AT^SIND only are set to <mode>=0.
2	Query the registration status and the current value of a single indicator type.

`<vmCounter>`

If delivered by the network: Number of new voice messages sent as part of the Voice Message Waiting Indicator. Refer to `<indDescr>`.

```
<eonsOperator>
```

Operator in format which depends on the type associated to the operator name. Refer to `<indValue>`.

```
<servProvider>(str)
```

Service Provider Name according to the status settings (SIM Service No. 17) in the SIM Service Table (SST) of the SIM.

```
<nitzUT>
```

Universal Time delivered as part of the "nitz" Indicator. Refer to `<indDescr>`.

```
<nitzTZ>
```

Time Zone delivered as part of the "nitz" Indicator. Refer to `<indDescr>`.

```
<nitzDST>
```

Adjustment for Daylight Saving Time as part of the "nitz" Indicator. Refer to `<indDescr>`.

Example

Activation and use of indicator "audio":

`AT^SIND="audio",1`	You register the indicator "audio".
`^SIND: audio,1,0`	
`OK`	
`AT+CMER=2,,,2`	You activate the Indicator Event Report with `AT+CMER`.
`OK`	A set of all registered URCs is presented. (Please note that the example includes the indicators registered due to the power-up default settings of `AT+CIND`.)
`+CIEV: battchg,5`	
`+CIEV: signal,0`	
`+CIEV: service,1`	
`+CIEV: sounder,0`	
`+CIEV: message,1`	
`+CIEV: call,0`	
`+CIEV: roam,0`	
`+CIEV: smsfull,0`	
`+CIEV: rssi,4`	
`+CIEV: audio,0`	
`ATD030123456;`	You make a call.
`OK`	
`+CIEV: audio,1`	
`+CIEV: sounder,1`	
`+CIEV: call,1`	
`+CIEV: signal,0`	
`+CIEV: sounder,0`	
`ATH`	You hang up.
`OK`	
`+CIEV: call,0`	
`+CIEV: rssi,3`	

```
+CIEV: audio,0
+CIEV: signal,0
+CIEV: rssi,4
```

3.4 AT+CEER Extended Error Report

`AT+CEER` returns an extended error report regarding the reason of the last

- call release
- failure to set up a call (both mobile originated or terminated)
- failure to modify a call by using Supplementary Services
- failed attempt to activate, register, query, deactivate or deregister a Supplementary Service
- unsuccessful GPRS attach or unsuccessful PDP context activation
- GPRS detach or PDP context deactivation

The release cause report is presented in numeric format. Default output in case of a none-error-situation is +CEER: 0,0,0. A description associated with each number can be found in the tables given in the following sub- clauses and the relevant GSM specifications.

The first parameter `<locationID>` serves to locate the other two parameters. Depending on the failure or release cause either `<reason>` or `<ssRelease>` are applicable, i.e. if `<reason>` ≠ 0, then `<ssRelease>` = 0. Vice versa, if `<reason>` = 0, then `<ssRelease>` may be ≠ 0.

In addition to `AT+CEER`, the command `ATS18` can be used to check especially the status of fax and data calls. When losing network coverage the G2111/G2151I series will disconnect the call. In this case, no network release cause is available, and `AT+CEER` returns only the default values +CEER: 0,0,0.

Syntax

Test Command
AT+CEER=?
Response(s)
OK
ERROR
+CME ERROR: <err>
Exec Command
AT+CEER
Response(s)
+CEER: <locationID>, <reason>, <ssRelease>
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<locationID>`(num)

Location ID as number code. Location IDs are listed in Section 3.4.1, Cause Location ID for the extended error report. Most IDs are connected to another table that contains a list of `<reason>`s or `<ssRelease>`s.

`<reason>`(num)

Reason for last call release as number code. The number codes are listed in several tables, sorted by different categories in the following subclauses. The tables can be found proceeding from the Location ID given in Section 3.4.1, Cause Location ID for the extended error report.

<ssRelease>(num)

Release cause for last Supplementary Service call (listed in Section 3.4.10, GSM Release cause for Supplementary Service Call) or last call related use of a Supplementary Service (listed in Section 3.4.11, Proprietary release cause for Call-related Supplementary Services (CRSS)) or release cause for supplementary services entity or manager (listed in Section 3.4.12, Proprietary release cause for Supplementary Services Entity and Section 3.4.13, Proprietary release cause for Supplementary Services Manager).

Examples

EXAMPLE 1

ATD"01751223344";	A mobile originated call is rejected by the remote party.
NO CARRIER	Call setup is terminated with NO CARRIER.
AT+CEER	To check the cause, the caller enters AT+CEER.
+CEER: 8,21,0	The Location ID 8 in Section 3.4.1 points to Section 3.4.7, where 21
OK	="call rejected". 0 = "no error" refers to parameter <ssRelease> that is not applicable.

EXAMPLE 2

The user attempts to activate call barring, but uses a wrong password.

AT+clck=oi,1,"0000",3	
+CME ERROR: incorrect password	
AT+CEER	
+CEER: 35,0,38	The Location ID 35 in Section 3.4.1 points to Section 3.4.10, where 38
OK	= "negative PW check" may mean that a wrong password was tried for the first time. 0 = "no error" refers to parameter <reason> that is not applicable.

3.4.1 Cause Location ID for the extended error report

ID	Description	Causes
0	no error (default)	--
1	Proprietary L2 cause	Section 3.4.2
2	GSM cause for L3 radio resource sublayer (GSM 04.08 annex F)	Section 3.4.3
3	Proprietary cause for L3 radio resource sublayer	Section 3.4.4
4	GSM cause for L3 mobility management (GSM 04.08 annex G)	Section 3.4.5
5	Proprietary cause for L3 mobility management	Section 3.4.6
6	GSM cause for L3 mobility management via MMR-SAP (GSM 04.08 annex G)	--
7	Proprietary cause for L3 mobility management via MMR-SAP	--
8	GSM cause for L3 call control (GSM 04.08 10.5.4.11 and annex H)	Section 3.4.7
9	Proprietary cause for L3 call control	Section 3.4.8
11	Proprietary cause for L3 advice of charge entity	Section 3.4.9
12	GSM cause for L3 SMS CP entity	--
13	Proprietary cause for L3 SMS CP entity	--
14	GSM cause for L3 SMS RL entity	--
15	Proprietary cause for L3 SMS RL entity	--
16	GSM cause for L3 SMS TL entity	--
17	Proprietary cause for L3 SMS TL entity	--
18	Proprietary cause for DSM entity	--

21	GSM cause for L3 call-related supplementary services	Section 3.4.10
22	Proprietary cause for L3 call-related supplementary services	Section 3.4.11
32	Proprietary cause for supplementary services entity	Section 3.4.12
33	Proprietary cause for supplementary services manager	Section 3.4.13
34	network cause for supplementary services (GSM 04.08 10.5.4.11 and annex H)	--
35	supplementary services network error (GSM 04.80 3.6.6)	--
48	GSM cause for GPRS mobility management (GSM 04.08 annex G.6)	--
49	Proprietary cause for GPRS mobility management	Section 3.4.14
50	GSM cause for session management (GSM 04.08 annex I)	--
51	Proprietary cause for session management	Section 3.4.15
127	GSM cause for protocol module or other local cause	Section 3.4.16
128	supplementary services general problem (GSM 04.80 3.6.7)	--
129	supplementary services invoke problem (GSM 04.80 3.6.7)	--
130	supplementary services result problem (GSM 04.80 3.6.7)	--
131	supplementary services error problem (GSM 04.80 3.6.7)	--
241	Proprietary cause for GPRS API	Section 3.4.17
242	Proprietary cause for link management	Section 3.4.18
243	Proprietary cause for PPP/IP-stack	Section 3.4.19

3.4.2　Proprietary L2 cause

Number	Description
249	no network response received, e.g. due to low signal quality

3.4.3　GSM release cause for L3 Radio Resource (RR)

Number	Description
0	normal event
1	abnormal release, unspecified
2	abnormal release, channel unacceptable
3	abnormal release, timer expired
4	abnormal release, no activity on the radio path
5	pre-emptive release
8	handover impossible, timing advance out of range
9	channel mode unacceptable
10	frequency not implemented
65	call already cleared
95	semantically incorrect message
96	invalid mandatory information
97	message type non-existent or not implemented
98	message type not compatible with protocol state
100	conditional information element error
101	no cell allocation available
111	protocol error unspecified

3.4.4　Proprietary release cause for L3 Radio Resource (RR)

Number	Description
1	RACCHs not answered
2	RACCHs rejected
3	access class of the SIM is barred by the network provider
4	SABM failure

5	radio link counter expiry or perform abnormal release
6	confirm ABORT of the MM
7	respond to DEACT REQ
8	loss of coverage
9	reestablishment not possible
10	T3122 still running
11	cell selection in progress
12	responding to paging
13	location area code has changed
14	circuit switched not available

3.4.5   GSM release cause for Mobility Management (MM) or Session Management (SM)

Number	Description
causes related to MS identification	
2	IMSI unknown in HLR
3	illegal MS
4	IMSI unknown in VLR
5	IMEI not accepted
6	illegal ME
cause related to subscription options	
11	PLMN not allowed
12	location area not allowed
13	roaming not allowed in this location area
causes related to PLMN specific network failures and congestion	
17	network failure
22	congestion
causes related to nature of request	
32	service option not supported
33	requested service option not subscribed
34	service option temporary out of order
38	call cannot be identified
causes related to invalid messages	
95	semantically incorrect message
96	invalid mandatory information
97	message type non-existent or not implemented
98	message not compatible with protocol state
99	information element non-existent or not implemented
100	conditional information element error
101	messages not compatible with protocol state
111	protocol error, unspecified
causes related to GPRS	
7	GPRS services not allowed
8	GPRS services not allowed in combination with non-GPRS services
9	MS identity cannot be identified by the network
10	implicitly detached
14	GPRS services not allowed in current PLMN
15	no suitable cells in location area
16	MSC temporary unreachable
36	regular PDP context deactivation

37	QoS not accepted
40	No PDP context activated

3.4.6 Proprietary release cause for L3 Mobility Management (MM)

Number	Description
1	no SIM available
8	no MM connection
9	authentification failure
11	MM performs detach
17	registration failed and will be re-attempted in a short term
18	CM connection establishment failed
19	registration failed and will be re-attempted in a long term
20	RR connection is released
21	MS tries to register
22	SPLMN is not available
23	an MTC is in progress
24	a PLMN scan is in progress
25	the MM is detached, the MS is in MS class C GPRS only

3.4.7 GSM release cause for L3 Call Control (CC)

Number	Description
0	no error
Normal class (all other values in the range 0 to 31 shall be treated as cause 31)	
1	unassigned (unallocated) number
2	service not available
3	no route to destination
6	channel unacceptable
8	operator determined barring
9	FDN mismatch
16	normal call clearing
17	user busy
18	no user responding
19	user alerting, no answer
21	call rejected
22	number changed
25	pre-emption
26	non-selected user clearing
27	destination out of order
28	invalid number format (incomplete number)
29	facility rejected
30	response to STATUS ENQUIRY
31	normal, unspecified
Resource unavailable class (all other values in the range 32 to 47 shall be treated as cause 47)	
34	no circuit/channel available
38	network out of order
41	temporary failure
42	switching equipment congestion
43	access information discarded

44	requested circuit/channel not available
47	resource unavailable, unspecified
Service or option not available class (all other values in the range 48 to 63 shall be treated as cause 63)	
49	quality of service unavailable
50	requested facility not subscribed
55	incoming calls barred within the CUG
57	bearer capability not authorized
58	bearer capability not presently available
63	service or option not available, unspecified
Service or option not implemented (all other values in the range 64 to 79 shall be treated as cause 79)	
65	bearer service not implemented
68	ACM equal or greater than ACM max
69	requested facility not implemented
70	only restricted digital information bearer capability is available
79	service or option not implemented, unspecified
Invalid message (e.g. parameter out of range) class (all other values in the range 80 to 95 shall be treated as cause 95)	
81	invalid transaction identifier value
87	user not member of CUG
88	incompatible destination
91	invalid transit network selection
95	semantically incorrect message
Protocol error (e.g. unknown message) class (all other values in the range 96 to 111 shall be treated as cause 111)	
96	invalid mandatory information
97	message type non-existent or not implemented
98	message type not compatible with protocol state
99	information element non-existent or not implemented
100	conditional information element error
101	message not compatible with protocol
102	recovery on timer expiry
111	protocol error, unspecified
Interworking class (all other values in the range 112 to 127 shall be treated as cause 127)	
127	interworking, unspecified

3.4.8   Proprietary release cause for L3 Call Control (CC)

Number	Description
1	call dropped
2	service not available
3	hold procedure not available
4	temporary no service, previous procedure not yet finished
5	no speech service available
6	call reestablishment procedure active
7	mobile received a release (complete) message during a modify procedure (modify reject)
8	call clearing, because loss of radio connection, if no reestablishment is allowed (call not active)
10	number not included in FDN list
11	zero length called party number
12	no more CC transactions available
13	outgoing calls barred
14	number is blacklisted in auto-call retry list
15	auto-call number is not in list and list is full

16	auto-call redial before minimum time elapsed
17	requesting entity is not in control of CC
notifications	
300	called party barred incoming call

3.4.9   Proprietary release cause for L3 Advice of Charge (AOC)

Number	Description
1	SIM data not available
2	SIM does not support AOC
3	SIM data access error
4	ACM limit almost reached ACM range overflow
5	ACM range overflow

3.4.10 GSM Release cause for Supplementary Service Call

Number	Description
0	no error (default)
1	unknown subscriber
9	illegal subscriber
10	bearer service not provisioned
11	teleservice not provisioned
12	illegal equipment
13	call barred
15	CUG reject
16	illegal SS operation
17	SS error status
18	SS not available
19	SS subscription violation
20	SS incompatibility
21	facility not supported
27	absent subscriber
29	short term denial
30	long term denial
34	system failure
35	data missing
36	unexpected data value
37	PW registration failure
38	negative PW check
43	number of PW attempts violation
71	unknown alphabet
72	USSD busy
126	max nums of MPTY calls exceeded
127	resources not available
general problem codes	
300	unrecognized component
301	mistyped component
302	badly structured component
invoke problem codes	
303	duplicate invoke ID

304	unrecognized operation
305	mistyped parameter
306	resource limitation
307	initiating release
308	unrecognized linked ID
309	linked response unexpected
310	unexpected linked operation
return result problem codes	
311	unrecognized invoke ID
312	return result unexpected
313	mistyped parameter
return error problem codes	
314	unrecognized invoke ID
315	return error unexpected
316	unrecognized error
317	unexpected error
318	mistyped parameter

3.4.11 Proprietary release cause for Call-related Supplementary Ser- vices (CRSS)

Number	Description
0	ECT procedure failed (timer expired)
1	call has been cleared without receiving an answer to ECT request
2	initial conditions not fulfilled (one active, one held call)
3	received "return error"
4	call has been cleared without receiving an answer to CCBS request
5	initial conditions for CCBS not fulfilled (Idle CRSS)
causes related to nature of request	
25	LLC or SNDCP failure
26	insufficient resources
27	unknown or missing access point name
28	unknown PDP address or PDP type
29	user authentification failed
30	activation rejected by GGSN
31	activation rejected, unspecified
32	service option not supported
33	requested service option not subscribed
34	service option temporary out of order
35	NSAPI already used
36	regular PDP context deactivation
37	QoS not accepted
38	network failure
39	reactivation requested
40	feature not supported
causes related to invalid messages	
81	invalid transaction identifier value
95	semantically incorrect message
96	invalid mandatory information
97	message type non-existent or not implemented
98	message type not compatible with protocol state

99	information element non-existent or not implemented
100	conditional information element error
101	message not compatible with protocol
111	protocol error, unspecified

3.4.12 Proprietary release cause for Supplementary Services Entity

Number	Description
1	Normal
2	MM (Mobility Managment) error
3	MM (Mobility Managment) release
4	SIM or power off
5	ASN (Abstract Syntax Notation) error
6	Unexpected release
7	MTC (Mobile Terminated Core) collision
8	Out of memory
9	RX erraneous message
10	RX registration on activating transaction identifier

3.4.13 Proprietary release cause for Supplementary Services Manager

Number	Description
0	Out of memory
1	Missing parameter
2	Unexpected parameter
3	Activate not allowed
4	Deactivate not allowed
5	Registrate not allowed
6	Erase not allowed
7	Interrogate not allowed
8	Illegal request
9	Null request
10	Busy
11	Rx unexpected facility information element
12	Rx release complete return error
13	Rx release complete return reject
14	Rx release complete without facility information element
15	Rx release complete with erroneous facility information element
16	Rx facility with erroneous information element
17	Rx return result with unexpected operator code
18	Rx return result with illegal operator code
19	Rx return result with unexpected empty result
20	Rx request barred
21	No error multiple TA (only internal)
22	Modified (used for SS AL)
23	Alphabet not IA5 compatible (the USSD string requested for transmission could not be converted into the IA5 alphabet when trying to re-transmit the string according to phase 1. The transmission was not successful)

24	No fallback in application mode (the USSD string transmission according to phase 2 was rejected by the network but the MS is not allowed to re-transmit the string when using USSD application mode)
25	No TI available (there are no transaction identifiers left to fulfill the request)
26	No peer response

3.4.14 Proprietary release cause for GPRS Mobility Management

Number	Description
0	Unknown
1	Authentication and ciphering reject
17	Internal error (not used)
19	Power off
20	SIM invalid
21	SIM out
22	GMM (GPRS Mobility Management) is in deactivation (not used)
23	Virtual detach
32	Successful update
33	Fifth attempt
34	VLR (Visitor Location Register) failure
35	Local detach
36	Attempt counter increment
48	GAPI initiated detach
49	Network initiated detach with reattach
50	Network initiated detach no reattach no cause
51	Paging with IMSI
64	MS not GPRS attached
65	RAT (Radio Access Technology) is GSM/GPRS
66	GPRS temporary not available (includes no coverage)
80	T3317 expiry
81	PS connection already released

3.4.15 Proprietary release cause for Session Management (SM)

Number	Description
1	The MS has not got any answer to the activate (secondary) PDP context request message sent five times to the network
2	The MS has not got any answer to the MODIFY PDP CONTEXT REQUEST message sent five times to the network
3	A MT PDP context which is active or in the activation process is deactivated because another MT PDP context with the same TI is requested by the network to be activated
4	A MT PDP context which is active or in the activation process is deactivated because another MT PDP context with the same TI is requested by the network to be activated. The activation request is rejected by the SM sending the cause 'insufficient resources' to the network because the SM was not able to perform the necessary comparisons for a static PDP address collision detection.
5	A MT PDP context which is active or in the activation process is deactivated because another MT PDP context with the same TI is requested by the network to be activated. As a static PDP address collision with an MO activating PDP context has been detected by the SM the SM dis-

	cards the activation request
6	A MT PDP context request has been indicated but could not be processed in time. The activation request is rejected by the SM sending the cause 'insufficient resources' to the network.
7	GAPI rejected a PDP context activation request or rejected of a activation request for a secondary PDP context.
8	As the consequence of a handover from a release 1999 to a GPRS release 1997/98 network all PDP contexts with the same PDP address and APN are deactivated except the one with the highest QoS.
9	deactivation of a PDP context initiated by the RABM.
10	The GAPI has requested either a secondary PDP context activation or a MS initiated PDP context modification in a release 1997/98 network. Asthese features both are not supported by in Release 1997/98, the SM rejects the request.
11	rejection of a PDP context modification request because of missing a new QoS or a new TFT.
12	The network requests to activate a PDP context with the same combination of APN and PDP address as an already activated PDP context. The MS has to deactivate the already activated PDP context and all linked PDP contexts (matching the combination of APN and PDP address) locally.
13	The network indicates that a PDP context which is regarded as not inactive by the MS is regarded as inactive by the network. The MS has to deactivate this PDP context locally.

3.4.16 GSM cause for L3 Protocol module or other local cause

Number	Description
2	no detailed cause

3.4.17 Proprietary release cause for GPRS API

Number	Description
0	regular deactivation of the call
1	action temporary not allowed
2	wrong connection type
3	specified data service profile invalid
4	PDP type or address is unknown
5	FDN check was not successful; GPRS attach and PDP context activation blocked
9	GPRS service not available
255	undefined

3.4.18 Proprietary release cause for Link Management

Number	Description
1	ActionTempNotAllowed (Mobile temporary busy due to previous conflicting action)
2	Invalid bearer setting
3	Data service profile not valid or complete
4	GPRS Data service profile not valid or complete
5	CSD Data service profile not valid or complete
6	CSD Service not allowed due to MS Class setting CG
17	CSD Modem Instance in already in use (e.g. Data cable is connected when WAP CSD connection shall be established)
18	CSD Modem is not responding
19	Modem returned ERROR
20	CSD Modem doesn't answered not within specified time
21	CSD Modem answered call request NO CARRIER (call estabishment failed)

22	CSD Modem answered call request with NO DIALTONE (no call possible at the moment e.g. no network available)
23	CSD Modem answered call request with BUSY (called subscriber is busy)
24	CSD Modem call establishment timed out (e.g. called subscriber modem doesn't answer)
25	CSD Modem established call lost (e.g. called subscriber hang up, network lost)

3.4.19 Proprietary release cause for PPP/IP-Stack

Number	Description
0	regular call deactivation
1	LCP stopped
255	undefined

3.5 ATS18 Extended call release report

`ATS18` controls the presentation of extended call release reports for circuit switched fax and data calls. Extended call release reports related to voice calls are controlled via `AT+CEER`.

The call release report is presented in numeric format and shows as follows:

`+CAUSE: <locationID>:<reason>`

If enabled the message will be reported every time a fax or data call is released or fails to be established.

Syntax

Read Command
ATS18?
Response(s)
<n>
OK
Write Command
ATS18=<n>
Response(s)
OK
ERROR

Parameter Description

$<n>^{(num)(\&W)(\&V)}$

An odd number enables the presentation of the extended call release report. Any even number disables this feature.

$0^{(\&F)}...255$

$<locationID>^{(num)}$

Location ID as number code, see also `<locationID>` of `AT+CEER`.

Location IDs are listed in Section 3.4.1, Cause Location ID for the extended error report. Each ID is related to another table that contains a list of `<reason>`s.

$<reason>^{(num)}$

Reason for last call release as number code (see also `<reason>` of `AT+CEER`).

<reason> numbers and the associated descriptions are listed in several tables, sorted by different categories at AT+CEER. The tables can be found proceeding from the Location IDs listed in Section 3.4.1, Cause Location ID for the extended error report.

Examples

EXAMPLE 1

ATS18=1 OK	Enables the presentation of extended call release reports.
ATD03012345678	Now, a mobile originated data call fails.
+CAUSE: 8:17	An extended error report is output, followed by the result code BUSY.
BUSY	The Location ID 8 stated in Section 3.4.1 points to Section 3.4.7, with 17 = "User busy".

EXAMPLE 2

ATS18=1 OK	Enables the presentation of extended call release reports.
ATD03012345678 CONNECT 9600/RLP Hello,....	Now, a mobile originated data call is set up.
+++	Call ends after remote party hung up.
+CAUSE: 8:16	Normal call release is reported, followed by the result code NO CARRIER.
NO CARRIER	The Location ID 8 stated in Section 3.4.1 points to Section 3.4.7, with 16 = "Normal call clearing".

3.6 AT+CPAS Activity Status

AT+CPAS execute command queries G2111/G2151I series' activity status.

Syntax

Test Command
AT+CPAS=?
Response(s)
+CPAS: (list of supported<pas>s)
OK
Exec Command
AT+CPAS
Response(s)
+CPAS: <pas>
OK

Parameter Description

<pas>(num)	

0	Ready
3	Incoming call (ringing)
4	Call in progress or call hold

3.7 AT+WS46 Select wireless network

Syntax

Test Command	
AT+WS46=?	3-26
Response(s)	
+WS46: (list of supported<n>s)	
OK	
Read Command	
AT+WS46?	
Response(s)	
<n>	
OK	
Write Command	
AT+WS46=[<n>]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	

Parameter Description

<n>(num)	
12	GSM digital cellular

4

Serial Interface Control Commands

The AT Commands described in this chapter allow the external application to determine various settings related to the G2111/G2151I series's serial interface.

The following topics are covered in this chapter:

4.1 AT\Q Flow Control

AT\Q allows to configure flow control on the G2111/G2151I series's asynchronous serial interface. It is strongly recommended to always use RTS/CTS hardware flow control.

Syntax

Exec Command
AT\Q[<n>]
Response(s)
OK
If RTS/CTS flow control is not supported by interface and <n> is 2 or 3:
ERROR

Parameter Description

<n>^{(num)(&W)(&V)}

[0]^(&F)	Disable flow control
1	XON/XOFF software flow control
2	Only CTS flow control by ME
3	RTS/CTS hardware flow control

Note

- When using XON/XOFF flow control (AT\Q1) in online mode, +++ should not be used while the data transmission is paused with XOFF. Before entering the command mode with +++ the paused transmission should be resumed using the XON character.

4.2 AT&C Set Data Carrier Detect (DCD) Line Mode

The AT&C command controls the behavior of the ME's DCD line.

Syntax

Exec Command
AT&C[<value>]
Response(s)
OK

Parameter Description

<value>^{(num)(&W)(&V)}

[0]	DCD line shall always be on.
1^(&F)	DCD line shall be on only when data carrier signal is present.
2	DCD line shall be on when one or more Internet services defined on the related serial channel are in state "Connecting" or "Up" as described below. For details on the various service states refer to AT^SISI, parameter <srvState> or AT^SISO, parameter <srvState>.

- Transparent TCP service, SOCKET: DCD shall be on when <srvState>="Connnecting" or "Up"
- FTP: DCD shall be on when data channel is connected, i.e. <srvState>="Up"

4.3 AT&D Set Data Terminal Ready (DTR) Line Mode

AT&D determines how the ME responds if the DTR line is changed from ON to OFF state during data connection(CSD or PPP or active Internet service opened with AT^SIST).

Syntax

Exec Command
AT&D[<value>]
Response(s)
OK

Parameter Description

<value>(num)(&W)(&V)

[0]	ME ignores status of the DTR line.
1	ON->OFF on DTR: Change to command mode while retaining the data connection.
2(&F)	ON->OFF on DTR: Disconnect the data connection (only for CSD and PPP) and change to command mode. For internet service the behavior is like AT&D1. During OFF state of the DTR line auto-answer is disabled.

4.4 AT&S Set Data Set Ready (DSR) Line Mode

AT&S determines how the ME sets the DSR line depending on its communication state.

Syntax

Exec Command
AT&S[<value>]
Response(s)
OK

Parameter Description

<value>(num)(&W)(&V)

[0](&F)	DSR line is always ON
1	ME in command mode: DSR is OFF. ME in data mode: DSR is ON.

4.5 ATE AT Command Echo

ATE controls if the G2111/G2151I series echoes characters received from TE during AT command state.

Syntax

Exec Command
ATE[<value>]
Response(s)
OK

Parameter Description

<value>(num)(&W)(&V)

[0]   Echo mode off

1(&F)   Echo mode on

4.6 AT+ILRR Bit Rate Reporting

AT+ILRR controls whether or not the intermediate result code "+ILRR" is transmitted from the G2111/G2151I series to the TE when a connection is being set up. The result code indicates the current bit rate. It is issued before the final result code of the connection, e.g. CONNECT, is transmitted to the TE.

Syntax

Test Command
AT+ILRR=?
Response(s)
+ILRR: (list of supported <value>s)
OK
Read Command
AT+ILRR?
Response(s)
+ILRR: <value>
OK
Write Command
AT+ILRR=<value>
Response(s)
OK
ERROR
+CME ERROR: <err>

Intermediate Result Code

+ILRR: <rate>

Indicates current bit rate setting upon connection setup.

Parameter Description

<value>(num)(&W)(&V)

0(&F)   Disable bit rate reporting.

1   Enables bit rate reporting.

<rate>(num)

Bit rate setting upon connection setup (bps)

0   Autobauding (see Section 4.7.1, Autobauding).
300
600
1200
2400
4800

```
9600
14400
19200
28800
38400
57600
115200
230400
```

4.7 AT+IPR Bit Rate

AT+IPR allows to query and set the bit rate of the G2111/G2151I series' asynchronous serial interfaces (UART).

The test command returns the values of supported automatically detectable bit rates and the values of the supported fixed bit rates.

The read command returns the current bit rate of the interface.

The write command specifies the bit rate to be used for the interface. Delivery bit rate value (<rate>) is Autobaud mode enabled (AT+IPR=0) on serial interface. This setting will not be restored with AT&F.

If using a fixed bit rate, make sure that both G2111/G2151I series and TE are configured to the same rate. A selected bit rate takes effect after the write command returns OK and is stored in non-volatile memory. It is not recommended to set bit rates lower than 9600 bps in order to avoid timing problems (see Section 1.5, Communication between Customer Application and G2111/G2151I series for details about timing).

In case of Autobaud mode (AT+IPR=0) the detected TE bit rate will not be saved and, therefore, needs to be resynchronized after any restart of the ME (for details refer Section 4.7.1, Autobauding). If Autobaud mode is activated, the ME will automatically recognize bit rate currently used by the TE.

Syntax

Test Command
AT+IPR=?
Response(s)
+IPR: (list of supported auto-detectable <rate>s) , (list of supported fixed-only <rate>s)
OK
Read Command
AT+IPR?
Response(s)
+IPR: <rate>
OK
Write Command
AT+IPR=<rate>
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<rate>(num)(&V)

Bit rate per second (bps)

0   Activates Autobaud mode.
300

600

1200

2400

4800

9600

14400

19200

28800

38400

57600

115200

230400

Note

- Generally, AT+IPR should be used as a standalone command as specified in Section 1.4.2, Concatenating AT Commands. If nevertheless combinations with other commands on the same command line cannot be avoided, there are several constraints to be considered:

  ➢ Avoid combinations with the AT commands listed in Section 1.4.2, Concatenating AT Commands.

  ➢ Keep in mind that there shall be a minimum pause between two AT commands as specified in Section 1.5, Communication between Customer Application and G2111/G2151I series.

  ➢ If AT+IPR=0 is entered, Autobaud mode will be activated after the response to the last command is received.

  ➢ If local echo is active (ATE1) and AT+IPR=x is entered with other commands you may encounter the following problem: If switching to the new bit rate takes effect while a response is being transmitted, the last bytes may be sent with the new bit rate and thus, not properly transmitted. The following commands will be correctly sent at the new bit rate.

4.7.1   Autobauding

To take advantage of Autobaud mode specific attention must be paid to the following requirements:

- Synchronization between TE and ME:

  Ensure that TE and ME are correctly synchronized and the bit rate used by the TE is detected by the ME. To allow the bit rate to be synchronized simply use an "AT" or "at" string. This is necessary

  ➢ after you have activated Autobaud mode

  ➢ when you start up the ME while Autobaud mode is enabled. It is recommended to wait 3 to 5 seconds before sending the first AT character. Otherwise undefined characters might be returned.

  If you want to use Autobaud mode and auto-answer at the same time, you can easily enable the TE-ME synchronization, when you activate Autobaud mode first and then configure the auto-answer mode (ATS0 ≠ 0).

- Restrictions on Autobaud mode operation:

  ➢ The serial interface shall be used with 8 data bits, no parity and 1 stop bit (factory setting), e.g. 2 stop bits are not supported for Autobaud mode.

  ➢ A/ cannot be used.

  ➢ Only the strings "AT" or "at" can be detected (neither "At" nor "aT").

  ➢ URCs that may be issued before the ME detects a new bit rate (by receiving the first AT character) will be sent at the previously detected bit rate or, after ME restart, at 57600 bps.

  ➢ It is not recommended to switch to Autobaud mode from a bit rate that cannot be detected by the Autobaud mode mechanism (e.g. 300 bps). Responses to AT+IPR=0 and any commands on the same line might be corrupted.

- Autobaud mode and bit rate after restart:

Unless the bit rate is determined, the following constraints apply:

- An incoming CSD call or a network initiated GPRS request cannot be accepted. This must be taken into account when Autobaud mode and auto-answer mode (ATS0 ≠ 0) are enabled at the same time, especially if SIM PIN 1 authentication is done automatically and the setting ATS0 ≠ 0 is stored to the user profile with AT&W.
- Until the bit rate is found, URCs generated after restart will be output at 57600 bps. This applies only to user defined URCs, such as "+CREG", "CCWA", "^SCKS" etc. The URCs "^SYSSTART" and "^SYS-START ALARM MODE" will not be indicated when Autobaud mode is enabled.

Note: To avoid any problems caused by undetermined bit rates in the direction from ME to TE we strongly recommend to configure a fixed bit rate rather than Autobaud mode.

5

Security Commands

The AT Commands described in this chapter allow the external application to determine various security related settings.

The following topics are covered in this chapter:

5.1 AT+CPIN PIN Authentication

The AT+CPIN write command can be used to enter one of the passwords listed below. The read command can be used to check whether or not the ME is waiting for a password, or which type of password is required.

This may be for example the SIM PIN1 to register to the GSM network, or the SIM PUK1 to replace a disabled SIM PIN1 with a new one, or the PH-SIM PIN if the client has taken precautions for preventing damage in the event of loss or theft etc. If requested by the ME AT+CPIN may also be used for the SIM PIN2 or SIM PUK2.

If no PIN1 request is pending (for example if PIN1 authentication has been done and the same PIN1 is entered again) G2111/G2151I series responds "+CME ERROR: operation not allowed"; no further action is required.

Each time a password is entered with AT+CPIN the module starts reading data from the SIM. The duration of reading varies with the SIM card. This may cause a delay of several seconds before all commands which need access to SIM data are effective.

Syntax

Test Command
AT+CPIN=?
Response(s)
OK
Read Command
AT+CPIN?
Response(s)
+CPIN: <code>
OK
ERROR
+CME ERROR: <err>
Write Command
AT+CPIN=<pin>[, <new pin>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<pin>(str)

Password (string type), usually SIM PIN1.

If the requested password was a PUK, such as SIM PUK1 or PH-FSIM PUK or another password, then <pin> must be followed by <new pin>.

<new pin>(text)

If the requested code was a PUK: specify a new password or restore the former disabled password. See Section 5.1.1, What to do if PIN or password authentication fails? for more information about when you may need to enter the PUK.

<code>(text)

SIM PIN authentication

READY   PIN has already been entered. No further entry needed.
SIM PIN   ME is waiting for SIM PIN1.

SIM PUK	ME is waiting for SIM PUK1 if PIN1 was disabled after three failed attempts to enter PIN1.
SIM PIN2	ME is waiting for PIN2. This is only applicable when an attempt to access a PIN2 related feature was acknowledged with +CME ERROR: 17 ("SIM PIN2 required"), for example when the client attempts to edit the FD phonebook). In this case the read command `AT+CPIN`? also prompts for SIM PIN2. Normally, the `AT+CPIN2` command is intended for SIM PIN2.
SIM PUK2	ME is waiting for PUK2 to unblock a disabled PIN2. As above, this is only necessary when the preceding command was acknowledged with +CME ERROR: 18 ("SIM PUK2 required") and only if the read command `AT+CPIN`? also prompts for SIM PUK2. Normally, the `AT+CPIN2` command is intended for SIM PUK2.

Phone security locks set by client or factory

PH-SIM PIN	ME is waiting for phone-to-SIM card password if "PS" lock is active and the client inserts other SIM card than the one used for the lock. ("PS" lock is also referred to as phone or antitheft lock).
PH-SIM PUK	ME is waiting for Master Phone Code, if the above "PS" lock password was incorrectly entered three times.
PH-FSIM PIN	ME is waiting for phone-to-very-first-SIM card. Necessary when "PF" lock was set. When powered up the first time, ME locks itself to the first SIM card put into the card holder. As a result, operation of the mobile is restricted to this one SIM card (unless the PH-FSIM PUK is used as described below).
PH-FSIM PUK	ME is waiting for phone-to-very-first-SIM card unblocking password to be given. Necessary when "PF" lock is active and other than first SIM card is inserted.
PH-NET PUK	ME is waiting for network personalization unblocking password.
PH-NS PIN	ME is waiting for network subset personalization password.
PH-NS PUK	ME is waiting for network subset unblocking password.
PH-SP PIN	ME is waiting for service provider personalization password.
PH-SP PUK	ME is waiting for service provider personalization unblocking password.
PH-C PIN	ME is waiting for corporate personalization password.
PH-C PUK	ME is waiting for corporate personalization un-blocking password.

Notes

- Successful PIN authentication only confirms that the entered PIN was recognized and correct. The output of the result code OK does not necessarily imply that the mobile is registered to the desired network. Typical example: PIN was entered and accepted with OK, but the ME fails to register to the network. This may be due to missing network coverage, denied network access with currently used SIM card, no valid roaming agreement between home network and currently available operators etc.
  G2111/G2151I series offers various options to verify the present status of network registration: For example, the `AT+COPS` command indicates the currently used network. With `AT+CREG` you can also check the current status and acti- vate an unsolicited result code which appears whenever the status of the network registration changes (e.g. when the ME is powered up, or when the network cell changes).
- <pin> and <new pin> can also be entered in quotation marks (e.g. "1234").
- To check the number of remaining attempts to enter the passwords use the AT^SPIC command.
- See AT+CPWD and AT^SPWD for information on passwords.
- See AT+CLCK and AT^SLCK for information on lock types.

5.1.1 What to do if PIN or password authentication fails?

PIN1 / PUK1:

After three failures to enter PIN 1, the SIM card is blocked (except for emergency calls). +CME ERROR: 12 will prompt the client to unblock the SIM card by entering the associated PUK (= PIN Unblocking Key / Personal Unblocking Key). After ten failed attempts to enter the PUK, the SIM card will be invalidated and no longer

operable. In such a case, the card needs to be replaced. PIN1 consists of 4 to 8 digits, PUK1 is an 8-digit code only.

To unblock a disabled PIN1 you have two options:

- You can enter AT+CPIN=PUK1,new PIN1.
- You can use the ATD command followed by the GSM code **05*PUK*newPIN*newPIN#;.

PIN2 / PUK2:

PIN2 prevents unauthorized access to the features listed in AT+CPIN2. The handling of PIN2 varies with the provider. PIN2 may either be a specific code supplied along with an associated PUK2, or a default code such as 0000. In either case, the client is advised to replace it with an individual code. Incorrect input of PUK2 will permanently block the additional features subject to PIN2 authentification, but usually has no effect on PIN1. PIN2 consists of 4 digits, PUK2 is an 8-digit code only.

To unblock a disabled PIN2 you have two options:
- You can enter AT+CPIN2=PUK2,new PIN2.
- You can use the ATD command followed by the GSM code **052*PUK2*newPIN2*newPIN2#;.

Phone lock:

If the mobile was locked to a specific SIM card (= "PS" lock or phone lock), the PUK that came with the SIM card cannot be used to remove the lock. After three failed attempts to enter the correct password, ME returns +CPIN: PH-SIM PUK (= response to read command AT+CPIN?), i.e. it is now waiting for the Master Phone Code. This is an 8-digit device code associated to the IMEI number of the mobile which can only by obtained from the manufacturer or provider. When needed, contact Cinterion Wireless Modules GmbH and request the Master Phone Code of the specific module.

There are two ways to enter the Master Phone code:
- You can enter AT+CPIN=Master Phone Code
- You can use the ATD command followed by the GSM code *#0003*Master Phone Code#;

Usually, the Master Phone Code will be supplied by mail or e-mail. If the received number is enclosed in the *# codes typically used for the ATD option, it is important to crop the preceding *#0003* characters and the appended #.

Example: You may be given the string *#0003*12345678#. When prompted for the PH-SIM PUK simply enter 12345678.

If incorrectly input, the Master Phone Code is governed by a specific timing algorithm: (n-1)*256 seconds (see table below). The timing should be considered by system integrators when designing an individual MMI.

Number of failed attempts	Time to wait before next input is allowed
1st failed attempt	No time to wait
2nd failed attempt	4 seconds
3rd failed attempt	3 * 256 seconds
4th failed attempt	4 * 256 seconds
5th failed attempt	5 * 256 seconds
6th failed attempt and so forth	6 * 256 seconds and so forth

SIM locks:

These are factory set locks, such as "PF", "PN", "PU", "PP", "PC". An 8-digit unlocking code is required to operate the mobile with a different SIM card, or to lift the lock. The code can only be obtained from the provider.

Failure to enter the password is subject to the same timing algorithm as the Master Phone Code (see Table above).

Call barring:

Supported modes are "AO", "OI", "OX", "AI", "IR", "AB", "AG", "AC". If the call barring password is entered incorrectly three times, the client will need to contact the service provider to obtain a new one.

Related sections:

"+CME ERROR: <err>" values are specified at Section 2.11.1, CME/CMS Error Code Overview. For further instructions and examples see AT+CLCK, AT^SLCK, AT+CPWD and AT^SPWD.

5.2 AT+CPIN2 PIN2 Authentication

AT+CPIN2 controls network authentication of the G2111/G2151I series.

The read command returns an alphanumeric string indicating whether or not network authentication is required.

The write command allows the G2111/G2151I series to store the entered password. This may be for example the SIM PIN2 to benefit from the features listed below, or the SIM PUK2 to replace a disabled PIN2 with a new one. Note that PIN2 can only be entered if PIN1 authentication was done.

If the G2111/G2151I series is requesting SIM PUK2, use <pin> to enter the PUK2, followed by <new pin> to specify the new PIN2.

Syntax

Test Command
AT+CPIN2=?
Response(s)
OK
Read Command
AT+CPIN2?
Response(s)
+CPIN2: <code>
OK
ERROR
+CME ERROR: <err>
Write Command
AT+CPIN2=<pin>[, <new pin>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<pind>(str)

Password (string type), usually SIM PIN2 or, if requested, SIM PUK2.

<new pin>(str)

If the requested code was SIM PUK2: new password (PIN2).

See Section 5.1.1, What to do if PIN or password authentication fails? for more information about when you may need to enter the PUK.

<code>(text)

READY	ME is not pending for any password.
SIM PIN2	ME is waiting for SIM PIN2.
	This <code> is returned only when PIN2 authentication has not yet been done or has failed ("+CME ERROR: 17").
SIM PUK2	ME is waiting for SIM PUK2.
	This <code> is returned only when PIN2 authentication has failed and ME is pending for SIM PUK2 (i.e. "+CME ERROR: 18").

Note

- Functions accessible only after PIN2 authentication:

  `AT+CACM`: Accumulated call meter (ACM) reset or query

  `AT+CAMM`: Accumulated call meter maximum (ACMmax) set or query

  `AT+CLCK`: Facility lock to "FD" (Fixed dialing phonebook)

  `AT^SLCK`: Facility lock to "FD" (Fixed dialing phonebook)

  `AT+CPWD`: Change "P2"password

  `AT^SPWD`: Change "P2"password

  `AT+CPUC`: Price per unit and currency table

  `AT+CPIN2`: Enter SIM PIN2 or SIM PUK2 if requested.

For example, SIM PIN2 will be needed when you attempt to edit the "FD" phonebook and ME returns "+CME ERROR: 17" or "+CPIN: SIM PIN2".

Once the required <pin> has been entered correctly, PIN2 authentication code changes to READY. After 300s, a repetition of the authentication process is required (PIN2 authentication code changes from READY to SIM PIN2).

Examples

EXAMPLE 1

Change PIN2

```
AT+CPWD="P2","0000","8888"        (where "0000" = old PIN2 and "8888" = new PIN2)
OK
```

EXAMPLE 2

Unblock a disabled PIN2

```
AT+CPIN2?
+CPIN2: SIM PUK2              PIN2 has been disabled, PUK2 must be entered
OK                           to define a new PIN2
AT+CPIN2=12345678,8888       where "12345678" is the PUK2, and "8888" the new PIN2.
```

EXAMPLE 3

Write into "FD" phonebook

```
AT+CPBS="FD"
OK
AT+CPBW=2,"+493012345678",145,"Charly"
+CME ERROR: 17                               access denied due to missing PIN2 authentication
AT+CPIN2=8888
OK
AT+CPBW=2,"+493012345678",145,"Charly"
OK
```

5.3 AT^SPIC Display PIN counter

The `AT^SPIC` command can be used to find out whether the ME is waiting for a password and, if so, how many attempts are left to enter the password.

The execute command returns the number of attempts still available for entering the currently required password, for example the PIN, PUK, PH-SIM PUK etc.

The read command `AT^SPIC?` indicates which password the number of attempts stated by the execute command actually refers to. Also, the write command may be used to query the counter for a specific password: It indicates the number of attempts still available for entering the password identified by `<facility>`, for example the PIN, PIN2, PH-SIM PIN etc.

To check whether or not you need to enter a password use the read commands `AT+CPIN?`, `AT+CPIN2?` and `AT^SPIC?`. If the response to `AT+CPIN?` is "READY" the counter of the execute command `AT^SPIC` relates to PIN2. See last example. If the responses to `AT+CPIN?` and `AT+CPIN2?` both read "READY", no password is currently required, and the referrer of the execute command `AT^SPIC` is explicitly undefined.

Syntax

Test Command
AT^SPIC=?
Response(s)
OK
Read Command
AT^SPIC?
Response(s)
^SPIC: <code>
OK
Exec Command
AT^SPIC
Response(s)
^SPIC: <counter>
OK
Write Command
AT^SPIC=<facility>
Response(s)
^SPIC: <counter>
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<counter>`(num)

Number of attempts left to enter the currently required password. This number will be counted down after each failure.

`<facility>`(str)

Password for which the corresponding PIN counter is to be displayed.

"SC"   SIM PIN or SIM PUK. If the SIM PIN has been deactivated after three failed attempts, the counter for SIM PUK will be returned instead.

"PS"   "Phone code" or "device code" (cf. `AT+CLCK` and `AT+CPWD`). If incorrectly entered three times, the Master Phone Code is required to lift the lock and the number of remaining

attempts for the master phone code will be returned.

"P2"	SIM PIN2 or SIM PUK2. If the SIM PIN2 has been deactivated after three failed attempts, the counter for SIM PUK2 will be returned instead.
"PN"	Network Personalization.

<code>(text)

Identification of the currently required password.

SIM PIN	ME is waiting for SIM PIN1.
SIM PUK	ME is waiting for SIM PUK1 if PIN1 was disabled after three failed attempts to enter PIN1.
SIM PIN2	ME is waiting for PIN2, when the attempt to access PIN2 requiring features was acknowledged with "+CME ERROR: 17" (e.g. if the user attempts to edit the FD phonebook).
SIM PUK2	ME is waiting for PUK2 to unblock a disabled PIN2. Necessary if preceding command was acknowledged with "+CME ERROR: 18".
PH-SIM PIN	ME is waiting for phone-to-SIM card password if "PS" lock is active and user inserts other SIM card than the one used for the lock. ("PS" lock is also referred to as phone or antitheft lock).
PH-SIM PUK	ME is waiting for Master Phone Code, if the above "PS" lock password was incorrectly entered three times.
PH-NET PUK	ME is waiting for network personalization unblocking password

Notes

- Whenever the required password changes, <counter> changes to reflect that change. Please refer to the examples below.
- For passwords associated to the phone lock ("PS" lock set by user or factory) or other factory set locks, such as "PF", "PN", "PU", "PP", "PC" the number of attempts is subject to a timing algorithm explained in AT+CPIN. If these passwords are incorrectly entered the counter first returns 3, 2 and 1 remaining attempt(s), but then gives the total number of attempts which amounts to 63 (see example below).
- See also Chapters AT+CLCK, AT+CPIN, AT+CPIN2, AT+CPWD, AT^SLCK for further information on locks and passwords.

Examples

EXAMPLE 1

The user fails to provide a correct SIM PIN three times. The counter decreases each time. After the counter reaches zero, the SIM PUK is required. After each failure to enter a correct SIM PUK, the counter decreases.

```
at+cpin?
+CPIN: SIM PIN
OK                                 Currently required password is PIN1.
at^spic
^SPIC: 3
OK                                 3 attempts left.
at+cpin=9999
+CME ERROR: incorrect password
at^spic
^SPIC: 2                           2 attempts left.
OK
at+cpin=9999
+CME ERROR: incorrect password
OK
at^spic
```

```
^SPIC: 1                                 1 attempt left.
OK
at+cpin=9999
+CME ERROR: incorrect password
at+cpin?
+CPIN: SIM PUK
OK                                       Now required password is PUK 1.
at^spic
^SPIC: 10
OK                                       10 attempts left for PUK 1.
at+cpin=01234567,1234
+CME ERROR: incorrect password
at^spic
^SPIC: 9
OK                                       9 attempts left for PUK 1.
```

EXAMPLE 2

Though a mobile is locked to a specific SIM card (phone lock), the user attempts to operate it with another SIM card. The user correctly enters the SIM PIN of the SIM card currently inserted, but then fails to give the "PS" lock password (PH-SIM PUK):

```
at+cpin=9999
OK
at+cpin?
+CPIN: PH-SIM PIN               ME is waiting for the phone lock password.
OK
at^spic
^SPIC: 3                        3 attempts left.
OK
at+cpin=4711
+CME ERROR: incorrect password
at^spic?
^SPIC: 2                        2 attempts left.
OK
at+cpin=4712
+CME ERROR: incorrect password
at^spic
^SPIC: 1                        1 attempt left.
OK
at^spic?
^SPIC: PH-SIM PIN               Displayed counter refers to phone lock password.
OK
at+cpin=4713
+CME ERROR: incorrect password
at^spic
^SPIC: 63
OK
at^spic?
^SPIC: PH-SIM PUK               Displayed counter refers to master phone code.
OK
at+cpin=4714
+CME ERROR: incorrect password
at^spic
^SPIC: 63
OK
```

EXAMPLE 3

This example shows that after successful SIM PIN1 authentication the counter of the `AT^SPIC` execute and read command refers to SIM PIN2, i.e. it does not reflect the status of SIM PIN1. This may be a problem if the user enters a wrong PIN1 and is not aware that the number of attempts left to enter SIM PIN1 is counted down.

`+CREG: 0`	
`at+cpin=1234`	
`OK`	
`+CREG: 2`	
`+CREG: 1`	The mobile ist properly registered to the network.
`at+cpin?`	
`+CPIN: READY`	The `AT+CPIN?` read command confirms that SIM PIN1 authentication was successful.
`at^spic`	
`^SPIC: 3`	As SIM PIN1 authentication was successful, the counter relates to SIM PIN2 and correctly indicates that the user has 3 attempts to enter SIM PIN2.
`OK`	
`AT^SPIC?`	Likewise, the read command notifies that the ME is waiting for SIM PIN2.
`^SPIC: SIM PIN2`	
`OK`	
`at+clck="SC",0,456789`	First attempt to enter a wrong SIM PIN1.
`+CME ERROR: incorrect password`	
`at^spic`	
`^SPIC: 3`	SIM PIN1 authentication is still valid, and the counter relates to SIM PIN2.
`at+clck="SC",0,456789`	Second attempt to enter a wrong SIM PIN1.
`+CME ERROR: incorrect password`	
`at^spic`	
`^SPIC: 3`	SIM PIN1 authentication is still valid, and the counter relates to SIM PIN2.
`at+clck="SC",0,456789`	Third attempt to enter a wrong SIM PIN1.
`+CME ERROR: incorrect password`	
`+CREG: 0`	SIM PIN1 authentication is no longer valid.
`at^spic`	
`^SPIC: 10`	This time, after the SIM PIN1 code has been disabled, the counter indicates the status of SIM PIN1 and notifies that 10 attempts are left to enter the SIM PUK.

To avoid conflicts we recommend to use the `AT^SPIC` read and write commands rather than the execute command only. The read command clearly states the currently required password, and the write command may be used to get the counter for a specific `<facility>`, in this case for example "P2".

5.4 AT+CLCK Facility lock

`AT+CLCK` can be used to lock, unlock or interrogate a network or ME `<facility>`. The command can be aborted when network facilities are being set or interrogated.

Syntax

Test Command
AT+CLCK=?
Response(s)
+CLCK:list of supported <facility>s

OK
Write Command
AT+CLCK=<facility>, <mode>[, <password>][, <class>]
Response(s)
if <mode> is not equal 2 and command successful:
OK
if <mode>= 2 and command successful:
+CLCK: <status>[, <class>]
[+CLCK: <status>[, <class>]]
[+CLCK: ...]
OK
ERROR
+CME ERROR: <err>

Parameter Description

<facility>(str)

Phone security locks set by client or factory

Primarily intended for the client to take safety precautions, "SC", "PS" and "FD" can be configured individually. "PS" may also be factory set.
Parameter <class> is not applicable to security locks.
See examples below for further details.

"SC"   SIM (lock SIM cards)
              SIM requests password upon ME power-up and when this lock command is issued.
              <password>: SIM PIN1.
"PS"   Phone locked to SIM card
              ME requests password when other than current SIM card is inserted.
              "PS" lock is frequently referred to as "phone lock", or "device lock". Accordingly, the
              password may be called "phone code" or "device code". The "PS" password is not
              associated with the PUK of the SIM card. If incorrectly entered three times, the Master
              Phone Code is required to lift the lock. This is an 8-digit device code associated to the IMEI
              number of the mobile which can only be obtained from the manufacturer of the module.
              Once the Master Phone Code has been accepted, the mobile is operational, and the "PS"
              lock is no longer active. If needed it must be set once again.
              <password>: User defined password. It is needed before the first use of <facility>
              "PS" and, therefore, must first be specified with AT+CPWD or AT^SPWD, if it has not been
              predefined by factory settings. If set by factory (e.g. for a prepaid mobile), the password is
              supplied by the provider or operator.
"FD"   SIM Fixed Dialing lock
              If "FD" lock is enabled numbers MMI *# codes can be used only if they start with
              matching numbers or characters stored in the "FD" phonebook. The capacity of the "FD"
              phonebook is depending on the SIM card.
              Numbers stored to the "FD" phonebook must not contain the call modifiers
              "I","i","*31#", "#31#".
              <password>: SIM PIN 2.
              Any attempt to dial a string not specified in the "FD" phonebook will be denied, causing an
              error result code. The type of result code varies depending on the type of service:
              "+CME ERROR: call barred" for voice calls, GPRS connections and *# codes for
              Supplementary Services.
              "NO CARRIER" for fax calls and circuit switched data calls.
              "+CMS ERROR: operation not allowed" for SMS.

              If "FD" lock is enabled the following applies:

- Handling of Supplementary Services:
  The "FD" lock is effective only for AT+CCFC <mode> 3 (registering the CF destination number). All other Supplementary Services and functions pro- vided by AT+CCFC are not restricted by the "FD" lock.
- GPRS commands can be used only if the "FD" phonebook contains an entry with phone number "*99#". This single entry enables all GPRS commands, including AT commands and modem compatibility commands like "ATD*99***1#" or "ATD*98***1#".
  Indication is "+CME ERROR: call barred".

Factory defined SIM locks:

Typical examples of factory set SIM locks are prepaid phones or network locks, used to restrict the operation of a mobile to a specific provider or operator. The client should be aware that each of these lock types can only be unlocked if the associated password is available. For example, a mobile can be locked to accept only SIM cards from the respective provider, or even one single SIM card. Once a different SIM card is inserted the ME will prompt the client to enter a specific code. This is not the PUK of the SIM card, but usually an 8-digit code which needs to be requested from the provider.

The locks can only be set by the manufacturer and need to be agreed upon between the parties concerned, e.g. provider, operator, distributor etc. on the one side and the manufacturer on the other side. For details contact your local dealer or Cinterion Wireless Modules GmbH.

Parameter <class> is not applicable to SIM locks.

<password> and instructions for unlocking must be obtained from the network provider.

"PF"	Lock Phone to the very First SIM card
"PN"	Network Personalization
"PU"	Network subset Personalization
"PP"	Service Provider Personalization
"PC"	Corporate Personalization

Supplementary Service Call Barring:

Supplementary Service "Call Barring" allows to specify conditions under which calls will be disallowed by the network.

The availability of the Supplementary Services varies with the network. To benefit from call barring the client will need to subscribe them, though a limited number of call barring types may be included in the basic tariff package.

When you attempt to set a <facility> or <class> which is not provisioned, not yet subscribed to, or not supported by the module, the setting will not take effect regardless of the response returned. The responses in these cases vary with the network (for example "OK", "+CME ERROR: operation not allowed", "+CME ERROR: operation not supported" etc.). To make sure check the extended error response with AT+CEER and the lock status with <mode>=2.

<password>: Network password supplied from the provider or operator. Usually there is one password which applies to all call barring options. For details contact your provider.

"AO"	BAOC (Bar All Outgoing Calls)
"OI"	BOIC (Bar Outgoing International Calls)
"OX"	BOIC-exHC (Bar Outgoing International Calls except to Home Country)
"AI"	BAIC (Bar All Incoming Calls)
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
"AB"	All Barring services (applicable only for <mode>=0)
"AG"	All outgoing barring services (applicable only for <mode>=0)
"AC"	All incoming barring services (applicable only for <mode>=0)

<mode>(num)

0	unlock
1	lock
2	query status

<status>(num)

0	lock is inactive
1	lock is active

<password>(str)

Password string used to lock and to unlock a <facility>. Length and authority for passwords depend on the <facility> in question and are therefore listed in the section on parameter <facility>. Passwords can be modified with AT+CPWD or AT^SPWD.

<class>(num)

Integer or sum of integers each representing a class of information, i.e. a bearer service, telecommunication service or bearer service group as defined in "GSM 02.04".

1	voice
2	class 2 ("data") comprises all those individual data classes between 16 and 128, that are supported both by the network and the MS. This means, a setting made for class 2 applies to all individual data classes (if supported). In addition, you can assign a different setting to a specific class. For example, you can activate Call Forwarding for all data classes, but deactivate it for data class 64, "dedicated packet access".
4	fax
8	SMS
16	data circuit sync
32	data circuit async
64	dedicated packet access
128	dedicated PAD access
1...[7]...255	combination of some of the above classes.
	For example, the default setting 7 represents the sum of the integers 1, 2 and 4 (voice, data and fax).
	The value 255 covers all classes.
	If parameter "class" is omitted, the default value 7 is used.

Notes

- The AT+CLCK command offers the full range of <class> parameters according to the GSM specifications. However, when you attempt to use a service option which is not provisioned or not yet subscribed to, the setting will not take effect regardless of the response returned.
  The responses in these cases vary with the network (for example "OK", "Operation not allowed", "Operation not supported" etc.). To make sure check the extended error response with AT+CEER and the lock status with <mode>=2.

- The command has been implemented with the full set of <class> parameters according to GSM 07.07. For actual applicability of a desired Call barring service to a specific service or service group (a specific <class> value) please consult table A.1 of GSM 02.04.

- If an outgoing Fax or Data Call is rejected due to an active "call barring" supplementary service, the call will be terminated with result code NO CARRIER.
  Under the same conditions, an outgoing Voice call will be terminated with result code NO DIALTONE.

- If an invalid <password> is entered several times in succession, a delay incremented after each failed attempt will increase the time to wait before the input of the <password> is accepted. To avoid blocking the serial interface the running AT+CLCK command is aborted after a short timeout and returns "+CME ERROR: unknown" (+CME ERROR: 100). If then the AT+CLCK command is issued once again execution is denied with "+CME ERROR: operation temporary not allowed" (+CME ERROR: 256). For details regarding the delay see Section 5.1.1, What to do if PIN or password authentication fails?

- If the user tries to set a lock although it is already active or, the other way round, tries to unlock an inactive lock, the response will be OK, but the <password> will not be checked or verified.

Examples

EXAMPLE 1

Lock SIM card (<facility>= "SC")

AT+CLCK="SC",1,"9999" OK	The "SC" parameter enables or disables the SIM PIN authentication (PIN 1) when you power up the GSM engine SIM card locked. As a result, SIM PIN 1 must be entered to enable ME to register to the GSM network.

AT+CLCK="SC",0,"9999" OK	Unlocks SIM card. When powered up, ME registers to the GSM network without requesting SIM PIN1. Note: Depending on the services offered by the provider, this feature is not supported by all SIM card types. If so, the command returns ERROR when you attempt to unlock the card.

To query the status of the SIM card lock:

AT+CLCK="SC",2 +CLCK: 1 OK	Query the status of SIM card lock. SIM card is locked. SIM PIN1 must be entered to enable ME to register to the GSM network.

EXAMPLE 2

Phone lock (<facility>="PS")

AT+CPIN? OK	Make sure that PIN1 authentication is valid.

To lock the ME to the currently inserted SIM card, first specify a password for <facility> "PS":

AT+CPWD="PS",,"1234" OK	If "PS" lock has not been set before: enter new password.

Optionally, if "PS" password was defined before, change existing password:

AT+CPWD="PS","1234","3333" OK	To replace existing "PS" password: Enter old and new password.

Then, activate the Phone Lock:

AT+CLCK="PS",1,"3333" OK	Locks the mobile to the current SIM card.

To operate the mobile with the SIM card for which "PS" lock was activated:

AT+CPIN?	

+CPIN: SIM PIN OK AT+CPIN="9999"	
OK	No additional password is required for operation (SIM recognized by mobile).

To operate the mobile with other SIM card than the one used for the "PS" lock:

Enter SIM PIN of present card, followed by "PS" lock password.

AT+CPIN?	
+CPIN: SIM PIN OK AT+CPIN="1111"	
OK	PIN authentication accepted.
AT+CPIN?	
+CPIN: PH-SIM PIN	"PS" lock password is required.
OK	
AT+CPIN="3333"	
OK	"PS" Lock password has been accepted. ME is fully operational now.

To deactivate the Phone Lock:

AT+CLCK="PS",0,"3333"	Phone Lock password has to be provided again.
OK	Now the mobile can be used with any SIM card, without the need of the phone lock password.

5.5 AT^SLCK Facility lock

AT^SLCK provides the "Facility lock" function as defined for the GSM 07.07 command AT+CLCK. The command can be used to lock, unlock or interrogate a network or ME <facility>.

AT^SLCK is, in every respect, identical with AT+CLCK, except that the command syntax and response prefix is "^SLCK" instead of "+CLCK". For further details please refer to AT+CLCK.

The command can be aborted when network facilities are being set or interrogated.

Syntax

Test Command
AT^SLCK=?
Response(s)
^SLCK:list of supported <facility>s
OK
Write Command
AT^SLCK=<facility>, <mode>[, <password>][, <class>]
Response(s)
if <mode> is not equal 2 and command successful:
OK
if <mode>= 2 and command successful:
^SLCK: <status>, <class>
[^SLCK: <status>, <class>]
[^SLCK: ...]
OK
If error is related to ME functionality
ERROR
+CME ERROR: <err>

5.6 AT+CPWD Change Password

AT+CPWD allows to define a new password for a password protected <facility> lock function. Each password is a string of digits, the length of which varies with the associated <facility>. The test command returns a list of pairs which represent the available facilities and the maximum length of the associated password. See AT commands AT+CLCK and AT^SLCK for more information on the various lock features.

Specifically the command can be used to

- change PIN1 or PIN2,
- change the password supplied from your provider for the "call barring" supplementary service,
- set individual phone security passwords,
- enter the unblocking key (Master Phone Code) to restore a disabled "PS" password.

To delete a password use the following syntax: at+cpwd=<facility>,<old password>

Syntax

Test Command
AT+CPWD=?
Response(s)
+CPWD:list of supported (<facility>, <password length>)
OK
Write Command
AT+CPWD=<facility>, <old password>[, <new password>]
Response(s)
New password has been registered for the facility lock function.
OK
If parameter <old password> was not correct:
+CME ERROR: 16 (+CME ERROR: incorrect password)
If the password for the selected <facility> has been invalidated due to too many failed attempts:
+CME ERROR: ...
If error is related to ME functionality:
+CME ERROR: <err>

Parameter Description

<facility>^(str)

Phone security locks set by client or factory:

Primarily intended for the client to take safety precautions, passwords "SC" (SIM PIN) and "P2" (SIM PIN2) are usually predefined, but can be configured individually. The password for lock facility "PS" may also be factory set.

"SC"   SIM PIN. SIM requests password upon ME power-up and when this lock command is issued.
               If incorrectly entered three times, the SIM PUK is required to perform authentication. Input of the SIM PUK password is possible only with AT command AT+CPIN or ATD. For further details please refer to Section 5.1.1, What to do if PIN or password authentication fails?
               <password length>: 4 to 8 digits.
"PS"   Phone locked to SIM card. ME requests password when other than current SIM card is inserted.
               "PS" lock is frequently referred to as "phone lock", or "device lock". Accordingly, the password may be called "phone code" or "device code". The "PS" password is not associated with the PUK of the SIM card. It must be defined before the first use of <facility> "PS" with AT+CLCK.

<password length>: 4 digits.

If incorrectly entered three times, the Master Phone Code is required to lift the lock. This Unblocking procedure is performed with AT+CPWD using the following parameters: <facility>="PS", <old password>= Master Phone Code (to be obtained from the module manufacturer), and <new password>= the new phone code ("PS" password for lock facility), if desired.

Mind that successful PIN authentication is a prerequisite for use of AT command AT+CPWD. If Pin authentication has not been completed, input of the Master Phone code password is possible only with AT command AT+CPIN or ATD. For further detail please refer to Section 5.1.1, What to do if PIN or pass- word authentication fails?

Once the Master Phone Code has been accepted, the mobile is operational, and the "PS" lock is no longer active. If needed it must be set once again with AT+CLCK.

"P2"　　　　SIM PIN 2, e.g. required for authentication with facility lock "FD" (cf. AT+CLCK). If incorrectly entered three times, the SIM PUK 2 is required to perform authentication. Input of the SIM PUK 2 password is possible only with AT command AT+CPIN2 or ATD. For further detail please refer to Section 5.1.1, What to do if PIN or password authentication fails?

<password length>: 4 to 8 digits.

Factory defined SIM locks:

Typical examples of factory set SIM locks are prepaid phones or network locks, used to restrict the operation of a mobile to a specific provider or operator. The client should be aware that each of these lock types can only be unlocked if the associated password is available. For example, a mobile can be locked to accept only SIM cards from the respective provider, or even one single SIM card. Once a different SIM card is inserted the ME will prompt the client to enter a specific code. This is not the PUK of the SIM card, but usually an 8-digit code which needs to be requested from the provider.

The locks can only be set by the manufacturer and need to be agreed upon between the parties concerned, e.g. provider, operator, distributor etc. on the one side and the manufacturer on the other side. For details contact your local dealer or Cinterion Wireless Modules GmbH.

"PF"	Lock Phone to the very First SIM card
"PN"	Network Personalization
"PU"	Network subset Personalization "PP" Service Provider Personalization
"PC"	"PC" Corporate Personalization

Supplementary Service Call Barring:

Supplementary Service "Call Barring" allows to specify conditions under which calls will be disallowed by the network.

The availability of the Supplementary Services varies with the network. To benefit from call barring the client will need to subscribe them, though a limited number of call barring types may be included in the basic tariff package.

<password length>: The Network Password needs to be supplied from the network provider or network operator. Usually there is one 4 digit password which applies to all call barring options. For details contact your provider.

"AO"	BAOC (Bar All Outgoing Calls)
"OI"	BOIC (Bar Outgoing International Calls)
"OX"	BOIC-exHC (Bar Outgoing International Calls except to Home Country)
"AI"	BAIC (Bar All Incoming Calls)
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
"AB"	All Barring services
"AG"	All outgoing barring services
"AC"	All incoming barring services

<pre><password length>(num)</pre>

4...8   Length of password. The range of permitted length for a password depends on the
                        associated <facility>. It is available from the test command response, or in the
                        description of parameter <facility>.

<pre><Old password>(str)</pre>

Password specified for the facility.

Parameter <old password> can be ignored if no old password was allocated to the facility.

Take into account that a password may have already been set by factory, or that the service is subject to a
password issued by the provider. See notes above or contact provider.

<pre><new password>(str)</pre>

New password. Mandatory, if <old password> was an unblocking key (such as the Master Phone Code).

Note

- When changing PIN2 (<facility>="P2") it is recommended to check the new state of PIN2 by using the
  AT+CPIN2 command.

Examples

EXAMPLE 1

To change PIN2

`AT+CPWD="P2","0000","8888"`	(where "0000" = old PIN2 and "8888" = new PIN2)
`OK`	PIN2 Password has been changed to "8888"

EXAMPLE 2

To set password used to enable or disable barring of all outgoing calls:

`AT+CPWD="AO","0000","3333"`	Requests the network to change the password for supplementary service "call barring".
`OK`	Usually this request will affect all barring services, even though the request is issued for Supplementary Service BAOC ("Barring of all outgoing calls") only. Refer to the respective network provider for detail.

EXAMPLE 3

Handling of the "PS" lock password

`AT+CMEE=2`	Enable text output of CME Error information
`AT+CPWD="PS","1111","2222"`	(where "1111" = old password and "2222" = new password)
`OK`	Password for facility "PS" is now "2222"
`AT+CPWD="PS","1111","2222"`	Repeat command to provoke error "incorrect password"
`+CME ERROR: incorrect password`	("1111" is no longer the correct password)

EXAMPLE 4

To specify a new "PS" lock password, after the old password was disabled (e.g. after three failed attempts to
change the "PS" password): use the master phone code.

CAUTION: THIS TEST SHOULD BE PERFORMED ONLY IF THE CORRECT MASTER PHONE CODE FOR THE INDIVIDUAL ME USED IS DEFINITELY AVAILABLE! Otherwise the module used will be rendered useless until the correct master phone code is entered!

`AT+CPWD="PS","12345678","1111"`
 	
`OK`
	where 12345678 is the Master Phone Code and 1111 is the new password. You may also use `<new password>` to restore the former disabled password.

Alternatively, without giving a new password:

`AT+CPWD="PS","12345678"`
 	
`OK`
	(where 12345678 is the Master Phone Code). Deactivates the present phone lock.

5.7 AT^SPWD Change Password

The `AT^SPWD` command provides the same functions as `AT+CPWD`. The major difference between both commands is that, apart from the different prefixes "^SPWD" and "+CPWD", the `AT^SPWD` command includes additional functions dedicated to the Customer SIM Lock. Please note that this feature is only supported by specifically pre-configured G2111/G2151I series and, therefore, not part of the standard "G2111/G2151I series AT Command Set". Ordering information and a detailed description of the "Customer SIM Lock" feature can be requested from Cinterion Wireless Modules GmbH. All other functions and parameters of `AT^SPWD` are described in Section 5.6, `AT+CPWD`.

Each password is a string of digits the length of which varies with the associated facility. The test command returns a list of pairs which represent the available facilities and the maximum length of the associated password.

See also AT commands `AT+CLCK` and `AT^SLCK` for more detail on the various lock features.

Syntax

Test Command
AT^SPWD=?
Response(s)
^SPWD:list of supported (<facility>, <password length>)
OK
Write Command
AT^SPWD=<facility>, <old password>[, <new password>]
Response(s)
New password has been registered for the facility lock function.
OK
If parameter <old password> was not correct:
+CME ERROR: 16 (+CME ERROR: incorrect password)
If the password for the selected <facility> has been invalidated due to too many failed attempts:
+CME ERROR: ...
If error is related to ME functionality:
+CME ERROR: <err>

Note

- When changing the PIN2 (<facility>="P2") it is recommended to check the new state of PIN2 using the AT+CPIN2 command.

6

Identification Commands

The AT Commands described in this chapter allow the external application to obtain various identification information related to the G2111/G2151I series and linked entities.

The following topics are covered in this chapter:

6.1 ATI Display product identification information

The `ATI` execute command delivers a product information text.

The "Revision" information consists of the following parts: Version xx and variant yyy of software release.

Syntax

Exec Command
ATI
Response(s)
Cinterion
BG2-W
REVISION xx.yyy
OK
Exec Command
ATI[<value>]
Response(s)
OK
Exec Command
ATI1
Response(s)
Cinterion
BG2-W
REVISION xx.yyy
A-REVISION aa.bbb.cc
OK

Parameter Description

`<value>`(num)

Values are not supported and only return OK.

Note

- "A-REVISION aa.bbb.cc" information consists of the following parts:
  Application Revision Number 'aa' as an indication of the supported application ('01' ... no dedicated application is present, ATC is the default application).
  Application Revision Version 'bbb' as an assignment to changes in customer application.
  'cc' as an additional number, e.g. defined by customer.

6.2 AT+CGMI Request manufacturer identification

`AT+CGMI` returns a manufacturer identification text. See also: `AT+GMI`.

Syntax

Test Command
AT+CGMI=?
Response(s)
OK
Exec Command

AT+CGMI
Response(s)
Cinterion
OK

6.3 AT+GMI Request manufacturer identification

AT+GMI returns a manufacturer identification text. See also: AT+CGMI.

Syntax

Test Command
AT+GMI=?
Response(s)
OK
Exec Command
AT+GMI
Response(s)
Cinterion
OK

6.4 AT+CGMM Request model identification

AT+CGMM returns a product model identification text. Command is identical with AT+GMM.

Syntax

Test Command
AT+CGMM=?
Response(s)
OK
Exec Command
AT+CGMM
Response(s)
BG2-W
OK

6.5 AT+GMM Request model identification

AT+GMM returns a product model identification text. Command is identical with AT+CGMM.

Syntax

Test Command
AT+GMM=?
Response(s)
OK
Exec Command
AT+GMM
Response(s)
BG2-W
OK

6.6 AT+CGMR Request revision identification of software status

AT+CGMR delivers a product firmware version identification. Command is identical with AT+GMR.

Syntax

Test Command
AT+CGMR=?
Response(s)
OK
Exec Command
AT+CGMR
Response(s)
REVISION <number>
OK

Parameter Description

<number>(str)

Version xx and variant yyy of software release.

6.7 AT+GMR Request revision identification of software status

AT+GMR delivers a product firmware version identification. Command is identical with AT+CGMR.

Syntax

Test Command
AT+GMR=?
Response(s)
OK
Exec Command
AT+GMR
Response(s)
REVISION <number>
OK

Parameter Description

<number>(text)

Version xx and variant yyy of software release.

6.8 AT+CGSN Request International Mobile Equipment Identity(IMEI)

AT+CGSN delivers the International Mobile Equipment Identity (IMEI). Command is identical with: AT+GSN.

Syntax

Test Command
AT+CGSN=?
Response(s)
OK
Exec Command
AT+CGSN
Response(s)
<sn>
OK

Parameter Description

<sn>(str)

International Mobile Equipment Identity (IMEI) used to identify a GSM mobile equipment to the GSM network

6.9 AT+GSN Request International Mobile Equipment Identity (IMEI)

AT+GSN delivers the International Mobile Equipment Identity (IMEI). Command is identical with AT+CGSN

Syntax

Test Command
AT+GSN=?
Response(s)
OK
Exec Command
AT+GSN
Response(s)
<sn>
OK

Parameter Description

<sn>(str)

International Mobile Equipment Identity (IMEI) used to identify a GSM mobile equipment to the GSM network

6.10 AT+CIMI Request International Mobile Subscriber Identity (IMSI)

AT+CIMI delivers the International Mobile Subscriber Identity (IMSI). The IMSI permits the TE to identify the individual SIM attached to the ME.

Syntax

Test Command
AT+CIMI=?
Response(s)
OK
Exec Command

AT+CIMI
Response(s)
<imsi>
OK
ERROR
+CME ERROR: <err>

Parameter Description

<code><imsi></code>^(str)

International Mobile Subscriber Identity (string without quotes).

7

Call related Commands

The AT Commands described in this chapter are related to Mobile Originated (MOC, i.e. outgoing) Calls and Mobile Terminated (MTC, i.e. incoming) Calls.

The following topics are covered in this chapter:

7.1 Call Status Information

For Circuit switched calls, including voice, fax and data calls, call status information is available with URC "+CIEV: call" (configurable via AT commands AT+CIND and AT+CMER) or - in more detail - from the list of current calls. This list can be displayed on request via at commands AT+CLCC and AT^SLCC. It can also be issued by the ME in the form of an unsolicited result code "^SLCC" if configured with AT^SLCC and AT+CMER.

URC "+CIEV: call" and URC "^SLCC" can be configured using AT command AT^SCFG. An overview of the possible configurations and their consequences for the availability of call status information will be given here.

Generally speaking, the call status values recognized by the ME are as follows:

*   active
*   held
*   dialing (MOC)
*   alerting (MOC)
*   incoming (MTC)
*   waiting (MTC)
*   terminating: The call is not active anymore, but inband information is still available.
*   dropped: The call has been suspended by the network, but may be resumed later.

The values "terminating" and "dropped" are not standardized for AT command AT+CLCC, and therefore only available for command AT^SLCC. A call in any of these two states will not appear in the list of current calls as displayed with AT+CLCC.

A call that is not recognized by the ME is considered to be in "unknown" state.

Some networks may schedule a traffic channel for a call that is not yet in the "active" state. This is reflected in parameter <traffic channel assigned> of AT command AT^SLCC and the corresponding URC. Depending on the value of AT^SCFG setting <succ>, Indicator "+CIEV" will be issued (if configured with AT+CIND and AT+CMER)

*   when a state transition ends in state "active" or in state "unknown"
    (if AT^SCFG setting <succ>="restricted'').
*   when any state transition (including transitions beginning or ending in state "unknown") occurs in the list of active calls, or when a traffic channel is established
    (if AT^SCFG setting <succ>="verbose'').

The indicator value for indicator "+CIEV: call" will be "1" if at least one call is in states "held" or "active", and "0" otherwise.

Depending on the value of AT^SCFG setting <sucs>, Indicator "^SLCC" will be issued (if configured with write command AT^SLCC and AT+CMER)

*   when a state transition ends in state "active" or in state "unknown" (if AT^SCFG setting <sucs>="restricted")
*   when any state transition (including transitions beginning or ending in state "unknown") occurs in the list of active calls, or when a voice channel is established (if AT^SCFG setting <sucs>="verbose").

Due to compatibility considerations, the power up default for AT^SCFG setting <succ> is "restricted", offering compatibility to the standard behavior of indicator "+CIEV: call", while the default for setting <sucs> is "verbose".

In order to see the URCs, event reporting for both indicators must be explicitly configured with the appropriate AT commands.

7.2 ATA Connect to Incoming Call

ATA connects the G2111/G2151I series to an incoming voice or data call, which is indicated by a "RING" URC. AT+CRC allows to customize the format of the incoming call URC.

`ATA` may also be used to accept a network request for a PDP context activation (see `ATA`).

Syntax

Exec Command
ATA
Response(s)
In case of incoming data call, if successfully connected (ME switches to data mode):
CONNECT <text>
In case of voice call, if successfully connected:
OK
When ME returns to command mode after call release:
OK
If incoming call is not available, i.e. already disconnected or hanged up:
NO CARRIER

Parameter Description

<text> (str)

Connection speed

Presented only if `ATX` parameter setting is greater 0.

Possible connection speed values:

"300"
"1200"
"2400"
"4800"
"9600"

Notes

- Additional AT commands on the same command line are ignored.
- ATA may be aborted if receiving a character during execution. It can't be aborted in some connection setup states, such as handshaking.
- For calls explicitly signaled as voice or data calls, this procedure will fail with result code "NO CARRIER", but the call in question will continue to ring.

7.3 ATD Mobile originated call to specified number

Syntax

Exec Command
ATD<n>[<mgsm>][;]
Response(s)
If no dialtone (parameter setting ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If a connection cannot be set up:
NO CARRIER
NO DIALTONE
If successfully connected and non-voice call (TA switches to online data mode):

CONNECT \<text\>

When TA returns to command mode after call release:

OK

If successfully connected and voice call:

OK

Command Description

This command can be used to set up outgoing voice, data or fax calls. It also serves to control Supplementary Services. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services. It must not be used for data and fax calls.

Additional notes on the responses returned after dialing with ATD:

- For voice calls, you have the choice of two different response modes that can be selected with AT^SM20: AT^SM20=1 (factory default) causes the ME to respond once the call setup is completed either successfully ("OK") or unsuccessfully ("NO CARRIER", "NO DIALTONE", "BUSY").
  AT^SM20=0 causes the ME to return "OK" immediately after dialing was completed (i.e. before call setup terminates successfully or unsuccessfully).

- For data connections, call setup always terminates when the call has been established (indicated by the result code "CONNECT \<text\>"), or when it fails (indicated by "NO CARRIER"). The settings of AT^SM20 do not apply.

Different call release indications:

- Upon termination, an outgoing fax or data call may show a different result code than a voice call would show under identical conditions. In order to track down the actual reason for call termination, AT+CEER or ATS18 should be used for all applicable connections.

Using ATD during an active call:

- When a user originates a second voice call while there is already an active voice call, the first call will automatically put on hold. The second call attempt is acknowledged with "OK" immediately after dialing with ATD has completed, without relation to a successful call setup. In case of failure, the additional result codes "NO CARRIER", "NO DIALTONE", "BUSY" will be presented afterwards (see example below).

Parameter Description

\<n\>(text)

String of dialing digits and optional V.250 modifiers: 0-9, *, #, +, A, B, C, D and p
The following V.250 modifiers are ignored: ,(comma), T, !, W ,@

\<mgsm\>(str)

String of GSM modifiers:

I	Activates CLIR (disables presentation of own phone number to called party, if no *#31#-code is within the dial string)
i	Deactivates CLIR (enables presentation of own phone number to called party, if no *#31#-code is within the dial string)
G	Activate Closed User Group explicit invocation for this call only.
g	Deactivate Closed User Group explicit invocation for this call only.

Notes

- The command may be aborted generally when receiving a character during execution. It cannot be aborted in some connection setup states, such as handshaking.
- \<mgsm\> is not supported for data calls.

- <n> is default for last number that can be dialed by ATDL.

- See also ATX for <text>.

- If ATD is used with a USSD command (e.g. ATD*100#;) an AT+CUSD=1 is executed implicitly (see AT+CUSD).

- Parameter 'G' or 'g' will be ignored if Closed User Group was already activated, respectively deactivated with AT+CCUG command before. Call by call invocation of CUG uses the settings provisioned by the provider or, if available, the settings of the parameters <index> and <info> made with AT+CCUG.

- The ME is equipped with a "Blacklist" function according to GSM02.07 Annex A. The handling of failed call attempts follows the timing restrictions specified there. When the maximum number of failed call attempts is reached the number will be blacklisted. Call attempts to blacklisted numbers will be barred by the ME and not signaled to the network.
  An attempt to start a voice call to a barred phone number is denied with a "+CME ERROR: call barred".
  An attempt to start a data or fax call to a barred phone number is denied with "NO CARRIER".
  According to GSM02.07 Annex A, the barred numbers will be removed from the blacklist after a call attempt was successful or after module restart.

- Emergency calls:
  If no SIM is inserted, call numbers 000, 08, 110, 112, 118,119, 911 and 999 cause an emergency call setup.
  If a SIM with ECC file is inserted, 112 and 911 and all additional call numbers stored in the ECC file cause an emergency call setup.
  If a SIM without or empty ECC file is inserted, call numbers 112 and 911 and in addition all call numbers specified with AT^SCFG, "Call/ECC", parameter <ecc> will cause an emergency call setup.

- When using the command on the second serial interface please see also Section 1.9.

- DTMF transmission:
  If a dial string contains the call modifier "p" the digits after this call modifier till the end are handled as DTMF tones, which are transmitted at connect state for voice calls. When encountering the DTMF separator subsequently, the module will insert a pause.

Example

The following example shows the call setup procedure when a call is already active and a second call attempt fails because the line of the called party is busy:

`ATD03012345678;`	Dialing out the first party's number.
`OK`	The first call is established.
`ATD03022222222;`	The number of the second party is dialed.
`OK`	The response "OK" is issued immediately though no call is established (same behavior as is you had chosen `AT^SM20=0`.)
`BUSY`	Line of the second called party is busy.

7.4 ATD><mem><n> Mobile originated call using specific memory and index number

Syntax

Exec Command
ATD><mem><n>[<mgsm>];
Response(s)
ERROR
+CME ERROR: <err>
If no dialtone (parameter ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY

If connection cannot be set up:

NO CARRIER

NO DIALTONE

When TA returns to command mode after call release:

OK

If successfully connected:

OK

Command Description

TA attempts to set up an outgoing call to the specified number. The termination character ";" is mandatory since dialing from a phonebook is only supported for voice calls and for sending *# codes of Supplementary Services or other functions.

Parameter Description

<mem>(str)

Phonebook storage:

For detailed description of storages see AT+CPBS.

"FD"	Fixed dialing phonebook
"SM"	SIM phonebook
"ON"	MSISDN list
"ME"	Mobile Equipment Phonebook
"LD"	Last number dialed phonebook
"MC"	Missed (unanswered received) calls list
"RC"	Received calls list
"VM"	CPHS voice mailbox phonebook

<n>(num)

Integer type memory location in the range of locations available in the selected memory, i.e. the index number returned by AT+CPBR.

<mgsm>(str)

String of GSM modifiers:

I	Activates CLIR (disables presentation of own phone number to called party, if no *#31#-code is within the dial string)
i	Deactivates CLIR (enables presentation of own phone number to called party, if no *#31#-code is within the dial string)

Notes

- This command may be aborted generally by receiving a character during execution. Abortion is not possible during some states of connection setup such as handshaking.
- There is no <mem> for emergency call ("EN").
- The command is not applicable to data calls. Any attempt to dial a data call number from <mem> causes the result code "NO CARRIER" to appear.
- Parameter <mgsm> only if no *# code is within the dialing string.
- See ATX for setting result code and call monitoring parameters.

Examples

EXAMPLE 1

To query the location number of the phonebook entry:

```
AT+CPBR=1,xx
```
TA returns the entries available in the active phonebook.

EXAMPLE 2

To dial a number from the SIM phonebook, for example the number stored to location 15:

```
ATD>"SM"15;
OK
```

EXAMPLE 3

To dial a phone number stored in the last dial memory on the SIM card:

```
ATD>"LD"9;
OK
```

7.5 ATD><n> Mobile originated call from active memory using index number

Syntax

Exec Command
ATD><n>[<mgsm>];
Response(s)
ERROR
+CME ERROR: <err>
If no dialtone (parameter ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If connection cannot be set up:
NO CARRIER
NO DIALTONE
When TA returns to command mode after call release:
OK
If successfully connected:
OK

Command Description

TA attempts to set up an outgoing call to the stored number. The termination character ";" is mandatory since dialing from a phonebook is only supported for voice calls and for sending *# codes of Supplementary Services or other functions.

Parameter Description

<n>(num)

Integer type memory location in the range of locations available in the selected memory, i.e. the index number returned by AT+CPBR.

<mgsm>^(str)

String of GSM modifiers:

I	Activates CLIR (disables presentation of own phone number to called party)
i	Deactivates CLIR (enables presentation of own phone number to called party)

Notes

- This command may be aborted generally by receiving a character during execution. Abortion is not possible during some states of connection setup such as handshaking.
- The command is not applicable to data calls. Any attempt to dial a data call number from <n> causes the result code "NO CARRIER" to appear.
- Parameter <mgsm> only if no *# code is within the dialing string.

7.6 ATD><str> Mobile originated call from active memory using corresponding field

Syntax

Exec Command
ATD><str>[<mgsm>];
Response(s)
ERROR
+CME ERROR: <err>
If no dialtone (parameter ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If connection cannot be set up:
NO CARRIER
NO DIALTONE
When TA returns to command mode after call release:
OK
If successfully connected:
OK

Command Description

This command searches the active phonebook for a given string <str> and dials the assigned phone number. The termination character ";" is mandatory since dialing from a phonebook is only supported for voice calls and for sending *# codes of Supplementary Services or other functions.

Parameter Description

<str>^(str)(+CSCS)

String type value ("x") that should equal an alphanumeric field in at least one phonebook entry in the searched memories; used character set should be the one selected with AT+CSCS. <str> can contain escape sequences as described in chapter "Supported character sets".

<str> must be wrapped in quotation marks (""), if escape sequences or parameter <mgsm> are used or if the alphanumeric strings contains a blank. If not, quotation marks are optional. If AT+CSCS is set to "UCS2", with

respect to the coding of UCS2-characters only phonebook entries that contain an alphanumeric string with a size less than the half of the parameter `<tlength>` from `AT+CPBW` can be dialed.

<code><mgsm></code>^(str)

String of GSM modifiers:

I	Activates CLIR (disables presentation of own phone number to called party, if no *#31#-code is within the dial string)
i	Deactivates CLIR (enables presentation of own phone number to called party, if no *#31#-code is within the dial string)

Notes

- This command may be aborted generally by receiving a character during execution. Abortion is not possible during some states of connection setup such as handshaking.
- The command is not applicable to data calls. Any attempt to dial <str> without semicolon ";" causes the result code "NO CARRIER" to appear.
- Parameter <mgsm> only if no *# code is within the dialing string.

7.7 ATDI Mobile originated data call to ISDN number

Syntax

Exec Command
ATDI<n>
Response(s)
If no dialtone (parameter ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If connection cannot be set up:
NO CARRIER
NO DIALTONE
All other error reasons:
+CME ERROR: <err>
If successfully connected :
CONNECT <text>
When TA returns to command mode after call release:
OK

Command Description

TA attempts to set up an outgoing data call to ISDN number.

Parameter Description

<code><n></code>^(str)

ISDN number

String with maximum length of 20 characters. Allowed characters: +, 0-9, A, B, C.

Note

- This command may be aborted generally by receiving a character during execution. Abortion is not possible during some states of connection setup such as handshaking.

7.8 ATDL Redial last number used

Syntax

Exec Command
ATDL[;]

Response(s)
If there is no last number or number is not valid:
+CME ERROR: <err>
If no dialtone (parameter ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If connection cannot be set up:
NO CARRIER
NO DIALTONE
If successfully connected and non-voice call (TA switches to online data mode):
CONNECT <text>
When TA returns to command mode after call release:
OK
If successfully connected and voice call:
OK

Command Description

This command redials the last voice and data call number used in the ATD command. If terminated with semi-colon ";" ATDL dials the last voice call number stored in the "LD" phonebook. Otherwise, the last dialed data or fax number will be used (not contained in the "LD" phonebook).

Notes

- This command may be aborted generally by receiving a character during execution. Abortion is not possible during some states of connection setup such as handshaking.
- Parameter "I" and "i" only if no *#-code is within the dial string.

7.9 ATH Disconnect existing connection

Syntax

Exec Command
ATH[<n>]

Response(s)
OK

Command Description

Disconnect existing call from command line by local TE and terminate call.

Parameter Description

<n>(num)

[0]   disconnect from line and terminate call

Notes

- OK is issued after circuit 109 (DCD) is turned off, if it was previously on.

- ATH terminates every circuit switched call (voice, data or fax), even if it is issued via another interface. This behavior is in accordance with ITU-T V.250; (07/97, "Hook control": "ATH is terminating any call in progress.").

- ATH clears any active PDP context or terminates any existing PPP connection, but only if issued on the same interface where GPRS is used and if there is no pending network request for PDP context activation. It does not affect PDP contexts and PPP connections on other interfaces (see also Section 11.20, Manual rejection of a network request for PDP context activation.

7.10 AT+CHUP Hang up call

Syntax

Test Command
AT+CHUP=?
Response(s)
OK
ERROR
+CME ERROR: <err>
Exec Command
AT+CHUP
Response(s)
OK
ERROR
+CME ERROR: <err>

Command Description

Cancels all active and held calls.

Note

- AT+CHUP implements the same function as ATH.

7.11 AT^SHUP Hang up call(s) indicating a specific GSM04.08 release cause

The AT^SHUP write command terminates calls known to the ME and indicates a specific GSM04.08 release cause specified by the user. The command can be used for voice, Fax and data calls. Calls will be terminated regardless of their current call status, which may be any of the states listed with AT+CLCC.

Syntax

Test Command
AT^SHUP=?
Response(s)
OK
Write Command
AT^SHUP=<cause>[, <cn>]
Response(s)
OK

ERROR

Parameter Description

`<cause>`(num)

Release cause

GSM04.08 release cause to be indicated to the network.
The G2111/G2151I series will release the selected connection(s) with release cause indication "cause" and location "user" (0)

in the "disconnect" protocol message to the network. It depends on the network whether or not the release cause will be forwarded to the remote party.

1	Send GSM04.08 release cause "unassigned (unallocated) number"
16	Send GSM04.08 release cause "normal call clearing"
17	Send GSM04.08 release cause "user busy"
18	Send GSM04.08 release cause "no user responding"
27	Send GSM04.08 release cause "destination out of order"
31	Send GSM04.08 release cause "normal, unspecified"

`<cn>`(num)

Call number

The "call number" is an optional index used in the list of current calls indicated by AT+CLCC. The AT^SHUP command will terminate the call identified by the given call number. The default call number "0" is not assigned to any call, but signifies "all calls". As "0" is the default value, it may be omitted.

[0]	Terminate all known calls.
1...7	Terminate the specific call number `<cn>`.

7.12   ATS0 Set number of rings before automatically answering a call

Syntax

Test Command
ATS0?

Response(s)
<n>
OK
ERROR

Write Command
ATS0=<n>

Response(s)
OK
ERROR

Parameter Description

`<n>`(num)(&W)(&V)

000(&F)   Automatic answer mode is disabled.

001-255   Enable automatic answering after specified number of rings.

Notes

- This command works for MT data and fax calls.
- Auto answering of CSD data and fax calls is supported.
- A CSD call will not be automatically answered when the module is in GPRS online mode, but it is possible in GPRS command mode. The application can detect a call by evaluating the RING line and determine whether to change into GPRS command mode or stay in GPRS online mode until GPRS is available again. To answer, to reject or to wait for automatically answering the incoming call the application has to switch into GPRS command mode.
- If <n> is set to higher values, the calling party may hang up before the call is automatically answered.
- The correlation between ATS7 and ATS0 is important.
  Example: Call setup may fail if ATS7=30 and ATS0=20.
- Setting is local to the interface. It is allowed to have different settings on different interfaces. In such cases the interface 'wins', which is idle and uses the smallest <n> value.
- The ATS0 write command is PIN protected.
- According to "3GPP TS 27.007 (GSM 07.07): AT command set for User Equipment (UE)", ATS0 is also used as GPRS compatibility command to answer automatically to a network request for PDP context activation (see Section 11.21). Therefore, when the ATS0 write command is issued with <n> greater than 0, the ME will attempt to perform a GPRS attach if not yet attached and if configured to do so (due to the setting AT^SCFG="GPRS/ATS0/withAttach","on").
  If the automatic GPRS attach fails the ME keeps trying to attach for approx. 5 minutes, before ATS0 ends up with "ERROR" or "+CME ERROR: unknown", though the new <n> value takes effect. To avoid the risk of long response times to ATS0 in such case take care that the parameter AT^SCFG=<gs0aa> is off, if auto answer mode is not needed for GPRS or if the mobile works in non-GPRS networks.
  The GPRS attach will not be performed on recalling a stored user profile with ATZ or on power up, even though a value <n> greater than 0 was stored in the user profile with AT&W.

7.13   ATS6 Set pause before blind dialing

ATS6 is implemented for compatibility reasons only, and has no effect.

Syntax

Test Command
ATS6?
Response(s)
<n>
OK
Write Command
ATS6=<n>
Response(s)
OK
ERROR

Parameter Description

<n>(num)(&W)(&V)

7.14   ATS7 Set number of seconds to wait for connection completion

ATS7 specifies the number of seconds the ME will wait for the completion of the call setup when answering or originating a data call. Also referred to as "no answer timeout". To put it plainly, this is the time to wait for the carrier signal. If no carrier signal is received within the specified time, the ME hangs up.

Syntax

Test Command
ATS7?
Response(s)
<n>
OK
Write Command
ATS7=<n>
Response(s)
OK
ERROR

Parameter Description

<n>(num)(&W)(&V)

Number of seconds to wait for connection completion

000...060(&F)

Notes

- Command ATS7 is only applicable to data calls.
- Values greater than 60 cause no error, but <n> will be restored to the maximum value of 60.
- The correlation between ATS7 and ATS0 is important. If the called party has specified a high value for ATS0=<n> call setup may fail.
  Example: Call setup may fail if ATS7=30 and ATS0=20.

7.15   ATS8 Comma Dial Pause Time

ATS8 is implemented for compatibility reasons only, and has no effect.

Syntax

Test Command
ATS8?
Response(s)
<n>
OK
Write Command
ATS8=<n>
Response(s)
OK

Parameter Description

<n>(num)(&W)(&V)

7.16   ATS10 Set disconnect delay after indicating the absence of data carrier

ATS10 determines the amount of time, that the ME remains connected in absence of a data carrier. If the data carrier is detected before disconnect, the ME remains connected.

Syntax

Test Command
ATS10?
Response(s)
<n>
OK
Write Command
ATS10=<n>
Response(s)
OK
ERROR

Parameter Description

<n>(num)(&W)(&V)

Number of seconds to wait for connection completion

001...2$^{(\&F)}$...254   Number of tenths of seconds to wait before disconnecting after ME has indicated the absence of received line signal

7.17   ATO Switch from command mode to data mode / PPP online mode

Syntax

Exec Command
ATO[<n>]
Response(s)
If connection is not successfully resumed:
NO CARRIER
or
TA returns to data mode from command mode
CONNECT <text>
Note: <text> output only if ATX parameter setting with value > 0.

Command Description

ATO is the corresponding command to the +++ escape sequence: When you have established a CSD call or a GPRS connection and TA is in command mode, ATO causes the TA to resume the data or GPRS connection and takes you back to data mode or PPP online mode.

Parameter Description

<n>(num)

[0]   Switch from command mode to data mode

7.18   +++ Escape from Data Mode to AT Command Mode

+++ esacape sequence is only available during a CSD call or a GPRS connection. The +++ character sequence causes the G2111/G2151I series to pause data mode and return to AT command mode. This allows to enter AT commands while maintaining the data connection to the remote device or, accordingly, the GPRS connection. By the way the same task can be performed by toggling the DTR line if AT&D is set to 1. ATO is used to resume data or PPP online mode.

To prevent the +++ character sequence from being misinterpreted as data, it must be preceded and followed by a pause of at least 1000 ms. The +++ characters must be entered in quick succession, all within 1000 ms.

Syntax

Exec Command
+++
Response(s)
OK

Note

• When using XON/XOFF flow control (AT\Q1) in online mode, +++ should not be used while the data transmission is paused with XOFF. Before entering the command mode with +++ the paused transmission should be resumed using the XON character.

7.19   AT+CBST Select Bearer Service Type

AT+CBST write command selects the bearer service <name>, the data rate <speed> and the connection element <ce> to be used when data calls are originated. The settings also apply to mobile terminated data calls, especially when single numbering scheme calls or calls from analog devices are received (see AT+CSNS). See GSM 02.02[1] for a list of allowed combinations of sub parameters.

Syntax

Test Command
AT+CBST=?
Response(s)
+CBST: (list of supported<speed>s), (list of supported<name>s), (list of supported<ce>s)
OK
Read Command
AT+CBST?
Response(s)
+CBST: <speed>, <name>, <ce>
OK
Write Command
AT+CBST=<speed>[, <name>[, <ce>]]
Response(s)
OK
ERROR

Parameter Description

<speed>(num)(&W)(&V)	
0	Automatic Speed Selection
4	2400 bps (V.22bis)
6	4800 bps (V.32)
7(&F)	9600 bps (V.32)
68	2400 bps (V.110)
70	4800 bps (V.110)
71	9600 bps (V.110)

<name>(num)I(&W)	
0(&F)	Asynchronous Modem

<ce>(num)(&W)	

Transparent mode is not supported.

1(&F)	Non-transparent

7.20 AT+CRLP Configure RLP Parameters for Outgoing Non-Trans- parent Data Calls

The AT+CRLP write command sets radio link protocol (RLP) parameters used when non-transparent data calls are originated. The read command returns the current settings for the supported RLP version 0.

Syntax

Test Command
AT+CRLP=?
Response(s)
+CRLP: (list of supported<iws>s), (list of supported<mws>s), (list of supported<T1>s), (list of supported<N2>s)
OK
Read Command
AT+CRLP?
Response(s)
+CRLP: <iws>, <mws>, <T1>, <N2>
OK
Write Command
AT+CRLP=[<iws>[, <mws>[, <T1>[, <N2>]]]]
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<iws>(num)(&W)(&V)

Interworking window size (IWF to MS)

0...61(&F)

<mws>(num)(&W)(&V)

Mobile window size (MS to IWF)

0...61(&F)

<T1>(num)(&W)(&V)

Acknowledgement timer (T1 in 10 ms units)

48...[78](&F)...255

<N2>(num)(&W)(&V)

Re-transmission attempts N2

1...6(&F)...255

7.21   AT+CLCC List of current calls

The execute command lists all current calls. If the command is successful, but no calls are available, no information response is sent to TE.

Syntax

Test Command
AT+CLCC=?
Response(s)
OK
Exec Command
AT+CLCC
Response(s)
[+CLCC: <idx>, <dir>, <stat>, <mode>, <mpty>[, <number>, <type>[, <alpha>]]] [+CLCC: <idx>, <dir>, <stat>, <mode>, <mpty>[, <number>, <type>[, <alpha>]]] [+CLCC: ...]
OK
ERROR
+CME ERROR: <err>

Parameter Description

<idx>(num)

Call identification number as described in GSM02.30 subclause 4.5.5.1; this number can be used in AT+CHLD command operations

<dir>(num)

0	Mobile originated call (MOC)
1	Mobile terminated call (MTC)

`<stat>`(num)

State of the call

0	Active
1	Held
2	Dialing (MOC)
3	Alerting (MOC)
4	Incoming (MTC)
5	Waiting (MTC)

`<mode>`(num)

Bearer/teleservice

0	Voice
1	Data
2	Fax
3	Voice followed by data, voice mode (only in connection with single numbering scheme AT+CSNS)
4	Alternating voice/data, voice mode (only in connection with single numbering scheme AT+CSNS)
5	Alternating voice/fax, voice mode (only in connection with single numbering scheme AT+CSNS)
6	Voice followed by data, data mode (only in connection with single numbering scheme AT+CSNS)
7	Alternating voice/data, data mode (only in connection with single numbering scheme AT+CSNS)
8	Alternating voice/fax, fax mode (only in connection with single numbering scheme AT+CSNS)
9	Unknown

`<mpty>`(num)

0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

`<number>`(str)

Phone number in format specified by `<type>`

`<type>`(num)

Type of address octect

145	Dialing string `<number>` includes international access code character '+'
128	Number is restricted
129	Otherwise

`<alpha>`(str)(+CSCS)

Alphanumeric representation of `<number>` corresponding to the entry found in phonebook (see for example `AT+CPBW`, parameter `<text>`).

Due to time constraints on the necessary evaluation of the phonebook, this parameter may show a default value in early call phases (e.g. for `<stat>`= "dialing", "incoming" or "alerting"), even if a phonebook entry is present for the number concerned.

Note
- Teleservices other than voice, data, fax are not fully supported by ME. They are used only in connection with the handling for AT+CSNS, and may therefore occur in parameter <mode> for mobile terminated calls.

7.22   AT^SLCC Extended list of current calls

`AT^SLCC` covers essentially the same information as GSM 07.07 command `AT+CLCC`, with the following extensions:

- The execute command response contains the additional parameter <traffic channel assigned> which indicates whether the call has been assigned a traffic channel by the network and transmission of DTMF tones, data or inband information is possible.

- The additional write command allows to activate event reporting for the list of current calls. If event reporting is active for an interface, a call status transition (cf. Call Status Information) and (if desired) the assignment of a traffic channel will generate an event report indication to this interface. In order to receive this event report as an URC, the URC presentation mode for this interface has to be configured with AT+CMER. Interface settings are saved with AT&W and can be displayed with AT&V.
The frequency of event report generation can be configured with AT command `AT^SCFG`. Refer to Call Status Information for further detail on the configuration options.

- The additional read command returns an indication whether event reporting is active for the current interface.
Mind that the URC will be displayed only if the URC presentation mode for the interface concerned has been configured with `AT+CMER`.

- The exec command returns, like AT+CLCC, a list of current calls. If the command is successful, but no calls are available, no information response is sent to the TE.

Syntax

Test Command
AT^SLCC=?
Response(s)
^SLCC: (list of supported`<n>`s)
OK
Read Command
AT^SLCC?
Response(s)
^SLCC: <n>
OK
Exec Command
AT^SLCC
Response(s)
[^SLCC:<idx>, <dir>, <stat>, <mode>, <mpty>, <traffic channel assigned>[, <number>, <type>[, <alpha>]]]
[^SLCC:<idx>, <dir>, <stat>, <mode>, <mpty>, <traffic channel assigned>[, <number>, <type>[, <alpha>]]]
[^SLCC:...]
OK
ERROR

+CME ERROR: <err>
Write Command
AT^SLCC=[<n>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Code

Unsolicited Call Status information if the list of current calls is empty:
`^SLCC:`

if one or more calls are currently in the list:
`^SLCC: <idx>, <dir>, <stat>, <mode>, <mpty>, <traffic channel assigned>[,<number>, <type>[, <alpha>]]`
`[^SLCC: <idx>, <dir>, <stat>, <mode>, <mpty>, <traffic channel assigned>[,<number>, <type>[, <alpha>]]]`
`[...]`
`^SLCC:`

URC "`^SLCC`" displays the list of current calls as displayed with the execute command AT^SLCC. The list is displayed in the state it has at the time of display, not in the state it had when the signal was generated.

The URC's occurrence indicates call status changes for any of the calls in the list of current calls.

Please refer to `Call Status Information` and `AT^SCFG` for further information about the configuration of this URC.

Event reporting can be enabled separately for each interface. Interface settings are saved with `AT&W` and can be displayed with `AT&V`. Additionally, The URC presentation mode for the interface must be configured with `AT+CMER`.

Depending on the value of `AT^SCFG` setting `<sucs>`, Indicator "`^SLCC`" will be issued (if configured with write command `AT^SLCC` and `AT+CMER`)

- when a state transition ends in state "active" or in state "unknown" (if AT^SCFG setting <sucs>="restricted")

- when any state transition (including transitions beginning or ending in state "unknown") occurs in the list of active calls, or when a traffic channel is established (if AT^SCFG setting <sucs>="verbose").

If multiple displays of identical list configurations occur, this happens because of short intermediate states of the list, that have already been overridden by new transitions and states. Thus, it is guaranteed that the configuration displayed is always the current configuration at the time of the last display.

The list of active calls displayed with this URC will always be terminated with an empty line preceded by prefix "^SLCC: ", in order to indicate the end of the list.

Parameter Description

<n>(num)(&W)(&V)

| [0](&F) | Presentation of URC "`^SLCC`" disabled |
| 1 | Presentation of URC "`^SLCC`" enabled |

<idx>(num)

Call identification number as described in GSM02.30 subclause 4.5.5.1; this number can be used in `AT+CHLD` command operations.

`<dir>`(num)

0	Mobile originated call (MOC)
1	Mobile terminated call (MTC)

`<stat>`(num)

State of the call

0	Active
1	Held
2	Dialing (MOC)
3	Alerting (MOC)
4	Incoming (MTC)
5	Waiting (MTC)
6	Terminating: The call is not active anymore, but inband information is still available.
7	Dropped: The call has been suspended by the network, but may be resumed later.

`<mode>`(num)

Bearer/teleservice

0	Voice
1	Data
2	Fax
3	Voice followed by data, voice mode (only in connection with single numbering scheme `AT+CSNS`)
4	Alternating voice/data, voice mode (only in connection with single numbering scheme `AT+CSNS`)
5	Alternating voice/fax, voice mode (only in connection with single numbering scheme `AT+CSNS`)
6	Voice followed by data, data mode (only in connection with single numbering scheme `AT+CSNS`)
7	Alternating voice/data, data mode (only in connection with single numbering scheme `AT+CSNS`)
8	Alternating voice/fax, fax mode (only in connection with single numbering scheme `AT+CSNS`)
9	Unknown

`<mpty>`(num)

0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

`<traffic channel assigned>`(num)

0	No traffic channel assigned. Transmission of DTMF tones not possible.
1	Traffic channel is assigned and the progress indicator IE has been received (call setup) or a voice connection has an active state. The parameter indicates that the audio path is activated. DTMF tones can be sent with `AT+VTS`.

`<number>`(str)

Phone number in format specified by `<type>`

`<type>`(num)

Type of address octect

145	Dialing string `<number>` includes international access code character '+'
128	Number is restricted
129	Otherwise

`<alpha>`(str)(+CSCS)

Alphanumeric representation of `<number>` corresponding to the entry found in phonebook (see for example AT+CPBW, parameter `<text>`).

Due to time constraints on the necessary evaluation of the phonebook, this parameter may show a default value during early call phases (e.g. for `<stat>`= "dialing", "incoming" or "alerting"), even if a phonebook entry is present for the number concerned.

Notes

- Teleservices other than voice, data, fax are not fully supported by ME. They are used only in connection with the handling for AT+CSNS, and may therefore occur in parameter <mode> for mobile terminated calls.
- If a URC "^SLCC" in verbose mode (see AT^SCFG) has been buffered while the interface was in dedicated mode (depending on the settings of AT+CMER parameter <bfr>), each buffered event indicator will be output as a separate URC after the interface returns to idle mode.
- However, the output will deliver the list of current calls in the "current" state (at the time when the output is generated), possibly leading to multiple displays of identical list configurations.
- Some parameters of the AT+CHLD command, as well as some situations where the call status in the network changes very quickly (e.g. the transition between <stat>= "unknown", "dialing" and "alerting" for a call to a reachable subscriber within the registered network) may lead to quasi-simultaneous changes to the states of one or several calls in the list, possibly leading to multiple displays of identical list configurations.
- If multiple displays of identical list configurations occur, this happens because of intermediate states of the list, that have already been overridden by new transitions and states. Thus, it is guaranteed that the configu- ration displayed in such cases is the current configuration at the time of the last display.
- It is advise able to receive URC "^SLCC" on an interface that is not used for call initiation, if verbose output is configured. If only voice calls are expected, a setting of AT^SM20= 0 may be used alternatively in order to keep the call from blocking the interface.

Examples

EXAMPLE 1

```
^SYSSTART
at+cpin=9999
OK
+CREG: 2
+CREG: 1,"0145","0016"          We are now registered.
at^sm20=0                       Command ATD for an outgoing voice call will terminate immediately
                                with response "OK".
OK
atd"1234567";                   We start a voice call.
OK                              "OK" response is issued immediately because of set- ting
^SLCC: 1,0,2,0,0,0,"1234567",   AT^SM20="0".
129,"Called Party"              MO voice call starts, paging B-party.
```

^SLCC:	End of current list
^SLCC: 1,0,2,0,0,1,"1234567", 129,"Called Party"	Traffic channel established, network may now transmit network announcements,ME may now transmit DTMF tones.
^SLCC:	End of current list
^SLCC: 1,0,3,0,0,1,"1234567", 129,"Called Party"	Call is now ringing at B-Party.
^SLCC:	End of current list
^SLCC: 1,0,0,0,0,1,"1234567", 129,"Called Party"	B-Party has accepted the call, connection established.
^SLCC:	End of current list.
atd23456;	We start a second voice call.
OK	"OK" response is issued immediately because another call is already active (cf. ATD).
^SLCC: 1,0,1,0,0,0,"1234567", 129,"Called Party"	The active call is automatically put on hold, triggering the display of the list.
^SLCC: 2,0,2,0,0,1,"23456",129	The second call has already started before the indication for the held call could be displayed
^SLCC:	End of current list.
^SLCC: 1,0,1,0,0,0,"1234567", 129,"Called Party"	The identical list is displayed again, triggered by the start of the second voice call.
^SLCC: 2,0,2,0,0,1,"23456",129	The status of the second list entry has already been displayed with the previous URC.
^SLCC:	End of current list.
^SLCC: 1,0,1,0,0,0,"1234567", 129,"Called Party"	The held call doesn't change status right now.
^SLCC: 2,0,3,0,0,1,"23456",129	The second call is now alerting the B-Party.
^SLCC:	End of current list.
^SLCC: 1,0,0,0,0,1,"1234567", 129,"Called Party"	The held call doesn't change status right now.
^SLCC:	End of current list: the B-Party of the second call has not accepted the call in time, the second call has ended.
NO CARRIER	The second call has ended.
^SLCC:	list is now empty: B-Party has ended the first call.
NO CARRIER	The first call has ended.

7.23   AT+CR Service reporting control

AT+CR configures the TA whether or not to transmit an intermediate result code +CR: <serv> to the TE when a call is being set up.

Setting the value of <mode> to 1 may lead to connection failure, if the application (e.g. WinFax) waits for default result code/URC.

Syntax

Test Command
AT+CR=?
Response(s)
+CR: (list of supported<mode>s)
OK
ERROR
Read Command
AT+CR?
Response(s)
+CR: <mode>
OK

ERROR
Write Command
AT+CR=<mode>
Response(s)
OK
ERROR

Intermediate Result Code

If enabled, an intermediate result code is transmitted during connect negotiation when the TA has determined the speed and quality of service to be used, before any error control or data compression reports are transmitted, and before any final result code (e.g. CONNECT) appears.

```
+CR: <serv>
```

Parameter Description

<mode>(num)(&W)(&V)	
0(&F)	Disable
1	Enable

<serv>(str)	

<serv>(str)	
"REL ASYNC"	Asynchronous non-transparent
"GPRS"	GPRS

7.24 AT+CRC Incoming Call Indication Format

AT+CRC controls the format of the incoming call indication.

Syntax

Test Command
AT+CRC=?
Response(s)
+CRC: (list of supported<mode>s)
OK
ERROR
Read Command
AT+CRC?
Response(s)
+CRC: <mode>
OK
ERROR
Write Command
AT+CRC=[<mode>]
Response(s)
OK
ERROR

Unsolicited Result Codes

URC 1

    RING

    Incoming call indication if `<mode>`=0.

URC 2

    +CRING: <type>

    Incoming call indication if `<mode>`=1.

Parameter Description

`<mode>`(num)(&W)(&V)	
[0](&F)	Disable extended format.
1	Enable extended format. Using this mode may lead to connection failures, if the Customer Application(e.g. running WinFax) expects default formatted URCs.

`<type>`(str)	
"REL ASYNC"	Asynchronous non-transparent
"FAX"	Facsimile
"VOICE"	Voice
"GPRS"	`<PDP_type>`, `<PDP_addr>` [,[<L2P>][,`<APN>`]] GPRS network request forPDP context activation

7.25 AT+CSNS Single Numbering Scheme

The `AT+CSNS` command enables the ME to accept incoming calls when no bearer capability information is provided with the call, e.g. single numbering scheme calls or calls originating from analog devices.

Syntax

Test Command
AT+CSNS=?
Response(s)
+CSNS: (list of supported<mode>s) OK
Read Command
AT+CSNS?
Response(s)
+CSNS: <mode> OK
Write Command
AT+CSNS=[<mode>]
Response(s)
OK ERROR +CME ERROR: <err>

Parameter Description

<code><mode></code>^(num)

<code><mode></code>^(num)	7-27

[0]^(D)	Voice: Each call received without bearer element is assumed to be speech
2	Fax: Each call received without bearer element is assumed to be an incoming fax.
4	Data: Each call received without bearer element is assumed to be a data call. Please take into account that the bearer service parameters set with AT+CBST apply to all data calls including those received without bearer capability.

Notes

- The command must be set before the call comes. By default, when you do not modify the settings, all calls received without bearer element are assumed to be voice.
- The setting will be saved when you power down the ME with AT^SMSO, provided that PIN authentication has been done. The saved value will be restored when the same SIM card is inserted and PIN authentication done again. If no SIM card or a different SIM card is inserted the default value 0 takes effect.

7.26   AT^SCNI List Call Number Information

Syntax

Test Command
AT^SCNI=?
Response(s)
OK
Exec Command
AT^SCNI
Response(s)
^SCNI: <id>1[,<cs>[,<number>,<type>]]
^SCNI: <id>2[,<cs>[,<number>,<type>]]
[...]
OK
ERROR
+CME ERROR: <err>

Command Description

TA returns a list of current calls of ME.

Parameter Description

<code><id></code>^(num)

call identification number as described in GSM 02.30 subclause 4.5.5.1; this number can be used in AT+CHLD command operations

1...7

<code><cs></code>^(num)

Call status of respective call number (first parameter)

0	call hold
1	call in progress
2	waiting cal

`<number>`(str)

string type phone number in format specified by `<type>`

`<type>`(num)

type of address octet in integer format; 145 when dialing string includes international access code character "+", 128 when number is restricted otherwise 129

Note
• See also GSM 07.07: AT+CLCC

7.27 AT^SLCD Display Last Call Duration

Syntax

Test Command
AT^SLCD=?
Response(s)
OK
ERROR
+CME ERROR: <err>
Exec Command
AT^SLCD
Response(s)
^SLCD: <time> OK
ERROR
+CME ERROR: <err>

Command Description
TA returns last call duration or current call duration.

Parameter Description

`<time>`(str)

Format is "hh:mm:ss", where characters indicate hours, minutes, seconds; E.g. 22:10:00 "22:10:00"
Max value is 9999:59:59

Note
• The proper working of that command is network dependant.

7.28 AT^STCD Display Total Call Duration

Syntax

Test Command
AT^STCD=?

Response(s)
OK
ERROR
+CME ERROR: <err>
Exec Command
AT^STCD
Response(s)
^STCD: <time>
OK
ERROR
+CME ERROR: <err>

Command Description

TA returns total call duration (accumulated duration of all calls).

Parameter Description

<time>(str)

Format is "hh:mm:ss", where characters indicate hours, minutes, seconds; E.g. 22:10:00 "22:10:00"
Max value is 9999:59:59

Notes

- The Total Call Duration will not be reset by power off or other means.
- The proper working of that command is network dependant and only for MO calls.

7.29   ATP Select pulse dialing

Syntax

Exec Command
ATP
Response(s)
OK

Note

- No effect for GSM.

7.30   ATT Select tone dialing

Syntax

Exec Command
ATT
Response(s)
OK

Note

- No effect for GSM.

7.31   ATS2 Set escape sequence character

The `ATS2`=43 is implemented for V.250ter compatibility reasons only, and has no effect.

Syntax

Test Command
ATS2?
Response(s)
<n>
OK
Write Command
ATS2=<n>
Response(s)
OK
ERROR

Parameter Description

<n>^(num)

43   The data value

8

Network Service Commands

The AT Commands described in this chapter are related to various network services.

The following topics are covered in this chapter:

8.1 AT+COPN Read operator names

The `AT+COPN` command returns the list of operator names from the ME. Each operator code `<numericn>` that has an alphanumeric equivalent `<alphan>` in the ME memory is returned. See also: `AT^SPLM`.

Syntax

Test Command
AT+COPN=?
Response(s)
OK
ERROR
+CME ERROR: <err>
Exec Command
AT+COPN
Response(s)
+COPN: <numericn>, <alphan>
[+COPN: ...]
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<numericn>`^(str)

Operator in numeric format; GSM location area identification number.

`<alphan>`^(str)

Operator in long alphanumeric format; can contain up to 16 characters.

8.2 AT+COPS Operator Selection

`AT+COPS` queries the present status of the G2111/G2151I series' network registration and allows to determine whether automatic or manual network selection shall be used. Additional service is available with `AT^SOPS`.

Three operator selection modes are available:
* Automatic
  G2111/G2151I series searches for the home operator automatically. If successful the G2111/G2151I series registers to the home net- work. If the home network is not found, G2111/G2151I series goes on searching. If a permitted operator is found, G2111/G2151I series registers to this operator.
  If no operator is found the G2111/G2151I series remains unregistered.
* Manual
  Desired operator can be determined using the `AT+COPS` write command. If the operator is found, G2111/G2151I series registers to it immediately. If the selected operator is forbidden, the G2111/G2151I series remains unregistered.
* Manual/automatic
  The ME first tries to find the operator determined via AT+COPS write command. If the ME fails to register to this operator, then it starts to select another (permitted) operator automatically.

The `AT+COPS` test command conists of several parameter sets, each representing an operator present in the network.

Each set contains the following information:
* an integer indicating the availability of the operator,

- long alphanumeric format of the operator's name and

- numeric format representation of the operator.

Any of the parameters may be unavailable and will then be an empty field (,,). The list of operators comes in the following order: Home network, networks referenced in SIM and other networks.

The operator list is followed by a list of the supported <mode>s and <format>s. These lists are delimited from the operator list by two commas.

If the test command is used during an ongoing GPRS transfer, traffic will be interrupted for up to one minute.

The AT+COPS read command returns the current <mode> and the currently selected operator. If no operator is selected, <format> and <opName> are omitted.

The AT+COPS write command forces an attempt to select and register to the GSM network operator (see note below). If the selected operator is not available, no other operator will be selected (except <mode>=4). The selected operator name <format> will apply to further read commands, too.

Command settings are effective over all serial interfaces of the G2111/G2151I series.

Syntax

Test Command
AT+COPS=?
Response(s)
+COPS: [list of present operators (<opStatus>, long alphanumeric <opName>s,,numeric <opName>s], , (list of supported <mode>s), (list of supported <format>s)   OK   ERROR   +CME ERROR: <err>
Read Command
AT+COPS?
Response(s)
+COPS:<mode>[, <format>[, <opName>]]   OK   ERROR   +CME ERROR: <err>

Parameter Description

<opStatus>(num)

Operator Status

0	Unknown
1	Operator available
2	Current operator
3	Operator forbidden

<opName>(str)(&V)

Operator Name

If test command: Operator name in long alphanumeric format and numeric format.
If read command: Operator name as per <format>.
If write command: Operator name in numeric format.

<mode>(num)(&V)

Parameter values 0 and 1 are stored non-volatile in the G2111/G2151I series.

0^(D)   Automatic mode; `<opName>` field is ignored.

1   Manual operator selection
                           Write command requires `<opName>` in numeric format, i.e. `<format>` shall be 2.
                           Read command returns the current `<mode>` and the currently selected `<opName>`. If no
                           operator is selected, `<format>` and `<opName>` are omitted.

2   Manually deregister from network and remain unregistered until `<mode>`=0 or 1 or 4 is
                           selected.

3   Set only `<format>` (for `AT+COPS` read command).

4   Automatic/manual selection; if manual selection fails, automatic mode (`<mode>`=0) is
                           entered (`<opName>` field will be present).

`<format>`^{(num)(&W)(&V)}

0^(&F)   Long alphanumeric format of `<opName>`. Can be up to 16 characters long.

2   Numeric format of `<opName>`. This is the GSM Location Area Identification (LAI)
                           number, which consists of the 3-digit Mobile Country Code (MCC) plus the 2- or 3-digit
                           Mobile Network Code (MNC).

Note

- It is not recommended to use the AT+COPS command before passing the CHV (card holder verification) I
  SIM PIN1 verification. This is because after PIN1 verification the ME will automatically try to register to the
  network as though AT+COPS were 0, regardless of the settings done before with or without SIM, such as
  AT+COPS=2 which remains unchanged. Also, the test command should only be used after PIN1
  authentication.

8.3 AT^SOPS Extended Operator Selection

`AT^SOPS` queries the present status of the G2111/G2151I series' network registration. Since basic operator
selection services are available with `AT+COPS` this command uses the methods of the Enhanced Operator
Name String (EONS) specification while handling operator name strings. Additional EONS related information
is available with `AT^SIND`.

`AT^SOPS` test command lists sets of five parameters, each representing an operator present in the network.

A set consists of
1. an integer indicating the availability of the operator,
2. specification of the source of the operator name <eonsOperator>,
3. operator name according to EONS Table,
4. Service Provider Name from the SIM Service Table and
5. numeric format representation of the operator.

Any of the parameters may be unavailable and will then be an empty field (,,).

The list of operators comes in the following order: Home network, networks referenced in SIM and other
networks.

If the test command is used during an ongoing GPRS transfer, traffic will be interrupted for up to a minute.

Syntax

Test Command
AT^SOPS=?
Response(s)
^SOPS:[list of present operator(<opStatus>, <eonsType>, <eonsOperator>, <servProvider>, <opName>)s], , (), ()

```
OK
ERROR
+CME ERROR: <err>
```

Parameter Description

`<opStatus>`(num)

Status

0	unknown
1	operator available
2	current operator
3	operator forbidden

`<eonsType>`(num)

Specification of the source of the operator name `<eonsOperator>`. Details of EONS-supplied operator name types are available at `AT^SIND`.

`<eonsOperator>`(+CSCS)

Operator name; format depends on the source of the operator name, specified by `<eonsType>`. Can be up to 24 characters long.

`<servProvider>`(str)(+CSCS)

Service Provider Name according to setting of Service No. 17 in the SIM Service Table (EF$_{SST}$). Can be up to 16 characters long.

`<opName>`

Operator

Operator name in numerical presentation contains the GSM Location Area Identification (LAI) number, which consists of the 3-digit Mobile Country Code (MCC) plus the 2- or 3-digit Mobile Network Code (MNC). Parameter is stored non-volatile to the SIM.

Note

• The AT^SOPS Test command is only accepted by the module after a valid pin has been entered.

8.4 AT+CREG Network registration

The `AT+CREG` command serves to verify the network registration status of the ME. For this purpose two types of URCs are available.

The `AT+CREG` read command returns the URC presentation mode `<n>` and an integer `<stat>` that shows the registration status of the ME. The location information elements `<lac>` and `<ci>` are returned only when `<n>`=2 and ME is registered to the network.

Syntax

```
Test Command
AT+CREG=?
```

Response(s)
+CREG: (list of supported\<n\>s)
OK
Read Command
AT+CREG?
Response(s)
+CREG: \<n\>, \<stat\>[, \<lac\>, \<ci\>]
OK
ERROR
+CME ERROR: \<err\>
Write Command
AT+CREG=[\<n\>]
Response(s)
OK
ERROR
+CME ERROR: \<err\>

Unsolicited Result Codes

URC 1

> If \<n\>=1 and there is a change in the ME network registration status:

> +CREG: \<stat\>

URC 2

> If \<n\>=2 and there is a change in the ME network registration status or a change of the network cell:

> +CREG: \<stat\>[, \<lac\>, \<ci\>]

Parameter Description

\<n\>(num)(&W)(&V)

[0](&F)	Disable +CREG URC
1	Enable URC +CREG:\<stat\> to report status of network registration
2	Enable URC +CREG:\<stat\>[,\<lac\>,\<ci\>] to report status of network registration including location information. The optional parameters \<lac\> and \<ci\> will not be updated during calls.

\<stat\>(num)(&V)

0	Not registered, ME is currently not searching for new operator
	There is a technical problem. User intervention is required. Yet, emergency calls can be made if any network is available. Probable causes:
	• no SIM card available
	• no PIN entered
	• no valid Home PLMN entry found on the SIM
1	Registered to home network
2	Not registered, but ME is currently searching for a new operator
	The ME searches for an available network. Failure to log in until after more than a minute may be due to one of the following reasons:
	• No network available or insufficient Rx level.
	• The ME has no access rights to the networks available.
	• Networks from the SIM list of allowed networks are around, but login fails due to one of the following reasons:

> ➤ #11 ... PLMN not allowed

> ➤ #12 ... Location area not allowed

> ➤ #13 ... Roaming not allowed in this location area

After this, the search will be resumed (if automatic network search is enabled).
- The Home PLMN or an allowed PLMN is available, but login is rejected by the cell (reasons: Access Class or LAC).

If at least one network is available, emergency calls can be made.

3   Registration denied
- If automatic network search is enabled:
  Authentication or registration fails after Location Update Reject due to one of the following reasons:

  > ➤ #2 ... IMSI unknown at HLR

  > ➤ #3 ... Illegal MS

  > ➤ #6 ... Illegal ME

  Either the SIM or the MS or the ME are unable to log into any network. User intervention is required. Emergency calls can be made, if any network is available.
- Only if manual network search is enabled:
  Manual registration fails after Location Update Reject due to the following reasons:

  > ➤ #2 ... IMSI unknown at HLR

  > ➤ #3 ... Illegal MS

  > ➤ #6 ... Illegal ME

  > ➤ #11 ... PLMN not allowed

  > ➤ #12 ... Location area not allowed

  > ➤ #13 ... Roaming not allowed in this location area

  No further attempt is made to search or log into a network. Emergency calls can be made if any network is available.

4   Unknown (not used)
5   Registered, roaming
           The ME is registered at a foreign network (national or international network)

`<lac>`(str)

Two byte location area code in hexadecimal format (e.g. "00C3" equals 193 in decimal).

`<ci>`(str)

Two byte cell ID in hexadecimal format.

Example

AT+CREG=2	Activates extended URC mode.
OK	
AT+COPS=0	Forces ME to automatically search network operator.
OK	
+CREG: 2	URC reports that ME is currently searching.
+CREG: 1,"0145","291A"	URC reports that operator has been found.

8.5 AT+CSQ Signal quality

The `AT+CSQ` execute command indicates the received signal strength `<rssi>` and the channel bit error rate `<ber`>.

Syntax

Test Command
AT+CSQ=?
Response(s)
+CSQ: (list of supported`<rssi>`s), (list of supported`<ber>`s)
OK
Exec Command
AT+CSQ
Response(s)
+CSQ: `<rssi>`,`<ber>`
OK

Parameter Description

`<rssi>`(num)

0	-113 dBm or less
1	-111 dBm
2..30	-109... -53 dBm
31	-51 dBm or greater
99	not known or not detectable

`<ber>`(num)

To check the bit error rate there must be a call in progress to obtain realistic values. If no call is set up, there is no BER to be determined. In this case the indicated value may be 0 or 99, depending on the SIM card.

0..7	as RXQUAL values in the table in GSM 05.08 section 8.2.4.
99	not known or not detectable

Note

• After using network related commands such as AT+CLCK, users are advised to wait 3s before entering AT+CSQ. This is recommended to be sure that any network access required for the preceding command has finished.

8.6 AT^SMONC Cell Monitoring

The `AT^SMONC` execute command delivers cell information containing 9 values from a maximum of 7 base stations. The first base station is the serving cell.

Syntax

Test Command
AT^SMONC=?
Response(s)
OK
ERROR
+CME ERROR: `<err>`
Exec Command
AT^SMONC

Response(s)
^SMONC:<MCC>1, <MNC>1, <LAC>1, <cell>1, <BSIC>1, <chann>1, <RSSI>1, <C1>1, <C2>1, <MCC>2,
<MNC>2, <LAC>2, <cell>2, <BSIC>2, <chann>2, <RSSI>2, <C1>2, <C2>2, …
OK
ERROR
+CME ERROR: <err>

Parameter Description

<MCC>(num)

Mobile country code

3 digits, e.g. 232

| 000 | Not decoded |

<MNC>(num)

Mobile network code

2 digits or 3 digits, e.g. 07 or 003

| 000 | Not decoded |

<LAC>(num)

Location area code

4 hexadecimal digits, e.g. 4EED

| 0000 | Not decoded |

<cell>(num)

Cell identifier

4 hexadecimal digits, e.g. 4EAF

| 0000 | Not decoded |

<BSIC>(num)

Base station identity code

2 digits, e.g. 32

| 00 | Not decoded |

<chann>(num)

ARFCN (Absolute Frequency Channel Number)

| 0 | Not decoded. In this case, all remaining parameters related to the same channel are neither decoded. For example, a non-existing cell appears as follows: 000,000,0000,0000,00,0,0,-,- |

`<RSSI>`^(num)

Received signal level of the BCCH carrier (0..63). The indicated value is composed of the measured value in dBm plus an offset. This is in accordance with a formula specified in 3GPP TS 05.08

`<C1>`^(num)

Coefficient for base station reselection, e.g. 30. In dedicated mode, under certain conditions the parameter can not be updated. In such cases a '-' is presented.

`<C2>`^(num)

Coefficient for base station reselection, e.g. 30. In dedicated mode, under certain conditions the parameter can not be updated. In such cases a '-' is presented.

Note

- To some extent, the cell monitoring commands AT^MONI, AT^MONP and AT^SMONC cover the same parameters. The receiving level, for example, can be queried with all three commands. Yet the resulting values may be slightly different, even though obtained over a time period of a few seconds. This is quite normal and nothing to worry about, as the cell information is permanently updated.

8.7 AT^SMOND Cell Monitoring

The AT^SMOND execute command can be used to obtain status information of the service cell and up to six neighbor cells. The advantage over other cell monitoring commands is that AT^SMOND delivers more detailed information about the received signal strength.

Syntax

Test Command
AT^SMOND=?
Response(s)
OK
ERROR
+CME ERROR: <err>
Exec Command
AT^SMOND
Response(s)
^SMOND:[<sci>][, <nci>][, <TA>][, <rssiber>]
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<sci>`^(str)

Serving cell information (comma-separated, no cr/lf included)
`<MCC>,<MNC>,<LAC>,<cell>,<BSIC>,<chann>,<RxLev>,<RxLev>`Full`,<RxLev>`Sub`,<RxQual>,<RxQual>`Full`,<RxQual>`Sub`,<Timeslot>`

If no serving cell is found, unavailable values are omitted:" ,,,,,,`<RxLev>`,,,0,,,0"

<nci>$^{(str)}$

Neighbour cell information for neighbour cell 1 through 6 (comma-separated, no cr/lf included)

$<MCC>_1,<MNC>_1,<LAC>_1,<cell>_1,<BSIC>_1,<chann>_1,<RxLev>_1,$ (these parameters repeated for

neighbor cells 2 through 6 with no CR/LF): ...

$<MCC>_6,<MNC>_6,<LAC>_6,<cell>_6,<BSIC>_6,<chann>_6,<RxLev>_6$

An unavailable cell appears as follows: " ,,,,,,0"

<rssiber>$^{(str)}$

Values for RSSI and BER (comma-separated, no cr/lf included)

<RSSI>,<BER>

<MCC>$^{(num)}$

Mobile country code

3 digits, e.g. 232

000	Not decoded

<MNC>$^{(num)}$

Mobile network code

2 digits or 3 digits, e.g. 07 or 003

000	Not decoded

<LAC>$^{(num)}$

Location area code

4 hexadecimal digits, e.g. 4EED

0000	Not decoded

<cell>$^{(num)}$

Cell identifier

4 hexadecimal digits, e.g. 4EAF

0000	Not decoded

<BSIC>$^{(num)}$

Base station identity code

2 digits, e.g. 32

00	Not decoded

8-11

`<chann>`(num)

ARFCN (Absolute Frequency Channel Number)

`<RxLev>`(num)

Received signal level in dBm

`<RxQual>`(num)

Received signal quality as defined in GSM05.08

`<Timeslot>`(num)

Assigned timeslot. If mobile is in idle mode, timeslot 0 (BCCH timeslot) will be indicated.

0...8   Assigned timeslot

`<TA>`(num)

Timing advance for the serving cell, in bits.

`<RSSI>`(num)

Receive Level, with value 99 indicating "not known or not detectable"

0...31   Signifies the RSSI range from -113dBm or less ("0") to -51dBm or greater ("31") in steps of -2dBm (e.g. "1" = -111 dBm, "2" = -109 dBm ..., "30" = -53dBm)

`<BER>`(num)

Bit Error rate, with value 99 indicating "not known or not detectable"

0...7   as RXQUAL values RXQUAL0 to RXQUAL7 in GSM 05.08 section 8.2.4

Notes

- To some extent, the cell monitoring commands AT^SMOND, AT^MONI, AT^MONP and AT^SMONC cover the same parameters. The receiving level, for example, can be queried with all three commands. Yet the resulting values may be slightly different, even though obtained over a time period of a few seconds. This is quite normal and nothing to worry about, as the cell information is permanently updated.
- During a connection, not all of the neighbor cell information can be decoded. The following restrictions apply:
  - ➢ Information is updated only for neighbor cells that have already been visible at connection setup, and continue to be included in the list of cells.
  - ➢ New neighbor cells added to the list, for example after handover, cannot be displayed until the connection is released.

Example

```
at^smond                              Execute command
^SMOND:262,01,3008,6060,32,100,       Line breaks inserted for readability in print
66,,,0,,,0,
```

```
262,01,3008,ddd1,35,92,80
262,01,3008,,31,96,83,
262,01,3008,BFBE,35,27,86,
262,01,3008,,32,98,88,
262,01,3008,BB44,32,90,89,
262,01,3008,8307,31,22,93,
2,23,99
```

8.8 AT^MONI Monitor idle mode and dedicated mode

The AT^MONI command supplies information of the serving/dedicated cell. There are two ways to retrieve the information: once on request by using the execute command or automatically every <period> seconds by using the write command. To stop the periodic presentation type "AT" or "at".

Syntax

Test Command
AT^MONI=?
Response(s)
^MONI:(list of supported <period>s)
OK
Exec Command
AT^MONI
Response(s)
See: Section 8.8.1, AT^MONI responses
OK
Write Command
AT^MONI=<period>
Response(s)
See: Section 8.8.1, AT^MONI responses
OK
ERROR
+CME ERROR: <err>

Parameter Description

<period>(num)

Display period in seconds

1...254

Notes

- The two header lines (see Section 8.8.1, AT^MONI responses) are output after every ten data lines.
- The length of following output lines exceeds 80 characters. Therefore a terminal program may draw a carriage return on a screen. However, this is not part of the response.
- The parameters LAC and cell are presented as hexadecimal digits, the remaining parameters are composed of decimal digits.
- If the radio cell changes during a connection, the parameters PWR, RXLev and C1 of the 'Serving Cell' part cannot be updated under certain conditions.
- If the BS supports frequency hopping during a connection, the dedicated channel (parameter chann) is not stable. This mode is indicated by chann = 'h'.

- To some extent, the cell monitoring command AT^SMONC covers the same parameters. The receiving level, for example, can be queried with both commands. Yet the resulting values may be slightly different, even though obtained over a time period of a few seconds. This is quite normal and nothing to worry about, as the cell information is permanently updated.
- For compatibility with earlier products and to support legacy applications, any input character may be used to stop the output in certain cases (depending on the settings of AT+IPR.

8.8.1 AT^MONI responses

ME is not connected:

a) ME is camping on a cell and registered to the network:

```
Serving Cell                                    I Dedicated channel
chann rs dBm MCC MNC LAC cell NCC BCC PWR RXLev C1 I chann TS timAdv PWR dBm Q ChMod
1013 21 -71 001 01 1001 0103 7 7 33 -105 33        I No connection
```

b) ME is camping on a cell but not registered to the network (only emergency call allowed):

```
Serving Cell                                    I Dedicated channel
chann rs dBm MCC MNC LAC cell NCC BCC PWR RXLev C1 I chann TS timAdv PWR dBm Q ChMod
1013 21 -71 001 01 1001 0103 7 7 33 -105 33        I Limited Service
```

c) ME camping on a cell, but searching for a better cell (cell reselection):

```
Serving Cell                                    I Dedicated channel
chann rs dBm MCC MNC LAC cell NCC BCC PWR RXLev C1 I chann TS timAdv PWR dBm Q ChMod
1013 21 -71 001 01 1001 0103 7 7 33 -105 33        I Cell Reselection
```

d) ME is searching and could not (yet) find a suitable cell:

```
Serving Cell                                    I Dedicated channel
chann rs dBm MCC MNC LAC cell NCC BCC PWR RXLev C1 I chann TS timAdv PWR dBm Q ChMod
Searching
```

ME is connected (Call in progress):

```
Serving Cell                                    I Dedicated channel
chann rs dBm MCC MNC LAC cell NCC BCC PWR RXLev C1 I chann TS timAdv PWR dBm Q ChMod
1013 19 -76 001 01 1001 0103 7 7 33 -105 33        I 1015 1 0 5 -76 0 S_HR
```

Columns for Serving Cell:

Column	Description
chann	ARFCN (Absolute Frequency Channel Number) of the BCCH carrier
rs	RSSI value 0 - 63 (RSSI = Received signal strength indication)
dBm	Receiving level of the BCCH carrier in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location area code, see note
cell	Cell ID
NCC	PLMN colour code
BCC	Base station colour code
PWR	Maximal power level used on RACH channel in dBm
RXLev	Minimal receiving level (in dBm) to allow registration
C1	Coefficient for base station selection

Columns for Dedicated channel:

Column	Description
chann	ARFCN (Absolute Frequency Channel Number) of the TCH carrier
	Note: <chann> = H or H850 or H900 or H18 or H19 indicate frequency hopping.
TS	Timeslot number
timAdv	Timing advance in bits
PWR	Current power level
dBm	Receiving level of the traffic channel carrier in dBm
Q	Receiving quality (0-7)
ChMod	Channel mode (--: Signalling, S_HR: Half rate, S_FR: Full rate, S_EFR: Enhanced Full Rate, A_HR: AMR Half rate, A_FR: AMR Full rate)

8.8.2 Service states

Depending on the service state, an additional textual output is generated (refer also to the response examples):

- 'Searching' - The MS is searching, but could not (yet) find a suitable cell. This output appears after restart of the MS or after loss of coverage.

- 'No connection' - The MS is camping on a cell and registered to the network. The service state is 'idle', i.e. there is no connection established or a dedicated channel in use.

- 'Cell Reselection' - The MS has not yet lost coverage but is searching for a better cell, since the cell reselection criterion is fulfilled.

- 'Limited Service' - The MS is camping on a cell but not registered to the network. Only emergency calls are allowed. The MS enters this state, for example, when

  - no SIM card is inserted, or PIN has not been given,
  - neither Home PLMN nor any other allowed PLMN are found,
  - registration request was not answered or denied by the network (use command AT+CREG to query the registration status),
  - authentication failed.

8.9 AT^MONP Monitor neighbor cells

The AT^MONP supplies information of up to six neighbor cells. There are two ways to retrieve the information: once on request by using the execute command or automatically every <period> seconds by using the write command. To stop the periodic presentation type "AT" or "at".

Syntax

Test Command
AT^MONP=?
Response(s)
^MONP:(list of supported <period>s)
OK
Exec Command
AT^MONP
Response(s)
See: Section 8.9.1, AT^MONP responses
OK
Write Command
AT^MONP=<period>
Response(s)
See: Section 8.9.1, AT^MONP responses
OK
ERROR
+CME ERROR: <err>

Parameter Description

```
<period>(num)
```

Display period in seconds

1...254

Notes

- Due to the fact that not all necessary information of the neighbor cells can be decoded during a connection, there are several constraints to be considered:
  - Only neighbor cells that have already been visible in IDLE mode will be further updated, as long as they are still included in the list.
  - Though new neighbor cells can be added to the list (e.g. due to handover), their C1 and C2 parameters cannot be displayed until the connection is released. In this case "-" will be presented for C1 and C2.
- To some extent, the cell monitoring command AT^SMONC covers the same parameters. The receiving level, for example, can be queried with both commands. Yet the resulting values may be slightly different, even though obtained over a time period of a few seconds. This is quite normal and nothing to worry about, as the cell information is permanently updated.
- For compatibility with earlier products and to support legacy applications, any input character may be used to stop the output in certain cases (depending on the settings of AT+IPR).

8.9.1   AT^MONP responses

Response of AT^MONP (Example):

```
chann   rs    dBm   MCC   MNC   BCC   C1    C2
 653    26    -84   262   07    0     22    22
 660    20    -90   262   07    3     16    16
 687    19    -91   262   07    1     15    15
 678    14    -96   262   07    3     10    10
 671    14    -96   262   07    1     10    10
 643    10   -100   262   07    7     6     6
```

Column	Description
Chann	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier
rs	RSSI value 0 - 63 (RSSI = Received signal strength indication)
dBm	Receiving level in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
BCC	Base Station colour code
C1	cell selection criterion
C2	cell reselection criterion

8.10   AT^SMONG Packet Data Monitor

The AT^SMONG command supplies packet data specific cell information. There are two ways to retrieve the information: once on request by using the execute command or automatically every <period> seconds by using the write command. To stop the periodic presentation type "AT" or "at".

Syntax

Test Command
AT^SMONG=?

Response(s)
^SMONG:(list of supported \<table>s), (list of supported \<period>s)
OK
ERROR
+CME ERROR: \<err>
Exec Command
AT^SMONG
Response(s)
GPRS Monitor
Cell Info Table (see: Section 8.10.1, AT^SMONG Cell Info Table)
OK
ERROR
+CME ERROR: \<err>
Write Command
AT^SMONG=\<table>[, \<period>]
Response(s)
^SMONG: GPRS Monitor
Cell Info Table (see: Section 8.10.1, AT^SMONG Cell Info Table)
OK
ERROR
+CME ERROR: \<err>

Parameter Description

<table>(num)

1   Cell Info Table

<period>(num)

Display period in seconds

If \<period> is omitted the cell data will be presented only once on a single line (as if Execute command was issued).

If \<period> is given, the cell data will be listed repeatedly on 10 data lines. Every 10th data line is followed by the header, simply to repeat the column titles.

1...100

Note

- For compatibility with earlier products and to support legacy applications, often any input character will stop the periodic output of the write command. But since this applies only in certain cases (depending on the settings of AT+IPR), it is recommended to always use "at" or "AT".

8.10.1 AT^SMONG Cell Info Table

Example output for AT^SMONG:

```
GPRS Monitor
BCCH G PBCCH PAT MCC MNC NOM TA RAC # Cell #
0637 1 – 4 234 05 2 00 0B
```

Columns of the cell info table:

Column	Description
BCCH	ARFCN of BCCH carrier.
	To distinguish between identical ARFCNs in 1800MHz and 1900MHz radio bands, a "*" attached to the channel number indicates the 1900MHz band
G	GPRS status: 0 GPRS not available in currently used cell 1 GPRS available in currently used cell 2 GPRS attached
PBCCH	If PBCCH is present, indication of ARFCN, else "-" or if Frequency Hopping is used "H"
PAT	Priority Access Threshold (GSM Rec. 04.08 / 10.5.2.37b) 0 Packet access is not allowed in the cell 1 Spare, shall be interpreted as "000" (packet access not allowed) 2 Spare, shall be interpreted as "000" (packet access not allowed) 3 Packet access is allowed for priority level 1 4 Packet access is allowed for priority level 1 to 2
MCC	Mobile Country Code
MNC	Mobile Network Code
NOM	Network Operation Mode (1...3)
TA	Timing Advance Value
RAC	Routing Area Code (as hexadecimal value)

8.11   AT^SALS Alternate Line Service

The AT^SALS command is designed to support Alternate Line Service. This allows the subscriber to use two voice numbers on the same SIM card (service requires a dual line SIM card).

The write command enables or disables the presentation of <view> and specifies the <line> used for outgoing calls. The read command returns the presentation mode of <view> and the currently selected <line>.

Syntax

Test Command
AT^SALS=?
Response(s)
^SALS:(list of supported <view>s), (list of supported <line>s)
OK
Read Command
AT^SALS?
Response(s)
^SALS: <view>, <line>
OK
ERROR
Write Command
AT^SALS=<view>[, <line>]
Response(s)
OK
ERROR

Unsolicited Result Code

If switched on with <view>=1:

^SALS: <line>

Indicates the line used by an incoming call.

Parameter Description

`<view>`(num)

Controls the presentation mode of the URC "^SALS" which indicates the line number used by an incoming call:

0(&F)(P)	Disables indication of the called line
1	Enables indication of the called line

`<line>`(num)

Selects the line to be used for outgoing calls. Setting is global for the ME and non volatile.

1(&F)(D)	ALS Line 1
2	ALS Line 2

Note

- If a non ALS SIM is inserted, the <line> will be reset to line 1.

Example

AT"SALS=1,1	Line 1 has been selected for outgoing calls. ""SALS" URC is enabled.
RING	You receive a notification that you have an incoming call on line 2.
"SALS: 2	

8.12 AT^SHOM Display Homezone

The AT^SHOM returns the home zone state. The result is valid only, if network registration state `<stat>` is 1 (registered) (see AT+CREG).

The feature is available only for supported network operators (Viag, One2One, Orange and LCI) and requires a suitable SIM card. If the home zone feature is not supported by the network operator or SIM card, result is always 0.

Syntax

Test Command
AT^SHOM=?
Response(s)
OK
Exec Command
AT^SHOM
Response(s)
^SHOM: <homezonestate>
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<homezonestate>`(num)

0	ME is out of Homezone
1	ME is within the Homezone

8.13 AT^SPLM Read the PLMN list

The `AT^SPLM` execute command returns the list of operators from the ME. Each operator code `<numeric>` that has an alphanumeric equivalent `<alpha>` in the ME memory is returned. The list is sorted by operator codes. See also GSM 07.07: `AT+COPN`, `AT+COPS`

Syntax

Test Command
AT^SPLM=?
Response(s)
OK
If error is related to ME functionality:
ERROR
+CME ERROR: <err>
Exec Command
AT^SPLM
Response(s)
^SPLM: <numeric>,<alpha>
[^SPLM: ...]
OK
If error is related to ME functionality:
ERROR
+CME ERROR: <err>

Parameter Description

`<numeric>`(str)

Operator in numeric form; GSM location area identification number

`<alpha>`(str)

Operator in long alphanumeric format; can contain up to 16 characters

8.14 AT+CPOL Preferred Operator List

`AT+CPOL` read command queries the list of the preferred operators. `AT+CPOL` write command allows to edit the list of the preferred operators. If `<index>` is given but `<operator>` is left out, the entry is deleted.

Syntax

Test Command
AT+CPOL=?
Response(s)
+CPOL:(list of supported <index>s), (list of supported <format>s)
OK
ERROR
+CME ERROR: <err>
Read Command
AT+CPOL?
Response(s)
+CPOL: <index>, <format>, <operator>
+CPOL: ...
OK

ERROR
+CME ERROR: <err>
Write Command
AT+CPOL=<index>[, <format>, <operator>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<index>(num)

The order number of the operator in the SIM preferred operator list.

<format>(num)

2   Numeric format

<operator>(str)

Operator in numeric format (GSM Location Area Identification number which consists of a 3-digit country code plus a 2- or 3-digit network code).

8.15   AT^SPLR Read entry from the preferred operators list

The AT^SPLR write command returns used entries from the SIM list of preferred operators with <index> between <index1> and <index2>. If <index2> is not given, only entry at <index1> is returned. The test command returns the whole index range supported by the SIM.

See also GSM 07.07: AT+CPOL

Syntax

Test Command
AT^SPLR=?
Response(s)
^SPLR:(list of supported <index>s)
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SPLR=<index1>[, <index2>]
Response(s)
^SPLR: <index1>, <oper> [^SPLR: <index2>, <oper>] [^SPLR: ...]
OK
ERROR
+CME ERROR: <err>

Parameter Description

<index1>(num)

Location number to start reading from

<index2>(num)

Location number where to stop reading

<index>(num)

Index range supported by the SIM card (between <index1> and <index2>)

<oper>(str)

Operator in numeric form; GSM location area identification number

8.16   AT^SPLW Write an entry to the preferred operators list

The AT^SPLW write command writes an entry to the SIM list of preferred operators at location number <index>. If <index> is given but <oper> is left out, the entry is deleted. An operator can be only once in the list. Test command returns the whole index range supported by the SIM.

See also GSM 07.07: AT+CPOL

Syntax

Test Command
AT^SPLW=?
Response(s)
^SPLW:(list of supported) <index>s
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SPLW=<index>[, <oper>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<index>(num)

location number

<oper>(str)

Operator in numeric format (GSM Location Area Identification number which consists of a 3-digit country code plus a 2- or 3-digit network code).

8.17   AT^SPCL Set Preferred Cell List

AT^SPCL can be used to specify a list of cells the ME shall preferably register to. The list may contain up to 8 pairs of location area code and cell ID. The list is stored non-volatile.

If a preferred cell list is available the ME will try to register to one of the listed cells, regardless of signal strength and quality. If more than one of the listed cells is visible on the air interface, the one with the best signal strength and quality is chosen to register to. If none of the listed cells is currently visible on the air interface, the normal cell selection mechanism applies.

Preferred cell registration works only in the home PLMN.

If the list is written with less than 8 elements then all other elements remain unchanged.

Syntax

Test Command
AT^SPCL=?
Response(s)
OK
Read Command
AT^SPCL?
Response(s)
^SPCL: <status>
OK
ERROR
+CME ERROR: <err>
Write Command
To specify the list:
AT^SPCL=[<LAC>1, <cell>1[, <LAC>2, <cell>2[, <LAC>3, <cell>3[, <LAC>4, <cell>4[, <LAC>5, <cell>5[, <LAC>6, <cell>6[, <LAC>7, <cell>7[, <LAC>8, <cell>8]]]]]]]]
Response(s)
OK
ERROR
+CME ERROR: <err>
Write Command
To erase the list:
AT^SPCL=0
Response(s)
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Code

The following URC is available as long as the preferred cell registration feature is enabled, i.e., as long as a preferred cell list is configured. After erasing the list with AT^SPCL=0 the URC is no longer generated.

```
^SPCL: <status>
```

The URC indicates whether the ME has registered to one of the listed cells or has lost registration to a listed cell.

Parameter Description

<LAC>(str)

Two byte location area code in hexadecimal format (e.g. "3008" equals 12296 in decimal).

<cell>(str)

Two byte cell ID in hexadecimal format (e.g. "77D5" equals 30677 in decimal).

<status>(num)

0	Not registered to a listed preferred cell. Normal cell selection applies.
1	Registered to a listed preferred cell.

Note

- URC "^SPCL: 1" is only generated as long as the ME is registered to the home network and the current serving cell is recorded in the preferred cell list.

<cell>(str)

Two byte cell ID in hexadecimal format (e.g. "77D5" equals 30677 in decimal).

9

Internet Service Commands

The following topics are covered in this chapter:

9.0 Internet Service Commands

G2111/G2151I series has an embedded TCP/IP stack that is driven by AT commands and enables the host application to easily access the Internet. The advantage of this solution is that it eliminates the need for the application manufacturer to implement own TCP/IP and PPP stacks, thus minimizing cost and time to integrate Internet connectivity into a new or existing host application. This chapter is a reference guide to all the AT commands and responses defined for use with the TCP/IP stack.

Access is provided to the following Internet Services:

1. Socket Client and Server for TCP, Client for UDP

2. Transparent TCP Client

3. FTP Client

Two design strategies for using Internet Service AT commands - URC mode or polling mode:

The G2111/G2151I series offers two modes of controlling an Internet session opened with AT^SISO. To select the mode that best suits the preferences of your application design use the AT^SCFG command, parameter "Tcp/WithURCs" (refer to <tcpWithUrc>).

- URC mode (delivery default):
  The progress of an Internet session is URC driven. The URCs notify the host whether data can be sent or received, whether data transfer has completed, whether the service can be closed or whether an error has occurred. This mechanism eliminates the need to poll the service until the necessary progress information is received.
  To enable the URC mode select: AT^SCFG="Tcp/WithURCs",on.

- Polling mode:
  In polling mode, the presentation of URCs related to the Internet Services is disabled. The host is responsible to retrieve all the status information needed for controlling the Internet session. This is done by polling, where the host application keeps sending the commands AT^SISR, AT^SISW, AT^SISI.
  To enable the polling mode select: AT^SCFG="Tcp/WithURCs",off.
  The disabled URCs are the following: "^SISR" URC, "^SISW" URC and "^SIS" URC for parameter <urcCause>=0 (Internet service events), but not for <urcCause>=1 or 2 (needed for Socket listener and always enabled).

Step-by-step overview of how to configure and use TCP/IP communications with G2111/G2151I series:

- Select URC mode or polling mode as described above.

- First of all, create a CSD or GPRS connection profile with AT^SICS. The connection profile is a set of basic parameters which determines the type of connection to use for an Internet service. The connection type is also referred to as bearer. Up to 6 connection profiles can be defined, each identified by the <conProfileId>.

- Secondly, use AT^SISS to create a service profile based on one of the connection profiles. Up to 10 service profiles can be defined, each identified by the <srvProfileId>. The service profile specifies the type of Internet service to use, i.e. Socket, FTP. To assign a connection profile to a service profile, the <conProfileId> of AT^SICS must be entered as "conId" value of the AT^SISS parameter <srvParmTag>. This offers great flexibility to combine connection profiles and service profiles.

- Once the connection profile and the service profile are created, an Internet session can be opened by entering the AT^SISO write command and the desired <srvProfileId>.
  In URC mode, the "^SISR" or "^SISW" URC indicates whether the service is ready to receive or send data. This means, that the AT^SISR or AT^SISW command shall be entered after the URC was received. If an error occurs the "^SIS" URC is delivered instead.
  In polling mode, you can enter the AT^SISR or AT^SISW command straight after AT^SISO though you may need to do so several times until the service confirms that data can be sent or received.

- The first parameter of the AT^SISR or AT^SISW commands is always the <srvProfileId>, the second parameter is the number of bytes which the host either wants to send to or is able to receive from the module. The way the module handles the data transfer follows the rules of the ordinary socket interface and

is aware that a host may be limited by its input buffer size. The maximum data size supported by G2111/G2151I series is 1500 bytes in both directions (read or write). To send or receive more than 1500 bytes, the read or write action shall be repeated until the data transfer has completed. Each read or write action requires that the command response (of AT^SISR or AT^SISW) confirms that the service is ready to send or receive data.

To end an upload data stream set the <eodFlag> in the last AT^SISW command.

- For Transparent TCP service the AT command AT^SIST provides a specific mode for data exchange and accepts <srvProfileId> only. In that mode the service is connected to the interface in a transparent manner and exchanging data is not related to the AT^SISW and AT^SISR cycles. To resume AT command mode enter the +++ escape sequence or toggle the DTR line.

- The AT^SISI command shall be used to monitor the progress of the session. The command reports the service state of the used service profile and indicates the number of bytes received, the number of bytes sent and, in the case of sending, the number of bytes acknowledged or unacknowledged at TCP layer.

- If an error occurs during a session you can enter the AT^SISE command and the <srvProfileId> to iden- tify the reason. This is especially important in polling mode.

- The AT^SICI command can be used any time to query the current status of one or all connection profile(s).

- Finally, to end a session, enter the AT^SISC write command and the <srvProfileId>.

Maximum number of profiles defined / used:

- Up to 6 connection profiles can be created (with AT^SICS).

- Up to 10 service profiles can be created (with AT^SISS), but the number of parallel profiles of the same service type is limited as listed below. If the maximum number of a service profile type is already defined, any attempt to set up another profile for the same type will be denied with "+CME ERROR: operation of service temporary not allowed".

  ➢ Maximum 6 socket profiles: The socket service can accept an incoming connection only when at least one service profile is still free (not yet created with AT^SISS), otherwise the incoming connection will be rejected from the listener.

  ➢ 2 Transparent TCP profiles

  ➢ 1 FTP profile

- The TCP/IP stack of G2111/G2151I series supports one service profile at a time. Trying to run more than one service profile may result in a blocking of one of these service profiles.

Using Internet Service AT commands on several interfaces:

- A connection profile can be created on one interface and then viewed or changed on all other interfaces.

- A service profile can be used only on one interface at a time:

  ➢ Service profiles can only be opened on the interface where they have been defined with AT^SISS.

  ➢ Accordingly, on each interface the read commands AT^SISO? and AT^SISI? deliver full status information for the service profiles configured / opened on this interface, while service profiles related to other interfaces are only listed by <srvProfileId> and service type name (= <srvParmTag> value "srvType") without any status parameters.

  ➢ Changes to a service profile are allowed only on the same interface where it was created, trying to change it on another interface is denied with "+CME ERROR: invalid index". If queried with the read command AT^SISS? the entire profile is returned on the interface where the service profile was created, while on all other interfaces only the service type of the profile is stated.

  ➢ To free a service profile for use on another interface, use the AT^SISS command and select service type = "none". This action deletes the entire profile and restores all parameters of the profile to their initial power-up state (all values are empty). For example, to remove the service profile 3, set AT^SISS=3,srvType,none. After this, a new profile 3 can be created on any other interface.

Address notation

Server addresses must be provided as IP addresses in standard dot-format (e.g. "192.168.1.2") or as server address names resolvable by a DNS server.

Timeouts

Timeouts are not part of the Internet AT command functionality implemented in G2111/G2151I series and, if desired, are the responsibility of the host application. It is recommended that the host application validates URCs and AT command responses and reacts adequately, for example by sending a close message or starting a timer.

Socket service used with UDP protocol

The significant differences between the TCP and UDP protocols imply that UDP sometimes requires particular procedures or even specific parameters. Details on how to handle UDP services can be found in extra notes or are included in the general parameter descriptions.

Using the DCD line to detect the connection status of Internet services

With AT&C you can configure the DCD line of the used serial interface to indicate whether an Internet service is active. For Socket the states "Up" or "Connecting" are indicated, for FTP and transparent TCP only the state "Up".

9.1 AT^SICS Internet Connection Setup Profile

AT^SICS serves to create and edit Internet connection profiles. A connection profile can be assigned to one or more service profiles defined with AT^SISS, and thus, determines which type of connection is to be established when opening a service profile with AT^SISO.

The AT^SICS read command requests the current settings of all Internet connection profiles. One line is issued for every possible parameter of a given <conParmTag> "conType" value.

The AT^SICS write command specifies all parameters of a connection profile identified by <conProfileId>. At first the type of Internet connection needs to be selected via <conParmTag> value "conType". This determines the applicability of all other <conParmTag> values related to this "conType" and automatically sets their defaults. An exception is the <conParmValue-alphabet> which can be set before or after selecting "conType".

To change the settings the write command needs to be executed for each single <conParmTag>. All profile parameters set with AT^SICS are volatile.

G2111/G2151I series supports the authentication methods PAP (Password Authentication Protocol), CHAP (Handshake Authentication Protocol) or none. The method actually used for an Internet connection via CSD or GPRS is negotiated at the LCP layer, i.e. it is negotiated with the remote peer at connection setup.

Table 9.1:   Applicability of AT^SICS <conParmTag> values

<conParmTag> value	CSD	GPRS0
"conType"	mandatory	mandatory
"user"	optional	optional
"passwd"	optional	optional
"apn"	ø	mandatory
"inactTO"	optional	optional
"calledNum"	mandatory	ø
"dataType"	mandatory	ø
"dns1"	optional	optional
"dns2"	optional	optional
"alphabet"	optional	optional

Syntax

Test Command
AT^SICS=?
Response(s)
OK
Read Command
AT^SICS?
Response(s)
^SICS: <conProfileId>, <conParmTag>, <conParmValue>
OK
Write Command
AT^SICS=<conProfileId>, <conParmTag>, <conParmValue>
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<conProfiledId>`(num)

0...5
Internet connection profile identifier.
The `<conProfileId>` identifies all parameters of a connection profile, and, when a service profile is created with `AT^SISS` the `<conProfileId>` needs to be set as "conId" value of the `AT^SISS` parameter `<srvParmTag>`.

`<conParmTag>`(str)

Internet connection parameter.

"conType"
Type of Internet connection.
For supported values of `<conParmValue>` refer to `<conParmValue-conType>`.

"alphabet"
Selects the character set for input and output of string parameters within a profile.
The selected value is bound to the specific profile. This means that different profiles may use different alphabets. Unlike other parameters the alphabet can be changed no matter whether the `<conParmTag>` value "conType" has been set.
For supported values of `<conParmValue>` refer to `<conParmValue-alphabet>`.

"user"
User name string: maximum 32 characters (where "" is default).

"passwd"
Password string: maximum 32 characters (where ***** is default).

"apn"
Access point name string value: maximum 100 characters (where "" is default).

"inactTO"
Inactivity timeout value in seconds: 0 ... 2^{16}-1, default = 20
Number of seconds the bearer remains open although the service no longer needs the bearer connection.
Do not set the timeout value below 3 sec. This may result in problems when using the `<eodFlag>` (set in the last `AT^SISW` command to terminate an upload data stream).

"calledNum"
Called BCD number.

"dataType"
Data call type.
For supported values of `<conParmValue>` refer to `<conParmValue-dataType>`.

"dns1"
Primary DNS server address (IP address in dotted-four-byte format).
This value determines whether to use the DNS server addresses dynamically assigned by the network or a specific DNS server address given by the user. "dns1" = "0.0.0.0" (default) means that the CSD or GPRS connection profile uses dynamic DNS assignment. Any other address means that the Primary DNS is manually set.

The default value applies automatically if no other address is set. Note that the `AT^SICS` read command only returns a manually configured IP address, while the value "0.0.0.0" is not indicated at all, no matter whether assumed by default or explicitly specified. See also note below.

"dns2"   Secondary DNS server address (IP address in dotted-four-byte format).

If "dns1" = "0.0.0.0" this setting will be ignored. Otherwise this value can be used to manually configure an alternate server for the DNS1.

If "dns1" is not equal "0.0.0.0" and no "dns2" address is given, then "dns2"="0.0.0.0" will be assumed automatically. The `AT^SICS` read command only returns a manually configured IP address, while the value "0.0.0.0" is not indicated at all, no matter whether assumed by default or explicitly specified.

`<conParmValue>`(str)

Parameter value; type and supported content depend on related `<conParmTag>`.

`<conParmValue-conType>`(str)

Supported connection type values in `<conParmValue>` for `<conParmTag>` value "conType".

"CSD"   Circuit-switched data call.
"GPRS0"   GPRS connection.

Settings of GPRS related commands are not used, e.g. `AT+CGDCONT`. When a service based on a GPRS connection profile is started after entering `AT^SISO` G2111/G2151I series automatically tries to attach to the GPRS. Yet, the only exception is `AT+CGATT` which can be used any time to detach from the GPRS and thus disconnect the bearer opened with `AT^SISO`.

"none"   Clears the connection profile.

`<conParmValue-alphabet>`(str)

Character set selectable with `<conParmValue>` for `<conParmTag>` value "alphabet".

["0"]   Character set determined with `AT+CSCS` applies.
"1"   International Reference Alphabet (IRA, seven bit ASCII) applies.

`<conParmValue-dataType>`(str)

Supported data call type values in `<conParmValue>` for `<conParmTag>` value "dataType".

"0"   ISDN
["1"]   Analog

Notes

- Before opening a service profile based on a connection profile recently used, check with AT^SICI that the previous connection was properly closed. If AT^SICI confirms that the connection profile is in <conState> 0 (Down) the connection profile may be used again.
- If a GPRS network does not support or is not correctly configured for automatic DNS address assignment the TCP/IP stack cannot resolve fully qualified domain names. In this case, a warning message will be returned when trying to open an Internet service configured for automatic DNS address assignment.

9.1.1   Example: Default values of a CSD connection profile

As stated earlier, the "conType" selected with AT^SICS determines all other matching profile parameters related to this "conType". Once "conType" is set in a new profile, the default values of all other related parameters are assumed. To view the default settings you can use the read command AT^SICS?

at^sics=1,conType,CSD OK	Select connection type CSD, identified by <conProfileId>1
at^sics?	Query current profiles.
^SICS: 0, "conType", ""	Profile with <conProfileId> 0 is still empty.
^SICS: 1, "conType", "CSD"	The new CSD profile just created is indicated with all related parameters set to their default.
^SICS: 1, "alphabet", "0"	Character set determined with AT+CSCS applies when string parameters are input with AT^SICS.
^SICS: 1, "user", ""	No user name set.
^SICS: 1, "passwd", "*****"	Password masked with asterisk.
^SICS: 1, "inactTO", "20"	Inactivity timeout = 20s.
^SICS: 1, "calledNum", ""	No destination set.
^SICS: 1, "dataType", "1"	Remote device is analog, e.g. an analog modem.
^SICS: 2, "conType", ""	Profile with <conProfileId> 2 is still empty.
^SICS: 3, "conType", ""	Profile with <conProfileId> 3 is still empty.
^SICS: 4, "conType", ""	Profile with <conProfileId> 4 is still empty.
^SICS: 5, "conType", ""	Profile with <conProfileId> 5 is still empty.
OK	

9.1.2   Example: GPRS connection profile

at^sics=0,conType,GPRS0 OK	Select connection type GPRS0.
AT^SICS=0,"inactTO", "20" OK	Inactivity timeout = 20s.
AT^SICS=0,dns1,"193.254.160.1" OK	IP address of Primary DNS server.
AT^SICS=0,passwd,t-d1 OK	Password for GPRS services provided by the Ger- man operator T-D1.
AT^SICS=0,apn,"internet.t-d1.de" OK	APN to access the GPRS services provided by the German operator T-D1.

9.2 AT^SICI Internet Connection Information

The AT^SICI read command requests the current status of the Internet connection profiles currently defined with AT^SICS.

The AT^SICI write command displays the status of the specified Internet connection profile. If the connection profile is not defined yet, the command returns a "+CME ERROR" response.

Syntax

Test Command
AT^SICI=?
Response(s)
[^SICI:(list of defined <conProfileId>s)] OK

Read Command
AT^SICI?
Response(s)
[^SICI: <conProfileId>, <conState>, <numServices>, <conAddr>] [^SICI: ...]   OK
Write Command
AT^SICI=<conProfileId>
Response(s)
^SICI: <conProfileId>, <conState>, <numServices>, <conAddr>   OK   ERROR   +CME ERROR: <err>

Parameter Description

<conProfileId>^(num)

Internet connection profile identifier as defined by AT^SICS (<conProfileId>).

0...5

<conState>^(num)

State of the Internet connection profile.

0	Down - Internet connection is defined but not connected.
1	Connecting - A service has been opened and so the Internet connection is initated.
2	Up - Internet connection is established and usable by one or more services.
3	Limited Up - Internet connection is established, but temporarily no network coverage. This state applies only to GPRS profiles (it does not occur with CSD).
4	Closing - Internet connection is terminating.

<numServices>^(num)

Number of services using this Internet connection profile.

0...9

<conAddr>^(str)

Local IP address of the Internet connection profile (empty if no address is associated yet).

Notes

- Before opening a service profile based on a connection profile recently used, check with AT^SICI that the previous connection was properly closed. If AT^SICI confirms that the connection profile is in <conState> 0 (Down) the connection profile may be used again.
- If AT^SICI is used simultaneously on different instances only one request can be handled at a time. On the other instance(s) "+CME ERROR: operation temporary not allowed" will be displayed. If so, repeat the command on this instance.
- After closing the last service which uses this connection profile, parameter value <numServices> is decreased after the expiry of the inactivity timeout "inactTO" of AT^SICS only.

9.2.1 Checking Connection Profile Status

```
at^sici?                          Query the current status of the connection profile.
^SICI: 1,2,1,"10.10.0.161"        One connection profile has been created at <conProfileId>=1,
                                  and one service is opened using this connection profile. The
                                  Internet connection is in <conState>=2 ("Up").
OK
```

Assume the network connection is temporarily not available. (If URC presentation mode of network registration is enabled the state is shown by the URC "+CREG: 2").

```
at^sici?                          Query once again the current status of the connection profile.
^SICI: 1,3,1,"10.10.0.161"        Parameter <conState> has changed to state "Limited up"
OK
```

The network connection is temporarily not available but the Internet connection is still established, so the host may decide to stop the data transfer to minimize the risk of losing data due to memory limitations.

```
at^sici?                          Query once again the current status of the connection profile.
^SICI: 1,2,1,"10.10.0.161"        After re-establishing the network connection, <conState> reverts
                                  to state "Up".
OK
```

Another service has been opened with AT^SISO:

```
at^sici?                          Query once again the current status of the connection profile.
^SICI: 1,2,2,"10.10.0.161"        After opening another service, parameter <numServices> has
                                  increased.
OK
```

After closing one service with AT^SISC:

```
at^sici?                          Query once again the current status of the connection profile.
^SICI: 1,2,1,"10.10.0.161"        Parameter <numServices> has decreased.
OK
```

After closing the last service with AT^SISC:

```
at^sici?                          Query once again the current status of the connection profile.
^SICI: 1,2,1,"10.10.0.161"        The bearer is still open because of the inactivity time- out "inactTO"
                                  of AT^SICS.
OK
at^sici?                          Query again the current status.
^SICI: 1,0,0,"0.0.0.0"            The inactivity timeout "inactTO" of AT^SICS has expired,
                                  therefore the bearer is closed now. Parameter <numServices>
                                  has decreased.
OK
```

9.3 AT^SISS Internet Service Setup Profile

AT^SISS serves to set up the necessary parameters in the Internet service profiles. Any service profile can then be used to control a data link in conjunction with AT^SISI, AT^SISO, AT^SISC, AT^SISR, AT^SISW, AT^SIST and AT^SISE.

The AT^SISS read command requests the current settings of all Internet service profiles. One line is issued for every possible parameter of a given <srvParmTag> "srvType" value.

The AT^SISS write command specifies the parameters for a service profile identified by <srvProfileId>. At first the type of Internet service needs to be selected via <srvParmTag> value "srvType". This determines the applicability of all other <srvParmTag> values related to this "srvType" and sets their defaults. Changing the

<srvParmTag> "srvType" of an existing service profile will reset all <srvParmTag> default values to suit the new "srvType". An exception is the <srvParmValue-alphabet> which can be set before or after selecting "srvType" and is not reset when "srvType" changes.

To change the settings the write command needs to be executed for each single <srvParmTag>. All profile parameters set with AT^SISS are volatile.

The list below shows which <srvParmTag> parameters apply to each Internet service and which of them are mandatory or optional.

Table 9.2: Applicability of AT^SISS <srvParmTag> values

<srvParmTag>	**Mandatory or optional**
Socket service	
"srvType"	mandatory
"conId"	mandatory
"alphabet"	optional
"address"	mandatory
"tcpMR"	optional
"tcpOT"	optional
Transparent service	
"srvType"	mandatory
"conId"	mandatory
"alphabet"	optional
"address"	mandatory
"tcpMR"	optional
"tcpOT"	optional
FTP service	
"srvType"	mandatory
"conId"	mandatory
"alphabet"	optional
"address"	mandatory
"tcpMR"	optional
"tcpOT"	optional

Syntax

Test Command
AT^SISS=?
Response(s)
OK
Read Command
AT^SISS?
Response(s)
^SISS: <srvProfileId>, <srvParmTag>, <srvParmValue>
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SISS=<srvProfileId>, <srvParmTag>, <srvParmValue>
Response(s)

```
OK
ERROR
+CME ERROR: <err>
```

Parameter Description

`<srvProfileId>`^(num)

Internet service profile identifier.

The `<srvProfileId>` is used to reference all parameters related to the same service profile. Furthermore, when using the AT commands `AT^SISO`, `AT^SISR`, `AT^SISW`, `AT^SIST` and `AT^SISC` the `<srvProfileId>` is needed to select a specific service profile.

0…9

`<srvParmTag>`

Internet service profile parameter.

srvType	Type of Internet service to be configured with consecutive usage of `AT^SISS`. For supported values of `<srvParmValue>` refer to `<srvParmValue-srv-Type>`.
alphabet	Selects the character set for input and output of string parameters within a profile. The selected value is bound to the specific profile. This means that different profiles may use different alphabets. Unlike other parameters the alphabet can be changed no matter whether the `<srvParmTag>` value "srvType" has been set. For supported values of `<srvParmValue>` refer to `<srvParmValue-alphabet>`.
user	User name string
	1. Socket
	Not applicable.
	2. Transparent
	Not applicable.
	3. FTP
	Not applicable; set within "address" parameter.
passwd	Password string
	1. Socket
	Not applicable.
	2. Transparent
	Not applicable.
	3. FTP
	Not applicable; set within "address" parameter.
conId	Internet connection profile to be used, for details refer `AT^SICS`.
tcpPort	TCP Port Number
	1. Socket
	Not applicable; set within "address" parameter.
	2. Transparent
	Not applicable; set within "address" parameter.
	3. FTP
	Not applicable; set within "address" parameter.
address	String value containing the URL for the specific service:
	1. Socket
	➢ Socket type TCP client URL
	"socktcp://'host':'remote tcpPort' "
	➢ Socket type TCP server URL

"socktcp://listener:'local tcpPort' "

➢ Socket type UDP client URL

"sockudp://'host':'remote udpPort'[;size='byte'][;port='word']"

Parameter "size" (optional):

0: PDU size is variable (default).

1 ... 1460: Fixed PDU size in bytes.

Parameter "port" (optional):

0: Port number will be assigned from service (default).

1 ... 2^{16}-1: defines the local port number for the UDP client.

2. Transparent

"'host':'remote TcpPort'[;timer=100][;etx=<etxChar>]"

Parameter "timer" (optional): 20 ... 500 milliseconds in steps of 20. Default if parameter is not specified: 100ms. The parameter configures the Nagle algorithm, which is used in transparent access mode.

Parameter "etx" (optional): Specifies the character used to change from transparent access mode to AT command mode.

Range of <etxChar>: 1 ...15, 17 ... 255. 16 is not allowed because defined as DLE (0x10).

If value is not set no escaping is configured, thus requiring either +++ or DTR ON-OFF transition for changing to AT command mode. If value is set, the transmitted bytes are parsed for the DLE (0x10) character followed by the specified <etxChar> value. If both characters are found the service returns to AT command mode without transmitting these two bytes. This behavior differs from +++ handling, where +++ is transmitted over the air. If you wish to send DLE characters as normal text string within your payload data the characters shall be doubled (DLE DLE).

3. FTP

➢ FTP client URL (get)

"ftp://'user':'password'@'host':'tcpPort'/'url-path' [;type='a|i|d'] "
Refer to "IETF-RFC 1738".

➢ FTP client URL (put)

"ftpput://'user':'password'@'host':'tcpPort'/'url-path'/'element name'[;type='a|i'][;mode='u|a|d'] "

Used parameters:

"host" is mandatory, all other parameters are optional.

If "password" is set then "user" must be set as well.

If "user" is omitted the string "anonymous" is selected for "user" and "password".

If "password" is omitted the password request is served by an empty string.

If "tcpPort" is omitted the service connects to the FTP default port 21.

If "url-path" contains only the IP address a directory listing is requested.

If "url-path" contains the IP address and has a slash '/' appended a detailed directory listing is requested.

"type": [a)scii | i)mage | d)irectory]

"mode": [u)nique | a)ppend | d)elete]

"u)nique" selects the FTP Store Unique command to create a file name unique to the current directory. If the file name is assigned by the server then the "^SIS" URC will appear, indicating <urcInfoId> 2100 and the file name.

"d)elete" clears given 'element name'.

If "mode" is omitted "replace mode" is default setting.

tcpMR   Parameter can be used to overwrite the global AT^SCFG parameter "Tcp/MaxRetransmissions"<tcpMr> for a specific Internet Service connection profile. If

the parameter is not specified the value specified with `AT^SCFG` will be used. Supported values `<srvParmValue>` for this parameter are the same as described for `<tcpMr>`.

Setting is not relevant for Internet Service "Socket" with type "UDP".

tcpOT   Parameter can be used to overwrite the global `AT^SCFG` parameter "Tcp/Over-allTimeout" `<tcpOt>` for a specific Internet Service connection profile. If the parameter is not specified the value specified with `AT^SCFG` will be used. Supported values `<srvParmValue>` for this parameter are the same as described for `<tcpOt>`. Setting is not relevant for Internet Service "Socket" with type "UDP".

`<srvParmValue>`(str)

Parameter value; type and supported content depend on related `<srvParmTag>`.

`<srvParmValue-srvType>`(str)

Supported Internet service type values in `<srvParmValue>` for `<srvParmTag>` value "srvType".

Before changing the "srvType" of an existing service profile be sure that the profile is closed. To verify the connection state of the service profile enter the read command `AT^SISI`. Only when `<srvState>`=2 is returned for this specific service profile you can change its service type.

"Socket"   G2111/G2151I series acting as client or server (listener) for TCP or UDP.
            If G2111/G2151I series is TCP listener at least two service profiles are required. The first socket profile must be configured as listener. The second service profile will be dynamically assigned when a socket connection request from a remote client is incoming. For this purpose, one service profile must be left free (= not configured with `AT^SISS`). An incoming socket connection request will be indi- cated by the "`^SIS`" URC, with the next free `<srvProfileId>` shown inside the URC as parameter `<urcInfoId>`. The connection request can be accepted or rejected by using the commands `AT^SISO` or `AT^SISC` and the ID retrieved from the "`^SIS`".

"Transparent"   G2111/G2151I series acting as Transparent TCP socket client.

"Ftp"   G2111/G2151I series acting as FTP client.

"none"   Reset Internet service profile settings. Operation is not allowed if profile is in use, i.e. it was activated via `AT^SISO`.

`<srvParmValue-alphabet>`(str)

Supported string parameter character set selections in `<srvParmValue>` for `<srvParmTag>` value "alphabet".

["0"]   Applicable character set is determined by current setting of `AT+CSCS`.

"1"   International Reference Alphabet (IRA, seven bit ASCII).

Notes

- String parameters are truncated if greater than the maximum length specified above.
- If AT^SISS is used simultaneously on different instances only one request can be handled at a time. On the other instance(s) "+CME ERROR: operation temporary not allowed" will be displayed. If so, repeat the command on this instance.
- For correct input of the @ character in address parameters please refer to Section 1.6, Supported character sets.

9.4 AT^SISI Internet Service Information

AT^SISI serves to monitor the status of Internet service profiles defined with AT^SISS.

The AT^SISI read command requests the current status of all defined Internet service profiles.

The AT^SISI write command requests the status of the specified Internet service profile. If the specified service profile is not defined yet, "+CME ERROR" is returned.

Syntax

Test Command
AT^SISI=?
Response(s)
[^SISI:(list of defined <srvProfileId>s)]
OK
Read Command
AT^SISI?
Response(s)
If response is related to service profile(s) created / opened on this interface:
[^SISI: <srvProfileId>, <srvState>, <rxCount>, <txCount>, <ackData>, <unackData>] [^SISI: ...]
If response is related to service profile(s) created / opened on other interface(s): [^SISI: <srvProfileId>, <srvParmTag>value "srvType"]
[^SISI: ...]
OK
ERROR
Write Command
AT^SISI=<srvProfileId>
Response(s)
^SISI: <srvProfileId>, <srvState>, <rxCount>, <txCount>, <ackData>, <unackData>
OK
ERROR
+CME ERROR: <err>

Parameter Description

<srvProfileId>(num)

Internet service profile identifier as defined by AT^SISS (<srvProfileId>).

0...9

<srvState>(num)

Internet service state (for details see AT^SISO parameter <srvState>).

2	Allocated
3	Connecting
4	Up
5	Closing
6	Down

<rxCount>(num)

Number of bytes received via AT^SISR or AT^SIST since last successful AT^SISO write command.

This is the same value as displayed by the AT^SISO read command with the parameter <rxCount>.

`<txCount>`^(num)

Number of bytes sent via `AT^SISW` or `AT^SIST` since last successful `AT^SISO` write command.

This is the same value as displayed by the `AT^SISO` read command with the parameter `<txCount>`.

`<ackData>`^(num)

Number of data bytes already sent and acknowledged at TCP layer. Value 0 indicates that no sent data is acknowledged yet.

Parameter is not applicable to and Socket with UDP. For these services the counter is always set to 0.

`<unackData>`^(num)

Number of data bytes already sent but not yet acknowledged at TCP layer. A value 0 indicates that all sent data is already acknowledged.

This is the same value as displayed in the response of the `AT^SISW` write command with the parameter

`<unackData>`

Parameter is not applicable to and Socket with UDP. For these services the counter is always set to 0.

Note
- If a service is in state "Down" the responses for <rxCount>, <txCount>, <ackData> and <unackData> are the last known values for the service in the states "Connecting", "Up" and "Closing".

9.5 AT^SISO Internet Service Open

The `AT^SISO` write command starts the Internet session configured by the service profile. All further steps needed to control the session depend on whether you are using URC mode or polling mode. The `AT^SISO` read command returns the current status of all services.

URC mode:
If the service opens successfully, the URCs "`^SISW`" and "`^SISR`" will trigger the action to follow, either writing data with `AT^SISW` or reading data with `AT^SISR`. To terminate an upload data stream set the `<eodFlag>` within the last `AT^SISW` command. If the URCs notify that a data transfer has been successful ("`^SISR`: x, 2" or "`^SISW`: x, 2"), the service can be closed with `AT^SISC`. If a special event occurs, e.g. an error or a warning, after opening or while using a service then the URC type "`^SIS`" will be delivered.

Polling mode:
After opening the service, all progress information needed to control the session shall be explicitly requested by the host application. The particular sequence of AT commands varies depending on the service used. The following list summarizes, by way of an example, the steps normally involved in managing an upload or download job.

- Upload (Socket, FTP):
  - ➢ Enter the `AT^SISO` command, e.g. AT^SISO=9.
  - ➢ Enter `AT^SISW`, specify `<reqWriteLength>`, e.g. AT^SISW=9,20. Check resulting response for `<cnfWriteLength>`. Optionally, check error with `AT^SISE`, e.g. AT^SISE=9. If necessary, repeat the sequence several times.
  - ➢ Enter last `AT^SISW` command and enable `<eodFlag>`, e.g. AT^SISW=9,0,1.

If Socket service: Query available data with AT^SISR, e.g. AT^SISR=9,1430.

➢ Check service state with AT^SISI, e.g. AT^SISI=9, if necessary several times until <srvState>=6 ("Down").

➢ Check error with AT^SISE, e.g. AT^SISE=9.

➢ Close service with AT^SISC, e.g. AT^SISC=9.

- Download (Socket, FTP):
  ➢ Enter the AT^SISO command, e.g. AT^SISO=9.
  ➢ Enter AT^SISR, specify <reqReadLength>, e.g. AT^SISR=9,1000. Check resulting response for <cnfReadLength>. If necessary, repeat the sequence several times until <cnfReadLength>= -2 (end of data) or ERROR.
  ➢ Check error with AT^SISE, e.g. AT^SISE=9.
  ➢ Close service with AT^SISC, e.g. AT^SISC=9.

- Socket service (upload and download possible in one session):
  ➢ Recommended: Set AT+CMEE=2 to enable extended error text.
  ➢ Enter the AT^SISO command, e.g. AT^SISO=9.
  ➢ Enter AT^SISR or AT^SISW, specifying <reqReadLength> or <reqWriteLength>, e.g. AT^SISR=9,20 or AT^SISW=9,20. Check resulting response for <cnfReadLength> or <cnfWriteLength>. If necessary, repeat the sequence several times.
  ➢ Check error with AT^SISE, e.g. AT^SISE=9.
  ➢ If write action: Enter last AT^SISW command and enable <eodFlag>, e.g. AT^SISW=9,0,1. [1)]
  If Socket service: Query available data with AT^SISR, e.g. AT^SISR=9,1430.
  ➢ Close service with AT^SISC, e.g. AT^SISC=9.

- Transparent TCP service:
  ➢ Enter the AT^SISO command, e.g. AT^SISO=9.
  ➢ Enter AT^SIST to enter transparent data mode. After communication has finished return to AT command mode via +++ escape sequence.
  ➢ Check error with AT^SISE, e.g. AT^SISE=9.
  ➢ Close service with AT^SISC, e.g. AT^SISC=9.

Syntax

Test Command
AT^SISO=?
Response(s)
OK
Read Command
AT^SISO?
Response(s)
^SISO: <srvProfileId>, <srvParmTag>value "srvType" [, <srvState>, <socketState>, <rxCount>, <txCount>, <locAddr>, <remAddr>]
[^SISO: …]
OK
Write Command
AT^SISO=<srvProfileId>
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<srvProfileId>`(num)

`<srvProfileId>` 0 ... 9 specified with `AT^SISS`.

`<srvState>`(num)

Internet service state.

Please note, that the state of an Internet service may influence the state of the serial DCD line. For details see description of value 2 for parameter `<value>` of command `AT&C`.

2	Allocated	

Service profile resources are allocated, i.e. at least the service type has been set (parameter `<srvParmTag>`, value "srvType" of `AT^SISS`). The service is not opened, but ready for configuration.

3   Connecting

State after opening a service with `AT^SISO` where the connection is being established. If connection setup is successful the service proceeds to the state "4" (Up) and one of the URCs "`^SISW`" and "`^SISR`" may follow. If connection setup is not successful, the "`^SIS`" URC may appear and th e service enters `<srvState>` 6 (Down).

In the case of FTP, `<srvState>`=3 means that the command channel is being established.

If the service profile is configured as Socket listener, then the listener always stays at `<srvState>`=3 and `<socketState>`=3 (LISTENER), while the `<srvState>` and `<socketState>` of the dynamically assigned service pro- file may change. See examples in Section 10.5.1.

4   Up

The service performs its purpose. The data transfer process is the major function at this state.

FTP: Data channel is up.

5   Closing

Internet Service is closing the network connection.

FTP: Command channel is released.

6   Down

This state is entered if

- the service has successfully finished its session (see note on Socket),
- the remote peer has reset the connection or
- the IP connection has been closed because of an error (see note below on service or network errors).

If a service in this state be sure to close it with `AT^SISC` before reopening it.

`<socketState>`(num)

Socket state identifier.

1	Socket not assigned, i.e. no TCP/UDP connection active.
2	Socket assigned as CLIENT.
3	Socket assigned as LISTENER.
4	Socket assigned as SERVER.

`<rxCount>`(num)

Number of bytes received via `AT^SISR` or `AT^SIST` since last successful `AT^SISO` write command.

`<txCount>`^(num)

Number of bytes sent via `AT^SISW` or `AT^SIST` since last successful `AT^SISO` write command.

`<locAddr>`^(str)

Recently used local IP address in dotted-four-byte format and TCP port, separated by colon, e.g. "192.60.10.10:80".

`<remAddr>`^(str)

Remote IP address in dotted-four-byte format and TCP port, separated by colon, e.g. "192.60.10.10:80".

Notes

- If the bearer cannot be established and AT^SISO returns an error there might be a general GSM/GPRS problem. To identify the reason you can take advantage of the AT+CEER command. Using AT+CEER is especially recommended when the <infoID> parameter of the AT^SISE command equals 0.

- If a service or network error occurs during an IP session and the "^SIS" URC or the AT^SISE command display an error message, the service enters <srvState>=5 and then 6, i.e. the IP connection is closed. In this case, the service still allows reading the data stored in the buffer, but writing data is denied. After reading, close the service and open it again.

- As in polling mode no error URCs are available you are advised to integrate the commands AT^SISI and AT^SISE into the command sequences for upload and download jobs. So, the AT^SISO command may be followed by AT^SISI to check that the service has entered the <srvState>=4 before sending AT^SISR, AT^SISW or AT^SIST. This helps you to detect errors even though the "^SIS" URCs are disabled. A typical example is that the service fails to be opened because the service profile contains a wrong destination address. In such a case, after opening with AT^SISO and OK response, the service quickly enters the states `<srvState>`=2, 4 and 6, with an error being returned no earlier than after sending the first `AT^SISR` or `AT^SISW` command. In URC mode, an error URC, such as "Host not found" would be received in this situation, but in polling mode the only way to detect the state is using `AT^SISI` or, alternatively, `AT^SISO`.

9.5.1   Example: Accepting/Rejecting Socket Connection Request from Remote Client

Host 1 configured as Socket listener with IP address 10.10.0.187 at port 65534 is receiving a connection request from the remote client 10.10.0.185 (at port 1024). The example assumes that connection and service profiles have been created as stated earlier.

Start the Socket service in listener mode, then query the IP address dynamically assigned to the Socket listener:

```
at^siso=4                                        Host 1 opens the Socket service.
at^siso?                                         Query the current status of all services. All service
^SISO: 0, ""                                     profiles are unused, except for service profile 4 which
^SISO: 1, ""                                     is running in listener mode, where <srvState>=3
^SISO: 2, ""                                     (listening) and <socketState>=3 (LISTENER). The
^SISO: 3, ""                                     response also indicates the IP address dynamically
                                                 assigned to the listener. The listener's access data (IP
                                                 address and TCP port number) shall be passed on to
                                                 the client.
^SISO: 4, "Socket","3","3","0","0","10.10.0.187:65534","0.0.0.0:0"
^SISO: 6, ""
```

```
^SISO: 7, ""
^SISO: 8, ""
^SISO: 9, ""
OK
```

Indication of incoming Socket connection request:

`^SIS: 4, 1, 0`	The URC indicates that the listener configured on service profile 4 is receiving a Socket connection request (`<urcCause>`=1) from the remote client. The last URC parameter `<urcInfoId>` represents the ID of the dynamically assigned service profile, here 0.
`at^siso?`	Query the current status of services.
`^SISO: 0, "Socket","2","4","0","0", "10.10.0.187:0","10.10.0.185:1024"`	Indication on host 1 that the connection request from the remote client has been dynamically assigned to service profile 0 which is set to Server mode (`<socketState>`=4).
`^SISO: 1, ""`	
`^SISO: 2, ""`	
`^SISO: 3, ""`	
`^SISO: 4, "Socket","3","3","0","0", "10.10.0.187:65534","0.0.0.0:0"`	
`^SISO: 6, ""`	
`^SISO: 7, ""`	
`^SISO: 8, ""`	
`^SISO: 9, ""`	
`OK`	

Host 1 accepts the Socket connection request:

`at^siso=0`	Host 1 accepts the connection request, where 0 is the ID of the dynamically assigned service profile.
`OK`	
`^SISW: 0, 1`	The URC indicates that data transmission to the remote client is possible. If the remote client has already sent some data the additional URC ^SISR: 0,1 is displayed.
`at^siso?`	Query the current status of services.
`^SISO: 0, "Socket","4","4","0","0", "10.10.0.187:65534","10.10.0.185:1024"`	The socket connection between host 1 and remote client is successfully established.
`^SISO: 1, ""`	
`^SISO: 2, ""`	
`^SISO: 3, ""`	
`^SISO: 4, "Socket","3","3","0","0","10.10.0.187:65534","0.0.0.0:0"`	
`^SISO: 6, ""`	
`^SISO: 7, ""`	
`^SISO: 8, ""`	
`^SISO: 9, ""`	
`OK`	

Host 1 rejects the Socket connection request:

`at^sisc=0`	Host 1 rejects the connection request, where 0 is the ID of the
`OK`	dynamically assigned service profile.
`at^siso?`	Query the current status of services.
`^SISO: 1, ""`	
`^SISO: 2, ""`	
`^SISO: 3, ""`	

```
^SISO: 4, "Socket","3","3","0","0","10.10.0.187:65534","0.0.0.0:0"
^SISO: 6, ""
^SISO: 7, ""
^SISO: 8, ""
^SISO: 9, ""
OK
```

9.6 AT^SISC Internet Service Close

The AT^SISC write command closes the TCP/IP connection to the remote peer which was opened with AT^SISO. All resources are released, all status information parameters, e.g. <srvState>, <unackData>, <ackData>, <rxCount> and <txCount> counters, are reset. Only the initial configuration settings are preserved. The service can be restarted any time, using the same configuration or a new one.

Syntax

Test Command
AT^SISC=?
Response(s)
OK
Write Command
AT^SISC=<srvProfileId>
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<srvProfileId>^(num)

0...9   <srvProfileId> specified with AT^SISS.

9.7 AT^SISR Internet Service Read Data

The AT^SISR command either triggers a read operation (download) or queries the number of bytes in the internal buffer.

The AT^SISR write command may return the following errors:

- "+CME ERROR: operation failed" if there is a problem on application, socket, PPP or GPRS/GSM level. The AT^SISE command and the "^SIS" URC offer additional error information.
- "+CME ERROR: operation temporary not allowed" e.g. if the service has not network resources allocated.
- "+CME ERROR: operation not allowed" e.g. if the service is not configured.

Syntax

Test Command
AT^SISR=?
Response(s)
OK
Write Command
AT^SISR=<srvProfileId>, <reqReadLength>
Response(s)
^SISR: <srvProfileId>, <cnfReadLength>[, <remainUdpPacketLength>]
Number of data bytes are sent as specified by <cnfReadLength>. If peek operator was used no data bytes are sent.

OK
ERROR
+CME ERROR: <err>

Unsolicited Result Code

`^SISR: <srvProfileId>, <urcCauseId>`

Data availability status of the Internet service configured with `AT^SISS` has changed. The URC is issued when:

- data is available after opening an Internet service or
- less data was confirmed (in <cnfReadLength>) than requested (with <reqReadLength>) during the last "Read Data" operation and new data is available.

The URC is disabled in polling mode. See `AT^SCFG`, parameter "Tcp/WithURCs", `<tcpWithUrc>`.

Parameter Description

`<srvProfileId>`(num)

`<srvProfileId>` 0 ... 9 specified with `AT^SISS`.

`<reqReadLength>`(num)

0	Peek Operator: Query number of received bytes within internal buffers. The behavior of the peek operator depends on the selected Internet service, i.e. it may not be supported by all IP Services. For "Socket" service configured for UDP the size of the next available UDP packet is returned.
1...1500	Requested number of data bytes to be read via the Internet service specified in `<srvProfileId>`.

`<cnfReadLength>`(num)

-2	Indicates end of data. Data transfer has been finished (all data have been read) and the service can be closed with `AT^SISC`.
0	Indicates that no further data is available at the moment.
>0	Number of available data bytes. The range is determined by `<reqReadLength>`: If `<reqReadLength>` was greater than 0, then `<cnfReadLength>` may be less or equal to the value requested with `<reqReadLength>`. If`<reqReadLength>` equals 0 (peek operator) the value indicated by `<cnfReadLength>` may be greater than 1500.

`<urcCauseId>`(num)

Indicates whether or not data is available for reading with `AT^SISR`.

1	Data is available and can be read by sending the `AT^SISR` command. The URC appears when less data was confirmed (in `<cnfReadLength>`) than requested (with `<reqReadLength>`) during the last "Read Data" operation and new data is available.
2	End of data. Data transfer has completed (all data read). The service can be closed with `AT^SISC`.

`<remainUdpPacketLength>`(num)

Optional third parameter of the `AT^SISR` write command response displayed only if the Socket service uses the UDP protocol.

The reception of each datagram must be completed before the next datagram can be received. This may be a problem if the buffer of the host application is limited and not designed to handle the maximum packet size of

1500 bytes. To compensate this, the host is advised to request, via `<reqReadLength>`, an amount less or equal its maximum buffer capacity and wait for the resulting `AT^SISR` write command response with parameter `<remainUdpPacketLength>`. The benefit of this approach is that the host may properly receive all parts of a UDP datagram, as after each received data part the number of remaining bytes is synchronized, until reading the datagram is finished.

If the currently read datagram is smaller than the number of bytes requested by the host the `<remainUdpPacketLength>` parameter is omitted.

Further write attempts with `AT^SISR` are denied as long as the `<remainUdpPacketLength>` is unequal 0 or is not omitted. In this case the service returns "+CME ERROR: operation of service temporary not allowed".

0	Indicates that all bytes of the current UDP datagram are read.
1...(max. data size)-1	Indicates that the currently read UDP datagram is not yet complete. The displayed value is the remaining number of bytes `<remainUdpPacketLength>` is unequal 0 until reading all parts of the current datagram is finished.

9.7.1   Example: Socket Host Reads Small Amounts of UDP Data Packets (URC Mode)

This section applies only to the Socket service using the UDP protocol. The example shows how to read UDP packets if the buffer of the host application can handle only a few bytes. There are two datagram available for reading.

Buffer size: 6 bytes

Datagram A = 18 bytes (content "THIS_IS_DATAGRAM_A")

Datagram B = 3 bytes (content "NEW")

`^SISR: 0,1`	Service profile 0 is configured for Socket service and UDP. The URC notifies host that data is available for reading.
`at^sisr=0,6`	The host requests to read 6 bytes.
`^SISR: 0,6,12`	The first 6 bytes of datagram A are confirmed and transmitted.
`THIS_I`	Another 12 bytes are still available.
`OK`	
`at^sisr=0,6`	The host requests to read the next part of 6 bytes.
`^SISR: 0,6,6`	The next 6 bytes of datagram A are confirmed and transmitted.
`S_DATA`	Another 6 bytes are still available.
`OK`	
`at^sisr=0,6`	The host requests to read the next part of 6 bytes.
`^SISR: 0,6,0`	Last part of datagram A was received, no remainder is left.
`GRAM_A`	
`OK`	
`at^sisr=0,6`	Again, the host requests to read 6 bytes. This time, the request refers to datagram B which has only 3 bytes. As the read datagram is smaller than the size requested by the host, the response does not include the `<remainUdpPacketLength>`.
`^SISR: 0,3`	3 bytes are confirmed and transmitted. Datagram B was properly received.
`NEW`	
`OK`	

9.8 AT^SISW Internet Service Write Data

AT^SISW triggers a write operation (upload) and queries the amount of data already sent, but not acknowledged at the TCP layer. The write operation may be run in binary mode, or in interactive text mode.

AT^SISW write command may return the following errors:

- "+CME ERROR: operation failed" if there is a problem on application, socket, PPP or GPRS/GSM level. The AT^SISE command and the "^SIS" URC offer additional error information.
- "+CME ERROR: operation temporary not allowed" e.g. if the service has not network resources allocated.
- "+CME ERROR: operation not allowed" e.g. if the service is not configured.

Syntax

Test Command
AT^SISW=?
Response(s)
OK
Write Command
AT^SISW=<srvProfileId>, <reqWriteLength>[, <eodFlag>[, <mode>]]
Response(s)
^SISW: <srvProfileId>, <cnfWriteLength>, <unackData>
Number of data bytes as specified by <cnfWriteLength>.
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Code

^SISW: <srvProfileId>, <urcCauseId>

Data availability status of the Internet service configured with AT^SISS has changed. The URC is issued when the service is ready to accept new user data. In this context the URC is also issued for Transparent TCP service that supports data transfer via AT^SIST only.

The URC is disabled in polling mode. See AT^SCFG, parameter "Tcp/WithURCs", <tcpWithUrc>.

Parameter Description

<srvProfileId>(num)

<srvProfileId> 0 ... 9 specified with AT^SISS.

<reqWriteLength>(num)

0...1500

Specifies the number of bytes to be sent with AT^SISW or, if set to 0, requests the amount of data already sent with AT^SISW but not yet acknowledged:

- Parameter <reqWriteLength> may be 1...1500 bytes to specify the amount of data to be sent with AT^SISW.
- If parameter <reqWriteLength> equals 0, AT^SISW does not expect any data, but a normal query is perfomed. This allows the application to explicitly request, in particular at the end of an upload job, the amount of unacknowledged data at the TCP layer indicated by <unackData>.
- In interactive text mode, <reqWriteLength> must be set to any value greater than 0 (but not necessarily the precise number of bytes). If set to 0 in interactive text mode, <reqWriteLength> would be interpreted as query for unacknowledged data and, thus, prevent data transfer.
- If Socket service is selected with UDP protocol

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> ➤ `<reqWriteLength>`=0 can be used to send an empty UDP packet;
> ➤ it is recommended that the size of each data packet be limited to 1460 bytes. Otherwise, it is possible that the following URC occurs: "`^SIS`: \<id\>, 0, 9, The supplied buffer was too small/large".

`<eodFlag>`(num)

End of data indication flag.

Parameter is ignored for FTP download.

[0]	No end of data. Other data may follow to be transmitted via the Internet service.
1	End of data is signalled to the Internet Service. Further `AT^SISW` write commands return an error response. However, reading data may be possible. The `<eodFlag>` is effective only if the `<reqWriteLength>` equals `<cnfWriteLength>`, in particular if the `<reqWriteLength>` equals 0.
	If `<mode>` equals 1 the `<eodFlag>` is effective only if the write operation has been finished with CTRL-Z.

`<mode>`(num)

Control how the application provides the data bytes to be sent.

[0]	Binary mode
	This mode allows sending a number of bytes defined with parameter `<reqWriteLength>`.
1	Interactive text mode
	This mode allows the user to type and send 8-bit ASCII characters while the service is open. Ctrl-Z terminates data input and causes the data to be transferred.
	Interactive text mode requires that the `<reqWriteLength>` is set to any value greater than 0 (though it is not necessary to specify the precise number of bytes). In this case the `<cnfWriteLength>` parameter indicates the maxi- mum length of the data stream without control character CTRL-Z.
	In interactive text mode, the following characters are predefined as control codes:

- BACKSPACE ("\x08") deletes the last given character,
- CTRL-Z ("\x1a") terminates the input,
- ESC ("\x1b") aborts the command. An `<eodFlag>` is ignored in this case.

The V.25 command ATE also controls the echo mode of the interactive text mode. If echo is enabled (ATE1) all characters are echoed until `<cnfWriteLength>` is reached. Any attempt to input further data ends up with the warning message 4001 indicated after the data stream has been completed with CTRL-Z, nevertheless all data within the range of `<cnfWriteLength>` will be sent. See also Section 10.11, Internet Service URC "^SIS". ATE0 disables the echo mode generally.

`<cnfWriteLength>`(num)

0...1500	Confirmed number of data bytes which can be transmitted via the Internet service configured in `<srvProfileId>`. In binary mode (see `<mode>`) this number may be less or equal to the value requested with `<reqWriteLength>`. The application has to deliver exactly the number of bytes indicated by `<cnfWriteLength>`. A 0 value means that no data can be written at this time, i.e. it serves as a flow control mechanism. In interactive text mode, `<cnfWriteLength>` indicates the maximum number of bytes it can process. Characters above the indicated number are ignored.

`<unackData>`(num)

Number of data bytes already sent but not yet acknowledged at the TCP layer.

The value is constantly changing until the entire upload job has completed. If the value equals 0 all data sent so far is acknowledged.

In binary mode, `<unackData>` includes the `<cnfWriteLength>` value of the pending write operation. Therefore, the very first write operation of an upload job returns identical values for `<cnfWriteLength>` and `<unackData>`.

This mechanism allows the host application to easily verify whether or not the remote host has successfully received the data.

Parameter is not applicable to and Socket with UDP protocol. For these services the counter is always set to 0.

`<urcCauseId>`(num)	
1	The service is ready to accept new user data.
2	Data transfer has been finished successfully and Internet service may be closed without loss of data.

Notes

- Do not send any characters after AT^SISW command line termination until response "^SISW" is received. This is necessary to avoid that any characters related to the AT command can be interpreted as being part of the data stream to be transferred. Also refer to Section 1.4, AT Command Syntax.
- If the Socket service is configured for use as UDP client and fixed size and the interactive text mode is active, the PDU length always equals the specified fixed length. If the input characters exceed the specified fixed length, then all surplus characters will be ignored. If the input characters are less than the specified fixed length, then the remaining range will be filled with "\0" bytes.

9.8.1   Usage of parameter <eodFlag>

Service type	
Socket	After the service accepts the end-of-data flag the service state changes to "Closing". No further user data is accepted. After releasing the TCP link the service remains in state "Down".
FTP	Parameter only applicable for FTP upload session. After accepting the end-of-data flag the service state changes to "Closing" and starts to end the running FTP session. No further user data is accepted. After the FTP session is completed on FTP protocol level the service state switches to "Down". In case of successful completion the URC "^SISW: x, 2" is generated.

9.9 AT^SIST Enter Transparent Access Mode

`AT^SIST` applies only to Transparent TCP service if defined with `AT^SISS`. It can be used after the Transparent service has been opened with `AT^SISO` and is in "Up" state (`<srvState>=4`). If the service is not "Up" trying to open it will be denied with "+CME ERROR: operation temporary not allowed".

There are two ways to verify that the service is "Up": Each time after opening the service with `AT^SISO` wait for the "`^SISW`: x, 1" URC (if URC mode is enabled). In addition, or when using Polling mode, you can request the `<srvState>` with `AT^SISO` or `AT^SISI`.

Then, after entering the `AT^SIST` command, the CONNECT response notifies that the service has entered transparent access mode and is ready to transparently send and receive payload data over the serial interface. In this mode, the signaling of URCs is dependent on the settings made with `AT^SCFG`, parameter `<udri>`.

There are several ways to quit the transparent access mode and revert to AT command mode:

- +++ escape sequence (also transmitted over the air)
- DTR ON-OFF transition (see AT&D for configuring DTR line)
- "etx" parameter set within the server address for transparent access mode (see AT^SISS, <srvParmTag>"address".

Switching back and forth between both modes does not affect the underlying socket and has no influence on the service <srvState>.

If the Transparent service is released by the server the following applies:

- If the service is in transparent access mode (CONNECT mode): ME returns to AT command mode, issues a specific "NO CARRIER" result code and goes to <srvState> 6 ("Down"). The "NO CARRIER" result code starts with 0x10 (DLE) and 0x04 (EOT) and ends with the command line termination character, followed by the response formatting character.
- If the service is in AT command mode and no data is pending: "^SIS" URCs notify the client that the server has disconnected and the ME goes to <srvState> 6 ("Down").
- If the service is in AT command mode and data is still available: "^SIS" URCs notify the client that the server has disconnected and the service remains in <srvState> 5 ("Closing"). In this case the client shall open the transparent access mode with AT^SIST. After the CONNECT response, all remaining data can be transferred. After that, the ME goes to <srvState> 6 ("Down").
- In all above scenarios, the Transparent TCP service shall be closed with AT^SISC. Trying to return to transparent access mode with AT^SIST would only end up with "NO CARRIER" once again and is not recommended.
- Use AT^SISO and AT^SISI to check the <srvState>.
- Please note that the "^SIS" URCs mentioned above vary with the network. There may be for example "^SIS" URCs with <urcInfoId> 15 ("Remote host has reset the connection") and 19 ("Socket has been shut down). See Section 9.11, Internet Service URC "^SIS" for a list of possible URCs.

Syntax

Test Command
AT^SIST=?
Response(s)
OK
Write Command
AT^SIST=<srvProfileId>
Response(s)
CONNECT
(indicates that ME has entered transparent access mode)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<srvProfileId>(num)

<srvProfileId> 0 ... 9 specified with AT^SISS.

9.10   AT^SISE Internet Service Error Report

The AT^SISE write command returns the current error status of the specified Internet service profile. If the service profile is not defined or the value is invalid "+CME ERROR" response is returned.

The error status is identical to the content of the "^SIS" URC last issued.

If a service fails the commands AT^SISR, AT^SISW or AT^SIST will return an error response. However, if the AT^SISE command returns <infoID>=0 it is recommended to use the AT+CEER command because a general GSM/GPRS problem might be the reason.

Syntax

Test Command
AT^SISE=?
Response(s)
OK
Write Command
AT^SISE=<srvProfileId>
Response(s)
^SISE: <srvProfileId>, <infoID>[, <info>]
OK
ERROR
+CME ERROR: <err>

Parameter Description

<srvProfileId>^(num)

Internet service profile identifier as defined by AT^SISS <srvProfileId>.

0...9

<infoID>^(num)

Reason for Internet service error. This is a subset of the <urcInfoId>s which can be found in Section 10.11, Internet Service URC "^SIS".

The value 0 indicates there is no special Internet service error. In this case the application may use AT+CEER to check for general GSM/GPRS problems.

<info>^(str)

Information text related to <infoID>. This is a subset of the <urcInfoText>s which can be found in Section 9.11, Internet Service URC "^SIS".

Note

• In particular cases, the AT^SISE command may deliver information and warnings. This applies the following services:
  FTP: Information 2100
  If an error occurs the information and warning messages are overwritten by error messages.

9.11   Internet Service URC "^SIS"

This section first describes the syntax and the parameters of the "^SIS" URC. The second part consists of tables listing the information elements delivered within the "^SIS" URC and the command response of AT^SISE.

The presentation of the "^SIS" URC containing the parameter <urcCause>=0 can be disabled or enabled depending on whether polling mode or URC mode is preferred. To do so, use the AT^SCFG command, parameter "Tcp/WithURCs" (refer to <tcpWithUrc>). However, if related to <urcCause>=1 or 2, the "^SIS" URC will always be delivered regardless of the setting made with AT^SCFG.

Unsolicited Result Code

Indicates an event, an error or an information element. The same information can be obtained via `AT^SISE`.

`^SIS: <srvProfileId>, <urcCause>[, [<urcInfoId>][, <urcInfoText>]]`

The URC may appear if an event or an error occurs, for example after opening an Internet service with `AT^SISO` or any time during operation. The URC also indicates a request for a mobile terminated Internet service client connection, or a failure if a mobile terminated request is rejected. Furthermore, the URC may deliver an information element resulting from a specific command given in the service profile.

A list of possible causes can be found in the tables below. The tables contain the `<urcInfoId>` and, if applicable, a specific `<urcInfoText>`. If marked with *) the precise text related to a `<urcInfoId>` varies greatly depending on the scenario and the implementation of the remote server. In these cases, only a brief explanation of the scenario can be found in the table column "Description".

Parameter Description

`<urcCause>`^(num)

URC cause identifier.

0	An event has occurred after opening or while using an Internet service. The event number is presented via `<urcInfoId>` and may be an error, a warning, an information element or a note. Optionally additional information may be supplied via `<urcInfoText>`.
1	Indicates that an opened Socket listener service is receiving a connection request from a remote client. The incoming socket connection is dynamically assigned to the next free Inter- net service profile. In this case, the parameter `<urcInfoId>` inside the "`^SIS`" URC equals the `<srvProfileId>` of the dynamically assigned service pro- file. This ID shall be used to accept the connection request with `AT^SISO` or to reject it with `AT^SISC`. The connection status may be requested by using the `AT^SISI` read or write command or the `AT^SISO` read command. Among other details, the response indicates the IP address of the remote client (parameter `<remAddr>`). This may be helpful to decide whether to accept or reject the request.
2	Incoming Socket service client connection has failed. The client request was rejected automatically because no free Internet service profile was available.

`<urcInfoId>`^(num)

Information identifier related to `<urcCause>`. See tables below for further detail. The `<urcInfoId>` number ranges indicate the type of information element:

0: Service is working properly.
1 - 2000: Error, service is aborted and enters `<srvState>`=6 (Down).
2001 - 4000: Information related to progress of service.
4001 - 6000: Warning, but no service abort.
6001 - 8000: Notes

Additional information for Socket service: As stated above, if a Socket connection request from a remote client is received (see `<urcCause>`=1) the `<urcInfoId>` equals the `<srvProfileId>` of the dynamically assigned free service profile.

`<urcInfoText>`^(str)

Information text related to `<urcCause>`. See tables below for further detail.

9.11.1 Information Elements Related to the Service Application

The following table lists the information elements which may be returned by all supported services within the "^SIS" URC and the command response of AT^SISE. It should be noted that TCP/IP socket problems may occur in all Internet service connections (Socket, Transparent TCP, FTP).

<urcInfoId>	<urcInfoText>	Description
Information Elements Returned by the TCP/IP socket		
2	Invalid socket descriptor	Socket error
3	Bad address specified	Socket error
4	Invalid operation	Socket error
5	No free socket descriptors	Socket error
6	The operation would block	Socket error
7	A previous attempt at this operation is still ongoing	Socket error
8	Socket is not bound	Socket error
9	The supplied buffer is too small / large	Socket error
10	Flags not supported	Socket error
11	Operation not supported	Socket error
12	The address is already in use	Socket error
13	The network is unavailable	Socket error
14	An established connection was aborted (transmission time-out or protocol error)	Socket error
15	Remote host has reset the connection	Socket error
16	No buffer space available	Socket error
17	The socket is already connected	Socket error
18	For TCP/IP sockets, the socket is not connected	Socket error
19	Socket has been shut down	Socket error
20	Connection timed out	Socket error
21	Remote host has rejected the connection	Socket error
22	Remote host is unreachable	Socket error
23	An unexpected error occurred	Socket error
24	Host not found	DNS error
25	An error occurred that may be transient; a further attempt may succeed.	DNS error
26	An unrecoverable error occurred	DNS error
General Information Elements		
46	Fatal: The service has detected an unknown error	
47	*)	Indicates that the remote service has closed the connection. The host shall close the service.
48	Remote peer has closed the connection	Remote peer has closed the connection unexpectedly, and no data are available. The host shall close the service. Note that the "^SIS" URC only indicates the <urcInfoId>, but the AT^SISE command indicates both the <urcInfoId> and the <urcInfoText>.
49	Fatal: No memory is available for service action	

50	Fatal: Service has detected an internal error	
80		Connection profile not defined.
84	PPP LCP FAILED	PPP error
85	PAP Authentication failed	PPP error
86	CHAP Authentication failed	PPP error
87	IPCP failed	PPP error
Warnings		
4001		Applies only to interactive text mode: Indicates that number of input characters is greater than <cnfWriteLength>.
General Information Elements		
6001		General progress information for connection setup.

*) Text varies depending on scenario.

9.11.2 Information Elements Related to FTP Service

<urcInfoId>	<urcInfoText>	Description
100	**)	FTP Server rejects session.
101	**)	FTP Server rejects USER command.
102	**)	FTP Server rejects PASS command.
103	**)	FTP Server rejects PASV command or client can't detect remote IP address.
104	**)	FTP Server rejects requested client action.
105	**)	The given path segment is wrong.
2100	FILE: <filename>	File name assigned by FTP server if mode=u is used.

**) Text varies depending on FTP server implementation. See RFC 959 for possible responses.

9.12   Examples of how to Configure and Use Internet Service Profiles

Below you can find selective examples of how to configure and use Internet service profiles. To visualize the difference between URC mode and polling mode the operation of services (after opening with AT^SISO) is explained in separate examples for either mode.

For correct input of the @ character in address parameters please refer to Section 1.6, Supported character sets.

9.12.1 Selecting URC Mode or Polling Mode

To enable or disable the presentation of URCs for the Internet services use the AT^SCFG command, type "TcpIp/WithURCs" and select "on" or "off" for parameter <tcpWithUrc>.

```
at^scfg=tcp/withurcs          Query the current setting.
^SCFG: "Tcp/WithURCs","on"    URC mode is enabled (delivery detault).
OK
at^scfg=tcp/withurcs,off      Select polling mode (by switching off URC mode).
^SCFG: "Tcp/WithURCs","off"   Polling mode is accepted.
OK
```

9.12.2 Configuring Socket Listener

The example assumes that a connection profile has been created as explained in Section 9.1.1 or Section 9.1.2. Keep in mind that if the host is configured as listener another service profile must be left free to be dynamically assigned as Server when the listener receives a connection request from a remote client.

Configure the service profile 4 for use as Socket listener:

`at^siss=4,srvType,socket` `OK`	Select service type Socket.
`at^siss=4,conId,0` `OK`	Select connection profile 0.

`at^siss=4,address,"socktcp://lis-`
`tener:65534"`
`OK`
	The host specifies its local port 65534 to be used for the Socket listener service. The local IP address will be dynamically assigned when the service is opened with `AT^SISO`.

Open the Socket service and query the IP address dynamically assigned to the Socket listener:

`at^siso=4` `OK`	Open the Socket service.

`at^siso?`
`^SISO: 0, ""`
`^SISO: 1, ""`
`^SISO: 2, ""`
`^SISO: 3, ""`
`^SISO: 4, "Socket","3","3","0","0","10.10.0.187:65534","0.0.0.0:0"`
`^SISO: 6, ""`
`^SISO: 7, ""`
`^SISO: 8, ""`
`^SISO: 9, ""`
`OK`
	Query the current status of services. All service profiles are unused, except for service profile 4 which is running in listener mode, where `<srvState>`=3 (lis- tening) and `<socketState>`=3 (LISTENER). The response also indicates the IP address dynamically assigned to the listener.

9.12.3 Configuring Socket Client for Calling a Socket Listener on

Another Host

The example assumes that a connection profile has been created as explained in Section 9.1.1 or Section 9.1.2.

Configure the client's service profile 1 for calling a Socket listener on another host:

`at^siss=1,srvType,socket` `OK`	Select service type Socket.
`at^siss=1,conId,0` `OK`	Select connection profile 0.

`at^siss=1,address,"socktcp://`
`10.10.0.187:65534"`
`OK`
	The service profile of the client contains the IP address and the TCP port of the remote host.

9.12.4 Socket Client Sends Data via TCP Connection (Polling Mode)

The example uses service profile 0 configured for Socket service and TCP.

```
AT^SISO=0                              The host opens service profile 0.
OK                                     Note: URC ^SISW:0, 1 does not appear! The host must poll the
                                       service state by means of AT^SISI until the service is in
                                       <srvState> "Up".
AT^SISI=0
^SISI: 0,3,0,0,0,0                     The service is still in <srvState> "Connecting".
OK
AT^SISI=0
^SISI: 0,4,0,0,0,0                     The service is now in <srvState> "Up" and is ready to accept
                                       data.
OK
AT^SISW=0,10                           The host requests to write 10 bytes.
^SISW: 0,10,10                         Response that 10 bytes can be sent and are unacknowledged.
0123456789
OK
AT^SISW=0,10,1                         The host requests to write next 10 bytes and enables the
                                       end-of-data flag.
^SISW: 0,0,10                          But the service refuses the request, even the end-of- data flag
                                       remains without effect.
OK
AT^SISW=0,10,1                         Next try (polling).
^SISW: 0,10,20                         Response that the service accepts 10 bytes and this data and the
                                       previously sent data are unacknowledged.
0123456789
OK
AT^SISW=0,0,0                          Polling to request unacknowledged data.
^SISW: 0,0,10                          There are 10 bytes still unacknowledged.
OK
AT^SISI=0                              Polling for <srvState> change ("Closing" → "Down").
^SISI: 0,5,0,20,10,10                  20 bytes are transfered via serial interface, 10 bytes are
                                       acknowledged by remote peer, 10 bytes are on the way.
OK
AT^SISI=0                              Polling for <srvState> change ("Closing" → "Down").
^SISI: 0,6,0,20,20,0                   The Service is in state "Down" and all data is con- firmed by the
                                       remote peer.
OK
AT^SISC=0                              Closing the Socket service.
OK
```

9.12.5 Socket Client Sends Data via TCP Connection with URCs

The example uses service profile 0 configured for Socket service and TCP.

```
AT^SISO=0                              The host opens service profile 0.
OK
^SISW: 0,1                             Socket service is ready for upload.
AT^SISW=0,10                           The host requests to write 10 bytes.
^SISW: 0,10,10                         Response that 10 bytes can be sent and are unacknowledged.
0123456789
OK
^SISW: 0,1                             The URC indicates that the Socket service is ready to transfer more
```

	data. Data of the last AT^SISW command are transferred to the remote host.
`AT^SISW=0,10,1`	The host requests to write next 10 bytes and enables the end-of-data flag to notify that these are the last 10 bytes of the session.
`^SISW: 0,10,20`	Response that the service accepts 10 bytes and this data and the previously sent data are unacknowledged.
`0123456789`	
`OK`	
`------`	Waiting for URC.
`^SISW: 0,2`	Data transfer has been finished.
`AT^SISC=0`	Closing the Socket service.
`OK`	

9.12.6 Configuring and Using FTP Download (URC Mode)

First set up a connection profile as explained in Section 9.1.1 or Section 9.1.2. Enter at least all parameters which are mandatory for the connection profile.

Configure the service profile 1 for FTP:

`at^siss=1,srvType,ftp`	Select service type FTP.
`OK`	
`at^siss=1,conId,0`	Select connection profile 0.
`OK`	
`at^siss=1,address,"ftp://` `192.168.1.2;type=d"`	Specify FTP address with user and password anonymous.
`OK`	

Make an FTP connection:

`at^siso=1`	Open the service.
`OK`	Bearer is established, service is getting started.
`^SISR: 1, 1`	Data is available.
`at^sisr=1,1500`	Request to read 1500 bytes.
`^SISR: 1, 50`	50 bytes are now available.
`hardware`	
`inttest`	
`software`	
`support`	
`systemtest`	
`OK`	
`^SISR: 1, 2`	Data transfer finished. No more data available. The connection to the FTP server is closed.
`at^sisc=1`	Close the service.
`OK`	

9.12.7 Configuring and Using FTP Upload (URC Mode)

First set up a connection profile as explained in Section 9.1.1 or Section 9.1.2. Enter at least all parameters which are mandatory for the connection profile.

Configure the service profile 1 for FTP:

`at^siss=1,srvType,ftp`	Select service type FTP.
`OK`	
`at^siss=1,conId,0`	Select connection profile 0.

```
OK
at^siss=1,address,"ftpput://
myname:mypasswd@192.168.1.2/upload/exam-
ple.bin;type=i"
OK
```
Specify FTP address with individual user name and password. The file "example.bin" shall be created on the FTP server.

Make an FTP connection:

`at^siso=1`	Open the service.
`OK`	Bearer is established, service is getting started.
`^SISW: 1, 1`	FTP service is ready for upload.
`at^sisw=1,100`	Client requests to send 100 bytes.
`^SISW: 1,100,100`	The write command response confirms that 100 bytes must be transferred now.
`01234567890123456789012345678901234567890129` `34567890123456789012345678901234567890123459` `67890123456789`	User data is transferred.
`OK`	
`^SISW: 1, 1`	URC indicates that the FTP service is ready to transfer more data. Data of the last AT^SISW command is transferred to the remote host.
`at^sisw=1,0,1`	No more data available. The file "example.bin"
`OK`	shal be closed on the FTP server.
`^SISW: 1, 2`	Data transfer finished successfully. The connection to the FTP server is closed.
`at^sisc=1`	Close the FTP service.

9.12.8 Creating Transparent TCP Socket Client

`at^siss=1,srvType,"Transparent"`	Select service type "Transparent".
`OK`	
`at^siss=1,conId,1`	Select connection profile 1.
`OK`	
`at^siss=1,address,"10.10.0.110:9996:timer=2` `00"`	Specify server address.
`OK`	

9.12.9 Opening and Closing Transparent TCP Service

`at^siso=1`	Open Transparent TCP service.
`OK`	
`^SISW: 1,1`	URC indicates that Transparent TCP service is ready.
`at^sist=1`	Open transparent access mode.
`CONNECT`	Service is ready to send or receive data.
	Client is sending data, e.g. Good Morning (not visible in example).
	Client types +++ to return to AT command mode (+++ not visible in example).
`OK`	
`at^sisi=1`	Check the service state of service profile 1.
`^SISI: 1,4,0,16,16,0`	Service is in state "Up" (4). 0 bytes received, 16 bytes sent and acknowledged.
`OK`	

```
at^siso?                                   Check the service state of service profile 1.
^SISO: 0, ""
^SISO: 1, "Transpar-                       Service is in state "Up" (4). Socket is assigned.
ent","4","2","0","16","10.10.0.200:1024","1 0 bytes received, 16 bytes sent. Local and remote
0.10.0.108:65532"                          IP address are assigned.
^SISO: 2, ""
^SISO: 3, ""
^SISO: 4, ""
^SISO: 5, ""
^SISO: 6, ""
^SISO: 7, ""
^SISO: 8, ""
^SISO: 9, ""
OK
at^sici?                                   Check the state of the Internet connection profile.
^SICI: 0,2,1,"10.10.0.200"                 Internet connection profile is in state "Up". Local
                                           IP address is assigned.
OK
at^sisc=1                                  Close the service.
OK
at^sisi=1                                  Check the service state of service profile 1.
^SISI: 1,2,0,0,0,0                         Service profile 1 is in state "Allocated" (2).
OK
at^siso?                                   Check the service state of service profile 1.
^SISO: 0, ""
^SISO: 1, "Transpar-                       Service is in state "Allocated" (2). Socket not
ent","2","1","0","0","0.0.0.0:0","0.0.0.0:0 "assigned.
^SISO: 2, ""
^SISO: 3, ""
^SISO: 4, ""
^SISO: 5, ""
^SISO: 6, ""
^SISO: 7, ""
^SISO: 8, ""
^SISO: 9, ""
OK
at^sici?                                   Check the state of the Internet connection profile.
^SICI: 0,0,0,"0.0.0.0"                     No Internet connection profile currently used.
OK
```

9.12.10 Server Disconnects While Transparent TCP Service is in Trans- parent Access Mode

```
at^siso=1                                  Open Transparent TCP service.
OK
^SISW: 1,1                                 URC indicates that Transparent TCP service is
                                           ready.
at^sist=1                                  Open transparent access mode.
CONNECT                                    Service is ready to send or receive data.
Good Morning NO CARRIER                    Server has sent data and disconnected. Client
                                           reads data. Then client gets NO CARRIER in AT
                                           command mode.
at^sisi=1                                  Check the service state of service profile 1.
```

```
^SISI: 1,6,12,0,0,0                                  Service is in state "Down" (6). 12 bytes received.
OK
at^siso?                                             Check the service state of service profile 1.
^SISO: 0, ""
^SISO: 1, "Transpar-                                 Service is in state "Down" (6). Socket is assigned.
ent","6","2","12","0","10.10.0.200:1026","1          6 bytes received. 12 bytes sent. Local and remote
0.10.0.108:65532"                                    IP address are assigned.
^SISO: 2, ""
^SISO: 3, ""
^SISO: 4, ""
^SISO: 5, ""
^SISO: 6, ""
^SISO: 7, ""
^SISO: 8, ""
^SISO: 9, ""
OK
at^sici?                                             Check the state of the Internet connection profile.
^SICI: 0,2,1,"10.10.0.200"                           Internet connection profile is in state "Up". Local
                                                     IP address is assigned.
OK
at^sisc=1                                            Close the service.
OK
at^sisi=1                                            Check the service state of service profile 1.
^SISI: 1,2,0,0,0,0                                   Service profile 1 is in state "Allocated" (2).
OK
```

9.12.11 Server Disconnects While Transparent TCP Service is in AT Command Mode

```
at^siso=1                          Open Transparent TCP service.
OK
^SISW: 1,1                         URC indicates that Transparent TCP service is ready.
^SIS: 1, 0, 15                     <urcInfoId> 15: Remote host has reset the connection. This
                                   means that the server has released the connection to Transparent
                                   TCP Socket client
^SIS: 1, 0, 19                     <urcInfoId> 19: Socket has been shut down.
at^sisi?                           Check service state of service profile 1.
^SISI: 1,6,0,0,0,0                 Service is in service "Down" state (6). No data pending.
OK
at^sisc=1                          Close the service.
OK
at^sisi=1                          Check service state of service profile 1.
OK
^SISI: 1,2,0,0,0,0                 Service profile 1 is in state "Allocated" (2).
```

9.12.12 Server Disconnects While Transparent TCP Service is in AT Command Mode and Data is Pending

```
at^siso=1                          Open Transparent TCP service.
OK
^SISW: 1,1                         URC indicates that Transparent TCP service is ready.
```

`^SIS: 1, 0, 15`	`<urcInfoId>` 15: Remote host has reset the connection. This means that the server has released the connection to Transparent TCP Socket client.
`^SIS: 1, 0, 19`	`<urcInfoId>` 19: Socket has been shut down.
`at^sisi?`	Check service state of service profile 1.
`^SISI: 1,5,0,0,0,0`	Service is in service "Closing" state (5).
`OK`	
`at^sist=1`	Open transparent access mode.
`CONNECT`	Service is ready to send or receive data.
`...DATA...`	Client is sending data.
`+++`	Client types +++ to return to AT command mode.
`OK`	
`at^sisc=1`	Close the service.
`OK`	
`at^sisi=1`	Check service state of service profile 1.
`OK`	
`^SISI: 1,2,0,0,0,0`	Service profile 1 is in state "Allocated" (2).
`OK`	

10

GPRS Commands

The AT Commands described in this chapter allow the external application to control packet switched services. Please use chapter "Using GPRS AT commands (Examples)" as a first guidance.

The following topics are covered in this chapter:

10.1 AT+CGACT PDP context activate or deactivate

Syntax

Test Command
AT+CGACT=?
Response(s)
+CGACT: (list of supported <state>s)
OK
Read Command
AT+CGACT?
Response(s)
+CGACT: <cid>, <state>
[+CGACT: <cid>, <state>]
...
OK
Write Command
AT+CGACT=[<state>[, <cid>[, <cid>]]]
Response(s)
OK
ERROR
+CME ERROR: <err>

Command Description

The test command is used for requesting information on the supported PDP context activation states. The read command returns the current activation states for all the defined PDP contexts.

The write command is used to activate or deactivate the specified PDP context(s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the MT is not GPRS attached when the activation form of the command is executed, the MT first performs a GPRS attach and then attempts to activate the specified contexts. If no <cid>s are specified the activation/deactivation form of the command activates/deactivates all defined contexts. If the MT is not able to activate a context because of a failed attach, the command returns "ERROR" or "+CME ERROR: unknown" after 385 seconds (timer T3310 expired).

If the MT is attached but is not able to activate a context for more than 160 seconds (timer T3380 expired), command returns "ERROR" or "+CME ERROR: unspecified GPRS error". In this case AT+CEER returns "+CEER: 51,3,0".

The command should not be used to deactivate a PDP context during the implicit PDP context deactivation procedure which is started automatically after LCP termination or by dropping the DTR line (if AT&D2 is configured).

Parameter Description

<state>(num)

Indicates the state of PDP context activation.

0	deactivated
[1]	activated

<cid>(num)

PDP Context Identifier is a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context related commands.

1...2

Notes

- ATH will deactivate any PDP context.
- If the MT is in dedicated mode, the write command returns "+CME ERROR: operation temporary not allowed".
- A maximum of 2 contexts can be activated at the same time, no matter on which interface. Trying to activate more than 2 contexts will cause "+CME ERROR: operation temporary not allowed". Note that, depending on the provider, the number of activated contexts may be further restricted. In such cases "+CME ERROR: unspecified GPRS error" will be returned and AT+CEER returns "+CEER: 50,26,0".

  Remember that contexts may be activated implicitly by using the ATD*98# or ATD*99# GPRS compatibility commands without specifying a <cid>.
- If an activated context will be deactivated without using the command AT+CGACT, then the result code "NO CARRIER" will be issued to indicate the context deactivation. This happens for example if the context deactivation is forced by the network or if deactivation results from a network deregistration with AT+COPS=2.

10.2   AT+CGANS Manual response to a network request for PDP con- text activation

Syntax

Test Command
AT+CGANS=?
Response(s)
+CGANS: (list of supported <response>s), (list of supported <L2P>s)
OK
Write Command
AT+CGANS=[<response>[, <L2P>[, <cid>]]]
Response(s)
CONNECT
NO CARRIER
ERROR
+CME ERROR: <err>

Command Description

The write command requests G2111/G2151I series to respond to a network request for Packet Domain PDP context activation which has been signaled to the TE by the "RING" or "+CRING: GPRS" URC. The <response> parameter allows the TE to accept or reject the request.

Parameter Description

<response>(num)

[0]   the request is rejected and G2111/G2151I series returns OK to the TE

1   accept the request

<L2P>(str)

a string parameter which indicates the layer 2 protocol to be used (see AT+CGDATA command)

```
<cid>(num)
```

a numeric parameter which specifies a particular PDP context definition (see `AT+CGDCONT` command).

Note

- If <response> is 1, the following procedure is followed by G2111/G2151I series:

  If the `<L2P>` parameter value is unacceptable to G2111/G2151I series, then it will return an "ERROR" or "+CME ERROR: <err>" response. Otherwise, G2111/G2151I series issues the intermediate result code CONNECT and enters V.250 online data state.

  A `<cid>` may be specified for use in the context activation request.

  During the PDP startup procedure G2111/G2151I series has the PDP type and the PDP address provided by the network in the Request PDP context activation message. If this is in conflict with the information provided by a specified `<cid>`, the command will fail. There will be no conflict, if the PDP type matches exactly and the PDP address given by the context definition for `<cid>` is empty or matches exactly with the address specified with the network PDP context activation message.

  The context will be activated using the values for PDP type and address provided by the network, together with all other information found in the PDP context definition.

  If no `<cid>` is given or if there is no matching context definition, G2111/G2151I series will attempt to activate the context using the values for PDP type and address provided by the network. The other parameters will be set to their default values (see `AT+CGDCONT`).

  If activation is successful, data transfer will proceed.

  After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the V.250 command state is reentered and G2111/G2151I series returns the final result code OK.

  In the event of an erroneous termination or a failure to start up, the V.250 command state is re-entered and G2111/G2151I series returns the final result code NO CARRIER, or if enabled, "+CME ERROR: <err>". Attach, activate and other errors may be reported. It is also an error to issue the `AT+CGANS` command when there is no pending network request.

  The command can be used in both normal and modem compatibility modes.

10.3   AT+CGATT GPRS attach or detach

Syntax

Test Command
AT+CGATT=?
Response(s)
+CGATT: (list of supported <state>s)
OK
Read Command
AT+CGATT?
Response(s)
+CGATT: <state>
OK
Write Command
AT+CGATT=[<state>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Command Description

The test command is used for requesting information on the supported GPRS service states. The read command returns the current GPRS service state.

The write command is used to attach the MT to, or detach the MT from the GPRS service. After the command has completed, the MT remains in V.250 command state. If the MT is already in the requested state, the command is ignored and the OK response is returned. Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

If the MT is not able to attach for more than 5 minutes, command returns "ERROR" or "+CME ERROR:unknown", but MT is still trying to attach.

If the MT is not able to detach for more than 80 seconds, command returns "ERROR" or "+CME ERROR:unknown", but MT is still trying to detach. If an attach is issued during a running detach, command returns "ERROR" or "+CME ERROR: unspecified GPRS error".

Parameter Description

$<state>^{(num)}$

Indicates the state of GPRS attachment.

$0^{(P)}$ detached

[1]   attached

Notes

- If the MT is in dedicated mode, write command returns "+CME ERROR: operation temporary not allowed".
- When the module is GPRS attached and a PLMN reselection occurs to a non-GPRS network or to a network where the SIM is not subscribed to for using GPRS, the resulting GMM (GPRS mobility management) state according to GSM 24.008 is REGISTERED/NO CELL, meaning that the read command will still show <state>=1

10.4 AT+CGAUTO Automatic response to a network request for PDP context activation

Syntax

Test Command
AT+CGAUTO=?
Response(s)
+CGAUTO: (list of supported <n>s)
OK
Read Command
AT+CGAUTO?
Response(s)
+CGAUTO: <n>
OK
Write Command
AT+CGAUTO=[<n>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Command Description

The test command returns the values of $<n>$ supported by the MT as a compound value.

The write command disables or enables an automatic positive response (auto-answer) to the receipt of a Request PDP Context Activation message from the network. It also provides control over the use of the V.250 basic commands `ATS0`, `ATA` and `ATH` for handling network requests for PDP context activation.

Parameter Description

$<n>$ (num)	
0	Disable automatic response for network requests for GPRS PDP context activation. GPRS network requests are manually accepted or rejected by the `AT+CGANS` command.
1	Enable automatic response for network requests for GPRS PDP context activation. GPRS requests are automatically accepted according to the description below.
3 (&F)(P)	Modem compatibility mode. The automatic acceptance of both GPRS and incoming CSD calls is controlled by the `ATS0` command. Manual control uses the `ATA` and `ATH` commands, respectively, to accept or reject GPRS network requests or incoming CSD calls.

Notes

- It is allowed to have different AT+CGAUTO settings on different interfaces.
- When the AT+CGAUTO=0 command is received, the MT will not perform a GPRS detach if it is attached. Subsequently, when the MT announces a network request for PDP context activation by issuing the URC RING or CRING, the TE may manually accept or reject the request by issuing the AT+CGANS command or may simply ignore the network request.
- When the AT+CGAUTO=1 command is received, the MT will attempt to perform a GPRS attach if it is not yet attached. Failure will result in ERROR or, if enabled +CME ERROR being returned to the TE. Subsequently, the MT announces a network request for PDP context activation by issuing the URC RING to the TE, followed by the intermediate result code CONNECT. The MT then enters V.250 online data state and follows the same procedure as it would after having received a +CGANS=1 with no <L2P> or <cid> values specified.
- If a GPRS attach will be initiated by this command and the MT is not able to attach for more than 385 seconds (timer T3310 expired), command returns with "ERROR" or "+CME ERROR: unknown", but MT is still trying to attach and the requested automatic mode <n> is in use.
- If a network request for PDP context activation is answered automatically and if another AT command is issued at the same time on the same interface, then this AT command is not executed. Any response belongs to the automatic context activation procedure. If the AT command which caused the collision was a circuit switched data call, the CONNECT response does not belong to this data call but to the GPRS. This can be detected if ATX is not set to 0. CS data call will issue CONNECT <text>, GPRS will issue CONNECT only.

10.5 AT+CGDATA Enter data state

Syntax

Test Command
AT+CGDATA=?
Response(s)
+CGDATA: (list of supported <L2P>s)
OK
Write Command
AT+CGDATA=[<L2P>[, <cid>[, <cid>]]]
Response(s)
CONNECT
NO CARRIER

```
ERROR
+CME ERROR: <err>
```

Command Description

The test command is used for requesting information on the supported layer 2 protocols to be used between the TE and MT.

The write command causes the MT to perform all actions which are necessary to establish communication between the TE and the network using one or more GPRS PDP types. This may include performing a GPRS attach and one or more PDP context activations. Commands following the AT+CGDATA command in the AT command line will not be processed by the MT.

If no <cid> is given or if there is no matching context definition, the MT will attempt to activate the context with PDP type IP and all other context parameters set to their default values (see AT+CGDCONT, AT+CGQREQ, AT+CGQMIN).

If the <L2P> parameter is omitted, the layer 2 protocol is unspecified and PPP will be used.

If the write command is successful, the MT issues the intermediate result code CONNECT and enters V.250 online data state.

After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the command state is reentered and the MT returns the final result code OK.

If the <L2P> parameter value is unacceptable to the MT, the MT returns ERROR or +CME ERROR.

In the event of erroneous termination or a failure to start up, the command state is reentered and the MT returns NO CARRIER, or if enabled +CME ERROR.

Parameter Description

<L2P>(str)

Layer 2 protocol to be used between the TE and MT.

["PPP"]   layer 2 protocol PPP

<cid>(num)

Parameter specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

1...2

Notes

- If the MT is in dedicated mode, write command returns "+CME ERROR: operation temporary not allowed".
- It is possible to leave the GPRS data mode and enter the command mode by using the V.250 command +++.

  By using the command AT+CGDATA again, the data mode is reentered. Which context is used to return to data mode, depends on the supplied parameter <cid>.

  If no <cid> is specified, this is equivalent to using the V.250 command ATO, which is usable for GPRS connections too. In this case the first context will be used, which is active and already in data mode since it has been activated (the internal context used for GPRS connection without explicitly specifying a context identifier has the highest priority).

  It is possible to use AT+CGDATA to enter the data mode for a context, which is not yet in data mode since it has been activated. With ATO this is not possible.

10.5.1 Automatic deactivation of PDP context during dial-up PPP

When using the AT+CGDATA write command or `ATD*99#` or `ATD*98#` the MT issues the intermediate result code CONNECT and enters V.250ter online data state. In V.250 online data state, first some LCP protocol exchange between MT and TE is performed to set up the PPP link. After successfully establishing the PPP link, the MT performs the PDP context activation procedure if the context is not already activated. As a result, the MT is in a "PDP context activated" state within the PLMN, the PPP link is established on the mobile side and the mobile is ready for IP data transfer.

If the TE wants to close the LCP link the MT may perform an LCP termination request procedure on PPP level. After this LCP termination procedure the MT deactivates the PDP context automatically and the MT returns to V.250 command mode and issues the final result code NO CARRIER.

During the implicit PDP context deactivation procedure after LCP termination the TE may change into V.250 command state (e.g. by using `+++` or by toggling DTR if `AT&D` is set to 1) before the result NO CARRIER occurs. In this case the application should not try to deactivate the PDP context by using the commands `AT+CGACT` or `ATH`. If DTR is configured to disconnect data connections (`AT&D2`), then the application should not toggle DTR during the implicit PDP context deactivation and before "NO CARRIER" is received.

10.6 AT+CGDCONT Define PDP Context

Syntax

Test Command
AT+CGDCONT=?
Response(s)
+CGDCONT: (range of supported<cid>s), <PDP_type>, , , (list of supported <d_comp>s), (list of supported <h_comp>s)
OK
ERROR
+CME ERROR: <err>
Read Command
AT+CGDCONT?
Response(s)
[+CGDCONT: <cid>, <PDP_type>, <APN>, <PDP_addr>, <d_comp>, <h_comp>] [+CGDCONT: ...]
OK
ERROR
+CME ERROR: <err>
Write Command
AT+CGDCONT=[<cid>[, <PDP_type>[, <APN>[, <PDP_addr>]]]]
Response(s)
OK
ERROR
+CME ERROR: <err>

Command Description

The test command returns supported values as a compound value.

The read command returns the current settings for each defined PDP context.

The write command specifies the parameters for a PDP context identified by the context identifier `<cid>`. The number of contexts that may be in a defined state at the same time is given by the range returned by the test command. A special form of the write command (`AT+CGDCONT=<cid>`) causes the values for context `<cid>` to become undefined.

Parameter Description

`<cid>`(num)

PDP Context Identifier

Parameter specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

1…2

`<PDP_type>`(str)

Packet Data Protocol type

Specifies the type of the packet data protocol.

"IP"   Internet Protocol (IETF STD 5)

`<APN>`(str)

Access Point Name

The logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested.

`<PDP_addr>`(str)

Packet Data Protocol address

Identifies the MT in the address space applicable to PDP (e.g. IP V4 address for PDP type IP). If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The read command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using `AT+CGPADDR`.

`<d_comp>`(num)

Data Compression

Controls the PDP data compression (applicable for Subnetwork Dependent Convergence Protocol (SNDCP) only) 3GPP TS 44.065

[0]   off

`<h_comp>`(num)

Header Compression

Controls the PDP header compression 3GPP TS 44.065, 3GPP TS 25.323

[0]   off

Notes

- The MT supports PDP type IP only.
- On ASC0 all context definitions will be stored non volatile. On all other instances only the settings of context 1 are stored non volatile.

10.7   AT+CGEQMIN Rel. 99 Quality of Service Profile (Minimum acceptable)

Syntax

Test Command
AT+CGEQMIN=?
Response(s)
+CGEQMIN: <PDP_type>, (list of supported <Traffic class>s), (list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s), (list of supported <Delivery order>s), (list of supported <Maximum SDU size>s), (list of supported <SDU error ratio>s), (list of supported <Residual bit error ratio>s), (list of supported <Delivery of erroneous SDUs>s), (list of supported <Transfer delay>s), (list of supported <Traffic handling priority>s)
OK
Read Command
AT+CGEQMIN?
Response(s)
[+CGEQMIN: <cid>, <Traffic class>, <Maximum bitrate UL>, <Maximum bitrate DL>, <Guaranteed bitrate UL>, <Guaranteed bitrate DL>, <Delivery order>, <Maximum SDU size>, <SDU error ratio>, <Residual bit error ratio>, <Delivery of erroneous SDUs>, <Transfer delay>, <Traffic handling priority>]
[+CGEQMIN: ...]
Write Command
AT+CGEQMIN=[<cid>[, <Traffic class>[, <Maximum bitrate UL>[, <Maximum bitrate DL>[, <Guaranteed bitrate UL>[, <Guaranteed bitrate DL>[, <Delivery order>[, <Maximum SDU size>[, <SDU error ratio>[, <Residual bit error ratio>[, <Delivery of erroneous SDUs>[, <Transfer delay>[, <Traffic handling priority>]]]]]]]]]]]]]
Response(s)
OK
ERROR
+CME ERROR: <err>

Command Description

The test command returns values supported as a compound value.

The read command returns the current settings for each defined context.

The write command allows the TE to specify a Quality of Service Profile for the context identified by the (local) context identification parameter <cid> which is checked by the MT against the negotiated profile returned in the Activate/Modify PDP Context Accept message.

A special form of the write command, AT+CGEQMIN=<cid> causes the requested profile for context number <cid> to become undefined.

On ASC0 all QoS profiles will be stored non volatile. On all other instances only the QoS settings for context 1 are stored non volatile.

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

1...2

`<Traffic class>`(num)

0	conversational
1	streaming
2	interactive
3	background
[4]	subscribed value

`<Maximum bitrate UL>`(num)

This parameter indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as 32 (e.g. `AT+CGEQMIN=...,32,...`).

[0]	subscribed value
1...63	
64...568	(value needs to be divisible by 8 without remainder)
576...8640	(value needs to be divisible by 64 without remainder)

`<Maximum bitrate DL>`(num)

This parameter indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as 32 (e.g. `AT+CGEQMIN=...,32,...`).

[0]	subscribed value
1...63	
64...568	(value needs to be divisible by 8 without remainder)
576...8640	(value needs to be divisible by 64 without remainder)

`<Guaranteed bitrate UL>`(num)

This parameter indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as 32 (e.g. `AT+CGEQ-MIN=...,32,...`).

[0]	subscribed value
1...63	
64...568	(value needs to be divisible by 8 without remainder)
576...8640	(value needs to be divisible by 64 without remainder)

`<Guaranteed bitrate DL>`(num)

This parameter indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as 32 (e.g. `AT+CGEQ- MIN=...,32,...`).

[0]	subscribed value
1...63	
64...568	(value needs to be divisible by 8 without remainder)
576...8640	(value needs to be divisible by 64 without remainder)

`<Delivery order>`(num)

This parameter indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0	no

1	yes
[2]	subscribed value

<Maximum SDU size>^(num)

This parameter indicates the maximum allowed SDU size in octets.

[0]	subscribed value
10…1520	(value needs to be divisible by 10 without remainder)
1502	

<SDU error ratio>^(str)

This parameter indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as "mEe". As an example a target SDU error ratio of $5*10^{-3}$.would be specified as "5E3" (e.g. AT+CGEQMIN=…,"5E3",…).

["0E0"]	subscribed value
"1E2"	
"7E3"	
"1E3"	
"1E4"	
"1E5"	
"1E6"	
"1E1"	

<Residual bit error ratio>^(str)

This parameter indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as "mEe". As an example a target residual bit error ratio of $5*10^{-3}$.would be specified as "5E3" (e.g. AT+CGEQMIN=…,"5E3",…).

["0E0"]	subscribed value
"5E2"	
"1E2"	
"5E3"	
"4E3"	
"1E3"	
"1E4"	
"1E5"	
"1E6"	
"6E8"	

<Delivery of erroneous SDUs>^(num)

This parameter indicates whether SDUs detected as erroneous shall be delivered or not.

0	no
1	yes
2	no detect
[3]	subscribed value

<Transfer delay>^(num)

This parameter indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds.

[0]	subscribed value
10...150	(value needs to be divisible by 10 without remainder)
200...950	(value needs to be divisible by 50 without remainder)
1000...4000	(value needs to be divisible by 100 without remainder)

<Traffic handling priority>(num)

This parameter specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of the other bearers.

[0]	subscribed
1	
2	
3	

<PDP_type>(str)

Packet Data Protocol Type

"IP"

Notes

- If parameters are not defined, the parameter default values depend on the HLR-stored subscribed default values.
- Definitions of parameters can be found in 3GPP TS 23.107
- If QOS settings are configured with AT+CGQMIN and AT+CGEQMIN in parallel the MT will use only the AT+CGEQMIN settings for connection setup while the AT+CGQMIN settings are ignored.

10.8 AT+CGEQREQ Rel. 99 Quality of Service Profile (Requested)

Syntax

Test Command
AT+CGEQREQ=?
Response(s)
+CGEQREQ: <PDP_type>, (list of supported <Traffic class>s), (list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s), (list of supported <Delivery order>s), (list of supported <Maximum SDU size>s), (list of supported <SDU error ratio>s), (list of supported <Residual bit error ratio>s), (list of supported <Delivery of erroneous SDUs>s), (list of supported <Transfer delay>s), (list of supported <Traffic handling priority>s)
OK
Read Command
AT+CGEQREQ?
Response(s)
[+CGEQREQ: <cid>, <Traffic class>, <Maximum bitrate UL>, <Maximum bitrate DL>, <Guaranteed bitrate UL>, <Guaranteed bitrate DL>, <Delivery order>, <Maximum SDU size>, <SDU error ratio>, <Residual bit error ratio>, <Delivery of erroneous SDUs>, <Transfer delay>, <Traffic handling priority>]

[+CGEQREQ: ...]
Write Command AT+CGEQREQ=[<cid>[, <Traffic class>[, <Maximum bitrate UL>[, <Maximum bitrate DL>[, <Guaranteed bitrate UL>[, <Guaranteed bitrate DL>[, <Delivery order>[, <Maximum SDU size>[, <SDU error ratio>[, <Residual bit error ratio>[, <Delivery of erroneous SDUs>[, <Transfer delay>[, <Traffic handling priority>]]]]]]]]]]]]]
Response(s) OK ERROR +CME ERROR: <err>

Command Description

The test command returns values supported as a compound value.

The read command returns the current settings for each defined context.

The write command allows the TE to specify a Quality of Service Profile for the context identified by the (local) context identification parameter <cid> which is used when the MT sends an Activate PDP Context Request message to the network.

A special form of the write command, AT+CGEQREQ=<cid> causes the requested profile for context number <cid> to become undefined.

On ASC0 all QoS profiles will be stored non volatile. On all other instances only the QoS settings for context 1 are stored non volatile.

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

1...2

<Traffic class>(num)

0	conversational
1	streaming
2	interactive
3	background
[4]	subscribed value

<Maximum bitrate UL>(num)

This parameter indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as 32 (e.g. AT+CGEQREQ=...,32,...).

[0]	subscribed value
1...63	
64...568	(value needs to be divisible by 8 without remainder)
576...8640	(value needs to be divisible by 64 without remainder)

<Maximum bitrate DL>(num)

This parameter indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as 32 (e.g. AT+CGEQREQ=...,32,...).

[0]	subscribed value

1...63
64...568   (value needs to be divisible by 8 without remainder)
576...8640   (value needs to be divisible by 64 without remainder)

`<Guaranteed bitrate UL>`(num)

This parameter indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as 32 (e.g. `AT+CGEQREQ=...,32,...`).

[0]   subscribed value
1...63
64...568   (value needs to be divisible by 8 without remainder)
576...8640   (value needs to be divisible by 64 without remainder)

`<Guaranteed bitrate DL>`(num)

This parameter indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as 32 (e.g. `AT+CGEQREQ=...,32,...`).

[0]   subscribed value
1...63
64...568   (value needs to be divisible by 8 without remainder)
576...8640   (value needs to be divisible by 64 without remainder)

`<Delivery order>`(num)

This parameter indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0   no
1   yes
[2]   subscribed value

`<Maximum SDU size>`(num)

This parameter indicates the maximum allowed SDU size in octets.

[0]   subscribed value
10...1520   (value needs to be divisible by 10 without remainder)
1502

`<SDU error ratio>`(str)

This parameter indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as "mEe". As an example a target SDU error ratio of $5*10^{-3}$.would be specified as "5E3" (e.g. `AT+CGEQREQ=...,"5E3",...`).

 ["0E0"]   subscribed value
"1E2"
"7E3"
"1E3"
"1E4"
"1E5"
"1E6"

"1E1"

`<Residual bit error ratio>`(str)

This parameter indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as "mEe". As an example a target residual bit error ratio of $5*10^{-3}$.would be specified as "5E3" (e.g. AT+CGEQREQ=…,"5E3",…).

["0E0"]	subscribed value
"5E2"	
"1E2"	
"5E3"	
"4E3"	
"1E3"	
"1E4"	
"1E5"	
"1E6"	
"6E8"	

`<Delivery of erroneous SDUs>`(num)

This parameter indicates whether SDUs detected as erroneous shall be delivered or not.

0	no
1	yes
2	no detect
[3]	subscribed value

`<Transfer delay>`(num)

This parameter indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds.

[0]	subscribed value
10…150	(value needs to be divisible by 10 without remainder)
200…950	(value needs to be divisible by 50 without remainder)
1000…4000	(value needs to be divisible by 100 without remainder)

`<Traffic handling priority>`(num)

This parameter specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of the other bearers.

[0]	subscribed value
1	
2	
3	

`<PDP_type>`(str)

Packet Data Protocol Type

"IP"

Notes

- If parameters are not defined, the parameter default values depend on the HLR-stored subscribed default values.

- Definitions of parameters can be found in 3GPP TS 23.107

- If QOS settings are configured with AT+CGQREQ and AT+CGEQREQ in parallel the MT will use only the AT+CGEQREQ settings for connection setup while the AT+CGQREQ settings are ignored.

10.9   AT+CGEREP GPRS event reporting

The write command enables or disables sending of unsolicited result codes, "+CGEV" from MT to TE in the case of certain events occurring in the GPRS MT or the network. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1 or 2 is entered. If a setting is not supported by the MT, ERROR or +CME ERROR: is returned.

Read command returns the current <mode> and buffer settings.

Test command returns the modes and buffer settings supported by the MT as compound values.

Syntax

Test Command
AT+CGEREP=?
Response(s)
+CGEREP: (list of supported <mode>s), (list of supported <bfr>s)
OK
Read Command
AT+CGEREP?
Response(s)
+CGEREP: <mode>, <bfr>
OK
Write Command
AT+CGEREP=[<mode>[, <bfr>]]
Response(s)
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Codes

URC 1

   +CGEV: REJECT <PDP_type>, <PDP_addr>

   A network request for PDP context activation occurred when the MT was unable to report it to the TE with a +CRING unsolicited result code and was automatically rejected.

URC 2

   +CGEV: NW REACT <PDP_type>, <PDP_addr>, [<cid>]

   The network has requested a context reactivation. The <cid> that was used to reactivate the context is provided if known to the MT.

URC 3

   +CGEV: NW DEACT <PDP_type>, <PDP_addr>, [<cid>]

   The network has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT.

URC 4

```
+CGEV: ME DEACT <PDP_type>, <PDP_addr>, [<cid>]
```

The mobile equipment has forced a context deactivation. The `<cid>` that was used to activate the context is provided if known to the MT.

URC 5

```
+CGEV: NW DETACH
```

The network has forced a GPRS detach.

URC 6

```
+CGEV: ME DETACH
```

The mobile equipment has forced a GPRS detach.

URC 7

```
+CGEV: NW CLASS <class>
```

The network has forced a change of MS class. The highest available class is reported.

URC 8

```
+CGEV: ME CLASS <class>
```

The mobile equipment has forced a change of MS class. The highest available class is reported.

Parameter Description

`<mode>`(num)	
0(P)	Buffer unsolicited result codes in the MT. Currently 3 +CGEV URCs can be buffered. If MT result code buffer is full, the oldest ones will be discarded. No codes are forwarded to the TE.
1	Discard unsolicited result codes when MT TE link is reserved (e.g. in on line data mode); otherwise forward them directly to the TE.
2	Buffer unsolicited result codes in the MT when MT TE link is reserved (e.g. in on line data mode) and flush them to the TE when MT TE link becomes avail- able; otherwise forward them directly to the TE. Currently 3 +CGEV URCs can be buffered. If MT result code buffer is full, the oldest URCs will be discarded.

`<bfr>`(num)	
0	MT buffer of unsolicited result codes defined within this command is cleared when `<mode>` 1 or 2 is entered
1	MT buffer of unsolicited result codes defined within this command is flushed to the TE when `<mode>` 1 or 2 is entered (OK response will be given before flushing the codes). Buffer is empty afterwards.

`<class>`(str)	

Parameter indicates the GPRS mobile class.

"B"	class B

10.10 AT+CGPADDR Show PDP address

Syntax

Test Command
AT+CGPADDR=?

Response(s)
[+CGPADDR: (list of defined <cid>s)]
OK

Write Command
AT+CGPADDR=[<cid>[,<cid>]]

Response(s)
[+CGPADDR: <cid>, <PDP_address>] [+CGPADDR: <cid>, <PDP_address>]
OK
ERROR
+CME ERROR: <err>

Command Description

The test command returns a list of defined <cid>s.

The write command returns a list of PDP addresses for the specified context identifiers. If no <cid> is specified, the addresses for all defined contexts are returned.

Parameter Description

<cid>(num)

A numeric parameter which specifies a particular PDP context definition (see AT+CGDCONT command).

<PDP_address>(str)

A string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic.

Note

- If no <cid> is specified, the write command will return a list of all defined contexts.

10.11 AT+CGQMIN Quality of Service Profile (Minimum acceptable)

Syntax

Test Command
AT+CGQMIN=?

Response(s)
+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)
OK
ERROR
+CME ERROR: <err>

Read Command
AT+CGQMIN?

Response(s)
[+CGQMIN: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>] [+CGQMIN: ...]
OK
ERROR
+CME ERROR: <err>

Write Command
AT+CGQMIN=[<cid>[, <precedence>[, <delay>[, <reliability>[, <peak>[, <mean>]]]]]]

Response(s)

```
OK
ERROR
+CME ERROR: <err>
```

Command Description

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

The read command returns the current settings for each defined context. If no minimum profile was explicitly specified for a context, simply OK will be returned, but default values will be used for that context.

This command allows the TE to specify a minimum acceptable profile which is checked by the MT against the negotiated profile returned in the Activate PDP Context Accept message.

The set command specifies a profile for the context identified by the (local) context identification parameter, `<cid>`

A special form of the set command, `AT+CGQMIN= <cid>` causes the minimum acceptable profile for context number `<cid>` to become undefined. In this case no check is made against the negotiated profile.

On ASC0 all QoS profiles will be stored non volatile. On all other instances only the QoS settings for context 1 are stored non volatile.

Parameter Description

`<cid>`(num)

Parameter specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

1...2

`<precedence>`(num)

Precedence class

[0]	network subscribed value
1	High Priority
	Service commitments shall be maintained ahead of precedence classes 2 and 3
2	Normal priority
	Service commitments shall be maintained ahead of precedence class 3
3	Low priority
	Service commitments shall be maintained

`<delay>`(num)

Delay class

The delay parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the GPRS network(s).

| [0] | network s ubscribed value |
| 1..4 | SDU size: 128 octets: |

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	

SDU size: 1024 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	

`<reliability>`(num)

Reliability class

[0]	network subscribed value
1	Non real-time traffic, error-sensitive application that cannot cope with data loss
2	Non real-time traffic, error-sensitive application that can cope with infrequent data loss
3	Non real-time traffic, error-sensitive application that can cope with data loss, GMM/SM, and SMS
4	Real-time traffic, error-sensitive application that can cope with data loss
5	Real-time traffic, error non-sensitive application that can cope with data loss

`<peak>`(num)

Peak throughput class (in octets per second).

[0]	network subscribed value
1	Up to 1 000 (8 kbit/s).
2	Up to 2 000 (16 kbit/s).
3	Up to 4 000 (32 kbit/s).
4	Up to 8 000 (64 kbit/s).
5	Up to 16 000 (128 kbit/s)
6	Up to 32 000 (256 kbit/s).
7	Up to 64 000 (512 kbit/s).
8	Up to 128 000 (1024 kbit/s).
9	Up to 256 000 (2048 kbit/s).

`<mean>`(num)

Mean throughput class(in octets per hour).

[0]	network subscribed value
1	100 (~0.22 bit/s)
2	200 (~0.44 bit/s)
3	500 (~1.11 bit/s)
4	1 000 (~2.2 bit/s)
5	2 000 (~4.4 bit/s)
6	5 000 (~11.1 bit/s)
7	10 000 (~22 bit/s)
8	20 000 (~44 bit/s)
9	50 000 (~111 bit/s)
10	100 000 (~0.22 kbit/s)
11	200 000(~0.44 kbit/s)
12	500 000(~1.11 kbit/s)
13	1 000 000 (~2.2 kbit/s)
14	2 000 000 (~4.4 kbit/s)
15	5 000 000 (~11.1 kbit/s)

16	10 000 000 (~22 kbit/s)
17	20 000 000 (~44 kbit/s)
18	50 000 000 (~111 kbit/s)
31	best effort

<PDP_type>(str)

Packet Data Protocol Type

"IP"

Notes
- If parameters are not defined, the parameter default values depend on the HLR-stored subscribed default values.
- Definitions of parameters in GSM 02.60 and GSM 03.60.
- If some of the QoS parameters are omitted, they will keep their current value (or the default value if not specified so far).
- If QOS settings are configured with AT+CGQMIN and AT+CGEQMIN in parallel the MT will use only the AT+CGEQMIN settings for connection setup while the AT+CGQMIN settings are ignored.

10.12 AT+CGQREQ Quality of Service Profile (Requested)

Syntax

Test Command
AT+CGQREQ=?
Response(s)
+CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)
OK
Read Command
AT+CGQREQ?
Response(s)
[+CGQREQ: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>] [+CGQREQ: ...]
Write Command
AT+CGQREQ=[<cid>[, <precedence>[, <delay>[, <reliability>[, <peak>[, <mean>]]]]]]
Response(s)
OK
ERROR
+CME ERROR: <err>

Command Description

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

The read command returns the current settings for each defined context. If no requested profile was explicitly specified for a context, simply OK will be returned, but default values will be used for that context.

This command allows the TE to specify a Quality of Service Profile that is used when the MT sends an Activate PDP Context Request message to the network.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>

A special form of the set command, +CGQREQ=<cid> causes the requested profile for context number <cid> to become undefined.

On ASC0 all QoS profiles will be stored non volatile. On all other instances only the QoS settings for context 1 are stored non volatile.

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

1...2

<precedence>(num)

Precedence class

[0]	network subscribed value
1	High Priority
	Service commitments shall be maintained ahead of precedence classes 2 and 3
2	Normal priority
	Service commitments shall be maintained ahead of precedence class 3
3	Low priority
	Service commitments shall be maintained

<delay>(num)

Delay class

This parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the GPRS network(s).

[0]	network subscribed value
1..4	with SDU size = 128 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	-

with SDU size = 1024 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	-

<reliability>(num)

Reliability class

[0]	network subscribed value
1	Non real-time traffic, error-sensitive application that cannot cope with data loss
2	Non real-time traffic, error-sensitive application that can cope with infrequent data loss
3	Non real-time traffic, error-sensitive application that can cope with data loss, GMM/SM,

and SMS

| 4 | Real-time traffic, error-sensitive application that can cope with data loss |
| 5 | Real-time traffic, error non-sensitive application that can cope with data loss |

`<peak>`(num)

Peak throughput class in octets per second

[0]	network subscribed value
1	Up to 1 000 (8 kbit/s)
2	Up to 2 000 (16 kbit/s)
3	Up to 4 000 (32 kbit/s)
4	Up to 8 000 (64 kbit/s)
5	Up to 16 000 (128 kbit/s)
6	Up to 32 000 (256 kbit/s)
7	Up to 64 000 (512 kbit/s)
8	Up to 128 000 (1024 kbit/s)
9	Up to 256 000 (2048 kbit/s)

`<mean>`(num)

Mean throughput class in octets per hour

[0]	network subscribed value
1	100 (~0.22 bit/s)
2	200 (~0.44 bit/s)
3	500 (~1.11 bit/s)
4	1 000 (~2.2 bit/s)
5	2 000 (~4.4 bit/s)
6	5 000 (~11.1 bit/s)
7	10 000 (~22 bit/s)
8	20 000 (~44 bit/s)
9	50 000 (~111 bit/s)
10	100 000 (~0.22 kbit/s)
11	200 000(~0.44 kbit/s)
12	500 000(~1.11 kbit/s)
13	1 000 000 (~2.2 kbit/s)
14	2 000 000 (~4.4 kbit/s)
15	5 000 000 (~11.1 kbit/s)
16	10 000 000 (~22 kbit/s)
17	20 000 000 (~44 kbit/s)
18	50 000 000 (~111 kbit/s)
31	best effort

`<PDP_type>`(str)

Packet Data Protocol type

"IP"

Notes

- If parameters are not defined, the parameter default values depend on the HLR-stored subscribed default values.
- Definitions of parameters in GSM 02.60 and GSM 03.60.

- If some of the QoS parameters are omitted, they will keep their current value (or the default value if not specified so far).
- If QOS settings are configured with AT+CGQREQ and AT+CGEQREQ in parallel the MT will use only the AT+CGEQREQ settings for connection setup while the AT+CGQREQ settings are ignored.

10.13 AT+CGREG GPRS Network Registration Status

AT+CGREG write command enables presentation of URC "+CGREG: <stat>" when <n>=1 and ME's GPRS network registration status changes.

AT+CGREG read command queries the current URC presentation status and <stat> which shows whether the network has currently indicated the registration of the ME.

Syntax

Test Command
AT+CGREG=?
Response(s)
+CGREG: (list of supported <n>s)
OK
Read Command
AT+CGREG?
Response(s)
+CGREG: <n>, <stat>
OK
Write Command
AT+CGREG=[<n>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Code

+CGREG: <stat>

Indicates a change in the ME's GPRS network registration status.

Parameter Description

<n>(num)	
0(&F)(P)	Disable network registration unsolicited result code
1	Enable network registration URC "+CGREG: <stat>"

<stat>(num)	
0	Not registered, ME is not currently searching an operator to register to. The ME is in GMM state GMM-NULL or GMM-DEREGISTERED-INITIATED. GPRS service is disabled, the ME is allowed to attach to GPRS if requested by the user.
1	Registered, home network. The ME is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED INITIATED on the home PLMN
2	Not registered, but ME is currently trying to attach or searching an operator to register to. The ME is in GMM state GMM-DEREGISTERED or GMM-REGIS- TERED-INITIATED. The

	GPRS service is enabled, but an allowable PLMN is currently not available. The ME will start a GPRS attach as soon as an allow- able PLMN is available.
3	Registration denied. The ME is in GMM state GMM-NULL. The GPRS service is disabled, the ME is not allowed to attach to GPRS if requested by the user.
4	Unknown
5	Registered, roaming. The ME is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED on a visited PLMN.

Note

- When the module is GPRS attached and a PLMN reselection occurs to a non-GPRS network or to a network where the SIM is not subscribed to for using GPRS, the resulting GMM (GPRS mobility management) state according to GSM 24.008 is REGISTERED/NO CELL, meaning that the read command will still show <stat>=1 or <stat>=5.

10.14 AT+CGSMS Select service for MO SMS messages

Syntax

Test Command
AT+CGSMS=?
Response(s)
+CGSMS: (list of supported <service>s)
OK
Read Command
AT+CGSMS?
Response(s)
+CGSMS: <service>
OK
Write Command
AT+CGSMS=[<service>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Command Description

The test command is used for requesting information on which services and service preferences can be set by using the AT+CGSMS write command

The read command returns the currently selected service or service preference.

The write command is used to specify the service or service preference that the MT will use to send MO SMS messages. If parameter <service> is not given, the current value remains unchanged.

Parameter Description

<service>(num)

A numeric parameter which indicates the service or service preference to be used. Parameter is global for all interfaces and volatile.

0	GPRS
1	Circuit switched
2	GPRS preferred (use circuit switched SMS transfer if mobile is not GPRS attached)

3$^{(\&F)(P)}$ Circuit switched preferred (use GPRS if circuit switched is not available)

Note

• Sending SMS via GPRS is only possible when mobile is attached using AT+CGATT.

10.15 AT^SGAUTH Set type of authentication for PPP connection

Syntax

Test Command
AT^SGAUTH=?
Response(s)
^SGAUTH: (list of supported <auth>s)
OK
ERROR
+CME ERROR: <err>
Read Command
AT^SGAUTH?
Response(s)
^SGAUTH: <auth>
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SGAUTH=<auth>
Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

<auth>$^{(num)}$

Indicates types of supported authentication.

0	none
1	PAP
2	CHAP
3$^{(\&F)(P)}$	PAP and CHAP

10.16 AT^SGCONF Configuration of GPRS related Parameters

Syntax

Test Command
AT^SGCONF=?

Response(s)
^SGCONF: (list of supported <llc_pdu_length_U>s), (list of supported <GPRS msclass>es)
OK

Read Command
AT^SGCONF?

Response(s)
^SGCONF: <llc_pdu_length_U>, <GPRS msclass> OK

Write Command
AT^SGCONF=[<llc_pdu_length_U>][, [<GPRS msclass>]]

Response(s)
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<llc_pdu_length_U>`(num)

The maximum number of octets in an information field of Unnumbered (U) frames.

0   No negotiation with network (500 will be used).

140...1520(P)   Lower values diminish performance.

`<GPRS msclass>`(num)

GPRS Multislot Class. The value can be one of the classes indicated with the Test command. The value set is volatile and power up value is the maximum allowed.

Note

- AT^SGCONF will respond with "+CME ERROR: operation temporary not allowed" if the module is already GPRS attached (see AT+CGATT).

10.17 ATA Manual acceptance of a network request for PDP context activation

The V.250 ATA command may be used to accept a network request for a PDP context activation announced by the unsolicited result codes "RING" or "+CRING: GPRS". G2111/G2151I series responds with CONNECT, enters V.250 online data state and follows the same procedure as it would after having received a AT+CGANS=1 with no <L2P> or <cid> values specified.

If you try to answer a request which is no longer present or which is already answered by another instance, NO CARRIER is returned.

Syntax

Exec Command
ATA

Response(s)
CONNECT
NO CARRIER

10.18 ATD*99# Request GPRS service

This command causes the MT to perform whatever actions are necessary to establish a communication between the TE and the external PDN.

The V.250 'D' (Dial) command causes the MT to enter the V.250 online data state and, with the TE, to start the specified layer 2 protocol. No further commands may follow on the AT command line. GPRS attachment and

PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the AT+CGATT and AT+CGACT commands. If the context to be used is already activated, it will be deactivated first. This ensures that the right context parameters will be used (e.g. QoS changes since the last context activation or the called address specified by ATD*99#).

Examples on how to use this command are provided in "Section 10.22, Using GPRS AT commands (Examples)".

To confirm acceptance of the command before entering the V.250 online data state command will respond with CONNECT.

When the layer 2 protocol has terminated, either as a result of an orderly shut down of the PDP or an error, the MT enters V.250 command state and returns NO CARRIER (for details refer to Section 10.5.1, Automatic deactivation of PDP context during dial-up PPP).

Syntax

Exec Command
ATD*99[* [<called_address>][* [<L2P>][* [<cid>]]]]#
Response(s)
CONNECT
NO CARRIER

Parameter Description

<called_address>(str)

IP V4 address in the form w.x.y.z, which identifies the called party; if it is provided, the MT will automatically set up a virtual call to the specified address after the context has been activated. This parameter is currently not used and needs not to be specified.

<L2P>(str)

Layer 2 protocol to be used between the TE and MT.

"PPP"   layer 2 protocol PPP
"1"   layer 2 protocol PPP

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT command). If no context is specified, an internal context with default properties is used (see AT+CGDCONT, AT+CGQREQ and AT+CGQMIN).

1...2

Notes

- If G2111/G2151I series is in dedicated mode, command returns "+CME ERROR: phone busy".
- ATD is used as a standard V.250 AT command, too.

10.19 ATD*98# Request GPRS IP service

This command causes the MT to perform whatever actions are necessary to establish a communication between the TE and the external PDN.

The V.250 'D' (Dial) command causes the MT to enter the V.250 online data state and, with the TE, to start the layer 2 protocol.

GPRS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the AT+CGATT and AT+CGACT commands. If the context to be used is already activated, it will be deactivated first. This ensures that the right context parameters will be used (e.g. QoS changes since the last context activation).

To confirm acceptance of the command before entering the V.250 online data state command will respond with CONNECT.

When the layer 2 protocol has terminated, either as a result of an orderly shut down of the PDP or an error, the MT enters V.250 command state and returns NO CARRIER (for details refer to Section 10.5.1, Automatic deactivation of PDP context during dial-up PPP).

Syntax

Exec Command
ATD*98[* <cid>]#
Response(s)
CONNECT
NO CARRIER

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT command). If no context is specified, an internal context with default properties is used (see AT+CGDCONT, AT+CGQREQ and AT+CGQMIN).

1...2

Notes

- If G2111/G2151I series is in dedicated mode, command returns "+CME ERROR: phone busy".
- ATD is used as a standard V.250 AT command, too.

10.20 ATH Manual rejection of a network request for PDP context activation

The V.250 ATH command may be used to deactivate all PDP contexts which are active or online on the same interface. This command should not be used to deactivate PDP contexts during the implicit PDP context deactivation procedure which is started automatically after LCP termination or by dropping the DTR line (if AT&D2 is configured). For details refer to Section 10.5.1, Automatic deactivation of PDP context during dial-up PPP.

The ATH command may also be used to reject a network request for PDP context activation announced by the unsolicited result codes "RING" or "+CRING: GPRS".

Syntax

Exec Command
ATH

Response(s)
OK

Notes

- In contrast to 3GPP 27.007 it is possible to cancel a connection with ATH after a break. This is done for compatibility reasons due to the "dial-up network" drivers of Microsoft Windows.
- ATH is used as a standard V.250 AT command, too (see ATH for details).
- If ATH is used to reject a network request for PDP context activation, then other PDP contexts on the same interface which are active or online will not be deactivated.

10.21 ATS0 Automatic Response to Network Request for PDP Context Activation

The V.250 `ATS0=<n>` (Automatic answer) command may be used to turn off (n=0) and on (n>0) the automatic response to a network request for a PDP context activation. See also "3GPP TS 27.007 (GSM 07.07): AT com- mand set for User Equipment (UE)".

When the `ATS0=<n>` (`<n>` > 0) command is received, G2111/G2151I series will attempt to perform a GPRS attach if not yet attached and if configured to do so (see `AT^SCFG`, parameter `<gs0aa>`). Subsequently, the ME will announce a network request for PDP context activation by issuing the URCs "`RING`" or "`+CRING: GPRS`" to the TE, followed by the intermediate result code CONNECT. The ME then enters V.250 online data state and follows the same procedure as it would after receiving a `AT+CGANS=1` command with no `<L2P>` or `<cid>` values specified. `ATS0=0` does not perform an automatic GPRS detach.

Syntax

Read Command
ATS0?
Response(s)
<n>
OK
Write Command
ATS0=<n>
Response(s)
OK

Parameter Description

<n>(num)(&W)(&V)

000(&F)   Disable automatic response mode.

001-255   Enable automatic response after specified number of rings.

Notes

- If different settings are used on each interface, and a request for PDP context activation is received, the interface 'wins' which is idle and uses the smallest ATS0 value.
- When a network request for PDP context activation is answered automatically and another AT command is issued at the same time on the same interface then this AT command will not be executed. Any response relates to the automatic context activation procedure. If the AT command which caused the collision was a CS data call, the CONNECT response does not pertain to this data call but to GPRS. This can be detected if ATX is not set to 0. The CS data call will issue CONNECT <text>, GPRS will issue CONNECT only.

- A network request for PDP context activation has a maximum duration of approximately 40 seconds (for details see GSM 04.08). A RING/CRING URC is issued every 5 seconds, so setting parameter <n> to values greater than 7 will not allow a successful context activation and is not recommended.

- Automatic GPRS attach will not be performed on recalling a stored user profile with ATZ or on power-up, even though a value <n> greater than 0 was stored in the user profile with AT&W.

- If AT^SCFG="GPRS/ATS0/withAttach","on" is selected, but the automatic GPRS attach attempt fails (e.g. the network rejects the attach request), the ATS0 write command ends up with "ERROR" or "+CME ERROR: unknown" after approx. 5 minutes, though the new <n> value takes effect. This is necessary because ATS0 is used for circuit switched calls too.

10.22 Using GPRS AT commands (Examples)

Examples

EXAMPLE 1

Defining and using a Context Definition ID (CID):
Every time a CID is used as a parameter for a GPRS command the CID has to be defined before by using the `AT+CGDCONT` command. To get the parameter of a CID use the `AT+CGDCONT` read option. If the response of 'AT+CGDCONT?' is OK only, there is no CID defined.

```
AT+CGDCONT?
OK                              There is no CID defined.
```

All parameters of the CID are initiated by NULL or not present values, and the CID itself is set to be undefined. To define a CID use the `AT+CGDCONT` command with at least one CID parameter. At the moment the mobile supports CID 1 and CID 2 by using the `AT+CGDCONT` command.

Define CID 1 and set the PDP type to IP, access point name and IP address are not set:

```
AT+CGDCONT=1,"IP"
OK
```

Define CID 2 and sets PDP type, APN and IP addr:

```
AT+CGDCONT=2,"IP", "internet.t-d1.gprs", 111.222.123.234
OK
```

A following read command will respond:

```
AT+CGDCONT?
+CGDCONT:1,"IP","","",0,0
+CGDCONT:2,"IP","internet.t-d1.gprs",111.222.123.234
OK
```

Set the CID 1 to be undefined:

```
AT+CGDCONT=1
OK
```

A following read command will respond:

```
AT+CGDCONT?
+CGDCONT:2,"IP","internet.t-d1.gprs",111.222.123.234
OK
```

EXAMPLE 2

Quality of Service (QoS) is a special parameter of a CID which consists of several parameters itself.

The QoS consists of
- the precedence class

- the delay class
- the reliability class
- the peak throughput class
- the mean throughput class

and is divided in "requested QoS" and "minimum acceptable QoS".

All parameters of the QoS are initiated by default to the "network subscribed value (= 0)" but the QoS itself is set to be undefined. To define a QoS use the `AT+CGQREQ` or `AT+CGQMIN` command.

Overwrite the precedence class of QoS of CID 1 and set the QoS of CID 1 to be present:

```
AT+CGQREQ=1,2
OK
```

A following read command will respond:

```
AT+CGQREQ?
+CGQREQ: 1,2,0,0,0,0
OK
```

All QoS values of CID 1 are set to network subscribed now, except precedence class which is set to 2. Now set the QoS of CID 1 to not present:

```
AT+CGQREQ=1
OK
```

Once defined, the CID it can be activated. To activate CID 2 use:

```
AT+CGACT=1,2
OK
```

If the CID is already active, the mobile responds OK at once.

If no CID and no STATE is given, all defined CIDs will be activated by:

```
AT+CGACT=
OK
```

If no CID is defined the mobile responds +CME ERROR: invalid index

Remark: If the mobile is NOT attached by `AT+CGATT=1` before activating, the attach is automatically done by the `AT+CGACT` command.

After defining and activating a CID it may be used to get online by:

`AT+CGDATA="PPP",1`	
`CONNECT`	The mobile is connected using the parameters of CID 1.

`AT+CGDATA=`	
`CONNECT`	The mobile is connected using default parameters (`<L2P>`="PPP" and `<cid>` as described for command `AT+CGDATA`).

The mobile supports Layer 2 Protocol (L2P) PPP only.

Remark: If the mobile is NOT attached by `AT+CGATT=1` and the CID is NOT activated before connecting, attaching and activating is automatically done by the `AT+CGDATA` command.

10.23 Using the GPRS dial command ATD

Example

In addition to the GPRS AT commands you can use the "D" command to dial into to the GPRS network.

There are two GPRS Service Codes for the ATD command: Values 98 and 99.

Examples:

`ATD*99#` `CONNECT`	Establish a connection by service code 99.

`ATD*99*123.124.125.126*PPP*1#` `CONNECT`	Establish a connection by service code 99, IP address 123 and L2P = PPP and using CID 1. The CID has to be defined by `AT+CGDCONT`.

`ATD*99**PPP#` `CONNECT`	Establish a connection by service code 99 and L2P = PPP.

`ATD*99***1#` `CONNECT`	Establish a connection by service code 99 and using CID 1.

`ATD*99**PPP*1#` `CONNECT`	Establish a connection by service code 99 and L2P = PPP and using CID 1. The CID has to be defined by `AT+CGDCONT`.

`ATD*98#` `CONNECT`	Establish a connection by service code 98.

`ATD*98*1#` `CONNECT`	Establish an IP connection by service code 98 using

11

Short Message Service (SMS) Commands

The AT Commands described in this chapter allow an external application to use the Short Message Service with the G2111/G2151I series.

The following topics are covered in this chapter:

11.1   SMS Parameters

Parameter Description

`<ackpdu>`(num)

Format is same for `<pdu>` in case of SMS, but without GSM 24.11 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

`<alpha>`(str)(+CSCS)

String type alphanumeric representation of `<da>` or `<oa>` corresponding to the entry found in phonebook; this feature is not supported

`<cdata>`(num)

Command Data

GSM 03.40 TP-Command-Data in text mode responses; ME converts each 8-bit octet into two IRA character long hexadecimal numbers, e.g. octet with integer value 42 is represented as two characters "2A", IRA 50 and 65 (decimal).

`<ct>`(num)

Command Type

GSM 03.40 TP-Command-Type in integer format

[0]...255

`<da>`(num)(+CSCS)

Destination Address

GSM 03.40 TP- Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by `<toda>`

`<data>`(num)(+CSCS)

User Data

In case of SMS: GSM 03.40 TP-User-Data in text mode responses; format:

- If <dcs> indicates that GSM 03.38 default alphabet is used and <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set: ME converts GSM alphabet into current TE character set according to rules covered in Annex A.
- If <dcs> indicates that 8-bit or UCS2 data coding scheme is used, or <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is set: ME converts each 8-bit octet into hexadecimal numbers containing two IRA characters, e.g. octet with integer value 42 is represented as two characters "2A", IRA 50 and 65 (decimal).

In case of CBS: GSM 03.41 CBM Content of Message in text mode responses; format:

- If <dcs> indicates that GSM 03.38 default alphabet is used: ME converts GSM alphabet into current TE char- acter set according to rules covered in Annex A.
- If <dcs> indicates that 8-bit or UCS2 data coding scheme is used: ME converts each 8-bit octet into hexa decimal numbers containing two IRA characters.

<dt>(num)

Discharge Time

GSM 03.40 TP-Discharge-Time in time-string format: "yy/MM/dd,hh:mm:ss+zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone. For example, 6th of May 1994, 22:10:00 GMT+2 hours equals "94/05/06,22:10:00+08"

<index>(num)

Integer type; value in the range of location numbers supported by the associated memory

<length>(num)

Message Length

Integer type value indicating in the text mode (AT+CMGF=1) the length of the message body <data> (or <cdata>) in characters; or in PDU mode (AT+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length) In text mode, the maximum length of an SMS depends on the used coding scheme: It is 160 characters if the 7 bit GSM coding scheme is used, and 140 characters according to the 8 bit GSM coding scheme.

If the SMS message format is "text mode" (AT+CMGF=1) and the character set is set to "UCS2" with AT+CSCS and the SMS is also coded as "UCS2" (see <dcs> of AT+CSMP), then the length is in octets instead of characters.

<mem1>(str)

Memory to be used when listing, reading and deleting messages:

"SM"   SIM message storage
"ME"   Mobile Equipment message storage
"MT"(D)   Sum of "SM" and "ME" storages

<mem2>(str)

Memory to be used when writing and sending messages:

"SM"   SIM message storage
"ME"   Mobile Equipment message storage
"MT"(D)   Sum of "SM" and "ME" storages

<mem3>(str)

Received messages will be placed in this memory storage if routing to TE is not set. See command AT+CNMI with parameter <mt>=2.

"SM"   SIM message storage
"MT"(D)   Sum of "SM" and "ME" storages

<mid>(num)

Message Identifier

GSM 03.41 CBM Message Identifier in integer format

`<mn>`(num)

Message Number

GSM 03.40 TP-Message-Number in integer format

`<mr>`(num)

Message Reference

GSM 03.40 TP-Message-Reference in integer format

`<oa>`(num)(+CSCS)

Originating Address

GSM 03.40 TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by `<tooa>`

`<page>`(num)

Page Parameter

GSM 03.41 CBM Page Parameter bits 4-7 in integer format

`<pages>`(num)

Page Parameter

GSM 03.41 CBM Page Parameter bits 0-3 in integer format

`<pdu>`(num)

In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME converts each octet of TP data unit into hexadecimal numbers containing two IRA characters, e.g. octet with integer value 42 is represented as two characters "2A", IRA 50 and 65 (decimal). In the case of CBS: `<ra>` GSM 03.40 TP-Recipient-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by `<tora>`

`<ra>`(num)(+CSCS)

Recipient Address

GSM 03.40 TP-Recipient-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (refer to command `AT+CSCS`.); type of address given by `<tora>`

`<sca>`(num)(+CSCS)

Service Center Address

GSM 04.11 RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (AT+CSCS); type of address given by `<tosca>`

`<scts>`(num)

Service Centre Time Stamp

GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer `<dt>`)

`<sn>`(num)

Serial Number

GSM 03.41 CBM Serial Number in integer format

`<st>`(num)

Status

GSM 03.40 TP-Status in integer format

0...255

`<stat>`(str)

Message status

3GPP 27.005 Interface of SMS and CB. Indicates the status of message in memory.

Description	text mode (<mode>=1)	PDU mode (<mode>=0)	Default
Received unread messages	"REC UNREAD"	0	for SMS reading commands
Received read messages	"REC READ"	1	
Stored unsent messages	"STO UNSENT"	2	for SMS writing commands
Stored sent messages	"STO SENT"	3	
All messages	"ALL"	4	

`<toda>`(num)

Type of Destination Address

GSM 04.11 TP-Destination-Address Type-of-Address octet in integer format (when first character of `<da>` is + (IRA 43) default is 145, otherwise default is 129)

0...255

`<tooa>`(num)

Type of Originating Address

GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer `<toda>`)

`<tora>`(num)

Type of Recipient Address

GSM 04.11 TP-Recipient-Address Type-of-Address octet in integer format (default refer `<toda>`)

`<tosca>`(num)

Type of Service Center Address

GSM 04.11 RP SC address Type-of-Address octet in integer format (default refer `<toda>`)

11.2   AT+CMGC Send SMS Command

Syntax

Test Command
AT+CMGC=?
Response(s)
OK
Write Command
If text mode (see AT+CMGF=1)
AT+CMGC=<fo>, <ct>[, <pid>[, <mn>[, <da>[, <toda>]]]]<CR> Text can be entered <CTRL-Z>/<ESC>
Response(s)
+CMGC: <mr>[, <scts>] If sending fails
ERROR
+CMS ERROR: <err>
Write Command
If PDU mode (see AT+CMGF=0)
AT+CMGC=<length><CR> PDU can be entered <CTRL-Z>/<ESC>
Response(s)
+CMGC: <mr>[, <ackpdu>]
OK
If sending fails
ERROR
+CMS ERROR: <err>

Notes

- After invoking the commands AT+CMGW, AT+CMGS or AT+CMGC it is necessary to wait for the prompt ">" before entering text or PDU. After the prompt a timer will be started to guard input period.
- In general but especially at baudrates below 19200 it is recommended to only use the command line termination character before starting text or PDU input. Use of line termination character followed by an additional response formatting character may cause the problem that the latter will become part of the input data.

11.3   AT+CMGD Delete short message

The write command deletes a short message from the preferred message storage `<mem1>` location `<index>`.

Syntax

Test Command
AT+CMGD=?
Response(s)
OK
Write Command
AT+CMGD=<index>

Response(s)
OK
ERROR
+CMS ERROR: <err>

Notes

- If there is no short message stored at the selected index, the response is OK too.
- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.

11.4   AT+CMGF Select SMS message format

The AT+CMGF command specifies the input and output format of the short messages.

Syntax

Test Command
AT+CMGF=?
Response(s)
+CMGF: (list of supported<mode>s)
OK
Read Command
AT+CMGF?
Response(s)
+CMGF: <mode>
OK
ERROR
+CMS ERROR: <err>
Write Command
AT+CMGF=<mode>
Response(s)
OK
ERROR
+CMS ERROR: <err>

Parameter Description

<mode>(num)(&W)(&V)

[0](&F)	PDU mode
1	Text mode

11.5   AT+CMGL List SMS messages from preferred store

The write command returns messages with status value <stat> from message storage <mem1> to the TE. If the status of the message is 'received unread', the status in the storage changes to 'received read'.

The execute command is the same as the write command with the given default for <stat>.

Syntax

Test Command

AT+CMGL=?
Response(s)
+CMGL: (list of supported <stat>s)
OK
Exec Command
AT+CMGL
Response(s)
+CMGL: (see write command for default of <stat>)
OK
Write Command
AT+CMGL=<stat>
Response(s)
Output if text mode (AT+CMGF=1) and command successful: For SMS- SUBMITs and/or SMS-DELIVERs
+CMGL: <index>, <stat>, <oa>/<da>, [<alpha>], [<scts>][, <tooa>/<toda>, <length>]
<data>
[...]
OK
For SMS-STATUS-REPORTs
+CMGL: <index>, <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st>
[...]
OK
For SMS-Commands
+CMGL: <index>, <stat>, <fo>, <ct>
[...]
OK
Output if PDU mode AT+CMGF=0 and command successful: For SMS-SUBMITs and/or SMS-DELIVERs
+CMGL: <index>, <stat>, [<alpha>], <length>
<pdu>
[...]
OK
If error is related to ME functionality
ERROR
+CMS ERROR: <err>

Notes

- The selected <mem1> can contain different types of SMs (e.g. SMS-DELIVERs, SMS-SUBMITs, SMS-STATUS-REPORTs and SMS-COMMANDs), the response may be a mix of the responses of different SM types. TE application can recognize the response format by examining the third response parameter.

- The parameters <ra> and <tora> will only be displayed if parameter <mode> of the AT^SSCONF command is set to 1.

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.

11.6 AT+CMGR Read SMS messages

The write command returns SMS message with location value <index> from message storage <mem1> to the

TE. If status of the message is 'received unread', status in the storage changes to 'received read'.

When using Text mode it is recommended to set AT+CSDH=1. In this case the AT+CMGR write command responses will include detailed header information. See AT+CSDH for details. The parameters <ra> and <tora> will only be displayed if parameter <mode> of the AT^SSCONF command is set to 1.

Syntax

Test Command
AT+CMGR=?
Response(s)
OK
Write Command
AT+CMGR=<index>
Response(s)
Output if text mode (AT+CMGF=1) and command successful: For SMS-DELIVER +CMGR: <stat>, <oa>, [<alpha>], <scts>[, <tooa>, <fo>, <pid>, <dcs>, <sca>, <tosca>, <length>] <data> [...] OK For SMS-SUBMIT +CMGR: <stat>, <da>, [<alpha>][, <toda>, <fo>, <pid>, <dcs>, [<vp>], <sca>, <tosca>, <length>] <data> [...] OK For SMS-STATUS-REPORT +CMGR: <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st> <data> [...] OK For SMS-Commands +CMGR: <stat>, <fo>, <ct>[, <pid>, [<mn>], [<da>], [<toda>], <length>] <data> [...] OK Output if PDU mode (AT+CMGF=0) and command successful: For SMS-SUBMITs and/or SMS-DELIVERs +CMGR: <stat>, [<alpha>], <length> <pdu> [...] OK ERROR +CMS ERROR: <err>

Notes

- Response if AT+CMGR is used to read an empty record index: +CMGR: 0,,0
- Response if AT+CMGR is used to read a non-existent record index: +CMS ERROR: invalid memory index
- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.

11.7   AT+CMGS Send SMS

`AT+CMGS` write command transmits a short message to network (SMS-SUBMIT).

After invoking the write command wait for the prompt ">" and then start to write the message. To send the message simply enter **<CTRL-Z>**. After the prompt a timer will be started to guard the input period.

To abort sending use **<ESC>**. Abortion is acknowledged with "OK", though the message will not be sent.

The message reference <mr> is returned by the ME on successful message delivery. The value can be used to identify the message in a delivery status report provided as an unsolicited result code.

Syntax

Test Command
AT+CMGS=?
Response(s)
OK
Write Command
If text mode (see AT+CMGF=1)
AT+CMGS=<da>[, <toda>]<CR> Text can be entered. <CTRL-Z>/<ESC>
Response(s)
+CMGS: <mr>[, <scts>]
OK
If sending fails see notes below.
Write Command
If PDU mode (see AT+CMGF=0)
AT+CMGS=<length><CR> PDU can be entered. <CTRL-Z>/<ESC>
Response(s)
+CMGS: <mr>[, <ackpdu>]
OK
If sending fails see notes below.

Notes

- If sending fails, for example, if a message is too long, the result code depends on the current setting of the `AT^SM20` command:

  If the `AT^SM20 <CmgwMode>` equals 1 (factory default) any failure to send a message is responded with "OK". Users should be aware, that despite the "OK" response, the message will not be sent to the subscriber.

  If the `AT^SM20 <CmgwMode>` equals 0 any failure to send a message is responded with "ERROR".

- If sending fails due to timeout, then

  `AT^SM20 <CmgwMode>`=1 causes "+CMS ERROR: unknown error" to be returned;

  `AT^SM20 <CmgwMode>`=0 causes "+CMS ERROR: timer expired" to be returned.

- Note that some providers do not recognize an @ symbol used in a short message. A widely used alternative is typing "*" as defined in GSM 03.40 (GPP TS 23.40).

- All characters entered behind the prompt ">" will be recognized as GSM characters. For example, "Backspace" (ASCII character 8) does not delete a character, but will be inserted into the short message as an additional physical character. As a result, the character you wanted to delete still appears in the text, plus the GSM code equivalent of the Backspace key.

- Message Length in Text Mode

  The maximum length of a short message depends on the used coding scheme: It is 160 characters if the 7 bit GSM coding scheme is used, and 140 characters according to the 8 bit GSM coding scheme.

  In case UCS2 character set selected it is highly recommended to set Data Coding Scheme (<dcs> of `AT+CSMP`) to 16-bit data, otherwise the length of sms user data is restricted to 88 octets. Even better for messages with UCS2 character set is the PDU Mode.

- In general but especially at baudrates below 19200 it is recommended to only use the command line termination character before starting text or PDU input. Use of line termination character followed by an additional response formatting character may cause the problem that the latter will become part of the input data.
- During a pending USSD user interaction the AT+CMGS write command returns "+CME ERROR: operation temporary not allowed" to prevent blocking situations.

11.8 AT+CMGW Write Short Messages to Memory

AT+CMGW execute and write commands transmit a short message (either SMS-DELIVER or SMS-SUBMIT) from TE to memory storage <mem2>. Memory location <index> of the stored message is returned. Message status will be set to 'stored unsent' unless otherwise given in parameter <stat>.

After invoking the execute or write command wait for the prompt ">" and then start to write the message. To save the message simply enter **<CTRL-Z>**. After the prompt a timer will be started to observe the input. To abort writing use **<ESC>**. Abortion is acknowledged with "OK", though the message will not be saved.

Message Length in Text Mode: The maximum length of a short message depends on the used coding scheme configured with <dcs> of AT+CSMP:

7 bit GSM coding scheme: 160 characters.
8 bit GSM coding scheme: 140 characters.
16 bit GSM coding scheme: 70 characters.

The length of 8-bit data coded short messages has to be greater than 0.

For more information on data coding schemes and character sets refer to GSM 03.38 and Section 1.6.1, GSM alphabet tables and UCS2 character values.

Syntax

Test Command
AT+CMGW=?
Response(s)
OK
Exec Command
If text mode (see AT+CMGF=1):
AT+CMGW
Response(s)
<CR> Text can be entered. <CTRL-Z>/<ESC>
+CMGW: <index>
OK
If writing fails
ERROR
+CMS ERROR: <err>
Write Command
If text mode (see AT+CMGF=1):
AT+CMGW=<oa>/<da>[, [<tooa>/<toda>][, <stat>]]<CR> Text can be entered. <CTRL-Z>/<ESC>
Response(s)
+CMGW: <index>
OK
If writing fails see notes below.
Write Command
If PDU mode (see AT+CMGF=0):
AT+CMGW=<length>[, <stat>]<CR> PDU can be entered. <CTRL-Z>/<ESC>
Response(s)

+CMGW: <index>
OK
If writing fails see notes below.

Notes

- If writing fails, for example, if a message is too long, the result code depends on the current setting of the AT^SM20 command:

  If the AT^SM20 <CmgwMode>=1 (factory default) any failure to send a message is responded with "OK". Users should be aware, that despite the "OK" response, the message will not be written to the selected SMS storage.

  If the AT^SM20 <CmgwMode> equals 0 any failure to write a message is responded with "ERROR".

- If writing fails due to timeout, then

  AT^SM20 <CmgwMode>=1 causes "+CMS ERROR: unknown error" to be returned;

  AT^SM20 <CmgwMode>=0 causes "+CMS ERROR: timer expired" to be returned.

- Note that some providers do not recognize an @ symbol used in a short message. A widely used alternative is typing "*" as defined in GSM 03.40 (GPP TS 23.40).

- In general but especially at baudrates below 19200 it is recommended to only use the command line termination character before starting text or PDU input. Use of line termination character followed by an additional response formatting character may cause the problem that the latter will become part of the input data.

- SMS-COMMANDs and SMS-STATUS-REPORTs cannot be stored in text mode.

- All characters entered behind the ">" prompt will be recognized as GSM characters. For example, "Backspace" (ASCII character 8) does not delete a character, but will be inserted into the short message as an additional physical character. As a result, the character you wanted to delete still appears in the text, plus the GSM code equivalent of the Backspace key.

11.9   AT+CMSS Send short messages from storage

The write command sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). If new recipient address <da> is given for SMS-SUBMIT, it shall be used instead of the one stored with the message. Reference value <mr> is returned to the TE on successful message delivery. Value can be used to identify message upon unsolicited delivery status report result code.

If the optional parameter <da> is given, the old status of the short message at <index> remains unchanged (see <stat>).

Syntax

Test Command
AT+CMSS=?
Response(s)
OK
Write Command
If text mode (AT+CMGF=1):
AT+CMSS=<index>[, <da>[, <toda>]]
Response(s)
+CMSS: <mr>[, <scts>]
OK
If sending fails
ERROR
+CMS ERROR: <err>

Write Command
If PDU mode (AT+CMGF=0):
AT+CMSS=<index>[, <da>[, <toda>]]

Response(s)
+CMSS: <mr>[, <ackpdu>]
OK
If sending fails
ERROR
+CMS ERROR: <err>

11.10 AT+CNMA New Message Acknowledgement to ME/TE

Write and execute command confirm successful receipt of a new message (SMS-DELIVER or SMS-STATUS-REPORT) routed directly to the TE.

G2111/G2151I series will not send another "+CMT" or "+CDS" URC to the TE until previous one is acknowledged with this com- mand. If the ME does not receive acknowledgement within required time (network timeout), it sends an "RP- ERROR" message to the network. The ME will automatically disable routing to the TE by setting both <mt> and <ds> values of AT+CNMI to zero.

Syntax

Test Command
AT+CNMA=?

Response(s)
+CNMA: (list of supported <n>s)
OK

Exec Command
AT+CNMA

Response(s)
OK ERROR
+CMS ERROR: <err>

Write Command
AT+CNMA=<n>

Response(s)
OK
ERROR
+CMS ERROR: <err>

Parameter Description

<n>^(num)

Parameter required only for PDU mode.

0   Command operates similarly as in text mode.

Notes

- Execute and write command shall only be used if AT+CSMS parameter <service> equals 1 (= phase 2+).
- Execute command can be used no matter whether text mode or PDU mode is activated. Write command is designed for the PDU mode only.

11.11 AT+CNMI SMS Event Reporting Configuration

AT+CNMI controls details of the SMS related URC presentation. It selects the procedure how the receipt of a new

SMS from the network is indicated to the TE when TE is active, e.g. DTR signal is ON.

If the TE is inactive (e.g. DTR signal is OFF), message receiving should be done as specified in GSM 03.38. If the DTR signal is not available or the state of the signal is ignored (V.250 command AT&D0, reliable message transfer can be assured by using AT+CNMA acknowledgment procedure.

The rules <mt>=2 and <mt>=3 for storing received messages are possible only if phase 2+ compatibility is activated with AT+CSMS=1. The parameter <ds>=1 is only available in phase 2+.

Syntax

Test Command
AT+CNMI=?
Response(s)
+CNMI: (list of supported<mode>s), (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s), (list of supported <bfr>s)
OK
Read Command
AT+CNMI?
Response(s)
+CNMI: <mode>, <mt>, <bm>, <ds>, <bfr>
OK
Write Command
AT+CNMI=<mode>[, <mt>[, <bm>[, <ds>[, <bfr>]]]]
Response(s)
OK
ERROR
+CMS ERROR: <err>

Unsolicited Result Codes

URC 1

   <mt>=1:

   +CMTI: <mem3>, <index>

   Indicates that new message has been received

URC 2

   <mt>=2 (PDU mode enabled):

   +CMT: <length><**CR><LF**><pdu>

   Indicates that new message has been received

URC 3

   <mt>=2 (text mode enabled):

   +CMT: <oa>, <scts>[, <tooa>, <fo>, <pid>, <dcs>, <sca>, <tosca>,

   <length>]<**CR><LF**><data>

   Indicates that new message has been received

URC 4

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        `<bm>=2 (PDU mode enabled)`:

        `+CBM: <length><`**`CR><LF>`**`<pdu>`

        Indicates that new cell broadcast message has been received

URC 5

        `<bm>=2 (text mode enabled)`:

        `+CBM: <sn>, <mid>, <dcs>, <page>, <pages><`**`CR><LF>`**`<data>`

        Indicates that new cell broadcast message has been received

URC 6

        `<ds>=1 (PDU mode enabled)`:

        `+CDS: <length><`**`CR><LF>`**`<pdu>`

        Indicates that new SMS status report has been received

URC 7

        `<ds>=1 (text mode enabled)`:

        `+CDS: <fo>, <mr>[, <ra>][, <tora>], <scts>, <dt>, <st>`

        Indicates that new SMS status report has been received

URC 8

        `<ds>=2`:

        `+CDSI: <mem3>, <index>`

        Indicates that new SMS status report has been received

Parameter Description

`<mode>`(num)(&W)(&V)

[0](&F)	SMS related URCs are always buffered in the ME. If the buffer is full, the oldest indications are discarded and replaced with newly received indications.
1	SMS related URCs are forwarded directly to the TE. However, if this is not possible because ME-TE link is reserved, e.g. during a data call, these URCs are discarded.
2	SMS related URCs are forwarded directly to the TE. However, if this is not possible because ME-TE link is reserved these URCs are buffered and flushed to the TE afterwards.
3	SMS related URCs are forwarded directly to the TE. However, if this is not possible because ME-TE link is reserved these URCs are buffered and flushed to the TE afterwards. Additionally, while ME-TE link is reserved, buffered URCs are signaled to the TE via sending a BREAK or activating the RING line, according to `AT^SCFG` parameters `<uri>`, `<udri>` and `<urat>`.

`<mt>`(num)(&W)(&V)

Rules for storing received short messages depend on the relevant data coding method (refer to GSM 03.38), preferred memory storage (`AT+CPMS`) setting and this value.

Note: If AT command interface is acting as the only display device, the ME must support storage of class 0 messages and messages in the message waiting indication group (discard message)

[0](&F)	No SMS-DELIVER indications are routed to the TE.
1	If SMS-DELIVER is stored in the ME, indication of the memory location is routed to the

	TE via URC.
2	SMS-DELIVERs, except class 2 messages and messages in the message waiting indication group (store message) are routed directly to the TE via URC.
3	Class 3 SMS-DELIVERs are routed directly to the TE using URCs defined in `<mt>`=2. Messages of other data coding schemes result in indication as defined in `<mt>`=1.

`<bm>`(num)(&W)(&V)

Rules for storing received CBMs depend on the relevant data coding method (refer to GSM 03.38), the setting of Select CBM Types (`AT+CSCB`) and this value:

[0]^(&F)	No CBM indications are routed to the TE.
2	New CBMs are routed directly to the TE via URC.
3	Class 3 CBMs are routed directly to TE using URCs defined in `<bm>`=2.

`<ds>`(num)(&W)(&V)

[0]^(&F)	No SMS-STATUS-REPORTs are routed to the TE.
1	SMS-STATUS-REPORTs are routed to the TE via URC.
2	If SMS-STATUS-REPORT is routed into ME, indication of the memory location is routed to the TE via URC.

`<bfr>`(num)(&V)

[1]^(&F)	ME's buffer of SMS related URCs is cleared when `<mode>` changes from 0 to 1, 2 or 3.

`<index>`(num)

Integer type; value in the range of location numbers supported by the associated memory

Notes

- Parameters <mt>=2,3 and <ds>=1 are only available with GSM phase 2+ (see AT+CSMS=1). Incoming SMs or Status Reports have to be acknowledged with AT+CNMA=0 when using these phase 2+ parameters.
- If the ME operates on different instances (or ASC0/ASC1) avoid different settings for routing and indicating short messages. For example, if messages shall be routed directly to one instance of the TE (set with AT+CNMI, AT^SSDA), it is not possible to activate the presentation of URCs with AT+CMER or AT+CNMI on another instance. Any attempt to activate settings that conflict with existing settings on another interface, will result in "+CME ERROR", or accordingly "+CMS ERROR".
- Handling of Class 0 short messages:

  If the host application is provided with a display and `AT^SSDA`=1 has been set Class 0 short messages can be displayed immediately.

  If the host application does not include a display, ME handles Class 0 short messages as though there was no message class, i.e. it will ignore bits 0 and 1 in the `<dcs>` and normal rules for exceeded memory capacity shall apply. This approach is compliant with GSM 03.38 .
- The parameters <ra> and <tora> will only be displayed if <mode> of the AT^SSCONF command is set to 1.
- If either a SM or a Status Report is not acknowledged, all AT+CNMI parameter in all channels will be set to zero.

11.12 AT+CPMS Preferred SMS message storage

The write command selects memory storages <mem1>,<mem2>, <mem3> to be used for reading, writing, etc.

Syntax

Test Command
AT+CPMS=?
Response(s)
+CPMS: (list of supported <mem1>s), (list of supported <mem2>s), (list of supported <mem3>s)
OK
Read Command
AT+CPMS?
Response(s)
+CPMS: <mem1>, <used1>, <total1>, <mem2>, <used2>, <total2>, <mem3>, <used3>, <total3>
OK
ERROR
+CMS ERROR: <err>
Write Command
AT+CPMS=<mem1>[, <mem2>[, <mem3>]]
Response(s)
+CPMS: <used1>, <total1>, <used2>, <total2>, <used3>, <total3>
OK
ERROR
+CMS ERROR: <err>

Parameter Description

<used1>(num)

Number of messages currently in <mem1>

<used2>(num)

Number of messages currently in <mem2>

<used3>(num)

Number of messages currently in <mem3>

<total1>(num)

Number of messages storable in <mem1>

<total2>(num)

Number of messages storable in <mem2>

<total3>(num)

Number of messages storable in <mem3>

Notes

- The Mobile Equipment storage "ME" offers space for 25 short messages, see <mem1>.

- "MT" is the sum of "ME" (= 25 locations) and "SM" (capacity varies with SIM card). The indices <index> of the "MT" storage are dependent on the order selected with AT^SSMSS

- The <mem1>, <mem2> and <mem3> parameter will be stored in non-volatile memory.

- The user should be aware that the setting "MT" involves "ME" and "SM", with "ME" being filled up first. If the "ME" storage is full, G2111/G2151I series will proceed with the "SM" storage.

  Incoming Class 1 short messages (ME specific) will be preferably stored to "ME" and may be transferred to the "SM" storage if "ME" is used up.

  Incoming Class 2 messages (SIM specific) will be stored to the SIM card only, no matter whether or not there is free "ME" space. As a result, the ^SMGO: 2 indication (see AT^SMGO) may be presented without prior indication of ^SMGO: 1. For more information regarding SIM and ME specific message classes refer to <dcs> and the following specifications: GSM 03.38 and 3GPP TS23038.

- When <mem3> is switched over from "MT" to "SM" all free "ME" locations will be filled with dummy short messages. This procedure can take up to 35 seconds, until all the 25 records are written.

  If switching from "MT" to "SM" was not finished due to error or user break, the value of <mem3> remains "MT", but some of the dummy records remain in the "ME" storage. These records have to be deleted manually. When <mem3> equals "SM", do not delete the dummy messages in the "ME". storage. They will be automatically deleted when you switch back from "SM" to "MT". Again, this may take up to 35 seconds. If switching from "SM" to "MT" was not finished due to an error or user break, the value of <mem3> remains "SM", but the "ME" storage will no longer be filled with dummy records. New incoming short messages may now be written to the "ME" storage, if "SM" is already full. To avoid this, repeat the AT+CPMS command as soon as possible to switch <mem3> back to "MT". As an alternative, you can manually delete the dummy records and issue AT+CPMS=MT,MT,MT.

- While <mem3> equals "SM" and <mem1> equals "ME" it is possible that, after deleting short messages from "ME", the freed space on "ME" is reclaimed for new incoming short messages, when there is no space left on the "SM" storage. As it is often the clients concern to have received short messages stored only to the SIM card, inconsistent settings should be generally avoided. This can be achieved simply by using the same parameter for all memory indices.

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.

- The indices <index> of the storage are dependent on the order selected with AT^SSMSS.

11.13 AT+CSCA SMS Service Center Address

Write command updates the SMSC address, through which mobile originated SMs are transmitted. In text mode, setting is used by send and write commands. In PDU mode, setting is used by the same commands, but only when the length of the SMSC address coded into the <pdu> parameter equals zero.

Syntax

Test Command
AT+CSCA=?
Response(s)
OK
Read Command
AT+CSCA?
Response(s)
+CSCA: <sca>, <tosca>
OK
Write Command

AT+CSCA=<sca>[, <tosca>]
Response(s)
OK

Notes

- In case of using no parameter after AT+CSCA= the content of <sca> will be deleted.
- This command writes the service center address to non-volatile memo.
- The SMS service center address should be entered as specified by the service provider.

11.14 AT+CSCB Select Cell Broadcast Message Indication

The test command returns the supported modes as a compound value.

The write command selects which types of CBMs are to be received by the ME.

Syntax

Test Command
AT+CSCB=?
Response(s)
+CSCB: (list of supported <mode>s)
OK
Read Command
AT+CSCB?
Response(s)
+CSCB: <mode>, <mids>, <dcss>
OK
Write Command
AT+CSCB=<mode>[, <mids>[, <dcss>]]
Response(s)
OK

Parameter Description

<mode>(num)

Message mode

0(&F)   Accept messages that are defined in <mids> and <dcss>

1   Forbid messages that are defined in <mids> and <dcss>

<mids>(str)

Cell Broadcast Message ID specification

[""](&F)   Default value of this parameter is empty string, and it means that no CBM identifiers are
                       specified.

- For <mode>=0: Six different possible combinations of CBM IDs (e.g. "0,1,5,320-478,922,2000-3000").
  In certain configurations, e.g. if using SIMs that contain data in Elementary File EF-CBMID (Cell Broadcast
  Message Identifier for Data download) less than six combinations may be available.
  To access a SIM's Elementary File data refer to command AT+CRSM.
- For <mode>=1: One CBM ID or range of IDs (e.g. "320-478").

`<dcss>`(str)

CBM data coding scheme specification

[""](&F)   default value of this parameter is empty string

All different possible combinations of CBM data coding schemes (e.g. "0-3,5"). Using default empty string leads to get all CBMs independent of their dcss.
A given `<dcss>` replaces any former value and is used for consecutive requests.

11.15 AT+CSDH Show SMS text mode parameters

The write command sets whether or not detailed header information is shown in text mode result codes.

Syntax

Test Command
AT+CSDH=?
Response(s)
+CSDH: (list of supported <show>s)
OK
Read Command
AT+CSDH?
Response(s)
+CSDH:<show>
OK
Write Command
AT+CSDH=<show>
Response(s)
OK

Parameter Description

`<show>`(num)(&W)

[0](&F)   Do not show header values defined in commands AT+CSCA and AT+CSMP
                         (<sca>, <tosca>,<fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or
                         <tooa> in "+CMTI", AT+CMGL, AT+CMGR result codes for SMS-DELIVERs and
                         SMS-SUBMITs in text mode; for SMS-COMMANDs in +CMGR result code, do
                         not show <pid>,<mn>,<da>, <toda>, <length> or <cdata>
1   Show the values in result codes

11.16 AT+CSMP Set SMS text Mode Parameters

The write command selects values for additional parameters needed when the short message is sent to the network or placed in a storage when text format message mode is selected.

It is possible to set the validity period starting from the time when the short message is received by the SMSC (`<vp>` is in range 0... 255) or define the absolute time of the validity period termination (`<vp>` is a string). The format of `<vp>` is given by `<fo>`. If TA supports the enhanced validity period format, see GSM 03.40), it shall be given as a hexadecimal coded string (e.g. `<pdu>`) with quotes.

Syntax

Test Command
AT+CSMP=?
Response(s)
OK
Read Command
AT+CSMP?
Response(s)
+CSMP:<fo>, <vp>/ <scts>, <pid>, <dcs>
OK
Write Command
AT+CSMP=<fo>[, <vp>/<scts>[, <pid>[, <dcs>]]]
Response(s)
OK
ERROR
+CMS ERROR: <err>

Parameter Description

<fo>(num)

First Octet

depending on the command or result code: first octet of GSM 03.40 SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, or SMS-COMMAND (default 2) in integer format

$0...17^{(\&F)}...255$

<vp>(num)

Depending on SMS-SUBMIT <fo> setting: GSM 03.40 TP-Validity-Period either in integer format or in time-string format (refer <dt>)

$0...167^{(\&F)}...255$

<dcs>(num)

Data Coding Scheme

GSM 03.38 SMS Data Coding Scheme, or Cell Broadcast Data Coding Scheme in integer format

$0^{(\&F)}...247$

<pid>(num)

Protocol Identifier

GSM 03.40 TP-Protocol-Identifier in integer format

$0^{(\&F)}...255$

Notes

- When storing a SMS DELIVER from the TE to the preferred memory storage in text mode (using the AT+CMGW write command), <vp> field can be used for <scts>.
- The command writes the parameters to the non-volatile memory.

11.17 AT+CSMS Select Message Service

Syntax

Test Command
AT+CSMS=?
Response(s)
+CSMS: (list of supported<service>s)
OK
Read Command
AT+CSMS?
Response(s)
+CSMS: <service>, <mt>, <mo>, <bm>
OK
Write Command
AT+CSMS=<service>
Response(s)
+CSMS: <mt>, <mo>, <bm>
OK
ERROR
+CMS ERROR: <err>

Parameter Description

<service>(num)(&W)(&V)

0(&F)	GSM 03.40 and GSM 03.41 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2 version 4.7.0; Phase 2+ features which do not require new command syntax may be supported, e.g. correct routing of messages with new Phase 2+ data coding schemes)
1	GSM 03.40 and GSM 03.41 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2+ version; the requirement of <service> setting 1 is mentioned under corresponding command descriptions).

<mt>(num)(&V)

Mobile Terminated Messages:

0	Type not supported
1	Type supported

<mo>(num)(&V)

Mobile Originated Messages:

0	Type not supported
1	Type supported

<bm>(num)(&V)

Broadcast Type Messages:

0	Type not supported
1	Type supported

Notes

- If CSMS mode is switched from Phase 2+ to Phase 2 and one or more AT+CNMI Parameter are Phase 2+ specific a "+CMS ERROR: unknown error" will appear. It is recommended to switch the AT+CNMI Parameters to Phase 2 specific values before entering Phase 2.
- Phase 2+ (<service>=1) must be set before the following features can be used:
  - ➢ Configuring procedures for indicating received short messages with the AT+CNMI parameters <mt>=2 or <mt>=3 and <ds>=1.
  - ➢ Acknowledging incoming short messages with AT+CNMA.
  - ➢ Receiving Status Reports and acknowledging them with AT+CNMA.

11.18 AT^SLMS List SMS Memory Storage

AT^SLMS indicates the max. capacity of each SMS storage type and the number of locations currently used.

Syntax

Test Command
AT^SLMS=?
Response(s)
OK
Exec Command
AT^SLMS
Response(s)
^SLMS: "MT",<total3>, <used3>
^SLMS: "SM",<total1>, <used1>
^SLMS: "ME",<total2>, <used2>
OK
ERROR
+CMS ERROR: <err>

Parameter Description

<total1>^(num)

Maximum number of messages storable in the SMS memory of the SIM (physical storage "SM")

<total2>^(num)

Maximum number of messages storable in the SMS memory of the Mobile Equipment (physical storage "ME")

<total3>^(num)

Sum of "SM" and "ME", indicated as "MT". Maximum number of all messages storable in the SIM memory and the Mobile Equipment memory.

<used1>^(num)

Number of messages currently stored in the SMS memory of the SIM (physical storage "SM")

<used2>^(num)

Number of messages currently stored in the SMS memory of the Mobile Equipment (physical storage "ME")

`<used3>`^(num)

Concatenated logical SMS storages of SIM ("SM") and Mobile Equipment ("ME"). Sum of all messages currently stored, indicated as "MT".

Note

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.

11.19 AT^SMGL List Short Messages from preferred store without set- ting status to REC READ

The write command allows to select a status type and lists, from the message storage `<mem1>`, all messages that currently have the specified `<stat>`. The major difference over the standard command AT+CMGL is that the status of the listed messages remains u n c h a n g e d (unread remains unread).

The execute command is the same as the write command, but uses the given default of `<stat>`.

Syntax

Test Command
AT^SMGL=?
Response(s)
same as AT+CMGL
Exec Command
AT^SMGL
Response(s)
^SMGL: (For default values of \<stat\>, see "Section 13.1, SMS Parameters.)
OK
Write Command
AT^SMGL=\<stat\>
Response(s)
same as AT+CMGL

Notes

- The selected <mem1> can contain different types of SMs (e.g. SMS-DELIVERs, SMS-SUBMITs, SMS-STATUS-REPORTs and SMS-COMMANDs), the response may be a mix of the responses of different SM types. TE application can recognize the response format by examining the third response parameter.
- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.

11.20 AT^SMGO Set or query SMS overflow presentation mode or query SMS overflow

The write command sets the overflow presentation mode.

The read command returns the overflow presentation mode and the SMS overflow status.

Syntax

Test Command
AT^SMGO=?
Response(s)
^SMGO: (list of supported<n>s)
OK
Read Command
AT^SMGO?
Response(s)
^SMGO: <n>, <mode>
OK
ERROR
+CMS ERROR: <err>
Write Command
AT^SMGO=<n>
Response(s)
OK
ERROR
+CMS ERROR: <err>

Unsolicited Result Code

SMS buffer change:

^SMGO: <mode>

Status of SMS buffer has changed.

Parameter Description

<n>(num)(&W)(&V)

SMS overflow presentation mode

[0](&F)   Disable

1   Enable

<mode>(num)(&V)

SMS overflow status

0   Space available
1   SMS buffer full (The buffer for received short messages is <mem3>. See AT+CPMS·)
2   Buffer full and new message waiting in SC for delivery to phone

Notes

• Incoming short messages with message class 1 (ME specific short messages) or class 2 (SIM specific short messages), see <dcs> in GSM 03.38, will be stored either in "ME" or in "SM" storage. Therefore the "^SMGO: 2" indication could occur, without issuing the indication "^SMGO: 1" before. The indication "^SMGO: 1" means that both buffers ("ME" and "SM") are full.

• For more information regarding SIM and ME specific message classes refer to <dcs> and the following specifications: GSM 03.38 and 3GPP TS 23.038 .

11.21 AT^SMGR Read short message without setting status to REC READ

The `AT^SMGR` command is a proprietary command which has the same syntax as `AT+CMGR`. The only functional difference is that the status "REC UNREAD" of a short message is not overwritten to "REC READ".

Syntax

Test Command
AT^SMGR=?
Response(s)
^SMGR:
OK
Write Command
AT^SMGR=<index>
Response(s)
see AT+CMGR

Note

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.

11.22 AT^SSCONF SMS Command Configuration

`AT^SSCONF` controls the presentation of the SMS parameters `<ra>` and `<tora>`. `<ra>` and `<tora>` are indicated within the result codes of `AT+CMGL`, `AT^SMGL`, `AT+CMGR`, `AT^SMGR` and the URC "+CDS".

Syntax

Test Command
AT^SSCONF=?
Response(s)
^SSCONF:(list of supported <mode>s)
OK
Read Command
AT^SSCONF?
Response(s)
^SSCONF:<mode>
OK
Write Command
AT^SSCONF=<mode>
Response(s)
OK

Parameter Description

<mode>(num)

Display recipient address

0(&F)(P)	G2111/G2151I series does not display `<ra>` and `<tora>`.
1	G2111/G2151I series displays `<ra>` and `<tora>`.

11.23 AT^SSDA Set SMS Display Availability

This command allows to notify the G2111/G2151I series of its controlling application's capability to immediately display incoming SMS on a display.

If the application is able to display incoming short messages, a class 0 message shall be displayed immediately. However, if it does not, class 0 messages shall be treated as if no message class is determined (GSM 03.38). The effect of this command if <da>=1 is to determine the behavior of parameter <mt> of AT+CNMI:

If <da>=1 and <mt>=1 or <mt>=3 incoming class 0 messages need to be acknowledged with AT+CNMA (see also AT+CNMI and AT+CSMS)

Syntax

Test Command
AT^SSDA=?
Response(s)
^SSDA:(list of supported <da>s)
OK
Read Command
AT^SSDA?
Response(s)
^SSDA:<da>
OK
Write Command
AT^SSDA=<da>
Response(s)
OK

Parameter Description

<da>(num)

Display Availability

0(&F)   Application is not able to display incoming short message

1   Application is able to display incoming short message

Note

- If the ME operates on different instances avoid different settings for routing and indicating short messages. For example, if messages shall be routed directly to one instance of the TE (set with AT+CNMI, AT^SSDA), it is not possible to activate the presentation of URCs with AT+CMER or AT+CNMI on another instance. Any attempt to activate settings that conflict with existing settings on another interface, will result in "+CME ERROR", or accordingly "+CMS ERROR".

11.24 AT^SSMSS Set Short Message Storage Sequence

The short message storage "MT" (see AT+CPMS) is a logical storage. It consists of two physical storages "ME" and "SM". This command allows to select the sequence of addressing this storage.

Syntax

Test Command
AT^SSMSS=?

Response(s)
^SSMSS: (list of supported <seq>s)
Read Command
AT^SSMSS?
Response(s)
^SSMSS: <seq>
OK
Write Command
AT^SSMSS=<seq>
Response(s)
OK

Parameter Description

<seq>(num)

MT sequence

0(&F)(P)   "MT" storage is "ME" then "SM

1   "MT" storage is "SM" then "ME"

Note

- Access to the SIM storage is faster. For compatibility with previous software releases, the "MT" sequence <seq>=0 is the factory default.

12

SIM related Commands

AT commands described in this chapter are related to the Subscriber Identity Module (SIM) connected to the

G2111/G2151I series.

Note:

If using data from the SIM please bear in mind that the content of all Elementary Files is *subject to change* at any moment!

This is because the network can change the SIM's data in the background via SIM Application Toolkit (SAT) procedure "Data download to SIM". For a detailed description please refer to 3GPP TS 11.14 (GSM 11.14).

The following topics are covered in this chapter:

12.1   AT+CRSM Restricted SIM Access

AT+CRSM offers easy access of the Elementary Files on the SIM. Access to the SIM database is restricted to the commands which are listed at <command>. However, additional SIM commands are available via AT^SXSM. All parameters of AT+CRSM are used as specified by GSM 11.11. G2111/G2151I series handles internally all required SIM interface locking and file selection routines.

As response to the command, the G2111/G2151I series sends the actual SIM information parameters and response data. Error result code "+CME ERROR" may be returned if the command cannot be passed to the SIM, e.g. if the SIM is not inserted. However, failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters.

Please beware of *possible changes to Elementary Files* by the network at any time, refer Chapter 12. SIM related Commands.

Syntax

Test Command	
AT+CRSM=?	
Response(s)	
OK	
Write Command	
AT+CRSM=<command>[, <fileID>[, <P1>, <P2>, <P3>[, <data>]]]	
Response(s)	
+CRSM: <sw1>,<sw2>[,<response>]	
OK	
ERROR	
+CME ERROR: <err>	
PIN ASC0 ASC1 ☼ Last	Reference(s)
- + + - -	GSM 07.07

Parameter Description

<command>(num)

SIM command number.

176	READ BINARY
178	READ RECORD
192	GET RESPONSE
214	UPDATE BINARY
220	UPDATE RECORD
242	STATUS

<fileID>(num)

Identifier for an elementary data file on SIM, if used by <command>.

<P1>(num)

Parameter to be passed on by the G2111/G2151I series to the SIM.

0...255

<P2>(num)

Parameter to be passed on by the G2111/G2151I series to the SIM.

0...255

<P3>(num)

Parameter to be passed on by the G2111/G2151I series to the SIM.

0...255

<data>(str)

Information which shall be written to the SIM (hexadecimal character format).

<sw1>(num)

Status information from the SIM about the execution of the actual command. It is returned in both cases, on successful or failed execution of the command.

0...255

<sw2>(num)

Status information from the SIM about the execution of the actual command. It is returned in both cases, on successful or failed execution of the command.

0...255

<response>(str)

Response data in case of a successful completion of the previously issued command.

"STATUS" and "GET RESPONSE" commands return data, which gives information about the currently selected elementary data field. This information includes the type of file and its size.

After "READ BINARY" or "READ RECORD" commands the requested data will be returned.

<response> is empty after "UPDATE BINARY" or "UPDATE RECORD" commands.

12.2   AT^SXSM Extended SIM Access

AT^SXSM extends AT+CRSM with additional SIM commands.

All parameters of AT^SXSM are used as specified by GSM 11.11. G2111/G2151I series handles internally all required SIM interface locking and file selection routines.

G2111/G2151I series may return error result code "+CME ERROR" if the command cannot be passed to the SIM, e.g. if no SIM is inserted. However, errors related to SIM action are reported in <sw1> and <sw2> parameters as defined in GSM 11.11.

Syntax

Test Command
AT^SXSM=?
Response(s)
OK
Write Command
AT^SXSM=<command>[, <fileID>[, <P1>, <P2>, <P3>[, <data>]]]

```
Response(s)
^SXSM: <sw1>, <sw2>[,<response>]
OK
ERROR
+CME ERROR: <err>
```

Parameter Description

<command>(num)

136   RUN GSM ALGORITHM

Start the authentication mechanism and cipher key generation on the SIM. It runs the algorithms A3 and A8 using a 16 byte random number and the sub- scriber authentication key Ki, which is stored in the SIM.

<fileID>(num)

Identifier for an elementary data file on SIM, if used by <command>.

<P1>(num)

Parameter to be passed on by the G2111/G2151I series to the SIM.

<P2>(num)

Parameter to be passed on by the G2111/G2151I series to the SIM.

<P3>(num)

Parameter to be passed on by the G2111/G2151I series to the SIM.

<data>(str)

If <command>=136 (RUN GSM ALGORITHM):

16 byte random number.

<sw1>(num)

Status information from the SIM about the execution of the actual command. It is returned in both cases, on successful or failed execution of the command.

0...255

<sw2>(num)

Status information from the SIM about the execution of the actual command. It is returned in both cases, on successful or failed execution of the command.

0...255

<response>(str)

Response in case of a successful completion of the previously issued SIM command.

If `<command>`=136 (RUN GSM ALGORITHM):

G2111/G2151I series returns SRES and cipher key Kc as calculated by the SIM.

Byte(s)	Description	Length
1 - 4	SRES - Signed RESponse	4
5 - 12	Kc - Cipher Key	8

Example

Use `<command>`=136 (RUN GSM ALGORITHM) to obtain SRES and cipher key Kc values as calculated by the SIM.

`at^sxsm=136,,0,0,16,"0011223` `3445566778899AABBCCDDEEFF"`	Start SIM command "RUN GSM ALGORITHM" with 16 byte random number.
`^SXSM:` `144,0,00112233445566778899AA` `BB` `OK`	SRES (bytes 1-4) and Cypher Key Kc (bytes 5-12) values as returned by the SIM.

12.3   AT^SCKS Query SIM and Chip Card Holder Status

This command controls the SIM connection presentation mode and queries the connection status of the SIM and the card holder tray of the G2111/G2151I series.

Syntax

Test Command
AT^SCKS=?
Response(s)
^SCKS:(list of supported <mode>s)
OK
Read Command
AT^SCKS?
Response(s)
^SCKS: <mode>, <SimStatus>
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SCKS=<mode>
Response(s)
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Code

`^SCKS: <SimStatus>`

If the SIM connection status has changed an unsolicited result code (URC) is issued.

Parameter Description

`<mode>`(num)(&W)(&V)

| 0(&F) | Suppress unsolicited result codes |
| 1 | Output unsolicited result codes |

<SimStatus>(num)(&V)	
0	Card holder tray removed or SIM connection error
1	SIM inserted (refer to note)
2	The SIM interface hardware has been deactivated (e.g. because an invalid SIM or a SIM with unsupported electrical specifications has been detected). The SIM interface can be reactivated only by restarting the ME, e.g. via "AT+CFUN=n,1".

Note

- <SimStatus> reflects the status of the SIM and the card holder tray. Therefore if an empty SIM card holder tray is inserted, two URCs will be presented, indicating the status 1 followed by 0. See example.

Example

AT^SCKS=1	Activates the presentation of unsolicited result codes
OK	

Now, after inserting an empty card tray the following URCs appear:

^SCKS: 1	Tray connected
^SCKS: 0	No SIM card found

12.4 AT^SCID Display SIM card identification number

Syntax

Test Command
AT^SCID=?
Response(s)
OK
Exec Command
AT^SCID
Response(s)
^SCID: <cid>
OK
ERROR
+CME ERROR: <err>

Command Description

TA returns the card identification number in SIM (SIM file EF_{ICCID}, see GSM 11.11 Chap.10.1.1) as string type.

Parameter Description

<cid>(str)

card identification number of SIM card

12.5   AT+CXXCID Display card ID

Syntax

Test Command		
AT+CXXCID=?		12-7
Response(s)		
OK		
Exec Command		
AT+CXXCID		
Response(s)		
+CXXCID: <cid>		
OK		
ERROR		
+CME ERROR: <err>		

Command Description

TA returns the card identification number in SIM (SIM file EF ICCID, see GSM 11.11 Chap.10.1.1) as string type.

Note

• See also: AT^SCID.

13

Hardware related Commands

All AT commands described in this chapter are related to the hardware interface of the G2111/G2151I series.

The following topics are covered in this chapter:

13.1   AT+CCLK   Real Time Clock

Syntax

Test Command		
AT+CCLK=?		
Response(s)		
OK		
Read Command		
AT+CCLK?		
Response(s)		
+CCLK: <time>		
OK		
Write Command		
AT+CCLK=<time>		
Response(s)		
OK		
ERROR		
+CME ERROR: <err>		

Parameter Description

$<time>^{(str)}$

Format is "yy/mm/dd,hh:mm:ss", where the characters indicate the two last digits of the year, followed by month, day, hour, minutes, seconds; for example 6th of July 2005, 22:10:00 hours equals to "05/07/06,22:10:00" Factory default is "03/01/01,00:00:00"

Notes

- <time> is retained if the device enters the Power Down mode via AT^SMSO.
- <time> will be reset to its factory default if power is totally disconnected. In this case, the clock starts with <time>= "03/01/01,00:00:00" upon next power-up.

13.2   AT+CALA Alarm Configuration

AT+CALA allows to set an alarm time for the G2111/G2151I series. When the alarm time is reached and the alarm is executed the ME returns an Unsolicited Result Code (URC) and the alarm time is reset to "00/01/01,00:00:00".

The alarm can adopt two functions, depending on whether or not you switch the GSM engine off after setting the alarm:

- Reminder message: You can use the alarm function to generate reminder messages. For this purpose, set the alarm as described below and do not switch off or power down the ME. When executed the message comes as "+CALA" URC which optionally may include a user defined <text>.
- Alarm mode: You can use the alarm function to restart the ME when powered down. For this purpose, set the alarm as described below. Then power down the ME via AT^SMSO. When the alarm time is reached the ME will wake up to Alarm mode, notified by the "^SYSSTART ALARM MODE" URC and, if configured, by an additional "+CALA" URC with a user defined <text>.

  During Alarm mode the ME is deregistered from the GSM network and only two AT commands are available. A 30 seconds Power Down timer starts instantly after the alarm event occurred. During this time you can either switch off the ME with AT^SMSO, or enter the reset command AT+CFUN=x,1 if you want the ME to return to full operation (Normal mode). Transition to Normal mode is indicated by the "^SYSSTART" URC if AT+IPR is set to a fixed bit rate.

Please consider, that if the ME does not receive the AT+CFUN=x,1 command within the 30 seconds timeout, the ME will automatically shut down.

AT+CALA test command returns the supported array index values <n>, the supported alarm types <type> and the maximum length of the text <tlength>.

AT+CALA read command returns the current alarm settings.

Syntax

Test Command
AT+CALA=?
Response(s)
+CALA: (list of supported<n>s), (list of supported<type>s), (list of supported<tlength>s)
OK
ERROR
+CME ERROR: <err>
Read Command
AT+CALA?
Response(s)
+CALA: <time>, <n>, <type>, <text>
+CALA: ...
OK
ERROR
+CME ERROR: <err>
Write Command
AT+CALA=<time>, <n>[, <type>[, <text>]]
Response(s)
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Codes

URC 1

   +CALA: [<text>]

   Indicates reminder message.

URC 2

   ^SYSSTART ALARM MODE

   +CALA: <text>

   Indicates ME wake-up into Alarm mode.

URC 3

   +CALA: Unexpected Error

   Indicates Unexpected CALA functionality error. When such an error occurs all alarm timers will be stopped and reset to default values.

Parameter Description

<time>(str)

Format is "yy/MM/dd,hh:mm:ss". For example, 6th of July 2005, 22:10:00 equals to "05/07/06,22:10:00". See also AT+CCLK.

If you attempt to set <time> to a date and time which is older than the ME's current time, one "+CALA" URC will be returned, and no alarm timer will be set.

To clear a given alarm before its scheduled time simply enter an empty string for parameter <time>.

`<n>`(num)

Integer type value indicating the array index of the alarm.

0 .. 4

`<type>`(num)

Integer type value indicating the type of the alarm.

0   Alarm indication: text message via serial interface

`<text>`(str)

String type value indicating the text to be displayed when alarm time is reached; maximum length is `<tlength>`. By factory default, `<text>` is undefined.

Note: `<text>` will be stored to the non-volatile flash memory when the device enters the Power Down mode via `AT^SMSO`. Once saved, it will be available upon next power-up, until you overwrite it by typing another text. This eliminates the need to enter the full string when setting a fresh alarm.

`<text>` should not contain characters which are coded differently in ASCII and GSM (e.g. umlauts), see also "Supported character sets" and "GSM alphabet tables".

`<tlength>`(num)

Integer type value indicating the maximum length of `<text>`. The maximum length is 16.

Notes
- After the alarm was executed the parameter <time> of AT+CALA will be reset to "00/01/01,00:00:00", but <text> will be preserved as described above.
- If ME is totally disconnected from power supply the most recently saved configuration of +CALA: <time>,<n> [,<type>[,<text>]] will be presented when ME is powered up.
- When an alarm is set on a given ASC interface only this interface will be allowed for further AT+CALA read/write operations. Using the read/write AT+CALA command on another interface will result an ERROR until the last alarm timer was executed or deleted.

Examples

EXAMPLE 1

You may want to configure a reminder message for July 31, 2005, at 9.30h, including the message "Good Morning".

```
AT+CALA="05/07/31,09:30:00",0,0,"Good Morning"
OK
```

Do not switch off the GSM engine. When the alarm occurs the ME returns the following URC:

```
+CALA: Good Morning
```

EXAMPLE 2

To set a fresh alarm using the same message as in Example 1, simply enter date, time and alarm index. `<type>,<text>,<tlength>` can be omitted:

```
AT+CALA="05/07/31,08:50:00",0
OK
```

When the alarm is executed the URC comes with the same message:

```
+CALA: Good Morning
```

EXAMPLE 3

To enable the ME to wake up into Alarm mode, e.g. on July 20, 2005, at 8.30h, enter

```
AT+CALA="05/07/20,08:30:00",0
OK
```

Next, power down the ME:

```
AT^SMSO
^SMSO: MS OFF
OK
^SHUTDOWN
```

When the alarm is executed the ME wakes up to Alarm mode and displays a URC. If available, this line is followed by the individual `<text>` most recently saved. If no individual message was saved only the first line appears.

```
^SYSSTART ALARM MODE
+CALA: Good Morning
```

13.3 AT^SBV Battery/Supply Voltage

`AT^SBV` allows to monitor the supply (or battery) voltage of the module. The voltage is continuously measured at intervals depending on the operating mode of the RF interface. The duration of a measurement period ranges from 0.5s in TALK / DATA mode up to 50s when G2111/G2151I series is in IDLE mode or Limited Service (deregistered). The displayed value is averaged over the last measuring period before the `AT^SBV` command was executed.

The measurement is related to the reference points of BATT+ and GND.

Syntax

Test Command
AT^SBV=?
Response(s)
OK
ERROR
+CME ERROR: <err>
Exec Command
AT^SBV
Response(s)
^SBV: <value>
OK
ERROR
+CME ERROR: <err>

Parameter Description

`<value>`(num)

Supply (or battery) voltage in mV

13.4 AT^SCTM Critical Operating Temperature Monitoring

AT^SCTM allows to monitor the operating temperature range of the G2111/G2151I series device. Refer to "G2111/G2151I series Hardware Interface Description" for specifications on critical temperature ranges.

AT^SCTM write command controls the presentation of URCs to report critical operating temperature limits.

Use parameter <UrcMode> to enable (1) and disable (0) URC presentation.

Important: Even if setting is <UrcMode>=0 URC presentation is enabled for a period of 15 seconds after G2111/G2151I series was switched on. After expiry URC presentation will be disabled, i.e. no URCs will be generated.

To avoid damage the module will shut down once the critical temperature is exceeded.

The procedure is equivalent to the power-down initiated with AT^SMSO.

Level "2" or "-2" URCs are followed by immediate shutdown. The presentation of these URCs is always enabled, i.e. they will be output even though the factory setting AT^SCTM=0 was never changed. URCs indicating alert levels "1" or "-1" are intended to enable the user to take appropriate precautions, such as protect G2111/G2151I series from exposure to extreme conditions, or save or back up data etc.

AT^SCTM read command returns:
- The URC presentation mode.
- Information about the current temperature range of the G2111/G2151I series device.
- The board temperature (in degree Celsius) if parameter <tempCtrl>=1.

Syntax

Test Command
AT^SCTM=?
Response(s)
^SCTM:(list of supported <UrcMode>s)[, (list of supported <tempCtrl>s)]
OK
Read Command
AT^SCTM?
Response(s)
^SCTM: <UrcMode>, <UrcCause>[, <temp>]
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SCTM=<UrcMode>[, <tempCtrl>]
Response(s)
OK
ERROR
+CME ERROR: <err>

Unsolicited Result Code

URCs will be automatically sent to the TE when the temperature reaches or exceeds the critical level, or when it is back to normal.

^SCTM_B: <UrcCause>

URC for G2111/G2151I series device temperature warning.

Parameter Description

<UrcMode>(num)

URC presentation mode

0(&F)(P)   Disable URC presentation (except for <UrcCause> equal to -2 or +2).

1   Enable URC presentation.

<UrcCause>(num)

-2	Below lowest temperature limit (causes immediate switch-off)
-1	Below low temperature alert limit
0	Normal operating temperature
1	Above upper temperature alert limit
2	Above uppermost temperature limit (causes immediate switch-off)

<tempCtrl>(num)

0(&F)(P)   Suppress output of <temp> in read command.

1   Output <temp> in read command.

<temp>(num)

Board temperature in Celsius. Is comprised between the lowest temperature warning level and the uppermost temperature warning level.

Examples

EXAMPLE 1

URCs issued when the operating temperature is out of range:

^SCTM_B: 1	Caution: Module close to over temperature limit.
^SCTM_B: 2	Alert: Module is above over temperature limit and switches off.
^SCTM_B: −1	Caution: Module close to under temperature limit.
^SCTM_B: −2	Alert: Module is below under temperature limit and switches off.

EXAMPLE 2

URCs issued when the temperature is back to normal (URC is output once):

^SCTM_B: 0	Module back to normal temperature.

14

Miscellaneous Commands

The AT Commands described in this chapter are related to various areas.

The following topics are covered in this chapter:

❒ **14.1   A/ Repeat Previous Command Line**

14.1   A/ Repeat Previous Command Line

Repeat previous AT command line.

In general, after beginning a command line with character "a" or "A" a second character "t", "T" or "/" has to follow. "/" acts as line terminating character. In case of using a wrong second character, it is necessary to start again with character "a" or "A".

Syntax

Exec Command
A/
Response(s)