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WIRELESS MODULES

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AT Command Set

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1. Introduction

1.1 Scope of the document

This document presents the AT Command Set for
  EU3-E Release 01.000.

Before using the product or upgrading to a new firmware version please read the latest product information provided in the Release Notes [1].

More information is available at http://www.cinterion.com.

1.2 Related documents

[1] EU3-E Release Notes, Version 01.000

[2] EU3-E Hardware Interface Description, Version 01.000

[3] User's Guide: Getting Started with EU3-E

[4] Multiplexer User's Guide

[5] Multiplex Driver Developer's Guide

[6] Multiplex Driver Installation Guide

[7] Application Note 02: Audio Interface Design

[8] Application Note 16: Updating EU3-E Firmware

[9] ISO/IEC10646: "Universal Multiple-Octet Coded Character Set (UCS)"; UCS2, 16 bit coding

[10] ITU-T Recommendation V.24: List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)

[11] ITU-T Recommendation V.250: Serial asynchronous automatic dialling and control

[12] 3GPP TS 100 918/EN 300 918 (GSM 02.04): General on supplementary services

[13] 3GPP TS 100 907 (GSM 02.30): Man-Machine Interface (MMI) of the Mobile Station (MS)

[14] 3GPP TS 23.038 (GSM 03.38): Alphabets and language specific information

[15] 3GPP TS 27.005 (GSM 07.05): Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)

[16] 3GPP TS 27.007 (GSM 07.07): AT command set for User Equipment (UE)

[17] 3GPP TS 27.060 (GSM 07.60): Mobile Station (MS) supporting Packet Switched Services

[18] 3GPP TS 51.011 (GSM 11.11): Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface

[19] ETSI 102 221: Smart cards; UICC-Terminal interface; Physical and logical characteristics

[20] 3GPP TS 31.102: 3rd Generation Partnership Project; Technical Specification Group Network and Terminals; Characteristics of the USIM application

[21] 3GPP TS 11.14 (GSM 11.14): Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface

[22] 3GPP TS 31.111: Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)

[23] 3GPP TS 22.101 (GSM 22.101): Service principles

[24] Common PCN Handset Specification (CPHS) v4.2

[25] USB Class Definitions for Communication Devices, Version 1.1 January 19, 1999

1.3 Document Conventions

Throughout the document, the GSM engines are referred to as ME (Mobile Equipment), MS (Mobile Station), TA (Terminal Adapter), DCE (Data Communication Equipment) or facsimile DCE (FAX modem, FAX board).
To control your GSM engine you can simply send AT Commands via its serial interface. The controlling device at the other end of the serial line is referred to as TE (Terminal Equipment), DTE (Data Terminal Equipment) or plainly 'the application' (probably running on an embedded system).
All abbreviations and acronyms used throughout this document are based on the GSM specifications. For definitions please refer to TR 100 350 V7.0.0 (1999-08), (GSM 01.04, version 7.0.0 release 1998).

1.3.1 Quick Reference Table

Each AT command description includes a table similar to the example shown below. The table is intended as a quick reference to indicate the following functions:

PIN: Is the AT command PIN protected?
  +   Yes
  -   No
  ±   Usage is dependent on conditions specified for the command, or not all command types are PIN protected (for example write command PIN protected, read command not).
  Note: The table provided in Section 21.3, `Available AT Commands and Dependency on SIM PIN` uses the same symbols.
MDM: Is the AT command supported on the Modem interface?
  +   Yes
  -   No
APP: Is the AT command supported on the Application interface?
  +   Yes
  -   No
Last: If commands are concatenated, this AT command must be the last one.
  +   Yes
  -   No
  Note: See also Section 1.5, AT Command Syntax for details on concatenated AT commands.

Example:

PIN	MDM	APP	Last
-	+	+	-

1.3.2 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 enclosed in quotation marks.

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

Parameter option	Meaning
<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 Interpreter

EU3-E features two interfaces for processing AT commands: Modem interface and Application interface. Both AT command interfaces can be assigned to the various physical and virtual interfaces of EU3-E. Their allocation is dependent on the setting of AT^SDPORT and whether the multiplexer is active or not.

This section describes the functions of the Modem interface and the Application interface as well as their allocation to the module's physical and virtual interfaces:

- *Modem interface:*
  This interface is referred to as "Modem" if queried with AT^SQPORT. In the quick reference tables it is named MDM.
  The Modem interface is intended particularly for circuit and packet switched transmission (HSDPA, GPRS, CSD, Fax).
  URCs relevant for data calls (RING, NO CARRIER) are issued on the modem interface, all other URCs normally only on the application interface. For further detail on URCs please refer to Section 1.8, Unsolicited Result Code Presentation, and the configuration command AT^SCFG, parameter <udi>.
  The Modem interface can be assigned to one of of these EU3-E interfaces, with only a single dial-up connection possible at the same time over the Modem interface:

  - Asynchronous serial interface ASC0

  - A logical channel of the USB composite device. For example, in Windows XP or Windows Vista set up as "Cinterion EU3-E HSDPA USB Modem" listed in the *Windows Device Manager* under *Modems*.

  - First multiplex channel if Multiplex mode is activated.

- *Application interface:*
  This interface is referred to as "Application" if queried with AT^SQPORT. In the quick reference tables it is named APP.
  The Application interface is designed especially for controlling the EU3-E, i.e. for entering AT commands, receiving URCs, or sending and receiving short messages. It cannot be used as data interface for HSDPA, GPRS, CSD and Fax.
  The Application interface can be assigned to one of these EU3-E interfaces:

  - A logical channel of the USB composite device. For example, in Windows XP or Windows Vista set up as "Cinterion EU3-E USB Com Port" listed in the *Windows Device Manager*, under *Ports (COM&LPT)*.

  - Second multiplex channel if Multiplex mode is activated.

  Please note that URCs are normally indicated only on this interface, no matter whether the Modem interface or the Application interface was used to send the AT commands for activating their presentation. This URC management scheme is the default configuration recommended for a typical EU3-E application. For further detail on URCs please refer to Section 1.8, Unsolicited Result Code Presentation, and the configuration command AT^SCFG, parameter <udi>.

Bear in mind that the Modem interface and the Application interface are handled by the same AT command interpreter. As a result, AT commands entered on both interfaces are not executed in parallel but sequentially, one after the other. So, an AT command issued on one interface will be buffered on this interface to be executed after the other interface has completed processing earlier AT command(s).

When a dial-up connection is established over the Modem interface, the Application interface can be used simultaneously for any control functions. This eliminates the need for the user to enter AT commands, such as +++ and ATO, to switch back and forth between command and online mode when working on one interface only. Yet, it should be noted that the dial-up connection disables the echo on both interfaces, due to the initialization strings typically set by modems. The echo can be re-activated by executing ATE1.

For further detail on Multiplex mode refer to AT+CMUX.

1.5 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.

1.5.1 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 subparameters 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: Omitting parameters in the middle of a string

```
AT+CCUG?                      Query current setting
+CCUG: 1,10,1
OK
AT+CCUG=,9                    Set only the middle parameter
OK
AT+CCUG?                      Query new setting
+CCUG: 1,9,1
OK
```

1.6 Communication between Customer Application and EU3-E

Leaving hardware flow control unconsidered the Customer Application (TE) is coupled with the EU3-E (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 EU3-E 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.
  The pause between two AT commands gives the EU3-E the opportunity to the transmission of pending URCs and get necessary service.
  Note that some AT commands may require more delay after "OK" or "ERROR" response, refer to the following command specifications for details.
- The TE shall communicate with the EU3-E using activated echo (ATE1), i.e. the EU3-E 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 EU3-E 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 command. On the other hand, this solution requires entering the escape sequence \08 for writing the "ò" character in GSM character string parameters.

1.7 Supported character sets

The ME supports three character sets: *GSM 03.38* (7 bit, also referred to as GSM alphabet or SMS alphabet), *UCS2* (16 bit, refer to ISO/IEC 10646), and *IRA* (International Reference Alphabet, ITU T T.50). See AT+CSCS for information about selecting the character set. Character tables can be found below.

Explanation of terms

* International Reference Alphabet (IRA)
The International Reference Alphabet is equivalent to ASCII (American Standard Code for Information Interchange) and ISO 646, i.e. it defines a 7-bit coded character set. The mapping can be obtained from the character set tables below (UCS2 values 0x0000 to 0x007F).

* Escape sequences
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 module, an escape sequence appears like any other byte received or sent.

* Terminal Adapter (TA)
TA is an equivalent term for Mobile Equipment (ME) which stands for the EU3-E module.

* Terminal Equipment (TE)
TE is the device connected to the TA via serial interface.

* TE Character Set
The character set currently used by Terminal Equipment is selected with AT+CSCS.

* 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 the GSM alphabet is selected, all characters sent over the serial line (between TE and TA) must be in the range from 0 to 127 (7 bit range).
Note: If the ME (TA) is configured for GSM alphabet, but the 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 printable 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 may cause problems on application level when using a 'C'-function as "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 often 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 hex values 7C or 00.

When you write characters differently coded in ASCII and GSM (e.g. Ä, Ö, Ü), you need to enter escape sequences. The escape sequence will be translated into the corresponding GSM character value that can be correctly represented by any program using the GSM alphabet. However, trying to read the same string with an ASCII terminal delivers a wrong character.

Table 1.5: Examples for character definitions depending on alphabet

GSM 03.38 character	GSM character hex. value	Corresponding ASCII character	ASCII Esc sequence	Hex Esc sequence
Ö	5C	\	\5C	5C 35 43
"	22	"	\22	5C 32 32
@	00	NULL	\00	5C 30 30

Some terminal programs do not recognize escape sequences, and thus, handle escape sequences as normal characters. Ways of writing escape sequences depend on the used terminal program.
To prevent misinterpretation of control characters or special characters it is recommended to prefer the USC2 alphabet and/or PDU mode in any external application.

1.7.1 GSM alphabet tables and UCS2 character values

This section provides tables for the GSM 03.38 alphabet supported by the ME. Below any GSM character find the corresponding two byte character value of the UCS2 alphabet.
(For related mapping definition see: http://www.unicode.org/Public/MAPPINGS/ETSI/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 00E7	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 1.6, Communication between Customer Application and EU3-E for further details on using backspace and "ò" 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							€ 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	[LF]							
1	0	1	1	11 /B								
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.

In the event that an MS receives a code where a symbol is not represented in Figure 1.2, Extension character table of GSM 03.38 alphabet the MS 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).

1.7.2 UCS2 and GSM data coding and conversion for SMS text mode and Remote SAT

This section provides basic information on how to handle input and output character conversion for SMS text mode and Remote SAT if internal (TA) and external (TE) character representation differ, i.e. if the Data Coding Scheme and the TE character use different coding.

1.7.2.1 Implementing output of SIM data to Terminal (direction TA 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 halfbyte.
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"

1.7.2.2 Implementing input of Terminal data to SIM (direction TE to TA)

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 TA 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 repesenting 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.

1.8 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. a URC is issued automatically when a certain event occurs. Hence, a 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. Only the URCs related to automatic undervoltage and overvoltage shutdown are not user definable. These URCs are described in Section 1.8.1, Common URCs. A summary of all URCs can be found in Section 21.5, Summary of Unsolicited Result Codes (URC).

As specified in Section 1.4, AT Command Interpreter the modem interface is dedicated for data transmission (HSDPA, GPRS, CSD), whereas the application interface is designed primarily for control functions. This implies that the majority of URCs are issued on the application interface, no matter which of the AT interfaces was used to send the AT command for activating their presentation. Only URCs relevant for data calls (RING, NO CAR-RIER) are issued on the modem interface to ensure compatability with existing modem applications.

Enabled by default when the ME is powered up, the above URC management scheme is the recommended approach for a typical EU3-E application. However, as an alternative to this approach, AT^SCFG, "URC/DstIfc", <udi> provides the option to determine the interface used for URC output.

If autobauding is enabled (as factory default mode or set with AT+IPR=0), URCs generated after restart will be issued with 115200 bps until the ME has detected the current bit rate. For details refer Section 4.6.1, Autobaud mode. To avoid problems it is recommended to configure a fixed bit rate rather than using autobauding.

Important: If the interface used for URC output is reserved by an active data connection or a long running AT command, URCs are buffered internally and will be issued after the interface becomes idle again. A pending URC will be signaled on the URC output interface via RING line or BREAK transmission. This allows to systematically suspend any longer data connection (refer +++ and ATO) to check for pending URCs after being signaled! For detailed information regarding configuration of URC signaling refer to AT^SCFG, "URC/Datamode/Ringline", <udri> and AT^SCFG, "URC/Ringline", <uri>.

1.8.1   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, except when the voltage threshold is exceeded very quickly.

URC 1

```
^SBC: Undervoltage
```

The URC indicates that the ME is close to the undervoltage threshold. If voltage falls below lower threshold of working voltage range a controlled shutdown procedure is initiated. This is a point of no return. Even if the voltage is increased again over upper threshold of lower warning range the module shall still shut off.

URC 2

```
^SBC: Overvoltage Warning
```

Supply voltage is above upper threshold of working range but below upper threshold of warning range.

URC 3

```
^SBC: Overvoltage Shutdown
```

Overvoltage threshold exceeded. Module switches off within 5 seconds after sending the URC. If voltage is measured once above upper threshold of warning range module shall shutdown, even if a lower voltage is measured again.

1.9 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.

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 2.8.1, CME/CMS Error Code Overview
- Section 2.4.1, Verbose and numeric result codes
- Section 3.2, AT+CEER

2.   Configuration Commands

The AT Commands described in this chapter allow the external application to determine the EU3-E's behaviour under various conditions.

2.1   AT&F   Set all current parameters to manufacturer defaults

AT&F sets all current parameters to the manufacturer defined profile.

Syntax

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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Parameter Description

<value>(num)

[0]   Set all TA parameters to manufacturer defaults

Notes

- List of parameters reset to manufacturer default can be found in Section 21.4, Factory Default Settings Restorable with AT&F.
- Every ongoing or incoming call will be terminated.

2.2 AT&V Display current Configuration

AT&V returns the setting of many AT command parameters applicable to the current operating mode, including the single-letter AT command parameters which are not readable otherwise.

Syntax

Exec Command
AT&V
Response(s)
Setting of many AT command parameters applicable to the current operating mode.
OK

PIN	MDM	APP	Last
-	+	+	-

2.3 ATQ   Result code presentation mode

This command determines whether or not the TA 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)

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Parameter Description

<n>(num)

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

2.4   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 2.4.1, Verbose and numeric result codes.

Syntax

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

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Parameter Description

<value>(num)

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

2.4.1   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, dialling impossible, wrong mode
BUSY	7	remote station busy
NO ANSWER	8	no answer
CONNECT 9600	49	link with 9600 bps
CONNECT 14400	50	link with 14400 bps
CONNECT 28800	51	link with 28800 bps
CONNECT 32000	52	link with 32000 bps
CONNECT 38400	53	link with 38400 bps
CONNECT 56000	54	link with 56000 bps
CONNECT 64000	55	link with 64000 bps

2.5 ATX Set CONNECT result code format

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

Syntax

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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Parameter Description

<value>(num)

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

2.6　ATZ　Reset all current parameters to the default configuration

ATZ resets all current parameters to the default configuration. It does not change DCE baud rate or PDP context profiles.

Syntax

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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Parameter Description

<value>(num)

[0]　　　　　　　　　　　Reset to user profile

2.7 AT+CFUN EU3-E Functionality Level

AT+CFUN controls EU3-E's functionality level. It can also be used to reset the ME.

If using minimum functionality level also refer to AT^SCFG, "MeOpMode/PwrSave" parameter <PwrSavePeriod> which allows to fine-tune the EU3-E's power saving behaviour.

Syntax

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

Read Command
AT+CFUN?
Response(s)
+CFUN: <fun>   OK   ERROR   +CME ERROR: <err>

Write Command
AT+CFUN=<fun>[, <rst>]
Response(s)
OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		3GPP TS 27.007

Parameter Description

<fun>(num)

0	Minimum functionality level. Shutdown TX and RX RF-circuits whereby EU3-E logs off from the network. A connected SIM remains accessible for network independent functions.
1(P)	Normal functionality level.
4	Minimum functionality level. Shutdown TX and RX RF-circuits whereby EU3-E logs off from the network. A connected SIM remains accessible for network independent functions.
5	Do not use.
6	Do not use.
7	Do not use.

`<rst>`(num)

Due to AT command syntax enter parameter `<fun>`, followed by `<rst>`, where `<fun>` needs to be set to 1.

[0]	Do not reset the MT before setting it to `<fun>` power level.
1	ME resets and restarts. After this, PIN 1 authentication may be necessary (`AT+CPIN`).

2.8 AT+CMEE Error Message Format

AT+CMEE controls the format of error result codes that indicates errors related to EU3-E 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 2.1, General "CME ERROR" Codes (GSM 07.07), Table 2.2, GPRS related "CME ERROR" Codes (GSM 07.07) and Table 2.4, SMS related "CMS ERROR" Codes (GSM 07.05).
AT+CMEE exec command performs a write command with factory default parameter setting.

Syntax

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

Read Command
AT+CMEE?
Response(s)
+CMEE: <errMode>
OK

Exec Command
AT+CMEE
Response(s)
OK
ERROR
+CME ERROR: <err>

Write Command
AT+CMEE=<errMode>
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		3GPP 27.007

Parameter Description

<errMode>(num)

0(&F)(P)	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.

2.8.1   CME/CMS Error Code Overview

Table 2.1:   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
100	unknown

Table 2.2:   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
132	service option not supported
133	requested service option not subscribed
134	service option temporary out of order
148	unspecified GPRS error
149	PDP authentication failure
150	invalid mobile class
273	minimum TFTs per PDP address violated
274	TFT precedence index not unique
275	invalid parameter combination

Table 2.3:   Enhanced "CME ERROR" Codes

<err> Code	Text (if AT+CMEE=2)
257	network rejected request
258	retry operation
259	invalid deflected to number
260	deflected to own number
261	unknown subscriber
262	service not available
263	unknown class specified
264	unknown network message
300	resource limitation
301	subscription violation
302	TeleService not provisioned
303	error BearerService not provisioned
304	system failure
305	data missing
306	unknown alphabet
307	unexpected data value
308	unrecognized component
309	mistyped component
310	badly structured component
311	mistyped parameter
312	initiating release
320	call barred
330	SMSC address unknown

Table 2.4: SMS related "CMS ERROR" Codes (GSM 07.05)

<err> Code	Text (if AT+CMEE=2)
0	none
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

2.9 AT+CSCS Select Character Set

AT+CSCS write command informs the ME which character set is used by the TE. This enables the ME to convert character strings correctly between TE and ME character sets. Also refer to Section 1.7, 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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		3GPP 27.007

Parameter Description

<chset>(str)

"GSM"	GSM default alphabet (GSM 03.38 subclause 6.2.1).
"UCS2"	16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99.
"IRA"(&F)(P)	International reference alphabet (ITU T T.50).

2.10 AT+GCAP Request complete TA capabilities list

AT+GCAP returns a list of additional capabilities.

Syntax

Test Command
AT+GCAP=?
Response(s)
OK

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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Parameter Description

<name>(str)

e.g.: +CGSM

Note

• +CGSM: The response text shows which GSM commands of the ETSI standard are supported.

2.11   AT^SCFG   Extended Configuration Settings

AT^SCFG can be used to query and configure various settings of the EU3-E.
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).

If not stated otherwise, then all string parameters of this command are IRA encoded, independent of the current
AT+CSCS setting.

Syntax

Test Command

AT^SCFG=?

Response(s)

^SCFG: "Call/ECC", (list of supported <ecc>s)
^SCFG: "GPRS/Auth", (list of supported <gauth>s)
^SCFG: "GPRS/AutoAttach", (list of supported <gaa>s)
^SCFG: "Ident/Manufacturer", (max. string length of <manufacturer>)
^SCFG: "Ident/Product", (max. string length of <product>)
^SCFG: "MEopMode/PwrSave", ("enabled"), (list of supported <PwrSavePeriod>s)
^SCFG: "MEopMode/RM", (list of supported <rm>s)
^SCFG: "MEShutdown/OnIgnition", (list of supported <msi>s)
^SCFG: "Radio/Band", (list of supported <rba>s), (list of supported <rbe>s)
^SCFG: "URC/DstIfc", (list of supported <udi>s)
^SCFG: "URC/Datamode/Ringline", (list of supported <udri>s)
^SCFG: "URC/Ringline", (list of supported <uri>s)
OK

Read Command

AT^SCFG?

Response(s)

^SCFG: "Call/ECC", <ecc>
^SCFG: "GPRS/Auth", <gauth>
^SCFG: "GPRS/AutoAttach", <gaa>
^SCFG: "Ident/Manufacturer", <manufacturer>
^SCFG: "Ident/Product", <product>
^SCFG: "MEopMode/PwrSave", "enabled", <PwrSavePeriod>
^SCFG: "MEopMode/RM", <rm>
^SCFG: "MEShutdown/OnIgnition", <msi>
^SCFG: "Radio/Band", (list of supported <rba>s)
^SCFG: "URC/DstIfc", <udi>
^SCFG: "URC/Datamode/Ringline", <udri>
^SCFG: "URC/Ringline", <uri>
OK

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

Configure PPP authentication

AT^SCFG="GPRS/Auth"[, <gauth>]

Response(s)

^SCFG: "GPRS/Auth", <gauth>
OK
ERROR
+CME ERROR: <err>

Write Command

Automatic GPRS attach

AT^SCFG="GPRS/AutoAttach"[, <gaa>]

Response(s)

^SCFG: "GPRS/AutoAttach", <gaa>
OK
ERROR
+CME ERROR: <err>

Write Command

Configure manufacturer name:

AT^SCFG="Ident/Manufacturer"[, <manufacturer>]

Response(s)

^SCFG: "Ident/Manufacturer", <manufacturer>
OK
ERROR
+CME ERROR: <err>

Write Command

Configure product name:

AT^SCFG="Ident/Product"[, <product>]

Response(s)

^SCFG: "Ident/Product", <product>
OK
ERROR
+CME ERROR: <err>

Write Command

Extended power saving control:

AT^SCFG="MEopMode/PwrSave"[, [, <PwrSavePeriod>]]

Response(s)

^SCFG: "MEopMode/PwrSave", , <PwrSavePeriod>
OK
ERROR
+CME ERROR: <err>

Write Command

Query/Configure Registration Mode:

AT^SCFG="MEopMode/RM"[, <rm>]

Response(s)

^SCFG: "MEopMode/RM", <rm>
OK
ERROR
+CME ERROR: <err>

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Write Command

Enable/disable shutdown by ignition line

AT^SCFG="MEShutdown/OnIgnition"[, <msi>]

Response(s)

^SCFG: "MEShutdown/OnIgnition", <msi>
OK
ERROR
+CME ERROR: <err>

Write Command

Enable/disable radio bands

AT^SCFG="Radio/Band"[, <rba>][, <rbe>]

Response(s)

^SCFG: "Radio/Band", <rba>
OK
ERROR
+CME ERROR: <err>

Write Command

Network selection mode

AT^SCFG="Radio/NWSM"[, <NetworkSelectionMode>]

Response(s)

^SCFG: "Radio/NWSM", <NetworkSelectionMode>
OK
ERROR
+CME ERROR: <err>

Write Command

Configure URC destination interface:

AT^SCFG="URC/DstIfc"[, <udi>]

Response(s)

^SCFG: "URC/DstIfc", <udi>
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>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<ecc>(str)

Emergency call numbers on non-ECC SIM

Setting specifies emergency call numbers on SIM cards without ECC field. It has no influence on the commonly used emergency numbers 112 and 911 which are always supported.
Please refer also to Section 7.2, 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).
Setting is global for the ME, non-volatile and will not be reset by AT&F. Any change to this parameter will take effect after reboot or SIM insertion.

" 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.

<gauth>(str)

PPP authentication mechanism

Setting can be used to configure which authentication algorithm the AT+CGDATA or ATD*99# commands will apply, during the PPP startup phase, for PDP contexts not yet activated.
Setting is global for all interfaces, volatile and will not be reset by AT&F.
For contexts activated with AT+CGACT please use the AT command AT^SGAUTH to configure the authentication method.

"0"	CHAP only
"1"	PAP only
"2"(P)	Try CHAP first, then PAP

<gaa>(str)

GPRS with AutoAttach

Setting can be used to control whether or not the ME will perform a GPRS attach immediately after power-up and registering to the network. If the setting is changed to "enabled" and the ME is not attached yet, it will not initiate an attach immediately but after the next restart and registration to the network.
Setting is global for all interfaces, non volatile and will not be reset by AT&F.

"disabled"(D)	GPRS auto attach is disabled
"enabled"	GPRS auto attach is enabled

<manufacturer>(str)

Manufacturer name

Setting can be used to configure the name of the product which is displayed with the commands ATI, AT+GMI and AT+CGMI. Maximal length of the Manufacturer name is 25 characters (or less if you use multibyte characters).
Setting is global for all interfaces, non volatile and will not be reset by AT&F.

"Cinterion"(D)

<product>(str)

Product name

Setting can be used to configure the name of the product which is displayed with the commands ATI, AT+GMM and AT+CGMM. Maximal length of the product name is 25 characters (or less if you use multibyte characters).
Setting is global for all interfaces, non volatile and will not be reset by AT&F.

"EU3-E"(D)

<PwrSavePeriod>(str)

Maximum Power Save Period

AT^SCFG, "MeOpMode/PwrSave" setting allows to control the EU3-E's power saving behaviour.
<PwrSavePeriod> setting determines the maximum duration the ME is allowed to stay in power save (SLEEP) state. For details refer chapter "Power Saving" in "EU3-E Hardware Interface Description, Version 01.000".
Setting is stored non volatile and will not be reset by AT&F.

"0"(D)	EU3-E is allowed to stay in power save (SLEEP) state for an unlimited duration. However, this may lead to unintentional operating states if the ME has no technical demands to cyclically quit the power save (SLEEP) state: If the radio interface is switched off (refer minimum functionality mode via AT+CFUN) and hardware flow control is used on ASC0 (refer UART mode via AT^SDPORT), but the TA has no direct access to its RTS line (e.g. Windows/Linux application using the standard device driver).
1...600	Maximum power save period in 1/10 seconds with tolerance. Recommended value is 52, i.e. 5.2 seconds.

<rm>(str)

Registration Mode

Setting can be used to influence the time the ME takes to register to the network. Any change to this parameter will take effect after reboot.
Setting is global for all interfaces, non-volatile and will not be reset by AT&F.

"0"(D)	Normal When trying to register to a network the ME sleeps longer than in "Fast mode" before restarting a network scan.
"1"	Fast "Fast mode" reduces the time the ME sleeps before restarting a network scan when trying to register. Advantage: If the ME is out of network service it may take less time to find a network. Disadvantage: Higher current consumption while the ME is out of network service.

<msi>(str)

MEShutdown/OnIgnition: Enable/disable shutdown by IGT line

Setting specifies two different switching modes of the ignition line IGT: The line may either be used only to switch on the ME, or to switch it on and off.
Setting <msi> is global for all interfaces, non-volatile and will not be reset by AT&F.

"on"	Ignition line (IGT) can be used to switch on and off the ME.
"off"(D)	Ignition line (IGT) can be used to switch on the ME.

<rba>(num)

Radio/Band: Enable/disable frequency band(s)

Setting can be used to select or deselect one or several frequency band(s) the ME is allowed to register to.
Please note that the band selection implementation of EU3-E is based on a single band group that includes all frequency bands it is capable to use.
Factory default of <rba> is the combination of all available bands meaning that all supported bands are allowed.
Together with the module's power-up default AT+COPS=0 (automatic mode) this solution allows the subscriber to take advantage of a full-featured automatic network selection when trying to register.
Therefore, changes to the band configuration are recommended only if the subscriber wishes to restrict the allowed bands to a specific band or band combination, in particular to speed up the network search, and thus, to reduce the power consumption. In such case, <rba> may be one of the supported single values listed below or the sum of the values of all desired bands. For example, for GSM 900 MHz (1) and GSM 1800 MHz (2) please enter the value 3.
When changing the <rba> value you can use the additional <rbe> parameter to make the changes take effect immediately without reboot being required (<rbe>="1") or after reboot only (<rbe>="0"). In either case, the <rba> value returned by the read command AT^SCFG="Radio/Band" is non-volatile and will be the value used after next reboot.
Setting is global for all interfaces, stored non-volatile and will not be reset by AT&F.

1	GSM 900
2	GSM 1800
16	WCDMA 2100 (BC1)
128	WCDMA 900 (BC8)

<rbe>(num)

Radio/Band: Set frequency band(s) immediately effective

The additional <rbe> parameter determines when a changed <rba> value becomes effective.

0	<rba> takes effect after next restart.
1	<rba> takes effect immediately and will also be effective after next restart. Setting a new <rba> value and <rbe>= 1 causes the ME to restart a network search and to deregister and re-register. If old and new <rba> are the same the command will be accepted without triggering a network search and without effect on the registration. <rbe>= 1 is not usable while the ME is set to AT+CFUN=0 or 4 (TX and RX RF switched off). In this case, the AT^SCFG write command returns an ERROR message.

<NetworkSelectionMode>(str)(+CSCS)

Network Selection Mode

Setting allows network selection without considering the MCC.
Setting is global for all interfaces, volatile and will not be reset by AT&F.
In order to comply with AT&T requirements regarding network selection, the application controlling the EU3-E module will have to send the following AT command during the initialization phase:AT^SCFG="Radio/NWSM","1"

"0"(P)	MCC based network selection mode.
"1"	Network selection mode without considering the MCC.

<udi>(str)

URC destination interface

Setting can be used to configure the interface which will be used to output URCs. Note that the recommended approach for a typical EU3-E application is using the default configuration. If you consider changing the configuration please carefully read Section 1.4, AT Command Interpreter and Section 1.8, Unsolicited Result Code Presentation.
If the application port is not available, then it is not possible to select it.
If AT^SDPORT is set to "2", then the powerup value is "mdm", otherwise "app".
If the multiplexer is started with AT+CMUX and AT^SDPORT is set to "2", then automatically the value "app" will be selected.
Setting is global for all interfaces, volatile and will not be reset by AT&F.
If the modem interface is used, keep in mind, that if the interface is blocked by an active data connection, then this connection should be periodically suspended to check for pending URCs!

"mdm"	Use modem interface to output URCs
"app"	Use application interface to output URCs

<uri>(str)(+CSCS)

URC RING line

Setting can be used to control the behaviour of the RING line to indicate URCs (if configured by parameter "URC/Datamode/Ringline" for a reserved link).
Setting 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

<udri>(str)(+CSCS)

URC Datamode RING line

Setting specifies whether RING or BREAK is used for the signaling of URCs when the TA-TE link is reserved (e.g. during circuit-switched data calls, fax connections, in GPRS data mode or during the execution of an AT command).
Setting is global for all interfaces, volatile and will not be reset by AT&F.

"off"	URC will be indicated by BREAK
"on"(P)	URC is indicated by an active RING line.

2.12 AT^SDPORT Configure Interface Allocation

AT^SDPORT can be used to query and configure the allocation of the Modem and Application interfaces, which are explained in Section 1.4, AT Command Interpreter.
Change of AT^SDPORT setting may affect the URC output: If the interface currently used for URC output still exists in the newly selected mode, the URC output interface is maintained. If the interface currently used for URC output does not exist in the newly selected mode, the URC interface will be switched as could normally be done via AT^SCFG, "URC/DstIfc", <udi>.

AT^SDPORT write command is not supported during Autobaud mode (AT+IPR) or Multiplex mode (AT+CMUX) and will return with <error> response in these cases. As soon as Multiplex mode (AT+CMUX) is started, Modem and Application interfaces are available via Multiplexer channels only. For details refer to Section 1.4, AT Command Interpreter.

Syntax

Test Command
AT^SDPORT=?
Response(s)
^SDPORT: (range of supported <mode>s)
OK

Read Command
AT^SDPORT?
Response(s)
^SDPORT: <mode>
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SDPORT=<mode>
Response(s)
^SDPORT: <mode>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<mode>(num)

Parameter setting is stored non-volatile. Any change becomes active immediately.

1(D)   Basic Mode
The Modem interface is available on ASC0. Application interface is available as logical channel of the USB composite communication device.
This mode - together with Autobaud mode - is solely intended to facilitate the initial contact with the EU3-E.
Therefore, it shall only be used to

1. determine a fixed bit rate via AT+IPR, and

2. switch to <mode> 2 (for UART user) or 3 (for USB user).

2	UART Mode
	The Modem interface is available on ASC0. However, the USB composite communication device is completely enumerated but no logical channel of the USB device is usable. Therefore, if URC output was active on an interface which is no longer usable due to change of AT^SDPORT setting, it is redirected to the Modem interface as could normally be done via AT^SCFG, "URC/DstIfc", <udi>.
3	USB Mode
	Modem and Application interfaces are all available as logical channels of the USB composite communication device. ASC0 is not usable.

2.13   AT^SMSO   Switch Off EU3-E

AT^SMSO initiates EU3-E's power-off procedure. Do not send any other AT command after this.

Syntax

Test Command
AT^SMSO=?
Response(s)
OK

Exec Command
AT^SMSO
Response(s)
OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	+

3.   Status Control Commands

The AT Commands described in this chapter allow the external application to obtain various status information from the EU3-E.

3.1   AT^SIND   Extended Indicator Control

The AT^SIND command controls the presentation of Indicator Event Reports. You can enable / disable URCs to be output each time when the value of the related indicator changes, you can request the current status of all indicators, and you can also query the status of a single indicator.

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>="lsta"
^SIND: "lsta", <mode>, <lstaLevel>
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: <indDescr>, <mode>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>

In case of: <indDescr>="nitz" and <mode>=2
^SIND: <indDescr>, <mode>, <nitzUT>, <nitzTZ>, <nitzDST>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SIND="lsta", <mode>[, <lstaLevel>]

Response(s)

^SIND: "lsta", <mode>[, <lstaLevel>]
OK

Write Command	(Continued)
AT^SIND="lsta", <mode>[, <lstaLevel>]	
Response(s)	
ERROR +CME ERROR: <err>	

PIN	MDM	APP	Last
-	+	+	-

Unsolicited Result Codes

URC 1

Format of the standard indicator:

+CIEV: <indDescr>, <indValue>

Value of an indicator has changed.

URC 2

Format of the "eons" indicator:

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

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

URC 3

Format of the "nitz" indicator:

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

URC 4

Format of the "lsta" indicator:
In case <indValue> equals "0".

+CIEV: <indDescr>, <indValue>, <lstaEdvs>, <lstaRssi>

The URC is issued for every radio link error. It provides the error downcounter value corresponding to number of consecutive errors on downlink and the RSSI of the serving cell.
Error downcounter value of 11 corresponds to first error occurred on downlink, 0 corresponds to last before cell loss.

URC 5

In case <indValue> equals "1".

+CIEV: <indDescr>, <indValue>, <lstaNo>, <lstaMin>, <lstaMax>, <lstaMean>, <lstaVar>

After the error downcounter reaches the value 0 the URC provides some statistic parameters of signal strength distribution across the band.

Parameter Description

<indDescr>(str)

String values and their <indValue> ranges.

"signal"	Channel bit error rate of the signal received: The parameter is always set to value 99. See also AT+CSQ.
"service"	Service availability: 0 Not registered to any network. 1 Registered to home network or, if "roam"=1 then registered to another network.

"sounder"	Sounder activity:
	Reports every event that causes the ME to generate a tone.
	0 Tone generator not active.
	1 Tone generator active.
	      Value 1 means for example:
	      Incoming call - ME is ringing. Note that in this case the URC "+CIEV: sounder" will be output only if ringing tones are enabled with AT^SRTC.
	      Waiting call - ME generates waiting call tone (if call waiting is enabled).
	      Outgoing call - ME generates BUSY tone.
	      Playback of ringing tones when tested with AT^SRTC.

"message"	Unread short message at memory location <mem1>. Refer to AT+CPMS. 0 No unread message(s) available. 1 Unread message(s) available.
"call"	Call in progress: 0 No call. 1 At least one MO or MT call is in state "active" (connection established).
"roam"	Roaming indicator: 0 Registered to home network or not registered. 1 Registered to other network.
"smsfull"	Capacity of storage for received short messages: 0 The short message memory location <mem3> is still free or has just become free again. Refer to AT+CPMS. 1 All memory locations of <mem3> are used up.
"rssi"	Received signal (field) strength: 0 Signal strength ≤ -112 dBm 1 - 4 Signal strength in 15 dB steps 5 Signal strength ≥ -51 dBm 99 Signal strength 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.

"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 answered.

"eons"	Enhanced Operator Name String (EONS) Indication: The Enhanced Operator Name String indicator feature allows the EU3-E 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 in the SIM card 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 card: EF$_{SST}$ (SIM Service Table) - describes which features are active. EF$_{OPL}$ (Operator PLMN List) - contains the PLMN identification and location ID together with the index of the corresponding PNN record EF$_{PNN}$ (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:

EF$_{ONString}$ (Operator Name String) - contains the name of the PLMN operator who issued the SIM.

EF$_{OPShort}$ (Operator Name Short form) - contains a short form of the name of the PLMN operator who issued the SIM.

"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 although 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 module detaches from network. Also when a manual network selection fails and the module 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.

"simstatus"	SIM Status Indication: The SIM Status indicator allows the EU3-E to output the status of the subscriber identity module (SIM) via URC.

0	SIM card removed. Note: Another way to verify the SIM card connection is the "^SCKS" URC enabled with AT^SCKS.
1	SIM card inserted.
5	SIM initialization completed - ME has finished reading SIM data.

"psinfo"	Packet Switched Status Indication "psinfo" indicates the status of the module related to packet switched data calls.

0	GPRS/EGPRS not available in currently used cell
1	GPRS available in currently used cell
2	GPRS attached
3	EGPRS available in currently used cell

4	EGPRS attached
5	camped on WCDMA cell
6	WCDMA PS attached
7	camped on HSDPA-capable cell
8	PS attached in HSDPA capable cell

"vcall"

Incoming call is a video call

0　　No incoming video call.

1　　The incoming call is a video call.

"lsta"

Link Stability Indication (for 2G only!)

The Link Stability indicator feature allows the EU3-E to output radio link errors and statistic parameters of signal strength distribution across the band via URC.

0　　Radio link error.

1　　Radio link signal strength distribution.

The presentation of the "lsta" indicator is determined by the radio link spectrum shape. For example, each time a radio link error appears the URC indicates an Error Downcounter value and the RSSI of the serving cell to provide some kind of warning. Every consecutive error decrements the Error Downcounter value and successful downlink signal reception resets it to start value of 11. The factor on which Error Downcounter is decremented depends on network settings. Error Downcounter value 0 means that the ME has lost the cell and will start the cell reselection process. In this case the URC is enhanced and includes the following statistic parameters of signal strength distribution across the band. These are:

- Number of reported channels,
- Maximal signal strength value,
- Minimal signal strength value,
- Mean value of signal strength across frequency band and
- Variance of signal strength across frequency band.

To avoid that radio link error URCs are output too often, when radio conditions are bad, you can select a lower warning level with `<lstaLevel>`.

`<indValue>`(num)

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

Notes specific to the EONS feature:

 If the indicator is "eons", the `<indValue>` is a type associated to the operator name according to GSM 22.101 [23]. 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) [24] (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(P)

Disables the presentation of a specific URC.

1	Enables the presentation of a specific URC. The URC will be buffered in the TA when the TA-TE link is reserved (e.g. in online data mode), and flushed to the TE when the TA-TE link is free again. Otherwise, the URC will be forwarded directly to the TE.
2	Requests the presentation mode of the URC status and the current value of a single indicator type.

<eonsOperator>[(str)(+CSCS)]

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

<servProvider>[(str)(+CSCS)]

Service Provider Name according to the status settings (SIM Service No. 17) in the SIM Service Table (SST) of the SIM.
Service Provider Name (SPN) will be read from EF_{SPN}. Service Provider Display Information (SPDI) will be read from EF_{SPDI} list.

<servProviderType>[(num)]

Service Provider Type according to Registered Public Land Mobile Network (RPLMN) and Home Public Land Mobile Network (HPLMN).

0	No Service Provider Information available.
1	Service Provider Name will be displayed. RPLMN is the HPLMN.
2	Service Provider Display Information will be displayed. One list entry is equal to the RPLMN.

<nitzUT>[(str)(+CSCS)]

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

<nitzTZ>[(num)]

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

<nitzDST>[(num)]

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

<lstaLevel>[(num)]

Warning Level

0-11	User value to limit the indication of radio link errors.

Refer to <indDescr>.

<lstaEdvs>[(num)]

EDVS (0-11)
Error Downcounter value scaled. Refer to <indDescr>.

<lstaRssi>[(num)]

value in dBm
Received signal strength indication value. Refer to <indDescr>.

<lstaNo>[(num)]

Number of reported channels. Refer to <indDescr>.

\<lstaMin\>(num)

value in dBm
Minimal received signal strength value. Refer to \<indDescr\>.

\<lstaMax\>(num)

value in dBm
Maximal received signal strength value. Refer to \<indDescr\>.

\<lstaMean\>(num)

value in dBm
Mean value of received signal strength across frequency. Refer to \<indDescr\>.

\<lstaVar\>(num)

Variance of signal strength across frequency. Refer to \<indDescr\>.

3.2 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 <report> is a single line containing the cause information given by GSM network in textual format.

Syntax

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

Exec Command
AT+CEER
Response(s)
+CEER: <report> OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Parameter Description

<report>(str)

release cause report

Reason for the last call failure to setup or release (listed in Section 3.2.1, List of status codes for the extended error report).

Both CS and PS domain call types are reported. Cause data is captured from Call Manager events and cached locally to later use by this command.

3.2.1   List of status codes for the extended error report

CS internal cause lookup
no cause information available (default)
phone is offline
no service available
network release, no reason given
received incoming call

CS internal cause lookup	
client ended call	3/12/10
UIM not present	
access attempt already in progress	
access failure, unknown source	
concur service not supported by network	
no response received from network	
GPS call ended for user call	
SMS call ended for user call	
data call ended for emergency call	
rejected during redirect or handoff	
lower-layer ended call	
call origination request failed	
client rejected incoming call	
client rejected setup indication	
network ended call	
no funds available	
no service available	
full service not available	
maximum packet calls exceeded	
video connection lost	
video protocol closed after setup	
video protocol setup failure	
internal error	

CS network cause lookup
unassigned/unalloacted number
no route to destination
channel unacceptable
operator determined barring
normal call clearing
user busy
no user responding
user alerting, no answer
call rejected
number changed
non selected user clearing
destination out of order
invalid/incomplete number
facility rejected
response to status enquiry
normal, unspecified
no circuit/channel available

CS network cause lookup
network out of order	3/12/10
temporary failure
switching equipment congestion
access information discarded
requested circuit/channel not available
resources unavailable, unspecified
quality of service unavailable
requested facility not subscribed
incoming calls barred within the CUG
bearer capability not authorized
bearer capability not available
service/option not available
bearer service not implemented
ACM >= ACM max
requested facility not implemented
only RDI bearer is available
service/option not implemented
invalid transaction identifier value
user not member of CUG
incompatible destination
invalid transit network selection
semantically incorrect message
invalid mandatory information
message non-existent/not implemented
message type not compatible with state
IE non-existent/not implemented
conditional IE error
message not compatible with state
recovery on timer expiry
protocol error, unspecified
interworking, unspecified

CS network reject lookup
IMSI unknown in HLR
illegal MS
IMSI unknown in VLR
IMEI not accepted
illegal ME
GPRS services not allowed
GPRS and non GPRS services not allowed
MS identity cannot be derived
implicitly detached

CS network reject lookup	
PLMN not allowed	3/12/10
location area not allowed	
roaming not allowed	
GPRS services not allowed in PLMN	
no suitable cells in location area	
MSC temporary not reachable	
network failure	
MAC failure	
synch failure	
congestion	
GSM authentication unacceptable	
service option not supported	
requested service option not subscribed	
service option temporary out of order	
call cannot be identified	
no PDP context activated	
semantically incorrect message	
invalid mandatory information	
message type non-existent	
message type not compatible with state	
information element non-existent	
message not compatible with state	
RR release indication	
RR random access failure	
RRC release indication	
RRC close session indication	
RRC open session failure	
low level failure	
low level failure no redial allowed	
invalid SIM	
no service	
timer T3230 expired	
no cell available	
wrong state	
access class blocked	
abort message received	
other cause	
timer T303 expired	
no resources	
release pending	
invalid user data	

PS internal cause lookup
invalid connection identifier
invalid NSAPI
invalid primary NSAPI
PDP establish timeout
invalid field
SNDCP failure
RAB setup failure
no GPRS context
PDP activate timeout
PDP modify timeout
PDP inactive max timeout
PDP lowerlayer error
PDP duplicate
access technology change
PDP unknown reason

CS PS network cause lookup
LLC or SNDCP failure
insufficient resources
missing or unknown APN
unknown PDP address or PDP type
user authentication failed
activation rejected by GGSN
activation rejected, unspecified
service option not supported
requested service option not subscribed
service option temporary out of order
NSAPI already used (not sent)
regular deactivation
QoS not accepted
network failure
reactivation required
feature not supported
semantic error in the TFT operation
syntactical error in the TFT operation
unknown PDP context
PDP context without TFT already activated
semantic errors in packet filter
syntactical errors in packet filter
invalid transaction identifier
semantically incorrect message
invalid mandatory information

CS PS network cause lookup			
message non-existent/not implemented	63	412	3/12/10
message type not compatible with state			
IE non-existent/not implemented			
conditional IE error			
message not compatible with state			
protocol error, unspecified			

3.3 AT+CPAS Activity Status

AT+CPAS execute command queries EU3-E's 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

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

Parameter Description

<pas>(num)	
0	Ready
3	Incoming call (ringing)
4	Call in progress

3.4 AT+WS46 Select wireless network

The AT+WS46 command is intended for reading the current status of the network selection. The write command has no effect. To select the network please use the AT+COPS command.

Syntax

Test Command
AT+WS46=?
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>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

Parameter Description

<n>(num)

12	GSM Digital Cellular Systems (GERAN only)
22	UTRAN only
25	3GPP Systems (both GERAN and UTRAN)

4. Serial Interface Control Commands

The AT Commands described in this chapter allow the external application to determine various settings related to the EU3-E's serial interface.

4.1 AT\Q Flow control

Syntax

Exec Command
AT\Q[<n>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<n>(num)	
[0]	Disable flow control
1	XON/XOFF software flow control
2	This value is not supported and will be mapped to RTS/CTS hardware flow control
3(&F)(P)	RTS/CTS hardware flow control Recommended for the following procedures: incoming or outgoing data calls, fax calls, MUX mode. Often, the initialization routine of Fax programs includes enabling RTS/CTS handshake, eliminating the need to issue AT\Q3 once again.

Notes

- AT\Q setting is always common for Modem and Application interface, for details refer Section 1.4, AT Command Interpreter.
- 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.
- For compatibility reasons, the AT\Q can be used in Multiplex mode (AT+CMUX), though the settings will not take effect.

4.2　AT&C　Set Data Carrier Detect (DCD) line mode

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

Syntax

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

PIN	MDM	APP	Last
+	+	-	-

Parameter Description

<value>(num)

[0]	DCD line shall always be on.
1(&F)(P)	DCD line shall be on only when data carrier signal is present.
2	DCD line shall be always on. Only when a data call is released the line shall briefly switch off.

4.3 AT&D Set Data Terminal Ready (DTR) line mode

AT&D determines how the ME responds if DTR line is changed from ON to OFF state during data mode.

Syntax

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

PIN	MDM	APP	Last
+	+	-	-

Parameter Description

<value>(num)

[0]	ME ignores status of DTR line.
1	ON->OFF on DTR: Change to command mode while retaining the connected call.
2(&F)(P)	ON->OFF on DTR: Disconnect (CSD or PPP) data call and change to command mode. 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

PIN	MDM	APP	Last		Reference(s)
-	+	-	-		V.250

Parameter Description

<value>(num)

[0](&F)(P)   DSR line is always ON

1   ME in command mode: DSR is OFF.
                                    ME in data mode: DSR is ON.

4.5 ATE Enable command echo

The ATE command determines whether or not the TA echoes characters received from TE during command state.

Syntax

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

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Parameter Description

<value>(num)

0	Echo mode off
[1](&F)(P)	Echo mode on

4.6 AT+IPR Bit Rate

AT+IPR allows to query and set the bit rate of the EU3-E's asynchronous serial interface (UART).
The test command returns the values of supported automatically detectable bit rates and the values of supported fixed bit rates.
The read command returns the currently set <rate> value.
The write command determines the bit rate to be used for the interface. Delivery bit rate value (<rate>) is Autobaud mode (AT+IPR=0). <rate> setting will not be restored with AT&F.

If using a fixed bit rate, make sure that both EU3-E (i.e. ME) and TA are configured to the same rate. A selected fixed 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 1.6, Communication between Customer Application and EU3-E for details about timing).
In case of Autobaud mode (AT+IPR=0) a detected TA bit rate will not be saved and, therefore, needs to be redetected after any restart of the ME. For details refer Section 4.6.1, Autobaud mode. If Autobaud mode is activated, EU3-E will automatically recognize the bit rate currently used by the TA.
Using AT+IPR on a USB channel or during Multiplex mode (AT+CMUX) write command responds with "OK", but will not have any effect. However, AT+IPR read command always returns the current setting dedicated to the UART channel.
It is highly recommended to use AT+IPR as a standalone AT command.
The current setting of AT+IPR will be preserved after firmware download (i.e. a firmware update does not restore the factory setting) or in the event of power failure.

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>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Parameter Description

<rate>(num)

bit rate per second (bps)

0	Autobaud mode. For details refer Section 4.6.1, Autobaud mode below.
300	
600	
1200	

2400

4800

9600

14400

19200

28800

38400

57600

115200

230400

460800

4.6.1   Autobaud mode

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

1. Synchronization between ME and TA:

    -   Autobaud mode is only intended to facilitate the initial contact with the EU3-E. Therefore, after successful synchronization between ME and TA Autobaud mode shall be deactivated by the TA via selecting a fixed bit rate with the first AT command (also refer AT^SDPORT). Hence, while Autobaud mode is enabled the ME needs to be restarted each time the TA's bit rate has changed.

    -   Autobaud mode does not take effect immediately after AT+IPR=0 ends. Instead the old bit rate remains active and Autobaud mode is activated with the next restart of the ME.

    -   Ensure that ME and TA are correctly synchronized and the bit rate used by the TA is detected by the ME. To allow the bit rate to be synchronized simply issue "AT" or "at" string. This is necessary when start up the ME while in Autobaud mode. It is recommended to wait 3 to 5 seconds before sending the first AT character. Otherwise undefined characters might be returned.

    -   Before activating Autobaud mode enable local echo with ATE1. To verify if Autobaud mode has become effective after restart first send the two characters "AT" or "at" (neither "At" nor "aT") and check that they are echoed within 100ms. In some cases you may need to repeat this several times, until both characters are properly echoed within 100ms.

2. Autobaud mode and bit rate after restart:
    Unless the bit rate is determined, the following constraints apply:

    -   Until the bit rate is detected, URCs will be output at 115200 bps. This applies to switchable URCs, such as "+CREG", "CCWA", "^SCKS". For details refer Section 1.6, Communication between Customer Application and EU3-E.

    Therefore, to avoid any problems caused by undetermined bit rates in the direction from TA to ME it is strongly recommended to configure a fixed bit rate as soon as possible.

3. Restrictions

    -   In Autobaud mode the TA shall always use hardware flow control, regardless the current flow control setting via AT\Q. Especially assure to not send a character while the CTS line is in inactive state.

    -   Autobaud mode supports 8N1 frame type (8 data bits, no parity and 1 stop bit) only.

    -   A/ cannot be used.

    -   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 115200 bps.

    -   If Autobaud mode is active Multiplex mode can not be enabled, refer AT+CMUX.

4.7 AT+CMUX Multiplex Mode

Multiplex mode according to GSM 07.10 and 3GPP TS 27.010 enables a serial interface to be partioned into virtual channels. It can be used either on EU3-E's USB interface or its asynchronous serial interface ASC0.

Multiplex mode can be started only on the Modem interface. This may be either the virtual modem port of the USB composite device or the ASC0 interface. In either case the Modem interface will be mapped to the first multiplex channel, and the Application interface will be mapped to the second multiplex channel. As a result, the functions of the first and second multiplex channels are the same as described in Section 1.4, AT Command Interpreter for the Modem and Application interfaces. Multiplex channels 5 and 6 are dedicated for the Transparent TCP/IP service. Both channels can be used for data exchange with AT^SIST. Channels 3 and 4 are reserved for future use. For details refer to "Multiplexer User's Guide".

EU3-E offers an internal multiplexer and thus integrates all functionality needed to implement full-featured multiplex solutions. For the application on top, customers have the flexibility to create their own multiplex programs conforming to the multiplexer protocol. To help system integrators save the time and expense of designing multiplexer applications, Cinterion Wireless Modules GmbH offers WinMux, a ready-to-use multiplex driver for Windows XP and Windows Vista. Another approach is to develop customized solutions based on the sources of the WinMux driver.

Refer to "Multiplexer User's Guide" which provides a detailed description of the multiplex architecture and step-by-step instructions of how to install and configure the Multiplex mode. The WinMux driver and its source files can be supplied on request. Please contact your local distributor to obtain the latest installation software and user's guide.

AT+CMUX write command is used to enter Multiplex mode. Setup of the logical channels is initiated by the TE, i.e. the TE acts as initiator. This means that the TE shall ensure that logical channels are established before any further actions on the channels can be started. There is a timeout of five seconds, if the multiplexer protocol is enabled but no multiplexer control channel is established. Afterwards EU3-E returns to AT command mode. The parameter maximum frame size (N1) according to GSM 07.10 is implemented as 98 bytes by default. All other parameters are not available. Refer to "Multiplexer User's Guide" for further details regarding frame size.

Syntax

Test Command
AT+CMUX=?
Response(s)
+CMUX: (list of supported <mode>s)
OK

Read Command
AT+CMUX?
Response(s)
+CMUX: <mode>
OK
ERROR
+CME ERROR: <err>

Write Command
AT+CMUX=<mode>
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
-	+	-	+		GSM 07.07, GSM 07.10, 3GPP TS 27.010

Parameter Description

<mode>(num)

Enable Multiplex mode.

0   Basic option

4.7.1   Restrictions on Multiplex mode

The following restrictions apply to Multiplex mode:

1. Before starting Multiplex mode, ensure that the bit rate set with AT+IPR is not lower than 57600 bps. For using data services in Multiplex mode it is recommended to set at least 115200 bps.

2. In Multiplex mode AT+IPR=<rate> has no effect but always responds with "OK".

3. Multiplex mode cannot be activated while autobauding is enabled.

4. Autobauding is not possible in Multiplex mode. Hence, the AT command which selects autobauding (AT+IPR=0) is not allowed.

5. It is recommended to set hardware flow control (AT\Q3) before starting Multiplex mode. XON/XOFF flow control (AT\Q1) is not supported in Multiplex mode.

4.8 AT^SQPORT   Query Port Type

AT^SQPORT enables the host application to query the type of virtual COM port it is connected to. Further details on the different types of virtual EU3-E interfaces can be found in Section 1.4, AT Command Interpreter.

Syntax

Test Command
AT^SQPORT=?
Response(s)
OK

Read Command
AT^SQPORT?
Response(s)
<type>
OK

Exec Command
AT^SQPORT
Response(s)
<type>
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<type>(str)

"Modem"	The virtual COM port is defined for use as a modem, mainly intended for dial-up connections. Using AT commands is not recommended except for the dialing command ATD.
"Application"	The virtual COM port is defined as application interface. It is recommended that this interface be used for controlling the EU3-E, e.g. for entering AT commands, receiving URCs, or sending and receiving short messages. URCs are indicated only on this interface, no matter which of the two interfaces was used to send the AT commands for activating their presentation. For further detail on URCs please refer to Section 1.8, Unsolicited Result Code Presentation.

5. Security Commands

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

5.1 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>

PIN	MDM	APP	Last
+	+	+	-

Reference(s)
GSM 07.07, GSM 02.04,   GSM 02.88, GSM 03.88, GSM 04.88

Parameter Description

<facility>(str)

Phone security locks set by client or factory

Primarily intended for the client to take safety precautions, "SC" can be configured individually.
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.

"FD" SIM fixed dialing memory: If the mobile is locked to "FD", only the phone numbers stored to the "FD" memory can be dialled. (Capacity of FD phonebook depending on the SIM card).
<password>: SIM PIN 2.
If a lock on the SIM fixed dialing memory is active, the following applies:

- Outgoing voice, data or fax calls can be made only to numbers stored in "FD" phonebook.
  Result code depends on the type of the call:
  for voice calls, indication is "+CME ERROR: call barred".
  for data and fax calls, indication is "NO CARRIER".

- Access to defined Supplementary Services such as Call barring, Call waiting, Call forwarding, Call hold and Multiparty is possible only if the exact corresponding public MMI *# code for the desired service is stored in the fixed dialing number phone book, and used with ATD.
  Indication is "+CME ERROR: call barred".
  Setting call forwarding using command AT+CCFC is possible only if <number> is stored in "FD" phonebook.

- Access to Unstructured Supplementary Services ("USSD") with ATD is possible only if the exact desired USSD string is stored in the fixed dialling number phone book.
  Indication is "+CME ERROR: call barred".
  However please note that the USSD command AT+CUSD is not barred while the "FD" lock is active.

- SMS can be sent only to phone numbers which are stored in the "fixed dialling numbers" phonebook "FD".
  Indication is "+CMS ERROR: operation not allowed".

- GPRS commands can be used only if the "fixed dialling numbers" phonebook "FD" 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".

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`.

<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 5.2.1, 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.

- As stated above <class> 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries the lock refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.

- The parameter <class> will not be sent to the network if <mode>=2. Therefore it may happen that the response of the query command contains information about classes which were not requested, or it shows only the inactive status of the class 1 or 255. This means that the status is valid for all classes.

- For PN (Network Personalisation) value of <facility> parameter refer to AT^SCSL command.

- Upper-case and lower-case characters cannot be used together for the <facility> parameter. For example, you can write either "FD" or "fd", but not "Fd".

Example

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

AT+CLCK="SC",1,"9999"	The "SC" parameter enables or disables the SIM PIN authentication (PIN 1) when you power up the GSM engine
OK	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"	Unlocks SIM card.
OK	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	Query the status of SIM card lock.
+CLCK: 1	SIM card is locked. SIM PIN1 must be entered to enable ME to register to the GSM network.
OK	

5.2   AT+CPIN   PIN Authentication

AT+CPIN controls network authentication of the EU3-E.

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

The write command allows the EU3-E to store the entered password. 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 no PIN1 request is pending (for example if PIN1 authentication has been done and the same PIN1 is entered again) EU3-E 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. See Section 21.1, Restricted access to SIM data after SIM PIN authentication for further detail.

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>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

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 5.2.1, 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.
SIM PUK2	ME is waiting for PUK2 to unblock a disabled PIN2.
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-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 PIN	ME is waiting for network personalisation password
PH-NET PUK	ME is waiting for network personalisation unblocking password
PH-NETSUB PIN	ME is waiting for network subset personalisation password
PH-NETSUB PUK	ME is waiting for network subset unblocking password
PH-SP PIN	ME is waiting for service provider personalisation password
PH-SP PUK	ME is waiting for service provider personalisation unblocking password
PH-CORP PIN	ME is waiting for corporate personalisation password
PH-CORP PUK	ME is waiting for corprorate personalisation 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.
  EU3-E 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 activate 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").

- See AT+CPWD for information on passwords.

- See AT+CLCK for information on lock types.

- See AT+CPBS for information on write access to the FD phonebook with PIN2

- PIN2 can be entered after at least first usage of protected functionality or along with the command used for accessing the PIN2 dependent feature.

5.2.1 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: SIM PUK required" 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+CPIN. 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+CPIN=PUK2,new PIN2.
- You can use the ATD command followed by the GSM code **052*PUK2*newPIN2*newPIN2#;.

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.
If incorrectly input, the password is governed by a specific timing algorithm: (n-1)*256 seconds (see table below).

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

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 2.8.1, CME/CMS Error Code Overview. For further instructions and examples see AT+CLCK and AT+CPWD.
For a complete list of Star-Hash codes please refer Section 21.2, Star-Hash (*#) Network Commands.

5.3 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` for more information on the various lock features.

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 the network provider or network operator doesn't supply the Network Password:
`+CME ERROR: 258` (`+CME ERROR: retry operation`)
If error is related to ME functionality:
`+CME ERROR: <err>`

PIN	MDM	APP	Last
+	+	+	-

Reference(s)

GSM 07.07

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.

"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 5.2.1, What to do if PIN or password authentication fails?. `<password length>`: 4 to 8 digits.
"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+CPIN` or `ATD`. For further detail please refer to Section 5.2.1, What to do if PIN or password authentication fails?. `<password length>`: 4 to 8 digits.

Supplementary Service Call Barring:

The call barring supplementary service 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>: ThenNetwork 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

<password length>(num)

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>. If the entered password is longer then the maximum password length it will be stripped to the maximum length and the remaining digits will be ignored.

<old password>(str)

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.

<new password>(str)

New password. Mandatory, if <old password> was an unblocking key (PUK).

Note

- As stated above there is usually a one 4-digit password for all call barring facilities. To change the password please use only the "AB" <facility> (All Barring services).

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 the password used to enable or disable Call Barring:

`AT+CPWD="AB","0000","3333"`	Requests the network to change the password for the call barring supplementary service.
`OK`	Even though issued for "AB" only the request applies to all other call barring services, too.

5.4 AT^SCSL Customer SIM Lock

The AT^SCSL command controls the Customer SIM Lock feature. This feature allows application manufacturers to lock a mobile to specific operators by activating a Network Personalization ("PN"). If the lock is enabled the mobile will accept only SIM cards from the given operators.
The lock is activated by specifying the mobile country codes and mobile networks codes on command line.
The Customer SIM Lock feature is protected by depersonalization key.

Syntax

Test Command
AT^SCSL=?
Response(s)
OK

Write Command
AT^SCSL=<facility>, <action>[, <password>, <data>]
Response(s)

If <action>=2 and no Customer SIM Lock has been programmed yet:
^SCSL: ""
If <action>= 2, Customer SIM Lock is effective and command is successful:
^SCSL: <data>[:<data>:<data>: ...]
If <action>=4 and no Customer SIM Lock has been programmed yet:
^SCSL: <password>
If <action>=4 and Customer SIM Lock is set:
^SCSL: ERROR
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<facility>(str)	
"PN"	Network Personalisation (= Customer SIM Lock)

<action>(num)	
0	Delete programmed SIM lock data and disable the personalization. Required parameters: <facility>="PN", <action>=0, <password>. Removing the Customer SIM Lock deletes all <data>, i.e. the entire list of operators . To make the change take effect the ME must be restarted.
1	Program given Customer SIM lock data and activate lock. Required parameters: <facility>="PN", <action>=1, <password>, <data>. To make the change take effect the ME must be restarted.
2	Request Customer SIM Lock status. Required parameters: <facility>="PN", <action>=2.

3	Set Customer SIM Lock into prepared state (Autolock). In this case, the SIM lock data will be read from the first inserted SIM card and stored. Required parameters: `<facility>`="PN", `<action>`=3, `<password>`. Setting the lock into prepared state will remove all `<data>`, i.e. the entire list of operators. To make the change take effect the ME must be restarted.
4	Request the depersonalization key, allowed if Customer SIM Lock has not already been programmed. Otherwise returns "ERROR". Required parameters: `<facility>`="PN", `<action>`=4.

`<password>`(str)

8-digit depersonalization key associated with the device.
The depersonalization key is necessary for programming a Customer SIM Lock. It can also be used to unblock a Customer SIM Lock in order to operate the mobile with a SIM other than the one associated with the Customer SIM Lock. See note below.
The `<password>` is unique for each device. To find out the `<password>` it is necessary to execute the `AT^SCSL` write command with `<action>`=4. Keep in mind that if a SIM lock is set, reading the `<password>` with `<action>`=4 is no longer possible, and will only return "ERROR". To allow for any later changes, it is the responsibility of the manufacturer to hold a database with the module specific passwords. To avoid unauthorized use, the `<password>` should not be provisioned to end users.
The password is not needed for `<action>`=2 and `<action>`=4.

`<data>`(str)

Data of the allowed network operators.
Each operator code consists of the "Mobile Country Code" MCC and the "Mobile Network Code" MNC, both separated by a dot, e.g. MCC1.MNC1. If more than one operator is entered on the same line, then a colon must be set between each operator code, e.g. MCC1.MNC1:MCC2.MNC2:MCC3.MNC3. For example, for the three operators T-Mobile D, Vodafone D2 and E-Plus you would enter the following data: 262.01:262.02:262.03
New operator entries will not be added to an existing list, but overwrite the all old entries. If you need to add new operator entries please send the complete list once again.

Notes

- Usage of the Customer SIM lock features may be restricted by existing facility locks, such as a factory set SIM lock.

- Reprogramming an active SIM lock is possible, but overwrites previous settings.

- As described above the depersonalization key (`<password>`) is needed for programming a Customer SIM Lock with `AT^SCSL`.
  It can also be used to unblock an existing Customer SIM Lock in order to operate the mobile with a SIM other than the one associated with the Customer SIM Lock. In such case, if the user inserts an unsupported SIM and enters PIN1 the ME returns OK, although access to SIM related commands (such as dialing out, access to phonebooks, SMS etc.) will be denied. If then the read command `AT+CPIN`? is executed the ME will request the PH-NET PIN, i.e. the `<password>`. After entering the `<password>` the ME can be operated with the new SIM. To avoid unauthorized use, the `<password>` should not be provisioned to end users.

Example

The example shows how to read out the `<password>` first. After this, configuring and removing the Customer SIM Lock is possible.

```AT^SCSL="PN",4```
```^SCSL: 12345678```
```OK```
	Check the `<password>`. If no Customer SIM Lock has been programmed yet the module specific `<password>` will be returned.

```AT^SCSL="PN",2```
```^SCSL: ""```
```OK```
	Request status.
	SIM Lock disabled.

```AT^SCSL="PN",1,"12345678","262.01:262.02"``` ```OK```	Program Customer SIM Lock.

```
AT^SCSL="PN",2                          Request status
^SCSL: "262.01:262.02"                  SIM Lock is enabled and takes effect after restart.
OK
AT^SCSL="PN",4                          Checking the <password> will now return "ERROR"
OK                                      only.
AT^SCSL="PN",0,"12345678"               Remove Customer SIM Lock.
OK
```

6. Identification Commands

The AT Commands described in this chapter allow the external application to obtain various identification information related to the EU3-E and linked entities.

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 yy of software release.

Syntax

Exec Command
ATI[<value>]
Response(s)
Cinterion EU3-E REVISION xx.yyy OK

Exec Command
ATI1
Response(s)
Cinterion EU3-E REVISION xx.yy A-REVISION xx.zzz.cc OK

Exec Command
ATI2
Response(s)
UICC Application Identification <applId> OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
±	+	+	-		V.250

Parameter Description

<value>(num)

Values are not supported and only return OK.

<applId>(num)

UICC application types. A single value or a combination of the following values is possible.
For example, the response value 3 represents the sum of the integers 1 and 2 (GSM application and USIM application).

1   GSM application

2	USIM application
4	ISIM application

Notes

- If the user changed the setting of the AT^SCFG parameter "Ident/Manufacturer", then instead of "Cinterion" the changed value will be returned (for details please refer to description of parameter <manufacturer>).

- If the user changed the setting of the AT^SCFG parameter "Ident/Product", then instead of "EU3-E" the changed value will be returned (for details please refer to description of parameter <product>).

- "A-REVISION xx.zzz.cc" information consists of the following parts:
  Application Revision Number 'xx' as an assignment to customer application. '01' indicates no customer application.
  Application Revision Version 'zzz' 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

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

Note

- If the user changed the setting of the AT^SCFG parameter "Ident/Manufacturer", then instead of "Cinterion" the changed value will be returned (for details please refer to description of parameter <manufacturer>).

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

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Note

- If the user changed the setting of the AT^SCFG parameter "Ident/Manufacturer", then instead of "Cinterion" the changed value will be returned (for details please refer to description of parameter <manufacturer>).

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)
EU3-E
OK

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

Note

• If the user changed the setting of the AT^SCFG parameter "Ident/Product", then instead of "EU3-E" the changed value will be returned (for details please refer to description of parameter <product>).

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)
EU3-E
OK

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Note

• If the user changed the setting of the AT^SCFG parameter "Ident/Product", then instead of "EU3-E" the changed value will be returned (for details please refer to description of parameter <product>).

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 <xx.yyy>
OK

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

Parameter Description

<xx.yyy>(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 <xx.yyy>
OK

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Parameter Description

<xx.yyy>(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

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

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

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Parameter Description

<imsi>(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.

7.1 ATA Answer a call

Syntax

Exec Command
ATA
Response(s)
In case of data call, if successfully connected (TA switches to data mode):
CONNECT <text>
In case of voice call, if successfully connected:
OK
When TA returns to command mode after call release:
OK
If no connection:
NO CARRIER

PIN	MDM	APP	Last		Reference(s)
+	+	±	-		V.250

Command Description

TA causes remote station to go off-hook (e.g. answer call).

Parameter Description

<text>(str)

Connection status

Output only if ATX parameter setting with value greater 0. Connection speed values:

"9600"

"14400"

"28800"

"57600"

"64000"

Notes

- The command may be aborted generally by receiving a character during execution. It can't be aborted in some connection setup states, such as handshaking.
- See also ATX for <text>.
- If an incoming call is no longer available (already disconnected/hanged up)a "NO CARRIER" result code will be given.

7.2 ATD Mobile originated call to specified number

Syntax

Exec Command

ATD<n>[<mgsm>][;]

Response(s)

If busy (parameter setting ATX3 or ATX4):
BUSY
If a connection cannot be set up:
NO CARRIER
NO ANSWER
OK
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 voice call successful or not:
OK

PIN	MDM	APP	Last		Reference(s)
±	+	±	-		V.250

Command Description

This command can be used to set up outgoing voice, video telephony, 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 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" or "BUSY") at the modem port.
- For voice calls the ME responds once the call setup is completed either successfully or unsuccessfully with ("OK").

Parameter Description

<n>(text)

String of dialing digits and optional V.250 modifiers: 0-9,*, #, +, A, B, C, D
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)
i   Deactivates CLIR (enables presentation of own phone number to called party)
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.
- See also ATX for <text>.

- The ME is equipped with a "Blacklist" function according to GSM02.07 Annex A:
  After a predefined number of failed call attempts, the dialed number is entered into a read-only phonebook called "blacklist" (phonebook "BL"). Call attempts to numbers contained in the blacklist will be barred by ME and not signalled to the network.
  An attempt to start a voice call to a barred phone number will be stopped with a "+CME ERROR: call barred".
  An attempt to start a data or fax call to a barred phone number will be answered immediately with result code "NO CARRIER".
  The barred numbers are automatically removed from the blacklist according to the timing conditions specified in GSM02.07 Annex A.

- 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 ECC file is inserted, call numbers 112 and 911 and in addition all call numbers enabled with AT^SCFG, "Call/ECC", parameter <ecc> will cause an emergency call setup.

- 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. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

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

Syntax

Exec Command

ATD>"<mem><n>";

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
When TA returns to command mode after call release:
OK
If voice call setup successful or not:
OK

PIN	MDM	APP	Last
+	+	+	-

Reference(s)

V.250

Command Description

TA attempts to set up an outgoing call to the specified number.

Parameter Description

<mem>(text)

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
EN	Emergency numbers
DC	Dialled calls list

<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.

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.
- See ATX for setting result code and call monitoring parameters.
- 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. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

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>"SM15";
OK
```

EXAMPLE 3

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

```
ATD>"LD9";
OK
```

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

Syntax

Exec Command
ATD><n>;
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 When TA returns to command mode after call release: OK If successfully connected: OK If voice call successful or not: OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Command Description

TA attempts to set up an outgoing call to the stored number.

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.

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.
- 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. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

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

Syntax

Exec Command
ATD><str>;
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
When TA returns to command mode after call release:
OK
If successfully connected:
OK
If voice call successful or not:
OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Command Description

This command searches the active phonebook for a given string <str> and dials the assigned phone number.

Parameter Description

<str>(str)(+CSCS)

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

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.

• 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. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

7.6 ATH Disconnect existing data connection

Syntax

Exec Command
ATH[<n>]
Response(s)
OK

PIN	MDM	APP	Last		Reference(s)
+	+	-	-		V.250

Command Description

Disconnect existing data (csd) call from command line by local TE and terminate call.

Parameter Description

<n>^(num)

[0]	disconnect from line and terminate call

7.7   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>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

Command Description

Cancels all active, waiting and held calls.

Note

• AT+CHUP supports only voice calls. Data or Fax connections can be disconnected with ATH only.

7.8   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
NO CARRIER

PIN	MDM	APP	Last
+	+	±	-

Parameter Description

<cause>(num)

Release cause

GSM04.08 release cause to be indicated to the network.
The EU3-E 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 "
21	Send GSM04.08 release cause "call rejected"
27	Send GSM04.08 release cause "destination out of order "
31	Send GSM04.08 release cause "normal, unspecified"
88	Send GSM04.08 release cause "incompatible destination"

<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. However, if circuit switched data calls and voice calls occur together, the command only terminates the CSD calls.
1...7	Terminate the specific call number <cn>.

7.9 ATS0 Set number of rings before automatically answering a call

Syntax

Read Command
ATS0?
Response(s)
<n>
OK
ERROR

Write Command
ATS0=<n>
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Parameter Description

<n>(num)
000(&F)(P)	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.
- If <n> is set to higher values, the calling party may hang up before the call is automatically answered.

7.10 ATS6 Set pause before blind dialing

Syntax

Read Command
ATS6?
Response(s)
<n>
OK

Write Command
ATS6=<n>
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Command Description

No effect for GSM.

Parameter Description

<n>(num)

002(&F)(P)...10

7.11 ATS7 Set number of seconds to wait for connection completion

ATS7 is implemented for v250ter compatibility reasons only, and has no effect.

Syntax

Read Command
ATS7?
Response(s)
<n>
OK

Write Command
ATS7=<n>
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Parameter Description

<n>(num)

7.12 ATS8 Set number of seconds to wait for comma dialing modifier

This command specifies the amount of time, in seconds, that the DCE shall pause, during signalling of call addressing information to the network (dialling), when a "," (comma) dial modifier is encountered in a dial string.

Syntax

Read Command
ATS8?
Response(s)
<n>
OK

Write Command
ATS8=<n>
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Command Description

No effect for GSM.

Parameter Description

<n>(num)	
0	DCE does not pause when "," encountered in dial string
1...2(&F)(P)...255	Number of seconds to pause

7.13 ATS10 Set disconnect delay after indicating the absence of data carrier

Syntax

Read Command
ATS10?
Response(s)
<n>
OK

Write Command
ATS10=<n>
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		V.250

Command Description

This parameter setting determines the amount of time, that the TA remains connected in absence of a data carrier. If the data carrier is detected before disconnect, the TA remains connected.

Parameter Description

<n>(num)

number of tenths of seconds of delay

001...14(&F)(P)...255

7.14 ATO Switch from command mode to data 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.

PIN	MDM	APP	Last		Reference(s)
+	+	-	-		V.250

Command Description

ATO is the corresponding command to the +++ escape sequence: When you have established a CSD call and TA is in command mode, ATO causes the TA to resume the data connection and takes you back to data mode mode.

Parameter Description

<n>(num)

[0]   Switch from command mode to data mode

7.15 +++ Switch from data mode to command mode

Syntax

Exec Command
+++
Response(s)
OK

PIN	MDM	APP	Last
-	+	-	-

Reference(s)
V.250

Command Description

This command is only available during a CSD call or a GPRS connection. The +++ character sequence causes the TA to cancel the data flow over the AT interface and switch to command mode. This allows you to enter AT commands while maintaining the data connection to the remote device or, accordingly, the GPRS connection. To prevent the +++ escape 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.

Notes

* To return from command mode to data or PPP online mode: Enter ATO.
* The DTR function mode 1 provides the same functionality as "+++" (see AT&D).

7.16 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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

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

`<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	
128	Restricted `<number>` includes unknown type and format.
145	Dialing string `<number>` includes international access code character '+'
129	Otherwise

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

Alphanumeric representation of `<number>` corresponding to the entry found in phonebook.
The maximum displayed length of `<alpha>` is 14 characters.

Note

- For alphanumeric representation the number stored in phonebook must be identical to the number transported over the network, then the associated name will be recognized.

7.17   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 additional write command allows to activate Event reporting for the list of current calls.
- The additional read command returns an indication whether event reporting is active for the current interface.
- 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>, <Reserved>[, <number>, <type>[, <alpha>]]]
[^SLCC:<idx>, <dir>, <stat>, <mode>, <mpty>, <Reserved>[, <number>, <type>[, <alpha>]]]
[^SLCC:...]
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SLCC=[<n>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
+	+	+	-

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>, <Reserved>[, <number>, <type>[,
<alpha>]]
[^SLCC: <idx>, <dir>, <stat>, <mode>, <mpty>, <Reserved>[, <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.
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)

[0](&F)(P)	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)

<mode>(num)

bearer/teleservice

0	Voice
1	Data
2	Fax

<mpty>(num)

0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

<Reserved>(num)

0	Reserved

<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

- 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 configuration displayed in such cases is the current configuration at the time of the last display.

- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

- If a multiparty call is established, the transmission of DTMF tones is not possible anymore till the call is released. This behaviour is caused due to an ambiguity between the different transaction identifiers.

7.18   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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

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)	
0(&F)(P)	Disable
1	Enable

<serv>(str)	
"REL ASYNC"	Asynchronous non-transparent
"GPRS"	GPRS
"SYNC"	Fax connection or video telephony

7.19 AT+CRC Set Cellular Result Codes for incoming call indication

The AT+CRC command controls whether or not to use the extended format of incoming call indication.
<mode>=1 may lead to connection failure, if the application (e.g. WinFax) waits for the default URC.

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

Exec Command
AT+CRC
Response(s)
OK
ERROR

Write Command
AT+CRC=[<mode>]
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Unsolicited Result Codes

URC 1

  RING

Indicates incoming call to the TE if <mode>=0.

URC 2

  +CRING: <type>

Indicates incoming call to the TE if <mode>=1.

Parameter Description

<mode>(num)	
[0](&F)(P)	Disable extended format
1	Enable extended format

<type>(str)	
"REL ASYNC"	Asynchronous non-transparent
"FAX"	Facsimile
"VOICE"	Voice
"SYNC"	synchronous transparent

7.20   AT+CBST   Select bearer service type

The 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. See GSM 02.02[1].

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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Parameter Description

<speed>$^{(num)}$

[0]$^{(\&F)(P)}$	Autobauding
7	9600 bps (V.32)
12	9600 bps (V.34)
14	14400 bps (V.34)
16	28800 bps (V.34)
17	32000 bps (V.34)
39	9600 bps (V.120)
43	14400 bps (V.120)
48	28800 bps (V.120)
51	56000 bps (V.120)
71	9600 bps (V.110)
75	14400 bps (V.110)
80	28800 bps (V.110 or X.31 flag stuffing)
81	38400 bps (V.110 or X.31 flag stuffing)
83	56000 bps (V.110 or X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI or RDI service in order to get FTM)
84	64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM)

| 116 | 64000 bps (bit transparent) |
| 134 | 64000 bps (multimedia) |

<name>(num)	
0(&F)(P)	Asynchronous modem
1	Synchronous modem
4	Asynchronous (RDI)

<ce>(num)	
0	Transparent
1(&F)(P)	Non-transparent

Note

•   Autobauding must not be used for CSD connections or video calls. For video calls <speed> shall be set to 134 (64000 bps).

7.20.1   Parameter configurations supported by AT+CBST

Table 7.1:   Parameter configurations supported by AT+CBST

<speed>	GSM	WCDMA	SYNC.	ASYNC.	ASYNC. (RDI)	TRANSP.	NON-TRANSP.
0	+	+		+			+
7	+			+		+	+
12	+			+		+	+
14	+	+		+		+	+
16		+		+			+
17		+		+			+
39	+			+			+
43	+	+		+			+
48		+		+			+
51		+		+			+
71	+			+			+
75	+	+		+			+
80	+	+		+			+
81	+	+		+			+
83	+	+		+	+		+
84		+		+			+
116		+	+			+	
134		+	+			+	

7.21 AT+CRLP Select radio link protocol parameters for originated non-transparent 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 till 2.

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), (list of supported<ver>s)
OK

Read Command

AT+CRLP?

Response(s)

+CRLP: <iws>, <mws>, <T1>, <N2>, <ver>
+CRLP: <iws>, <mws>, <T1>, <N2>, <ver>
+CRLP: <iws>, <mws>, <T1>, <N2>, <ver>
OK

Write Command

AT+CRLP=[<iws>[, <mws>[, <T1>[, <N2>[, <ver>]]]]]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
+	+	+	-

Reference(s)

GSM 07.07

Parameter Description

<iws>(num)

Interworking window size (IWF to MS)

$0...61^{(\&F)(P)}$

$0...240^{(\&F)(P)}...488$ for <ver>=2

<mws>(num)

Mobile window size (MS to IWF)

$0...61^{(\&F)(P)}$

$0...240^{(\&F)(P)}...488$ for <ver>=2

<T1>(num)

Acknowledgement timer (T1 in 10 ms units)

$38...48^{(\&F)(P)}...255$

$42...52^{(\&F)(P)}...255$ for <ver>=2

<N2>(num)

Re-transmission attempts N2

1...6(&F)(P)...255

<ver>(num)

RLP version number

0...2

7.22 ATP Select pulse dialing

Syntax

Exec Command
ATP
Response(s)
OK

PIN	MDM	APP	Last
+	+	+	-

Reference(s)
V.250

Note

• No effect for GSM.

7.23 ATT Select tone dialing

Syntax

Exec Command
ATT
Response(s)
OK

PIN	MDM	APP	Last
+	+	+	-

Reference(s)
V.250

Note

• No effect for GSM.

7.24 AT+ES   Synchronous Data Mode Configuration

This command enables the Synchronous Data Mode

Syntax

Test Command

AT+ES=?

Response(s)

+ES: list of supported <orig_rqst>values, , list of supported <ans_fbk>values
OK
ERROR
+CME ERROR: <err>

Read Command

AT+ES?

Response(s)

+ES:[<orig_rqst>], [, <ans_fbk>]
OK
ERROR
+CME ERROR: <err>

Write Command

AT+ES=[<orig_rqst>], [, <ans_fbk>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
±	+	+	-

Reference(s)

ITU-T V.80ter

Parameter Description

<orig_rqst>(num)

Requested mode

6(D)   Initiate Synchronous Access mode when connection is completed, and Data
                        Suite is entered

<ans_fbk>(num)

Fallback mode answerer

8(D)   Initiate Synchronous Mode when connection is completed, and Data Suite is
                        entered

7.25   AT+ESA   Synchronous access mode configuration

This command configures the Synchronous access mode.

Syntax

Test Command
AT+ESA=?
Response(s)
+ESA: (list of supported <trans_idle>values), , , , (list of supported <crc_type>values), (list of supported <nrzi_en>values), (list of supported <syn1>values),   OK   ERROR   +CME ERROR: <err>

Read Command
AT+ESA?
Response(s)
+ESA:<trans_idle>,,,,<crc_type>, <nrzi_en>, <syn1>,   OK   ERROR   +CME ERROR: <err>

Write Command
AT+ESA=[<trans_idle>][,][,][,][,][<crc_type>][<nrzi_en>][<syn1>]
Response(s)
OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		ITU-T V.80ter

Parameter Description

<trans_idle>(num)

Transmitted bit sequence

Specifies the bit sequence transmitted by the DCE when a transmit data buffer underrun condition occurs, while operating in Transparent sub-Mode.

0	In Transparent sub-Mode, DCE transmits 8-bit SYN sequence on idle. DCE receiver does not hunt for synchronization sequence.

<crc_type>(num)

CRC checking

0	CRC generation and checking disabled.

<nrzi_en>(num)

NRZI encoding

0	NRZI encoding and decoding disabled.

`<syn1>`(num)

When `<trans_idle>`=0, specifies the 8-bit transmit idle sequence to be used by the DCE.

0 - 255

7.26   AT+CSTA   Select type of address

Set command selects the type of number for further dialling commands `ATD` according to GSM/UMTS specifications. Test command returns values supported a compound value.

Syntax

Test Command
`AT+CSTA=?`
Response(s)
+CSTA: (list of supported`<type>`s)
OK

Read Command
`AT+CSTA?`
Response(s)
+CSTA: `<type>`
OK

Write Command
`AT+CSTA=<type>`
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Parameter Description

`<type>`(num)	
145	when dialling string includes international access code character "+"
129	otherwise

8. Network Service Commands

The AT Commands described in this chapter are related to various network services. More commands related to this area can be found in Chapter 9., Supplementary Service Commands.

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.

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>`

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

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 EU3-E's 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 with AT+COPS:

- Automatic
  EU3-E searches for the home operator automatically. If successful the EU3-E registers to the home network. If the home network is not found, EU3-E goes on searching. If a permitted operator is found, EU3-E registers to this operator.
  If no operator is found the EU3-E remains unregistered.

- Manual
  Desired operator can be determined using the AT+COPS write command. If the operator is found, EU3-E registers to it immediately. If the selected operator is forbidden, the EU3-E 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 lists sets of five parameters, each representing an operator present in the network. A set consists of

- an integer indicating the availability of the operator,
- long alphanumeric format of the operator's name,
- short alphanumeric format of the operator's name,
- numeric format representation of the operator and
- an integer indicating the acccess technology 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.

The reponse to the AT+COPS read command depends on the registration status. If the ME is not registered, the read command returns only the current <mode>. If the ME is registered the response returns the currently selected operator, the currently set format and the currently used <AcT>.

The AT+COPS write command forces an attempt to select and register to a 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.

The AT+COPS exec command returns OK and has no effect on the current <mode>.

Syntax

Test Command
AT+COPS=?
Response(s)
+COPS: [list of present operators (<opStatus>, long alphanumeric <oper>s, short alphanumeric <oper>s, numeric <oper>s , <AcT>], , (list of supported <mode>s), (list of supported <format>s)   OK   ERROR   +CME ERROR: <err>
Read Command
AT+COPS?
Response(s)
+COPS:<mode>[, <format>[, <oper>][, <AcT>]]   OK

Read Command	(Continued)
AT+COPS?	

Response(s)

ERROR
+CME ERROR: <err>

Exec Command
AT+COPS

Response(s)

OK

Write Command
AT+COPS=<mode>[, <format>[, <oper>][, <AcT>]]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Parameter Description

<opStatus>(num)

Status

0	Unknown
1	Operator available
2	Current operator
3	Operator forbidden

<oper>(str)

Operator

If test command: Operator name in long alphanumeric format, short alphanumeric format and numeric format.
If read command: Operator name as per <format>.
If write command: Operator name in numeric format.

<mode>(num)

0(P)	Automatic mode; <oper> field is ignored.
1	Manual operator selection The AT+COPS write command requires <oper> in numeric format, i.e. <format> shall be 2. The AT+COPS read command returns the current <mode>, the currently selected <oper> and the currently used <AcT>. If the ME is not registered the AT+COPS read command returns only the currently set <mode>.
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 (<oper> field will be present).

<AcT>(num)

Access technology also referred to as RAT (Radio Access Technology)

By delivery default, the <AcT> parameter is set to an automatic selection mode which enables the ME to select either UTRAN (UMTS) or GSM, depending on the network coverage. This automatic mode for selecting <AcT> remains enabled until you explicitly set either "0" for GSM or "2" for UTRAN. This means, setting the <AcT> parameter is a restriction, i.e. it forces the ME to select either UTRAN only or GSM only. If the selected <AcT> is not available, the ME cannot register to a network.

The automatic <AcT> selection mode can be restored any time by executing the AT+COPS write command without choosing a specific <AcT>, i.e. simply by omitting the <AcT> value. When you do so, it does not matter, which value(s) you select for other AT+COPS parameters. For example, an easy way is setting AT+COPS=0, which means both PLMN and RAT are automatically selected. Another way is giving the AT+COPS write command with any <mode>, <format>, or <oper>, but <AcT> omitted.

The <AcT> setting remains unchanged upon power-up, in contrast to <mode> that is always restored to "0" after power-up. Yet, please consider that the AT+COPS? read command does not reflect whether <AcT> was omitted or explicitly set. This is because the response to the AT+COPS? read command will always indicate the currently used <AcT>.

0	GSM
2	UTRAN

<format>(num)

0(&F)	Long alphanumeric format of <oper>. Can be up to 16 characters long.
1	Short alphanumeric format of <oper>. Can be up to 8 characters long.
2	Numeric format of <oper>. 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).

Notes

- A manually selected PLMN is volatile if the network registration has not been successful before powered down. So, ME starts acquisition with RPLMN.

- AT+COPS=? shows PLMNs as available (<opStatus>=1) as long as a location update was not rejected and the PLMNs are not written to the forbidden PLMN list (SIM EF-FPLMN).

- Trying to change the <AcT> parameter during an active connection causes the AT+COPS command to remain in a waiting state. This state can only be left by user break which then returns an error message. Therefore, take care to avoid changing <AcT> during an active connection.

8.3   AT^SOPS   Extended Operator Selection

AT^SOPS queries the present status of the EU3-E's 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.
After the operator list the EU3-E returns lists of supported <mode>s and <format>s. These lists are delimited from the operator list by two commas.
If the test command is used while an ongoing GPRS transfer, traffic will be interrupted for up to one minute.

Command settings are effective over all serial interfaces of the EU3-E.

Syntax

Test Command

AT^SOPS=?

Response(s)

^SOPS:[list of present operator(<opStatus>, <eonsType>, <eonsOperator>, <servProvider>, <servProviderType>, <opName>, <acT>)s], , (list of supported <mode>)s, (list of supported <format>)s
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
+	+	+	-

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>

Operator name; format depends on the source of the operator name, specified by <eonsType>.

<servProvider>^(str)

Service Provider Name according to setting of Service No. 17 in the SIM Service Table (EF$_{SST}$).
Service Provider Name (SPN) will be read from EF$_{SPN}$. Service Provider Display Information (SPDI) will be read from EF$_{SPDI}$ list.

<servProviderType>^(num)

Service Provider Type according to Registered Public Land Mobile Network (RPLMN) and Home Public Land Mobile Network (HPLMN).

0	No Service Provider Information available.
1	Service Provider Name will be displayed. RPLMN is the HPLMN.
2	Service Provider Display Information will be displayed. One list entry is equal to the RPLMN.

<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.

<mode>^(num)

Parameter is not applicable.

<acT>^(num)

Access technology selected

0	GSM
2^(D)	UTRAN

<format>^(num)

Parameter is not applicable.

Notes

*   The AT^SOPS Test command is only accepted by the module after a valid pin has been entered.

*   AT^SOPS=? shows PLMNs as available (<opStatus>=1) as long as a location update was not rejected and the PLMNs are not written to the forbidden PLMN list (SIM EF-FPLMN).

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 AT+CREG exec command sets the URC presentation mode <n> to the factory default value.

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>

Exec Command
AT+CREG
Response(s)
OK ERROR +CME ERROR: <err>

Write Command
AT+CREG=[<n>]
Response(s)
OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

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)	
[0](&F)(P)	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. Optional parameters <lac> and <ci> will not be displayed during calls or if these values have not changed since last AT+CREG read command or since last indication by +CREG URC.

<stat>(num)	
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
	• 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.

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)

16 bit (2G) or 28 bit (3G) cell ID in hexadezimal format.

Example

`AT+CREG=1`	Activates 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`	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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

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)	
0..7	as RXQUAL values in the table in GSM 05.08 section 8.2.4 (for GSM network only).
99	not known or not detectable (for GSM and UMTS networks).

Note

- After using network related commands such as AT+CCWA, AT+CCFC, 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+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>[, <gsm>, <gsm_compact>, <utran>]
+CPOL: ...
OK
ERROR
+CME ERROR: <err>

Write Command

AT+CPOL=<index>[, <format>, <operator>[, <gsm>, <gsm_compact>, <utran>]]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

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).

<gsm>(num)

0   AcT GSM disabled
1   AcT GSM enabled

<gsm_compact>^(num)	
0	AcT GSM Compact disabled

<utran>^(num)	
0	AcT UTRAN disabled
1	AcT UTRAN enabled

Notes

- If you enter AT+CPOL=? immediately after the CHV, you get the URC: "+CME ERROR: operation not allowed". In addition the AT+CPOL command is blocked until the ME is restarted. You get at any time the faulty response: "+CME ERROR: operation not allowed". The preferred operator list will not be shown.
  To avoid this problem and to check the status of SIM initialization after CHV you can activate the "^SIND: sim-status" URC provided by AT^SIND.

- The Access Technology selection parameters <gsm>, <gsm_compact> and <utran> are not required for SIM cards and GSM application on UICC.

8.7   AT^SMONI   Monitor the serving cell

The AT^SMONI command supplies information of the serving cell. To retrieve the information use the execute command.

Syntax

Test Command

AT^SMONI=?

Response(s)

OK

Exec Command

AT^SMONI

Response(s)

See: Section 8.7.1, AT^SMONI responses

OK

PIN	MDM	APP	Last
-	+	+	-

Notes

• The parameters LAC and cell are presented as hexadecimal digits, the remaining parameters are composed of decimal digits.

• If the BS supports frequency hopping during a connection, the dedicated channel (parameter chann) is not stable. This mode is indicated by chann = 'h'.

8.7.1   AT^SMONI responses

ME is not connected:
a) ME is camping on a 2G cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,ARFCN,TS,timAdv,dBm,Q,ChMod
Example:
^SMONI: 2G,71,-61,262,02,0143,83BA,33,33,3,6,G,NOCONN
```

b) ME is camping on a 3G cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/
n0,RSCP,ComMod
Example:
^SMONI: 3G,10564,296,-7.5,-79,262,02,0143,00228FF,-92,-78,NOCONN
```

c) ME is searching and could not (yet) find a suitable 2G cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,ARFCN,TS,timAdv,dBm,Q,ChMod
Example:
^SMONI: 2G,SEARCH
```

d) ME is searching and could not (yet) find a suitable 3G cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/
n0,RSCP,ComMod
Example:
^SMONI: 3G,SEARCH
```

ME is connected (Call in progress):
a:) 2G cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,ARFCN,TS,timAdv,dBm,Q,ChMod
Example:
^SMONI: 2G,673,-80,262,07,4EED,A500,35,35,7,4,G,643,4,0,-80,0,S_FR
```

b:) 3G cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/
n0,RSCP,ComMod
Example:
^SMONI: 3G,10663,212,-3.0,-75,262,03,9C57,7E7D68B,30,43,DPCH,128,8,-3.0,-75,0
```

Columns for Serving Cell (2G parameters):

Column	Description
ACT	Access Technology
ARFCN	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier
BCCH	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
C1	Coefficient for base station selection
C2	Coefficient for base station selection
NCC	PLMN colour code
BCC	Base station colour code
GPRS	GPRS state

Columns for Serving Cell (3G parameters):

Column	Description
ACT	Access Technology
UARFCN	UARFCN (UTRAN Absolute Radio Frequency Channel Number) of the BCCH carrier
PSC	Primary Synchronisation Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power 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
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)

Columns for Dedicated Channel (2G paramaters):

Column	Description
ARFCN	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier
TS	Timeslot number
timAdv	Timing advance in bits
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)

Columns for Dedicated Channel (3G paramaters):
Note: Physical channel in downlink are considered.

Column	Description
PhysCh	Physical Channel Type Note: DPCH considered only
SF	Spreading Factor (4,8,16,32,64,128,256,512)
Slot	Slot Format (0-16) (see 3GPP 25.211; Table 11)
EC/n0	Carrier to noise ratio in dB
RSCP	Received Signal Code Power in dBm
ComMod	Compressed Mode (0-1) (indicates valid transmission gap pattern)

8.7.2　　Service States

Depending on the service state, an additional textual output is generated (refer also to the response examples):

- 'SEARCH' (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.

8.8 AT^SMONP Monitor neighbour cells

The AT^SMONP supplies information of neighbour cells. To retrieve the information use the execute command.

Syntax

Test Command
AT^SMONP=?
Response(s)
OK

Exec Command
AT^SMONP
Response(s)
See: Section 8.8.1, AT^SMONP responses
OK

PIN	MDM	APP	Last
-	+	+	-

Notes

- Due to the fact that not all necessary information of the neighbour cells can be decoded during a connection, there are several constraints to be considered:
    - Only neighbour 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 neighbour 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 "-" is presented for C1 and C2.
- The neighbour cells have the same PLMN as the serving cell. In case of searcing for a network the serving cell can change and the ME shows different sets of neighbour cells depending on the PLMN of the serving cell.
- In case of a 2G serving cell the ME shows 2G and 3G neighbour cells. If 3G is available then no neighboring 2G cells are shown.
- Not all parameters are shown. The output is still under development and will be changed in future releases. Unsupported parameters are signed as "-" .

8.8.1 AT^SMONP responses

Response of AT^SMONP (Example):

In case of a 2G serving cell:

```
2G:
ARFCN_1,rs_1,dBm_1,MCC_1,MNC_1,NCC_1,BCC_1,C1_1,C2_1,LAC_1,cell_1
ARFCN_2,rs_2,dBm_2,MCC_2,MNC_2,NCC_2,BCC_2,C1_2,C2_2,LAC_2,cell_2
...
ARFCN_n,rs_n,dBm_n,MCC_n,MNC_n,NCC_n,BCC_n,C1_n,C2_n,C31_n,C32_n
3G:
UARFCN_1,PSC_1,EC/n0_1,RSCP_1
UARFCN_2,PSC_2,EC/n0_2,RSCP_2
...
UARFCN_n,PSC_n,EC/n0_n,RSCP_n

Example:
```

```
2G:
653,26,-84,262,07,3,0,22,22,0141,3B2F
660,20,-90,262,07,3,3,16,16,0143,83B9
687,19,-91,262,07,3,1,15,15,0141,3B31
678,14,-95,262,07,3,3,10,10,0141,3B2F
671,14,-96,262,07,3,1,10,10,0141,8F67
643,10,-99,262,07,3,7,6,6,0141,83BB
3G:
10564,296,-6.5,-68
10564,96,-10.5,-83
```

In case of a 3G serving cell:

```
3G:
UARFCN_1,PSC_1,EC/n0_1,RSCP_1,SQual_1,SRxLev_1
UARFCN_2,PSC_2,EC/n0_2,RSCP_2,SQual_2,SRxLev_2
...
UARFCN_n,PSC_n,EC/n0_n,RSCP_n,SQual_n,SRxLev_n

2G:
ARFCN_1,RSSI_1,NCC_1,BCC_1,SRxLev_1
ARFCN_2,RSSI_2,NCC_2,BCC_2,SRxLev_2
...
ARFCN_n,RSSI_n,NCC_n,BCC_n,SRxLev_n
Example:

3G:
10663,212,-8.0,-76,20,39
10663,346,-12.5,-81,11,34
10663,52,-14.0,-83,8,32
10663,208,-19.5,-87,-3,28
10663,214,-22.0,-90,-8,25
10663,263,-24.0,-100,-27,15
2G:
----,----,-,-,----
```

Columns for 2G paramaters:

Column	Description
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)
NCC	Network colour Code
BCC	Base Station colour code
C1	cell selection criterion
C2	cell reselection criterion
LAC	Location area code
cell	Cell identifier

Columns for 3G paramaters:

Column	Description
UARFCN	UTRAN Absolute Radio Frequency Channel Number of the BCCH carrier
PSC	Primary Synchronisation Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)

9. Supplementary Service Commands

The AT Commands described in this chapter are related to the Supplementary Services offered by the GSM network.

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

Syntax

Test Command
AT+CACM=?
Response(s)
OK

Read Command
AT+CACM?
Response(s)
+CACM: <acm>
OK
ERROR
+CME ERROR: <err>

Write Command
AT+CACM=[<passwd>]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Command Description

The read command returns the current ACM value.

The write command resets the Advice of Charge related to the accumulated call meter (ACM) value in SIM file EF(ACM). ACM contains the total number of home units for both the current and preceding calls.

Parameter Description

<acm>(str)

Three bytes of the current ACM value in hexadecimal format (e.g. "00001E" indicates decimal value 30) 000000 - FFFFFF.

<passwd>(str)

SIM PIN2

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

Syntax

Test Command

AT+CAMM=?

Response(s)

OK

Read Command

AT+CAMM?

Response(s)

+CAMM: <acmmax>
OK
ERROR
+CME ERROR: <err>

Write Command

AT+CAMM=<acmmax>[, <passwd>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Command Description

The read command returns the current ACMmax value.

The write command sets the Advice of Charge related to the accumulated call meter maximum value in SIM file EF (ACMmax). ACMmax contains the maximum number of home units allowed to be consumed by the subscriber.

Parameter Description

<acmmax>(str)

Three bytes of the max. ACM value in hexadecimal format (e.g. "00001E" indicates decimal value 30) 000000 disable ACMmax feature 000001-FFFFFF.

<passwd>(str)

SIM PIN2

9.3 AT+CAOC Advice of Charge information

Syntax

Test Command
AT+CAOC=?
Response(s)
+CAOC: (list of supported<mode>s) OK

Read Command
AT+CAOC?
Response(s)
+CAOC: <mode> OK

Exec Command
AT+CAOC
Response(s)
OK ERROR +CME ERROR: <err>

Write Command
AT+CAOC=[<mode>]
Response(s)
ERROR +CME ERROR: <err> If <mode>=0, TA returns the current <ccm> value. +CAOC: <ccm> OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Unsolicited Result Code

+CCCM: <ccm>

When activated, an unsolicited result code is sent when the CCM value changes, but not more often than every 10 seconds.

Command Description

The write command sets the Advice of Charge supplementary service function mode.

Parameter Description

<mode>(num)	
0	query CCM value
[1](P)	deactivate the unsolicited reporting of <ccm> value
2	activate the unsolicited reporting of <ccm> value

$<ccm>^{(str)}$

Three bytes of the current CCM value in hexadecimal format (e.g. "00001E" indicates decimal value 30); bytes are similarly coded as ACMmax value in the SIM 000000-FFFFFF.

9.4 AT+CCUG   Closed User Group

Syntax

Test Command
AT+CCUG=?
Response(s)
OK

Read Command
AT+CCUG?
Response(s)
+CCUG:<n>, <index>, <info>
OK
ERROR
+CME ERROR: <err>

Write Command
AT+CCUG=[[<n>][, <index>][, <info>]]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07, GSM 02.85, GSM 03.85, GSM 04.85

Command Description

The Test command returns the supported parameters.

The Read command returns if the Explicit CUG invocation is activated (in parameter <n>), which CUG <index> is chosen, and if Preferential Group or Outgoing Access is suppressed (in parameter <info>).

The write command serves to activate or deactivate the explicit CUG invocation, to set the desired index, and to specify if Preferential Group or Outgoing Access shall be suppressed.

Parameter Description

<n>(num)

explicit CUG invocation options

0(D)	Deactivate explicit CUG invocation
1	Activate explicit CUG invocation

<index>(num)

0-9	explicit selection of CUG index
10(D)	No index (preferred CUG taken from subscriber data)

<info>(num)

state of the call

0(D)	no information
1	suppress outgoing access

| 2 | suppress preferential CUG |
| 3 | Suppress preferential CUG and Outgoing Access. |

Notes

- The active settings for omitted parameters are retained without changes.
- Explicit CUG invocation means that at each call setup, CUG information is added to the called number.
- Upon delivery, settings are predefined with
  <n>=0,
  <index>=10,
  <info>=0.
  These delivery defaults cannot be recalled automatically.
- When starting a call with ATD, Parameter 'G' or 'g' of command ATD will have no effect if the option selected for this single call is identical to the option already selected with AT+CCUG.
- Current settings are saved in the ME automatically.
- ATZ or AT&F do not influence the current settings.
- some combinations of parameters may lead to rejection of CUG calls by the network. For more information, please consult GSM 04.85

9.5 AT+CCFC Call forwarding number and conditions control

AT+CCFC controls the call forwarding supplementary service. Registration, erasure, activation, deactivation and status query are supported.

Syntax

Test Command
AT+CCFC=?
Response(s)
+CCFC:(list/range of supported <reason>s)
OK

Write Command
AT+CCFC=<reason>, <mode>[, <number>, <type>][, <class>][, <sub-number>, <sub-type>][, <time>]
Response(s)
If <mode> is not equal 2 and command successful:
OK
If <mode>= 2, <reason> is not equal 2 and command successful:
+CCFC: <status>, <class>[, <number>, <type>, <sub-number>, <sub-type>]
OK
If <mode>= 2, <reason>= 2 and command successful:
+CCFC: <status>, <class>[, <number>, <type>, <sub-number>, <sub-type>, <time>]
OK
If error is related to ME functionality
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07, GSM 02.04, GSM 02.82, GSM 03.82, GSM 04.82

Parameter Description

<reason>(num)
Reason for call forwarding

0	unconditional
1	mobile busy
2	no reply
3	not reachable
4	all call forwarding (includes reasons 0, 1, 2 and 3)
5	all conditional call forwarding (includes reasons 1, 2 and 3)

<mode>(num)
Network operation to be performed for Supplementary service "call forwarding"

0	disable call forwarding (disable service)
1	enable call forwarding (enable service)
2	query status of call forwarding (query service status)

3	register <number> and activate call forwarding (register service)
4	erase <number> and deactivate call forwarding (erase service)

<number>(str)

String type phone number of forwarding address in format specified by <type>. If you select <mode>= 3, the phone <number> will be registered in the network. This allows you to disable / enable CF to the same destination without the need to enter the phone number once again. Depending on the services offered by the provider the registration may be mandatory before CF can be used. The number remains registered in the network until you register another number or erase it using <mode> = 4.

<type>(num)

Type of address octect

145	dialing string <number> includes international access code character '+'
129	otherwise

<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	data <class> 2 (data) comprises all those <class> values 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 remaining 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 a specific data class.
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 (CF for voice, data and fax). The value 255 covers all classes. If the <class> parameter is omitted, the default value 7 is used.

<sub-number>(str)

String type phone number of sub address in format specified by <type>.

<sub-type>(num)

Type of sub-address octect

145	international access code character '+'
129	otherwise

<time>(num)

5...[20]...30	Time to wait before call is forwarded, rounded to a multiple of 5 sec. (only for <reason>=no reply)

<status>(num)	
0	Call forwarding not active
1	Call forwarding active

Notes

- For some networks, the interrogation command will return the same result for each requested class.

- You can register, disable, enable and erase <reason> 4 and 5 as described above. However, querying the status of <reason> 4 and 5 with AT+CCFC will result in an error.

- Most networks will not permit registration of new parameters for conditional call forwarding (reasons 1,2,3,5) while unconditional call forwarding is enabled.

- The AT+CCFC command offers a broad range of call forwarding options according to the GSM specifications. However, when you attempt to set a call forwarding 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 call forwarding status with <mode>=2.

- Some networks may choose to have certain call forwarding condtions permanently enabled (e.g. forwarding to a mailbox if the mobile is not reachable). In this case, erasure or deactivation of call forwarding for these conditions will not be successful, even if the CCFC request is answered with response "OK".

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

- There is currently no release of GSM standard "GSM 02.04", in which the call forwarding supplementary service is defined as applicable to SMS services.

- It may happen that the reponse of the query command shows only the inactive status of the class 1 or 255 instead of each requested class. This means, that the status is valid for all classes.

- As stated above <class> 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries call forwarding refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.

- The parameter <class> will not be sent to the network if <mode>=2. Therefore it may happen that the response of the query command contains information about classes which were not requested, or it shows only the inactive status of the class 1 or 255. This means that the status is valid for all classes.

Example

Please note that when you configure or query call forwarding without specifying any classes, the settings will refer to classes 1, 2 and 4 only (=default). The handling of classes is equivalent to AT+CLCK.

- To register the destination number for unconditional call forwarding (CFU):

```
at+ccfc=0,3,"+493012345678",145
OK
```

The destination number will be registered for voice, data and fax services (default <class> 7).
In most networks, the registration will also cause call forwarding to be activated for these <class> values.

- To query the status of CFU without specifying <class>:

```
at+ccfc=0,2
+CCFC: 1,1,"+493012345678",145
+CCFC: 1,4,"+493012345678",145
OK
```

- To erase the registered CFU destination number:

```
at+ccfc=0,4
OK
```

Now, when you check the status, no destination number will be indicated:

```
at+ccfc=0,2
+CCFC: 0,1
+CCFC: 0,4
OK
```

*   To query the status of CFU for all classes:

```
at+ccfc=0,2,,,255
+CCFC: 0,255
OK
```

*   `<reason>` 4 or 5 cannot be used to query the status of all call forwarding reasons (see also notes above):

```
at+ccfc=4,2
error
at+ccfc=5,2
error
```

9.6 AT+CCWA Call Waiting

The AT+CCWA write command controls the call waiting supplementary service according to GSM 02.83. Activation, deactivation and status query are supported. The read command returns the current value of <n>.

Syntax

Test Command
AT+CCWA=?
Response(s)
+CCWA:(list of supported <n>s)
OK

Read Command
AT+CCWA?
Response(s)
+CCWA:<n>
OK

Write Command
AT+CCWA=[[<n>][, <mode>][, <class>]]
Response(s)
If <mode> is not equal 2 and command successful:
OK
If <mode>= 2 and command successful:
+CCWA: <status>, <class>
[+CCWA: <status>, <class>]
[+CCWA: ...]
OK
If error is related to ME functionality
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07, GSM 02.04, GSM 02.83, GSM 03.83, GSM 04.83

Unsolicited Result Code

Indication of a call that is currently waiting and can be accepted.

+CCWA: <calling number>, <type of number>[, <class>], [, <CLI validity>]

If <n>=1 and the call waiting supplementary service is enabled in the network, URC "+CCWA" indicates a waiting call to the TE. It appears while the waiting call is still ringing.

Parameter Description

<n>(num)	
Switch URCs "+CCWA" for call waiting on/off	
0	Disable display of URCs "+CCWA"
1	Enable display of URCs "+CCWA"

<mode>(num)

Network operation to be performed for Supplementary service call waiting

0	Disable call waiting (disable service)
1	Enable call waiting (enable service)
2	Query status of call waiting (query service status)

<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".
In the write command, parameter <class> specifies the class of the active call during which an incoming call of any class is to be regarded as a waiting call.
In URC "+CCWA: <calling number>, <type of number>[, <class>], [, <CLI validity>]", parameter <class> specifies the class of the waiting call.

1	Voice
2	Data <class> 2 (data) comprises all those <class> values 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 remaining data classes (if supported). In addition, you can assign a different setting to a specific class. For example, you can activate call waiting for all data classes, but deactivate it for a specific data class.
4	Fax
[7]	Voice, data and fax (1+2+4)
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 (CF for voice, data and fax). The value 255 covers all classes. If parameter "class"is omitted, the default value 7 is used.

<status>(num)

0	Call waiting service is not active
1	Call waiting service is active

<calling number>(str)

Phone number of waiting caller in the format specified by parameter <type of number>.

<type of number>(num)

Type of address octet in integer format (refer to GSM 04.08, subclause 10.5.4.7)

145	<calling number> includes international access code character '+'
128	number restricted
129	Otherwise

<CLI validity>(num)

0	CLI valid

| 1 | CLI has been withheld |
| 2 | CLI is not available |

Notes

- With the AT+CHLD command, it is possible to establish a multiparty call or to set the active voice call on hold and then accept a waiting voice call (not possible with fax and data call). See also AT+CHLD

- Users should be aware that if call waiting is activated (<mode>=1), the presentation of URCs needs to be enabled, too (<n>=1).
  Otherwise, on the one hand, a waiting caller would be kept waiting due to lack of BUSY signals, while, on the other hand, the waiting call would not be indicated to the called party.

- The AT+CCWA command offers a broad range of options according to the GSM specifications. However, when you attempt to enable call waiting for a <class> for which the service is not provisioned or not supported , 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 current call waiting settings with <mode>=2.

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

- Despite the specifications stated in GSM 02.04 call waiting is not handled uniformly among all networks:
  GSM 02.04, Annex A, provides the following specification:
  "The applicability of call waiting refers to the telecommunication service of the active call and not of the waiting call. The incoming, waiting, call may be of any kind." Nevertheless, networks do differ on the actual implementation of the service. For example, the activation of call waiting for <class> 4, "fax", causes some networks to send a call waiting indication if a call "of any kind" comes in during an active fax call, but others may (with the same settings active) indicate a waiting fax call during any kind of active call. Thus, the only reliable way to receive or prevent a call waiting indication under any circumstances and in any network, is to activate or deactivate call waiting for all tele- and bearer services (<class> 255).

- As stated above <class> 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries call waiting refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.

- The parameter <class> will not be sent to the network if <mode>= 2. Therefore it may happen that the response of the query command contains information about classes which were not requested or it shows only the inactive status of the class 1 or 255. This means, that the status is valid for all classes.

9.7   AT+CHLD   Call Hold and Multiparty

The AT+CHLD command controls the Supplementary Services Call Hold and Multiparty. Calls can be put on hold, recovered, released and added to a conversation.

Like for all Supplementary Services, the availability and detailed functionality of Call Hold and Multiparty services depends on the configuration of the GSM network. The EU3-E can only request the service, but the network decides whether and how the request will be answered.

Syntax

Test Command
AT+CHLD=?
Response(s)
+CHLD: (list of supported <n>s)   OK

Write Command
AT+CHLD=[<n>]
Response(s)
OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Parameter Description

<n>(num)

0	Release all held calls or set User Determined User Busy (UDUB) for a waiting call:
	• If a call is waiting, release the waiting call. The calling party will receive a "BUSY" indication (Supplementary Service User Determined User Busy "UDUB")
	• Otherwise, terminate all held calls (if any).
1	Terminate all active calls (if any) and accept "the other call" as the active call:
	• If a call is waiting, the waiting call will be accepted.
	• Otherwise, if a held call is present, the held call becomes active.
1X	Terminate a specific call X. The call may be active, held or waiting. The remote party of the terminated call will receive a "NO CARRIER" indication. Parameter X is the call number <idx> in the list of current calls indicated by AT+CLCC. Instead of AT+CLCC, the AT^SLCC command with parameter <idx> can be used.
2	Place all active calls on hold (if any) and accept "the other call" as the active call:
	• If a call is waiting, the waiting call will be accepted.
	• Otherwise, if a held call is present, the held call becomes active.
2X	Place all active calls on hold except call X. Parameter X is the call number <idx> in the list of current calls indicated by AT+CLCC. Instead of AT+CLCC, the AT^SLCC command with parameter <idx> can be used.

3	Add a held call to the active calls in order to set up a conference (multiparty) call.
4	Connects the two calls of a multiparty call and disconnects the subscriber from both calls (ECT).

Notes

- The AT+CHLD command offers a broad range of options according to the GSM specifications. However, if you attempt to invoke an option which is not provisioned by the network, or not subscribed to, invocation of this option will fail. The responses in these cases may vary with the network (for example "Operation not allowed", "Operation not supported" etc.).

- The handling of the supplementary service Call hold and Multiparty varies with the types of calls. This is because only voice calls can be put on hold, while data or fax calls cannot. The following procedures apply: With AT+CHLD=2 the user can simultaneously place a voice call on hold and accept another waiting voice, data or fax call. If the waiting call is a data or fax call, it is also possible to put the voice call on hold. The user needs to wait for the RING signal and manually answer the data / fax call with ATA. To switch back from the active data or fax call to the held voice call the active call must be terminated with AT+CHLD=1. If all active and held calls are voice calls it is possible to switch back and forth with AT+CHLD=2.

- In conflict situations, e.g. when a waiting call comes while there are already held calls, the above procedures apply to the waiting call only. For example, `<n>`=0 rejects the waiting call, but does not affect the held calls.

- See also the AT+CCWA command for details on how to display waiting calls.

Example

```
at+cpin="9999"
OK
+CREG: 2
+CREG: 1,"0145","0016"              The mobile is now registered.
at+ccwa=1,1,1                       You activate the indication of waiting calls during
                                    voice calls.
OK
atd"1234567";                       You make a voice call.
OK
+CCWA: "+491791292364",145,32,,0    You receive a URC indicating a waiting data call.
at+chld=2                           You put the voice call on hold.
OK
RING                                You now receive the RING of the data call.
RING
RING
ATA                                 You accept the data call.
OK
CONNECT 9600                        The data connection is set up.
hello
+++                                 With "+++" you go in command mode.
OK
at+clcc                             You interrogate the status of all established calls.
+CLCC: 1,0,1,0,0,"03038639268",129
+CLCC: 2,1,0,1,0,"+491791292364",145
OK
at+chld=1                           The active data call is terminated and the held voice
                                    call becomes active.
OK
at+clcc
+CLCC: 1,0,0,0,0,"03038639268",129
OK
```

9.8 AT+CLIP   Calling Line Identification Presentation

This command refers to the GSM supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call.

The AT+CLIP write command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

The AT+CLIP read command gives the status of <n>, and also triggers an interrogation of the provision status of the CLIP service according to GSM 02.81 (given in <m>).

Syntax

Test Command
AT+CLIP=?
Response(s)
+CLIP: (list of supported<n>s)
OK
ERROR
+CME ERROR: <err>

Read Command
AT+CLIP?
Response(s)
+CLIP: <n>,<m>
OK
ERROR
+CME ERROR: <err>

Write Command
AT+CLIP=<n>
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07, GSM 02.81

Unsolicited Result Code

+CLIP: <number>, <type>, , [, <alpha>][, <CLI validity>]

When CLIP is enabled at the TE (and is permitted by the calling subscriber), this URC is delivered after every "RING" or "+CRING" URC when a mobile terminated voice call occurs. For data calls the URC is delivered only once.

Parameter Description

<n>(num)	
[0](&F)(P)	Suppress unsolicited result codes
1	Display unsolicited result codes

<m>(num)	
0	CLIP not provisioned

1	CLIP provisioned
2	Unknown

`<number>`(str)

String type phone number of calling address in format specified by `<type>`.

`<type>`(num)

Type of address octet in integer format; 145 when dialing string includes international access code character "+", otherwise 129.

TA shall return the recommended value 128 for `<type>` (TON/NPI unknown in accordance with GSM 04.08 subclause 10.5.4.7).

`<alpha>`(str)

String type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set is the one selected with `AT+CSCS`.

`<CLI validity>`(num)

0	CLI valid
1	CLI has been withheld by the originator.
2	CLI is not available due to interworking problems or limitations of originating network. `<number>` shall be an empty string ("") and `<type>` value will not be significant.

When CLI is not available (`<CLI validity>`=2), `<number>` shall be an plus string ("+") and `<type>` value will be "145". Nevertheless, TA shall return the recommended value 128 for `<type>` (TON/NPI unknown in accordance with GSM 04.08 subclause 10.5.4.7).

When CLI has been withheld by the originator, (`<CLI validity>`=1) and the CLIP is provisioned with the "override category" option (refer GSM 02.81 and GSM 03.81), `<number>` and `<type>` is provided. Otherwise, TA shall return the same setting for `<number>` and `<type>` as if the CLI was not available.

Note

- For alphanumeric representation the number stored in the phonebook must be identical to the number transported via the network - then the associated name will be recognized.

9.9 AT+CLIR Calling Line Identification Restriction

The AT+CLIR command refers to the GSM supplementary service CLIR (Calling Line Identification Restriction).

Syntax

Test Command
AT+CLIR=?
Response(s)
+CLIR: (list of supported <n>s)   OK

Read Command
AT+CLIR?
Response(s)
+CLIR<n>, <m>   OK   ERROR   +CME ERROR: <err>

Write Command
AT+CLIR=[<n>]
Response(s)
+CLIR: <n>, <m>   OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Parameter Description

<n>(num)

Parameter shows the settings for outgoing calls:

[0](P)	Presentation indicator is used according to the subscription of the CLIR service
1	CLIR invocation
2	CLIR suppression

<m>(num)

Parameter shows the subscriber CLIR service status in the network:

0	CLIR not provisioned
1	CLIR provisioned in permanent mode
2	Unknown (e.g. no network, etc.)
3	CLIR temporary mode presentation restricted
4	CLIR temporary mode presentation allowed

Note

- The settings made with AT+CLIR=1 or AT+CLIR=2 are used for all outgoing calls until the ME is switched off or AT+CLIR=0 is used.

9.10 AT+COLP Connected Line Identification Presentation

This command refers to the GSM supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated voice call. The command enables or disables the presentation of the COL at the TE. It has no effect on the execution of the supplementary service COLR in the network.

Syntax

Test Command
AT+COLP=?
Response(s)
+COLP:(list of supported <n>s)
OK

Read Command
AT+COLP?
Response(s)
+COLP: <n>,<m>
OK
ERROR
+CME ERROR: <err>

Write Command
AT+COLP=[<n>]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Unsolicited Result Code

Call response format:

+COLP: <number>, <type>[, <sub-number>][, <sub-type>][, <alpha>]

Parameter Description

<n>(num)	
0	Disable - suppress unsolicited result codes
1	Enable - display unsolicited result codes

<m>(num)	
0	COLP not provisioned (no presentation)
1	COLP provisioned
2	Unknown

<number>(str)

String type phone number of connected address in format specified by <type>

<type>(num)

Type of address octet in integer format; 145 when dialling string includes international access code character "+", otherwise 129.

<sub-number>(str)

String type phone number of sub address in format specified by <sub-type>.

<sub-type>(num)

Type of sub-address octect

145	international access code character '+'
129	otherwise

<alpha>(str)

String type alphanumeric representation of <number> corresponding to the entry found in phonebook; used character set is the one selected with AT+CSCS.

Note

• For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

9.11　AT+CPUC　Price per unit and currency table

Syntax

Test Command

AT+CPUC=?

Response(s)

OK

Read Command

AT+CPUC?

Response(s)

+CPUC: <currency>, <ppu>
OK
ERROR
+CME ERROR: <err>

Write Command

AT+CPUC=<currency>, <ppu>[, <passwd>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Command Description

Read command returns the current parameters of PUC.

Write command sets the parameters of Advice of Charge related price per unit and currency table. SIM PIN2 is usually required to set the parameters.

Parameter Description

<currency>(str)(+CSCS)

Three-character currency code (e.g. "GBP", "EUR"). If the currency name is longer than three characters, all characters will be cut off after the third position. Before they are written to the SIM Card, these characters are converted to the standard GSM alphabet.

<ppu>(str)

Price per unit; dot is used as a decimal separator (e.g. "2.66"). The length is limited to 20 characters. If the string length is exceeded, the command is terminated with an error. This string may only contain digits and a dot. Leading zeros are removed from the string. The minimum and maximum value are determined by the structure of the SIM-PUCT file. The maximum price per unit value is 999 999 999.00. When successfully entered, this value is rounded to maximum accuracy.
Note: Due to storage in mantisse (range 0-4095) and exponent (-7 to 7) it is possible that rounding errors occur.

<passwd>(str)

SIM PIN2. String parameter which can contain any combination of digits. The maximum string length is limited to 8 digits. If this value is exceeded, the command terminates with an error message. If the PIN2 is incorrect, a CME error (+CME ERROR: incorrect password) is output.

9.12 AT+CSSN Supplementary service notifications

Syntax

Test Command
AT+CSSN=?
Response(s)
+CSSN: (list of supported<n>s), (list of supported<m>s) OK

Read Command
AT+CSSN?
Response(s)
+CSSN: <n>, <m> OK

Write Command
AT+CSSN=<n>[, <m>]
Response(s)
OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	**+**	**+**	**-**		GSM 07.07

Unsolicited Result Codes

URC 1

+CSSI: <code 1>

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code "+CSSI: <code 1>" is sent to TE before any other MO call setup result codes

URC 2

+CSSU: <code 2>

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, unsolicited result code "+CSSU: <code 2>" is sent to TE.

Command Description

The write command enables or disables the presentation of URCs for supplementary services.

Parameter Description

<n>(num)	
0(&F)(P)	Suppress "+CSSI" URCs
1	Activate "+CSSI" URCs

<m>(num)	
0(&F)(P)	Suppress "+CSSU" URCs
1	Activate "+CSSU" URCs

<code 1>(num)	
0	unconditional call forwarding is active
1	some of the conditional call forwardings are active
2	call has been forwarded
3	Waiting call is pending
5	Outgoing call are barreded

<code 2>(num)	
0	The incoming call is a forwarded call.
2	call has been put on hold (during a voice call).
3	call has been retrieved (during a voice call).
5	Held call was terminated by other party
10	additional incoming call forwarded

Note

- URCs will be displayed only if the call concerned is a voice call, but some URCs will be displayed as well as for data calls (like "+CSSU"=0).

9.13   AT+CUSD   Unstructured supplementary service data

AT+CUSD allows control of the Unstructured Supplementary Service Data (USSD) according to GSM 02.90. Both network and mobile initiated operations are supported. The interaction of this command with other commands based on other GSM supplementary services is described in the GSM standard.

Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) "+CUSD: <m>[, <str_urc>[, <dcs>]]" to the TE.

When parameter <str_write> is given, a mobile initiated USSD string or a response USSD string to a network initiated operation is sent to the network. The response USSD string from the network is returned in a subsequent unsolicited result code "+CUSD"

Syntax

Test Command
AT+CUSD=?
Response(s)
+CUSD: (list of supported<n>s)   OK

Read Command
AT+CUSD?
Response(s)
+CUSD: <n>   OK

Write Command
AT+CUSD=<n>[, <str_write>[, <dcs>]]
Response(s)
OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07, GSM 02.90, GSM 03.90, GSM 04.90

Unsolicited Result Code

+CUSD: <m>[, <str_urc>[, <dcs>]]
URC "+CUSD" indicates an USSD response from the network, or network initiated operation

Parameter Description

<n>(num)	
0(&F)(P)	Disable the result code presentation in the TA
1	Enable the result code presentation in the TA
2	Cancel session (not applicable to read command response)

<str_write>(str)(+CSCS)

String type USSD-string (when <str_write> parameter is not given, network is not interrogated).
For the write command, only <dcs>= 15 is supported.

`<str_urc>`^(str)(+CSCS)

String type USSD-string .
If `<dcs>` indicates that GSM 03.38 default alphabet is used TA converts GSM alphabet into current TE character set according to rules of GSM 07.05 Annex A. Otherwise in case of invalid or omitted `<dcs>` conversion of `<str_urc>` is not possible.

`<dcs>`^(num)

GSM 03.38 Cell Broadcast Data Coding Scheme in integer format (default 15). In case of an invalid or omitted `<dcs>` from the network side (MT) `<dcs>` will not be given out.

`<m>`^(num)

0	No further user action required (network initiated USSD-Notify, or no further information needed after mobile initiated operation)
1	Further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation). If `<m>`=1, then user input has to be done with an additional `AT+CUSD`=1 command `<ESC>`.
2	USSD terminated by network.
3	other local client has responded, this means the interface was not idle and an busy was send to the network already
4	operation not supported
5	network time out

Notes

- When a USSD string is sent via `ATD`, a "`AT+CUSD`=1" is executed implicitly.

- It is recommended to finalize or escape a pending USSD user interaction before further actions are done to prevent blocking situations.

10. GPRS Commands

This chapter describes AT commands that a TE (Terminal Equipment, e.g. an application running on a controlling PC) may use to control the EU3-E acting as GPRS Mobile Termination (MT).

10.1 AT+CGATT   PS attach or detach

The execution command is used to attach the MT to, or detach the MT from, the Packet Domain service. After the command has completed, the MT remains in V.25ter command state. If the MT is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned.
Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.
The read command returns the current Packet Domain service state.
The test command is used for requesting information on the supported Packet Domain service states.

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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		3GPP 27.007

Parameter Description

<state>(num)

Indicates the state of PS attachment.

0(P)	detached
[1]	attached

Note

• If the currently used access technology is GSM and an CS call is in progress, then the write command returns "+CME ERROR: GPRS services not allowed".

10.2 AT+CGACT PDP context activate or deactivate

Syntax

Test Command

AT+CGACT=?

Response(s)

+CGACT: (list of supported <state>s)
OK
ERROR
+CME ERROR: <err>

Read Command

AT+CGACT?

Response(s)

+CGACT: [<cid>, <state>]
[+CGACT: <cid>, <state>]
...
OK
ERROR
+CME ERROR: <err>

Write Command

AT+CGACT=<state>[, <cid>[, <cid>]]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last	Reference(s)
+	+	+	-	3GPP 27.007

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.

Parameter Description

<state>(num)

Indicates the state of PDP context activation.

0   deactivated
1   activated

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).

Notes

- A maximum of 3 contexts can be activated at the same time, no matter on which interface (for interface restrictions see Section 1.4, AT Command Interpreter). Note that, depending on the provider, the number of activated contexts may be further restricted.
  Remember that contexts may be activated implicitly by using the ATD*99# GPRS compatibility command without specifying a <cid>.
- If activation or deactivation of a context fails, then AT+CEER may provide further informations about the reason.
- If activation of an Internet service related context fails with "+CME ERROR: service option temporary out of order", then either you already have too many contexts active or deactivation of this context was initiated before, but could not be completed because one or more services are still using this context (see below).
- It is possible to deactivate an Internet service related context even if one or more services are still using this context. In this case any open service using the context will be closed and will indicate this by its <srvState>.

10.3 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>]]
Response(s)
CONNECT
NO CARRIER
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	-	+		3GPP 27.007

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 the write command is successful, the MT issues the intermediate result code CONNECT and enters V.250 online data state.
The application that initiates the PPP mode must be designed to start all LCP configure requests in accordance with TS 27.060 par 9.1. Otherwise the MT remains, after the CONNECT, infinitely in a waiting 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 (see AT+CGDCONT parameter <cid>).
If parameter is not specified, then the first defined primary context is used.

10.3.1 Automatic deactivation of PDP context during dial-up PPP

When using the AT+CGDATA write command or `ATD*99#` the MT issues the intermediate result code CON-NECT 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.

If DTR is configured to disconnect data connections (`AT&D`2), then the application should not toggle DTR during the implicit PDP context deactivation and before "NO CARRIER" is received.

10.4   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: <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>[, <d_comp>[, <h_comp>]]]]]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
+	+	+	-

Reference(s)

3GPP 27.007

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. This parameter is used in other PDP context-related commands.

1...16

101...116   Internet service related context definitions

<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
1   on
2   RFC1144
3   RFC2507

Note

• All context definitions are stored non-volatile and are independent from AT&F and ATZ.

10.5 AT+CGPADDR Show PDP address

Syntax

Test Command
AT+CGPADDR=?
Response(s)
[+CGPADDR: (list of defined <cid>s)] OK

Exec Command
AT+CGPADDR
Response(s)
[+CGPADDR: <cid>, <PDP_address>] [+CGPADDR: ...] OK ERROR +CME ERROR: <err>

Write Command
AT+CGPADDR=<cid>[,<cid>[, ...]]
Response(s)
[+CGPADDR: <cid>, <PDP_address>] [+CGPADDR: ...] OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		3GPP 27.007

Command Description

The test command returns a list of defined <cid>s.

The exec command returns a list of PDP addresses for all defined GPRS contexts.

The write command returns a list of PDP addresses for the specified context identifiers. If a context is not defined, then no output line is generated for it.

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).

<PDP_address>(str)

A string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic.

10.6   AT+CGQMIN   Quality of Service Profile (Minimum acceptable)

Syntax

Test Command

AT+CGQMIN=?

Response(s)

+CGQMIN: "IP", (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: <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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		3GPP 27.007

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 context for which a QOS was explicitly specified.

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 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.

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).

<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 subscribed 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" | Internet Protocol (IETF STD 5) |

Notes

- Definitions of parameters can be found in 3GPP 23.107.
- All QOS settings are stored non-volatile and are independent from AT&F and ATZ.

10.7   AT+CGEQMIN   3G Quality of Service Profile (Minimum acceptable)

Syntax

Test Command
AT+CGEQMIN=?
Response(s)
+CGEQMIN: "IP", (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: <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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		3GPP TS 27.007

Command Description

The test command returns values supported as a compound value.

The read command returns the current settings for each context for which a QOS was explicitly specified.

The write command allows the TE to specify a Quality of Service Profile for the context identified by the 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.

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).

<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...384	

<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...7168	

<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+CGEQMIN=...,32,...).

[0]	subscribed value
1...384	

<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+CGEQMIN=...,32,...).

[0]	subscribed value
1...7168	

<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
100...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"   Internet Protocol (IETF STD 5)

Notes

- Definitions of parameters can be found in 3GPP 23.107. Please note, that not all parameter combinations are allowed. Details can be found in 3GPP TS 23.107 in section 6.5.1 "Ranges of UMTS Bearer Service Attributes".

- All QOS settings are stored non-volatile and are independent from AT&F and ATZ.

10.8 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 <n> and an integer <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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		3GPP 27.007

Unsolicited Result Code

+CGREG: <stat>
Indicates a change in the ME's GPRS network registration status.

Parameter Description

<n>(num)	
0(&F)(P)	Disable GPRS network registration URC
1	Enable GPRS 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.

10.9   AT+CGQREQ   Quality of Service Profile (Requested)

Syntax

Test Command

AT+CGQREQ=?

Response(s)

+CGQREQ: "IP", (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: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>]
[+CGQREQ: ...]

Write Command

AT+CGQREQ=<cid>[, <precedence>[, <delay>[, <reliability>[, <peak>[, <mean>]]]]]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		3GPP 27.007

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 context for which a QOS was explicitly specified.

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 context identification parameter, <cid>.
A special form of the set command, +CGQREQ=<cid> causes the requested profile for context number <cid> to become undefined.

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).

<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 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"	Internet Protocol (IETF STD 5)

Notes

• Definitions of parameters can be found in 3GPP 23.107.

• All QOS settings are stored non-volatile and are independent from AT&F and ATZ.

10.10 AT+CGEQREQ 3G Quality of Service Profile (Requested)

Syntax

Test Command

AT+CGEQREQ=?

Response(s)

+CGEQREQ: "IP", (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: <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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		3GPP TS 27.007

Command Description

The test command returns values supported as a compound value.

The read command returns the current settings for each context for which a QOS was explicitly specified.

The write command allows the TE to specify a Quality of Service Profile for the context identified by the 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.

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).

<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...384	

<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...7168	

<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...384	

<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...7168	

<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
100...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"	Internet Protocol (IETF STD 5)

Notes

- Definitions of parameters can be found in 3GPP 23.107. Please note, that not all parameter combinations are allowed. Details can be found in 3GPP TS 23.107 in section 6.5.1 "Ranges of UMTS Bearer Service Attributes".
- All QOS settings are stored non-volatile and independent from `AT&F` and `ATZ`.

10.11   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>

PIN	MDM	APP	Last
+	+	+	-

Reference(s)

3GPP 27.007

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.

Parameter Description

<service>(num)

A numeric parameter which indicates the service or service preference to be used. Parameter is global for all interfaces and non-volatile.

0	GPRS
1	Circuit switched
2(D)	GPRS preferred (use circuit switched SMS transfer if mobile is not GPRS attached)
3	Circuit switched preferred (use GPRS if circuit switched is not available)

10.12   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.
To confirm acceptance of the command before entering the V.250 online data state command will respond with CONNECT.
The application that initiates the PPP mode must be designed to start all LCP configure requests in accordance with TS 27.060 par 9.1. Otherwise the MT remains, after the CONNECT, infinitely in a waiting state.
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 10.3.1, Automatic deactivation of PDP context during dial-up PPP).

Syntax

Exec Command
ATD*99[* [<called_address>][* [<L2P>][* [<cid>]]]]#
Response(s)
CONNECT
NO CARRIER

PIN	MDM	APP	Last
+	+	-	+

Reference(s)
3GPP TS 27.007

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.

<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 parameter <cid>).

10.13 AT^SGAUTH Set type of authentication for PDP-IP connections

Syntax

Test Command

AT^SGAUTH=?

Response(s)

^SGAUTH:(range of supported<cid>s), (list of supported <auth_type>s), ,
OK
ERROR
+CME ERROR: <err>

Read Command

AT^SGAUTH?

Response(s)

^SGAUTH:<cid>, <auth_type>[, <user>]
^SGAUTH:<cid>, <auth_type>[, <user>]
...
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SGAUTH=<cid>[, <auth_type>[, <passwd>, <user>]]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
+	+	+	-

Parameter Description

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).

<auth_type>(num)

Indicates the types of authentication to be used for the specified context. If CHAP or PAP is selected two additional parameters <passwd> and <user> need to be specified.

[0]	none
1	PAP
2	CHAP

<passwd>(str)

Parameter specifies the password used for authentication. It is required for the authentication types PAP and CHAP.

<user>(str)

Parameter specifies the user name used for authentication. It is required for the authentication type PAP and CHAP.

Note

*   All settings will be stored non volatile.

11. FAX Commands

This chapter describes the AT commands used for fax communications.
If the ME is acting as a fax modem for a PC based fax application (e.g. "WinFax") it is necessary to select the proper Service Class (Fax Class) provided by the ME. The ME reports its Service Class capabilities, i.e. the current setting and the range of services available. This is provided by the AT+FCLASS command.

11.1 AT+FCLASS Set the Service Class of a facsimile DCE

AT+FCLASS sets the ME to a particular mode of operation (data, fax). This allows the ME to process information in a manner suitable for that type of information.

Syntax

Test Command
AT+FCLASS=?
Response(s)
(list of supported <n>s)
OK

Read Command
AT+FCLASS?
Response(s)
<n>
OK

Write Command
AT+FCLASS=<n>
Response(s)
OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		EIA/TIA-592-A

Parameter Description

<n>$^{(num)}$

0$^{(\&F)(P)}$	Data (e.g. EIA/TIA-602 or ITU V.250)
1	Fax class 1 (EIA/TIA-578-A, Service Class 1)

11.2   AT+FAR   Adaptive Rate Control

The AT+FAR command can be used to disable the DCE's ability to adaptively detect the selected message carrier or V.21 control message and to adjust +FRM processing accordingly.

Syntax

Test Command
AT+FAR=?
Response(s)
+FAR: (list of supported <n>s)
OK

Read Command
AT+FAR?
Response(s)
+FAR: <n>
OK

Exec Command
AT+FAR
Response(s)
OK

Write Command
AT+FAR=<n>
Response(s)
OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		EIA/TIA-592-A

Parameter Description

<n>(num)

0	Adaptive reception disabled.

11.3   AT+FDD   Double Escape Character Replacement

The AT+FDD command specifies how to use the (DLE) (SUB) pair to encode consecutive (1/0) (1/0) in data.

Syntax

Test Command
AT+FDD=?
Response(s)
+FDD: (list of supported <v>s)
OK

Read Command
AT+FDD?
Response(s)
+FDD: <v>
OK

Exec Command
AT+FDD
Response(s)
OK

Write Command
AT+FDD=<v>
Response(s)
OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		EIA/TIA-592-A

Parameter Description

<v>(num)

0-1

11.4　AT+FCL　Carrier Loss Timeout

The AT+FCL command specifies the duration (time*100 millisecond) used by DCE to terminate the session if no activity is detected on the carrier, i.e. the OTA interface.

Syntax

Test Command
AT+FCL=?
Response(s)
+FCL: (list of supported <n>s)
OK

Read Command
AT+FCL?
Response(s)
+FCL: <n>
OK

Exec Command
AT+FCL
Response(s)
OK

Write Command
AT+FCL=<n>
Response(s)
OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		EIA/TIA-592-A

Parameter Description

<n>(num)

Time

0-255

11.5   AT+FIT   DTE Inactivity Timeout

The AT+FIT command specifies the duration (in second) used by the DCE to terminate the session if the DTE fails to respond.

Syntax

Test Command
AT+FIT=?
Response(s)
+FIT: (list of supported <t>s), (list of supported <a>s)
OK

Read Command
AT+FIT?
Response(s)
+FIT: <t>, <a>
OK

Exec Command
AT+FIT
Response(s)
OK

Write Command
AT+FIT=<t><a>
Response(s)
OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		EIA/TIA-592-A

Parameter Description

<t>(num)

Time

0-255

<a>(num)

Action

0, 1; Action 0 and 1 are treated the same, i.e. terminate the T.31 session

11.6 AT+FTS Transmit silence

AT+FTS directs DCE to stop the transmission for the specified amount of time (in 10 millisecond increments).

Syntax

Test Command
AT+FTS=?
Response(s)
+FTS: (list of supported <Time>s)
OK
ERROR

Write Command
AT+FTS=<Time>
Response(s)
OK
In on-hook mode:
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		TIA/EIA-578

Parameter Description

<Time>(num)

No. of 10 millisecond intervals

0...255

Note

• Used for Fax Class 1 only

11.7   AT+FRS   Receive Silence

AT+FRS directs the DCE to listen for silence from the remote end and report back OK when silence has been detected for the specified amount of time (in 10 millisecond increments). Command is abortable.

Syntax

Test Command
AT+FRS=?
Response(s)
+FRS: (list of supported <Time>s)
OK
ERROR

Write Command
AT+FRS=<Time>
Response(s)
OK
If error is related to ME functionality:
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		TIA/EIA-578

Parameter Description

<Time>(num)

Number of 10 millisecond intervals

0...255

Note

• Used for Fax Class 1 only

11.8 AT+FTM Transmit message

AT+FTM directs the DCE to transmit T.30 facsimile message data using the specified modulation scheme.

Syntax

Test Command
AT+FTM=?
Response(s)
(list of <mod>s)
OK

Write Command
AT+FTM=<mod>
Response(s)
CONNECT
If error is related to ME functionality:
ERROR

PIN	MDM	APP	Last
+	+	-	-

Reference(s)

TIA/EIA-578

Parameter Description

<mod>(num)
Modulation scheme

72	V.29 - 7200 bps
73	V.17 - 7200 bps
74	V.17 - 7200 bps
96	V.29 - 9600 bps
97	V.17 - 9600 bps
98	V.17 - 9600 bps

11.9 AT+FRM Receive message

AT+FRM directs the DCE to receive T.30 facsimile message data using the specified modulation scheme. Command is abortable.

Syntax

Test Command
AT+FRM=?
Response(s)
(list of <mod>s)
OK

Write Command
AT+FRM=<mod>
Response(s)
CONNECT
If error is related to ME functionality:
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	-	-		TIA/EIA-578

Parameter Description

<mod>(num)

Modulation scheme

72	V.29 - 7200 bps
73	V.17 - 7200 bps
74	V.17 - 7200 bps
96	V.29 - 9600 bps
97	V.17 - 9600 bps
98	V.17 - 9600 bps

11.10   AT+FTH   Transmit Data Using HDLC Framing

AT+FTH directs the DCE to transmit T.30 HDLC data using the modulation scheme "3".

Syntax

Test Command
AT+FTH=?
Response(s)
In off-hook mode only:
+FTH: (list of <mod>s)
OK
In on-hook mode:
ERROR

Write Command
AT+FTH=<mod>
Response(s)
CONNECT

PIN	MDM	APP	Last		Reference(s)
+	+	-	-		TIA/EIA-578

Parameter Description

<mod>(num)

Modulation scheme

3	Clause 2/V.21 - 300 bps

11.11 AT+FRH Receive Data Using HDLC Framing

AT+FRH directs the DCE to transmit T.30 HDLC data using the specified modulation scheme "3".

Syntax

Test Command
AT+FRH=?
Response(s)
In off-hook mode only:
+FRH:(list of <mod>s)
OK
In on-hook mode:
ERROR

Write Command
AT+FRH=<mod>
Response(s)
CONNECT
If error is related to ME functionality
ERROR

PIN	MDM	APP	Last		Reference(s)
+	+	-	-		TIA/EIA-578

Parameter Description

<mod>(num)
Modulation scheme
3	Clause 2/V.21 - 300 bps

Note

• Used for Fax Class 1 only.

12. Short Message Service (SMS) Commands

The AT Commands described in this chapter allow an external application to use the Short Message Service with the EU3-E.

12.1 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 rarameter

<alpha>(str)(+CSCS)

String type alphanumeric representation of <da> or <oa> corresponding to the entry found in phonebook; this feature is not supported

<ct>(num)

Command Type

GSM 03.40 TP-Command-Type in integer format

[0]...255

<da>(str)(+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/TA 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/TA converts each 8-bit octet into hexadecimal numbers con-taining two IRA characters (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65).

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/TA 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: ME/TA 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. Indexing starts from 0.

<length>(num)

Message Length

Integer type value indicating 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).

<mem1>(str)

Memory to be used when listing, reading and deleting messages:

"SM"	SIM message storage
"ME"	Mobile Equipment message storage
"MT"	Same as "ME" storage

<mem2>(str)

Memory to be used when writing and sending messages:

"SM"	SIM message storage
"ME"	Mobile Equipment message storage
"MT"	Same as "ME" storage

<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
"ME"	Mobile Equipment message storage
"MT"	Same as "ME" storage

<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>(str)(+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/TA converts each octet of TP data unit into hexadecimal numbers containing two IRA characters (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). In the case of CBS: <ra> GSM 03.40 TP-Recipient-Address Ad-dress-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by <tora>

<ra> (str)(+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> (str)(+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 (refer to command 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>`)

12.2   AT+CMGC   Send an 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 ERROR +CMS ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Note

- After invoking the commands AT+CMGW, AT+CMGS or AT+CMGC it is necessary to wait for the prompt ">" before entering text or PDU.

12.3 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>`

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Notes

- If there is no short message stored at the selected index, the response is OK too.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

12.4 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

Write Command
AT+CMGF=<mode>
Response(s)
OK

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Parameter Description

<mode>(num)
[0]$^{(\&F)(P)}$	PDU mode
1	Text mode

12.5 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>`

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Notes

- The selected <mem1> can contain different types of SMs (e.g. SMS-DELIVERs, SMS-SUBMITs, SMS-STA-TUS-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 error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

12.6 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'.

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>

PIN	MDM	APP	Last
+	+	+	-

Reference(s)

GSM 07.05

Notes

- If `AT+CMGR` is used to read an empty record the response is: OK.
- If `AT+CMGR` is used to read a non-existent record index the response is: "+CMS ERROR: 321" (invalid memory index).
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.
- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

12.7 AT+CMGS   Send Short Message

The write command transmits a short message from TE 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>`.
To abort sending use `<ESC>`. Abortion is acknowledged with "OK", though the message will not be sent.
The message reference `<mr>` is returned to the TE 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 ERROR +CMS ERROR: `<err>`

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 ERROR +CMS ERROR: `<err>`

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Notes

- 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).

- 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.

12.8 AT+CMGW Write Short Messages to Memory

The 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>.
To abort writing use <ESC>. Abortion is acknowledged with "OK", though the message will not be saved.

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 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 ERROR +CMS ERROR: <err>

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.

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Notes

- 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).

- 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.

12.9 AT+CMMS   More Messages to Send

The AT+CMMS write command controls the continuity of the SMS relay protocol link. When the feature is enabled (and supported by network) multiple messages can be sent much faster as the link is kept open.

Syntax

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

Read Command
AT+CMMS?
Response(s)
+CMMS: <mode>
OK

Write Command
AT+CMMS=<mode>
Response(s)
OK
ERROR
+CMS ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Parameter Description

<mode>^(num)	
[0]	Disable
1	Keep link enabled until the time between the response of the latest message send command (AT+CMGS, AT+CMSS, etc.) and the next send command exceeds 1-5 seconds. Then the ME will close the link and TA switch <mode> automatically back to <mode> 0.
2	Enable (if the time between the response of the latest message send command and the next send command exceeds 1-5 seconds. Then the ME will close the link, but TA will not switch automatically back to <mode>=0).

Note

• After issuing the read command a delay of 5-10 seconds is required before issuing the write command, otherwise the "+CMS ERROR: 500" will appear.

12.10 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 ERROR +CMS ERROR: `<err>`

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

12.11 AT+CNMA New Message Acknowledgement to ME/TE, only phase 2+

The write / execute command confirms successful receipt of a new message (SMS-DELIVER or SMS-STATUS-REPORT) routed directly to the TE. If ME does not receive acknowledgement within required time (network time-out), it will send RP-ERROR to the network. In this case routing to the TE will be disabled automatically 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>

PIN	MDM	APP	Last
+	+	+	-

Reference(s)

GSM 07.05

Parameter Description

<n>(num)

Parameter required only for PDU mode.

0	Command operates similarly as in text mode.
1	Send positive (RP-ACK) acknowledgement to the network. Accepted only in PDU mode.
2	Send negative (RP-ERROR) acknowledgement to the network. Accepted only in PDU mode.

Note

- The execute / write command shall only be used when AT+CSMS parameter <service> equals 1 (= phase 2+) and appropriate URC has been issued by the module, i.e.:
  <+CMT> for <mt>=2 incoming message classes 0,1,3 and none;
  <+CMT> for <mt>=3 incoming message classes 0 and 3;
  <+CDS> for <ds>=1.

12.12   AT+CNMI   New short Message Indication

The write command selects the procedure how the receipt of new short messages from the network is indicated to the TE when TE is active, e.g. DTR signal is ON. If 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, 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 also 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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Unsolicited Result Codes

URC 1

<mt>=1,2 or 3 - indication only:

+CMTI: <mem3>, <index>

Indicates that new message has been received

URC 2

<mt>=1,2 or 3 - directly routed message (PDU mode enabled):

+CMT: <length><CR><LF><pdu>

Indicates that new message has been received

URC 3

<mt>=1,2 or 3 - directly routed message (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

<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)	
[0](&F)(P)	Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications.
1	Discard indication and reject new received message unsolicited result codes when TA-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 TA when TA-TE link is reserved (e.g. in online data mode) and flush them to the TE after reservation. Otherwise forward them directly to the TE.

<mt>(num)	
Rules for storing received short messages depend on the relevant data coding method (refer to GSM 03.38), preferred memory storage setting (AT+CPMS) and this value.	
[0](&F)(P)	No SMS-DELIVER indications are routed to the TE.
1	Class 0 SMS-DELIVERs are routed directly to the TE using unsolicited result codes. For all other messages the following applies: If SMS-DELIVER is stored in ME/TA, indication of the memory location is routed to the TE using unsolicited result code.

2	SMS-DELIVERs, except class 2 messages and messages in the message waiting indication group (store message) are routed directly to the TE using unsolicited result code.
3	Class 0 and 3 SMS-DELIVERs are routed directly to the TE using unsolicited result codes defined in `<mt>`=2. Messages of other data coding schemes result in indication as defined in `<mt>`=1.

`<bm>`(num)

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)(P)	No CBM indications are routed to the TE.
2	New CBMs are routed directly to the TE using unsolicited result code.

`<ds>`(num)

[0](&F)(P)	No SMS-STATUS-REPORTs are routed to the TE.
1	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code.
2	If SMS-STATUS-REPORT is routed into ME/TA, indication of the memory location is routed to the TE using unsolicited result code.

`<bfr>`(num)

[1](&F)	TA buffer of unsolicited result codes defined within this command is cleared when `<mode>` changes from 0 to 1...3.

`<index>`(num)

Integer type; value in the range of location numbers supported by the associated memory

Notes

- With `<mt>`=2,3 and `<ds>`=1 messages routed directly to the TE (either short messages or status reports) have to be acknowledged with `AT+CNMA`. To do this, GSM Phase 2+ has to be enabled (see `AT+CSMS`).
- If Phase 2+ is enabled and either a short message or a status report is not acknowledged within the required time, then `<mt>` and `<ds>` will be set to zero. See `AT+CNMA` for further detail.

12.13   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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

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 255 short messages, see `<mem1>`.

- The `<mem1>`, `<mem2>` and `<mem3>` parameter will be stored in non-volatile memory.

- 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. For more information regarding SIM and ME specific message classes refer to the following specifications: GSM 03.38 and 3GPP TS23038.

- 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 error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

12.14 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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Notes

*   This command writes the service center address to non-volatile memory.
*   The SMS service center address should be entered as specified by the service provider.

12.15   AT+CSCB   Select Cell Broadcast Message Indication

The test command returns the supported `<operation>`s as a compound value.
The read command displays the accepted message types.
Depending on the `<operation>` parameter, the write command adds or deletes the message types accepted by the ME.

Syntax

Test Command
`AT+CSCB=?`
Response(s)
+CSCB: (list of supported `<operation>`s)
OK
ERROR
+CMS ERROR: `<err>`

Read Command
`AT+CSCB?`
Response(s)
+CSCB: `<operation>`, `<mids>`, `<dcss>`
OK
ERROR
+CMS ERROR: `<err>`

Write Command
`AT+CSCB=[<operation>[, <mids>[, <dcss>]]]`
Response(s)
OK
ERROR
+CMS ERROR: `<err>`

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Parameter Description

`<operation>`(num)

Add/delete operation

0(&F)(P)	Add new message types defined in `<mids>` to the list of accepted message types by ME and replace types defined in `<dcss>`. In case of using this operation code without parameters default (0-65535) range will be added to the list of `<mids>`.
1	Delete message types defined in `<mids>` from the list of accepted message types by ME and replace types defined in `<dcss>`. In case of using this operation code without parameters all `<mids>`s and `<dcss>`s will be deleted. (for more see notes)

`<mids>`(str)

Cell Broadcast Message ID specification

All different possible combinations of CBM message identifiers; e.g. "0,1,5,320-478,922".

<dcss>^(str)

CBM data coding scheme specification

All different possible combinations of CBM data coding schemes (e.g. "0-3,5"). If default empty string is used all CBMs are received independent of their dcss.
A given <dcss> replaces any former value and is used for consecutive requests.

Note

- The <operation> parameter shown in the AT+CSCB read command response retains the value last used in the write command. This way, the read command response always reflects the last action done: 0 means that the last action was adding new channel(s), 1 means that the last action was deleting channel(s).

12.16 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

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Parameter Description

<show>(num)	
[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>
1	Show the values in result codes

12.17   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>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.05

Parameter Description

<fo>(num)

First Octet

depending on the command or result code: first octet of GSM 03.40 SMS-DELIVER, SMS-SUBMIT, SMS-STA-TUS-REPORT, or SMS-COMMAND in integer format

0...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...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 <dcs> and <pid> to the non-volatile memory.

12.18   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>

PIN	MDM	APP	Last
+	+	+	-

Reference(s)

GSM 07.05

Parameter Description

<service>(num)

0(&F)(P)	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)

Mobile Terminated Messages:

0	Type not supported
1	Type supported

<mo>(num)

Mobile Originated Messages:

0	Type not supported
1	Type supported

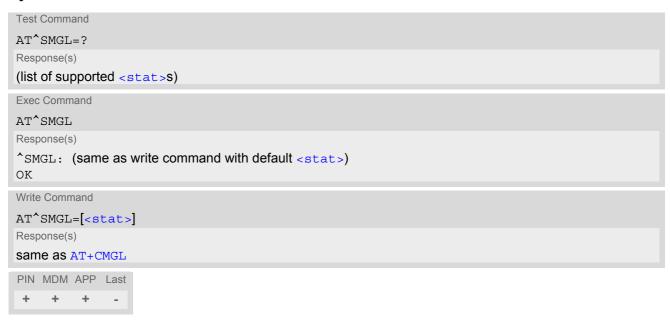| <bm>(num)	
Broadcast Type Messages:	
0	Type not supported
1	Type supported

Note

- Phase 2+ (<service>=1) must be set before acknowledging incoming short messages with AT+CNMA is possible. Acknowledgements are required for directly routed messages delivered using "+CMT" and "+CDS" URCs. Direct routing is used for certain message classes when <mt>=2, <mt>=3 or <ds>=1.

12.19   AT^SMGL   List Short Messages from preferred store without setting status to REC READ

The write command lists messages stored in <mem1> without changing their status to "read". The execute command is identical to the write command with default <stat> (for defaults see "Section 12.1, SMS parameters).

Syntax

Test Command
AT^SMGL=?
Response(s)
(list of supported <stat>s)

Exec Command
AT^SMGL
Response(s)
^SMGL: (same as write command with default <stat>) OK

Write Command
AT^SMGL=[<stat>]
Response(s)
same as AT+CMGL

PIN	MDM	APP	Last
+	+	+	-

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 error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

13. Internet Service Commands

EU3-E 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. UDP Client
   2. Transparent TCP Client

Step-by-step overview of how to configure and use TCP/IP communications with EU3-E:
- First of all, create a connection profile with AT+CGDCONT which later will be used by the IP service. The connection is also referred to as bearer.
- Secondly, use AT+CGACT to activate the connection.
- Thirdly, use AT^SISS to create an IP service profile.
- Once the connection profile and the service profile are created, an Internet session can be opened by entering the AT^SISO write command with the desired <srvProfileId>.
  A URC indicates how to proceed. The "^SISW" URC means that data can be sent. The "^SISR" URC means that received data are available for reading. If an error occurs the "^SIS" URC is delivered instead.
- If you are using the UDP client you can now either read data packets with AT^SISR or write data packets with AT^SISW. The read / write mechanism has been designed because UDP is a packet-oriented protocol.
- If you are using the Transparent TCP client you can now enter the AT^SIST command which opens the transparent access mode. In that mode the service is connected to a dedicated multiplex channel or to the Modem interface in a transparent manner. Exchanging payload data is stream-oriented, i.e. a single data stream can be sent, and another single data stream can be received.
- If an error occurs during a session you can enter the AT^SISE command to identify the reason.
- Finally, to end an Internet service session, enter the AT^SISC write command.

AT commands designed for controlling and monitoring the connection profiles (bearers):
- The commands AT+CGDCONT, AT+CGQMIN, AT+CGEQMIN, AT+CGQREQ, AT+CGEQREQ and AT^SGAUTH can be used to define the connection profile.
- The AT+CGACT command can be used to activate, deactivate or query the activation state of a connection.
- The AT+CGPADDR command can be used to query the local IP address for an active connection.
- The AT^SISX command is usable to send ICMP (Internet Control Message Protocol) Echo Requests (Ping) to a target IP address or host name to verify the TCP/IP network connection. This command can also be used to resolve DNS addresses.
- With the command AT^SICS it is possible to explicitly set the addresses of the DNS servers used to resolve DNS addresses.

Restrictions for Internet service profiles:
- Up to 10 service profiles can be created (with AT^SISS), but the number of parallel opened profiles is limited:
  - Maximum 2 Transparent TCP services can be open at the same time.
  - Additionally 1 UDP client service can be open at the same time.

  If the maximum number of opened service profiles is reached, then any attempt to open another profile will be denied with "+CME ERROR: operation of service temporary not allowed".
- The TCP/IP stack of EU3-E supports using several service profiles at the same time, provided all of them are running on the same connection profile (bearer).
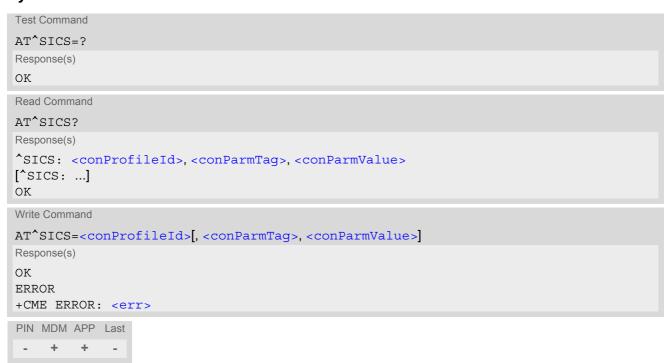
13.1   AT^SICS   Internet Connection Settings

AT^SICS serves to specify additional settings for Internet connection specified with the AT+CGDCONT command. Currently only setup and query of DNS server addresses is supported.
All additional connection profile parameters set with AT^SICS are non-volatile.

Table 13.1:   Applicability of AT^SICS <conParmTag> values

<conParmTag>	Mandatory or optional
"dns1"	optional
"dns2"	optional

Syntax

Test Command
AT^SICS=?
Response(s)
OK

Read Command
AT^SICS?
Response(s)
^SICS: <conProfileId>, <conParmTag>, <conParmValue>
[^SICS: ...]
OK

Write Command
AT^SICS=<conProfileId>[, <conParmTag>, <conParmValue>]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<conProfileId>(num)

Internet connection profile as specified with AT+CGDCONT parameter <cid>. Invoking command only with this parameter will delete related DNS server address.

<conParmTag>(str)

Internet connection parameter.

"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 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>`.

Note

- 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.

13.2   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^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> values.

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 13.2:   Applicability of AT^SISS <srvParmTag> values

<srvParmTag>	Mandatory or optional
UDP client service	
"srvType"	mandatory
"conId"	mandatory
"address"	mandatory
Transparent TCP service	
"srvType"	mandatory
"conId"	mandatory
"address"	mandatory

Syntax

Test Command
AT^SISS=?
Response(s)
OK

Read Command
AT^SISS?
Response(s)
^SISS: <srvProfileId>,<srvParmTag>,<srvParmValue>   [^SISS: ...]   OK   ERROR   +CME ERROR: <err>

Write Command

AT^SISS=<srvProfileId>, <srvParmTag>, <srvParmValue>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

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^SISC, AT^SISR, AT^SISW, AT^SIST and AT^SISE the <srvProfileId> is needed to select a specific service profile.

0...9

<srvParmTag>(str)

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-srvType>.
"conId"	Internet connection profile to be used as specified with AT+CGDCONT parameter <cid>. Empty string "" will be printed in case the value was not set.
"address"	String value specifying a URL to be used

1. *UDP client service:*
   "sockudp://:'local udpPort'"

   Parameter "local udpPort":
   1 ... 2^{16}-1 for the local port number to be used for the UDP client.

2. *Transparent TCP service:*
   "'host':'remote tcpPort'[;timer=100][;etx=<etxChar>]"

   Parameter "host":
   IP address in the standard dot format (e.g. "192.168.1.2").

   Parameter "remote tcpPort":
   1 ... 2^{16}-1 for the remote port number.

   Parameter "timer" (optional):
   Either 0 or 20 ... 500 milliseconds in steps of 20. Default if parameter is not specified is 100ms. Value 0 disables the Nagle algorithm. 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. The value 16 is not allowed because it is defined as DLE (data link escape character, 0x10). If value is not set, then no escaping is configured, thus requiring either +++ or DTR ON-OFF transition for changing to AT command mode. If value is set, then the transmitted bytes are parsed for the DLE 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 the `+++` characters are 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).

`<srvParmValue>`(str)

Parameter value; type and supported content depend on related `<srvParmTag>` and are described above.

`<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^SISO`?. Only when `<srvState>`=2 is returned for this specific service profile you can change its service type.

"Socket"	EU3-E acting as UDP client
"Transparent"	EU3-E acting as Transparent TCP socket client.
"none"	Reset Internet service profile settings. Operation is not allowed if profile is in use, i.e. it was activated via `AT^SISO`.

13.3 AT^SISO Internet Service Open

The AT^SISO write command starts the internet service configured before with AT^SISS. Before you can start a service it's necessary to activate, with AT+CGACT, the connection used by the service that was specified with the AT^SISS parameter "conId").

If the service opens successfully, the URCs "^SISW" and "^SISR" will trigger the action to follow, either writing data with AT^SISW, reading data with AT^SISR or starting the transparent mode by using AT^SIST.

If an error occurs after opening or while using a service then the URC type "^SIS" described below will be delivered. An opened service must be finished by sending the Close command AT^SISC. This applies no matter whether the service has been completed successfully (all data transmitted) or ends up with error (e.g. indicated by the "^SIS" URC).

The AT^SISO read command requests the status of all Internet service profiles. One line is issued for every Internet service profile. Information following the parameter <srvType> is issued only, if the AT^SISS parameter <srvParmValue-srvType> is set to a value other than "None".

Syntax

Test Command
AT^SISO=?
Response(s)
OK

Read Command
AT^SISO?
Response(s)
^SISO: <srvProfileId>, <srvType>[, <srvState>, <socketState>, <rxCount>, <txCount>, <locAddr>[, <remAddr>]]   [^SISO: ...]   OK

Write Command
AT^SISO=<srvProfileId>
Response(s)
OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last
±	+	+	-

Parameter Description

<srvProfileId>(num)

The profile identifier as specified by the parameter <srvProfileId> of AT^SISS.

<srvType>(str)

The type of the internet service as specified by the AT^SISS parameter <srvParmValue-srvType>.

<srvState>(num)

Internet service state.

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.
	This state is entered implicitly if the associated internet connection was closed by the network or by the user itself by initiating context deactivation using AT+CGACT=0 or by initiating a GPRS detach by using AT+CGATT=0.
4	Up
	The service is usable for data transfer.
5	Closing
	Internet Service is closing the network connection.
6	Down
	This state is entered if

- the service has successfully finished its session,

- 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 is in this state you need to close it with AT^SISC before you can reopen it.

<socketState>(num)

Socket state identifier.

1	Socket not assigned, i.e. no TCP/UDP connection active.
2	Socket assigned as CLIENT.

<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 port, separated by colon, e.g. "192.60.10.10:80".

<remAddr>(str)

Remote IP address in dotted-four-byte format and port, separated by colon, e.g. "192.60.10.10:80". This parameter is displayed only for Transparent TCP services.

Notes

- In addition to the "^SIS" URC detailed release cause information can be obtained with AT+CEER.

- 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 <socketState>=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.

13.4   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>, <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>

PIN	MDM	APP	Last
±	+	+	-

Parameter Description

<srvProfileId>^(num)

0...9   <srvProfileId> specified with AT^SISS.

13.5 AT^SISR Internet Service Read Data

The functions of the AT^SISR command vary depending on the service:
- UDP service:
  The AT^SISR write command and the "^SISR" URC trigger the process of data reading.
- Transparent TCP service:
  The "^SISR: x, 1" URC notifies the Transparent TCP client of incoming data while not in transparent access mode. See parameter <urcCauseId>.

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>
Response(s)
^SISR: <srvProfileId>, <cnfReadLength>[, <address>] Number of data bytes are sent as specified by <cnfReadLength>. OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last
±	+	+	+

Unsolicited Result Code

^SISR: <srvProfileId>, <urcCauseId>
Data availability status of the Internet service configured with AT^SISS has changed.

Parameter Description

<srvProfileId>(num)

<srvProfileId> 0 ... 9 specified with AT^SISS.

<address>(num)

IP address of the remote host incl. remote port separated by colon, e.g. "192.168.1.3:450". Parameter is displayed only if <cnfReadLength> is not 0.

<cnfReadLength>(num)

0	Indicates that no data can be read
1...1460	Confirmed number of data bytes to be read via the Internet service configured by AT^SISS.

<urcCauseId>(num)

Indicates whether or not data is available for reading with AT^SISR or AT^SIST.

1	*Meaning of value "1" for UDP:* Data arrived and queued and can be read by using AT^SISR.
	Meaning of value "1" for Transparent TCP service: If data is received while the service is in "Up" state, but not in transparent access mode, the "^SISR: x, 1" URC appears once notifying the client that the server has sent new data. In this case, the client shall enter AT^SIST to go to transparent access mode and read out the data.
3	Maximum number of queued elements is exceeded, data is lost.

13.6   AT^SISW   Internet Service Write Data

The AT^SISW write command is used for the UDP client to trigger the process of sending data. The URC "^SISW: <srvProfileId>, <urcCauseId>" will be issued if the EU3-E is ready to accept user data.

The 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>[, <remAddr>]

Response(s)

^SISW: <srvProfileId>, <cnfWriteLength>
[Number of data bytes as specified by <cnfWriteLength>.]
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
±	+	+	+

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 user data. In this context the URC is also issued for Transparent TCP service that supports data transfer via AT^SIST only.

Parameter Description

<srvProfileId>(num)

<srvProfileId> 0 ... 9 specified with AT^SISS.

<reqWriteLength>(num)

0...1460

Specifies the number of bytes to be sent with AT^SISW. If the selected service is an UDP client, then <reqWriteLength>=0 can be used to send an empty UDP packet.

<remAddr>(str)

Remote IP address in dotted-four-byte format and remote port, separated by colon, e.g. "192.60.10.10:80".

`<cnfWriteLength>`(num)	
0...1460	Confirmed number of data bytes which can be transmitted via the UDP client service. The application has to deliver exactly the number of bytes indicated by `<cnfWriteLength>`. Characters above the indicated number are ignored. A 0 value means that no data can be written at this time.

`<urcCauseId>`(num)	
1	Socket sucessfully connected, transfer possible from now

Note

- The `AT^SISW` write command must be terminated only with the ASCII character set with `ATS3`. The factory default for S3 is #13 (Carriage Return). Do not send any further characters after the S3 end-of-line identifier, until the 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 1.5, AT Command Syntax.

13.7   AT^SIST   Transparent Access Mode

The AT^SIST command applies only to the Transparent TCP service defined with AT^SISS. The command controls the transparent access mode which enables the ME to transparently send or receive payload data either over dedicated multiplex channels or over the Modem interface.

AT^SIST can be used after the Transparent TCP 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. In addition you can request the <srvState> with AT^SISO.

If data is received while the service is in "Up" state, but not in transparent access mode, the "^SISR: x, 1" URC appears once notifying the client that the server has sent new data. In this case, the client shall enter AT^SIST to go to transparent access mode and read out the data.

See also Section 1.4, AT Command Interpreter and Section 1.8, Unsolicited Result Code Presentation) for information regarding the interfaces used for URC output.

The handling of the service largely depends on whether you are using transparent access mode on the dedicated multiplex channels or on the Modem interface. The major difference is that the second method blocks the AT command interface used for transparent access and the first method does not.

1. Using transparent access mode on dedicated multiplex channels 5 and 6:
In this case, enter the AT^SIST write command either on the Application interface or the Modem interface along with the parameters <muxChannelId> and <muxChannelState> "1". The advantage is that the Application or Modem interface remains accessible for AT commands and URCs, while transparent access mode is assigned to a dedicated multiplex channel. The multiplex channel is only used for transferring payload data. Therefore, result codes such as "CONNECT" or "NO CARRIER" will not appear. The DCD line goes active when transparent access mode starts, and inactive when it stops. If a transparent socket is closed (remotely by the server or locally by the client) the transparent access mode closes automatically.

2. Using transparent access mode without dedicated multiplex channels:
In this case, enter the AT^SIST write command on the Modem interface with <srvProfileId> only. Please note that this method is not supported on the Application interface (trying to do so will be denied with "+CME ERROR: operation not allowed").
After entering AT^SIST the CONNECT response notifies that the ME has entered transparent access mode and is ready to transfer payload data over the Modem interface.
There are several ways to quit transparent access mode and revert to AT command mode on the used interface:

*   +++ escape sequence (also transmitted over the air)
*   DTR ON-OFF transition (see AT&D for configuring DTR handling)
*   "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 TCP service is released, for example by the local client with AT^SISC or by the remote server, and the service is in transparent access mode (CONNECT mode) the following applies: The ME returns to AT command mode and issues a specific "NO CARRIER" result code. The "NO CARRIER" result code starts with 0x10 (DLE) and 0x04 (EOT) and ends with the characters defined by ATS3 and ATS4.
The result codes "CONNECT" and "NO CARRIER" are not influenced by ATV.
In AT command mode or after releasing Transparent TCP service, you can use AT^SISO to check the <srvState>.

Syntax

Test Command
AT^SIST=?

Response(s)
OK

Read Command
AT^SIST?

Response(s)
^SIST: <srvProfileId>, <ChannelId>
[^SIST: ...]
OK

Write Command
AT^SIST=<srvProfileId>[, <muxChannelId>, <muxChannelState>]

Response(s)
CONNECT
(indicates that the Modem interface has entered transparent access mode. Not issued on multiplex channels 5 or 6.)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	+

Parameter Description

<srvProfileId>(num)

<srvProfileId> 0 ... 9 specified with AT^SISS.

<muxChannelId>(num)

5...6
Identifier of the dedicated multiplex channel to be used for data exchange.
If the parameter is not specified, then the Modem interface instead of a dedicated multiplex channel is used to exchange the data. In this case AT^SIST is allowed to be executed on the Modem interface only.

<ChannelId>(num)

0	Transparent access mode is activated on the Modem interface.
5...6	Transparent mode is activated on a multiplex channel. The value refers to <muxChannelId>.

<muxChannelState>(num)

Control the transparent access mode on a dedicated multiplex channel.

[0]	Stop transparent access mode
1	Start transparent access mode

13.8 AT^SISX Internet Service Execution

The AT^SISX command can be used to send ICMP (Internet Control Message Protocol) Echo Requests to a target IP address or DNS host name (also referred to as Ping command). This command can also be used to resolve DNS host names to IP addresses (HostByName).

The AT^SISX command can be used any time while a connection profile (bearer) is active. If issued although no connection is active, then AT^SISX returns ERROR.

If the AT^SISX write command is executed for Ping, then the command returns one row for every ICMP Echo Request. The last Ping response line is followed by an empty line, then another two lines appear to report a statistic calculated from the Echo Request responses. After starting the ping command the AT channel is blocked until all ICMP requests are executed. To stop the periodic ping early, send any character (user break).

It is also possible to cancel the HostByName service by user break. But this may temporarily block further AT^SISX write commands which is indicated by the error response "+CME ERROR: resource limitation". As soon as the background activity for the last started HostByName service is finished the AT^SISX write command can be used again.

Syntax

Test Command
AT^SISX=?
Response(s)
^SISX:"Ping", (list of supported <conProfileId>s), , (range of <request>), (range of <timelimit>) ^SISX:"HostByName", (list of supported <conProfileId>s) OK

Write Command
AT^SISX=<service>, <conProfileId>, <address>[, <request>, <timelimit>]
Response(s)
In case of <pingInfoType>= 1: ICMP Echo Requests (1 - 30 rows) ^SISX:<service>, <pingInfoType>, <conProfileId>, <ip-address>, <roundTripTime> [...] In case of <pingInfoType>= 2: Packet statistic (1 row) ^SISX:<service>, <pingInfoType>, <conProfileId>, <sent>, <received>, <lost>, <lostPercent> In case of <pingInfoType>= 3: Time statistic (1 row) ^SISX:<service>, <pingInfoType>, <conProfileId>, <minRTT>, <maxRTT>, <meanRTT> In case of <service>= "HostByName" ^SISX:<service>, <ip-address> OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last
+	+	+	-

Parameter Description

<service>(str)	
"Ping"	Service type.
"HostByName"	Service type.

<conProfileId>(num)

The context identifier <cid> of an activated Internet connection profile to be used (defined with AT+CGDCONT and activated with AT+CGACT).

<address>(str)

In case of "Ping" this is the target DNS host name or IP address (i.e. 192.168.1.3), in case of "HostByName" this is the DNS host name to be translated into the IP address.

<ip-address>(str)

The resolved IP address for the host DNS host name (i.e. 192.168.1.3).

<request>(num)

[1]...30	Number of "Ping" requests (ICMP Echo Requests). Parameter is ignored for "HostByName".

<timelimit>(num)

200...[5000]...10000	Amount of time, in milliseconds, to wait for an Echo Response message related to a sent Echo Request message. Parameter is ignored for "HostByName".

<pingInfoType>(num)

Marks the type and format of the information given in the command responses (see syntax of the AT^SISX write command above).

1	Ping status received for the ICMP Echo Request(s). Depending on parameter <request> 1 - 30 rows. Address and Round Trip Time are returned for each request.
2	one row packet statistic calculated from the ping response(s) received for <pingInfoType>=1.
3	one row time statistics calculated from the ping response(s) received for <pingInfoType>=1 (displayed only if at least one Echo response message was received).

<roundTripTime>(num)

Round Trip Time in milliseconds. If the Echo Response message is not received within the time specified by <timelimit> the value -1 is returned (e.g. when the bearer shuts down during command execution).

<sent>(num)

Number of sent packets.

<received>(num)

Number of received packets.

<lost>(num)

Number of lost packets.

<lostPercent>(num)

Lost packets in percent.

<minRTT>(num)

Minimum Round Trip Time in milliseconds.

<maxRTT>(num)

Maximum Round Trip Time in milliseconds.

<meanRTT>(num)

Average Round Trip Time in milliseconds.

13.9   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 or 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>

PIN	MDM	APP	Last
-	+	+	-

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 13.10, Internet Service URC.
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 13.10, Internet Service URC.

13.10 Internet Service URC

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.

Unsolicited Result Code

Indicates an event, an error or an information element. The same information can be obtained via AT^SISE.

```
^SIS: <id>, <urcCause>[, [<urcInfoId>][, <urcInfoText>]]
```

The URC may appear if an event or an error related to the Internet service commands 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 <id>.

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

<id>(num)

Identifier of the relevant Internet service profile as defined with AT^SISS parameter <srvProfileId> or, if <urcCause> is 6002, the relevant Internet service connection identifier as defined with the AT+CGDCONT parameter <cid> and referenced by the AT^SISS Internet service profile parameter "conId" (see <srvParmTag> for details).

<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>.

<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

<urcInfoText>(str)

Information text related to <urcCause>. See tables below for further details.

13.10.1 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.

`<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
27	IP address changed, causing TCP reset.	Socket 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.

`<urcInfoId>`	`<urcInfoText>`	Description
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	
70	Mobile is in a QOS Unaware System.	
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
General Information Elements		
6001		General progress information for connection setup.
6002	Unsolicited change of connection state	Implicite state change of connection `<id>`, e.g. caused by network loss. Query the activation state of the given `<id>` using `AT+CGACT` read command. The command `AT+CEER` can be used to query the cause of the status change.

*) Text varies depending on scenario.

13.11 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.

13.11.1 Configuring an Internet Connection Profile

`AT+COPS?`	Checking network registration.
`+COPS: 0,0,"E-Plus",0`	ME is registered to German provider E-Plus.
`OK`	
`AT+CGATT=1`	Attaching to GPRS network (optional).
`OK`	
`AT+CGDCONT=101,"ip","internet.eplus.de"`	Specifying PDP context 101 with APN for E-Plus.
`OK`	
`AT^SICS=101,"dns1","198.023.097.002"`	Specifiying primary DNS address (optional).
`OK`	
`AT^SICS=101,"dns2","212.023.097.003"`	Specifiying secondary DNS address (optional).
`OK`	
`AT+CGACT=1,101`	Activating PDP context 101.
`OK`	
`AT+CGPADDR=101`	Requesting dynamic IP address assigned to local client for context 101.
`+CGPADDR: 101,"10.129.137.217"`	Response returns currently assigned IP address.
`OK`	

13.11.2 Configuring a Service Profile for Transparent TCP Service

`AT^SISS=2,srvType,transparent`	Configuring service profile 2 for Transparent TCP Service.
`OK`	
`AT^SISS=2,address,"10.10.228.5:9999"`	Setting remote host and port for Transparent TCP service.
`OK`	
`AT^SISS=2,conId,101`	Assigning PDP context to service profile 2.
`OK`	
`AT^SISS?`	Requesting current service profile settings.
`^SISS: 0,"srvType","none"`	"none" means that service profile is not created.
`^SISS: 1,"srvType","none"`	
`^SISS: 2,"srvType","Transparent"`	Service profile 2 is configured for Transparent TCP service.
`^SISS: 2,"conId","101"`	Service profile 2 is assigned to PDP context 101.
`^SISS: 2,"address","10.10.228.5:9999"`	Remote host and port for Transparent TCP service are shown.
`^SISS: 3,"srvType","none"`	
`^SISS: 4,"srvType","none"`	
`^SISS: 5,"srvType","none"`	
`^SISS: 6,"srvType","none"`	
`^SISS: 7,"srvType","none"`	
`^SISS: 8,"srvType","none"`	
`^SISS: 9,"srvType","none"`	
`OK`	
`AT^SISO=2`	Opening service profile 2.
`OK`	

`^SISW: 2,1`	URC indicates that Transparent TCP service is ready.
`^SISR: 2,1`	URC indicates that new data is available for reading.
`AT^SISO?`	Requesting status of service profiles.
`^SISO: 0,"none"`	
`^SISO: 1,"none"`	
`^SISO: 2,"Transpar-ent",4,2,0,0,"10.129.137.217:53042","10.10.228.5:9999"`	Transparent TCP Service is open and in "Up" state (`<srvState>`=4). Locally assigned IP address, remote host and remote port are shown.
`^SISO: 3,"none"`	
`^SISO: 4,"none"`	
`^SISO: 5,"none"`	
`^SISO: 6,"none"`	
`^SISO: 7,"none"`	
`^SISO: 8,"none"`	
`^SISO: 9,"none"`	
`OK`	

13.11.3   Using Transparent TCP Service on Dedicated Multiplex Channel

This example uses the Internet connection profile shown in Section 13.11.1 and the service profile shown in Section 13.11.2. The service can be started from the Modem or Application interface. The example only shows actions taken on the AT command interface, data transfer on the multiplex channel is not visualized. Remember that the DCD line indicates the state of the transparent access mode on the multiplex channel.

`AT^SIST=2,5,1`	Starting transparent access mode on multiplex channel 5.
`OK`	
`AT^SIST?`	Requesting status of transparent access mode.
`^SIST: 2,5`	Transparent access mode has been started on multiplex channel 5.
`OK`	Sending or receiving data on multiplex channel 5 is now possible (not visualized in this example).
`AT^SISO?`	Requesting status of service profiles.
`^SISO: 0,"none"`	
`^SISO: 1,"none"`	
`^SISO: 2,"Transpar-ent",4,2,550,2,"10.129.137.217:53042","10.10.228.5:9999"`	Transparent TCP Service is open and in "Up" state (`<srvState>`=4). Socket is assigned. On the multiplex channel 550 bytes were received and 2 bytes sent. Locally assigned IP address, remote host and remote port are shown.
`^SISO: 3,"none"`	
`^SISO: 4,"none"`	
`^SISO: 5,"none"`	
`^SISO: 6,"none"`	
`^SISO: 7,"none"`	
`^SISO: 8,"none"`	
`^SISO: 9,"none"`	
`OK`	
`AT^SIST?`	Requesting status of transparent access mode.
`OK`	Connection hung up by server.
`AT^SISO?`	Requesting status of service profiles.
`^SISO: 0,"none"`	
`^SISO: 1,"none"`	

`^SISO: 2,"Transpar-`
`ent",6,1,550,2,"0.0.0.0:0","10.10.228.5:999`
`9"`
	Transparent TCP Service is in "Down" state (`<srvState>`=6). Socket is assigned. On the multiplex channel 550 bytes were received and 2 bytes sent. No IP address assigned to local client. Remote host address and port are shown.

`^SISO: 3,"none"`
`^SISO: 4,"none"`
`^SISO: 5,"none"`
`^SISO: 6,"none"`
`^SISO: 7,"none"`
`^SISO: 8,"none"`
`^SISO: 9,"none"`
`OK`	

`AT^SISC=2?`	Closing Transparent TCP service.
`OK`	
`AT^SISO?`	Requesting status of service profiles.
`^SISO: 0,"none"` `^SISO: 1,"none"`	
`^SISO: 2,"Transpar-` `ent",2,1,0,0,"0.0.0.0:0","10.10.228.5:9999"`	Service profile resources are allocated.

`^SISO: 3,"none"`
`^SISO: 4,"none"`
`^SISO: 5,"none"`
`^SISO: 6,"none"`
`^SISO: 7,"none"`
`^SISO: 8,"none"`
`^SISO: 9,"none"`
`OK`	

13.11.4   Using Transparent TCP Service on Modem Interface

This example uses the Internect connection profile shown in Section 13.11.1 and the service profile shown in Section 13.11.2. Without employing multiplex channels the service can only be started on the Modem interface. The example assumes that the Modem interface is mapped to the module's ASC0 interface, i.e. `AT^SDPORT`=2 is set. In this case all URCs are output on the same interface.

`AT^SQPORT`	Requesting currently used interface.
`^SQPORT: MODEM`	Modem interface is used.
`AT+CGPADDR=101`	Requesting dynamic IP address assigned to local client for context 101.
`+CGPADDR: 101,"10.129.69.29"`	Response returns currently assigned IP address.
`OK`	
`AT^SISO=2`	Opening service profile 2.
`OK`	
`^SISW: 2,1`	URC indicates that Transparent TCP service is ready.
`^SISR: 2,1`	URC indicates that new data is available for reading.
`AT^SISO?`	Requesting status of service profiles.
`^SISO: 0,"none"` `^SISO: 1,"none"`	

`^SISO: 2,"Transpar-`
`ent",4,2,0,0,"10.129.69.29:9824","10.10.228`
`.5:9999"`
	Transparent TCP Service is open and in "Up" state (`<srvState>`=4). Locally assigned IP address, remote host and remote port are shown.

`^SISO: 3,"none"`
`^SISO: 4,"none"`
`^SISO: 5,"none"`
`^SISO: 6,"none"`	

```
^SISO: 7,"none"
^SISO: 8,"none"
^SISO: 9,"none"
OK
AT^SIST=2                                       Starting transparent access mode on Modem inter-
                                                face.

CONNECT                                         Service is ready to send or receive data.
                                                Client is sending data (not visible in example).
                                                Client types +++ to return to AT command mode (not
                                                visible in example).

OK
AT^SIST=2                                       Returning to transparent access mode on Modem
                                                interface.

CONNECT                                         CONNECT response indicates that data can be
                                                transmitted.

Hello...NO CARRIER                              Client is reading data. Finally, the NO CARRIER
                                                result code indicates that the server has hung up

AT^SIST?                                        Requesting status of transparent access mode.
OK                                              Transparent access mode has been stopped.
AT^SISO?                                        Requesting status of service profiles.
^SISO: 0,"none"
^SISO: 1,"none"
^SISO: 2,"Transpar-                             Transparent TCP service is in "Down" state
ent",6,1,50,100,"0.0.0.0:0","10.10.228.5:99     (<srvState>=6). 50 bytes received, 100 bytes
99"                                             sent. No IP address assigned to local client. Remote
                                                host and port are shown.
^SISO: 3,"none"
^SISO: 4,"none"
^SISO: 5,"none"
^SISO: 6,"none"
^SISO: 7,"none"
^SISO: 8,"none"
^SISO: 9,"none"
OK
AT^SISC=2                                       Closing Transparent TCP service.
OK
AT^SISO?                                        Requesting status of service profiles.
^SISO: 0,"none"
^SISO: 1,"none"
^SISO: 2,"Transpar-                             Service profile resources are allocated.
ent",2,1,0,0,"0.0.0.0:0","10.10.228.5:9999"
^SISO: 3,"none"
^SISO: 4,"none"
^SISO: 5,"none"
^SISO: 6,"none"
^SISO: 7,"none"
^SISO: 8,"none"
^SISO: 9,"none"
OK
```

13.11.5   Configuring and Using the UDP Client

```
AT^SISS=3,srvType,socket                        Configuring service profile 3 for a UDP client.
OK
AT^SISS=3,address,"sockudp://:6666"             Specifying local UDP port.
OK
```

```
^SISS: 0,"srvType","none"
^SISS: 1,"srvType","none"
^SISS: 2,"srvType","none"
^SISS: 3,"srvType","Socket"
^SISS: 3,"conId","101"
^SISS: 3,"address","sockudp://:6666"
^SISS: 4,"srvType","none"
^SISS: 5,"srvType","none"
^SISS: 6,"srvType","none"
^SISS: 7,"srvType","none"
^SISS: 8,"srvType","none"
^SISS: 9,"srvType","none"
OK
```

`AT^SISO=3`	Opening service profile 3.
`OK`	
`^SISW: 3,1`	The URC confirms that the UDP client is ready to send data.
`AT^SISW=3,10,10.10.228.5:9998`	The UDP client requests to send 10 bytes to the given address.
`^SISW: 3,10`	The write command response confirms that 10 bytes can be sent.
`test test`	Data sent.
`OK`	
`AT^SISO?`	Requesting status of service profiles.
`^SISO: 0,"none"`	
`^SISO: 1,"none"`	
`^SISO: 2,"none"`	Service profile resources are allocated.
`^SISO:` `3,"Socket",4,2,10,10,"10.129.69.109:6666"`	UDP service is in state "Up" (4). Socket is assigned. 10 bytes received, 10 bytes sent. Locally assigned IP address is indicated.
`^SISO: 4,"none"`	
`^SISO: 5,"none"`	
`^SISO: 6,"none"`	
`^SISO: 7,"none"`	
`^SISO: 8,"none"`	
`^SISO: 9,"none"`	
`OK`	
`AT^SISC=3`	Closing the UDP client.
`OK`	
`AT^SISO?`	Requesting status of service profiles.
`^SISO: 0,"none"`	
`^SISO: 1,"none"`	
`^SISO: 2,"none"`	Service profile resources are allocated.
`^SISO: 3,"Socket",2,1,0,0,"0.0.0.0:0"`	UDP service is state "Allocated" (2). Socket is not assigned (1). No IP address assigned to local client.
`^SISO: 4,"none"`	
`^SISO: 5,"none"`	
`^SISO: 6,"none"`	
`^SISO: 7,"none"`	
`^SISO: 8,"none"`	
`^SISO: 9,"none"`	
`OK`	

13.11.6 Ping

This example shows a Ping output. The example uses the Internet connection profile shown in Section 13.11.1.

```
AT^SISX=Ping,101,"74.125.39.99",5,5000
^SISX: "Ping",1,101,"74.125.39.99",1696
^SISX: "Ping",1,101,"74.125.39.99",175
^SISX: "Ping",1,101,"74.125.39.99",174
^SISX: "Ping",1,101,"74.125.39.99",174
^SISX: "Ping",1,101,"74.125.39.99",2111
^SISX: "Ping",2,101,5,5,0,0
^SISX: "Ping",3,101,174,2111,865
OK
```

13.11.7 Resolving DNS Host Name to IP Address

This example uses the Internet connection profile shown in Section 13.11.1.

```
AT^SISX=HostByName,101,"www.google.de"
^SISX: "HostByName","74.125.39.99"
OK
```

14. SIM related Commands

The AT commands described in this chapter are related to the Subscriber Identity Module (SIM) connected to EU3-E.

 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 the SIM Application Toolkit (SAT) procedure "Data download to SIM". For a detailed description please refer to GSM 11.14, [21].

To get informed that changing Elementary Files has taken place the TA needs to hook to the SAT Proactive Command "REFRESH". For more information please refer to Chapter 15., SIM Application Toolkit (SAT) Commands and Section 15.7, SAT Get Information - Refresh (1) in particular.

14.1 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 listed with parameter <command>.

All parameters of AT+CRSM are used as defined by the specifications listed below. EU3-E handles internally all required SIM interface locking and file selection routines.

As response to the command, the EU3-E sends the actual SIM information parameters and response data. "+CME ERROR" may be returned if the command cannot be passed to the SIM, e.g. if the SIM is not inserted. Failures to execute the command on the SIM will be reported by the <sw1> and <sw2> parameters.

Please beware of *possible changes to Elementary Files* by the network at any time, refer Chapter 14., SIM related Commands.

Syntax

Test Command
AT+CRSM=?
Response(s)
OK

Write Command
AT+CRSM=<command>[, <fileID>[, <P1>, <P2>, <P3>[, <data>][, <pathId>]]]
Response(s)
+CRSM: <sw1>,<sw2>[,<response>]   OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		3GPP TS 27.007, 3GPP TS 31.102, ETSI TS 102 221, GSM 11.11

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 EU3-E to the SIM.

0...255

<P2>(num)

Parameter to be passed on by the EU3-E to the SIM.

0...255

<P3>(num)

Parameter to be passed on by the EU3-E to the SIM.

0...255

<data>(str)

Information which shall be written to the SIM (hexadecimal character format).

<pathId>(str)

Contains the directory path of an elementary file on a UICC in hexadecimal format (e.g. "7F105F50").
Up to 3 Dedicated Files (DFs) can be listed.
The <pathId> parameter is applicable only to UICCs.
Some types of UICCs may have Dedicated Files which are not unique, because the same FileID is allocated to several applications on the UICC and this way used twice or even more times. Therefore, to access UICC files of SIM applications please use the optional parameter <pathId>. UICC files of USIM applications are accessible without any need for the <pathId> parameter.

<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.

14.2 AT+CSIM Generic SIM Access

AT+CSIM allows direct control of the SIM.
Compared to Restricted SIM Access command AT+CRSM, the definition of AT+CSIM allows the ME to take more control over the SIM interface.
However, the SIM Application Toolkit functionality is not supported by AT+CSIM. Therefore the following SIM commands cannot be used: TERMINAL PROFILE, ENVELOPE, FETCH and TEMINAL RESPONSE.

Syntax

Test Command
AT+CSIM=?
Response(s)
OK

Write Command
AT+CSIM=<length>, <command>
Response(s)
+CSIM: <length>,<response> OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		3GPP TS 27.007, 3GPP TS 31.102, ETSI TS 102 221, GSM 11.11

Parameter Description

<length>(num)

Length of <command> or <response> string.

<command>(str)

Command passed on by the ME to the SIM.
Parameter length: maximum 260 Bytes.

<response>(str)

Response data of the command returned by the SIM.
Parameter length: maximum 258 Bytes.

Note

• Access to datafields via SELECT is only allowed to files according to GSM 11.11, Chapter 6.2: File identifier [18].

Example

The following examples explain how to use AT+CSIM.

AT+CSIM=14,"A0A40000027F10"	Select DF-Telecom
+CSIM: 4,"9F19"	Command successful, length '19' of the response data
OK	
AT+CSIM=14,"A0A40000026F3A"	Select EF-ADN (Abbreviated dialling numbers)

```
+CSIM: 4,"9F0F"                          Command successful, length '0F' of the response
                                         data
OK
AT+CSIM=16,"A0C000000F"                  Get Response
+CSIM: 34,"000002306F3A040011F0220102011C9000"
OK
```

14.3   AT^SCKS   Query SIM and Chip Card Holder Status

The AT^SCKS write command enables or disables the presentation of URCs to report the connection status of the SIM/UICC.
The AT^SCKS read command returns the URC presentation mode and the status of the SIM/UICC connection.
See also the AT^SIND command. It includes an extended status parameter for monitoring the SIM/UICC status, also referred to as "simstatus".

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>

PIN	MDM	APP	Last
-	+	+	-

Unsolicited Result Codes

URC 1

^SCKS: <SimStatus>

If the SIM/UICC connection status has changed an unsolicited result code (URC) is issued.

URC 2

^SCRD: <MCC>

If the SIM is not supported by EU3-E and the connection is rejected an unsolicited result code (URC) is issued. The presentation of this URC cannot be suppressed.

Parameter Description

<mode>(num)

0(&F)(P)	Suppress unsolicited result code ^SCKS
1	Output unsolicited result codes

<SimStatus>(num)

0	SIM/UICC connection error (usually SIM/UICC not inserted)

1	SIM/UICC inserted
2	The SIM interface hardware has been deactivated to prevent possible damage (e.g. if a SIM with invalid or unsupported electrical specifications has been detected). The SIM interface can be reactivated only with a restart of the module, e.g. with "AT+CFUN= n,1". In case a 5V SIM is inserted it might be possible that the SIM is not functional at all. As a result, the "^SCKS: 0" URC occurs.

<MCC>(num)

The MCC (Mobile Country Code) of a SIM that is not supported by EU3-E.

14.4 AT^SSET Indicate SIM data ready

After power-up and personalization (PIN entry if required) the ME starts reading data from SIM. The AT^SSET command controls the presentation of the "^SSIM READY" URC which indicates, on the corresponding serial channel, when the ME has finished reading SIM data. Afterwards all commands that depend on SIM data fields can be used, e.g. SMS and phonebook commands. See Section 21.1, Restricted access to SIM data after SIM PIN authentication for further detail.

Syntax

Test Command
AT^SSET=?
Response(s)
^SSET:(list of supported <n>s)
OK

Read Command
AT^SSET?
Response(s)
^SSET: <n>
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SSET=[<n>]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Unsolicited Result Code

^SSIM READY

The URC acknowledges to the user that SIM data is accessible. Before that, any attempt to access a phonebook, view SMS or access SIM data will result in "+CME ERROR: 14" (SIM busy).

Parameter Description

<n>^(num)

URC presentation mode

0^(&F)	Disable URC "^SSIM READY" indication.
1	Enable URC "^SSIM READY" indication.

15.   SIM Application Toolkit (SAT) Commands

This chapter describes AT commands and responses related to the EU3-E's SIM Application Toolkit (SAT) implementation.

3GPP document GSM 11.14 [21] specifies SAT and 3GPP TS 31.111 [22] specifies USAT in detail.

SIM Application Toolkit (SAT) is a technology that allows an application running on the SIM to control the Mobile Equipment (ME). USIM Application Toolkit (USAT) is a technology that allows an application running on the USIM to control the Mobile Equipment (ME).

To simplify the description in the following only SAT is used for both SAT and USAT applications. Remote-SAT (RSAT) provides a link between applications located on the SIM/UICC and a customer application (TA). The purpose of Remote-SAT is to allow the TA to send AT commands to the SAT interface and to display all SAT activities on the user interface of the customer application. The overall scenario is illustrated in the context diagram below.

Two groups of commands are exchanged between the SAT located on the EU3-E and the SIM Application running on the SIM/UICC:
• Proactive commands are sent from the SIM application to the EU3-E's SAT, such as "DISPLAY TEXT".
• Envelope commands are sent from the EU3-E's SAT to the SIM application, such as "MENU SELECTION".

Figure 15.1: Remote-SAT Context diagram

15.1 Usage of Remote-SAT

If SAT functionality is delivered by the SIM provider, the related SAT commands have to be handled. Otherwise other SIM functionality may not working correctly (e.g. SMS-PP downloads).
Therefore two possible modes are available.

15.1.1 Automatic Response Mode (AR Mode)

If the ME operates in this (default) mode, usage of any Remote-Sat AT commands is not necessary. In this case, all commands and responses are exchanged automatically between the ME and the SIM application. The type of Terminal Response (TR) to a SAT Proactive Command issued by the SIM application used in AR mode is listed at Table 15.6, Command Type Table, column "Auto Terminal Response".

To take full advantage of Remote-SAT the ER mode has to be enabled using AT^SSTA=1. This setting is stored non-volatile and takes effect after next switch-on of the ME.

15.1.2 Explicit Response Mode (ER Mode)

As a Wireless Modem does not have an MMI, Remote-SAT differs from a phone implementation of SAT. It uses a special set of AT commands to pass data, e.g. a list of menu items, to the TA and to receive responses, e.g. a selected menu item.
The TA is required to monitor the status of an ongoing SAT Proactive Command (PAC) and, if required, sends appropriate AT commands, depending upon users input.

15.1.3 Character Sets

Strings are passed as UCS2 characters, but using the GSM alphabet is also possible. Use of GSM alphabet is not recommended since a SIM can contain text which might be not displayable, e.g. greek characters. Use AT^SSTA command to select the type of alphabet both for input and output. UCS is specified in ISO/IEC 10646. There are 2 and 4 octet versions available, of which only the 2-octet variant is used, known as UCS2. The 65536 positions in the 2-octet form of UCS are divided into 256 rows, each with 256 cells. The first octet of a character representation gives the row number, the second the cell number. The first row, row 0, contains exactly the same characters as ISO/IEC 8859-1. The first 128 characters are thus the ASCII characters. The octet representing an ISO/IEC 8859-1 character is easily transformed to the representation in UCS by putting a 0 octet in front of it. UCS includes the same control characters as ISO/IEC 8859 which are located in row 0.

15.1.4 SIM Update Initiated by the Network

If a terminal adapter (TA) uses data of the SIM card please consider that the contents of all elementary files are subject to change at any time. This happens because the network can change the SIM card data in the background via the SIM Application Toolkit (SAT) procedure "Data download to SIM". For a detailed description refer to GSM 11.14. In order to receive the information that an elementary file has been changed the TA has to activate Remote SAT and needs to look for the SAT Proactive Command "REFRESH", see chapter 1.4.2.

15.1.5 Icon Handling

Several SAT Proactive commands may provide an icon identifier. Icons are intended to enhance the MMI by providing graphical information to the user. The display of icons is optional for the ME.
The SIM indicates to the ME whether the icon replaces an alpha identifier or text string, or whether it accompanies it (icon qualifier).

If both an alpha identifier or text string, and an icon are provided with a proactive command, and both are requested to be displayed, but the ME is not able to display both together on the screen, then the alpha identifier or text string takes precedence over the icon.

If the SIM provides an icon identifier with a proactive command, then the ME shall inform the SIM if the icon could not be displayed by sending the response "Command performed successfully, but requested icon could not be displayed" (via AT^SSTR).

Icon data can be fetched directly from the SIM via command AT+CRSM, for details please refer to GSM 11.11, Annex G [18]. Icon data can be read from the SIM on system start then cached.

15.1.6 Using SMS Related AT Commands

ME activities triggered by SAT often end in sending or receiving short messages. Usually, a short message containing a service request is sent to the network, for example a request to send the latest news. Subsequently, the network returns a short message containing the requested information. This short message needs to be read by the application running on the TA.

Set SMS text mode
AT+CMGF=1

Activate the display of a URC on every received SMS
AT+CNMI=1,1

If needed activate extended SMS text mode parameter output
AT+CSDH=1
This is useful in order to obtain more detailed header information along with the incoming SMS (e.g. SMS class). Please refer to 3GPP standard GSM 03.38 for details.
As a result, a URC will be output each time a short message is received
"+CMTI": "MT", 1 where
• the first parameter "MT" specifies the storage type of the SMS
• the second parameter contains a unique location number.
In the given example, the short message was stored to the memory type "MT" at location number 1.
The short message storage "MT" is a logical storage. For more detailed information please refer to AT+CPMS.

To read the SMS data use
AT+CMGR=<location>
where <location> is the location number of the received SMS, e.g. 1 in the example above.

To list all stored short messages use
AT+CMGL="ALL"

To delete a certain SMS after reading use
AT+CMGD=<location>

15.2   Remote-SAT States

In order to communicate with the SIM Application Toolkit it is necessary to use AT commands which are explained in detail in the following chapters. In general, the type of AT command which should be issued depends on the current state of the Remote-SAT interface.
The current state of Remote-SAT is determined by

1. the Remote-SAT operating mode (AR or ER mode),
2. the application running on the SIM,
3. the application running on the TA (in case of ER mode only), and
4. internal actions of the ME (especially SAT and Call Control).

15.2.1 Remote-SAT State Transition Diagram

Figure 15.2: Remote-SAT State Transition Diagram

15.2.2   Remote-SAT State Transition Table

The following table outlines which AT commands can be issued during certain states. However, the test and read AT commands are available at any time. This way it is possible to determine the current state of the interface via AT^SSTA?.

Meaning of options usable in column "M/O/X" of the following tables:
M: The TA has to issue the AT command to get Remote-SAT service (mandatory).
O: Usage of AT command is optional.
X: Usage of AT command is not allowed or not useful at this time and may cause an error message.

Table 15.1:   State: RESET description

RESET: State after power on the ME.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	X	
^SSTR=<pac>	X	
^SSTR=<event>	X	

Table 15.2:   State: OFF description

OFF: ME is in Auto Response Mode.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	X	
^SSTR=<pac>	X	
^SSTR=<event>	X	

Table 15.3:   State: IDLE description

IDLE: ME is in Explicit Response Mode.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	O	Show PAC information
^SSTR=<pac>	X	
^SSTR=<event>	O	

Table 15.4: State: PAC description

PAC[1]: SIM application has issued a proactive command. This event is signalled to the TA via ^SSTN: <cmdType>.		3/12/10
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	M	Show PAC information
^SSTR=<pac>	X	
^SSTR=<event>	X	

Table 15.5: State: WAIT description

WAIT[1]: SIM application is waiting for the response to the ongoing proactive command.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	O	Show PAC information
^SSTR=<pac>	M	
^SSTR=<event>	X	

1) To limit the time Remote-SAT is kept in states PAC or WAIT, any ongoing (but unanswered) PAC will be aborted after 5 minutes automatically. For details refer to AT^SSTA, parameter <userTOut>.

15.3 Remote-SAT Command Types

The Command Type value (cmdType) identifies the type of command or associated response passed between the TA and the ME.

cmdType is the parameter that comes first in AT commands, in responses to AT^SSTGI and AT^SSTR commands, and in the "^SSTN" URC. Also, the cmdType values may be used as Next Action Indicator for the SETUP MENU and for SELECT ITEM.

The SAT implementation supports SAT class 3 (GSM 11.14 Release 99, letter class "c"). Therefore, Table 15.6 summarizes only those command types and parameters which may appear on the user interface (UI) and thus, allow the user to take an action. Command types that are transparent to the user are not listed in the table, although they are supported by Remote-SAT as specified in GSM 11.14.

Table 15.6: Command Type Table

Command types supported by Remote-SAT; i.e. UI related						
cmdType value (dec.)	SSTGI applicable	Used as Next Action Indicator as specified in GSM 11.14	SSTR required	Auto Terminal Response	Timeout Terminal Response	Command Name
Proactive commands (TA <- ME <- SIM), follows GSM 11.14 (version 8.5.0 2000-12) Section 13.4						
1	X		X	0	32	REFRESH
5	X		X	0	32	SET UP EVENT LIST
16	X	X	X	34	32	SET UP CALL
17	X	X	X	0	32	SEND SS
18	X	X	X	0	32	SEND USSD
19	X	X	X	0	32	SEND SHORT MESSAGE
20	X		X	0	32	SEND DTMF
21	X		X	34	32	LAUNCH BROWSER
32	X	X	X	0	32	PLAY TONE
33	X	X	X	0	18	DISPLAY TEXT
34	X	X	X	18	18	GET INKEY
35	X	X	X	18	18	GET INPUT
36	X	X	X	18	18	SELECT ITEM
37	X	X	X	0	0	SET UP MENU
40	X	X	X	0	32	SET UP IDLE MODE TEXT
53	X		X	0	32	LANGUAGE NOTIFICATION
Termination of proactive commands (URCs, TA <- ME <- SIM)						
101						Terminate REFRESH
105						Terminate SET UP EVENT LIST
116						Terminate SET UP CALL
117						Terminate SEND SS
118						Terminate SEND USSD
119						Terminate SEND SHORT MESSAGE
120						Terminate SEND DTMF

cmdType value (dec.)	SSTGI applicable	Used as Next Action Indicator as specified in GSM 11.14	SSTR required	Auto Terminal Response	Timeout Terminal Response	Command Name
Command types supported by Remote-SAT; i.e. UI related						
121						Terminate LAUNCH BROWSER
132						Terminate PLAY TONE
133						Terminate DISPLAY TEXT
134						Terminate GET INKEY
135						Terminate GET INPUT
136						Terminate SELECT ITEM
137						Terminate SET UP MENU
140						Terminate SET UP IDLE MODE TEXT
153						Terminate LANGUAGE NOTIFICATION
Event commands (TA -<ME -<SIM)						
211			X			User Menu Item Selection
232			X			User activity
233			X			Idle screen available
235			X			Language selection
236			X			Browser Termination
Additional commands (URCs, TA <- ME <- SIM)						
254		X	X			Notification: SIM Application returns to main menu <CR>Response: Terminate Command
255						Notification: REFRESH "SIM RESET"

15.4   AT^SSTA   Remote-SAT Interface Activation

AT^SSTA write command can be used to determine the Remote-SAT activation mode <mode> and, if Explicit Response mode is enabled, to activate the Remote-SAT interface. Removing and inserting the SIM does not affect the activation status.
SAT commands which are not using the AT interface (non-MMI related SAT commands, e.g. PROVIDE LOCAL INFORMATION) are executed without activating Remote-SAT.
The read command can be used to request the current operating status and the used alphabet of the Remote-SAT interface.

Syntax

Test Command
AT^SSTA=?
Response(s)
^SSTA: (list of supported <state>s), (list of supported <Alphabet>s)
OK

Read Command
AT^SSTA?
Response(s)
^SSTA: <state>, <Alphabet>, <allowedInstance>, <SatProfile>, <userTOut>, <AppType>
OK

Write Command
AT^SSTA=<mode>[, <Alphabet>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<state>(num)

EU3-E Remote-SAT interface states

0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT

<Alphabet>(num)

Parameter is stored non-volatile and takes effect after next restart of the ME.

0(D)   GSM character set
Input of a character requests one byte, e.g. "Y".

1   UCS2
To display the 16 bit value of characters represented in UCS2 alphabet a 4 byte string is required, e.g. "0059" is coding the character "Y". For details please refer to ISO/IEC 10646.

<allowedInstance>(num)

Remote-SAT handling (i.e. ^SSTN, AT^SSTGI and AT^SSTR sequence) is only usable via the serial channnel on which the Explicit Response (ER) mode was activated.
To change the serial channel execute AT^SSTA=1 on the desired channel and perform a restart.

0	Not applicable
1	SAT may be started on this instance via the write version of this command.

<SatProfile>(str)

SAT profile according to GSM 11.14 [21] or USAT profile according to 3GPP TS 31.111 [22].
EU3-E supports different profiles for 2G SIM and 3G USIM applications. The type of profile issued by AT^SSTA read command depends on the inserted SIM or USIM.
In case of no SIM is inserted the GSM profile will be issued for compatibility reasons.
The profile tells the SIM Application which features (e.g. Proactive Commands) are supported by the SIM Application Toolkit implementation of the EU3-E.

<userTOut>(str)

PAC user timeout in seconds.
To limit the time Remote-SAT is kept in states PAC or WAIT, any ongoing (but unanswered) proactive command will be aborted automatically after 5 minutes. In this case, the terminal response is either "ME currently unable to process command", or if applicable, "No response from user". In addition a URC "Terminate Proactive Command" will be sent to the external application.

<AppType>(str)

SIM Application type.
This parameter shows the type of SIM application currently running.

"1"	2G Application (GSM SAT)
"2"	3G Application (USAT)

<mode>(num)

Select Remote-SAT activation mode.
Parameter is stored non-volatile and takes effect after next restart of the ME. Removing and inserting the SIM does not affect the activation status.

0(D)	Automatic Response (AR) mode. All commands and responses are exchanged automatically between the ME and the SIM application. This eliminates the need to enter any Remote-SAT commands including the AT^SSTA command. If AR mode is enabled the ME enters the OFF state (<state>=1) after restart.
1	Explicit Response (ER) mode. This mode is intended for use with an MMI. If ER mode is enabled the MMI is required to handle, via EU3-E's Remote-SAT interface, all commands and responses transmitted to or from the SIM or USIM. If ER mode is enabled the ME enters the IDLE state (<state>=2) after reboot.

15.5 ^SSTN SAT Notification

Unsolicited Result Codes

URC 1

Proactive command notification

^SSTN: <cmdType>

Every time the SIM Application issues an MMI relevant proactive command, via the ME, the TA will receive a notification. This indicates the type of proactive command issued.
AT^SSTGI must then be used by the TA to request the parameters of the proactive command from the ME. Upon receiving the ^SSTGI response from the ME, the TA must send AT^SSTR to confirm the execution of the proactive command and provide any required user response, e.g. a selected menu item.

URC 2

Terminate proactive command notification

^SSTN: <cmdTerminateValue>

When the SIM Application has issued a proactive command to the ME, it is possible that this command will be terminated later. URC "^SSTN" is sent with a different proactive command type number (added terminate offset 100) to indicate the termination of the specified command.
The state changes to idle. Therefore the TA should avoid sending any further commands related to the terminated proactive command, e.g. AT^SSTGI or AT^SSTR.

URC 3

Notification to the TA when the SIM Application has finished a command cycle and does not issue a subsequent proactive command.

^SSTN: 254

The TA does not need to respond directly, i.e. AT^SSTR is not required. The next action is left as an implementation decision to the manufacturer of the customer application (TA). Examples:

• If a Toolkit menu "^SSTN: 37" (SET UP MENU) proactive command was received at startup, the customer application can return to this Toolkit menu again after receiving the "^SSTN: 254" URC.

• In a Windows Mobile environment, the ToolkitUI application can be closed after receiving this URC.

Important notes:

• The Idle Mode text transferred with the SET UP IDLE MODE TEXT proactive command should not be removed as a result of this URC.

• If the text transferred with the DISPLAY TEXT proactive command is coded with an immediate response object set to "1" (see parameter <immediateResponse> of the AT^SSTGI=33 command), the text should not be removed as a result of this URC.

URC 4

SIM reset notification

^SSTN: 255

Notification to the TA if a proactive command "REFRESH - SIM Reset" has been issued by the SIM Application, please refer to AT^SSTGI.
This URC should be used to set the TAs application to its initial state since the SIM Application will start from the beginning, too.
The TA does not need to respond directly, i.e. related AT^SSTGI and AT^SSTR are neither required nor allowed.
Since the ME is still busy on SIM access the ME may respond with "+CME ERROR: SIM blocked" or "+CME ERROR: SIM busy" on following PIN required AT Commands for a while. Then TA shall retry until the ME responds with "OK". The time needed for this process depends on the SIM and may take more than 10 seconds.

Parameter Description

<cmdType>(num)

Proactive Command number

<cmdTerminateValue>(num)

Defined as <cmdType> + terminate offset. The terminate offset equals 100.

15.6   AT^SSTGI   SAT Get Information

Regularly this command is used upon receipt of an URC "^SSTN" to request the parameters of the Proactive Command.
Then the TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed. AT^SSTR will also provide any user information, e.g. a selected menu item.
The Proactive Command type value specifies to which "^SSTN" the command is related.

Syntax

Test Command
AT^SSTGI=?

Response(s)
^SSTGI:(list of supported <state>s), (list of supported <cmdType>s)
OK

Read Command
AT^SSTGI?

Response(s)
^SSTGI: <state>,<cmdType>
OK

Write Command
AT^SSTGI=<cmdType>

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

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<state>(num)

EU3-E Remote-SAT interface states

0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT

<cmdType>(num)

Related Proactive Command

15.7 AT^SSTGI SAT Get Information - Refresh (1)

The AT^SSTGI=1 command shall be used after receiving the URC "^SSTN: 1". This URC notifies the TA that one or more Elementary Files on the SIM have been changed as a result of a SIM application activity, usually caused by the network provider. The response to the AT^SSTGI=1 command indicates what type of SIM refresh has occurred. The change requires that the Elementary Files of the SIM be synchronized with the equivalent information (if any) stored inside the TA. Depending on the type of SIM refresh the TA may need to use the AT+CRSM command to read out the Elementary Files and store the refreshed information.

The response parameters <pathLen>, <fileNum> and <fileList> are mandatory if <commandDetails> equals 1 or 2. In all other cases they are optional and can be ignored.

Syntax

Write Command

AT^SSTGI=1

Response(s)

^SSTGI: <cmdType>, <commandDetails>[, <pathLen>, <fileNum>, <fileList>]
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

1	Proactive command ID, see Section 15.3, Remote-SAT Command Types and Table 15.6.

<commandDetails>(num)

For every return value of <commandDetails> other than 4 (SIM Reset) the TA shall complete the proactive command cycle using AT^SSTGI=1.

0	SIM Initialization and Full File Change Notification
1	File Change Notification
2	SIM Initialization and File Change Notification
3	SIM Initialization
4	Value "4" means SIM Reset, but the value itself never appears. This is because value "4" is mapped to the URC "^SSTN: 255" which will be sent when a SIM reset occurs. In this case, the TA does not need to respond, i.e. the SIM Refresh commands AT^SSTGI and AT^SSTR are neither required nor allowed. Instead, as the SIM application restarts, the Toolkit application inside the TA should also return to initial state after receiving the URC "^SSTN: 255". For more information on SIM reset and the URC "^SSTN: 255" refer to Section 15.5, SAT Notification.
5...255	Reserved values

<pathLen>(num)

Number of bytes coded in <fileList>

<fileNum>(num)

Number of updated Elementary Files (EF) with path given in <fileList>

<fileList>(num)

String containing Elementary File paths. Each path contains at least two file entries; each file entry (MF, EF or DF) consists of two bytes, e.g. '3F002FE2' or '3F007F206FAD'. Every path in the file description begins with the Master File (MF). There can be any number of Dedicated File (DF) entries between Master File and Elementary File.

Example

If the SIM contains an AT&T Customer Service Profile (CSP) the TA shall react to the URC "^SSTN: 1" as follows: When <commandDetails> equals 0, 2, 3 or 4 the TA shall synchronize the SIM information by using AT+CRSM. When <commandDetails> equals 1, reloading the SIM information with AT+CRSM is necessary only if the Elementary File EF_CSP is found in the <fileList>. The example shows the latter case:

`^SSTN: 1`	Indicates that a SIM Refresh has occurred.
`AT^SSTGI=1`	Request type of SIM Refresh.
`^SSTGI:` `1,1,68,5,"3F007F665F304F313F007F665F304F343F007FFF6F153F007F206FC63F007F206FC5"`	
`OK`	The Elementary File EF_CSP is included in the Refresh File List, indicating that its contents may have changed.
`AT^SSTR=1,0`	Terminate the proactive command.
`OK`	
`AT+CRSM=176,28437,0,0,26`	TA reads the EF_CSP.
`+CRSM:` `144,0,"01F00200038004C005C00600070008830984` `C0DDFF00FF00FF00"`	The SIM Refresh concerns the PLMN mode bit that has been enabled.
`OK`	

This is an example for a Refresh with File Change Notification at EF_FDN for USIM.

`^SSTN: 1`	Indicates that a SIM Refresh has occurred.
`AT^SSTGI=1`	Request type of SIM Refresh.
`^SSTGI: 1,1,6,1,"3F007FFF6F3B"`	
`OK`	The Elementary File EF_FDN is included in the Refresh File List, indicating that its contents may have changed.
`AT^SSTR=1,0`	Terminate the proactive command.
`OK`	

15.8 AT^SSTGI SAT Get Information - Set Up Event List (5)

This command shall be used after receiving the URC ^SSTN: 5.
However, please refer to the note below.
The response informs the TA of the events that it must monitor within itself. If any of these events occur the TA must report them to the ME.

Syntax

Write Command

AT^SSTGI=5

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <eventList>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

5   Proactive command ID, see Table 15.6, Command Type Table.

<commandDetails>(num)

This byte is RFU.

<eventList>(num)

The event list tells the TA which events have to be reported to the ME via the related commands AT^SSTR=(232, 233, 235, 236)

0...255	Used as bit field
bit 1-4	RFU
bit 5	0: User Activity not in Event List
	1: Any user activity (keyboard press) has to be signaled to the ME
bit 6	0: Idle Screen Available not in Event List
	1: Any idle screen available event has to be signaled to the ME.
bit 7	RFU
bit 8	0: Language Selection not in Event List
	1: Language Selection events have to be signaled to the ME.
bit 9	0: Browser Termination not in Event List
	1: Browser Termination events have to be signaled to the ME
bit 10-16	RFU

Note

• It is possible to issue AT^SSTGI during states IDLE, PAC and WAIT for this proactive command without previously receiving a URC ^SSTN:<cmdType>, see AT^SSTGI.

15.9   AT^SSTGI   SAT Get Information - Set Up Call (16)

This command shall be used after receiving the URC ^SSTN: 16. If the SIM Application attempts to set up a call it uses this response to inform the TA of the call parameters.

The sequence of events is as follows:
1. After the Remote-SAT notification 16 was issued the TA has to request the command parameter using AT^SSTGI=16.
2. If the SIM Application does not supply a confirmation text or icon parameter, the TA gives other information to the user, e.g. the telephone number. In this case refer to step 4.
3. If the SIM Application supplies a non empty confirmation text or icon parameter, the TA uses only these to ask the user whether or not he wishes to set up the call.
4. If the user confirms to set up the call, AT^SSTR=16,0 shall be responded.
5. If the user denies to set up the call, AT^SSTR=16,34 shall be responded.
6. After confirmation phase the TA may present a dialing animation on the screen until a mandatory parameter line ^SSTR: 16, <TermQualifier>, <TerminationCauseText> is issued.
7. If <TermQualifier> is not equal to 0 the call setup process has not been successfully. If <TerminationCause-Text> is not an empty string, this text shall be shown to the user for an appropriate time, e.g. 2 seconds. The text contains information regarding the dial termination cause, e.g. call barring through Call Control by SIM mechanism. If <TerminationCauseText> is an empty string, the TA shall give an own indication to the user.
8. If <TermQualifier> is equal to 0, the call setup process has been started:
If <TerminationCauseText> is not an empty string, this text shall be used to inform the user during the call setup.
If <TerminationCauseText> is an empty string, <callSetupText> and/or <confirmationIconId> shall be used to inform the user during call setup. However, if <callSetupText> contains no data, too, no indication shall be shown.
9. The TA shall give the user an opportunity to end an ongoing call, set up by the Proactive Command. In this case the TA shall issue an ATH command to the ME.

Syntax

Write Command

AT^SSTGI=16

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <confirmationText>, <calledNumber>,
<callSetupText>, <confirmationIconQualifier>, <confirmationIconId>,
<callSetupIconQualifier>, <callSetupIconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

16	Proactive command ID, see Table 15.6, Command Type Table.

<commandDetails>(num)

0	Set up call, but only if not currently busy on another call
1	Set up call, but only if not currently busy on another call, with redial
2	Set up call, putting all other calls (if any) on hold
3	Set up call, putting all other calls (if any) on hold, with redial
4	Set up call, disconnecting all other calls (if any)

5	Set up call, disconnecting all other calls (if any), with redial
6...255	Reserved Values

<confirmationText>(str)

String for user confirmation stage

<calledNumber>(num)

String containing called number

<callSetupText>(str)

String for call set up stage

<confirmationIconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<confirmationIconId>(num)

0...255	
0	No Icon

<callSetupIconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<callSetupIconId>(num)

0...255	
0	No Icon

Note

• If the Fixed Dialling Number service is enabled, the number included in the SET UP CALL proactive command shall not be checked against those of the FDN list.

15.10   AT^SSTGI   SAT Get Information - Send SS (17)

This command shall be used after receiving the URC ^SSTN: 17
The module is sending a supplementary service request to the network, and is alerting the user of this. Text and an icon identifier shall be passed to the TA to display to the user.

Syntax

Write Command

AT^SSTGI=17

Response(s)

^SSTGI: <cmdType>[, <commandDetails>][, <text>], <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

17   Proactive command ID, see Table 15.6, Command Type Table.

<commandDetails>(num)

This byte is RFU.

<text>(str)

String to provide the user with information.
If the string is provided by the SIM, the TA shall use it to inform the user. This is also an indication that the TA should not give any other information to the user on the fact that the ME is sending a short message.
If the alpha identifier is not provided by the SIM, the ME may give information to the user concerning what is happening.

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

15.11 AT^SSTGI SAT Get Information - Send USSD (18)

This command shall be used after receiving the URC ^SSTN: 18
The module is sending an unstructured supplementary service request to the network, and is alerting the user of this.
Text and an icon identifier shall be passed to the TA to display to the user.

Syntax

Write Command

AT^SSTGI=18

Response(s)

^SSTGI: <cmdType>[, <commandDetails>][, <text>], <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

18   Proactive command ID, see Table 15.6, Command Type Table.

<commandDetails>(num)

This byte is RFU.

<text>(str)

String to provide the user with information.
If the string is provided by the SIM, the TA shall use it to inform the user. This is also an indication that the TA should not give any other information to the user on the fact that the ME is sending a short message.
If the alpha identifier is not provided by the SIM, the ME may give information to the user concerning what is happening.

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

15.12 AT^SSTGI SAT Get Information - Send Short Message (19)

This command shall be used after receiving the URC ^SSTN: 19
The SIM Application is sending a Short Message and the TA is informed of this. The user can be passed a string containing information to display.

Syntax

Write Command

AT^SSTGI=19

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <textInfo>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

19	Proactive command ID, see Table 15.6, Command Type Table.

<commandDetails>(num)

This byte is RFU.

<textInfo>(str)

String to provide the user with information.
If the string is provided by the SIM, the TA shall use it to inform the user. This is also an indication that the TA should not give any other information to the user on the fact that the ME is sending a short message.
If the alpha identifier is not provided by the SIM, the ME may give information to the user concerning what is happening.

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon
1	An icon is provided by the SIM, the icon indicated in the command may be used by the ME to inform the user, in addition to, or instead of the alpha identifier, as indicated with the icon qualifier.

15.13   AT^SSTGI   SAT Get Information - Send DTMF (20)

This command shall be used after receiving the URC ^SSTN: 20
The SIM Application is sending DTMF tones to the network, and can provide the TA with some information about this.
Text and an icon identifier can be passed to the TA to display to the user.

Syntax

Write Command

AT^SSTGI=20

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

20	Proactive command ID, see Table 15.6, Command Type Table.

<commandDetails>(num)

This byte is RFU.

<text>(str)

String to provide the user with information.
If the string is provided by the SIM, the TA shall use it to inform the user. This is also an indication that the TA should not give any other information to the user on the fact that the ME is sending a short message.
If the alpha identifier is not provided by the SIM, the ME may give information to the user concerning what is happening.

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

15.14   AT^SSTGI   SAT Get Information - Launch Browser (21)

This command shall be used after receiving the URC ^SSTN: 21.
If the SIM Application attempts to start an Internet Browser, it uses this response to inform the TA of the launch parameters.

The sequence of events is as follows:
1. After the Remote-SAT notification 21 was issued the TA shall ask for the command parameters via AT^SSTGI=21.
2. The ME shall ask the user for confirmation using the Alpha Identifier/Icon Identifier (user confirmation phase) if present, when it receives a LAUNCH BROWSER command which requests to connect the existing browser session to a new URL or to terminate a browser session.
3. If the user confirms to start the browser, AT^SSTR=21,0 shall be responded.
4. If the user denies to start the browser, AT^SSTR=21,34 shall be responded.
5. The SIM Application will end the proactive session.
6. The ME shall request content using the given URL. However, if no URL string is supplied a default URL shall be used.
7. On response AT^SSTR=21,0 the browser session may still be active while a next proactive command is issued. Therefore the end of the browser session shall be reported to the ME via browser termination event command asynchronously if determined by the event list.
For details please refer to AT^SSTR.

Syntax

Write Command

AT^SSTGI=21

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <confirmationText>, <confirmationIconQualifier>, <iconId>, <browserIdentity>, <url>, <bearerList>, <fileRefList>, <gatewayIdentity>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

21   Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

This byte is RFU.

<confirmationText>(str)

String for user confirmation stage

<confirmationIconQualifier>(num)

0...255   Used as bit field

bit 1   0: Icon is self explanatory and replaces text

	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

<browserIdentity>(num)

0...255	Browser to be used
0	Default Browser shall be used.
1...255	RFU

<url>(str)

String containing URL to be used by the TA to request content. The way the ME requests content using the URL is out of the scope of the present document. This is specified in RFC 1738 Annex K for example.

<bearerList>(str)

"00"	SMS
"01"	CSD
"02"	USSD
"03"	GPRS
04...FF	RFU

<fileRefList>(str)

String containing full path to the provisioning file. The first byte contains the number of files. Every comma separated path is the concatenation of file identifiers starting from the Master File (e.g. 3F007F206FXY). The file contains a single unambiguous set of parameters required to make the connection. The content of the file is expected to be consistent with the format defined for provisioning information for the requested type of browser.

<gatewayIdentity>(str)

String containing the Gateway/Proxy Identity which gives to the mobile the name/identity of the Gateway/Proxy to be used for connecting to the URL. This Gateway/Proxy identity is required when the bearer data object is present.

15.15 AT^SSTGI SAT Get Information - Play Tone (32)

This command shall be used after receiving the URC ^SSTN: 32.
The ME has been instructed to generate an audible tone, and may pass to the TA some information to support this.
Text and an icon identifier are passed to the TA for display to the user.

Syntax

Write Command

AT^SSTGI=32

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <infoText>, <tone>, <durationUnit>, <duration>,
<iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

32	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

This byte is RFU.

<infoText>(str)

String to accompany tone

<tone>(str)

Tone generated by the ME

01...08	Standard supervisory tones:
"01"	Dial tone
"02"	Called subscriber busy
"03"	Congestion
"04"	Radio path acknowledge
"05"	Radio path not available / Call dropped
"06"	Error / Special information
"07"	Call waiting tone
"08"	Ringing tone
16...18	ME proprietary tones:
"16"	General beep
"17"	Positive acknowledgement tone
"18"	Negative acknowledgement or error tone

<durationUnit>(num)

0	Minutes
1	Seconds
2	Tenth of Seconds

<duration>(num)

1...255	Duration of tone, expressed in units

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

15.16   AT^SSTGI   SAT Get Information - Display Text (33)

This command shall be used after receiving the URC ^SSTN: 33. The TA gets a message to be displayed to the user. The message can have different display characteristics. Text and icon identifier can be passed to the TA to be displayed.

Syntax

Write Command

AT^SSTGI=33

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <text>, <immediateResponse>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

33	Proactive command ID, see Section 15.3, Remote-SAT Command Types and Table 15.6.

<commandDetails>(num)

0...255	Used as bit field
bit 1	0: Normal priority (see note).
	1: High priority (see note).
bit 2-7	RFU
bit 8	0: Clear message after a delay.
	1: Wait for user to clear message.

<text>(str)

String to be displayed (up to 240 bytes)

<immediateResponse>(num)

This parameter indicates whether the ME should sustain the display beyond sending the TERMINAL RESPONSE.

0	Send TERMINAL RESPONSE when text is cleared from screen.
1	Send TERMINAL RESPONSE immediately and continue to display the text until one of the following events occurs:
	• A subsequent proactive command is received, containing display data.
	• A short delay notified with <commandDetails> has expired.
	• User intervention.

• A higher priority event occurs, e.g. a mobile terminated call.

No further TERMINAL RESPONSE shall be sent when the ME removes the text from the display, regardless of the cause.
If the <immediateResponse> parameter equals "1" the subsequent "^SSTN: 254" URC should not be used to clear the text from the screen - in this case the text should remain on the screen until one of the above events occurs.

<iconQualifier>^(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text.
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>^(num)	
0...255	
0	No Icon

Notes

• The MMI shall reject normal priority text commands if the screen is currently used for more than its normal standby display, e.g. if the MMI is in sub-menu. If the command is rejected, the MMI sends the TERMINAL RESPONSE message to the SIM (ME currently unable to process command - screen busy).

• High priority text shall be displayed on the screen immediately, except if a priority conflict of the alerting events occurs, e.g. incoming call, see GSM 11.14, Chapter "Proactive SIM commands and procedures, Display Text".

15.17 AT^SSTGI SAT Get Information - Get Inkey (34)

This command shall be used after receiving the URC ^SSTN: 34.
The TA is asked to prompt the user for an input, which is a single character. Help can be requested by the user, if available.
Text and an icon identifier can be passed to the TA to be displayed.

Syntax

Write Command

AT^SSTGI=34

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

34	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

0...255	Used as bit field
bit 1	0: Digits only (0 9, *, # and +)
	1: Alphabet set
bit 2	0: SMS default alphabet (GSM character set)
	1: UCS2 alphabet
bit 3	0: Character sets defined by bit 1 and bit 2 are enabled
	1: Character sets defined by bit 1 and bit 2 are disabled and the "Yes/No" response is requested
bit 4-7	RFU
bit 8	0: No help information available
	1: Help information available

<text>(str)

String as prompt for text.

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255

0   No Icon

15.18   AT^SSTGI   SAT Get Information - Get Input (35)

This command shall be used after receiving the URC ^SSTN: 35.
The TA is asked to prompt the user for an input, of a specified length and type, e.g. digits only. Help can be requested by the user, if available.
Text and an icon identifier can be passed to the TA to be displayed.

Syntax

Write Command

AT^SSTGI=35

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <text>, <responseMin>, <responseMax>[, <defaultText>], <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

35	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

0...255	Used as bit field
bit 1	0: Digits only (0 9, *, # and +)
	1: Alphabet set
bit 2	0: SMS default alphabet (GSM character set)
	1: UCS2 alphabet
bit 3	0: ME may echo user input on the display
	1: User input shall not be revealed in any way (see note)
bit 4	0: User input to be in unpacked format
	1: User input to be in SMS packed format
bit 5-7	RFU
bit 8	0: No help information available
	1: Help information available

<text>(str)

String as prompt for text

<responseMin>(num)

0...255	Minimum length of user input.

<responseMax>(num)

0...255	Maximum length of user input.

<defaultText>(str)

String supplied as default response text

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

Note

- Hidden entry mode (see GSM 11.14) is only available when using digit input. In hidden entry mode only characters ('0', '9', '*' and '#') are allowed.

15.19 AT^SSTGI SAT Get Information - Select Item (36)

This command shall be used after receiving the URC ^SSTN: 36.
The TA is supplied with a list of items allowing the user to select one. Help can be requested by the user, if available and the presentation style is specified. In addition to text strings and icon identifiers, a next action indicator informs the user of the likely result of selecting a chosen item.

Syntax

Write Command

AT^SSTGI=36

Response(s)

The first line of output from the ME is:
^SSTGI: <cmdType>, <commandDetails>, <numOfItems>, <titleText>, <defaultItemId>, <itemIconsPresent>, <itemIconsQualifier>, <titleIconQualifier>, <titleIconId>
One line follows for every item, repeated for <numOfItems>:
^SSTGI: <cmdType>, <itemId>, <itemText>, <nextActionId>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

36	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

0...255	Used as bit field
bit 1	0: Presentation type is not specified
	1: Presentation type is specified in bit 2
bit 2	0: Presentation as a choice of data values, if bit 1 = '1'
	1: Presentation as a choice of navigation options if bit 1 is '1'
bit 3	0: No selection preference
	1: Selection using soft key preferred
bit 4-7	RFU
bit 8	0: No help information available
	1: Help information available

<numOfItems>(num)

Number of items in the list

<titleText>(str)

String giving menu title

<defaultItemId>(num)

ID of default item
The SIM may supply with the list an indication of the default item, e.g. the previously selected item

0	No default item issued by the SIM application
1...255	Id of the default Item

<itemIconsPresent>(num)

0	No icons
1	Icons present

<itemIconsQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<titleIconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<titleIconId>(num)

0...255	
0	No Icon

<itemId>(num)

Item identifier (1 - <numOfItems>)

<itemText>(str)

String giving menu title

<nextActionId>(num)

The next proactive command type to be issued upon execution of the menu item. See Remote-SAT Command Types

0	Next Action information available

<iconId>(num)

0...255	
0	No Icon

15.20 AT^SSTGI SAT Get Information - Set up Menu (37)

This command shall be used after receiving the URC ^SSTN: 37.
However, please refer to note below. The response provides the main menu of the SIM Application to the TA. It will be stored by the TA so that it can be displayed without invoking a proactive session.

Syntax

Write Command

AT^SSTGI=37

Response(s)

The first line of output from the ME is:
^SSTGI: <cmdType>, <commandDetails>, <numOfItems>, <titleText>, <menuItemIconsPresent>, <menuItemIconsQualifier>, <titleIconQualifier>, <titleIconId>
One line follows for every item, repeated for <numOfItems>:
^SSTGI: <cmdType>, <itemId>, <itemText>, <nextActionId>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

37	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

0...255	Used as bit field
bit 1	0: No selection preference
	1: Selection using soft key preferred
bit 2-7	RFU
bit 8	0: No help information available
	1: Help information available

<numOfItems>(num)

Number of menu items in the list

<titleText>(str)

String displaying menu title

<menuItemIconsPresent>(num)

0	No icons
1	Icons present

<menuItemIconsQualifier>(num)

0...255	Used as bit field

bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<titleIconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<titleIconId>(num)

0...255	
0	No Icon

<itemId>(num)

Menu item identifier (1 - <numOfItems>)

<itemText>(str)

Title of menu item

<nextActionId>(num)

The next proactive command type to be issued upon execution of the menu item. See Remote-SAT Command Types

0	No next Action information available

<iconId>(num)

0...255	
0	No Icon

Notes

- As with every proactive command the TA is expected to acknowledge the ^SSTGI response with AT^SSTR to confirm that the proactive command has been executed.
  Terminal response via AT^SSTR will not provide any user information in case of this proactive command. Refer to AT^SSTR.
- AT^SSTGI can be issued during states IDLE, PAC and WAIT for this proactive command without previously receiving a URC ^SSTN:<cmdType>, see AT^SSTGI.

15.21   AT^SSTGI   SAT Get Information - Set up Idle Mode Text (40)

This command shall be used after receiving the URC ^SSTN: 40.
It provides text and optionally an icon to be displayed by the TA when the display is Idle.

Syntax

Write Command
AT^SSTGI=40
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

40	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

This byte is RFU.

<text>(str)

to display when TA in IDLE mode

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

Note

• AT^SSTGI can be issued during states IDLE, PAC and WAIT for this proactive command without previously receiving a URC ^SSTN:<cmdType>, see AT^SSTGI.

15.22 AT^SSTGI SAT Get Information - Language Notification (53)

This command shall be used after receiving the URC ^SSTN: 53.
It provides text to inform the TA about the language currently used for any text string within proactive commands or envelope command responses.
The notified language remains valid until the end of the card session or upon executing another LANGUAGE NOTIFICATION command.
If the Toolkit application is not aware of the currently selected language, no specific language or several languages will be used. The SIM may notify non-specific language. All LANGUAGE NOTIFICATION previously made will be cancelled.
Two types of language notification are defined:
• specific, where a two-character language notification is issued in <langText>,
• non-specific, where no language notification is issued, i.e. <langText> is an empty string.
The TA may use the language included in LANGUAGE NOTIFICATION as appropriate. For instance, this could be done to avoid a mix of languages in screen displays combining ME MMI and SIM Toolkit originating text strings.

Syntax

Write Command
AT^SSTGI=53
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <langText>   OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

53	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

0...255	Used as bit field
bit 1	0: non-specific language notification
	1: specific language notification
bit 2-8	RFU

<langText>(str)

Language code string provided as a pair of alpha-numeric characters, defined in ISO 639. Each alphanumeric character is coded on one byte using the SMS default 7-bit coded alphabet as defined in 3GPP TS 23.038[14].

Note

• AT^SSTGI can be issued during states IDLE, PAC and WAIT for this proactive command without previously receiving a URC ^SSTN:<cmdType>, see AT^SSTGI.

15.23   AT^SSTR   SAT Response

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed. AT^SSTR will also provide any user information, e.g. a selected menu item.

Syntax

Test Command

AT^SSTR=?

Response(s)

^SSTR: (list of supported <state>s), (list of supported <cmdType>s)
OK

Read Command

AT^SSTR?

Response(s)

^SSTR: <state>, <cmdType>
OK

Write Command

AT^SSTR=<cmdType>, <status>[, <inputNumber>][, <inputString>][, <statAddInfo>]

Response(s)

OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<state>(num)

EU3-E Remote-SAT interface states

0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT

<cmdType>(num)

Number related to Proactive Command or event type according to GSM 11.14 [21].

<status>(num)

Command status return regarding the type of action that has taken place, e.g. action performed by the user. Values are in accordance with GSM 11.14 [21].

<inputNumber>(num)

Response number entered by user

<inputString>(str)

Response string entered by user

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

15.24 AT^SSTR SAT Response - Refresh (1)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=1, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

Note

• The refresh action (SIM data cache update) will be performed in any case, i.e. <status> values other than 0 will be ignored.

15.25   AT^SSTR   SAT Response - Set Up Event List (5)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed. The TA is acknowledging that the event list has been set up correctly.

Syntax

Write Command
AT^SSTR=5, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

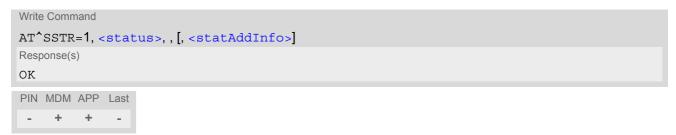|	
0	Command performed successfully
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

15.26 AT^SSTR SAT Response - Set Up Call (16)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=16, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
20	USSD/SS Transact terminated by user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy
33	Network currently unable to process command
34	User did not accept the proactive command. Indicate that the user has denied the call request
35	User cleared down call before connection or network release

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

Note

• After confirmation phase the TA may show a dialling animation on the screen until a mandatory response parameter is issued.
^SSTR: <cmdType>, <TermQualifier>, <TerminationCauseText>

15.27   AT^SSTR   SAT Response - Send SS (17)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=17, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the SS request.
4	Command performed successfully, but requested icon could not be displayed.
20	USSD/SS Transact terminated by user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy
33	Network currently unable to process command

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

15.28   AT^SSTR   SAT Response - Send USSD (18)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=18, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the USSD request.
4	Command performed successfully, but requested icon could not be displayed.
20	USSD/SS Transact terminated by user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy
33	Network currently unable to process command

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].
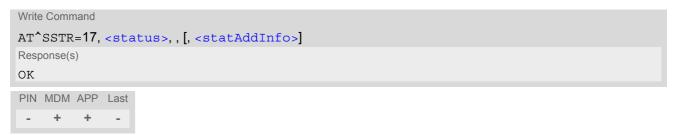
0...255

15.29 AT^SSTR SAT Response - Send Short Message (19)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=19, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

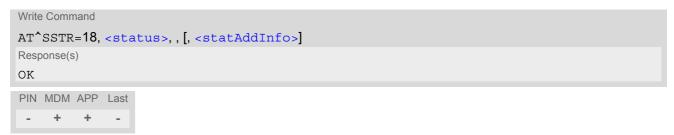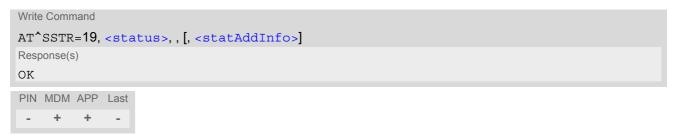|	
0	Command performed successfully. Indicate that the user has accepted the Send SMS request.
4	Command performed successfully, but requested icon could not be displayed.
20	USSD/SS Transact terminated by user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy
33	Network currently unable to process command

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

15.30   AT^SSTR   SAT Response - Send DTMF (20)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=20, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

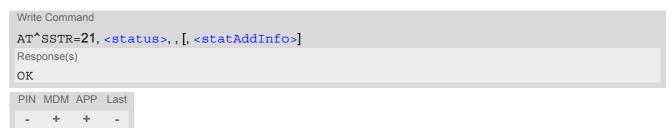| 0	Command performed successfully. Indicate that the user has accepted the Send DTMF request.
4	Command performed successfully, but requested icon could not be displayed.
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

15.31 AT^SSTR SAT Response - Launch Browser (21)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=21, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the Launch Browser request.
4	Command performed successfully, but requested icon could not be displayed.
32	TA currently unable to process command
34	User did not accept the proactive command. Indicate that the user has denied the Launch Browser request
38	Launch Browser generic error with additional information "No specific cause can be given".
132	TA currently unable to process command because screen is busy
138	Launch Browser generic error with additional information "Bearer unavailable".
238	Launch Browser generic error with additional information "Browser unavailable".
239	Launch Browser generic error with additional information "ME unable to read the provisioning data".

<statAddInfo>(num)

For the general result "Launch Browser generic error code", it is mandatory for the ME to provide additional information.

0...255

0	"No specific cause can be given"
1	"Bearer unavailable"
2	"Browser unavailable"
3	"ME unable to read the provisioning data"

15.32 AT^SSTR SAT Response - Play Tone (32)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=32, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

Note

• This command starts playing the tone by the ME. It is possible for the TA to stop playing the tone via user break, i.e. issuing any character whilst the command is running.

15.33 AT^SSTR SAT Response - Display Text (33)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=33, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].
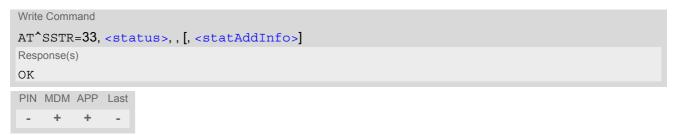
0...255

15.34 AT^SSTR SAT Response - Get Inkey (34)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=34, <status>, , <inputString>[, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
19	Help information required by the user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<inputString>(str)

User response entered as a string parameter

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

Notes

- Coding of any input character is related to the selected alphabet:
  - Input of a character in case of GSM character set requests one byte, e.g. "Y".
  - Input of any characters in UCS2 alphabet requests a 4 byte set, e.g. "0059" is coding the same character "Y".
  - If, as a user response, a binary choice (Yes/No) is requested by the SIM application using bit 3 of the <commandDetails> parameter the valid content of the <inputString> is:
  a) GSM alphabet: "Y" or "y" (positive answer) and "N" or "n" (negative answer).
  b) UCS2 alphabet "0079" or "0059" (positive answer) and "006E" or "004E" (negative answer) For more detailed information refer to AT^SSTGI.
  - Coding of an empty string is done as a "\1b" string with every alphabet.
- The alphabet - and therefore the set of allowed characters - is specified by the ME in the response to the related AT^SSTGI. However, do not mix up this alphabet with the one selected for the alphabet format on the transmission line on SAT activation, i.e. second parameter of AT^SSTA).

15.35   AT^SSTR   SAT Response - Get Input (35)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=35, <status>, , <inputString>[, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
19	Help information required by the user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<inputString>(str)

User response entered as a string, length depends on values of <responseMin> and <responseMax> returned by the related AT^SSTGI command

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

Notes

- Coding of any input character is related to the selected alphabet:
  - Input of a character in case of GSM character set requests one byte, e.g. "Y".
  - Input of any characters in UCS2 alphabet requests a 4 byte set, e.g. "0059" is coding the same character "Y".
  - Coding of an empty string is done as a "\1b" string with every alphabet.
- The alphabet - and therefore the set of allowed characters - is specified by the ME in the response to the related AT^SSTGI. However, do not mix up this alphabet with the one selected for the alphabet format on the transmission line on SAT activation, i.e. second parameter of AT^SSTA).
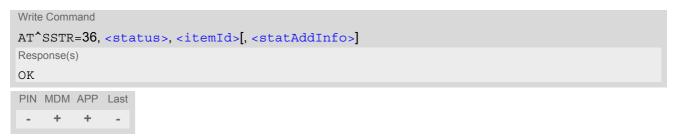
15.36   AT^SSTR   SAT Response - Select Item (36)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed. The TA sends a response that can indicate the user's intentions, e.g. when the user is requesting help or selecting a menu item.
GSM11.14 states:

Syntax

Write Command

AT^SSTR=36, <status>, <itemId>[, <statAddInfo>]

Response(s)

OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
19	Help information required by the user
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<itemId>(num)

Item IDs are supplied by the SIM Application

1...255	ID of selected item can be issued if a <status> value of 0 is returned

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

Notes

*   "When the ME issues a successful TERMINAL RESPONSE ('0X' result value ...) for a SELECT ITEM command, it shall supply the identifier of the item selected by the user in the Item identifier data object. If the ME issues a TERMINAL RESPONSE with result "Help information required by the user" for a SELECT ITEM command, it shall supply the identifier of the item for which the user is requiring help information. All other types of TERMINAL RESPONSE do not need to include Item identifier. If one is included by the ME, the SIM shall ignore it.".

*   For compatibility reasons <itemId> is optional in case of <status>=19 ("Help information required by the user"). In this case <itemId>=0 is sent to the SIM.
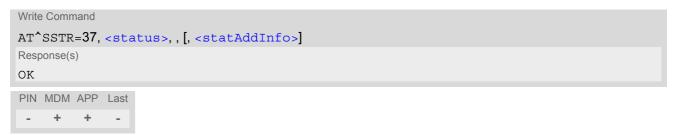
• The alphabet - and therefore the set of allowed characters - is specified by the ME in the response to the related AT^SSTGI. However, do not mix up this alphabet with the one selected for the alphabet format on the transmission line on SAT activation, i.e. second parameter of AT^SSTA).

15.37   AT^SSTR   SAT Response - Setup Menu (37)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=37, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

Notes

- The response simply conveys, to the SAT, the information that the main menu was received and set up on the user interface. It does not transmit any information about a selected item, like in the case of AT^SSTR.

  Once this command was executed the user can proceed as described in the AT^SSTR SAT Response - Setup Menu (37).

- As with every proactive command the TA is expected to acknowledge the ^SSTGI response with AT^SSTR to confirm that the proactive command has been executed.

15.38 AT^SSTR SAT Response - Set Up Idle Mode Text (40)

The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

Write Command
AT^SSTR=40, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

15.39 AT^SSTR SAT Response - Language Notification (53)
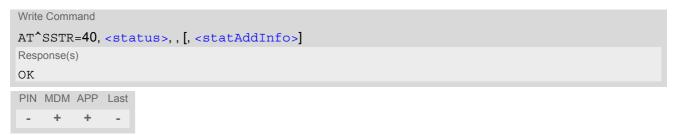
The TA is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed. The TA indicates whether the Language Notification command was correctly executed.

Syntax

Write Command
AT^SSTR=53, <status>, , [, <statAddInfo>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cmdType>(num)

53	Proactive command ID, see Table 15.6, Command Type Table.

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
32	TA currently unable to process command
132	TA currently unable to process command because screen is busy

<statAddInfo>(num)

Optional additional command status; for possible values refer to GSM 11.14 [21].

0...255

15.40 AT^SSTR SAT Event - Menu Selection (211)

The TA specifies the user's selection of an item from the main menu, which was set up using SETUP MENU command. Alternatively help can be requested.

Syntax

Write Command
AT^SSTR=211, <status>, <itemId>
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully.
19	Help information required by the user, no other value can be returned.

<itemId>(num)

ID of selected item

0...255

15.41 AT^SSTR SAT Event - User Activity (232)

Sent by the customer application to indicate that a key has been pressed.

Syntax

Write Command
AT^SSTR=232
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

15.42   AT^SSTR   SAT Event - Idle Screen Available (233)

Sent by the customer application to indicate that the screen has become idle.

Syntax

Write Command
AT^SSTR=233
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

15.43   AT^SSTR   SAT Event - Language Selection (235)

Sent by the customer application to indicate that the customer application has changed the language.
The last value given via this command is also provided to the SIM as response to the proactive command "Provide Local Information (Language Setting)".

Syntax

Write Command
AT^SSTR=235,,,<inputString>
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<inputString>(str)

Two character language tag, e.g. "en" for English or "de" for German. Default value is "en".

15.44 AT^SSTR SAT Event - Browser Termination (236)

Sent by the customer application to indicate that the internet browser application has been terminated.

Syntax

Write Command
AT^SSTR=236,,,<TermCause>
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<TermCause>(num)

Browser Termination Cause

0...255

0	User termination
1	Error termination

15.45   AT^SSTR   SAT Event - Terminate Command (254)

This command allows the TA to finish an ongoing proactive command. This is done by sending repeatedly a terminal response "ME currently unable to process command" to the SIM (see GSM 11.14 [21]), if issued in states PAC or WAIT. No action is performed if the interface is already in IDLE state. However, the command returns "OK".
The reaction to the terminal response depends on the SIM application. The command can be used to return to IDLE state regardless whether a proactive command is ongoing or not.

Syntax

Write Command
AT^SSTR=254
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

Note

- This command is allowed in states IDLE, PAC and WAIT and forces a return to IDLE state.

15.46 Examples for Using Remote-SAT

To give you an idea of how to start and use Remote-SAT, you may follow the steps described below:

// Start after switch on the module
at
OK

// Switch on verbose error messages
at+cmee=2
OK

// Enter the PIN code (if necessary due to SIM configuration)
at+cpin=1234
OK

// Query the Remote-SAT activation status
at^ssta?
^SSTA: 1,0,1,"6FFFFFFF7F0300DF7F",300,1
OK
// First '1' indicates that the interface is in OFF state, i.e. the Automatic Response (AR) mode is enabled. During this mode all SAT Proactive Commands are handled internally by the ME.

// Tell the module that the TA is interested in handling SAT, i.e. switch to Explicit Response (ER) mode.
at^ssta=1,0
OK

// This setting takes effect after next start of the ME only, so switch off first
AT^SMSO
OK

// Switch on ME again

// Switch on verbose error messages
at+cmee=2
OK

// Enter the PIN code (if necessary due to SIM configuration)
at+cpin=1234
OK

// Receiving the first proactive command (if the mounted SIM carries a SIM Application)
^SSTN:37

// Requesting parameter details
at^sstgi=37

// These are the details:
^SSTGI: 37,0,3,"SAT Special Menu",0,1,1,0
^SSTGI: 37,1,"News",0,0
^SSTGI: 37,2,"EMail",0,0
^SSTGI: 37,3,"Banking",0,0

OK

// To query the status of the proactive command
at^sstr=37,0

OK

// SAT indicates that the proactive session has ended and enters its main menu (which should then be opened

on the screen by an MMI): ^SSTN:254

// Selecting item number 1 of the menu sent before:
at^sstr=211,0,1

OK

// Receiving the next proactive command:
^SSTN:36

// Requesting more information...
at^sstgi=36

// ... and get it:
^SSTGI: 36,0,12,"Rubriken >",0,0,1,1,0
^SSTGI: 36,1,"News >",0,0
^SSTGI: 36,2,"Stock Infos>",0,0
^SSTGI: 36,3,"Aktien D >",0,0
^SSTGI: 36,4,"Aktien INT >",0,0
^SSTGI: 36,5,"Sports >",0,0
^SSTGI: 36,6,"1.BL-Clubs >",0,0
^SSTGI: 36,7,"Unterhaltung>",0,0
^SSTGI: 36,8,"Horoskop >",0,0
^SSTGI: 36,9,"Wetter D >",0,0
^SSTGI: 36,10,"Wetter INT >",0,0
^SSTGI: 36,11,"Wetter spez>",0,0
^SSTGI: 36,63,"Extras >",0,0

OK

// Remember to acknowledge:
at^sstr=36,0,63

OK

// And again: Receiving the next proactive command:
^SSTN:36
// ...

Examples

EXAMPLE 1

    // Switch on verbose error messages
    at+cmee=2
    OK

EXAMPLE 2

    // Enter the PIN code
    at+cpin=1234
    OK

EXAMPLE 3

    // Start Remote-SAT
    at^ssta=1,0
    OK

EXAMPLE 4

    // Proactive command "GET INKEY" is issued by the SIM
    ^SSTN: 34

EXAMPLE 5

    // Get complete data

at^sstgi=34
^SSTGI: 34,0,"<COLOUR-ICON>",1,2
OK

EXAMPLE 6

// Use GET RESPONSE command (192) to analyze SIM file EF-IMG (hex. 4F20)
at+crsm=192,20256,0,0,15
+CRSM: 144,0,000000644F20040014F04401020114
OK

EXAMPLE 7

// Use READ RECORD command (178) to get its content
at+crsm=178,20256,2,4,20
+CRSM: 144,0,010808214F0200000016FFFFFFFFFFFFFFFFFFFF
OK

EXAMPLE 8

// Use READ BINARY command (176) to get content of image instance data file (e.g. hex 4F02)
at+crsm=176,20226,0,0,22
+CRSM: 144,0,080802030016AAAA80028542814281428152800 2AAAA
OK

at+crsm=176,20226,0,22,9
+CRSM: 144,0,FF000000FF000000FF
OK

EXAMPLE 9

// Finalize Proactive Command session
at^sstr=34,0,,"+"
OK

EXAMPLE 10

// Session end indication, i.e. display SAT main menu
^SSTN: 254

16.   Phonebook Commands

The AT commands described in this chapter allow the external application to access the phonebooks located in the EU3-E's memory or on the attached Subscriber Identity Module (SIM).

16.1   AT+CNUM   Read own numbers

AT+CNUM returns the subscribers own number(s) from the SIM.

Syntax

Test Command
AT+CNUM=?
Response(s)
OK

Exec Command
AT+CNUM
Response(s)
[+CNUM: [<alpha>], <number>, <type>]
[+CNUM: ...]
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07

Parameter Description

<alpha>(str)

Optional alphanumeric string associated with <number>.

<number>(str)

Phone number in format specified by <type>.

<type>(str)

Type of address octet, see also: AT+CPBR <type>.

Notes

• 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. See Section 21.1, Restricted access to SIM data after SIM PIN authentication for further detail.

• For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

16.2   AT+CPBF   Find phonebook entries

The AT+CPBF write command returns phonebook entries (from the current phonebook memory storage selected with AT+CPBS) which alphanumeric field start with string <findtext>.
Entry fields returned are location number <location>, phone number stored there <number> (of format <type>) and text <text> associated with the number.
The AT+CPBF test command returns the maximum lengths of <nlength> and <tlength> fields.

Syntax

Test Command

AT+CPBF=?

Response(s)

+CPBF: <nlength>, <tlength>
OK
ERROR
+CME ERROR: <err>

Write Command

AT+CPBF=<findtext>

Response(s)

+CPBF: <location>, <number>, <type>, <text>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
+	+	+	-

Parameter Description

<location>(num)

The location number in the range of location numbers of phonebook memory.

<number>(str)

Phone number in format specified by <type>, it may be an empty string.

<type>(num)

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with ATD><mem><n> is, depending on the network, not always possible (refer to GSM 04.08 subclause 10.5.4.7 for details). See also <type> of AT+CPBW.
Possible values are:

128	Restricted <number> includes unknown type and format.
145	Dialing string <number> includes international access code character '+'.
161	National number <number>. Network support of this type is optional.
177	Network specific number <number>, ISDN format.
209	Dialing string <number> has been saved as ASCII string and includes non-digit characters other than "*", "#", "+" or "p". Note that phonebook entries saved with this type cannot be dialed.

| 255 | Dialing string `<number>` is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional. |
| 129 | Otherwise. |

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

Text assigned to a phone number. The maximum length for this parameter is given with test command response parameter `<tlength>`.
If using an ASCII terminal characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.7, Supported character sets.

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

String for finding the `<text>` in the active phonebook.

`<nlength>`(num)

Maximum length of phone number for "normal" locations. Depending on the storage a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is 2*`<nlength>` digits for normal numbers, but only `<nlength>` digits for numbers saved with `<type>`=209.

`<tlength>`(num)

Maximum length of `<text>` assigned to the telephone number. The value indicated by the test command is given in octets. If `<text>` is given as GSM characters each character corresponds to one octet. If the `<text>` string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM according to GSM 11.11, Annex B [18]. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.

Notes

- 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. See Section 21.1, Restricted access to SIM data after SIM PIN authentication for further detail.
- The search in the dialled calls (DC) phonebook is not supported.

Example

`AT+CPBF=?`	First run the AT+CPBF test command to find out the lengths of <nlength> and <tlength> in the active phonebook.
`+CPBF: 40,16`	EU3-E returns the supported values, where 40 is the maximum length of the phone number and 16 is the maximum length of the associated text.
`AT+CPBF="cha"`	Then use the AT+CPBF write command to find any text string in the phonebook.
`+CPBF:1,"+999999",145,"Charlie"`	

16.3   AT+CPBR   Read from phonebook

AT+CPBR serves to read one or more entries from the phonebook selected with AT command AT+CPBS.

The AT+CPBR test command returns the location range supported by the current phonebook storage, the maximum length of <number> field and the maximum length of <text> field.
Note: Length information may not be available while SIM storage is selected. If storage does not offer format information, the format list contains empty parenthesizes.

The AT+CPBR write command determines the phonebook entry to be displayed with <location1> or a location range from <location1> to <location2>. Hence, if no <location2> is given only the entry at <location1> will be displayed.
If no entries are found at the selected location "+CME ERROR: not found" will be returned.

Syntax

Test Command
AT+CPBR=?
Response(s)
+CPBR: (1-<maxloc>), <nlength>, <tlength>   OK   ERROR   +CME ERROR: <err>

Write Command
AT+CPBR=<location1>[, <location2>]
Response(s)
[+CPBR: <location1>, <number>, <type>, <text>]   [+CPBR: <location2>, <number>, <type>, <text>]   OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07, GSM 11.11

Parameter Description

<location1>(num)

The first (lowest) location number within phonebook memory where to start reading. The maximum range supported by the current phonebook is given in the test command response.
If <location1> exceeds the upper bound <maxloc> (as indicated by the test command), command will respond with "+CME ERROR: invalid index".

<location2>(num)

The last (highest) location number within phonebook memory where to stop reading. The maximum range supported by the current phonebook is given in the test command response.
If both <location1> and <location2> are in the range indicated by the test command parameter <maxloc>, the list of entries will be output and terminated with "OK".
If <location2> exceeds the range indicated by the test command parameter <maxloc>, no list of entries will be shown and the output is terminated with "+CME ERROR: invalid index".

<number>(str)

Phone number in format specified by <type>, it may be an empty string.

<type>(num)

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with ATD<mem><n> is, depending on the network, not always possible (refer to GSM 04.08 subclause 10.5.4.7 for details). See also <type> of AT+CPBW.
Possible values are:

128	Restricted <number> includes unknown type and format.
145	Dialing string <number> includes international access code character '+'.
161	National number <number>. Network support of this type is optional.
177	Network specific number <number>, ISDN format.
209	Dialing string <number> has been saved as ASCII string and includes non-digit characters other than "*", "#", "+" or "p". Note that phonebook entries saved with this type cannot be dialed.
255	Dialing string <number> is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
129	Otherwise.

<text>(str)(+CSCS)

Text assigned to a phone number. The maximum length for this parameter is given with test command response parameter <tlength>.
If using an ASCII terminal characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.7, Supported character sets.

<maxloc>(num)

Maximum location number for the currently selected storage. For phonebooks located on the SIM this value depends on the SIM card type.

<nlength>(num)

Maximum length of phone number for "normal" locations. Depending on the storage a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is 2*<nlength> digits for normal numbers, but only <nlength> digits for numbers saved with <type>=209.

<tlength>(num)

Maximum length of <text> assigned to the telephone number. The value indicated by the test command is given in octets. If <text> is given as GSM characters each character corresponds to one octet. If the <text> string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM according to GSM 11.11, Annex B [18]. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.

Notes

- 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. See Section 21.1, Restricted access to SIM data after SIM PIN authentication for further detail.

- When storing a supplementary service command to the phonebook along with a "+" within the phone number please note that the ME will not display the "+" after restart, but correctly handles the phone number as international type.

- When emergency number ("EN") phonebook is selected by AT+CPBS write command the numbers 911 and 112 must always be output by using AT+CPBR write command. For more details about emergency numbers see notes in ATD dial command.

Example

`AT+CPBR=?`	First run the AT+CPBR test command to find out the maximum range of entries stored in the active phonebook.
`+CPBR: (1-100),20,17`	EU3-E returns the supported values, where 100 is the supported range of location numbers, 20 is the length of the phone number and 17 is the maximum length of the associated text.

`AT+CPBR=1,3`
`+CPBR: 1,"+999999",145,"Charlie"`
`+CPBR: 2,"+777777",145,"Bill"`
`+CPBR: 3,"+888888",145,"Arthur"`
	Then use the AT+CPBR write command to display the phonebook entries sorted by location numbers.

16.4 AT+CPBS Select phonebook memory storage

AT+CPBS selects the active phonebook storage, i.e. the phonebook storage that all subsequent phonebook commands will be operating on.
The read command returns the currently selected <storage>, the number of <used> entries and the <total> number of entries available for this storage. The test command returns all supported <storage>s as compound value.

Syntax

Test Command

AT+CPBS=?

Response(s)

+CPBS: (list of supported <storage>s)
OK
ERROR
+CME ERROR: <err>

Read Command

AT+CPBS?

Response(s)

+CPBS: <storage>, <used>, <total>
OK
ERROR
+CME ERROR: <err>

Exec Command

All records of the "MC", "RC", "DC" and "LD" phonebooks will be deleted.

AT+CPBS

Response(s)

OK
ERROR
+CME ERROR: <err>

Write Command

AT+CPBS=<storage>

Response(s)

OK
ERROR
+CME ERROR: <err>

Write Command

For write access to FD phonebook

AT+CPBS=<storage>, <pin>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM07.07

Parameter Description

<storage>(str)	
"SM"(&F)(P)	SIM phonebook Capacity: depending on SIM card Location: SIM
"DC"	Dialed calls list Capacity: max. 10 entries Location: ME AT+CPBW command is not applicable to this storage.
"FD"	Fixed dialing phonebook Capacity: depending on SIM card Location: SIM
"LD"	Last number dialed phonebook. Stores all call numbers dialed with ATD. Capacity: max. 10 entries, depending on SIM Location: SIM AT+CPBW command is not applicable to this storage.
"MC"	Missed (unanswered received) voice calls list Capacity: max. 10 entries Location: ME AT+CPBW command is not applicable to this storage.
"ME"	Mobile Equipment Phonebook Capacity: max. 250 entries Location: ME
"RC"	Received voice calls list Capacity: max. 10 entries Location: ME AT+CPBW command is not applicable to this storage.
"EN"	Emergency number Capacity: max. 50 entries Location: SIM or ME AT+CPBW command is not applicable to this storage.
"ON"	MSISDN list Capacity: depending on SIM card Location: SIM
"VM"	CPHS voice mailbox phonebook Capacity: 1 or 2 entries, depending on SIM card 1 - Line 1 mailbox 2 - Line 2 mailbox Location: SIM

<used>(num)

Value indicating the number of used locations in selected memory storage.

<total>(num)

Value indicating the maximum number of locations allowed in the selected memory storage.

Notes

- 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. See Section 21.1, Restricted access to SIM data after SIM PIN authentication for further detail.

- To get write access to the "FD" phonebook the following input is required: AT+CPBS="FD","PIN2"

- When using "EN" phonebook the numbers 911 and 112 must always be output by using AT+CPBR write command. For more details about emergency numbers see notes in ATD dial command.

• Missed and received calls which are not presented to the called party are not stored in MC and RC phonebook.

• "LD" phonebook is only supported when corresponding Elementary File is available on SIM or USIM. Elementary Files belonging to "LD" phonebook are optional on SIM respectively USIM.

• If `<tlength>` of the number dialed and stored in the ME phonebook is higher then allowed for the "LD" phonebook then the "LD" phonebook doesn't store this number. In this case, use the "DC" phonebook.

• The `<text>` assigned to a phone `<number>` is stored to the "DC", "LD", "MC" and "RC" phonebooks only if the complete comparison with the number delivered by the network provider is successful.

• When a dial string includes DTMF digits, the DTMF digits are not saved at the "LD" or "DC" phonebook. ABCD can be used as DTMF digits within a `ATD` dial string, but cannot be saved due to BCD limitations.

16.5   AT+CPBW   Write into phonebook

The AT+CPBW write command can be used to create, edit and delete a phonebook entry at a <location> of the active storage selected with AT+CPBS.
If <storage>="FD" (SIM fixed dialing numbers) is selected, PIN2 authentication has to be performed prior to any write access.

The AT+CPBW test command returns the location range supported by the current storage, the maximum length of the <number> field, the range of supported <type> values and the maximum length of the <text> field. Note: The length may not be available while SIM storage is selected. If storage does not offer format information, the format list contains empty parenthesizes.

Syntax

Test Command
AT+CPBW=?
Response(s)
+CPBW: (1-<maxloc>), <nlength>, (list of supported <type>s), <tlength>   OK   ERROR   +CME ERROR: <err>

Write Command
AT+CPBW=[<location>][, <number>[[, <type>][, <text>]]]
Response(s)
OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
+	+	+	-		GSM 07.07, GSM 04.08

Parameter Description

<location>(num)

Location number within phonebook memory. The maximum range supported by each storage type is indicated in the test command response. If <location> is not given, the first free entry will be used.
If <location> is given as the only parameter, the phonebook entry specified by <location> is deleted.

<number>(str)

Phone number in format specified by <type>. Parameter must be present, although it may be an empty string. Alphabetic characters are not permitted. The <number> may contain dialstring modifiers "*", "#", "+" or "p".
If other printable non-alphabetic characters are used the entry needs to be saved with <type>=209. Otherwise, if <type>=209 is not used any non-digit characters other than "*", "#", "+" or "p" will be removed from the string and only accepted modifiers from the GSM alphabet will be saved.
A <number> saved with <type>=209 requires double memory. In order to fit into a standard location, the number needs to be reduced to a maximum length of <nlength>/2, including all digits and dial string modifiers. Extended locations may be used as stated below for <nlength>.

<type>(num)

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with ATD><mem><n> is, depending on the network, not always possible (refer GSM 04.08 subclause 10.5.4.7 for details).
If <type> is not specified the unknown <type>=129 is used. If <number> contains a leading "+" <type>=145 (international) is used.
Supported values are:

128	Restricted <number> includes unknown type and format.
145	Dialing string <number> includes international access code character "+".
161	National number <number>. The network support for this type is optional.
209	Dialing string <number> will be saved as ASCII string. This is the default value, if <type> is not specified explicitly and characters other than "*", "#", "+" or "p" are included in <number>. Note that phonebook entries saved with this type cannot be dialed.
255	Dialing string <number> is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
129	Unknown number. If <type> is unknown and the <number> contains a leading "+", then this sign is removed.

<text>(str)(+CSCS)

Text assigned to the phone number. The maximum length of this parameter is given in the test command response <tlength>. When using an ASCII terminal, characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.7, Supported character sets.

<maxloc>(num)

Maximum number of locations supported by the currently selected storage. For phonebooks located on SIM, this value varies depending on the SIM card. See AT+CPBS for typical values.

<nlength>(num)

Maximum length of phone number for "normal" locations. Depending on the storage, a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is 2*<nlength> digits for normal numbers, but only <nlength> digits for numbers saved with parameter <type>= 209. If all extended locations of the selected phonebook are used up, then any attempt to write a number which requires extended memory will be denied with "+CME ERROR: memory full".

<tlength>(num)

Maximum length of <text> assigned to the telephone number. The value indicated by the test command is given in octets. If the <text> string is given in GSM characters, each character corresponds to one octet. If the <text> string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.
For a detailed description please refer to GSM 11.11, Annex B [18].

Notes

- 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. See Section 21.1, Restricted access to SIM data after SIM PIN authentication for further detail.

- See for more details AT+CPBS select command which phonebook <storage> is possible to write by the user.

- DTMF transmission:
If a dial string contains the call modifier "p" the digits after this call modifier will be saved as DTMF tones. The DTMF tones 'A','B','C' and 'D' can not be saved due to BCD limitations.

Examples

EXAMPLE 1

Make a new phonebook entry at the first free location

```
AT+CPBW=,"+431234567",145,"international"
```

EXAMPLE 2

Delete entry at location 1

```
AT+CPBW=1
```

EXAMPLE 3

The following examples are provided to illustrate the effect of writing phonebook entries with different types
of dial string modifiers in <number>

```
AT+CPBW=5,"12345678",,"Arthur"
AT+CPBW=6,"432!p-765()&54*654#",,"John"
AT+CPBW=7,"432!p-765()&54*654#",129,"Eve"
AT+CPBW=8,"432!p-765()&54*654#",145,"Tom"
AT+CPBW=9,"432!p-765()&54*654#",209,"Richard"
```

EXAMPLE 4

Read phonebook entries from locations 5 - 9 via AT+CPBR

```
+CPBR:5,"12345678",129,"Arthur"
+CPBR:6,"432!p-765()&54*654#",209,"John"
+CPBR:7,"432p76554*654#",129,"Eve"
+CPBR:8,"+432p76554*654#",145,"Tom"
+CPBR:9,"432!p-765()&54*654#",209,"Richard"
```

17. Audio Commands

The AT Commands described in this chapter are related to the EU3-E's audio interface.

17.1 ATL Set monitor speaker loudness

ATL is implemented for V.250ter compatibility reasons only, and has no effect.

Syntax

Exec Command
ATL[<val>]
Response(s)
OK

PIN	MDM	APP	Last
+	+	+	-

Reference(s)
V.250

Parameter Description

<val>(num)

17.2 ATM Set monitor speaker mode

ATM is implemented for V.250ter compatibility reasons only, and has no effect.

Syntax

Exec Command
ATM[<val>]
Response(s)
OK

PIN	MDM	APP	Last
+	+	+	-

Reference(s)
V.250

Parameter Description

<val>(num)

17.3 AT+CMUT Mute control

The AT+CMUT command mutes the microphone input. The command can be used in all audio modes (1 to 6) and during a voice call only. See AT^SNFS for more details on the various audio modes.
During an active call, users should be aware that when they switch back and forth between different audio modes the value of <mute> does change.

Syntax

Test Command
AT+CMUT=?
Response(s)
+CMUT: (list of supported<mute>s)
OK

Read Command
AT+CMUT?
Response(s)
+CMUT: <mute>
OK
ERROR
+CME ERROR: <err>

Write Command
AT+CMUT=<mute>
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

Parameter Description

<mute>(num)

0	Mute off
1	Mute on

Note

• When a voice connection will be established or an other audio mode will be started by AT^SNFS command during an active voice call then mute will be switched off.

17.4 AT+VTS DTMF and tone generation

AT+VTS is intended to send ASCII characters which cause the Mobile Switching Center (MSC) to transmit DTMF tones to a remote subscriber. The command can be used in alert state and during active voice calls and offers the following variants:

- AT+VTS=<dtmf>[,<duration>] allows to send a single DTMF tone. The duration can be indvidually determined during the call.

Syntax

Test Command
AT+VTS=?
Response(s)
+VTS: (list of supported<dtmf>s), (list of supported<duration>s)
OK

Write Command
AT+VTS=<dtmf>[, <duration>]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last		Reference(s)
-	**+**	**+**	**-**		GSM 07.07

Parameter Description

<dtmf>(str)

ASCII character in the set 0...9,#,*, A, B, C, D. The string must be enclosed in quotation marks ("...").

<duration>(num)

Tone duration in 1/10 seconds with tolerance. If not specified the default value (300 ms) is used.

The minimum duration of DTMF signals is 300ms. DTMF tones below 300ms cannot be generated.

1...[3]...255

17.5 AT^SNFI Set microphone path parameters

AT^SNFI controls the microphone settings. Read and write parameters of this command are related to the current audio mode. The write command works only in audio modes 2 to 6 to configure with AT^SNFS. Audio mode 1 is write protected for AT^SNFI.

Syntax

Test Command
AT^SNFI=?
Response(s)
^SNFI: (list of supported <micAmp1>s), (list of supported <micAmp2>s), (list of supported <micTxVol>s)   OK

Read Command
AT^SNFI?
Response(s)
^SNFI: <micAmp1>, <micAmp2>, <micTxVol>   OK   ERROR   +CME ERROR: <err>

Write Command
AT^SNFI=<micAmp1>, <micAmp2>, <micTxVol>
Response(s)
OK   ERROR   +CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<micAmp1>^(num)

First analogue amplifier, 0 dB or +24 dB.

0^(D)	0 dB
1	24 dB

<micAmp2>^(num)

Second analogue amplifier, adjustable in 22 steps of 1.5 dB from -6 dB to +25.5 dB.
(0 = -6 dB, 21 = +25.5 dB, 22 steps of 1.5 dB).

0...21

<micTxVol>^(num)

Multiplication factor for digital gain of uplink speech.
The digital gain has a valid range from -84 dB to +12 dB and can be calculated according to following formula:
Gain = $20 * LOG(<micTxVol> / 16384)$
The value 16384 for <micTxVol> corresponds to unity gain and the value 0 to mute state.

0...65535

Notes

- CAUTION! When you adjust audio parameters avoid exceeding the maximum allowed level. Bear in mind that exposure to excessive levels of noise can cause physical damage to users!
- All audio parameters handled by AT^SNFI and AT^SNFO will be stored volatile for the current audio mode.

17.6   AT^SNFO   Set audio output parameter (loudspeaker path)

AT^SNFO controls the audio output path amplification. The read and write parameters of this commands are related to the current audio mode configured by AT^SNFS. The write command works only in audio modes 2 to 6. Audio mode 1 is write protected for AT^SNFO.

Syntax

Test Command
AT^SNFO=?
Response(s)
^SNFO: (list of supported <cdcRxGain>s) , (list of supported <rxVol>s) , (list of supported <stGain>s) OK

Read Command
AT^SNFO?
Response(s)
^SNFO: <cdcRxGain>, <rxVol>, <stGain> OK ERROR +CME ERROR: <err>

Write Command
AT^SNFO=<cdcRxGain>, <rxVol>, <stGain>
Response(s)
OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<cdcRxGain>(num)

<cdcRxGain> is basis for digital gain of downlink speech for the purpose of speaker or driver sensitivity adjustment. The digital gain has a valid range of resulting gain from -84 dB to +12 dB. The resulting gain has to be calculated according to following formula:
Gain = 20 * LOG (<cdcRxGain> / 16384)
<cdcRxGain> value of 16384 corresponds to unity gain and the value 0 to mute state.

0...65535

<rxVol>(num)

<rxVol> is the speaker volume gain control (digital gain).
There are 42 volume gain levels covering the range from -50 dB to +12 dB which are adjustable in steps of 1.5 dB (-50 dB means mute).
(0 = mute, 1 = -48 dB, 41 = +12 dB, 42 steps of 1.5 dB).

0...41

<stGain>(num)

Multiplication factor for digital gain of the loop-back from speech TX to speech RX path (side tone gain).
The digital gain has a valid range from -96 dB to 0 dB and can be calculated according to following formula:
Gain = 20 * LOG(<stGain> / 16384) - 12 dB
<stGain> value 16384 results in -12 dB of gain and the value 0 in side tone muting.

0...65535

Notes

- CAUTION! When you adjust audio parameters avoid exceeding the maximum allowed level. Bear in mind that exposure to excessive levels of noise can cause physical damage to users!

- All audio parameters handled by AT^SNFI and AT^SNFO will be stored volatile for the current audio mode.

17.7 AT^SNFS   Select audio hardware set

The AT^SNFS write command serves to set the audio mode required for the connected equipment. Each audio mode can be assigned to a specific interface.
The AT^SNFS read command delivers the last configured audio mode.

Syntax

Test Command
AT^SNFS=?
Response(s)
^SNFS: (list of supported <audMode>s) OK

Read Command
AT^SNFS?
Response(s)
^SNFS: <audMode> OK ERROR +CME ERROR: <err>

Write Command
AT^SNFS=<audMode>
Response(s)
OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<audMode>(num)

[1]	Audio mode 1: Standard mode optimized for the reference handset, that can be connected to the analog interface (see "EU3-E Hardware Interface Description" for information on this handset). Note: The default parameters are determined for type approval and are not adjustable with AT commands.
2	Audio mode 2: Customer specific mode. This mode will be used for router applications.
3	Audio mode 3: Customer specific mode. This mode will be used for a user handset.
4	Audio mode 4: Customer specific mode. This mode will be used for a mono-headset.
5	Audio mode 5: Customer specific mode. This mode will be used for a speakerphone.
6	Audio mode 6: Customer specific mode. This mode will be used for a transparent application.

Notes

- Audio mode 1 will be active each time after module is powered up.
- The write command can be used during a voice call to switch back and forth between different modes. This allows the user, for example, to switch handsfree operation (speakerphone) on and off.

17.8   AT^SRTC   Ring tone configuration

The AT^SRTC test command returns a list of ranges for parameter <event>, <number> and <volume>.

The AT^SRTC read command returns the currently set ring tone melody <number> and ring tone volume <volume> for the incoming <event>s voice call, fax call and SMS.

The AT^SRTC write command allows to configure the parameters ring tone melody <number> and ring tone volume <volume> for the ring tone events <event> voice call, fax call and SMS.
The selected parameters are stored in the volatile RAM memory and, thus, need to be selected again after each Power Down.

The AT^SRTC execution command is intended for testing. It starts to test the settings currently selected for incoming fax calls. To stop test playback use AT^SRTC again. During the test it is not possible to change any setting. Stop the test, change the settings and start the test again.

Syntax

Test Command

AT^SRTC=?

Response(s)

^SRTC:(list of supported <event>s) , (list of supported <number>s) , (list of supported <volume>s)
OK

Read Command

AT^SRTC?

Response(s)

^SRTC: 0, <number>, <volume>
^SRTC: 1, <number>, <volume>
^SRTC: 2, <number>, <volume>
OK
ERROR
+CME ERROR: <err>

Exec Command

AT^SRTC

Response(s)

OK
ERROR
+CME ERROR: <err>

Write Command

AT^SRTC=<event>, <number>, <volume>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Reference(s)

Cinterion

Parameter Description

<event>(num)

Ring tone melodies for incoming Voice calls, Fax calls or SMS messages are supported. Melody will be played from the audio output.

0	Ringing alert for incoming Voice calls.
1	Ringing alert for incoming Fax calls.
2	Ringing alert for incoming SMS messages.

<number>(num)

Type or number of ring tone melody. You have a choice of ring tone melody or mute. Ring tone melody will be played from the audio output. <number>=0 is only intended for muting.

0(D)	No ringing alert melody.
1	Melody #1 active.
2	Melody #2 active.
3	Melody #3 active.
4	Melody #4 active.
5	Melody #5 active.
6	Melody #6 active.
7	Melody #7 active.
8	Melody #8 active.
9	Melody #9 active.

<volume>(num)

The volume of ring tone melodies varies from 0 dB to mute.

0(D)	Mute.
1	Volume level 1, set to -12dB.
2	Volume level 2, set to -8dB.
3	Volume level 3, set to -4dB.
4	Volume level 4, set to 0dB.

Note

• The ring tone factory setting are AT^SRTC=0,0,0 (ring tones for incoming voice call is muted), AT^SRTC=1,0,0 (ring tones for incoming fax call is muted) and AT^SRTC=2,0,0 (ring tones for incoming SMS is muted). To activate ring tones please use the write command.
 When the incoming fax call event was configured before with <number>=0 it's possible to mute a running tone (for example during an incoming call) by using the AT^SRTC execution command. Otherwise please call AT^SRTC execution command two times.

18. Hardware related Commands

All AT commands described in this chapter are related to the hardware interface of the EU3-E. Further information regarding this interface is available in the "EU3-E Hardware Interface Description" [2].

18.1 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>

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		GSM 07.07

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 "80/01/06,00:00:00"

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>= "80/01/06,00:00:00" upon next power-up.
- Each time EU3-E is restarted it takes 2s to re-initialize the RTC and to update the current time.

18.2 AT^SLED LED Feature

AT^SLED controls the LED function provided by the SYNC pin of the EU3-E, which acts as an output and can be used to control a connected LED. The electrical specifications of the status pin and advice on how to connect the LED circuit can be found in [2].
The LED indicates EU3-E's operating states as listed below:

Table 18.1: EU3-E Status and Mode Indication via LED

EU3-E Status	<mode>=1	<mode>=2	<mode>=2,<flash>
ME is registered to a network. GSM CS data or voice call or UMTS voice call is in progress.	Permanently on	10 ms on / 990 ms off	<flash> ms on / 990 ms off
ME is registered to a network. GSM PS data (GPRS) transfer or UMTS CS data call is in progress.	Permanently on	10 ms on / 1990 ms off	<flash> ms on / 1990 ms off
ME is registered to a network. No call is in progress. ME is either awake or in power saving state.	Permanently on	10 ms on / 3990 ms off	<flash> ms on / 3990 ms off
ME is in Limited Network Service, e.g. because no SIM/USIM, no PIN or during network search.	500ms on / 500 ms off	500ms on / 500 ms off	500ms on / 500 ms off

Syntax

Test Command
AT^SLED=?
Response(s)
^SLED: (list of supported <mode>s), (range of supported <flash>s)
OK
Read Command
AT^SLED?
Response(s)
^SLED: <mode>[, <flash>]
OK
Write Command
AT^SLED=<mode>[, <flash>]
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

`<mode>`(num)

LED operating mode

0(P)	LED feature is disabled.
1	LED lights steadily when the ME is registered to the network and either awake or in power saving state.
2	LED is flashing when the ME is registered to the network and either awake or in power saving state. The duration of flashing can be configured using the parameter `<flash>`.

`<flash>`(num)

LED flash period

1...10(P)...50	LED flash period (in milliseconds) if `<mode>`=2. LED off-time between flashing is approximately 4 seconds and is not configurable.

18.3 AT^SBV Battery/Supply Voltage

The AT^SBV execute command 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 EU3-E 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. For details on the reference points please refer to the Hardware Interface Description [2].

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>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<value>^(num)

Supply (or battery) voltage in mV

18.4   AT^SCTM   Critical Operating Temperature Monitoring

AT^SCTM allows to monitor the operating temperature range of the EU3-E device. Refer to "EU3-E Hardware Interface Description" [2] 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 EU3-E was switched on. After expiry URC presentation will be disabled, i.e. no URCs will be generated.

URCs indicating levels "2" or "-2" are always enabled, i.e. they will be issued even though the factory setting AT^SCTM=0 was never changed. After URCs of cause "2" or "-2" EU3-E will switch-off within 5 seconds, unless the following occurs (within this period): EU3-E returns to a valid operating temperature level ("1", "0", "-1").
URCs indicating alert levels "1" or "-1" are intended to enable the TA to take appropriate precautions, such as protect EU3-E 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 EU3-E device.
•   The board temperature (in degree Celsius) if parameter <tempCtrl>=1.

Syntax

Test Command
AT^SCTM=?
Response(s)
^SCTM:(list of supported <UrcMode>s)[, (range of <temp>in Celsius)]
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>

PIN	MDM	APP	Last
-	+	+	-

Unsolicited Result Code

URCs will be automatically sent to the TA when the temperature reaches or exceeds the critical level, or when it is back to normal.

^SCTM_B: <UrcCause>
URC for EU3-E device temperature warning.

Parameter Description

<UrcMode>(num)

URC presentation mode. Setting will not be stored during power-down, i.e. after next restart default setting will be restored.

0(P)	Disable URC presentation (except for <UrcCause> equal to -2 or +2).
1	Enable URC presentation.

<UrcCause>(num)

-2	Below lowest temperature limit (causes switch-off after 5 s time)
-1	Below low temperature alert limit
0	Normal operating temperature
1	Above upper temperature alert limit
2	Above uppermost temperature limit (causes switch-off after 5 s time)

<tempCtrl>(num)

0(&F)(P)	Suppress output of <temp> in read command.
1	Output <temp> in test and 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 overtemperature limit.
^SCTM_B: 2	Alert: Module is above overtemperature limit and switches off.
^SCTM_B: -1	Caution: Module close to undertemperature limit.
^SCTM_B: -2	Alert: Module is below undertemperature 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.

18.5   AT^SRADC   Configure and Read ADC Measurement

The AT^SRADC command controls the module's Analog-to-Digital Converter (ADC). The ADC can be used to measure the voltage of external devices connected to the ADC inputs. The AT^SRADC write command configures the parameters required for ADC measurement and returns the measurement result(s). The value(s) can be delivered once on request by using the single measurement mode, or periodically by specifying the measurement interval.

Note that the EU3-E Module uses an unbalanced input with two pins. This requires different pin names as listed below (see also [2]):

• First ADC channel of EU3-E Module: ADC1_IN.
• Second ADC channel of EU3-E Module: ADC2_IN.

Syntax

Test Command

AT^SRADC=?

Response(s)

^SRADC: (list of supported <ch>s), (list of supported <op>s), (list of supported <it>s)
OK

Read Command

AT^SRADC?

Response(s)

^SRADC: <ch>, <op>, <it>
[^SRADC: <ch>, <op>, <it>]
[^SRADC: ...]
OK

Write Command

Single measurement (incl. automatic channel open and close):

AT^SRADC=<ch>

Response(s)

^SRADC: <ch>, <count>, <value>
OK
ERROR
+CME ERROR: <err>

Write Command

Periodic measurement:

AT^SRADC=<ch>, <op>[, <it>]

Response(s)

[^SRADC: <ch>, <count>, <value>]
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Reference(s)

CINTERION

Unsolicited Result Code

ADC measurement URC (only used in periodic measurement mode).

^SRADC: <ch>, <count>, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>]]]]]]]]]]

Parameter Description

<ch>(num)

ADC channel

0	First ADC channel (ADC1_IN)
1	Second ADC channel (ADC2_IN)

<op>(num)

Operation

Open or close ADC channel for measurement.
If parameter is not specified, then single measurement mode is initiated (incl. open and close of channel). Single measurement is not allowed if the channel is already open.

[0]	Close ADC channel (value of parameter <it> is ignored).
1	Open ADC channel

<it>(num)

Measurement interval

Parameter is used only if operation <op> is 1 (Open).

[0]	Single measurement mode (incl. close of channel)
100...30,000	Output interval in ms in periodic measurement mode.

<value>(num)

Measurement value

0...255	Measured raw value of the actual voltage applied at the ADCx_IN input pin in 0,01015625V.
32767	URCs lost

<count>(num)

1...11	Number of measured samples In single measurement mode: <count> is always 1. In periodic measurement mode: <count> is the number of <value>s indicated by the URC "^SRADC". The higher the sample rate set with <it>, the more measured values are reported within the URC "^SRADC".

Note

• If an AT command is input on the same interface where the periodic measurement mode is on, up to 5 "^SRADC" URCs are queued up and sent after AT command completion.
If more than 5 URCs occur before the AT command is completed their measurement values are lost. In this case, an URC with the value "32767" is sent along with the first buffered URCs. See example below.

Examples

EXAMPLE 1

Single measurement

```
AT^SRADC=0                          Open the first ADC channel for single measurement.
^SRADC: 0,1,78
OK
```

EXAMPLE 2

Periodic measurement at low sample rate (5s):

```
AT^SRADC=0,1,5000                          Start periodic measurement mode on the first ADC
^SRADC: 0,1,76                             channel. Samples are taken every 5s. Every 5s the
^SRADC: 0,1,78                             URC "^SRADC" appears to report the measured volt-
^SRADC: 0,1,76                             ages. The second parameter represents the number
                                           of measured samples, in this case only one.
^SRADC: 0,1,76
AT^SRADC=0,0                               Stop the periodic measurement
OK
```

EXAMPLE 3

Periodic measurement at high sample rate (250ms):

```
AT^SRADC=0,1,250                           Start periodic measurement on the first ADC chan-
^SRADC: 0,4,76,76,77,76                    nel. Samples are taken every 250ms. Every second
^SRADC: 0,4,76,76,75,76                    a URC "^SRADC" appears to report the measured
^SRADC: 0,5,77,77,76,76,76                 voltage. The number of samples is 4 or 5.
^SRADC: 0,4,76,76,75,76
AT^SRADC=0,0
OK                                         Stop the periodic measurement
```

EXAMPLE 4

Handling of "^SRADC" URCs and AT command execution on the same interface:

```
AT^SRADC=0,1,250                           Start periodic measurement mode on the first ADC
^SRADC: 0,4,76,76,77,76                    channel. Samples are taken every 250ms.
^SRADC: 0,5,77,77,76,76,76
^SRADC: 0,4,76,76,75,76
^SRADC: 0,4,76,76,75,76
AT^SRADC?                                  Input of AT command and <CR> takes some sec-
                                           onds.
^SRADC: 0,1,250
^SRADC: 1,0,0
OK
^SRADC:                                     some URCs were buffered during command input
0,11,75,75,75,75,75,75,75,75,75,75,75       and sent after completion.
^SRADC: 0,8,75,75,75,75,75,75,75,77
^SRADC: 0,1,75
^SRADC: 0,4,76,76,75,76                     More URCs are delivered.
^SRADC: 0,4,76,76,75,76
^SRADC: 0,5,77,77,76,76,76
^SRADC: 0,4,76,76,77,76
^SRADC: 0,4,76,76,75,76
AT^SRADC?                                  Input of AT command and <CR> takes 90s.
^SRADC: 0,1,250
^SRADC: 1,0,0
OK
^SRADC:                                     some URCs were buffered during command input
0,11,75,75,75,75,75,75,75,75,75,75,75       and sent after completion
^SRADC:
0,11,73,74,73,74,73,73,73,74,74,73,73
^SRADC: 0,11,74,73,74,73,73,73,73,73,73,73,73
^SRADC: 0,11,73,73,74,74,73,73,74,73,73,74,74
^SRADC: 0,11,73,73,73,73,73,73,73,74,74,73,73
^SRADC: 0,8,73,73,74,73,73,73,73,32767      The URC indicates lost measurement results.
^SRADC: 0,4,74,74,73,73                     More URCs are delivered.
^SRADC: 0,4,75,75,75,75
......
```

19. GPIO Commands

This chapter describes the AT commands needed to access and configure the GPIO pins of the EU3-E.

Please also refer to [2] for electrical specifications of the GPIOs.

19.1 AT^SPIO   General Purpose IO Driver Open/Close

The AT^SPIO write command opens and closes the general purpose IO driver. The command must be executed before any other GPIO command can be used. After closing the driver, all pins used (i.e. opened) will be put into high impedance state (inputs) with no internal pull up or down.

The command does not reserve any general purpose IO pin, only the drivers required for GPIO pin management will be loaded.

Syntax

Test Command
AT^SPIO=?
Response(s)
^SPIO:(list of supported <mode>s)
OK

Write Command
AT^SPIO=<mode>
Response(s)
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<mode>(num)

0	Close General purpose IO driver
1	Open General purpose IO driver

19.2   AT^SCPIN   Pin Configuration

The AT^SCPIN write command serves to add (or remove) and configure pins.

Syntax

Test Command
AT^SCPIN=?
Response(s)
^SCPIN:(list of supported <mode>s), (list of supported <pin_id>s), (list of supported <direction>s), (list of supported <startValue>s) OK

Write Command
AT^SCPIN=<mode>, <pin_id>, <direction>[, <startValue>]
Response(s)
OK ERROR +CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<mode>(num)

0	Close pin
1	Open pin

<pin_id>(num)

Pin identifier

0	GPIO1
1	GPIO2
2	GPIO3
3	GPIO4
4	GPIO5
5	GPIO6
6	GPIO7
7	GPIO8
8	GPIO9
9	GPIO10

<direction>(num)

Parameter <direction> is mandatory when opening a pin, but can be omitted when closing a pin

0	Input
1	Output

<startValue>(num)

Can be set only for outputs.

[0]	Low
1	High

Notes

• For closing a pin with the write command (<mode>=0), the parameter <direction> is not needed.

• Before changing the configuration of a pin be sure to close the pin.

19.3   AT^SCPOL   GPIO Polling Configuration

AT^SCPOL write command serves to start and stop polling a pin specified with <io_id>. The pin must already be configured via AT^SCPIN. Polling is only applicable to input pins.
After polling has been activated on a specified pin, all new values related to this pin will be reported via "^SCPOL" URC.

Syntax

Test Command

AT^SCPOL=?

Response(s)

^SCPOL:(list of supported <mode>s), (list of supported <io_id>s)
OK

Write Command

AT^SCPOL=<mode>, <io_id>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Unsolicited Result Code

^SCPOL: <io_id>, <value>

Parameter Description

<mode>(num)

0	Suppress polling
1	Activate polling

<io_id>(num)

This can be either an already configured or an already opened <pin_id>.

<value>(num)

New value on this <io_id>.

0	Low for <pin_id>
1	High for <pin_id>

Notes

*   Pin monitoring is interrupt handled. If a state transition is detected at a configured pin, a debouncing routine will start. The signal state has to stay stable for at least 10 ms to be evaluated.

*   If EU3-E stays in power save (SLEEP) state, a transition at GPIO1 - GPIO8 will not wake up the system. In this case, the interrupt and debouncing will be triggered when the module cyclically suspends power saving. This may result in a delay of up to 5 seconds in an UMTS network and up to 2.7 seconds in a GSM network. However, a state transition at GPIO9 and GPIO10 (<pin_id> 8 and 9) will cause the system to wake up after a short delay of around 7 ms.
    Refer to AT^SCFG, "MeOpMode/PwrSave" parameter <PwrSavePeriod> which allows to fine-tune the EU3-E's power saving behaviour.

19.4   AT^SGIO   Get IO state of a specified pin

Syntax

Test Command

AT^SGIO=?

Response(s)

^SGIO:(list of supported <io_id>s)
OK

Write Command

AT^SGIO=<io_id>

Response(s)

^SGIO: <value>
OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<io_id>(num)

This is an already configured <pin_id>.

<value>(num)

State read on this <io_id>.

0	Low for <pin_id>
1	High for <pin_id>

19.5   AT^SSIO   Set IO state of a specified pin

Syntax

Test Command

AT^SSIO=?

Response(s)

^SSIO:(list of supported <io_id>s), (list of supported <value>s)
OK

Write Command

AT^SSIO=<io_id>, <value>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

Parameter Description

<io_id>(num)

This is an already configured <pin_id>.

<value>(num)

State to be set for this <io_id>.

0	Low for <pin_id>
1	High for <pin_id>

20. Miscellaneous Commands

3/12/10

The AT Commands described in this chapter are related to various areas.

20.1 A/ Repeat previous command line

Syntax

Exec Command
A/
Response(s)

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

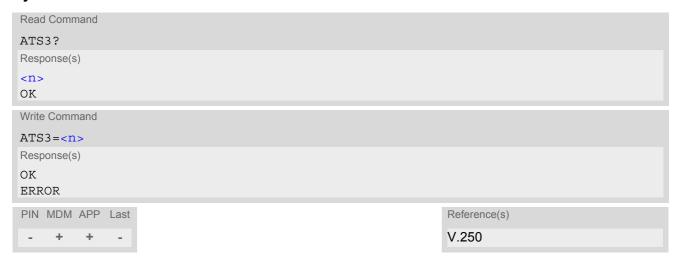### *Command Description*

Repeat previous command line.

Notes

- Line does not need to end with terminating character.
- After beginning with the character "a" or "A" a second character "t", "T" or "/" has to follow. In case of using a wrong second character, it is necessary to start again with character "a" or "A".
- If autobauding is active, the command A/ cannot be used (see AT+IPR).

20.2   ATS3   Set command line termination character

The ATS3 command determines the character recognized by the TA to terminate an incoming command line. It is also generated for result codes and information text, along with the ATS4 parameter.

Syntax

Read Command
ATS3?

Response(s)
<n>
OK

Write Command
ATS3=<n>

Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Parameter Description

<n>(num)

command line termination character

$000...13^{(\&F)(P)}...127$

Note

• Using a value other than the default 13 may cause problems when entering commands.

20.3 ATS4 Set response formatting character

The ATS4 command determines the character generated by the TA for result code and information text, along with the ATS3 parameter .

Syntax

Read Command
ATS4?
Response(s)
<n>
OK

Write Command
ATS4=<n>
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Parameter Description

<n>(num)

response formatting character

000...10(&F)(P)...127

20.4 ATS5 Write command line editing character

Syntax

Read Command
ATS5?
Response(s)
`<n>`
OK

Write Command
ATS5=`<n>`
Response(s)
OK
ERROR

PIN	MDM	APP	Last		Reference(s)
-	+	+	-		V.250

Command Description

This parameter setting determines the character recognized by TA as a request to delete the immediately preceding character from the command line.

Parameter Description

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

command line editing character

$000...8^{(\&F)(P)}...127$

20.5 AT^SFDL Enter Firmware Download Mode

AT^SFDL allows the application manufacturer to download EU3-E firmware into the module by starting the download process from the host application or a customer-designed download program. The download can be performed via the following serial interfaces: USB, ASC0. The firmware download is processed on the same serial interface as AT^SFDL was issued, using the currently selected baud rate (refer AT+IPR).
However, if AT+IPR=0 is set, one of the following two scenarios will occur:

1. A TA bit rate has been detected by the EU3-E autobaud mechanism. Hence, this bit rate will be used for the firmware download.

2. If no bit rate could be detected by the autobaud mechanism 115200 bps will be used.

The EU3-E firmware update file must be available in the *.USF format. It consists of records to be transferred one by one from the host application to the module.

This manual only describes the handling of the AT^SFDL command. All technical requirements and steps to prepare the host application for this download solution can be found in the Application Note "Updating Firmware". An example for developing an appropriate download program is included.

The AT^SFDL execute command causes the module to enter the firmware download mode (this may take some milliseconds). After entering the download mode the module sends the start pattern HEX 0x01 ("ANSWER_OK") to the application to indicate its ready state. Next, the application shall start to send the records of the firmware file. Each record received on the module is acknowledged to the host application. Once all records are successfully received, the module shuts down automatically.

If a valid firmware is still installed, but the AT^SFDL command is issued without sending any firmware afterwards the module will stay in ready state. In this case it must be switched off.

Syntax

Test Command
AT^SFDL=?
Response(s)
OK

Exec Command
AT^SFDL
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	+

21.   Appendix

21.1   Restricted access to SIM data after SIM PIN authentication

The following commands can be used only after data from the SIM have been read successfully 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 use any of the following commands will result in "+CME Error: 14" (SIM busy).

The "^SIND: simstatus" URC enabled with AT^SIND can be used to notify the user when the ME has finished reading the SIM card and SIM data are accessible after SIM PIN authentication.

ø ... AT Command not available
- ... AT command accessible immediately after PIN entry has returned OK
+ ... AT command fully accessible after SIM PIN authentication has been completed

AT Command	Exec	Test	Read	Write
AT+CMGL	**+**	**-**	ø	**+**
AT+CMGR	ø	**-**	ø	**+**
AT+CSCA	ø	**-**	**+**	**+**
AT+CNUM	**+**	**+**	ø	ø
AT+CPBF	ø	**+**	ø	**+**
AT+CPBR	ø	**+**	ø	**+**
AT+CPBS	ø	**+**	**+**	**+**
AT+CPBW	ø	**+**	ø	**+**

21.2 Star-Hash (*#) Network Commands

The following command strings can be sent to the network via ATD and have to be terminated with a semicolon. The command strings are defined with GSM 2.30 [13].

Table 21.1: Star-Hash (*#) Command Overview

Star-Hash Code	Functionality	Response, also refer to Table 21.3
Phone Security		
*#06#	Query IMEI	<IMEI> OK
**04[2]*oldPin[2]*newPin[2]*newPin[2]#	Change SIM pwd	+CME ERROR: <err> / OK
**05[2]*unblKey[2]*newPin[2]*newPin[2]#	Change/Unblocking SIM pwd	+CME ERROR: <err> / OK
[*]03[ZZ]*oldPw*newPw*newPw#	Registration of net password	+CME ERROR: <err> / OK
Phone number presentation		
*#30#	Check status of CLIP (Calling Line Identification Presentation)	+CLIP : <n>,<m> OK (see AT+CLIP)
*#31#	Check status of CLIR (Calling Line Identification Restriction)	+CLIR : <n>,<m> OK (see AT+CLIR)
*31#<Phonenumber>[;]	Suppress CLIR	(see AT+CLIR)
#31#<Phonenumber>[;]	Activate CLIR	(see AT+CLIR)
*#76#	Check status of COLP (Connected Line Identification Presentation)	+COLP : 0,<m> OK (where <m> = active or not active)
*#77#	Check status of COLR (Connected Line Identification Restriction)	+COLR : 0,<m> OK (where <m> = active or not active)
Call forwarding		
(choice of *,#,*#,**,##)21*DN*BS#	Act/deact/int/reg/eras CFU	+CCFC : <status>, <class> [,...] (see: AT+CCFC)
(choice of *,#,*#,**,##)67*DN*BS#	Act/deact/int/reg/eras CF busy	see above
(choice of *,#,*#,**,##)61*DN*BS*T#	Act/deact/int/reg/eras CF no reply	see above
(choice of *,#,*#,**,##)62*DN*BS#	Act/deact/int/reg/eras CF no reach	see above
(choice of *,#,*#,**,##)002*DN*BS*T#	Act/deact/int/reg/eras CF all	see above
(choice of *,#,*#,**,##)004*DN*BS*T#	Act/deact/int/reg/eras CF all cond.	see above
Call waiting		
(choice of *,#,*#)43*BS#	Activation/deactivation/int WAIT	+CCWA : <status>, <class> [,...]. (Refer to AT+CCWA)
Call barring		
(choice of *,#,*#)33*Pw*BS#	Act/deact/int BAOC	+CLCK : <status>, <class> [, ...].(Refer to AT+CLCK)
(choice of *,#,*#)331*Pw*BS#	Act/deact/int BAOIC	see above
(choice of *,#,*#)332*Pw*BS#	Act/deact/int BAOIC exc.home	see above

Star-Hash Code	Functionality	Response, also refer to Table 21.3
(choice of *,#,*#)35*Pw*BS#	Act/deact/int. BAIC	see above
(choice of *,#,*#)351*Pw*BS#	Act/deact/int BAIC roaming	see above
#330*Pw*BS#	Deact. All Barring Services	see above
#333*Pw*BS#	Deact. All Outg.Barring Services	see above
#353*Pw*BS#	Deact. All Inc.Barring Services	see above
Call Hold / Multiparty		
C[C] in call	Call hold and multiparty	+CME ERROR: <err> / OK
USSD messages		
[C]...[C]#	Send USSD message	+CME ERROR: <err> / OK
C[C] (excluded 1[C])	Send USSD message	+CME ERROR: <err> / OK

Table 21.2: Abbreviations of Codes and Parameters used in Table 21.1

Abbreviation	Meaning	Value
ZZ	Type of supplementary services: Barring services All services	 330 Not specified
DN	Dialing number	String of digits 0-9
BS	Basic service equivalent to parameter class: Voice FAX SMS SMS+FAX Data circuit asynchron Data circuit synchron Dedicated PAD access Dedicated Packet access Data circuit asynchron+PAD Data circuit synchron+Packet Data circuit asynchron+synchron+Packet+PAD All Services	 11 13 16 12 25 24 27 26 21 22 20 --
T	Time in seconds	In contrast to AT+CCFC, parameter T has no default value. If T is not specified, an operator defined default or the last known value may be used, depending on the network operator.
PW	Password	--
C	Character of TE character set (e.g. asterisk, hash or digit in case of USSD, or digits in case of held calls or multiparty calls)	--

Table 21.3: Star-Hash Command Response Parameters

Parameter	Meaning
<m>	Mode: 0 = not active, 1 = active
<n>	Unsolicited result code: 0 = presentation disabled, 1 = presentation enabled
<status>	Status: 0 = not active, 1 = active
<class>	Represents BS = basic service, refer to AT+CCFC, AT+CLCK

Parameter	Meaning	
<fac>	Facility lock, refer to AT+CLCK	
<reason>	Call forwarding reason	

For exact specification of format and parameters for Star-Hash commands refer to GSM 02.04, Table 3.2 [12] and GSM 02.30, Annex C [13].

Table 21.4: Star-Hash Commands for Supplementary Services

Star-Hash Code	Abbreviations in Table 21.1	Functionality
*	act	Activate (except for CLIR, see list above)
**	reg	Register and activate
*#	int	Check status (interrogate)
#	deact	Deactivate (except for CLIR, see list above)
##	eras	Unregister and deactivate

21.3 Available AT Commands and Dependency on SIM PIN

ø ... Command not available
- ... Command does not require PIN1
+ ... Command requires PIN1
± ... Command sometimes requires PIN1

Table 21.5: Available AT Commands and Dependency on SIM PIN

AT Command	Exec	Test	Read	Write
Configuration Commands				
AT&F	+	ø	ø	ø
AT&V	-	ø	ø	ø
ATQ	+	ø	ø	ø
ATV	-	ø	ø	ø
ATX	+	ø	ø	ø
ATZ	+	ø	ø	ø
AT+CFUN	ø	-	-	-
AT+CMEE	-	-	-	-
AT+CSCS	ø	+	+	+
AT+GCAP	+	+	ø	ø
AT^SCFG	ø	-	-	-
AT^SDPORT	ø	-	-	-
AT^SMSO	-	-	ø	ø
Status Control Commands				
AT^SIND	ø	-	-	-
AT+CEER	+	+	ø	ø
AT+CPAS	-	-	ø	ø
AT+WS46	ø	-	-	-
Serial Interface Control Commands				
AT\Q	-	ø	ø	ø
AT&C	+	ø	ø	ø
AT&D	+	ø	ø	ø
AT&S	-	ø	ø	ø
ATE	-	ø	ø	ø
AT+IPR	ø	-	-	-
AT+CMUX	ø	-	-	-
AT^SQPORT	-	-	-	ø
Security Commands				
AT+CLCK	ø	+	ø	+
AT+CPIN	ø	-	-	-
AT+CPWD	ø	+	ø	+

AT Command	Exec	Test	Read	Write
AT^SCSL	ø	-	ø	-
Identification Commands				
ATI	±	ø	ø	ø
AT+CGMI	-	-	ø	ø
AT+GMI	-	-	ø	ø
AT+CGMM	-	-	ø	ø
AT+GMM	-	-	ø	ø
AT+CGMR	-	-	ø	ø
AT+GMR	-	-	ø	ø
AT+CGSN	-	-	ø	ø
AT+GSN	-	-	ø	ø
AT+CIMI	+	+	ø	ø
Call related Commands				
ATA	+	ø	ø	ø
ATD	±	ø	ø	ø
ATD><mem><n>	+	ø	ø	ø
ATD><n>	+	ø	ø	ø
ATD><str>	+	ø	ø	ø
ATH	+	ø	ø	ø
AT+CHUP	-	-	ø	ø
AT^SHUP	ø	+	ø	+
ATS0	ø	ø	+	+
ATS6	ø	ø	+	+
ATS7	ø	ø	+	+
ATS8	ø	ø	+	+
ATS10	ø	ø	+	+
ATO	+	ø	ø	ø
+++	-	ø	ø	ø
AT+CLCC	+	+	ø	ø
AT^SLCC	+	+	+	+
AT+CR	ø	+	+	+
AT+CRC	+	+	+	+
AT+CBST	ø	+	+	+
AT+CRLP	ø	+	+	+
ATP	+	ø	ø	ø
ATT	+	ø	ø	ø
AT+ES	ø	-	±	±
AT+ESA	ø	-	+	+
AT+CSTA	ø	+	+	+

AT Command	Exec	Test	Read	Write
Network Service Commands				
AT+COPN	+	+	ø	ø
AT+COPS	+	+	+	+
AT^SOPS	ø	+	ø	ø
AT+CREG	-	-	-	-
AT+CSQ	+	+	ø	ø
AT+CPOL	ø	+	+	+
AT^SMONI	-	-	ø	ø
AT^SMONP	-	-	ø	ø
Supplementary Service Commands				
AT+CACM	ø	+	+	+
AT+CAMM	ø	+	+	+
AT+CAOC	+	+	+	+
AT+CCUG	ø	+	+	+
AT+CCFC	ø	+	ø	+
AT+CCWA	ø	+	+	+
AT+CHLD	ø	+	ø	+
AT+CLIP	ø	+	+	+
AT+CLIR	ø	+	+	+
AT+COLP	ø	+	+	+
AT+CPUC	ø	+	+	+
AT+CSSN	ø	+	+	+
AT+CUSD	ø	+	+	+
GPRS Commands				
AT+CGATT	ø	+	+	+
AT+CGACT	ø	+	+	+
AT+CGDATA	ø	+	ø	+
AT+CGDCONT	ø	+	+	+
AT+CGPADDR	+	+	ø	+
AT+CGQMIN	ø	+	+	+
AT+CGEQMIN	ø	+	+	+
AT+CGREG	ø	+	+	+
AT+CGQREQ	ø	+	+	+
AT+CGEQREQ	ø	+	+	+
AT+CGSMS	ø	+	+	+
ATD*99#	+	ø	ø	ø
AT^SGAUTH	ø	+	+	+
FAX Commands				
AT+FCLASS	ø	+	+	+

AT Command	Exec	Test	Read	Write
AT+FAR	+	+	+	+
AT+FDD	+	+	+	+
AT+FCL	+	+	+	+
AT+FIT	+	+	+	+
AT+FTS	ø	+	ø	+
AT+FRS	ø	+	ø	+
AT+FTM	ø	+	ø	+
AT+FRM	ø	+	ø	+
AT+FTH	ø	+	ø	+
AT+FRH	ø	+	ø	+
Short Message Service (SMS) Commands				
AT+CMGC	ø	+	ø	+
AT+CMGD	ø	+	ø	+
AT+CMGF	ø	+	+	+
AT+CMGL	+	+	ø	+
AT+CMGR	ø	+	ø	+
AT+CMGS	ø	+	ø	+
AT+CMGW	+	+	ø	+
AT+CMMS	ø	+	+	+
AT+CMSS	ø	+	ø	+
AT+CNMA	+	+	ø	+
AT+CNMI	ø	+	+	+
AT+CPMS	ø	+	+	+
AT+CSCA	ø	+	+	+
AT+CSCB	ø	+	+	+
AT+CSDH	ø	+	+	+
AT+CSMP	ø	+	+	+
AT+CSMS	ø	+	+	+
AT^SMGL	+	+	ø	+
Internet Service Commands				
AT^SICS	ø	-	-	-
AT^SISS	ø	-	-	-
AT^SISO	ø	-	-	+
AT^SISC	ø	-	ø	+
AT^SISR	ø	-	ø	+
AT^SISW	ø	-	ø	+
AT^SIST	ø	-	-	-
AT^SISX	ø	+	ø	+
AT^SISE	ø	-	ø	-

AT Command	Exec	Test	Read	Write
SIM related Commands				
AT+CRSM	Ø	-	Ø	-
AT+CSIM	Ø	-	Ø	-
AT^SCKS	Ø	-	-	-
AT^SSET	Ø	-	-	-
SIM Application Toolkit (SAT) Commands				
AT^SSTA	Ø	-	-	-
^SSTN	Ø	Ø	Ø	Ø
AT^SSTGI	Ø	-	-	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTGI	Ø	Ø	Ø	-
AT^SSTR	Ø	-	-	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-

AT Command	Exec	Test	Read	Write
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
AT^SSTR	Ø	Ø	Ø	-
Phonebook Commands				
AT+CNUM	+	+	Ø	Ø
AT+CPBF	Ø	+	Ø	+
AT+CPBR	Ø	+	Ø	+
AT+CPBS	+	+	+	+
AT+CPBW	Ø	+	Ø	+
Audio Commands				
ATL	+	Ø	Ø	Ø
ATM	+	Ø	Ø	Ø
AT+CMUT	Ø	-	-	-
AT+VTS	Ø	-	Ø	-
AT^SNFI	Ø	-	-	-
AT^SNFO	Ø	-	-	-
AT^SNFS	Ø	-	-	-
AT^SRTC	-	-	-	-
Hardware related Commands				
AT+CCLK	Ø	-	-	-
AT^SLED	Ø	-	-	-
AT^SBV	-	-	Ø	Ø
AT^SCTM	Ø	-	-	-
AT^SRADC	Ø	-	-	-
GPIO Commands				
AT^SPIO	Ø	-	Ø	-
AT^SCPIN	Ø	-	Ø	-
AT^SCPOL	Ø	-	Ø	-
AT^SGIO	Ø	-	Ø	-
AT^SSIO	Ø	-	Ø	-
Miscellaneous Commands				
A/	-	Ø	Ø	Ø
ATS3	Ø	Ø	-	-

AT Command	Exec	Test	Read	Write
ATS4	Ø	Ø	-	-
ATS5	Ø	Ø	-	-
AT^SFDL	-	-	Ø	Ø

21.4 Factory Default Settings Restorable with AT&F

Table 21.6: Factory Default Settings Restorable with AT&F

AT Command	Factory Defaults
Configuration Commands	
ATQ	`<n>`=0
ATV	`<value>`=1
ATX	`<value>`=0
AT+CMEE	`<errMode>`=0
AT+CSCS	`<chset>`="IRA"
Serial Interface Control Commands	
AT\Q	`<n>`=3
AT&C	`<value>`=1
AT&D	`<value>`=2
AT&S	`<value>`=0
ATE	`<value>`=1
Call related Commands	
ATS0	`<n>`=000
ATS6	`<n>`=2
ATS8	`<n>`=2
ATS10	`<n>`=014
AT^SLCC	`<n>`=0
AT+CR	`<mode>`=0
AT+CRC	`<mode>`=0
AT+CBST	`<speed>`=0, `<name>`=0, `<ce>`=1
AT+CRLP	`<iws>`=61, `<mws>`=61, `<T1>`=48, `<N2>`=6
Network Service Commands	
AT+COPS	`<format>`=0
AT+CREG	`<n>`=0
Supplementary Service Commands	
AT+CLIP	`<n>`=0
AT+CSSN	`<n>`=0, `<m>`=0
AT+CUSD	`<n>`=0
GPRS Commands	
AT+CGREG	`<n>`=0
FAX Commands	
AT+FCLASS	`<n>`=0

AT Command	Factory Defaults
Short Message Service (SMS) Commands	
AT+CMGF	`<mode>`=0
AT+CNMI	`<mode>`=0, `<mt>`=0, `<bm>`=0, `<ds>`=0, `<bfr>`=1
AT+CSCB	`<operation>`=0
AT+CSDH	`<show>`=0
AT+CSMP	`<dcs>`=0, `<pid>`=0
AT+CSMS	`<service>`=0
SIM related Commands	
AT^SCKS	`<mode>`=0
AT^SSET	`<n>`=0
Phonebook Commands	
AT+CPBS	`<storage>`="SM"
Hardware related Commands	
AT^SCTM	`<tempCtrl>`=0
Miscellaneous Commands	
ATS3	`<n>`=013
ATS4	`<n>`=010
ATS5	`<n>`=008

21.5 Summary of Unsolicited Result Codes (URC)

Table 21.7: Summary of Unsolicited Result Codes (URC)

AT Command	URC
Unsolicited Result Code Presentation	
	^SBC: Undervoltage
	^SBC: Overvoltage Warning
	^SBC: Overvoltage Shutdown
Status Control Commands	
AT^SIND	+CIEV: <indDescr>, <indValue>
AT^SIND	+CIEV: <indDescr>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>
AT^SIND	+CIEV: <indDescr>, <nitzUT>, <nitzTZ>, <nitzDST>
AT^SIND	+CIEV: <indDescr>, <indValue>, <lstaEdvs>, <lstaRssi>
AT^SIND	+CIEV: <indDescr>, <indValue>, <lstaNo>, <lstaMin>, <lstaMax>, <lstaMean>, <lstaVar>
Call related Commands	

AT^SLCC	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>, <Reserved>[, <number>, <type>[, <alpha>]]
	[^SLCC: <idx>, <dir>, <stat>, <mode>, <mpty>, <Reserved>[, <number>, <type>[, <alpha>]]]
	[...]
	^SLCC:

AT+CRC	RING
AT+CRC	+CRING: <type>
Network Service Commands	
AT+CREG	+CREG: <stat>
AT+CREG	+CREG: <stat>[, <lac>, <ci>]
Supplementary Service Commands	
AT+CAOC	+CCCM: <ccm>
AT+CCWA	+CCWA: <calling number>, <type of number>[, <class>], [, <CLI validity>]
AT+CLIP	+CLIP: <number>, <type>, , [, <alpha>][, <CLI validity>]
AT+COLP	+COLP: <number>, <type>[, <sub-number>][, <sub-type>][, <alpha>]
AT+CSSN	+CSSI: <code 1>
AT+CSSN	+CSSU: <code 2>
AT+CUSD	+CUSD: <m>[, <str_urc>[, <dcs>]]
GPRS Commands	
AT+CGREG	+CGREG: <stat>

AT Command	URC
Short Message Service (SMS) Commands	
AT+CNMI	+CMTI: \<mem3\>, \<index\>
AT+CNMI	+CMT: \<length\>**\<CR\>\<LF\>**\<pdu\>
AT+CNMI	+CMT: \<oa\>, \<scts\>[, \<tooa\>, \<fo\>, \<pid\>, \<dcs\>, \<sca\>, \<tosca\>, \<length\>]**\<CR\>\<LF\>**\<data\>
AT+CNMI	+CBM: \<length\>**\<CR\>\<LF\>**\<pdu\>
AT+CNMI	+CBM: \<sn\>, \<mid\>, \<dcs\>, \<page\>, \<pages\>**\<CR\>\<LF\>**\<data\>
AT+CNMI	+CDS: \<length\>**\<CR\>\<LF\>**\<pdu\>
AT+CNMI	+CDS: \<fo\>, \<mr\>[, \<ra\>][, \<tora\>], \<scts\>, \<dt\>, \<st\>
AT+CNMI	+CDSI: \<mem3\>, \<index\>
Internet Service Commands	
AT^SISR	^SISR: \<srvProfileId\>, \<urcCauseId\>
AT^SISW	^SISW: \<srvProfileId\>, \<urcCauseId\>
Internet Service URC	^SIS: \<id\>, \<urcCause\>[, [\<urcInfoId\>][, \<urcInfoText\>]]
SIM related Commands	
AT^SCKS	^SCKS: \<SimStatus\>
AT^SCKS	^SCRD: \<MCC\>
AT^SSET	^SSIM READY
SIM Application Toolkit (SAT) Commands	
^SSTN	^SSTN: \<cmdType\>
^SSTN	^SSTN: \<cmdTerminateValue\>
^SSTN	^SSTN: 254
^SSTN	^SSTN: 255
Hardware related Commands	
AT^SCTM	^SCTM_B: \<UrcCause\>
AT^SRADC	^SRADC: \<ch\>, \<count\>, \<value\>[, \<value\>[, \<value\>[, \<value\>[, \<value\>[, \<value\>[, \<value\>[, \<value\>[, \<value\>[, \<value\>[, \<value\>]]]]]]]]]]
GPIO Commands	
AT^SCPOL	^SCPOL: \<io_id\>, \<value\>

21.6 AT Commands Supported Only on the Modem Interface

Table 21.8: AT Commands Supported Only on the Modem Interface

AT Command
Serial Interface Control Commands
AT&C
AT&D
AT&S
AT+CMUX
Call related Commands
ATH
ATO
+++
GPRS Commands
AT+CGDATA
ATD*99#
FAX Commands
AT+FTM
AT+FRM
AT+FTH
AT+FRH

21.7 Alphabetical List of AT Commands

Table 21.9: Alphabetical List of AT Commands

AT Command	Description	Section and Page
+++	Switch from data mode to command mode	Section 7.15, page 111
^SSTN	SAT Notification	Section 15.5, page 289
A/	Repeat previous command line	Section 20.1, page 386
AT&C	Set Data Carrier Detect (DCD) line mode	Section 4.2, page 67
AT&D	Set Data Terminal Ready (DTR) line mode	Section 4.3, page 68
AT&F	Set all current parameters to manufacturer defaults	Section 2.1, page 27
AT&S	Set Data Set Ready (DSR) line mode	Section 4.4, page 69
AT&V	Display current Configuration	Section 2.2, page 28
AT+CACM	Accumulated call meter (ACM) reset or query	Section 9.1, page 147
AT+CAMM	Accumulated call meter maximum (ACMmax) set or query	Section 9.2, page 148
AT+CAOC	Advice of Charge information	Section 9.3, page 149
AT+CBST	Select bearer service type	Section 7.20, page 120
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