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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
ELS62-W *Revision 02.200*

Before using the ELS62-W or upgrading to a new firmware version please read the latest product information provided in "[ELS62-W Release Notes, Revision 02.200](#)".

DISCLAIMER:

AT commands or parameters not documented in this document are subject to change and reserved for future use. Telit Cinterion Deutschland GmbH reserves the right to modify or even eliminate these options in later releases.



1.2 Related documents

- [1] ELS62-W Release Notes, Revision 02.200
- [2] ELS62-W Hardware Interface Description, Revision 02.200
- [3] User's Guide: Getting Started with ELS62-W
- [4] Application Note 16: Updating ELS62-W Firmware
- [5] Application Note 39: USB Interface Description for ELS62-W
- [6] Application Note 62: Transport Layer Security for Client TCP/IP Services
- [7] MPSS.AT LTE RF Software Overview
- [8] Controlling Rx Chains on LTE
- [9] [3GPP TR 21.905](#) (descendant of 3GPP TR 01.04): Vocabulary for 3GPP Specifications
- [10] [3GPP TS 27.010](#) (descendant of 3GPP TS 07.10): Terminal Equipment to User Equipment (TE-UE) multiplexer protocol
- [11] International Organization for Standardization (ISO): [ISO/IEC 10646](#): Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane. This international standard is [closely related](#) to the [Unicode Standard](#) published by the [Unicode Consortium](#)
- [12] The [Unicode Consortium](#): [Mapping of ETSI GSM 03.38 7-bit default alphabet characters into Unicode \[TXT!\]](#)
- [13] [ITU-T V.24](#) List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)
- [14] [ITU-T V.250](#) Serial asynchronous automatic dialling and control
- [15] [3GPP TS 11.11](#): Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
- [16] [3GPP TS 31.101](#): UICC-terminal interface; Physical and logical characteristics
- [17] [3GPP TS 31.102](#): Characteristics of the Universal Subscriber Identity Module (USIM) application
- [18] [ETSI TS 102 221](#): Smart Cards; UICC-Terminal interface; Physical and logical characteristics
- [19] [3GPP TS 11.14](#): Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
- [20] [3GPP TS 31.111](#): Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)
- [21] [ETSI TS 102 223](#): Smart Cards; Card Application Toolkit (CAT)
- [22] [3GPP TS 31.124](#): Mobile Equipment (ME) conformance test specification - Universal Subscriber Identity Module Application Toolkit (USAT) conformance test specification
- [23] [3GPP TS 22.002](#) (descendant of 3GPP TS 22.02): Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)
- [24] [3GPP TS 22.004](#) (descendant of 3GPP TS 02.04): General on supplementary services
- [25] [3GPP TS 22.030](#) (descendant of 3GPP TS 02.30): Man-Machine Interface (MMI) of the Mobile Station (MS)
- [26] [3GPP TS 22.060](#) (descendant of 3GPP TS 02.60): General Packet Radio Service (GPRS); Service description; Stage 1
- [27] [3GPP TS 23.060](#) (descendant of 3GPP TS 03.60): General Packet Radio Service (GPRS); Service description; Stage 2
- [28] [3GPP TS 22.081](#) (descendant of 3GPP TS 02.81): Line Identification Supplementary Services; Stage 1
- [29] [3GPP TS 22.082](#) (descendant of 3GPP TS 02.82): Call Forwarding (CF) Supplementary Services; Stage 1
- [30] [3GPP TS 22.083](#) (descendant of 3GPP TS 02.83): Call Waiting (CW) and Call Holding (HOLD); Supplementary Services; Stage 1
- [31] [3GPP TS 22.085](#) (descendant of 3GPP TS 02.85): Closed User Group (CUG) supplementary services; Stage 1
- [32] [3GPP TS 22.088](#) (descendant of 3GPP TS 02.88): Call Barring (CB) supplementary services; Stage 1
- [33] [3GPP TS 22.090](#) (descendant of 3GPP TS 02.90): Unstructured Supplementary Service Data (USSD); Stage 1
- [34] [3GPP TS 23.038](#) (descendant of 3GPP TS 03.38): Alphabets and language specific information



- [35] [3GPP TS 23.040](#) (descendant of 3GPP TS 03.40): Technical realization of the Short Message Service (SMS)
- [36] [3GPP TS 23.041](#) (descendant of 3GPP TS 03.41): Technical realization of Cell Broadcast Service (CBS)
- [37] [3GPP TS 23.107](#): Quality of Service (QoS) concept and architecture
- [38] [3GPP TS 24.011](#) (descendant of 3GPP TS 04.11): Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface
- [39] [3GPP TS 24.008](#) (descendant of 3GPP TS 04.08): Mobile radio interface Layer 3 specification; Core network protocols; Stage 3
- [40] [3GPP TS 24.080](#) (descendant of 3GPP TS 04.80): Mobile radio interface layer 3 supplementary services specification; Formats and coding
- [41] [3GPP TS 24.301](#) Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS)
- [42] [3GPP TS 25.133](#) Requirements for support of radio resource management
- [43] [3GPP TS 25.304](#) User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode
- [44] [3GPP TS 27.005](#) (descendant of 3GPP TS 07.05): Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
- [45] [3GPP TS 27.007](#) (descendant of 3GPP TS 07.07): AT command set for User Equipment (UE)
- [46] [3GPP TS 27.060](#) (descendant of 3GPP TS 07.60): Mobile Station (MS) supporting Packet Switched Services
- [47] [3GPP TS 45.008](#) (descendant of GSM 05.08): Radio subsystem link control
- [48] [3GPP TS 36.101](#) Evolved Universal Terrestrial Radio Access (E-UTRA)
- [49] [3GPP TS 36.133](#) Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management
- [50] [Documents posted on website of USB Implementers Forum](#)
- [51] [USB Language Identifiers \(LANGIDs\) \[.PDF!\]](#)
- [52] USB Class Definitions for Communication Devices, Version 1.1 January 19, 1999

1.3 Document Conventions

Throughout this document ELS62-W is also referred to as GSM/LTE Engine or short UE, ME (Mobile Engine), MS (Mobile Station) or Mobile Terminal (MT). In related documents the equivalent term DCE (Data Communication Equipment) may be found.

AT Commands are used to control the ELS62-W. The controlling device is referred to as Customer Application or short TE. Related documents may use the equivalent term DTE (Data Terminal Equipment).

All abbreviations and acronyms used throughout this document are based on GSM or 3GPP specifications. For additional definitions please refer to 3GPP TR 21.905 [9].

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 20.2, Available AT Commands and Dependency on SIM PIN uses the same symbols.
→	Is the AT command supported in AIRPLANE mode?
+	Yes
-	No
±	In AIRPLANE mode, not all described functions are available. For example, the test or read command is usable, the write or execute command is not. Furthermore, only some of the listed parameters can be changed in AIRPLANE mode. A typical example is AT^SCFG that controls different features.
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	→	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.
<param> ^(text)	Parameter value is a string according to selected character set. Not enclosed in double quotes.
<param> ^(u)	Unspecified, i.e. parameter value may be numeric or string type.

Table 1.2: Symbols used to indicate storage options or correlations with other commands

Parameter option	Meaning
<param> ^(+CSCS)	Parameter value has to be (is) coded according to current setting of <charSet> (see AT+CSCS for details)
<param> ^(&W)	Parameter value is stored to user profile in non-volatile memory after executing AT&W
<param> ^(&V)	Parameter value is displayed by AT&V
<param> ^(NV)	Parameter is stored in non-volatile memory.

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

Value option	Meaning
[x]	Default value set if parameter is omitted.
x ^(&F)	Factory value restored by AT&F
x ^(P)	Powerup value of a parameter not stored in non-volatile memory.
x ^(D)	Delivery value of a parameter which may be overridden from non-volatile setting (refer to symbol ^(NV) and symbol ^(&W) above).



1.4 AT Command Interpreter

ELS62-W features several AT command ports mapped to

- the USB Modem (AT command port 1),
- the USB serial ports 1 - 2 (AT command ports 2 - 3)
- the serial interfaces ASC0 and ASC1 (AT command port 4 - 5).

If Multiplex mode is enabled, the number of AT command ports is extended. For more details, see [AT+CMUX](#).

All AT command ports are independent and do not share configuration settings if not stated otherwise.

The AT command scanner has a 30s timeout. If after AT command input started the scanner does not receive the next character within 30s current AT command input is terminated with "ERROR". This will free the AT command port, and URCs will not be blocked any longer. Any received character will restart the 30s timeout. The timer is stopped when AT command input is finished (command line termination character detected). So to avoid the timeout error just send at least 1 character every 29s until you send the finishing command line termination character.

If the AT parser detects an unknown AT command it will return "+CME ERROR: unknown".

Please note, that not all of the AT commands, which are described as mandatory in ITU-T V.250 [14], are implemented but only the ones described in this specification.

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 test response returns supported parameters and supported values. Values can be shown as a list of single values or a range, for example, (1,2,3) or (1-3).
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 UE.

1.5.1 Using Parameters

- Parameters are separated by commas.
Please note that throughout this document spaces behind commas may be added for better readability.
- Optional parameters are enclosed in square brackets. If optional parameters are omitted and no default value is explicitly specified, then 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 command string it must be replaced by a comma.
- A parameter value enclosed in square brackets represents the value that will be used if an optional parameter is omitted.
- 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 ITU-T V.250 command is omitted, its value is assumed to be 0.
- Hexadecimal numeric parameters consist of a sequence of one or more of the characters "0" through "9", inclusive, and "A" through "F" inclusive. The characters "A" through "F" represent the equivalent decimal values 10 through 15. A leading "0x" is not allowed.

1.5.2 Concatenating AT Commands

Concatenating AT commands on the same line is possible, though not recommended because of restrictions listed below (for more details see ITU-T V.250 [14]).

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

Disadvantages and restrictions:

- There is no way to control the minimum time to wait between finishing an AT command and sending the next one. Please refer to Section 1.6, [Communication between Customer Application and ELS62-W](#) for details about timing.
- The sequence of processing the AT commands may be different from the sequential order of command input.
- Many AT commands cannot be concatenated (see list below). Concatenating these commands might end up



with an error result code, or leads to an unexpected order of responses.

AT command type	Comment
3GPP TS 27.007 commands	Cannot be concatenated with extended commands (prefix AT^S)
3GPP TS 27.005 commands (SMS)	To be used standalone
Commands starting with AT&	To be used standalone
AT+IPR	To be used standalone

1.6 Communication between Customer Application and ELS62-W

After power-up or restart ensure that the UE is in ready state before trying to send any AT command or data. For detailed information on timing conditions, signal states and particularly the startup behavior of the ELS62-W's signal lines refer to ["ELS62-W Hardware Interface Description, Revision 02.200"](#).

Leaving hardware flow control unconsidered the Customer Application (TE) is coupled with the ELS62-W (UE) 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 and the ELS62-W 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 ELS62-W the opportunity to the transmission of pending URCs and get necessary service.
- The TE shall communicate with the ELS62-W using activated echo ([ATE1](#)), i.e. the ELS62-W 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 ELS62-W 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 "ð" character in GSM character string parameters.
- If command echo is enabled ([ATE1](#)) Backspace may cause 08 - 32 - 08 (decimal) character sequence or no echo, depending on serial interface and speed of character input.

Software flow control:

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

1.7 Supported character sets

ELS62-W supports two character sets: *GSM 7 bit*, also referred to as GSM alphabet or SMS alphabet (3GPP TS 23.038 [34]) and *UCS216 bit* (ISO-10646 [11]). See [AT+CSCS](#) for information about selecting the character set. Character tables can be found below.

Explanation of terms

- **Escape Character**
There are two types of escape sequences which lead to an alternative interpretation on subsequent characters by the UE:
 - **AT command interface**
Escape sequences starting with character value 0x5C are used for the UE's non-UCS2 input and output.
 - **GSM 7 bit default alphabet**
The escape sequence used within a text coded in the GSM 7 bit default alphabet is starting with character value 0x1B and needs to be correctly interpreted by the TE, both for character input and output. To the ELS62-W, an escape sequence appears like any other byte received or sent.

For SMS user data input after the prompt '>' in text mode ([AT+CMGF](#))=1 and [AT+CSCS](#)="GSM" the character 0x1A is interpreted as 'CTRL-Z'. The character 0x1B (interpreted as 'ESC') as well as the escape character 0x5C (is interpreted as 'Ö'), therefore both escape mechanisms are not supported in this case.
- **TE Character Set**
The character set currently used by the Customer Application is selected with [AT+CSCS](#). It is recommended to select UCS2 setting.
- **Data Coding Scheme (DCS)**
DCS is part of a short message and is saved on the SIM. When writing a short message to the SIM in text mode, the DCS stored with [AT+CSMP](#) is used and determines the coded character set.
- **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).

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

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

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

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

Note:

The UE also uses escape sequences for its non-UCS2 output: Quotation mark (") and the escape character itself (\, respectively Ö in GSM alphabet) are converted, as well as all characters with a value below 32 (hexadecimal 0x20).

Hence, the input parser of the Customer Application needs to be able to translate escape sequences back to the corresponding character of the currently used alphabet.

Unsupported characters are shown as a space (hexadecimal 0x20).



Table 1.5: Exemplary escape sequences generated by ELS62-W for its non-UCS2 output

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

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

To prevent misinterpretation of control characters or special characters it is recommended to always use UCS2 alphabet and PDU mode.



1.7.1 GSM alphabet tables and UCS2 character values

This section provides tables for the GSM default alphabet (3GPP TS 23.038 [34]) supported by the ELS62-W. Below any GSM character find the corresponding two byte character value of the UCS2 alphabet. For details refer to "ETSI GSM 03.38 mapping into Unicode" [12].

Main character table of GSM 7 bit default 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	i 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	ξ 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	Ş 00A7	o 006F	à 00E0

Figure 1.1: Main character table of GSM 7 bit default 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 for further details on using backspace and "ð" character.



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

Figure 1.2: Extension character table of GSM 7 bit default alphabet

- 1) This code value is reserved for the extension to another extension table. On receipt of this code, a receiving entity shall display a space until another extension table is defined.
- 2) This code represents the EURO currency symbol. The code value is the one used for the character 'e'. Therefore a receiving entity which is incapable of displaying the EURO currency symbol will display the character 'e' instead.
- 3) This code is defined as a Page Break character and may be used for example in compressed CBS messages. Any mobile which does not understand the 7 bit default alphabet table extension mechanism will treat this character as Line Feed.



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

1.7.2 UCS2 and GSM character coding and conversion

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

1.7.2.1 Output of SIM data (UE 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 UCS2 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 Input of SIM data (TE to UE)

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 UE as GSM character (or ASCII with standard terminal emulation, e.g. Hyper-terminal®).

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 `<dc>` of `AT+CSMP` (add 64).

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

Case 2

Every data byte is sent as 2 IRA characters.

Maximum text length is 280 IRA characters which will be converted into 140 bytes SMS binary user data

Example: "C8" typed is sent as 43'H, 38'H → stored as C8'H

Case 3

Every 16-bit value is sent as 4 IRA characters.

Maximum text length is 280 IRA characters which will be converted into 70 UCS2 characters (16-bit each)

Number of IRA characters must be a multiple of four because always 4 half bytes are needed for a 16-bit value

Example: "D2C8" typed is sent as 44'H, 32'H, 43'H, 38'H → stored as D2C8'H

Case 4

Every GSM character is sent as 4 IRA characters representing one UCS2 character.

Example: To store text "ABC" using UCS2 character set you have to type "004100420043".

This is sent as 30'H,30'H,34'H,31'H, 30'H,30'H,34'H,32'H, 30'H,30'H,34'H,33'H → detected as IRA representation of 3 UCS2 characters, converted to GSM character set and stored as 41'H, 42'H, 43'H.

Maximum input is 640 IRA characters representing 160 UCS2 characters when compression is active. These are converted to 160 GSM 7-bit characters.

Without compression only 140 GSM characters can be stored which are put in as 560 IRA characters.

Values of UCS2 characters must be smaller than 80'H (128 decimal) to be valid GSM characters.

Number of IRA characters must be a multiple of four. Problems:

- "41" → Error, there are four IRA characters (two bytes) needed
- "0000" → Error, not an UCS2 character
- "4142" → Error, value of UCS2 character > 7F'H
- "008B" → Error, value of UCS2 character > 7F'H

This affects the maximum input length of a string)

Case 5

Every UCS2 character is sent as 4 IRA characters and is converted into two 8-bit values. This means that the first two characters have to be '00'.

Example: UCS2 character 009F'H typed as "009F" is sent as 30'H,30'H,39'H,46'H → converted into 8-bit value 9F'H.

Maximum number of UCS2 characters is 140 which are represented by 560 IRA characters. Number of IRA characters must be a multiple of four.

Case 6

Every UCS2 character is sent as 4 IRA characters each and is converted into a 16-bit value again.

Example: UCS2 character 9F3A'H typed as "9F3A" is sent as 39'H,46'H,33'H,41'H → converted into 9F3A'H.

Maximum number of UCS2 characters is 70 which are represented by 280 IRA characters. Number of IRA characters must be a multiple of four.

Invalid UCS2 values must be prevented.



1.8 Unsolicited Result Code Presentation

URC stands for Unsolicited Result Code and is a report message issued by the ELS62-W 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 UE needs to be configured whether or not to send a URC. Such URCs will be sent only on the AT channels for which they were enabled. Descriptions of these URCs are provided with the associated AT command.

Some URCs are not user definable and will be sent on all AT channels. These URCs are described in Section 1.8.1, [Common URCs](#).

A summary of all URCs can be found in Section 20.6, [Summary of Unsolicited Result Codes \(URC\)](#).

1.8.1 Common URCs

This section lists URCs that cannot be disabled by the user and appear automatically when the required conditions described below occur.

- "RING"
- "NO CARRIER"
- "^SYSSTART"
- "^SYSSTART AIRPLANE MODE"
- Voltage Monitoring:
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.
 - "^SBC: Undervoltage Warning"
 - "^SBC: Undervoltage Shutdown"
 - "^SBC: Overvoltage Warning"
 - "^SBC: Overvoltage Shutdown"
- "^SHUTDOWN"
- "^SYSLOADING START"
- "^SYSLOADING FINISHED"

URC 1

RING

Indicates incoming call to the TE.

URC 2

NO CARRIER

Indicates end of call to the TE if call was released from remote party and call dialing command was already finished by any final command response.

URC 3

^SBC: Undervoltage Warning

Supply voltage is close to the defined undervoltage threshold.

URC 4

^SBC: Undervoltage Shutdown

Undervoltage threshold exceeded. Module switches off within 5 seconds after sending the URC.

URC 5

`^SBC: Overvoltage Warning`

Supply voltage is close to overvoltage threshold. The URC is sent once.

URC 6

`^SBC: Overvoltage Shutdown`

Overvoltage threshold exceeded. Module switches off within 5 seconds after sending the URC.

URC 7

`^SHUTDOWN`

Indicates that the power-off procedure is finished and the module will be switched off in less than 1 second. In case of Fast Shutdown the "`^SHUTDOWN`" URC will not be issued.

URC 8

`^SYSLOADING START`

Indicates that the JAM (Java application manager) is started and the existing applications will be started soon.

URC 9

`^SYSLOADING FINISHED`

Indicates that the JAM is ready and the installed application is up and ready to use.



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 [2.9.1](#), [CME/CMS Error Code Overview](#)
- Section [2.5.1](#), [Verbose and numeric result codes](#)
- Section [3.1](#), [AT+CEER](#)

2. Configuration Commands

The AT Commands described in this chapter allow the external application to determine the ELS62-W's behaviour under various conditions.

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

[AT&F](#) resets AT command settings to their factory default values. [AT&W](#) shall be used to retain these values effective for next power-up.

However, the command does not change the current bit rate of ELS62-W's asynchronous serial interface (UART).

For a list of affected parameters refer to Section [20.5, Factory Default Settings Restorable with AT&F](#).

Syntax

Exec Command					
AT&F[<value>]					
Response(s)					
OK					
PIN	→	Last	Reference(s)		
-	+	-	ITU-T V.250 [14]		

Parameter Description

<value> ^(num)	
[0]	Reset parameters in Section 20.5, Factory Default Settings Restorable with AT&F to their factory default values.



2.2 AT&V Display current Configuration

[AT&V](#) returns the setting of several AT command parameters applicable to the current operating mode, including the single-letter AT command parameters which are not readable otherwise.
The response of [AT&V](#) varies depending on whether or not PIN authentication has been done.

Syntax

Exec Command

AT&V

Response(s)

ACTIVE PROFILE:
... (see Section 2.2.1, [AT&V Response](#))
OK

PIN  Last

- + -

2.2.1 AT&V Response

Table 2.1: AT&V Response

PIN authentication done	No PIN authentication
ACTIVE PROFILE: E1 Q0 V1 S3: 013 S4: 010 S5: 008 +CMEE: 0 &S: 0 &C: 1 &D: 2 +CREG: 0 +CNMI: 1,0,0,0,0 \Q: 3 S0: 000 +IPR: 115200 +ICF: 3 +CSDH: 0 +CMGF: 0 +CRC: 0 +CSMS: 0,1,1,1 +CGSMS: 3 +CLIP: 0 +COPS: 0[,<format>,<opName>,<rat>] ^SCKS: 0 ^SSET: 0 ^SLED: 0 OK	ACTIVE PROFILE: E1 Q0 V1 S3: 013 S4: 010 S5: 008 +CMEE: 0 &S: 0 &C: 1 &D: 2 +CREG: 0 \Q: 3 S0: 000 +IPR: 115200 +ICF: 3 ^SCKS: 0 ^SSET: 0 ^SLED: 0 OK



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

[AT&W](#) stores the current AT command settings to a user defined profile in non-volatile memory of ELS62-W. The AT command settings will automatically be restored from the user defined profile during power-up or if [ATZ](#) is used. [AT&F](#) restores AT command factory default settings. Hence, until first use of [AT&W](#), [ATZ](#) works as [AT&F](#). A list of parameters stored to the user profile can be found at [Section 20.4, AT Command Settings storable with AT&W](#).

Syntax

Exec Command		
AT&W[<value>]		
Response(s)		
OK		
ERROR		
+CME ERROR: <err>		
PIN	✈	Last
-	+	-
Reference(s)		V.250

Parameter Description

<value> ^(num)	
[0]	User Profile Number



2.4 ATQ Result Code Presentation Mode

ATQ controls if the ELS62-W 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	→	Last
-	+	-
		Reference(s)
		V.250

Parameter Description

<n> (num)(&V)(&W)	
Result Code Presentation Mode. It is not recommended to change this value.	
[0] (&F)(D)	UE transmits result code.
1	Result codes are suppressed and not transmitted.



2.5 ATV Result code format mode

This command determines the contents of header and trailer transmitted with AT command result codes and information responses. Possible responses are described in Section 2.5.1, [Verbose and numeric result codes](#). Please note, that ATV does not affect numeric or verbose +CME ERROR responses. This means that if [AT+CMEE](#) parameter `<errMode>` is set to 1 or 2 and a command returns a CME or CMS error, then it is always printed verbose. A numeric result code is printed only if `ATV0` and `AT+CMEE=0` is set.

Syntax

Exec Command	
ATV[<value>]	
Response(s)	
OK	
ERROR	
PIN → Last	Reference(s)
- + -	ITU-T V.250 [14]

Parameter Description

<value> ^{(num)(&V)(&W)}	
[0]	Information response: <code><text><CR><LF></code> Short result code format: <code><numeric code><CR></code>
1 ^{(&F)(D)}	Information response: <code><CR><LF><text><CR><LF></code> Long result code format: <code><CR><LF><verbose code><CR><LF></code>

2.5.1 Verbose and numeric result codes

Verbose format	Numeric format	Meaning
OK	0	command executed, no errors
CONNECT	1	link established
RING	2	ring detected
NO CARRIER	3	link not established or disconnected
ERROR	4	invalid command or command line too long
NO DIALTONE	6	no dial tone, dialling impossible, wrong mode
BUSY	7	remote station busy
NO ANSWER	8	no answer
CONNECT 9600	49	link with 9600 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



2.6 ATZ Restore AT Command Settings from User Defined Profile

First [ATZ](#) resets the AT command settings to their factory default values, similar to [AT&F](#). Afterwards the AT command settings are restored from a user defined profile in non-volatile memory of ELS62-W, if one was stored with [AT&W](#) before. Any additional AT command on the same command line may be ignored. A delay of 300 ms is required before next AT command is sent.

However, [ATZ](#) does not change the current bit rate of ELS62-W's asynchronous serial interface (UART). [ATZ](#) does not change the PDP context profiles.

Syntax

Exec Command			
ATZ[<value>]			
Response(s)			
OK			
PIN	→	Last	Reference(s)
+	+	-	V.250

Parameter Description

<value> ^(num)	
[0]	User Profile Number



2.7 AT+CFUN ELS62-W Functionality Level

AT+CFUN controls ELS62-W functionality levels "Normal Functionality Mode" and "Airplane Mode".
AT+CFUN can also be used to reset the UE.

In pure Airplane Mode (**AT+CFUN** parameter `<fun>=4`) the UE shuts down its radio interface (PA and receiver), what causes the UE to log off from network and disables AT commands whose execution requires a radio connection. In extended Airplane Mode (`<fun>=0`) the UE shuts down its radio and USIM interfaces. The benefit of using Airplane Modes is that they allow to save power and, at locations where no RF emission is allowed (typically airplanes, hospitals etc.), the subscriber can continue network-independent activities rather than powering off the UE.

Syntax

Test Command AT+CFUN=? Response(s) +CFUN: (list of supported <code><fun>s</code>), (list of supported <code><rst>s</code>) OK ERROR +CME ERROR: <code><err></code>	
Read Command AT+CFUN? Response(s) +CFUN: <code><fun></code> OK ERROR +CME ERROR: <code><err></code>	
Write Command AT+CFUN= <code><fun></code> [, <code><rst></code>] Response(s) OK ERROR +CME ERROR: <code><err></code>	
PIN  Last - + -	Reference(s) 3GPP TS 27.007 [45]

Unsolicited Result Codes

URC 1

^SYSSTART

URC indicates that the UE is running in Normal Functionality level.

URC 2

^SYSSTART AIRPLANE MODE

URC indicates that the UE is running in Airplane Mode.

URC 3

^SYSLOADING START

Indicates that the JAM (Java application manager) is started and the existing applications will be started soon.



URC 4

^SYSLOADING FINISHED

Indicates that the JAM is ready and the installed application is up and ready to use.

Parameter Description

<fun>^(num)

This parameter determines the functionality level of the UE.

0	Switch UE into Minimum Functionality level. UE's RF (TX and RX) and USIM interfaces are shut down. Consequently, the UE logs off from network. Accordingly, AT commands whose execution requires a radio connection or USIM access either return an error result code or reflect the limited operating state. Direct switches between pure and extended Airplane Modes (and vice versa) are not supported. To return to Normal Functionality level use AT+CFUN=1 or AT+CFUN=1,1 . After this, PIN authentication may be necessary if required by the USIM.
1 ^(P)	Switch UE into Normal Functionality level, which is indicated via " ^SYSSTART " URC.
4	Switch UE into pure Airplane Mode. UE's RF-interface (TX and RX) is shut down whereby it logs off from the network. USIM remains accessible. Accordingly, AT commands whose execution requires a radio connection will return an error result code or reflect the limited operating state. Direct switches between pure and extended Airplane Modes (and vice versa) are not supported. To return to Normal Functionality level use AT+CFUN=1 or AT+CFUN=1,1 . The UE may reregister to the network, e.g. if network service is available.

<rst>^(num)

[0]	UE switches to <fun> level without reset.
1	Reset and restart the UE. Restart is only possible with <fun>=1; however, the current functionality level will be retained.



2.8 AT^SMSO Switch Off ELS62-W

AT^SMSO initiates ELS62-W's power-off procedure.

If `<fso>="fast"`, the Fast-Shutdown procedure will be started:

- Finalize current flash erase/program cycles
- No further schedule in system will be arranged
- Power off the module

If parameter `<fso>` is omitted then the module will execute the "normal" shutdown procedure.

When Fast Shutdown is performed, there are no responses such as ^SMSO: OFF, OK, or ERROR URC. Do not send any other AT command after this.

For further detail please refer to [2].

Syntax

Test Command
AT^SMSO=?
Response(s)
^SMSO:(list of supported<fso>s)
OK
Exec Command
AT^SMSO
Response(s)
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SMSO=[<fso>]
Response(s)
PIN → Last
- + +

Parameter Description

<fso> ^(str)
Fast Shutdown
"fast"
perform Fast-Shutdown procedure



2.9 AT+CMEE Error Message Format

AT+CMEE controls the format of error result codes that indicates errors related to ELS62-W 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 2.2, General "CME ERROR" Codes (3GPP TS 27.007), Table 2.3, GPRS related "CME ERROR" Codes (3GPP TS 27.007) and Table 2.5, SMS related "CMS ERROR" Codes (3GPP TS 27.005).

Syntax

Test Command AT+CMEE=? Response(s) +CMEE: (list of supported<errMode>s) OK	
Read Command AT+CMEE? Response(s) +CMEE: <errMode> OK	
Write Command AT+CMEE=<errMode> Response(s) OK ERROR +CME ERROR:<err>	
PIN → Last - + -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 27.005 [44]

Parameter Description

<errMode> ^{(num)(&V)(&W)}	
0(&F)(D)	Disable result code, i.e. only "ERROR" will be displayed.
1	Enable error result code with numeric values.
2	Enable error result code with verbose (string) values.

2.9.1 CME/CMS Error Code Overview

Table 2.2: General "CME ERROR" Codes (3GPP TS 27.007)

<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



<err> Code	Text (if AT+CMEE=2)
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
50	Incorrect parameters
100	unknown

Table 2.3: GPRS related "CME ERROR" Codes (3GPP TS 27.007)

<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



<err> Code	Text (if AT+CMEE=2)
127	missing or unknown APN
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 2.4: Enhanced "CME ERROR" Codes

<err> Code	Text (if AT+CMEE=2)
256	operation temporary not allowed
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
331	network search aborted
332	could not camp on chosen cell
333	reselection to chosen cell failed
340	call index error
341	call state error



<err> Code	Text (if AT+CMEE=2)
342	sys state error
343	parameters error
344	expired password
350	cancelled due to active call state
351	cancelled due to location update processing
352	cancelled due to packet transfer mode
353	cancelled due to radio resource connection establishment
354	cancelled due to ongoing SMS transfer
355	cancelled due to ongoing SS transaction
767	operation failed

Table 2.5: SMS related "CMS ERROR" Codes (3GPP TS 27.005)

<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



2.10 AT+CSCS Character Set

AT+CSCS write command informs the ELS62-W which character set is used by the TE. This enables the UE to convert character strings correctly between TE and UE character sets. Please also refer to Section 1.7, [Supported character sets](#).

Note: If UE-TE interface is set to 8-bit operation (**AT+ICF**) and selected character set is **<charSet>="GSM"** (7-bit), the highest bit will be set to zero.

Syntax

Test Command AT+CSCS=? Response(s) +CSCS: (list of supported<charSet>s) OK	
Read Command AT+CSCS? Response(s) +CSCS: <charSet> OK	
Write Command AT+CSCS=<charSet> Response(s) OK ERROR +CME ERROR: <err>	
PIN  Last - + -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<charSet>^(str)	
"GSM"^(&F)(P)	GSM default alphabet (3GPP TS 23.038 [34] , subclause 6.2.1).
"UCS2"	16-bit universal multiple-octet coded character set (ISO-10646 [11]). UCS2 character strings are converted to hexadecimal numbers in the range 0000 to FFFF; e.g. "004100620063" equates three 16-bit characters with decimal values 65, 98 and 99.



2.11 AT^SCFG Extended Configuration Settings

AT^SCFG can be used to query and configure various settings of the ELS62-W.

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).

Syntax

Test Command

AT^SCFG=?

Response(s)

```

^SCFG: "Audio/Loop", (list of supported <al>s)
^SCFG: "Call/ECC", (list of supported <ecc>s)
^SCFG: "Call/Speech/Codec", (list of supported <sc>s)
^SCFG: "GPIO/Mode/AntTun", (list of supported <mode>s)
^SCFG: "GPIO/Mode/ASC1", (list of supported <g_mode>s)
^SCFG: "GPIO/Mode/DTR0", (list of supported <dtr0>s)
^SCFG: "GPIO/Mode/DSR0", (list of supported <dsr0>s)
^SCFG: "GPIO/Mode/RING0", (list of supported <ring0>s)
^SCFG: "GPIO/Mode/DCD0", (list of supported <dcd0>s)
^SCFG: "GPIO/Mode/FNS", (list of supported <g_mode>s)
^SCFG: "GPIO/Mode/SYNC", (list of supported <g_mode>s)
^SCFG: "GPIO/Mode/DAI", (list of supported <g_mode>s)
^SCFG: "GPIO/Mode/MCLK", (list of supported <g_mode>s)
^SCFG: "GPRS/AutoAttach", (list of supported <gaa>s)
^SCFG: "GPRS/MTU/Mode", (list of supported <nwmode>s)
^SCFG: "GPRS/MTU/Size", (range of supported <mtusize>s)
^SCFG: "Ident/Manufacturer", (max. string length of <manufacturer>)
^SCFG: "Ident/Product", (max. string length of <product>)
^SCFG: "MEopMode/ExpectDTR", (list of supported <expDtrSet>s), (list of supported <expDtrPort>s)
^SCFG: "MEopMode/IMS", (list of supported <ims>s)
^SCFG: "MEopMode/PingRsp", (list of supported <pingv>s)
^SCFG: "MEopMode/SRPOM", (list of supported <srpom>s)
^SCFG: "MEopMode/RingOnData", (list of supported <ringlineSig>s)
^SCFG: "MESHutdown/sVsUp/threshold", (list of supported <vthresh>s), (list of supported
<PowerSupplyDomain>s)
^SCFG: "Radio/Band/2G", (list of supported <rba2g>s)
^SCFG: "Radio/Band/4G", (list of supported <rba4g-1>s), (list of supported <rba4g-2>s)
^SCFG: "Radio/Mtpl", (list of supported <PL_mode>s), (list of supported <PL_profile>s)
^SCFG: "Radio/Mtpl/2G", (list of supported <PL_mode>s), (list of supported <PL_profile>s), (list of
supported <PL_band2g>s), , (list of supported <PL_limit2g>s), (list of supported <PL_limit_psk>s)
^SCFG: "Radio/Mtpl/4G", (list of supported <PL_mode>s), (list of supported <PL_profile>s), (list of
supported <PL_band4g-1>s), (list of supported <PL_band4g-2>s), (list of supported <PL_limit4g>s)
^SCFG: "Radio/OutputPowerReduction", (list of supported <ropr>s)
^SCFG: "RemoteWakeUp/Ports", (list of supported <RemWakePortSet>s), (list of supported
<RemWakePort>s)
^SCFG: "SAT/AR/Refresh", (list of supported <mode>s)
^SCFG: "SIM/CS", (list of supported <sslot>s)
^SCFG: "SIM/DualMode", (list of supported <sdm>s)
^SCFG: "Serial/USB/DDD", (list of supported <usbDeviceDescr>s), (list of supported
<usbDescrIndex>s), (max. string length of <usbLangId>), (max. string length of <usbVendorId>),
(max. string length of <usbProductId>), (max. string length of <usbManufacturer>), (max. string length
of <usbProduct>), (max. string length of <usbSerialNo>)
^SCFG: "Tcp/MR", (list of supported <tcpMr>)
^SCFG: "Tcp/OT", (list of supported <tcpOt>)
^SCFG: "Tcp/IRT", (list of supported <tcpirt>)
^SCFG: "Tcp/WithURCs", (list of supported <tcpWithUrc>)

```



Test Command

(Continued)

AT^SCFG=?

Response(s)

^SCFG: "Tcp/TLS/Version", (list of supported <TLS_min_version>s), (list of supported <TLS_max_version>s)
^SCFG: "URC/Ringline", (list of supported <urcRinglineCfg>s)
^SCFG: "URC/Ringline/ActiveTime", (list of supported <urcRinglineDuration>s)
^SCFG: "URC/Ringline/SelWUrc", (list of supported <urcRinglineFilter>s)
OK

Read Command

AT^SCFG?

Response(s)

^SCFG: "Audio/Loop", <al>
^SCFG: "Call/ECC", <ecc>
^SCFG: "Call/Speech/Codec", <sc>
^SCFG: "GPIO/Mode/AntTun", <mode>
^SCFG: "GPIO/mode/ASC1", <g_mode>
^SCFG: "GPIO/Mode/DTR0", <dtr0>
^SCFG: "GPIO/Mode/DSR0", <dsr0>
^SCFG: "GPIO/Mode/RING0", <ring0>
^SCFG: "GPIO/Mode/DCD0", <dcd0>
^SCFG: "GPIO/mode/FNS", <g_mode>
^SCFG: "GPIO/mode/SYNC", <g_mode>
^SCFG: "GPIO/mode/DAI", <g_mode>
^SCFG: "GPIO/mode/MCLK", <g_mode>
^SCFG: "GPRS/AutoAttach", <gaa>
^SCFG: "GPRS/MTU/Mode", <nwmode>
^SCFG: "GPRS/MTU/Size", <mtusize>
^SCFG: "Ident/Manufacturer", <manufacturer>
^SCFG: "Ident/Product", <product>
^SCFG: "MEopMode/ExpectDTR", "current"[, <expDtrPort>₁[, <expDtrPort>₂[, ...]]]
^SCFG: "MEopMode/ExpectDTR", "powerup"[, <expDtrPort>₁[, <expDtrPort>₂[, ...]]]
^SCFG: "MEopMode/IMS", <ims>
^SCFG: "MEopMode/PingRsp", <pingv>
^SCFG: "MEopMode/RingOnData", <ringlineSig>
^SCFG: "MEopMode/SRPOM", <srpom>
^SCFG: "MESHutdown/sVsup/threshold", <vthresh_BB_curr>, <vthresh_BB_request>
^SCFG: "Radio/Band/2G", <rba2g>
^SCFG: "Radio/Band/4G", <rba4g-1>, <rba4g-2>
^SCFG: "Radio/Mtpl", <PL_mode>[, <PL_profile>]
^SCFG: "Radio/Mtpl/2G", <PL_mode>[, <PL_profile>]
^SCFG: "Radio/Mtpl/4G", <PL_mode>[, <PL_profile>]
^SCFG: "Radio/OutputPowerReduction", <ropr>
^SCFG: "RemoteWakeUp/Ports", "current"[, <RemWakePort>₁[, <RemWakePort>₂[, ...]]]
^SCFG: "RemoteWakeUp/Ports", "powerup"[, <RemWakePort>₁[, <RemWakePort>₂[, ...]]]
^SCFG: "SIM/CS", <sslot>
^SCFG: "SIM/DualMode", <sdm>
^SCFG: "Serial/USB/DDD", <usbDeviceDescr>, <usbDescrIndex>, <usbLangId>, <usbVendorId>, <usbProductId>, <usbManufacturer>, <usbProduct>, <usbSerialNo>
^SCFG: "Tcp/MR", <tcpMr>
^SCFG: "Tcp/OT", <tcpOt>
^SCFG: "Tcp/IRT", <tcpirt>
^SCFG: "Tcp/WithURCs", <tcpWithUrc>
^SCFG: "Tcp/TLS/Version", <TLS_min_version>, <TLS_max_version>
^SCFG: "URC/Ringline", <urcRinglineCfg>



Read Command

(Continued)

AT^SCFG?

Response(s)

^SCFG: "URC/Ringline/ActiveTime", <urcRinglineDuration>

^SCFG: "URC/Ringline/SelWUrc", <urcRinglineFilter>

^SCFG: "SAT/AR/Refresh", <mode>

OK

Write Command

Configure Audio Loop.

AT^SCFG="Audio/Loop", <al>

Response(s)

^SCFG: "Audio/Loop", <al>

OK

ERROR

+CME ERROR: <err>

Write Command

Query/Configure Emergency numbers for USIM without or empty ECC field.

AT^SCFG="Call/ECC", <ecc>

Response(s)

^SCFG: "Call/ECC", <ecc>

OK

ERROR

+CME ERROR: <err>

Write Command

Speech Codec Configuration for voicecalls.

AT^SCFG="Call/Speech/Codec", <scc>

Response(s)

^SCFG: "Call/Speech/Codec", <scc>

OK

ERROR

+CME ERROR: <err>

Write Command

Enable/disable Antenna Switch signal lines Tuner0 and Tuner1.

AT^SCFG="GPIO/Mode/AntTun", <mode>

Response(s)

^SCFG: "GPIO/Mode/AntTun", <mode>

OK

ERROR

+CME ERROR: <err>

Write Command

Configure ASC1 interface lines RXD1, TXD1, RTS1, CTS1 shared with GPIO16 - GPIO19 lines

AT^SCFG="GPIO/mode/ASC1", <g_mode>

Response(s)

^SCFG: "GPIO/mode/ASC1", <g_mode>

OK

ERROR

+CME ERROR: <err>



Write Command

Configure DTR0 signal line.

```
AT^SCFG="GPIO/Mode/DTR0"[, <dtr0>]
```

Response(s)

```
^SCFG: "GPIO/Mode/DTR0", <dtr0>
```

```
OK
```

```
ERROR
```

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

Write Command

Configure DSR0 signal line.

```
AT^SCFG="GPIO/Mode/DSR0"[, <dsr0>]
```

Response(s)

```
^SCFG: "GPIO/Mode/DSR0", <dsr0>
```

```
OK
```

```
ERROR
```

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

Write Command

Configure RING0 signal line.

```
AT^SCFG="GPIO/Mode/RING0"[, <ring0>]
```

Response(s)

```
^SCFG: "GPIO/Mode/RING0", <ring0>
```

```
OK
```

```
ERROR
```

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

Write Command

Configure DCD0 signal line.

```
AT^SCFG="GPIO/Mode/DCD0"[, <dcd0>]
```

Response(s)

```
^SCFG: "GPIO/Mode/DCD0", <dcd0>
```

```
OK
```

```
ERROR
```

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

Write Command

Configure "SIM/DualMode" (<sdm>) shared with GPIO8 line.

```
AT^SCFG="GPIO/mode/FNS"[, <g_mode>]
```

Response(s)

```
^SCFG: "GPIO/mode/FNS", <g_mode>
```

```
OK
```

```
ERROR
```

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

Write Command

Configure Status LED line shared with GPIO5 line

```
AT^SCFG="GPIO/mode/SYNC"[, <g_mode>]
```

Response(s)

```
^SCFG: "GPIO/mode/SYNC", <g_mode>
```

```
OK
```

```
ERROR
```

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



Write Command

Configure Digital Audio Interface lines DOUT, DIN, FSC, and BCLK, shared with GPIO20 - GPIO23 lines.

AT^SCFG="GPIO/mode/DAI", <g_mode>

Response(s)

^SCFG: "GPIO/mode/DAI", <g_mode>

OK

ERROR

+CME ERROR: <err>

Write Command

Activate or switch off Master Clock Signal Line.

AT^SCFG="GPIO/mode/MCLK", <g_mode>

Response(s)

^SCFG: "GPIO/mode/MCLK", <g_mode>

OK

ERROR

+CME ERROR: <err>

Write Command

PS Domain auto attach.

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

Response(s)

^SCFG: "GPRS/AutoAttach", <gaa>

OK

ERROR

+CME ERROR: <err>

Write Command

Use pre-configured MTU Mode.

AT^SCFG="GPRS/MTU/Mode", <nwmode>

Response(s)

^SCFG: "GPRS/MTU/Mode", <nwmode>

OK

ERROR

+CME ERROR: <err>

Write Command

Use pre-configured MTU size.

AT^SCFG="GPRS/MTU/Size", <mtusize>

Response(s)

^SCFG: "GPRS/MTU/Size", <mtusize>

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

AT^SCFG="MEopMode/ExpectDTR", <expDtrSet>[, <expDtrPort>₁[, <expDtrPort>₂[, ...]]]

Response(s)

^SCFG: "MEopMode/ExpectDTR", "current", <expDtrPort>₁[, <expDtrPort>₂[, ...]]

^SCFG: "MEopMode/ExpectDTR", "powerup", <expDtrPort>₁[, <expDtrPort>₂[, ...]]

OK

ERROR

+CME ERROR: <err>

Write Command

IMS mode.

AT^SCFG="MEopMode/IMS", <ims>

Response(s)

^SCFG: "MEopMode/IMS", <ims>

OK

ERROR

+CME ERROR: <err>

Write Command

Allow/block response on PING

AT^SCFG="MEopMode/PingRsp", <pingv>

Response(s)

^SCFG: "MEopMode/PingRsp", <pingv>

OK

ERROR

+CME ERROR: <err>

Write Command

Subcommand controls whether ring line signalization is used by the UE in case it can't output data due to a blocked interface. The ring line signalization is provided for incoming data in transparent mode while the TE is in power saving.

AT^SCFG="MEopMode/RingOnData", <ringlineSig>

Response(s)

^SCFG: "MEopMode/RingOnData", <ringlineSig>

OK

ERROR

+CME ERROR: <err>

Write Command

Enable or disable RPM if inserted USIM contains no RPM files.

AT^SCFG="MEopMode/SRPOM", <srpom>

Response(s)

^SCFG: "MEopMode/SRPOM", <srpom>

OK



Write Command

(Continued)

Enable or disable RPM if inserted USIM contains no RPM files.

AT^SCFG="MEopMode/SRPOM"[, <srpom>]

Response(s)

ERROR

+CME ERROR: <err>

Write Command

Query / configure undervoltage threshold

AT^SCFG="MESHutdown/sVsup/threshold"[, <vthresh>][, <PowerSupplyDomain>]

Response(s)

^SCFG: "MESHutdown/sVsup/threshold", <vthresh_BB_curr>, <vthresh_BB_request>

OK

ERROR

+CME ERROR: <err>

Write Command

Enable/disable 2G radio bands.

AT^SCFG="Radio/Band/2G"[, <rba2g>]

Response(s)

^SCFG: "Radio/Band/2G", <rba2g>

OK

ERROR

+CME ERROR: <err>

Write Command

Enable/disable 4G radio bands.

AT^SCFG="Radio/Band/4G"[, <rba4g-1>, <rba4g-2>]

Response(s)

^SCFG: "Radio/Band/4G", <rba4g-1>[, <rba4g-2>]

OK

ERROR

+CME ERROR: <err>

Write Command

To control (deactivate / activate) output power limitation for SAR (Specific Absorption Rate)

<PL_mode> 2 and 3 (query / configure) are applicable only with:

"Radio/Mtpl/2G"

"Radio/Mtpl/4G"

AT^SCFG="Radio/Mtpl"[, <PL_mode>[, <PL_profile>]]

Response(s)

^SCFG: "Radio/Mtpl", <PL_mode>[, <PL_profile>]

OK

ERROR

+CME ERROR: <err>



Write Command

To control (query / configure) output power limitation for SAR (Specific Absorption Rate).

<PL_mode> 0 and 1 (deactivate / activate) are applicable only with "Radio/Mtpl".

```
AT^SCFG="Radio/Mtpl/2G",<PL_mode>,<PL_profile>,<PL_band2g>,,<PL_limit2g>,<PL_limit_psk>]]
```

Response(s)

```
^SCFG: "Radio/Mtpl/2G",<PL_mode>,<PL_profile>,<PL_band2g>,,<PL_limit2g>,<PL_limit_psk>]
```

In case of <PL_mode>=2 and <PL_profile> one profile configuration is printed out

```
^SCFG: "Radio/Mtpl/2G",<PL_mode>,<PL_profile>,<PL_band2g>,,<PL_limit2g>,<PL_limit_psk>]
```

```
^SCFG: ["Radio/Mtpl/2G",<PL_mode>,<PL_profile>,<PL_band2g>,,<PL_limit2g>,<PL_limit_psk>]
```

```
^SCFG: ["Radio/Mtpl/2G", ...]
```

In case of <PL_mode>=2 full profile configuration (1-8) is printed out

```
^SCFG: "Radio/Mtpl/2G",<PL_mode>,<PL_profile>,<PL_band2g>,,<PL_limit2g>,<PL_limit_psk>]
```

```
^SCFG: ["Radio/Mtpl/2G",<PL_mode>,<PL_profile>,<PL_band2g>,,<PL_limit2g>,<PL_limit_psk>]
```

```
^SCFG: ["Radio/Mtpl/2G",<PL_mode>,<PL_profile>,<PL_band2g>,,<PL_limit2g>,<PL_limit_psk>]
```

```
^SCFG: ["Radio/Mtpl/2G", ...]
```

In case of <PL_mode>=3 and <PL_profile>,<PL_band2g>,<PL_limit2g>,<PL_limit_psk>

```
^SCFG: "Radio/Mtpl/2G",<PL_mode>,<PL_profile>]
```

OK

ERROR

+CME ERROR: <err>

Write Command

To control (query / configure) output power limitation for SAR (Specific Absorption Rate).

<PL_mode> 0 and 1 (deactivate / activate) are applicable only with "Radio/Mtpl".

```
AT^SCFG="Radio/Mtpl/4G",<PL_mode>,<PL_profile>,<PL_band4g-1>,<PL_band4g-2>,<PL_limit4g>]]
```

Response(s)

```
^SCFG: "Radio/Mtpl/4G",<PL_mode>,<PL_profile>,<PL_band4g-1>,<PL_band4g-2>,<PL_limit4g>]
```

In case of <PL_mode>=2 and <PL_profile> one profile configuration is printed out

```
^SCFG: "Radio/Mtpl/4G",<PL_mode>,<PL_profile>,<PL_band4g-1>,<PL_band4g-2>,<PL_limit4g>]
```

```
^SCFG: ["Radio/Mtpl/4G",<PL_mode>,<PL_profile>,<PL_band4g-1>,<PL_band4g-2>,<PL_limit4g>]
```

```
^SCFG: ["Radio/Mtpl/4G", ...]
```

In case of <PL_mode>=2 full profile configuration (1-8) is printed out

```
^SCFG: "Radio/Mtpl/4G",<PL_mode>,<PL_profile>,<PL_band4g-1>,<PL_band4g-2>,<PL_limit4g>]
```

```
^SCFG: ["Radio/Mtpl/4G",<PL_mode>,<PL_profile>,<PL_band4g-1>,<PL_band4g-2>,<PL_limit4g>]
```

```
^SCFG: ["Radio/Mtpl/4G",<PL_mode>,<PL_profile>,<PL_band4g-1>,<PL_band4g-2>,<PL_limit4g>]
```

```
^SCFG: ["Radio/Mtpl/4G", ...]
```

In case of <PL_mode>=3 and <PL_profile>,<PL_band4g-1>,<PL_band4g-2>,<PL_limit4g>



Write Command

(Continued)

To control (query / configure) output power limitation for SAR (Specific Absorption Rate).

<PL_mode> 0 and 1 (deactivate / activate) are applicable only with "Radio/Mtpl".

```
AT^SCFG="Radio/Mtpl/4G", <PL_mode>[, <PL_profile>, <PL_band4g-1>, <PL_band4g-2>, <PL_limit4g>]
```

Response(s)

```
^SCFG: "Radio/Mtpl/4G", <PL_mode>[, <PL_profile>]
```

OK

ERROR

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

Write Command

Radio output power reduction.

```
AT^SCFG="Radio/OutputPowerReduction", <ropr>]
```

Response(s)

```
^SCFG: "Radio/OutputPowerReduction", <ropr>
```

OK

ERROR

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

Write Command

Select ports for waking up the TE

```
AT^SCFG="RemoteWakeUp/Ports", <RemWakePortSet>[, <RemWakePort>_1[, <RemWakePort>_2[, ...]]]
```

Response(s)

```
^SCFG: "RemoteWakeUp/Ports", "current", <RemWakePort>_1[, <RemWakePort>_2[, ...]]
```

```
^SCFG: "RemoteWakeUp/Ports", "powerup", <RemWakePort>_1[, <RemWakePort>_2[, ...]]
```

OK

ERROR

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

Write Command

Select USIM card.

```
AT^SCFG="SIM/CS", <sslot>]
```

Response(s)

```
^SCFG: "SIM/CS", <sslot>
```

OK

ERROR

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

Write Command

Configure USIM Dual Mode.

```
AT^SCFG="SIM/DualMode", <sdm>]
```

Response(s)

```
^SCFG: "SIM/DualMode", <sdm>
```

OK

ERROR

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



Write Command

USB Device Descriptor.

```
AT^SCFG="Serial/USB/DDD" [, <usbDeviceDescr>, [<usbDescrIndex>], [<usbLangId>],
<usbVendorId>, <usbProductId>, [<usbManufacturer>], [<usbProduct>][, <usbSerialNo>]]
```

Response(s)

```
^SCFG: "Serial/USB/DDD", <usbDeviceDescr>, <usbDescrIndex>, <usbLangId>, <usbVendorId>,
<usbProductId>, <usbManufacturer>, <usbProduct>, <usbSerialNo>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Configuration of TCP parameter 'MaxRetransmissions'.

```
AT^SCFG="Tcp/MR"[, <tcpMr>]
```

Response(s)

```
^SCFG: "Tcp/MR", <tcpMr>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Configuration of TCP parameter 'OverallTimeout'.

```
AT^SCFG="Tcp/OT"[, <tcpOt>]
```

Response(s)

```
^SCFG: "Tcp/OT", <tcpOt>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Configuration of TCP parameter 'Initial Retransmission Timeout'.

```
AT^SCFG="Tcp/IRT"[, <tcpirt>]
```

Response(s)

```
^SCFG: "Tcp/IRT", <tcpirt>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Configuration of Internet Service URCs:

```
AT^SCFG="Tcp/WithURCs"[, <tcpWithUrc>]
```

Response(s)

```
^SCFG: "Tcp/WithURCs", <tcpWithUrc>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Set a range of accepted TLS versions for the IPoverAT services.

```
AT^SCFG="Tcp/TLS/Version", <TLS_min_version>, <TLS_max_version>
```

Response(s)

```
^SCFG: "Tcp/TLS/Version", <TLS_min_version>, <TLS_max_version>
```

OK



Write Command

(Continued)

Set a range of accepted TLS versions for the IPoverAT services.

AT+SCFG="Tcp/TLS/Version", <TLS_min_version>, <TLS_max_version>

Response(s)

ERROR

+CME ERROR: <err>

Write Command

Subcommand controls the behavior of the RING line if it is selected for URC signalization.

AT+SCFG="URC/Ringline", <urcRinglineCfg>

Response(s)

^SCFG: "URC/Ringline", <urcRinglineCfg>

OK

ERROR

+CME ERROR: <err>

Write Command

Subcommand controls duration of active RING line if it is selected for URC signalization.

AT+SCFG="URC/Ringline/ActiveTime", <urcRinglineDuration>

Response(s)

^SCFG: "URC/Ringline/ActiveTime", <urcRinglineDuration>

OK

ERROR

+CME ERROR: <err>

Write Command

Subcommand specifies a filter for URC types allowed to toggle the Ring line

AT+SCFG="URC/Ringline/SelWUrc", <urcRinglineFilter>

Response(s)

^SCFG: "URC/Ringline/SelWUrc", <urcRinglineFilter>

OK

ERROR

+CME ERROR: <err>

Write Command

(U)SAT Enhancement for Refresh Automatic Response Mode.

AT+SCFG="SAT/AR/Refresh", <mode>

Response(s)

^SCFG: "SAT/AR/Refresh", <mode>

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -



Parameter Description

<al>^(str)

Audio Loop Setting

This parameter can be used to start and stop an audio loop. The feature is intended for testing the audio path without SIM card inserted and without mobile network environment. It is not intended for normal operation. Before starting the audio loop, it is recommended to set the audio related AT commands for the audio functions to be tested.

"0" ^(P)	No audio loop active
"1"	Audio loop active

<ecc>^{(str)(NV)}

Emergency call numbers on non-ECC USIM

Setting specifies emergency call numbers on a USIM without or empty ECC field. It has no influence on the commonly used emergency numbers 112 and 911 which are always supported.

Also refer to Section 7.2, [ATD](#) where you can find a list of emergency call numbers supported if no USIM 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 takes effect after next UE restart or USIM insertion.

"0" ^(D) ... "255"	Bitmask setting:
"0"	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.

<sc>^{(str)(NV)}

Speech Codec Configuration for voice calls

This parameter can be used to configure the speech version indications in the bearer capabilities in case of voice calls (see 3GPP TS 24.008).

If you change this parameter the command returns "OK", but a new setting takes effect the next time the UE is restarted (after power-cycle).

"0" ^(D)	All supported speech codecs are enabled for voice calls.
"1"	All other codecs (EFR, HR, AMR) except FR are disabled for voice calls.
"2"	The speech codecs AMR WB are disabled for voice calls.

<dtr0>^{(str)(NV)}

DTR0 signal line configuration

Setting takes effect after next restart.

"std" ^(D)	Configure DTR0 signal line functionality.
"gpio"	Configure GPIO functionality.



<dsr0>^(str)(NV)

DSR0 signal line configuration

Setting takes effect after next restart.

"std"^(D) Configure DSR0 signal line functionality.

"gpio" Configure GPIO functionality.

<ring0>^(str)(NV)

RING0 signal line configuration

Setting takes effect after next restart.

"std"^(D) Configure RING0 signal line functionality.

"gpio" Configure GPIO functionality.

<dcd0>^(str)(NV)

DCD0 signal line configuration

Setting takes effect after next restart.

"std"^(D) Configure DCD0 signal line functionality.

"gpio" Configure GPIO functionality.

<mode>^(str)(NV)

Mode of operation for Antenna Switch

Tuner0 and Tuner1 signal lines configuration.

To enable the Antenna Switch by signal lines Tuner0 and Tuner1, select `AT^SCFG="GPIO/mode/AntTun","std"`. The two lines can be set as combination "1,1", "1,0" or "0,1" to indicate RX/TX operation on frequencies in the defined frequency range, and set to combination "0, 0" for operation on all other frequencies. By default, the Antenna Switch is disabled.

Note that the value "gpio" is named for compatibility reasons. The signal lines Tuner0 and Tuner1 are not shared with any GPIO lines.

Setting takes effect after next restart.

For more details on Antenna Switch, refer to [2].

"std" Antenna Switch is activated.

"gpio"^(D) Antenna Switch is switched off.

<g_mode>^(str)(NV)

Mode of operation for signal lines

Parameter of several `AT^SCFG "GPIO/mode/xxx"` subcommands. Can be used to configure shared signal lines of the ELS62-W module. Depending on the connected devices, the setting determines the specific function assigned to the related signal line(s). Keep in mind that the functions assigned to shared lines are mutually exclusive. Please refer also to `AT^SCPIN` which provides an overview on shared lines.

To enable the DAI interface select `AT^SCFG="GPIO/mode/DAI","std"`. This will lock the GPIO functionality of GPIO20 - GPIO23. IMPORTANT: Audio commands offer full functionality only if the DAI is enabled with `AT^SCFG="GPIO/mode/DAI","std"`. If DAI resources are not available then DAI dependent audio commands will respond "+CME ERROR: operation not allowed".

For Fast Shutdown function, the parameter `<g_mode>` is always effective as "std". The value "gpio" is available for compatibility reasons, and has no functional effect. Fast Shutdown can also be triggered by using the write command `AT^SMSO` parameter `<fso>`.



Likewise, to enable the second serial interface ASC1, select `AT^SCFG="GPIO/mode/ASC1","std"`.

Changes take effect after restart of the UE.

"std"	Signal lines are assigned to this interface.
"gpio"	Signal lines are used as GPIO.
"rsv"	Signal lines are reserved by other interface. This value cannot be set by the <code>AT^SCFG="GPIO/mode/xxx"</code> write command

`<gaa>^(str)(NV)`

PS Domain auto attach

Setting can be used to control whether or not the UE will perform a PS Domain attach immediately after power-up during registration to the network or right after registering to the network, depending on network configuration. If the setting is changed to "enabled" and the UE is not attached yet, it will not initiate an attach immediately but after the next restart and registration to the network. For LTE please see more information in Section 13.5.1, [Attaching to LTE Networks and Registering to IMS](#).

"disabled"	PS Domain auto attach is disabled
"enabled" ^(D)	PS Domain auto attach is enabled

`<nwmode>^(num)(NV)`

0	Ask network for MTU size
1	Don't ask network for MTU size and use default value

Note: The default value for AT&T will be "1" and the default value for other MNOs will be "0".

`<mtusize>^(num)(NV)`

MTU size in bytes. Module restart is required for the setting to take effect. The setting might be overwritten during profile switch. Depending on the MNO the setting might be overwritten by the network. In this case network preference has higher priority and will be applied.

1280...1430^(D)...1500

Notes:

- IPv6 connection will be limited to 1280 bytes and ignore the MTU size configuration.

`<manufacturer>^(str)(NV)`

Manufacturer name

Setting can be used to configure the name of the manufacturer 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).

"Cinterion"^(D)

`<product>^(str)(NV)`

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).

"ELS62-W"^(D)



<expDtrSet>^(str)

The <expDtrSet> parameter specifies whether the "MEopMode/ExpectDTR" configuration set with <expDtrPort> is non-volatile or volatile.

"current" The currently used configuration (volatile).
"powerup" The configuration used after powerup or restart (non-volatile).

<expDtrPort>^(str)

The purpose of AT^SCFG "MEopMode/ExpectDTR" subcommand is to ensure power saving even though a Customer Application is designed to use only some but not all of the UE's ports. Keep in mind that the UE enters Sleep mode only if there is no data pending on any port. This might be a problem if ports are not connected or not opened. To ensure power saving in such case, the AT^SCFG "MEopMode/ExpectDTR" subcommand can be activated simply by listing all those ports for which the Customer Application has no driver implemented. Vice versa, if a Customer Application implements a driver for a given port, and thus ensures to open this port and read all data, this port can be removed from the <expDtrPort> list.

On each port listed via <expDtrPort>, the UE transmits data and notifications only *after* the connected host has activated DTR, or has sent a "SetControlLineState(DTE present)" request to a USB CDC ACM port. Any data pending on such a port *BEFORE* the host has notified its readiness will be discarded because the UE assumes that there is no host connected reading the data. This is to avoid that data left unsent in the output queues (e.g. a ^SYSSTART URC) prevent the UE from sleeping, or even gradually block the output queue.

The supported ports are reported by the AT^SCFG test command in the line for "MEopMode/ExpectDTR". By delivery default, no port is listed in the AT^SCFG "MEopMode/ExpectDTR" read command responses, meaning that the "MEopMode/ExpectDTR" feature is deactivated at all, and all ports have to be read.

Preconditions:

- AT^SCFG "GPIO/mode/DSR0" parameter <g_mode> shall be set to "std".
- AT&D shall be set to 0. AT&D modes 1 or 2 cannot be set on a port enabled with AT^SCFG "MEopMode/ExpectDTR".

"acm0"^(D) Refers to USB0
"acm1"^(D) Refers to USB1
"acm2"^(D) Refers to USB2
"asc0"^(D) Refers to ASC0

Examples:

Default: No ports listed. AT^SCFG "MEopMode/ExpectDTR" is deactivated.
AT^SCFG?

```
....
^SCFG: "MEopMode/ExpectDTR","current"
^SCFG: "MEopMode/ExpectDTR","powerup"
```

....
OK

Suppose the Customer Application implements a driver for the USB modem, but not for USB1 and USB2. The "MEopMode/ExpectDTR","powerup" list should include only the unused ports:

```
AT^SCFG="MEopMode/ExpectDTR","powerup","acm1","acm2"
^SCFG: "MEopMode/ExpectDTR","current",
^SCFG: "MEopMode/ExpectDTR","powerup","acm1","acm2"
```

OK

AT+CFUN=1,1

OK

^SYSSTART

AT^SCFG="MEopMode/ExpectDTR"

```
^SCFG: "MEopMode/ExpectDTR","current","acm1","acm2"
^SCFG: "MEopMode/ExpectDTR","powerup","acm1","acm2"
OK
```



Please note, the usage of this feature on ports with standard applications, like Windows DUN, may cause unexpected behaviour, because such standard applications may toggle DTR line and therefore lose expected data. For such cases, please remove the port from `<expDtrPort>`.

`<ims>`^{(str)(NV)}

IMS Mode

The parameter `<ims>` of `AT+SCFG` "MEopMode/IMS" can be used to enable or disable the IMS registration attempt after LTE attach. If value is not supported a "NOT IN USE" will be given. Depending on provider requirements, the delivery value is part of the provider profiles preconfigured in the UE, thus eliminating the need to change it. If nevertheless the setting may need to be changed consider that the new setting takes effect after restart.

"0" Disable IMS registration attempt after LTE attach.
 "1" Enable IMS registration attempt after LTE attach.

`<pingv>`^{(str)(NV)}

Enable ping response

Enable or disable response on PING. If module is connected to Internet and has valid IP address, it will or will not respond to ICMP PING depending on this setting.

"0"^(D) Disable response on PING.
 "1" Enable response on PING.

`<ringlineSig>`^{(str)(NV)}

Parameter determines whether ring line signalization is used by the UE in case it can't output data due to a blocked interface. The ring line signalization is provided for incoming data in transparent mode while the TE is in power saving. For USB use `AT+SCFG="RemoteWakeUp/Ports",<RemWakePort>` to configure ring line signalization.

For details about URC presentation and related hardware signalization refer to Section 1.8, [Unsolicited Result Code Presentation](#). See also parameters `<urcRinglineCfg>` and `<urcRinglineDuration>`.

"on" Ring line signalization is enabled if data can't be sent by the UE due to a blocked interface. The ring line signalization is provided for incoming data in transparent mode while the TE is in power saving.
 "off"^(P) No Ring line signalization if interface is blocked.

`<srpom>`^{(str)(NV)}

Radio Policy Manager Mode

Depending on the provider configuration it is possible that the `AT+SCFG="MEopMode/SRPOM"` command is not available.

This parameter enables / disables the usage of the default Radio Policy Manager (RPM) parameter settings according to GSMA "TSG.34/TS.34 - IoT Device Connection Efficiency Guidelines", as of Version 1.x, chapter 8. If RPM files are found on the inserted USIM the configuration given in these RPM files applies, i.e. the Radio Baseband Chipset shall use the RPM parameter settings of the USIM. In this case `<srpom>` settings are not effective.

If the USIM does not contain RPM files, RPM functionality shall be enabled or disabled based on the default setting of the UE's RPM parameter settings.

The `AT+SINFO="RPM"` subcommand returns the currently loaded RPM (Radio Policy Manager) parameters.



In some special provider configurations setting to enable or disable is not allowed. In this case the result code will be "+CME ERROR: operation temporary not allowed".

Delivery value is dependent of provider requirements.

Changed value takes effect after restart.

"0"	Usage of default RPM parameter settings saved in the UE is disabled.
"1"	Usage of default RPM parameter settings saved in the UE is enabled. Compliant with TS.34_8.2.1_REQ_001 in the GSMA "TSG.34/TS.34 - IoT Device Connection Efficiency Guidelines", as of Version 1.x, chapter 8.

<vthresh>^{(str)(NV)}

Undervoltage threshold value

The undervoltage thresholds defined for BB domain are calculated for max. 400 mV voltage drops during transmit burst. Power supply sources for ELS62-W applications shall be designed to tolerate 400 mV voltage drops without crossing the lower limits of 3.0 V (BB domain). For ELS62-W applications operating at the limit of the allowed tolerance the default undervoltage threshold may be adapted by selecting a <vthresh> value.

New settings take effect after restart.

<PowerSupplyDomain>^(str)

Power Supply Domain

"0"	<vthresh> value applies to BB domain (BATT+ _{BB} line).
-----	--

<vthresh_BB_curr>^(str)

Current BB undervoltage threshold

"-4"	3.00 V
"-3"	3.05 V
"-2"	3.10 V
"-1"	3.15 V
"0" ^(D)	3.20 V
"1"	3.25 V
"2"	3.30 V
"3"	3.35 V
"4"	3.40 V

<vthresh_BB_request>^(str)

BB undervoltage threshold after next restart

For values see <vthresh_BB_curr>.

<rba2g>^{(str)(NV)}

<rba2g> determines the 2G frequency bands the UE is allowed to use. Values are given in *hexadecimal 32-bit-value order*. Every bit corresponds to a dedicated band number.

"1"	GSM 900
"2"	GSM 1800
"4"	GSM 850
"8"	GSM 1900

Factory default of <rba2g> is the combination of all available bands meaning that all supported bands are allowed. If AT+COPS equals "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, `<rba2g>` may be one of the supported single values listed below.

Any change of `<rba2g>` will take effect immediately and will also be effective after next UE restart. So, `<rba2g>` is a parameter that may be used to read out the current band combination any time.

Note: The `AT+SCFG=?` test command shows the minimum and maximum band values. Switching off all bands returns an error. At least one remaining band must be activated.

`<rba4g-1>^(str)(NV)`

`<rba4g-1>` determines 4G frequency bands the UE is allowed to use. Values are given in *hexadecimal 32-bit-value order*. Every bit corresponds to a dedicated band number. The number range of `<rba4g-1>` covers band 1 to band 32.

"1"	LTE 2100 (B1)
"2"	LTE 1900 (B2)
"4"	LTE 1800 (B3)
"8"	LTE 1700 (B4)
"10"	LTE 850 (B5)
"40"	LTE 2600 (B7)
"80"	LTE 900 (B8)
"80000"	LTE 800 (B20)
"8000000"	LTE 700 (B28)

Factory default of `<rba4g-1>` is the combination of all available bands meaning that all supported bands are allowed. If `AT+COPS` equals "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, `<rba4g-1>` may be one of the supported single values listed below.

Any change of `<rba4g-1>` will take effect immediately and will also be effective after next UE restart. So, `<rba4g-1>` is a parameter that may be used to read out the current band combination any time.

Note: The `AT+SCFG=?` test command shows the minimum and maximum band values. Switching off all bands returns an error. At least one remaining band must be activated.

`<rba4g-2>^(str)(NV)`

`<rba4g-2>` determines 4G frequency bands the UE is allowed to use. Values are given in *hexadecimal bit-value order*. Every bit corresponds to a dedicated band number. Leading zeros and 0x... are not necessary. The number range of `<rba4g-2>` covers band 33 to max possible band. If the UE does not support band 33 or higher, the `AT+SCFG` test command returns the value range 0 - 0, and the `AT+SCFG` read command response does not display `<rba4g-2>`.

"20"	LTE 2600 (B38)
"80"	LTE 2350 (B40)
"100"	LTE 2550 (B41)
"200000000"	LTE 1745 (B66)

Factory default of `<rba4g-2>` is the combination of all available bands meaning that all supported bands are allowed. If `AT+COPS` equals "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, `<rba4g-2>` may be one of the supported single values listed below.

Any change of `<rba4g-2>` will take effect immediately and will also be effective after next UE restart. So, `<rba4g-2>` is a parameter that may be used to read out the current band combination any time.

Note: The `AT^SCFG=?` test command shows the minimum and maximum band values. Switching off all bands returns an error. At least one remaining band must be activated.

Note: When using the parameter `<rba4g-2>` at least also parameter `<rba4g-1>` must be used.

`<PL_mode>`^(str)

Power Limitation Mode

`AT^SCFG` subcommand "Radio/Mtpl/..." can be used to instantly adapt the module's Specific Absorption Rate (SAR) by reducing its output power for specific or all bands in any operating mode. 8 profiles for instant RF output power limitation can be defined and stored to the NV memory.

`<PL_mode>` 0 and 1 (deactivate / activate) are applicable only with "Radio/Mtpl".

Modes 2 and 3 (query / configure) are applicable only with specific subcommands.

- for GSM use "Radio/Mtpl/2G".

- for LTE use "Radio/Mtpl/4G".

A profile contains all supported bands

- for GSM see `<PL_band2g>`,

- for LTE see `<PL_band4g-1>` and `<PL_band4g-2>`

and, for each single band, a parameter limiting the maximum RF output power

- for GSM see `<PL_limit2g>`,

- for LTE see `<PL_limit4g>`.

For GSM, a second parameter, `<PL_limit_psk>`, is required to set the RF output power limit for GSM 8 PSK. The RF output power limit for a GSM band is related to one transmit timeslot. If two/three/four timeslots are used for transmission the specified power limit is reduced by another 3 / 4.8 / 6 dB.

Changes take effect immediately. For an example on how to configure and trigger instant power limitation see below *Example* section.

"0"(P)	Power limitation deactivated (no further parameters are possible).
"1"	Power limitation activated. <code><PL_profile></code> parameter is mandatory for activation.
"2"	Query profile settings. The response shows the currently used limit values if instant power limitation is active, i.e. if <code><PL_mode>= 1</code> . Therefore, bear in mind that modified profile values will be visible only if you restart the UE and run a query before activating instant power limitation. You can read either all profiles, or a specific profile by adding a <code><PL_profile></code> number.
"3"	Configure profile. All parameters are mandatory. Remember to restart the UE after changing the output power limits of a profile.

`<PL_profile>`^(str)

Power Limitation Profile

This parameter identifies a profile.

When no profile is activated `<PL_mode>` "0" is returned and if any profile is activated `<PL_mode>` "1" and `<PL_profile>` "1" ... "8" is returned in read command.

"1"..."8" Number of profile.

`<PL_band2g>`^(str)

Radio Band 2G

Parameter specifies the 2G frequency bands of the UE in *hexadecimal 32-bit-value order*. Every bit corresponds to a dedicated band number.

"1"	GSM 900
"2"	GSM 1800



"4"	GSM 850
"8"	GSM 1900

<PL_band4g-1>^(str)

Radio Band 4G First Part

Parameter specifies the 4G frequency bands of the UE in *hexadecimal 32-bit-value order*. Every bit corresponds to a dedicated band number. Value <PL_band4g-1> supports band 1 to band 32.

"0"	Must be used when setting any value for <PL_band4g-2> (parameter is mandatory).
"1"	LTE 2100 (B1)
"2"	LTE 1900 (B2)
"4"	LTE 1800 (B3)
"8"	LTE 1700 (B4)
"10"	LTE 850 (B5). (B6) is a true sub-band of (B5) with same uarfcn. (B5) and (B6) always switched simultaneous.
"40"	LTE 2600 (B7)
"80"	LTE 900 (B8)
"80000"	LTE 800 (B20)
"8000000"	LTE 700 (B28)

<PL_band4g-2>^(str)

Radio Band 4G Second Part

Parameter specifies the 4G frequency bands of the UE in *hexadecimal bit-value order*. Every bit corresponds to a dedicated band number. <PL_band4g-2> specifies band 33 to band 85 (if supported by UE).

"0"	Must be used when setting any value for <PL_band4g-1> (parameter is mandatory).
"20"	LTE 2600 (B38)
"80"	LTE 2350 (B40)
"100"	LTE 2550 (B41)
"200000000"	LTE 1745 (B66)

<PL_limit2g>^{(str)(NV)}

Power Limitation 2G

This parameter is used to set the power limit.

Setting takes effect after next restart.

Please note that the configuration of <PL_limit2g> also affects Power Limitation 8 PSK (only for GSM)

<PL_limit_psk>.

"18"... "33"	Power limit value in dBm for GSM low bands.
"18"... "30"	Power limit value in dBm for GSM high bands.

<PL_limit4g>^{(str)(NV)}

Power Limitation 4G

This parameter is used to set the power limit.

Setting takes effect after next restart.

"18"... "23"	Power limit value in dBm for LTE bands.
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`<PL_limit_psk>^(str)(NV)`

Power Limitation 8 PSK (only for GSM)

This parameter is used to set the power limit 8 PSK.

This parameter is available for compatibility reasons and has no functional influence.

Please note that the configuration of Power Limitation 8 PSK is affected by the configuration of `<PL_limit2g>`.

"18"... "27" Power limit value in dBm only for GSM 8 PSK low bands.

"18"... "26" Power limit value in dBm only for GSM 8 PSK high bands.

`<ropr>^(str)(NV)`

Radio Output Power Reduction

According to 3GPP TS 45.005, it is permissible to reduce the the maximum (E)GPRS output power. The amount of the maximum (E)GPRS power reduction is configurable for the case of 4TX.

Setting takes effect after next restart.

"0" No power reduction with GMSK and 8PSK.

"1" 2 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.

"2" 4 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.

"3" 6 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.

"4"^(D) Max. power reduction for GMSK and 8PSK (6dB for 4 Tx).

`<RemWakePortSet>^(str)(NV)`

Set of ports signaling Remote Wakeup Events

The `<RemWakePortSet>` parameter specifies whether the "RemoteWakeUp/Ports" configuration set with `<RemWakePort>` is volatile or non-volatile.

"current" The currently used configuration (volatile).

"powerup" The configuration used after powerup or restart (non-volatile).

`<RemWakePort>^(str)`

Port

Only ports listed with `<RemWakePort>` try to wake up the TE.

"acm0"^(D) Refers to USB0

"acm1"^(D) Refers to USB1

"acm2"^(D) Refers to USB2

"ecm"^(D) Refers to ECM



`<sslot>(str)(+CSCS)(NV)`

USIM switch

This parameter determines which network/subscription to use.

In case a user decides to switch the active subscription, the currently active card is logically removed, and powered down. After that, the second USIM is connected physically and logically and powered up. Changing the active USIM causes the UE to register to a network with prior derigistration.

The first USIM and second USIM do not share the same PDP context defined. The PDP context needs to be re-defined when switching the USIM.

For detailed information please refer to AN87 "Smart Network Switching".

If `<sdm>=1`:

"0" ^(D)	First USIM slot enabled. Always active when USIM Dual Mode is disabled (<code><sdm>=0</code>)
"3"	Second USIM slot enabled.

If `<sdm>=2`:

"SIM1" ^(D)	First USIM slot enabled. Always active when USIM Dual Mode is disabled (<code><sdm>=0</code>)
"SIM3"	Second USIM slot enabled.

For eSIM option only (`<sdm>=2`):

"SIM1"	First USIM slot enabled.
"SIM3" ^(D)	The eSIM interface enabled.

`<sdm>(str)(+CSCS)(NV)`

USIM Dual Mode

This parameter enables / disables USIM Dual Mode.

If USIM Dual Mode is enabled the UE is capable of quickly switching between two networks/subscriptions using the subcommand `AT+SCFG="SIM/CS",<sslot>`.

Two USIMs can be connected to the UE either via module's two internal SIM interfaces or via multiplexer connected to module's first SIM interface and driven by GPIO8. GPIO8 has to be reconfigured via `AT+SCFG="GPIO/mode/FNS", "std"` before USIM Dual Mode with multiplexer can be enabled, see parameter `<g_mode>`.

Each subscription has its own USIM card. It is possible to connect USIM cards with different voltage classes and different connection speeds.

At any given moment only one of the subscriptions is active, i.e. any MO request to the network is done in the account assigned to the currently active USIM card.

The first USIM and second USIM do not share the same PDP context defined. The PDP context need to be re-defined when switching the USIM. For detailed information please refer to AN87 "Smart Network Switching".

"0" ^(D)	USIM Dual Mode disabled.
"1"	USIM Dual Mode enabled, using the external SIM multiplexer which is controlled by GPIO8.
"2"	USIM Dual Mode enabled, using the module's first and second physical SIM interface. For eSIM option: USIM Dual Mode is enabled by default. The eSIM interface is available, and can be switched to the first physical SIM interface.

`<tcpMr>(str)(NV)`

Maximum Number of Retransmissions (MR)

"1"... "10" ^(D) ... "12"	The <code>AT+SCFG "Tcp/MR"</code> subcommand determines the maximum number of times to retransmit TCP packets. The value set with <code><tcpMr></code> will be assumed as default for the <code><srvParm-Tag> "tcpMR"</code> when a new service profile is created with <code>AT+SISS</code> . In each
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service profile, you can set another "tcpMR" value which has precedence over the global value set with [AT^SCFG](#). Existing service profiles are not affected when you change the global value via [AT^SCFG](#). Use of default value is recommended.

`<tcpOt>^(str)(NV)`

Overall TCP Timer for outstanding connections (tcpOT)

"1"... "6000"^(D)

The [AT^SCFG](#) "Tcp/OT" subcommand specifies the number of seconds to wait before closing a connection if TCP/IP packets are not acknowledged.

Setting the maximum value is practically equivalent to deactivating the tcpOT mechanism because the maximum time would never be reached by the TCP/IP stack.

The two [AT^SCFG](#) subcommands "Tcp/OT" and "Tcp/MR" are related to each other. When a packet has to be retransmitted, the TCP/IP stack starts an internal TCP timer to wait for an ACK. Each retransmission attempt for a packet is triggered at a time stamp incrementing from `<tcpirt>*(2,4,8,16,32,64 to 128s)`, where `<tcpirt>*128s` is the maximum. As a result, the entire timeout would equal (`<tcpOt>` value) + (`<tcpirt>*128s` or less). For this reason the "SIS: connection timed out" URC may be reported later than set with `<tcpOt>`, in the worst case `<tcpirt>*128s` later.

The value set with `<tcpOt>` will be assumed as default for the `<srvParm-Tag>` "tcpOT" when a new service profile is created with [AT^SISS](#). However, in each service profile, you can set another "tcpOT" value which has precedence over the global value set with [AT^SCFG](#). Existing service profiles are not affected when you change the global value via [AT^SCFG](#). Use of default value is recommended.

`<tcpirt>^(str)(NV)`

Initial Retransmission Timeout

"1"... "60"

Parameter controls the initial retransmission timeout used by TCP on each new connection. Special care must be taken when selecting the value because setting large value will dramatically increase the amount of time that it takes for a TCP connection attempt to fail, if target IP address does not exist. Default value is set to 3 seconds.

`<tcpWithUrc>^(str)(NV)`

URC mode or polling mode for Internet service commands

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

"on"^(D)

Enable URCs related to Internet service commands.

Throughout the Chapter "Internet Service AT Commands" the mode is also referred to as URC mode.

"off"

Disable URCs related to Internet service commands.

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

`<TLS_min_version>^(str)(NV)`

Minimum TLS Version allowed

This parameter sets the accepted minimum TLS version for IPoverAT services.

"MIN"

Automatic minimum

"1.1"

TLSv1.1 (DTLSv1.0)



"1.2" ^(D)	TLSv1.2
"1.3"	TLSv1.3 (DTLSv1.2)
"MAX"	Automatic maximum

<TLS_max_version>^{(str)(NV)}

Maximum TLS version allowed

This parameter sets the accepted maximum TLS version for IOverAT services. Must be equal or greater than <TLS_min_version>.

"1.2"	TLSv1.2
"1.3"	TLSv1.3 (DTLSv1.2)
"MAX" ^(D)	Automatic maximum

<usbDeviceDescr>^{(str)(NV)}

Device Descriptor

Parameter determines whether to use the UE's standard USB Device Descriptor configuration (default) or a Device Descriptor configuration customized by the Customer Application manufacturer. Setting takes effect after next restart.

"0" ^(D)	Standard USB Device Descriptor of the UE. If <usbDeviceDescr>=0 is set all other parameters related to "Serial/USB/DDD" cannot be changed.
"1"	Customer specific USB Device Descriptor. If <usbDeviceDescr>=1 is set all other parameters related to "Serial/USB/DDD" can be changed. Customizing the USB Device Descriptor configuration requires a unique Vendor ID obtained from the USB Implementers Forum. For information please refer to http://www.usb.org .

<usbDescrIndex>^{(str)(NV)}

Descriptor Index

"0" ^(D)	Not to be changed. Use always 0.
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<usbLangId>^{(str)(NV)}

Language ID

Language ID as defined by USB.ORG [51]. Parameter shall be given in HEX format, maximum 4 characters, and cannot be set to 0. ELS62-W supports only language ID "0409" (English) which cannot be changed.

<usbVendorId>^{(str)(NV)}

Vendor ID

This parameter represents the Vendor ID obtained from the USB Implementers Forum. The Vendor ID will, together with the Product ID, be transmitted to the host during USB enumeration. Parameter shall be given in HEX format, maximum 4 characters. It can be changed only if <usbDeviceDescr> equals 1. Setting takes effect after next USB interface enumeration.



<usbProductId>^{(str)(NV)}

Product ID

Product ID (PID) defined by the Customer Application manufacturer to identify the USB device. The Product ID will, together with the Vendor ID, be transmitted to the host during USB enumeration. Parameter shall be given in HEX format, maximum 4 characters. It can be changed only if <usbDeviceDescr> equals 1. Setting takes effect after next USB interface enumeration.

<usbManufacturer>^{(str)(NV)}

Manufacturer name

Optional manufacturer string defined by the Customer Application manufacturer. Parameter length: maximum 63 characters. It can be changed only if <usbDeviceDescr> equals 1. Setting takes effect after next USB interface enumeration.

<usbProduct>^{(str)(NV)}

Product string

Optional product name defined by the Customer Application manufacturer.

Parameter length: maximum 63 characters. It can be changed only if <usbDeviceDescr> equals 1. Setting takes effect after next USB interface enumeration.

<usbSerialNo>^{(str)(NV)}

Device's serial number

Optional serial number. Empty string if not used, like in the case of the UE's standard USB Device Descriptor configuration. A serial number enables the host to assign the same virtual COM port to the USB device even though the device is connected to another USB port. This eliminates the need for the host to load the driver again. Parameter length: maximum 8 characters. It can be changed only if <usbDeviceDescr> equals 1. Setting takes effect after next USB interface enumeration.

<urcRinglineCfg>^{(str)(NV)}

Parameter specifies the ring line to be used for signaling URCs both for idle interface and while interface is reserved, i.e. while busy on AT command execution or data transmission. See also parameter <ringline-Sig>.

For details about URC presentation and related hardware signalization refer to Section 1.8, [Unsolicited Result Code Presentation](#). For details on using the RING0 line to wake up the TE refer to "ELS62-W Hardware Interface Description, Revision 02.200".

"off"	URCs do not activate a ring line.
"local" ^(D)	Ring line will be activated on the same device where the URC appears: This is the RING0 line (active low) if the URC appears on ASC0 device and a virtual ring line if the URC appears on a USB related device.
"asc0"	RING0 line will be activated (low active) when an URC is sent on the current AT command port.

<urcRinglineDuration>^{(str)(NV)}

Parameter determines how long the ring line shall be activated for URC signalization. The type of ring line depends on parameter <urcRinglineCfg>.

For details about URC presentation and related hardware signalization refer to Section 1.8, [Unsolicited Result Code Presentation](#).

"0"	Ring line will be activated for 7ms
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- "1" Ring line will be activated for about 100ms.
- "2"(D) Ring line will be activated for about 1s.

<urcRinglineFilter>(str)(NV)

Parameter determines the types of URCs allowed to toggle the Ring line in the way specified with parameter <urcRinglineCfg> of the AT^SCFG subcommand "URC/Ringline". It is possible to set a single <urcRinglineFilter> value, or a combination, such as AT^SCFG="URC/Ringline/SelWUrc","RING","+CMT".

- "all"(D) All types of URCs are allowed to toggle the Ring line.
- "RING" Only call related URCs ("RING" and "+CRING") are allowed to toggle the Ring line.
- "+CMT" Only SMS related URCs ("CMT" and "+CMTI") are allowed to toggle the Ring line.

<mode>(str)

This parameter configure execution conditions for SAT proactive command refresh.

- "0"(P) SAT Refresh always executed
- "2" SAT Refresh always rejected

Examples

EXAMPLE 1

The example shows how to activate or deactivate output power limitation using the AT^SCFG "Radio/Mtpl" command.

See parameters <PL_mode> and <PL_profile>.

^SYSSTART	
AT^SCFG="Radio/Mtpl"	Read "Radio/Mtpl" mode.
^SCFG: "Radio/Mtpl","0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl",1,1	Activate Profile 1.
^SCFG: "Radio/Mtpl","1","1"	Instant power limitation is now enabled with profile 1.
OK	
AT^SCFG="Radio/Mtpl",1,2	Switch profiles, and activate profile 2.
^SCFG: "Radio/Mtpl","1","2"	Instant power limitation is now enabled with profile 2, still using delivery default values.
OK	
AT^SCFG="Radio/Mtpl",0	Deactivate instant power limitation.
^SCFG: "Radio/Mtpl","0"	Instant power limitation is now disabled.
OK	

EXAMPLE 2

The example shows how to query or configure output power limitation using the AT^SCFG "Radio/Mtpl/2G" subcommand.

See parameters <PL_mode>, <PL_profile>, <PL_band2g>, <PL_limit2g>, <PL_limit_psk>.

^SYSSTART	
AT^SCFG="Radio/Mtpl/2G"	Read "Radio/Mtpl/2G" mode.
^SCFG: "Radio/Mtpl/2G","0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl/2G",2,1	Query profile 1 settings. Delivery default settings are shown:
^SCFG: "Radio/Mtpl/2G","2","1","00000001",,"33","27"	
^SCFG: "Radio/Mtpl/2G","2","1","00000002",,"30","26"	
^SCFG: "Radio/Mtpl/2G","2","1","00000004",,"33","27"	
^SCFG: "Radio/Mtpl/2G","2","1","00000008",,"30","26"	
OK	



AT^SCFG="Radio/Mtpl/2G",3,1,1,,25,20	Profile 1: Configure max. RF output power limit of GSM 900 band to 25dBm and 8PSK to 20dBm. Instant power limitation is still disabled.
^SCFG: "Radio/Mtpl/2G","0"	
OK	
AT^SCFG="Radio/Mtpl/2G",3,1,2,,25,20	Profile 1: Configure max. RF output power limit of GSM 1800 band to 25dBm and 8PSK to 20dBm. Instant power limitation is still disabled.
^SCFG: "Radio/Mtpl/2G","0"	
OK	
AT^SCFG="Radio/Mtpl/2G",3,1,4,,25,20	Profile 1: Configure max. RF output power limit of GSM 850 band to 25dBm and 8PSK to 20dBm. Instant power limitation is still disabled.
^SCFG: "Radio/Mtpl/2G","0"	
OK	
AT^SCFG="Radio/Mtpl/2G",3,1,8,,25,20	Profile 1: Configure max. RF output power limit of GSM 1900 band to 25dBm and 8PSK to 20dBm. Instant power limitation is still disabled.
^SCFG: "Radio/Mtpl/2G","0"	
OK	
AT^SCFG="Radio/Mtpl/2G",2,1	Query profile 1 settings.
.....	The response returns the old values as above (therefore omitted in this example).
AT+CFUN=1,1	Restart UE to enable the profile 1 settings configured above.
OK	
^SYSSTART	
AT^SCFG="Radio/Mtpl"	Read "Radio/Mtpl" mode.
^SCFG: "Radio/Mtpl","0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl/2G",2,1	Query profile 1 settings. Changed values are shown now.
^SCFG: "Radio/Mtpl/2G","2","1","00000001",,"25","20"	
^SCFG: "Radio/Mtpl/2G","2","1","00000002",,"25","20"	
^SCFG: "Radio/Mtpl/2G","2","1","00000004",,"25","20"	
^SCFG: "Radio/Mtpl/2G","2","1","00000008",,"25","20"	
OK	
AT^SCFG="Radio/Mtpl",1,1	Activate Profile 1.
^SCFG: "Radio/Mtpl","1","1"	Instant power limitation is now enabled with profile 1 and new limits as changed above.
OK	
AT^SCFG="Radio/Mtpl",1,2	Switch profiles, and activate profile 2.
^SCFG: "Radio/Mtpl","1","2"	Instant power limitation is now enabled with profile 2, still using delivery default values.
OK	
AT^SCFG="Radio/Mtpl",0	Deactivate instant power limitation.
^SCFG: "Radio/Mtpl","0"	Instant power limitation is now disabled.
OK	

EXAMPLE 3

The example shows how to query or configure output power limitation using the `AT^SCFG "Radio/Mtpl/4G"` subcommand.

See parameters `<PL_mode>`, `<PL_profile>`, `<PL_band4g-1>`, `<PL_band4g-2>`, `<PL_limit4g>`.

^SYSSTART	
AT^SCFG="Radio/Mtpl/4G"	Read "Radio/Mtpl/4G" mode.
^SCFG: "Radio/Mtpl/4G","0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl/4G",2,1	Query profile 1 settings. Delivery default settings are shown:
^SCFG: "Radio/Mtpl/4G","2","1","00000001","00000000","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00000002","00000000","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00000004","00000000","23"	



<pre> ^SCFG: "Radio/Mtpl/4G", "2", "1", "00000008", "00000000", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "00000010", "00000000", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "00000040", "00000000", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "00000080", "00000000", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "00080000", "00000000", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "08000000", "00000000", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "00000000", "00000020", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "00000000", "00000080", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "00000000", "00000100", "23" ^SCFG: "Radio/Mtpl/4G", "2", "1", "00000000", "20000000", "23" OK AT^SCFG="Radio/Mtpl/4G", 3,1,1,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B1 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,2,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B2 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,4,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B3 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,8,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B4 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,10,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B5 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,40,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B7 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,80,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B8 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,80000,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B20 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,8000000,0,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B28 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,0,20,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B38 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,0,80,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B40 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" OK AT^SCFG="Radio/Mtpl/4G", 3,1,0,100,23 </pre>	Profile 1: Configure max. RF output power limit of LTE B41 band to 23dBm.
<pre> Instant power limitation is still disabled. ^SCFG: "Radio/Mtpl/4G", "0" </pre>	Instant power limitation is still disabled.



OK	
AT^SCFG="Radio/Mtpl/4G",3,1,0,200000000,23	Profile 1: Configure max. RF output power limit of LTE B66 band to 23dBm.
^SCFG: "Radio/Mtpl/4G", "0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl/4G",2,1	Read profile 1 settings.
.....	The response returns the old values as above (therefore omitted in this example).
AT+CFUN=1,1	Restart UE to enable the profile 1 settings configured above.
OK	
^SYSSTART	
AT^SCFG="Radio/Mtpl/4G"	Read "Radio/Mtpl/4G" mode.
^SCFG: "Radio/Mtpl/4G", "0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl/4G",2,1	Read profile 1 settings. Changed values are shown now.
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000001", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000002", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000004", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000008", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000010", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000040", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000080", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00080000", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "08000000", "00000000", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000000", "00000020", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000000", "00000080", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000000", "00000100", "23"	
^SCFG: "Radio/Mtpl/4G", "2", "1", "00000000", "20000000", "23"	
OK	
AT^SCFG="Radio/Mtpl",1,1	Activate Profile 1.
^SCFG: "Radio/Mtpl", "1", "1"	Instant power limitation is now enabled with profile 1 and new limits as changed above.
OK	
AT^SCFG="Radio/Mtpl",1,2	Switch profiles, and activate profile 2.
^SCFG: "Radio/Mtpl", "1", "2"	Instant power limitation is now enabled with profile 2, still using delivery default values.
OK	
AT^SCFG="Radio/Mtpl",0	Deactivate instant power limitation.
^SCFG: "Radio/Mtpl", "0"	Instant power limitation is now disabled.
OK	



2.12 AT^SPOW Set UART Mode and SLEEP Mode on UART

AT^SPOW enables or disables the UE's UART interfaces ASC0 and ASC1 and controls SLEEP mode on both interfaces. Parameter settings are non-volatile and common for all interfaces but are not effective for USB.

If SLEEP mode is enabled on ASC0 and ASC1, keep in mind that the module's current consumption decreases only if USB is either disconnected at all, or in Suspend state with VUSB_IN line enabled.

Please refer to "[ELS62-W Hardware Interface Description, Revision 02.200](#)" for more information on power saving.

Syntax

Test Command
AT^SPOW=?
Response(s)
^SPOW: (list of supported <mode>s), (time range of <timeout>), (time range of <awake>)
OK
ERROR
+CME ERROR: <err>
Read Command
AT^SPOW?
Response(s)
^SPOW: <mode>, <timeout>, <awake>
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SPOW=<mode>, <timeout>, <awake>
Response(s)
OK
ERROR
+CME ERROR: <err>
PIN → Last
- + -

Parameter Description

<mode> ^(num) (NV)	
0	UART interfaces ASC0 and ASC1 are deactivated. Please note that the UART interfaces can only be reactivated by changing the <mode> setting again via the USB interface. Also, this setting does not save significantly more power than <mode>=2 with the corresponding <timeout> and <awake> settings.
1 ^(D)	UART interfaces ASC0 and ASC1 are activated.
2	UART interfaces ASC0 and ASC1 are in a power saving mode, i.e., in SLEEP mode.
<timeout> ^(num) (NV)	
0 ^(D)	Value 0 applies only to <mode>= 0 or 1. Note that the AT^SPOW? read command response value of <awake> is always equal 0 when power saving is off.



3...65535

In SLEEP mode (`<mode>=2`), time in milliseconds the UE remains awake after the last sent character.
 Minimum value: 3 ms, recommended 1000 ms. `<timeout>` values below 3 are denied with ERROR.
`<timeout>` value cannot be lower than `<awake>` value. If `<timeout>` is set to lower value than `<awake>` it will be automatically set to be equal `<awake>`.

`<awake>`(num)(NV)

0^(D)

Value 0 applies only to `<mode>=0` or 1. Note that the `AT^SPW?` read command response value of `<awake>` is always equal 0 when power saving is off.

3...255

In SLEEP mode (`<mode>=2`), active period of CTS0/CTS1 in milliseconds when UE is listening to paging messages from the base station and the AT command interface is enabled.
 Minimum and recommended value: 3 ms. Lower `<awake>` values are denied with ERROR. Setting a higher value is recommended only when the TE flow control is too slow.



2.13 AT+GCAP Capabilities List

[AT+GCAP](#) displays a list of basic capabilities supported by the ELS62-W. This allows the TE to determine which groups of extended-syntax AT commands can be used with the UE.

Syntax

Test Command	
AT+GCAP=?	
Response(s)	
OK	
Exec Command	
AT+GCAP	
Response(s)	
+GCAP: <name>	
OK	
PIN  Last	Reference(s)
+ + -	ITU-T V.250 [14]

Parameter Description

<name> ^(str)
e.g. +GCAP: +CGSM



3. Status Control Commands

The AT Commands described in this chapter allow the external application to obtain various status information from the ELS62-W.

3.1 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 PS attach or unsuccessful PDP context activation
- PS detach or PDP context deactivation

The release cause report **<report>** is a single line containing the cause information given by the 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>	
Write Command AT+CEER= <reset> Response(s) OK ERROR +CME ERROR	
PIN → Last + + -	Reference(s) 3GPP TS 27.007 [45] 3GPP TS 24.008 [39]



Parameter Description

<report>^(str)

release cause report

Reason for the last call release or call failure. See Section 3.1.1, [List of status codes for 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.

<reset>^(num)

0 Reset the extended error report to initial value.

3.1.1 List of status codes for extended error report

CS internal cause

0 Unknown

CS network cause

1 Unassigned/unallocated number

3 No route to destination

6 Channel unacceptable

8 Operator determined barring

16 Normal call clearing

17 User busy

18 No user responding

19 User alerting, no answer

21 Call rejected

22 Number changed

26 Non selected user clearing

27 Destination out of order

28 Invalid/incomplete number

29 Facility rejected

30 Response to status enquiry

31 Normal: unspecified

34 No circuit/channel available

38 Network out of order

41 Temporary failure

42 Switching equipment congestion

43 Access information discarded

44 Requested circuit/channel not available

47 Resources unavailable, unspecified

49 Quality of service unavailable

50 Requested facility not subscribed

55 Incoming calls barred within CUG

57 Bearer capability not authorized



CS network cause

- 58 Bearer capability not available
- 63 Service/option not available
- 65 Bearer service not implemented
- 68 ACM >= ACM max
- 69 Requested facility not implemented
- 70 Only RDI bearer is available
- 79 Service/option not implemented
- 81 Invalid transaction identifier value
- 87 User not member of CUG
- 88 Incompatible destination
- 91 Invalid transit network selection
- 102 Recovery on timer expiry
- 127 Interworking, unspecified

CS network reject

- 7 GPRS services not allowed
- 8 GPRS services and non-GPRS services not allowed
- 11 PLMN not allowed
- 12 Location Area not allowed
- 13 Roaming not allowed in this location area
- 14 GPRS services not allowed in this PLMN
- 15 No Suitable Cells In Location Area
- 22 Congestion
- 25 Not authorized for this CSG
- 111 unspecified

Other release cause

- 224 Call barring

PS LTE cause

- 8 Operator Determined Barring
- 26 Insufficient resources
- 27 Unknown or missing APN
- 28 Unknown PDN type
- 29 User authentication failed
- 30 Request rejected by Serving GW or PDN GW
- 31 Request rejected, unspecified
- 32 Service option not supported
- 33 Requested service option not subscribed
- 34 Service option temporarily out of order
- 35 PTI already in use
- 36 Regular deactivation
- 37 EPS QoS not accepted



PS LTE cause

- 38 Network failure
- 39 Reactivation required
- 40 Feature not supported
- 41 Semantic error in the TFT operation
- 42 Syntactical error in the TFT operation
- 43 Invalid EPS bearer identity
- 44 Semantic errors in packet filter(s)
- 45 Syntactical errors in packet filter(s)
- 46 EPS bearer context without TFT already activated
- 47 PTI mismatch
- 49 Last PDN disconnection not allowed
- 50 PDN type IPV4 only allowed
- 51 PDN type IPV6 only allowed
- 52 Single address bearers only allowed
- 111 Protocol errors

PS LTE local cause

- 7 EPS services not allowed
- 8 EPS services and non-EPS services not allowed
- 11 PLMN not allowed
- 12 Tracking Area not allowed
- 13 Roaming not allowed in this tracking area
- 14 EPS services not allowed in this PLMN
- 15 No Suitable Cells In Tracking Area
- 22 Congestion
- 25 Not authorized for this CSG
- 111 unspecified



3.2 AT^SCEER Extended Error Report

AT^SCEER exec command returns an extended error report regarding the reason of the last. The release cause report is a single line containing the cause group and reason given by the network in numeric format.

AT^SCEER write command resets the currently stored cause information and enables the user to activate indication of causes via URC.

Syntax

Test Command AT^SCEER=? Response(s) OK ERROR +CME ERROR: <err>	
Exec Command AT^SCEER Response(s) ^SCEER: <causeGroup>, <causeReason> OK ERROR +CME ERROR: <err>	
Write Command AT^SCEER=<errorStatus>, <reset> Response(s) ^SCEER:0, 0 OK ERROR +CME ERROR	
Write Command AT^SCEER=<URC>, <urcCtrl> Response(s) ^SCEER: <urcCtrl> OK ERROR +CME ERROR	
PIN → Last + - -	Reference(s) 3GPP TS 27.007 [45] 3GPP TS 24.008 [39]

Unsolicited Result Code

If [<urcCtrl>](#)=1, following URC shall be presented whenever a new cause occurs:

^SCEER: [<causeGroup>](#), [<causeReason>](#)



Parameter Description

<causeGroup>^(num)

Release Cause Group.

0	No Error.
1	CS Internal Cause.
2	CS Network Cause.
3	CS Network Reject.
6	Other Release Cause.
7	PS LTE Cause.
8	PS LTE Local Cause.
41	ITU Q.850 Release Cause.

<causeReason>^(num)

Release cause information given by the network in numeric format.

<errorStatus>^(str)

“errorStatus” Reset the extended error report to initial value.

<URC>^(str)

“URC” Enable the user to activate indication of causes via URC.

<urcCtrl>^(num)

0 ^(D)	^SCEER URC is off.
1	^SCEER URC is on.

<reset>^(num)

0 Reset the extended error report to initial value.

3.2.1 List of status codes for extended error report

Number	CS internal cause
0	unknown
1	Phone is offline
2	No service available
3	Network release, no reason given
4	Received incoming call
5	Client ended call
6	UIM not present
7	Access attempt already in progress
8	Access failure, unknown source
9	Concur service not supported by network
10	No response received from network
11	GPS call ended for user call



Number	CS internal cause
12	SMS call ended for user call
13	Data call ended for emergency call
14	Rejected during redirect or handoff
15	Lower-layer ended call
16	Call origination request failed
17	Client rejected incoming call
18	Client rejected setup indication
19	Network ended call
20	No funds available
21	No service available
22	Full service not available
23	Maximum packet calls exceeded
24	Video connection lost
25	Video setup failure
26	Video protocol closed after setup
27	Video protocol setup failure
28	Internal error

Number	CS network cause
1	Unassigned/unallocated number
3	No route to destination
6	Channel unacceptable
8	Operator determined barring
16	Normal call clearing
17	User busy
18	No user responding
19	User alerting, no answer
21	Call rejected
22	Number changed
26	Non selected user clearing
27	Destination out of order
28	Invalid/incomplete number
29	Facility rejected
30	Response to status enquiry
31	Normal, unspecified
34	No circuit/channel available
38	Network out of order
41	Temporary failure
42	Switching equipment congestion
43	Access information discarded
44	Requested circuit/channel not available
47	Resources unavailable, unspecified



Number	CS network cause
49	Quality of service unavailable
50	Requested facility not subscribed
55	Incoming calls barred within the CUG
57	Bearer capability not authorized
58	Bearer capability not available
63	Service/option not available
65	Bearer service not implemented
68	ACM >= ACM max
69	Requested facility not implemented
70	Only RDI bearer is available
79	Service/option not implemented
81	Invalid transaction identifier value
87	User not member of CUG
88	Incompatible destination
91	Invalid transit network selection
102	Recovery on timer expiry
127	Interworking, unspecified

Number	CS network reject
2	IMSI unknown in HLR
3	Illegal MS
4	IMSI unknown in VLR
5	IMEI not accepted
6	Illegal ME
7	GPRS services not allowed
8	GPRS and non GPRS services not allowed
9	MS identity cannot be derived
10	Implicitly detached
11	PLMN not allowed
12	Location area not allowed
13	Roaming not allowed
14	GPRS services not allowed in PLMN
15	No suitable cells in location area
16	MSC temporary not reachable
17	Network failure
20	MAC failure
21	Synch failure
22	Congestion
23	GSM authentication unacceptable
25	Not authorized for this CSG
28	SMS provided via GPRS in this routing area
32	Service option not supported



Number	CS network reject
33	Requested service option not subscribed
34	Service option temporary out of order
38	Call cannot be identified
40	No PDP context activated
48	Retry upon entry into a new cell minimum value
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type non-existent
98	Message type not compatible with state
99	Information element non-existent
100	Conditional information element error
101	Message not compatible with state
111	Protocol error, unspecified

Number	Other release cause
55	Call Barred

Number	PS LTE cause
8	Operator Determined Barring
26	Insufficient resources
27	Unknown or missing APN
28	Unknown PDN type
29	User authentication failed
30	Request rejected by ServingGW or PDN GW
31	Request rejected, unspecified
32	Service option not supported
33	Requested service option not subscribed
34	Service option temporarily out of order
35	PTI already in use
36	Regular deactivation
37	EPS QoS not accepted
38	Network failure
39	Reactivation required
41	Semantic error in the TFT operation
42	Syntactical error in the TFT operation
43	Invalid EPS bearer identity
44	Semantic errors in packet filter(s)
45	Syntactical errors in packet filter(s)
46	EPS bearer context without TFT already activated
47	PTI mismatch
49	Last PDN disconnection not allowed
50	PDN type IPV4 only allowed



Number	PS LTE cause
51	PDN type IPV6 only allowed
52	Single address bearers only allowed
53	ESM information not received
54	PDN connection does not exist
55	Multiple PDN connection for given APN not allowed
56	Collision with network initiated request
59	Unsupported QCI value
81	Invalid PTI value

Number	PS LTE local cause
2	IMSI unknown in HSS
3	Illegal UE
5	IMEI not accepted
6	Illegal ME
7	EPS services not allowed
8	EPS services and non-EPS services not allowed
9	UE identity cannot be derived by the network
10	Implicitly Detached
11	PLMN not allowed
12	Tracking area not allowed
13	Roaming not allowed in this tracking area
14	EPS services not allowed in this PLMN
15	No Suitable cells in tracking area
16	MSC temporarily not reachable
17	Network failure
18	CS Domain Not available
19	ESM failure
20	MAC failure
21	Synch failure
22	Congestion
23	UE security capabilities mismatch
24	Security mode rejected, unspecified
25	Not Authorized for this CSG
26	Non-EPS authentication unacceptable
35	Requested service option not authorized in this PLMN
38	CS fallback call EST not allowed
39	CS domain temporarily not allowed
40	No EPS bearer context activated
43	Unknown EPS bearer context
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type non-existent or not implemented



Number	PS LTE local cause
98	Message type not compatible with the protocol state
99	Information element non-existent or not implemented
100	Conditional IE error
101	Message not compatible with the protocol state
111	Protocol error, unspecified



3.3 AT^SIND Extended Indicator Control

AT^SIND controls the presentation of indicator event URCs. You can enable or disable URCs to be issued by the ELS62-W each time 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>="nitz"

^SIND: nitz, <mode>, <nitzUT>, <nitzTZ>[, <nitzDST>]

In case of <indDescr>="lsta"

^SIND: lsta, <mode>, <lstaLevel>

In case of <indDescr>="ceer"

^SIND: ceer, <mode>, <ceerRelCauseGroup>₁[, <ceerRelCauseGroup>₂[, ...]]

In case of <indDescr>="dtmf"

^SIND: dtmf, <mode>, <dtmfSrc>

In case of <indDescr>="is_cert"

^SIND: is_cert, <mode>[, <srvProfileId>, <issuer>, <serialNumber>, <subject>, <signatureAlgorithm>, <thumbprintAlgorithm>, <thumbprint>]

In case of <indDescr>="is_psk"

^SIND: is_psk, <mode>[, <srvProfileId>, <pskurl>, <pskid>, <pskhint>, <certificate>]

In case of <indDescr>="simstatus"

^SIND: simstatus, <mode>

In case of <indDescr>="imsi"

^SIND: imsi, <mode>

OK

ERROR

+CME ERROR: <err>

Write Command

AT^SIND=<indDescr>, <mode>

Response(s)

^SIND: <indDescr>, <mode>[, <indValue>]



Write Command

(Continued)

AT^SIND=<indDescr>, <mode>

Response(s)

In case of: <indDescr>="nitz" and <mode>=2

^SIND: nitz, <mode>, <nitzUT>, <nitzTZ>[, <nitzDST>]

In case of: <indDescr>="is_cert" and <mode>=1 or 2:

^SIND: is_cert, <mode>[, <srvProfileId>, <issuer>, <serialNumber>, <subject>, <signatureAlgorithm>, <thumbprintAlgorithm>, <thumbprint>]

In case of <indDescr>="is_psk" and <mode>=2:

^SIND: is_psk, <mode>[, <srvProfileId>, <pskurl>, <pskid>, <pskhint>, <certificate>]

OK

ERROR

+CME ERROR: <err>

Write Command

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

Response(s)

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

OK

ERROR

+CME ERROR: <err>

Write Command

AT^SIND="ceer", <mode>[, <ceerRelCauseGroup>]

Response(s)

^SIND: ceer, <mode>, <ceerRelCauseGroup>₁[, <ceerRelCauseGroup>₂[, ...]]

OK

ERROR

+CME ERROR: <err>

Write Command

AT^SIND=dtmf, <mode>[, <dtmfSrc>]

Response(s)

^SIND: dtmf, <mode>, <dtmfSrc>

ERROR

+CME ERROR: <err>

Write Command

AT^SIND="ceer", <mode>[, <ceerRelCauseGroup>]

Response(s)

^SIND: ceer, <mode>, <ceerRelCauseGroup>₁[, <ceerRelCauseGroup>₂[, ...]]

OK

ERROR

+CME ERROR: <err>

PIN → 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 "simdata" indicator follows the AT^SSTGI response:

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

This URC is issued when the UE receives a USAT Proactive Command (PAC) from the (U)SIM Application, e.g. indicating that the content of one or more Elementary Files has been changed.

Additionally, independent of Remote-USAT modes, a "+CIEV: "simdata"" URC is issued if REFRESH command processing fails. The reason may be derived from <status> and <statAddInfo> values.

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

URC 3

Format of the "nitz" indicator:

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

URC 4

Format of the "lsta" indicator:

In case <indValue> equals "0" or <indValue> equals "2".

+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.

URC 6

In case <indValue> equals "21".

+CIEV: <indDescr>, <indValue>, <lstaFrRep>, <lstaBandScnd>, <lstaFrMin>, <lstaFrMax>, <lstaMin>, <lstaMax>, <lstaMean>, <lstaGrade>

After radio link loss the URC provides some statistic parameters of signal strength distribution across the band.

URC 7

Format of the "ceer" indicator:

+CIEV: <indDescr>, <ceerRelCauseGroup>, <ceerReport>

URC 8

Format of the "dtmf" indicator:



+CIEV: [<indDescr>](#), [<dtmfChar>](#), [<dtmfSrc>](#)

DTMF characters are enclosed in quotation marks "...". The URC is sent when the DTMF tone detected.

Refer to [<indDescr>](#), "dtmf".

URC 9

Format of the "is_cert" indicator:

+CIEV: [<indDescr>](#), [<srvProfileId>](#), [<issuer>](#), [<serialNumber>](#), [<subject>](#),
[<signatureAlgorithm>](#), [<thumbprintAlgorithm>](#), [<thumbprint>](#)

The URC is issued after opening a secure Internet connection with [AT^SISO](#).

URC 10

Format of the "is_psk" indicator:

+CIEV: [<indDescr>](#), [<srvProfileId>](#), [<pskurl>](#), [<pskid>](#), [<pskhint>](#), [<certificate>](#)

The URC is issued after opening a secure Internet connection with [AT^SISO](#) if server select PSK mode.

Parameter Description

[<indDescr>](#)^(str)

This section describes [<indDescr>](#) values and their associated [<indValue>](#) ranges.

For command input on the [AT^SIND](#) write command line [<indDescr>](#) values are handled as string type. In responses and URCs [<indDescr>](#) values are output without quotation marks.

"service"	Service availability: 0 Not registered to any network. 1 Registered to home network or, if "roam"=1 then registered to another network.
"message"	Unread short message at memory location <mem1> . Refer to AT+CPMS . 0 No unread message(s) available. 1 Unread message(s) available.
"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.
"rsqi"	Received signal (field) strength: 0 Signal strength $\leq$ -112 dBm 1 - 4 Signal strength in 15 dB steps 5 Signal strength $\geq$ -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.
"simdata"	If the UE has Remote-USAT set to Automatic Response mode the (U)SIM Application activity is handled internally; for details refer to AT^SSTA , parameter <mode> . However, it is necessary for the Customer Application (TE) to be informed about some types of ongoing Proactive Commands (PAC) with their content and status. Therefore, AT^SIND="simdata" provides URC notification for PAC type REFRESH: PAC REFRESH is sent by the (U)SIM Application to notify the UE of changes to Elementary File(s) data on the (U)SIM. All data provided by the USIM is stored in one of many of its so-called Elementary Files. This data can be queried by the TE directly via AT+CRSM or implicitly via many AT



commands presented by this document. For instance the (U)SIM's International Mobile Subscriber Identity (IMSI) can be queried via [AT+CIMI](#), but actually is stored in EF_{IMSI}, as defined in 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17].

However, be aware that the content of any Elementary File can be changed at any time by the network provider or the (U)SIM Application. For details refer to [USAT](#) feature "Data Download to USIM" in 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [21]. If this happens the TE urgently needs to refresh its own copy of the changed data to ensure its safe and consistent use!

Therefore, "+CIEV: "simdata"" URCs can be enabled in both [Remote-USAT](#) modes (Autoreponse mode and Explicit Response mode) indicating that the content of one or more Elementary Files has been changed.

One "+CIEV: "simdata"" URC is generated, containing PAC data and Terminal Response.

The UE provides a limited storage to keep numerous "simdata" events received while [AT^SIND](#) setting was not enabled or UE-TE link was reserved, e.g. in online data mode. In case of storage overflow a special URC "+CIEV: "simdata",1,254" will be issued.

"nitz"

Network Identity and Time Zone:

This indicator shows the time relevant information elements of an MM Information (MMI) or GMM Information (GMMI) message received from the network (see 3GPP TS 24.008 [39], 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 day-light 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 UE detaches from network. Also when a manual network selection fails and the UE 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"	USIM status: 0 USIM removed. Note: Another way to verify the USIM connection is the "^SCKS" URC enabled with AT^SCKS. 1 USIM inserted. 3 USIM PIN required - USIM locked. USIM PIN must be entered to enable ELS62-W to register to the network. 5 USIM initialization completed - UE has finished reading USIM data. Note: If SIM is changed between lock and unlock status, the simstatus value will be updated after module restart.
"simtray"	Indication of USIM tray status as indicated by CCIN line. Result does not depend on whether the tray holds a USIM or not. Generating a URC on status change is not supported. 0 USIM tray empty. 1 USIM tray plugged in.
"psinfo"	Packet Switched status: "psinfo" indicates the status of the UE 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 16 Camped on E-UTRAN capable cell 17 Attached in E-UTRAN capable cell
"lsta"	Link Stability indication (for GSM): The Link Stability indicator feature allows the ELS62-W 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. 2 Radio link error during voice call. 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 Error Downcounter value is only available in IDLE mode or during voice calls or during CS data connections. It will not be presented during PS connections. The factor on which Error Downcounter is decremented depends on network settings. Error Downcounter value 0 means that the UE 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>. Link Stability indication (for LTE): URC is issued for statistic parameters of signal strength distribution across the band. 21 Radio link signal strength distribution. If UE is out of service the URC with <indValue> equals "21" will be output for each scan.



It includes statistic parameters of signal strength distribution across the band.

"iccid"	USIM identification number: "iccid" indicator shows the USIM identification number stored in the USIM Elementary File EF_{ICCID}. The AT^SIND test command indicates the maximum length of the "iccid" <indValue>.
"euiccid"	USIM embedded identification number: "euiccid" indicator shows the USIM embedded identification number stored in the USIM Elementary File EF_{EUICCID}. The AT^SIND test command indicates the maximum length of the "euiccid" <indValue>.
"imsi"	International Mobile Subscriber Identity: The "imsi" indicator shows the IMSI stored in the USIM Elementary File EF_{IMSI}. The AT^SIND test command indicates the maximum length of the "imsi" <indValue>. Note: If SIM is changed between lock and unlock status, the imsi value will be updated after module restart.
"ceer"	Extended Error Report: "ceer" delivers an extended error / release cause report as a single line containing the cause information given by the network in textual format. The URC "CIEV: ceer,<ceerRelCauseGroup>,<ceerReport>" shows the same information as the standard command AT+CEER. If enabled the indicator will show up each time when a release cause is detected, whereas AT+CEER only polls the release cause of the latest event. The major benefit is that "ceer" URCs can be used for better analysis and tracing.
"dtmf"	DTMF character indication If enabled with parameter <mode>=1, a DTMF character is shown as "dtmf" URC when the DTMF tone detected in a voice call. The source of DTMF can only be the network <dtmfSrc>= 1. Additionally when DTMF source is network, it is strongly recommended to activate audio mode: <audMode>=6 set with AT^SNFS. Example for a DTMF character: +CIEV: dtmf,"*",1
"is_cert"	Report details of the server certificate used for a secure Internet connection opened with AT^SISO. The following certificate details are listed: <srvProfileId>, <issuer>, <serialNumber>, <subject>, <signatureAlgorithm>, <thumbprintAlgorithm>, <thumbprint> Detailed guidelines for managing the required certificates can be found in [6]. See also AT commands AT^SISS, AT^SBNR and AT^SBNW.
"is_psk"	Report details of the server Pre-SharedKey information used for a secure Internet connection opened with AT^SISO. The following PSK details are listed: <srvProfileId>, <pskurl>, <pskid>, <pskhint>, <certificate>, Detailed guidelines for managing the required PSK can be found in [6]. See also AT commands AT^SISS, AT^SSECUC.

[<indValue>](#)^(num)

Integer type value as specified above for the corresponding [<indDescr>](#).



<mode>^(num)

Set or query URC presentation mode of a specific indicator <indDescr>.

- | | |
|------------------|---|
| 0 ^(P) | Disables the presentation of a specific URC. |
| 1 | Enables the presentation of a specific URC.
The URC will be buffered in the UE when the UE-TE link is reserved (e.g. in online data mode), and flushed to the TE when the UE-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. |

<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. Displayed only when received from network. 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>.

<lstaFrRep>^(num)

Number of reported frequencies. Refer to <indDescr>.

<lstaBandScnd>^(num)

Scanned band. Refer to <indDescr>.

<lstaFrMin>^(num)

Refer to <indDescr>.

4G:

Lowest DL EARFCN reported in the scan. Please see 3GPP TS 36.101 [48] chapter 5.4.4.

<lstaFrMax>^(num)

Refer to <indDescr>.

4G:

Highest DL EARFCN reported in the scan. Please see 3GPP TS 36.101 [48] chapter 5.4.4.

<lstaGrade>^(num)

Value in dBm.

Grade derived from the <lstaMean> value of the power scan results. Provides values of received signal strength.

Use the following formula in order to calculate <lstaGrade>: ($\text{<lstaMean>} + 108 + 6$) / 6.

Refer to <indDescr> and to the resulting mapping table below:

RSSI measurement	Grade
RSSI <-108 dBm	grade=0
-108 dBm <RSSI <-102 dBm	grade=1
-102 dBm <RSSI <-96 dBm	grade=2

<ceerRelCauseGroup>^(num)

Release Cause Group.

To enable the URC "CIEV: ceer,<ceerRelCauseGroup>,<ceerReport>" activate <mode> "1", and either select single <ceerRelCauseGroup> values, or choose value "99" for all release causes.

For each single <ceerRelCauseGroup> value the AT^SIND write command needs to be executed. The responses of the AT^SIND write or read command, however, then will list all activated single values. If only one <ceerRelCauseGroup> or value 99 was activated, the AT^SIND write and read command responses contain just this one value. <ceerRelCauseGroup> value "0" can be used to clear all activated values.

0 ^(P)	Clear activated <ceerRelCauseGroup> values.
1	CS Internal Cause.
2	CS Network Cause.
3	CS Network Reject.
6	Other Release Cause.
7	PS LTE Cause.
8	PS LTE Local Cause.



- 41 ITU Q.850 Release Cause.
- 99 All Release Causes.
Note that if value "99" is set selecting a single release cause will have no effect.
Before activating single release cause values first set [<ceerRelCauseGroup>](#) "0".

[<ceerReport>](#)^(str)

Release cause information given by the network in textual format.

[<dtmfChar>](#)^(str)

DTMF character string of the "dtmf" URC.

[<dtmfSrc>](#)^{(num)(&W)}

Source of the DTMF signal. Refer to [<indDescr>](#), "dtmf".

1(&F)(D) DTMF source is network

[<srvProfileId>](#)^(num)

Internet service profile identifier. Refer to [AT^SIS](#), [<srvProfileId>](#).

[<issuer>](#)^(str)

Certificate's issuer. Refer to [<indDescr>](#).

[<serialNumber>](#)^(str)

Certificate's serial number. Refer to [<indDescr>](#).

[<subject>](#)^(str)

Certificate's subject. Refer to [<indDescr>](#).

[<signatureAlgorithm>](#)^(str)

Certificate's signature algorithm. Refer to [<indDescr>](#).

[<thumbprintAlgorithm>](#)^(str)

Certificate's thumbprint algorithm. Refer to [<indDescr>](#).

[<thumbprint>](#)^(str)

Certificate's thumbprint. Refer to [<indDescr>](#).

[<srvProfileId>](#)^(num)

Internet service profile identifier. Refer to [AT^SIS](#), [<srvProfileId>](#).

[<pskurl>](#)^(str)

URL of Pre-shared key. Refer to [<indDescr>](#).

[<pskid>](#)^(str)

PSK Identity. Refer to [<indDescr>](#).



`<pskhint>^(str)`

Optional. If server identity hint is in server exchange message. Refer to [<indDescr>](#).

`<certificate>^(str)`

Optional. If certificate is used in key exchange algorithm.(Not support yet) Refer to [<indDescr>](#).

Notes

- If the `AT^SIND` indicator "Ista" URC's [<indValue>](#) equals "1" and [<1staNo>](#) is low, the following assumptions are possible:
 - Low [<1staMean>](#) indicates out of coverage
 - High [<1staVar>](#) indicates industrial interference
 - High (or middle depending on distance from jammer) [<1staMean>](#) and low [<1staVar>](#) indicates jamming.
- If the `AT^SIND` indicator "Ista" URC's [<indValue>](#) equals "1" and [<1staNo>](#) is high, the following assumption is possible:
 - High [<1staMean>](#) and low [<1staVar>](#) indicates jamming.
- If the `AT^SIND` indicator "Ista" URC's [<indValue>](#) equals "21" and [<1staNo>](#) is low, the following assumption is possible:
 - Low [<1staMean>](#) and low [<1staGrade>](#) indicates out of coverage.
- If the `AT^SIND` indicator "Ista" URC's [<indValue>](#) equals "21" and [<1staNo>](#) is high, the following assumption is possible:
 - High [<1staMean>](#) and high [<1staGrade>](#) indicates jamming.

3.4 AT+CPAS Activity Status

AT+CPAS execute command queries ELS62-W'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 → Last	Reference(s)
- + -	3GPP TS 27.007 [45]

Parameter Description

<pas> ^(num)	
0	Ready
1	Unavailable (UE does not allow commands from TE)
2	Unknown(UE is not guaranteed to respond to instructions)
3	Incoming call (ringing)
4	Call in progress
5	Asleep (UE is unable to process commands from TE because it is in a low functionality state)
6	Future extension



4. Serial Interface Control Commands

The AT Commands described in this chapter allow the external application to determine various settings related to the ELS62-W's serial interface.

4.1 AT\Q Flow Control

AT\Q allows to configure flow control on the ELS62-W's asynchronous serial interface ASC0 and ASC1 (UART). It is strongly recommended to always use RTS/CTS hardware flow control. In particular, when using SLEEP mode (see AT^SPOW) or Multiplex mode (see AT+CMUX), ensure that both UE and TE have RTS/CTS hardware flow control enabled.

The AT\Q setting is always common for all interfaces and can be changed, for compatibility reasons, on each interface, but is only applicable to the ASC0 and ASC1 interface. AT\Q settings have no effect on the USB ports because the USB protocol integrates a flow control mechanism of its own.

The setting will become active only after saving the configuration to the user profile with AT&W followed by a restart of ELS62-W.

Syntax

Exec Command

AT\Q[<n>]

Response(s)

OK

PIN → Last

- + -

Parameter Description

<n> (num)(&V)(&W)	
[0]	Disable flow control
1	XON/XOFF software flow control Value 1 can be set on ASC0 and ASC1, but XON/XOFF software flow control takes effect only on ASC0. On ASC1, RTS/CTS hardware flow control remains effective even though value 1 has been selected.
2	This value is not supported and will be mapped to RTS/CTS hardware flow control
3(&F)(D)	RTS/CTS hardware flow control

Notes

- 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, AT\Q can be used in Multiplex mode (AT+CMUX), though the settings will not take effect. However, be aware that whenever you use the AT\Q write command in Multiplex mode and then save the current configuration to the user profile with AT&W, the changed AT\Q setting will become active after restart.



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

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

AT&C offers full functionality only if the DCD0 line is enabled with `AT^SCFG="GPIO/mode/DCD0","std"`. Otherwise AT&C will respond "+CME ERROR: operation not allowed".

Syntax

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

PIN
→
Last

- + -

Parameter Description

<value> ^{(num)(&V)(&W)}	
[0]	DCD line shall always be on.
1(&F)(D)	DCD line shall be on only when data carrier signal is present.
2	DCD line shall be on when one or more Internet services defined on the related serial channels are in an active state as described below. For details on the various service states refer to <code>AT^SISI</code>, parameter <srvState> or <code>AT^SISO</code>, parameter <srvState>. - Transparent TCP or Transparent UDP client, SOCKET, HTTP,: DCD shall be on when <srvState>="Connecting" or "Up". - Transparent TCP Listener: DCD shall be on when <srvState>="Up", "Alerting", "Connected" and "Released". - FTP: DCD shall be on when data channel is connected, i.e. <srvState>="Up".



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

[AT&D](#) determines how the UE responds if DTR line is changed from ON to OFF state during data mode.

[AT&D](#) offers full functionality only if the DTR0 line is enabled with [AT^SCFG](#)="GPIO/mode/DTR0","std". Otherwise [AT&D](#) will respond "+CME ERROR: operation not allowed".

Syntax

Exec Command

AT&D[<value>]

Response(s)

OK

PIN → Last

- + -

Parameter Description

<value> ^{(num)(&V)(&W)}	
[0]	ME ignores status of DTR line.
1	ON->OFF on DTR: Change to command mode while retaining the connected call.
2(&F)(D)	ON->OFF on DTR: Disconnect data call (CSD or PPP) and change to command mode. During OFF state of the DTR line the auto-answer function (see ATS0) is disabled. In Transparent Access Mode set up with AT^SIST DTR ON-OFF transition changes to command mode. For more details see AT^SISS and AT^SIST .



4.4 AT&S Set Data Set Ready (DSR) line mode

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

AT&S offers full functionality only if the DSR0 line is enabled with AT^SCFG="GPIO/mode/DSR0","std". Otherwise AT&S will respond "+CME ERROR: operation not allowed".

Syntax

Exec Command			Reference(s)
AT&S[<value>]			
Response(s)			
OK			
PIN	✈	Last	V.250
-	+	-	

Parameter Description

<value> (num)(&V)(&W)	
[0](&F)(D)	DSR line is always ON
1	ME in command mode: DSR is OFF. ME in data mode: DSR is ON.



4.5 ATE AT Command Echo

ATE controls if the ELS62-W echoes characters received from TE during AT command state.

Syntax

Exec Command		
ATE[<value>]		
Response(s)		
OK		
ERROR		
PIN	→	Last
-	+	-
Reference(s)		
		V.250

Parameter Description

<value>^(num)(&V)(&W)	
[0]	Echo mode off
1(&F)(D)	Echo mode on



4.6 AT+ICF Serial Interface Character Framing

The command [AT+ICF](#) controls the serial interface character framing format and parity used for receiving and transmitting.

The following setting is supported:

- 8 bits, no parity, 1 stop bit ([AT+ICF=3](#))

The selected setting is stored in the user defined profile with next [AT&W](#). It will only be used on next start of the ELS62-W. [AT+ICF](#) read command will always show the setting stored in the user defined profile, not the current setting of the character framing.

For compatibility reason AT+ICF can be used in Multiplex mode (refer AT+CMUX), though setting will not take effect. However, settings made on multiplex channel shall be stored in the user defined profile with next [AT&W](#).

If [AT+ICF](#) modes 7E1 or 7O1 are set, the parity bit will not be transmitted over the air!

Syntax

Test Command	
AT+ICF=?	
Response(s)	
+ICF: (list of supported <format>s), (list of supported <parity>s)	
OK	
Read Command	
AT+ICF?	
Response(s)	
+ICF: <format> [, <parity>]	
OK	
Write Command	
AT+ICF=[<format> [, <parity>]]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
- + +	ITU-T V.250 [14]

Parameter Description

<format> ^{(num)(&V)}	
Character format	
Specifies the character format used for receiving and transmitting.	
1	8 data 0 parity 2 stop
2	8 data 1 parity 1 stop
[3] ^{(&F)(D)}	8 data 1 stop
5	7 data 1 parity 1 stop



`<parity>(num)`

Parity bit

Specifies the method of calculating the parity bit, if a parity bit is supported by `<format>`.

If `<format>` does not support parity, this parameter has to be omitted.

0	Odd
1	Even



4.7 AT+IPR Bit Rate

[AT+IPR](#) allows to query and set the bit rate of the ELS62-W'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.

A selected fixed bit rate takes effect after the write command returns "OK" and is stored in the 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 ELS62-W](#) for details about timing).

In case of Autobaud mode ([AT+IPR=0](#)) a detected TE bit rate will not be saved and, therefore, needs to be re-detected after any restart of the UE. For details refer to Section [4.7.1, Autobaud mode](#). If Autobaud mode is activated, ELS62-W will automatically recognize the bit rate currently used by the TE. If using a fixed bit rate, make sure that both UE and TE are configured to the same rate.

When using [AT+IPR](#) on a USB channel or on a Multiplex mode related channel([AT+CMUX](#)) the [AT+IPR](#) write command responds with "OK", but will not have any effect. However, the [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, i.e. better do not combine with other commands on the same AT command line.

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 selectable <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 → Last	Reference(s)
- + -	V.250

Parameter Description

<rate> ^{(num)(NV)}	
Bit rate per second (bps)	
0	Autobaud mode. For details refer to Section 4.7.1, Autobaud mode below.
Autobaud rates:	
1200	



4800
9600
19200
38400
57600
115200
230400

Selectable rates:

300
1200
2400
4800
9600
19200
38400
57600
115200^(D)
230400
460800
921600

4.7.1 Autobaud mode

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

1. Synchronization between UE and TE:
 - Autobaud mode is only intended to facilitate the initial contact between UE and TE when the ELS62-W is taken into operation for the first time ever. Then, after successful synchronization between UE and TE, Autobaud mode shall be deactivated by selecting a fixed bit rate.
 - 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 UE. Hence, while Autobaud mode is enabled, the UE needs to be restarted each time the TE's bit rate has changed.
 - Ensure that UE and TE are correctly synchronized and the bit rate used by the TE is detected by the UE. To allow the bit rate to be synchronized, simply issue "AT" or "at" string. This is necessary when you start up the UE 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 to Section 1.6, [Communication between Customer Application and ELS62-W](#).

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

3. Restrictions

- In Autobaud mode the TE shall always use hardware flow control, regardless of the current flow control setting selected with via [AT\Q](#). Especially ensure not to 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.
- URCs that may be issued before the UE detects a new bit rate (by receiving the first AT character) will be sent at the previously detected bit rate or, after UE restart, at 115200 bps.
- If Autobaud mode is active, Multiplex mode cannot be enabled. Refer to [AT+CMUX](#).

4.8 AT+CMUX Multiplex mode

Multiplex mode according to 3GPP TS 27.010 [10] enables a serial interface to be multiplexed into virtual channels. It can be used on the AT command port(s) of the following interface(s):

- USB interface;
- serial interface ASC0;

The multiplex channels will be mapped as AT command ports.

For the host hardware, customers have to create their own multiplex programs conforming to the multiplexer protocol.

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 ELS62-W returns to AT command mode. The parameter maximum frame size (N1) according to 3GPP TS 27.010 [10] is implemented as 98 bytes by default. All other parameters are not available.

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 → Last - + +	Reference(s) 3GPP TS 27.007 [45] 3GPP TS 27.010 [10]

Parameter Description

<mode> ^(num)	
Enable Multiplex mode.	
0	Basic option



4.8.1 Restrictions while using Multiplex mode

If Multiplex mode is used on ASC0 interface:

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. Using `AT+IPR` write command on a Multiplex mode related channel command has no effect although "OK" result code will be returned.
3. Multiplex mode cannot be activated while Autobaud mode is enabled.
4. Autobaud mode is not usable in Multiplex mode. Hence, the AT command which selects Autobaud mode (`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.

5. Security Commands

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

5.1 AT+CPIN PIN Authentication

The [AT+CPIN](#) read command returns an alphanumeric string indicating whether or not network authentication is required.

The write [AT+CPIN](#) command allows the ELS62-W to store the entered password. This may be for example the SIM PIN1 to register to a GSM/LTE 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 SIM PIN1 authentication was successful and no SIM PIN1 request is pending the [AT+CPIN?](#) read command returns "READY", but the next [AT+CPIN=<pin>](#) write command request refers to SIM PIN2. As a result, whilst SIM PIN2 has not been given, each attempt to enter SIM PIN1 again leads to "+CME ERROR: incorrect password", thus decreasing the SIM PIN2 counter. Therefore, you are advised to check which password is requested by using the read command [AT^SPIC?](#) and the execute command [AT^SPIC](#).

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 → Last	Reference(s)
- + -	3GPP TS 27.007 [45]

Parameter Description

<pin> ^(str)
Password (string type).
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>^(str)

If the requested code was a PUK: specify a new password or restore the former disabled password.

<code>^(text)

SIM PIN authentication

READY	PIN has already been entered. No further entry needed.
SIM PIN	UE is waiting for SIM PIN1.
SIM PUK	UE is waiting for SIM PUK1 if PIN1 was disabled after three failed attempts to enter PIN1.
SIM PIN2	UE is waiting for PIN2.
SIM PUK2	UE is waiting for PUK2 to unblock a disabled PIN2.
Phone security locks set by client or factory	
PH-SIM PIN	UE is waiting for phone-to-SIM card password if "PS" lock is active and the client inserts other USIM, card than the one used for the lock. ("PS" lock is also referred to as phone or antitheft lock).
PH-FSIM PIN	UE is waiting for phone-to-very-first-SIM card password. Necessary when "PF" lock was set. When powered up the first time, UE locks itself to the first USIM card put into the card holder. As a result, operation of the mobile is restricted to this one USIM card (unless the PH-FSIM PUK is used as described below).
PH-FSIM PUK	UE is waiting for phone-to-very-first-USIM card unblocking password to be given. Necessary when "PF" lock is active and other than first USIM card is inserted.
PH-NET PIN	UE is waiting for network personalisation password
PH-NET PUK	UE is waiting for network personalisation unblocking password
PH-NETSUB PIN	UE is waiting for network subset personalisation password
PH-NETSUB PUK	UE is waiting for network subset unblocking password
PH-SP PIN	UE is waiting for service provider personalisation password
PH-SP PUK	UE is waiting for service provider personalisation unblocking password
PH-CORP PIN	UE is waiting for corporate personalisation password
PH-CORP PUK	UE is waiting for corporate 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 UE fails to register to the network. This may be due to missing network coverage, denied network access with currently used USIM card, no valid roaming agreement between home network and currently available operators etc. ELS62-W 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 UE 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



5.2 AT^SPIC Display PIN Counter

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

The execute command returns the number of attempts still available for entering the currently required password, for example the SIM PIN, SIM PUK, SIM PIN2 or SIM PUK2.

The read command `AT^SPIC?` indicates which password the number of attempts stated by the execute command actually refers to. Also, the write command may be used to query the counter for a specific password. It indicates the number of attempts still available for entering the password identified by `<facility>`, for example the SIM PIN, SIM PUK, SIM PIN2 or SIM PUK2.

To check whether or not you need to enter a password use the read commands `AT+CPIN?` or `AT^SPIC?` If the response to `AT+CPIN?` is "READY" the counter of the execute command `AT^SPIC` relates to PIN2. See [last example](#). If PIN and PIN2 (e. g. `AT+CPBS="FD","PIN2"`) are entered successfully no password is currently required and `AT^SPIC` read and execute commands return only OK.
If no USIM card is inserted the `AT^SPIC` read, execute and write commands return "+CME ERROR: SIM not inserted".

Syntax

Test Command

`AT^SPIC=?`

Response(s)

OK

Read Command

`AT^SPIC?`

Response(s)

`^SPIC: <code>`

OK

Exec Command

`AT^SPIC`

Response(s)

`[^SPIC: <counter>]`

OK

Write Command

`AT^SPIC=<facility>[, <pin_puk>]`

Response(s)

`^SPIC: <counter>`

OK

ERROR

`+CME ERROR: <err>`

PIN → Last

- + -

Parameter Description

`<counter>`^(num)

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



<facility>^(str)

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

"SC"	SIM PIN if parameter <pin_puk> is omitted or set to 0. SIM PUK if parameter <pin_puk> is set to 1.
"PS"	PH-SIM PIN current retries if parameter <pin_puk> is omitted or set to 0. PH-SIM PIN maximum retries if parameter <pin_puk> is set to 1. PH-SIM PUK is not supported.
"P2"	SIM PIN2 if parameter <pin_puk> is omitted or set to 0. SIM PUK2 if parameter <pin_puk> is set to 1.
"PN"	Network Personalisation. PH-NET PIN current retries if parameter <pin_puk> is omitted or set to 0. PH-NET PIN maximum retries if parameter <pin_puk> is set to 1. PH-NET PUK is not supported.

<pin_puk>^(num)

[0]	Show PIN counter for given <facility> .
1	Show PUK counter for given <facility> ="SC" or "P2". Show maximum retries PIN counter for given <facility> ="PS" or "PN".

<code>^(text)

Identification of the currently required password.

SIM PIN	ME is waiting for SIM PIN1.
SIM PUK	ME is waiting for SIM PUK1 if PIN1 was disabled after three failed attempts to enter PIN1.
SIM PIN2	ME is waiting for PIN2, when the attempt to access PIN2 requiring features was acknowledged with "+CME ERROR: SIM PIN2 required" (e.g. if the user attempts to edit the FD phonebook by using AT+CPBS="FD","PIN2").
SIM PUK2	ME is waiting for PUK2 to unblock a disabled PIN2. Necessary if preceding command was acknowledged with "+CME ERROR: SIM PUK2 required".
PH-SIM PIN	ME is waiting for 8-digit code to unlock the UE to a SIM/UICC if "PS" lock is active and user inserts other SIM card than the one used for the lock. For details see AT+CLCK="PS" .
PH-SIM PUK	Not supported.
PH-NET PIN	ME is waiting for Network Personalisation. For details see AT+CLCK="PN" , AT^SCSL="PN" , AT+CPIN and AT+CPWD for further information.
PH-NET PUK	Not supported.

Notes

- Whenever the required password changes, [<counter>](#) changes to reflect that change. Please refer to the examples below.
- See also chapters [AT+CLCK](#), [AT^SCSL](#), [AT+CPIN](#) and [AT+CPWD](#) for further information on locks and passwords.

Examples

EXAMPLE 1

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

```
at+cpin?
+CPIN: SIM PIN
```



OK	Currently required password is PIN1.
at^spic?	
^SPIC: SIM PIN	
OK	Currently required password is PIN1.
at^spic	
^SPIC: 3	
OK	3 attempts left.
at+cpin="9999"	
+CME ERROR: incorrect password	
at^spic	
^SPIC: 2	2 attempts left.
OK	
at+cpin="9999"	
+CME ERROR: incorrect password	
OK	
at^spic	
^SPIC: 1	1 attempt left.
OK	
at+cpin="9999"	
+CME ERROR: incorrect password	
at+cpin?	
+CPIN: SIM PUK	
OK	Now required password is PUK1.
at^spic	
^SPIC: 10	
OK	10 attempts left for PUK1.
at+cpin="01234567","1234"	
+CME ERROR: incorrect password	
at^spic	
^SPIC: 9	
OK	9 attempts left for PUK1.

EXAMPLE 2

Though a mobile is locked to Network Personalisation ("PN"), the user attempts to operate it with another SIM card. The user correctly enters the SIM PIN of the SIM card currently inserted:

at+cpin="9999"	
OK	
at+cpin?	
+CPIN: PH-NET PIN	ME is waiting for the Network Personalisation password.
OK	
at^spic	
^SPIC: 10	10 attempts left.
OK	
at^spic="PN",1	
^SPIC: 10	Maximum retries PIN counter.
OK	
at+cpin="11110000"	
+CME ERROR: operation failed	
at^spic	
^SPIC: 9	9 attempts left.
OK	
at+cpin="11110000"	
+CME ERROR: operation failed	
and so on ...	
at^spic	
^SPIC: 1	1 attempt left.



OK	
at^spic?	
^SPIC: PH-NET PIN	Displayed counter refers to Network Personalisation password.
OK	
at+cpin="12345678"	The password is a self defined module specific password.
OK	

EXAMPLE 3

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

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

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



5.3 AT+CLCK Facility Lock

AT+CLCK can be used to lock, unlock or interrogate a network or UE <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>][, <data>] Response(s) If <mode> is 0 or 1 and command successful: OK If <mode>= 2 and command successful: +CLCK: <status>[, <class>] [+CLCK: <status>[, <class>]] [+CLCK: ...] OK ERROR +CME ERROR: <err>	
PIN → Last + ± -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 22.004 [24], 3GPP TS 22.088 [32], 3GPP TS 23.088, 3GPP TS 24.088

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 card). SIM requests password upon UE power-up and when this lock command is issued. <password>: SIM PIN1.
"PS"	PH SIM (lock PHone to SIM/UICC card). UE asks for <password> when other than current SIM/UICC card is inserted. <password>: PH-SIM PIN. This 8-digit code is unique for each device. The PH-SIM PIN is necessary to lock the UE to a SIM/UICC. The <password> is a self defined module specific password and must be unique for each device. Parameter <class> is not applicable. 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 PH-SIM PIN should not be provisioned to end



users.

Be careful to enter wrong <password> when unlock with <mode>=0 the UE. After having entered 10 times a wrong <password> the UE is blocked and there is no chance to unblock it !

“FD”

SIM Fixed Dialing Phonebook lock.

If "FD" lock is enabled, numbers or public MMI *# codes can be used only if they start with matching numbers or characters stored in the "FD" phonebook. Numbers stored to the "FD" phonebook must not contain the call modifiers "I", "i", "*31#", "#31#".

The capacity of the "FD" phonebook is depending on the SIM card.

<password>: SIM PIN2 is mandatory for <mode>=0 (unlock) or <mode>=1 (lock).

Any attempt to dial a string not specified in the "FD" phonebook will be denied, causing an error result code. The type of result code varies depending on the type of service:

" +CME ERROR: call barred" for voice calls, packet switched connections and *# codes for Supplementary Services and USSD.

"NO CARRIER" for circuit switched data calls.

" +CMS ERROR: operation not allowed" for SMS.

If "FD" lock is enabled the following applies:

- Handling of AT+CCFC:
The "FD" lock is effective only for AT+CCFC <mode> 3 (registering the CF destination number). All other functions provided by AT+CCFC are not restricted by the "FD" lock.
- Handling of USSD:
Access to Unstructured Supplementary Services is possible with ATD if the ATD dial string starts with a matching *# code stored in the "FD" phonebook. The USSD command AT+CUSD, however, is not barred by an "FD" lock.
- SMS can be sent only to phone numbers which are stored in the "fixed dialing numbers" phonebook "FD".
If SMS numbers are missing in "FD" phonebook, indication is "+CMS ERROR: operation not allowed".

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 (parameter <password> is mandatory).
1	Lock (parameter <password> is mandatory).
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 which can be modified see [AT+CPWD](#).

The <password> for <facility>="PS" is a self defined module specific password and must be unique for each device.

<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 3GPP TS 22.004 [\[24\]](#).

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 (only for compatibility reasons, not supported by ELS62-W)
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 for voice, data and fax (fax only for compatibility reasons) . The value 255 covers all classes. If parameter "class" is omitted, the default value 7 is used.

<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 D1, 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. If you need to add new operator entries please unlock the old one and send the complete list once again.



Notes

- The **AT+CLCK** command offers the full range of **<class>** parameters according to the 3GPP Technical 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 3GPP TS 27.007 [45]. 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 3GPP TS 22.004 [24].
- If an outgoing Data Call is rejected due to an active **<facility>="FD"** 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.
- In the airplane mode the write command version for the network related **<facility>** (AO, OI, OX, AI, IR, AB, AG and AC) is not supported. For remaining facilities the command is fully functional then.
- 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.
- Parameter **<class>** is also allowed by **<mode>=2**.

Examples

EXAMPLE 1

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

<pre>AT+CLCK="SC",1,"9999" OK</pre>	The "SC" parameter enables or disables the SIM PIN authentication (PIN1) when you power up the UE. SIM card locked. As a result, SIM PIN1 must be entered to enable UE to register to the network.
-------------------------------------	--

<pre>AT+CLCK="SC",0,"9999" OK</pre>	Unlocks SIM card. When powered up, UE registers to the 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:

<pre>AT+CLCK="SC",2 +CLCK: 1 OK</pre>	Query the status of SIM card lock. SIM card is locked. SIM PIN1 must be entered to enable UE to register to the network.
---------------------------------------	--

EXAMPLE 2

Phone locked to SIM card (**<facility>="PS"**):

<pre>AT+CPIN? +CPIN: READY OK</pre>	Make sure that PIN1 authentication is valid.
-------------------------------------	---

To lock the UE to the currently inserted SIM card use:

<pre>AT+CLCK="PS",1,"55555555" OK</pre>	Locks the UE to the current SIM card.
---	--

Optionally, query the status of the phone locked to SIM card:



```
AT+CLCK="PS",2
+CLCK: 1
OK
```

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

```
AT+CPIN?
+CPIN: SIM PIN
OK
AT+CPIN="9999"
OK
```

No additional password is required for operation (SIM recognized by UE).

To operate the UE with other SIM card than the one used for the "PS" lock:
Enter PH-SIM PIN of present card, followed by "PS" lock password.

```
AT+CPIN?
+CPIN: SIM PIN
OK
AT+CPIN="1111"
OK
```

PIN authentication accepted.

```
AT+CPIN?
+CPIN: PH-SIM PIN
OK
AT+CPIN="55555555"
OK
```

"PS" phone lock password is required.

"PS" phone lock password has been accepted. UE is fully operational now.

To deactivate the phone locked to SIM card:

```
AT+CLCK="PS",0,"55555555"
OK
```

"PS" phone lock password has to be provided again.
Now the UE can be used with any SIM card, without the need of the phone lock password.

5.4 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 command **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 → Last + ± -	Reference(s) 3GPP TS 27.007 [45]

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 .
"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 .



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...16	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, which will be set if correct old password is provided.

Notes

- In the airplane mode the write command version for the network related **<facility>** (AO, OI, OX, AI, IR, AB, AG and AC) is not supported. For remaining facilities the command is fully functional then.
- 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 PIN1

```
AT+CPWD="SC","1111","2222"
OK
```

(where "1111" = old PIN1 and "2222" = new PIN1)
PIN1 password has been changed to "2222"

EXAMPLE 2

To change PIN2

```
AT+CPWD="P2","0000","8888"
OK
```

(where "0000" = old PIN2 and "8888" = new PIN2)
PIN2 password has been changed to "8888"



EXAMPLE 3

To set the password used to enable or disable Call Barring:

```
AT+CPWD="AB","0000","3333"
```

```
OK
```

Requests the network to change the password for the call barring supplementary service. Even though issued for "AB" only the request applies to all other call barring services, too.



5.5 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 a depersonalization key.

If a SIM card is inserted **AT^SCSL** is SIM PIN protected, i.e., changing or querying any settings requires SIM PIN authentication. If no SIM card is inserted **AT^SCSL** is not SIM PIN protected, i.e., all settings can be changed and queried without SIM PIN authentication. The benefit for application manufacturers is that Customer SIM Lock can be set during production.

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>: ...]"
OK
ERROR
+CME ERROR: <err>

PIN → Last
± + -

Parameter Description

<facility> ^(str)	
"PN"	Network Personalisation (= Customer SIM Lock). <i>Be careful to enter wrong <password> when unlock with <action>=0 the UE.</i> <i>After having entered 10 times a wrong <password> the UE is blocked and there is no chance to unblock it !</i>
<action> ^(num)	
0	Delete programmed SIM lock data (unlock) 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.
1	Program given Customer SIM Lock data and activate lock. Required parameters: <facility>="PN",<action>=1,<password>,<data>.
2	Request Customer SIM Lock status. Required parameters: <facility>="PN",<action>=2.



`<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 unlock 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 a self defined module specific password and must be unique for each device.

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`.

`<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 D1, 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 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.
- When reprogramming an active SIM lock, first delete the current SIM Lock and request the new SIM Lock.
- As described above the depersonalization key `<password>` is needed for programming a Customer SIM Lock with `AT^SCSL`.
It can also be used to unlock 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 use the `<password>` which is self defined and must be module specific. Configuring and removing the Customer SIM Lock is then possible.

<code>AT^SCSL="PN",2</code>	Request status.
<code>^SCSL: ""</code>	SIM lock disabled.
OK	
<code>AT^SCSL="PN",1,"12345678","262.01:262.02"</code>	Program Customer SIM Lock.
OK	
<code>AT^SCSL="PN",2</code>	Request status
<code>^SCSL: "262.01:262.02"</code>	SIM lock is enabled.
OK	
<code>AT^SCSL="PN",0,"12345678"</code>	Remove Customer SIM Lock.
OK	



5.6 AT^SSECUA Internet Service Certificate Store Actions

AT^SSECUA can be used to initialize and update the Internet Services Certificate Store of the ELS62-W by pre-configured certificates. Also certificates of the pre-configured and Internet Service certification store can be deleted.

AT^SSECUA="CertStore/TLS/PreconfigureCerts" can be used for initializing the Internet Service Certificate store. This initialization is possible only in case the Internet Service certificate store is empty, otherwise ERROR is returned. In case the client certificate with key was not pre-configured at the factory, the command returns ERROR and no certificate is copied.

AT^SSECUA="CertStore/TLS/PreconfigureCert" can be used for copying a single certificate to the Internet Service Certificate store, if there is a certificate available at [<preloaded-index>](#).

AT^SSECUA="CertStore/TLS/UpdateServerCerts" can be used for updating the Internet Service Certificate store. It is possible to update only the server certificates in the Internet Service certificate store. Additionally after firmware update procedure it is possible to update the list of server certificates in the Internet Service certificate store in case it has changed with the latest firmware update procedure. The server certificates that are not currently configured in the active Internet Service certificate store but are in the pre-configured list are added. Firmware update procedure can also introduce list of certificates to be revoked. Those server certificates for which thumbprint is included in the revocation list are removed from the Internet Service certificate store.

Syntax

Test Command

AT^SSECUA=?

Response(s)

```
^SSECUA: "CertStore/TLS/PreconfigureCerts", (list of supported <index>s)
^SSECUA: "CertStore/TLS/PreconfigureCert", (list of supported <index>s), (list of supported <preloaded-index>s)
^SSECUA: "CertStore/TLS/UpdateServerCerts", (list of supported <index>s), (list of supported <action>s)
OK
```

Write Command

Initialize Internet Service Certificate Store with preconfigured server certificates and a pair of private certificate and key.

AT^SSECUA="CertStore/TLS/PreconfigureCerts"[, <signature>]

Response(s)

```
^SSECUA: "CertStore/TLS/PreconfigureCerts", <index>
[... ]
OK
```

If error is related to ME functionality:

ERROR

+CME ERROR: <err>

Write Command

Initialize Internet Service Certificate Store with only selected certificate.

AT^SSECUA="CertStore/TLS/PreconfigureCert", [<signature>], <preloaded-index>

Response(s)

```
^SSECUA: "CertStore/TLS/PreconfigureCerts", <index>
OK
```

If error is related to ME functionality:

ERROR

+CME ERROR: <err>



Write Command

Internet Service Certificate Store Update for server certificates.

AT^SSECUA="CertStore/TLS/UpdateServerCerts", <signature>, <mode>

Response(s)

^SSECUA: "CertStore/TLS/UpdateServerCerts", <index>, <action>

[...]

OK

If error is related to ME functionality:

ERROR

+CME ERROR: <err>

PIN → Last

- + -

Unsolicited Result Code

Format of the certification update indicator:

^SSECUA: "CertStore/TLS/UpdateServerCerts", <index>, <action>

[...]

When <certUpdateMode> is set to automatic mode, the module will generate URCs messages during boot after changing firmware and successful certificates update. The URCs messages are sent for each certificate, which is changed.

Parameter Description

<signature>^(str)

Signature used to authenticate the command if the TLS server and client authentication certificates are configured to be protected in secure mode (i.e. <secmode>=1 or 2, <sectag>="TLS", and <secmap>="0x0001"), otherwise the value is "don't care".

IMEI is required in the signature only when "Secure mode with certificate + IMEI" is enabled (i.e. <secmode>=2).

<mode>^(str)

Mode used to control how the certificates will be updated.

"0" Perform revocation and replacement of revoked certificates only.

"1" Copy all certificates that are not yet in IS certificate store.

<index>^(num)

0...30 index of Internet Service certification store, where the server certificate is added or removed.

<preloaded-index>^(num)

0...30 index of Internet Service certification store, where the certificate is added .

<action>^(num)

0 for removed certificate

1 for added certificate



Notes

- For Internet Service Certificate store initialization commands `AT+SSECUA="CertStore/TLS/Preconfigure-Certs"` and `AT+SSECUA="CertStore/TLS/PreconfigureCert"`:
 - In case there is not enough space currently to store all added certificates then only part of the certificates are added and ERROR returned.
- For Internet Service Certificate store update command `AT+SSECUA="CertStore/TLS/UpdateServerCerts"`:
 - The client certificate at index 0 of Internet Service certificate store cannot be updated. The command returns ERROR in case the certificate at index 0 is empty in Internet Service certificate store.
 - After successful manual/automatic Internet Service store update the preconfigured certificates set is not removed.

5.7 AT^SSECUC Internet Service Certificate Store Update Configuration

AT^SSECUC="CertStore/TLS/UpdateServerCerts/Mode" can be used to configure and query the update mode for the Internet Services Certificate Store of the ELS62-W.

AT^SSECUC="SEC/MODE" can be used to configure the Secure Mode of the ELS62-W.

AT^SSECUC="SEC/LEVEL" can be used to configure and query the Secure Level of the ELS62-W.

AT^SSECUC can be used to configure and query the pre-shared keys (PSKs) for Internet Service of the ELS62-W.

Syntax

Test Command

AT^SSECUC=?

Response(s)

^SSECUC: "Cred/TLS/PSK/<slotID>", supported length of (<signature>), supported length of (<PSK_identity>), supported length of (<PSK_key>), supported length of (<PSK_url>), supported length of (<PSK_hint>)
^SSECUC: "CertStore/TLS/UpdateServerCerts/Mode", supported length of (<signature>), list of supported (<certUpdateMode>)
^SSECUC: "SEC/MODE", supported length of (<signature>), list of supported (<secmode>)
^SSECUC: "SEC/LEVEL", supported length of (<signature>), list of supported (<sectag>), list of supported (<secmap>)
OK

Write Command

Internet Service Certification Store update configuration and query update mode

AT^SSECUC="CertStore/TLS/UpdateServerCerts/Mode"[<signature>], <certUpdateMode>]

Response(s)

^SSECUC: "CertStore/TLS/UpdateServerCerts/Mode", <certUpdateMode>
OK
If error is related to ME functionality:
ERROR
+CME ERROR: <err>

Write Command

Secure Mode Control - protect asset modification on module

AT^SSECUC="SEC/MODE", <signature>, <secmode>

Response(s)

^SSECUC: "SEC/MODE", <secmode>
OK
If error is related to ME functionality:
ERROR
+CME ERROR: <err>

Write Command

Secure Level Control - control the security setting in the various functional groups as designated by <sectag>

AT^SSECUC="SEC/LEVEL"[<signature>, <sectag>, <secmap>]

Response(s)

^SSECUC: "SEC/LEVEL", <sectag>, <secmap>
OK
If error is related to ME functionality:



Write Command	(Continued)
Secure Level Control - control the security setting in the various functional groups as designated by <code><sectag></code>	
AT+SSECUC="SEC/LEVEL"[, <code><signature></code> , <code><sectag></code> , <code><secmap></code>]	
Response(s)	
ERROR	
+CME ERROR: <code><err></code>	
Write Command	
Write/Read Pre-Shared Key information	
AT+SSECUC="Cred/TLS/PSK/<slotID>", <code><signature></code> [, <code><PSK_identity></code> , <code><PSK_key></code> [, [<code><PSK_url></code>], <code><PSK_hint></code>]]]	
Response(s)	
^SSECUC: "Cred/TLS/PSK/<slotID>", , <code><PSK_identity></code> , , <code><PSK_url></code> , <code><PSK_hint></code>	
OK	
ERROR	
+CME ERROR: <code><err></code>	
Write Command	
Remove Pre-Shared Key	
AT+SSECUC="Cred/TLS/PSK/<slotID>", <code><signature></code> , "", ""	
Response(s)	
^SSECUC: "Cred/TLS/PSK/<slotID>"	
OK	
ERROR	
+CME ERROR: <code><err></code>	
PIN → Last	
- + -	

Parameter Description

`<signature>`^(str)

Signature used to authenticate the command

IMEI is required in the signature only when "Secure mode with certificate + IMEI" is enabled (i.e. `<secmode>`=2). The range of supported length of this parameter is given in the test command response (0-768).

`<certUpdateMode>`^{(str)(NV)}

"0" ^(D)	Only manual IS certificate store update from pre-configured set can be done using the AT+SSECUC="CertStore/TLS/UpdateServerCerts"[, <code><signature></code>]
"1"	Manual IS certificate store update from pre-configured set without signature verification can be done using the AT+SSECUC="CertStore/TLS/UpdateServerCerts"
"2"	Perform automatic IS certificate store update after each pre-configured certificate set update (e.g. after firmware update)
"3"	Perform automatic revocation and certificate replacement (mode 0) in IS certificate store update after each pre-configured certificate set update (e.g. after firmware update).

`<secmode>`^(str)

Secure Mode.

"0" ^(D)	Unsecured mode
--------------------	----------------



"1"	Secure mode with certificate only (set and query) where AT commands and other means to access or modify security-relevant configuration data, credentials and code are protected by a cryptographic signature based on the secure-mode certificate loaded onto the module.
"2"	Secure mode with certificate + IMEI (set and query) where AT commands and other means to access or modify security-relevant configuration data, credentials and code are protected by a cryptographic signature based on the secure-mode certificate loaded onto the module and on the IMEI of the module (for customer IMEI modules the module serial no. is used instead).

<sectag>^(str)

Secure Tag.

"TLS"	Define 2 bits in <secmap> to protect TLS related assets, including TLS server, TLS client, pre-shared symmetric keys, and TLS stack configuration.
"DevMan" ^(D)	Define 2 bits in <secmap> to protect LwM2M client and IoT Service agent related assets.

<secmap>^(str)

Secure Map. Containing a bitmap describing which assets to protect.

Only when <sectag>="DevMan":

"0x0000-0xFFFF"	Secmap of TLS sectag is protected and cannot be read.
"0x0001" ^(D)	Bitmap to protect the configuration of DM security, server, and basic device identification parameters.
"0xFFFF"	Bitmap to protect the complete DM configuration, values, and DM client states (including starting and stopping the client).

Only when <sectag>="TLS":

"0x0000-0xFFFF"	Secmap of TLS sectag is protected and cannot be read.
"0x0001"	Bitmap to protect TLS server authentication certificates resp. root of trust, TLS client authentication certificate chain and private key, and TLS pre-shared symmetric keys (if applicable).
"0x0002"	Bitmap to protect the TLS stack configuration.
"0xFFFF" ^(D)	Bitmap to protect all the TLS related assets, including TLS server, client, pre-shared symmetric keys, and stack configuration.

<slotID>^(num)

PSK slot ID

1...10	Slot ID in which the PSK information is stored.
--------	---

<PSK_identity>^{(str)(NV)}

PSK identity in ASCII strings

Up to 128 printable characters, indicating which client PSK identity will be used.

<PSK_key>^{(str)(NV)}

PSK key as ASCII string in hexadecimal encoding

Up to 128 printable characters, indicating which PSK key will be used.



`<PSK_url>^(str)(NV)`

PSK URL for PSK auto selection

Up to 256 printable characters.

In PSK auto selection, the module will pick up the right PSK information, in which PSK server URL matches the target URL (no wildcarding). For example, in UDP/TCP socket service, the chosen PSK URL has the same value as `<host>:<remotePort>` in the `<srvParmValue>`, where `<srvParmTag>="address"` in an Internet service profile.

In PSK manual selection, this parameter is ignored.

`<PSK_hint>^(str)(NV)`

Up to 128 printable characters.

Server identity hint might be transmitted in server exchange message.

In PSK auto selection, the module will select the PSK identity which has the same hint with the server.

In PSK manual selection, this parameter is ignored.

Note

- `AT^SSECUC="CertStore/TLS/UpdateServerCerts/Mode"` without any parameters queries current `<certUpdateMode>` value.

The configuration of `AT^SSECUC="SEC/LEVEL"` takes effect only when secure mode is enabled (`<sec-mode>=1` or `2`).

`AT^SSECUC="Cred/TLS/PSK/<slotID>"` without any parameters queries current PSK slot value.

5.8 AT^SSECRUN Signature Authentication for Protected Commands in Secure Mode

When Secure Mode is on (i.e. `<secmode>="1" or "2"`) and proper Secure Level is set, the following AT commands require signature authentication using `AT^SSECRUN` write command before execution.

For Secure level with `<sectag>="DevMan"`:

- `AT^SRVCFG`
- `AT^SRVCTL`
- `AT^SRVACT`

For Secure level with `<sectag>="TLS"`:

- `AT^SCFG="Tcp/TLS/Version"`
- `AT^SBNW="ciphersuites"`
- `AT^SBNW="is_cert"`
- `AT^SBNW="management_cert"`
- `AT^SSECUC`
- `AT^SSECUA`

`AT^SSECRUN` write command provides one-time authentication on the command immediately following it, with 2 steps below:

- Run `AT^SSECRUN` with a valid signature for the protected AT command.
- Enter the protected AT command immediately on the same AT command port.

Note that the signature cache will be cleared after the execution of the command immediately following it. For any repeated execution of the protected AT commands, repeat the 2 steps above.

Syntax

Write Command

Signature authentication for protected commands in Secure Mode

`AT^SSECRUN="sign", <at-command-signature>`

Response(s)

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

`<at-command-signature>`^(str)

Signature used to authenticate the command protected by Secure Mode. Note that the signature cache will be cleared after the execution of the command immediately following it.



Note

- `AT^SSECRUN="sign", <at-command-signature>` supports command concatenation. To do so, enter the separator semicolon ";" followed by the protected command and parameters, without prefix "AT", as follows:

Example:

`AT^SSECRUN="sign", <at-command-signature>;^SCFG="TCP/TLS/VERSION",1.1,1.2.`

6. Identification Commands

The AT Commands described in this chapter allow the external application to obtain various identification information related to the ELS62-W and linked entities.

6.1 ATI Display product identification information

The [ATI](#) execute command delivers a product information text.

Syntax

Exec Command

ATI

Response(s)

Cinterion
ELS62-W
REVISION xx.yyy
OK

Exec Command

ATI1

Response(s)

Cinterion
ELS62-W
REVISION xx.yyy
A-REVISION xx.zzz.cc
OK

Exec Command

ATI2

Response(s)

UICC Application Identification <applId>
OK
ERROR
+CME ERROR: <err>

Exec Command

ATI8

Response(s)

C-REVISION ccccc.vv
OK

Exec Command

ATI176

Response(s)

<imeisv_number>
OK

PIN → Last

± + -

Reference(s)

ITU-T V.250 [14]



Parameter Description

`<applId>(num)`

UICC application types. A single value or a combination of the following values is possible. For example, the response value 0x03 represents the sum of the integers 0x01 and 0x02 (GSM application and USIM application).

0x01	GSM application
0x02	USIM application
0x04	ISIM application
0x08	CSIM application

AT+I2 command requires SIM-PIN to be provided.

`<imeisv_number>(num)`

IMEISV (International Mobile station Equipment Identity and Software Version number) conforming to the format: <IMEI>.<SVN>. For information on IMEISV refer to 3GPP TS 23.003 and 3GPP TS 27.007 [45].

Notes

- The "Revision" information consists of the following parts: Version xx and variant yyy of software release.
- "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.
- 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 "ELS62-W" the changed value will be returned (for details please refer to description of parameter `<product>`).

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 → Last	Reference(s)
- + -	3GPP TS 27.007 [45]

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 → Last	Reference(s)
- + -	ITU-T V.250 [14]

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)	
ELS62-W	
OK	
PIN  Last	Reference(s)
- + -	3GPP TS 27.007 [45]

Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Product", then instead of "ELS62-W" 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)	
ELS62-W	
OK	
PIN  Last	Reference(s)
- + -	ITU-T V.250 [14]

Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Product", then instead of "ELS62-W" 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 → Last	Reference(s)
- + -	3GPP TS 27.007 [45]

Parameter Description

<xx.yyy> ^(text)
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 → Last	Reference(s)
- + -	ITU-T V.250 [14]

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](#) returns 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	→	Last
-	+	-
Reference(s)		3GPP TS 27.007 [45]

Parameter Description

<sn> ^(text)
IMEI used to identify mobile equipment when used on a mobile network.

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

[AT+GSN](#) returns 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	→	Last
-	+	-
Reference(s)		ITU-T V.250 [14]

Parameter Description

<sn> ^(text)
IMEI used to identify mobile equipment when used on a mobile 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 UE.

Syntax

Test Command

AT+CIMI=?

Response(s)

OK

Exec Command

AT+CIMI

Response(s)

<imsi>

OK

ERROR

+CME ERROR: <err>

PIN  Last

+ + -

Reference(s)

3GPP TS 27.007 [\[45\]](#)

Parameter Description

<imsi>^(text)

International Mobile Subscriber Identity



6.11 AT^SINFO Information Output

The `AT^SINFO` command delivers general product information text.

Syntax

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

Read Command
AT^SINFO?
Response(s)
^SINFO: "RPM", <RpmFlag>, <RpmN1>, <RpmT1>, <RpmF1>, <RpmF2>, <RpmF3>, <RpmF4>, <RpmLR-1>, <RpmLR-2>, <RpmLR-3>, <RpmC-BR-1>, <RpmC-R-1>, <RpmC-PDP-1>, <RpmC-PDP-2>, <RpmC-PDP-3>, <RpmC-PDP-4>, <RpmVer>, <RpmOrigin>
OK
ERROR
+CME ERROR: <err>

Write Command
Display loaded RPM (Radio Policy Manager) parameters
AT^SINFO="RPM"
Response(s)
^SINFO: "RPM", <RpmFlag>, <RpmN1>, <RpmT1>, <RpmF1>, <RpmF2>, <RpmF3>, <RpmF4>, <RpmLR-1>, <RpmLR-2>, <RpmLR-3>, <RpmC-BR-1>, <RpmC-R-1>, <RpmC-PDP-1>, <RpmC-PDP-2>, <RpmC-PDP-3>, <RpmC-PDP-4>, <RpmVer>, <RpmOrigin>
OK
ERROR
+CME ERROR: <err>

PIN → Last
- + -

Parameter Description

<RpmFlag>^(str)

The `AT^SINFO "RPM"` command returns the loaded RPM (Radio Policy Manager) parameters specified in the GSMA "TSG.34/TS.34 - IoT Device Connection Efficiency Guidelines", as of Version 1.x, chapter 8. For further information see also the GSMA "TSG.35/TS.35 - IoT Device Connection Efficiency Test Book". See also `AT^SCFG "MEopMode/SRPOM"` parameter <srpom>.

"0"	RPM disabled
"1"	RPM enabled

<RpmN1>^(str)

Max number of SW resets per hour allowed by RPM following "permanent" MM/GMM/EMM reject.

"0"	Requirement disabled.
"1"..."255"	Number of resets per hour.



<RpmT1>^(str)

T1. Average time before RPM resets modem following permanent MM/GMM/EMM reject.

"0" Requirement disabled.

"1"... "255" Defines in 6 min increments the time to reset after receiving a permanent MM/GMM/EMM reject, i.e. MM#2.

<RpmF1>^(str)

F1. Max. number of PDP Activation Requests per Hour allowed by RPM following a PDP Activation Ignore Scenario.

"0" Requirement disabled.

"1"... "255" Defines in 6 min increments the time to reset after receiving a permanent MM/GMM/EMM reject, i.e. MM#2.

<RpmF2>^(str)

F2. Max number of PDP Activation Requests per Hour allowed by RPM following a "Permanent" PDP Activation Reject.

"0" Requirement disabled.

"1"... "255" Max. attempts allowed.

<RpmF3>^(str)

F3. Max number of PDP Activation Requests per Hour allowed by RPM following a "Temporary" PDP Activation Reject.

"0" Requirement disabled.

"1"... "255" Max. attempts allowed.

<RpmF4>^(str)

F4. Max number of PDP Activation/Deactivation Requests per Hour allowed by RPM.

"0" Requirement disabled.

"1"... "255" Max. attempts allowed.

<RpmLR-1>^(str)

LR-1. Leak rate for C-BR-1.

"0" C-BR-1 shall not be decremented.

"1"... "255" Defines number of hours before C-BR-1 is decremented by 1.

<RpmLR-2>^(str)

LR-2. Leak rate for C-R-1.

"0" C-R-1 shall not be decremented.

"1"... "255" Defines number of hours before C-R-1 is decremented by 1.

<RpmLR-3>^(str)

LR-3. Leak rate for C-R-3.

"0" C-PDP-1 TO C-PDP-4 shall not be decremented.

"1"... "255" Defines number of hours before C-PDP-1 TO C-PDP-4 is decremented by 1.



<RpmC-BR-1>^(str)

C-BR-1. Counter related to N1.

"1"... "255" Indicate number of control actions triggered by N1.

<RpmC-R-1>^(str)

C-R-1. Counter related to T1.

"1"... "255" Indicate number of control actions triggered by T1.

<RpmC-PDP-1>^(str)

C-PDP-1. Counter related to F1.

"1"... "255" Indicate number of control actions triggered by F1.

<RpmC-PDP-2>^(str)

C-PDP-2. Counter related to F2.

"1"... "255" Indicate number of control actions triggered by F2.

<RpmC-PDP-3>^(str)

C-PDP-3. Counter related to F3.

"1"... "255" Indicate number of control actions triggered by F3.

<RpmC-PDP-4>^(str)

C-PDP-4. Counter related to F4.

"1"... "255" Indicate number of control actions triggered by F4.

<RpmVer>^(str)

RPM version implemented on the device

<RpmOrigin>^(str)

Origination of RPM parameters

"0" UE's memory

"1" USIM

Notes

- We can display the parameters also if RPM is disabled (can be disabled by SIM or by enable flag from EFS).
- RPM init is done after PIN verification, so before PIN verification most of the RPM data is not valid.



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 Connect to Incoming Call

[ATA](#) connects the ELS62-W to an incoming voice or data call indicated by a "RING" URC. [AT+CRC](#) allows to customize the format of the incoming call URC.

Additional AT commands on the same command line are ignored.

The command may be aborted by any character sent from the TE to the UE during execution. It cannot be aborted in some connection setup states, such as handshaking.

Syntax

Exec Command			Reference(s) ITU-T V.250 [14]
ATA			
Response(s)			
In case of incoming data call, if successfully connected, UE switches to data mode:			
CONNECT			
In case of voice call, if successfully connected:			
OK			
When UE returns to command mode after data call release:			
OK			
If incoming call is not available, i.e. already disconnected or hung up:			
NO CARRIER			
PIN	→	Last	
+	-	+	

Parameter Description

<text> ^(str)
Connection speed
Presented only if ATX parameter setting is greater 0. See also ATV .



7.2 ATD Mobile originated call to specified number

ATD can be used to set up outgoing voice, and data calls. Supplementary Services can also be controlled with ATD. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services. For data calls the semicolon ";" must be omitted.

The command may be aborted by any character sent from the TE to the UE during execution. It cannot be aborted in some connection setup states, such as handshaking.

Response modes:

- For data connections, call setup always terminates when the call has been established (indicated by the CONNECT result code, or when it fails (indicated by "NO CARRIER" or "BUSY") at the modem port.
- For voice calls the UE returns "OK" once call setup is completed either successfully or unsuccessfully.

Syntax

Exec Command	
ATD<n>[<mgs>];	
Response(s)	
If successfully connected and non-voice call, UE switches to online data mode indicated by:	
CONNECT	
If voice call successful or not:	
OK	
When sending *# sequences response is specific to *# sequence. For details see Section 20.1, Star-Hash (*#) Network Commands	
If a connection cannot be set up:	
NO CARRIER	
NO ANSWER	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
± - -	ITU-T V.250 [14]

Parameter Description

<n>(text)	
String of dialing digits and optional V.250 modifiers: 0-9, *, #, +, A, B, C, D, P	
The following V.250 modifiers are ignored: ,(comma), T, !, W, @	
DTMF transmission: If the dial string <n> 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. When encountering the DTMF separator subsequently, the module will insert a pause.	
<mgs>(text)	
Modifier characters:	
I	Activates CLIR (disables presentation of own phone number to called party, *#31#-code will be ignored)
i	Deactivates CLIR (enables presentation of own phone number to called party, *#31#-code will be ignored)
G	Activate Closed User Group explicit invocation for this call only.
g	Deactivate Closed User Group explicit invocation for this call only.



Notes

- The UE 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 UE 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 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 or empty 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.

7.3 ATDL Redial last number used

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

Syntax

Exec Command	
ATDL[;]	
Response(s)	
If there is no last number or number is not valid:	
+CME ERROR: <err>	
If no dialtone (parameter ATX2 or ATX4):	
NO DIALTONE	
If busy (parameter setting ATX3 or ATX4):	
BUSY	
If connection cannot be set up:	
NO CARRIER	
NO DIALTONE	
If successfully connected and non-voice call (TA switches to online data mode):	
CONNECT <text>	
When TA returns to command mode after call release:	
OK	
If successfully connected and voice call:	
OK	
PIN → Last	Reference(s)
+ - -	ITU-T V.250 [14]

Notes

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



7.4 ATH Disconnect existing data connection

[ATH](#) disconnects circuit switched data calls.
To disconnect PS data connections refer to [AT&D](#).
For voice calls use [AT+CHUP](#) or [AT^SHUP](#).

Syntax

Exec Command			Reference(s)
ATH[<n>]			
Response(s)			ITU-T V.250 [14]
OK			
PIN	✈	Last	
-	-	-	

Parameter Description

<n> ^(num)	
[0]	Disconnect from line and terminate data call.

7.5 AT+CHUP Hang up call

[AT+CHUP](#) cancels all voice calls.
For data connections use [ATH](#) or [AT^SHUP](#).

Syntax

Test Command

AT+CHUP=?

Response(s)

OK

ERROR

+CME ERROR: [<err>](#)

Exec Command

AT+CHUP

Response(s)

OK

ERROR

+CME ERROR: [<err>](#)

PIN  Last

- - -

Reference(s)

3GPP TS 27.007 [\[45\]](#)



7.6 AT^SHUP Hang up call(s) indicating a specific 3GPP TS 24.008 release cause

The [AT^SHUP](#) write command terminates calls known to the UE and indicates a specific 3GPP TS 24.008 [\[39\]](#) release cause specified by the user. The command can be used for voice and data calls. Calls will be terminated regardless of their current call status, which may be any of the states listed with [AT+CLCC](#). Release clauses may differ depending of used Radio Access Technology e.g. between CS and VoLTE calls.

Syntax

Test Command
AT^SHUP=?
Response(s)
OK
Write Command
AT^SHUP=<cause>[, <cn>]
Response(s)
OK
ERROR
+CME ERROR: <err>
PIN → Last
+ - -

Parameter Description

<cause> ^(num)
Release cause
3GPP TS 24.008 [39] release cause to be indicated to the network.
The ELS62-W 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 3GPP TS 24.008 [39] release cause "unassigned (unallocated) number"
16
Send 3GPP TS 24.008 [39] release cause "normal call clearing"
17
Send 3GPP TS 24.008 [39] release cause "user busy"
18
Send 3GPP TS 24.008 [39] release cause "no user responding"
21
Send 3GPP TS 24.008 [39] release cause "call rejected"
27
Send 3GPP TS 24.008 [39] release cause "destination out of order"
31
Send 3GPP TS 24.008 [39] release cause "Normal: unspecified"
88
Send 3GPP TS 24.008 [39] 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>.



Notes

- Multiparty calls within a IMS call cannot be terminated individually by `AT^SHUP` command, due to limitations of the IMS standard. For releasing an individual IMS multiparty call you have to use `AT+CHLD=1x` instead.
- IMS calls in 4G cannot be terminated by `AT^SHUP`. Please use `AT+CHUP` to hang up calls.



7.7 **ATS0 Set number of rings before automatically answering a call**

Setting is local to the AT command port. It is allowed to have different settings on different AT command ports. In such cases the AT command port 'wins', which is idle and uses the smallest `<n>` value.

Syntax

Read Command	
ATS0?	
Response(s)	
<code><n></code>	
OK	
ERROR	
Write Command	
ATS0= <code><n></code>	
Response(s)	
OK	
ERROR	
PIN → Last - - -	Reference(s) ITU-T V.250 [14]

Parameter Description

<code><n></code> ^{(num)(&V)(&W)}	
000 ^{(&F)(D)}	Automatic answer mode is disabled.
001-255	Enable automatic answering after specified number of seconds.



7.8 ATO Switch from command mode to data mode / PPP online mode

[ATO](#) is the corresponding command to the [+++](#) escape sequence: If the UE is in command mode during a data connection [ATO](#) causes the UE to return to data mode.

Syntax

Exec Command		
ATO[<n>]		
Response(s)		
If connection is not successfully resumed:		
NO CARRIER		
or		
UE returns to data mode from command mode		
CONNECT		
PIN	→	Last
-	-	-
Reference(s)		
		ITU-T V.250 [14]

Parameter Description

<n> ^(num)	
[0]	Switch from command mode to data mode



7.9 +++ Escape from Data Mode to AT Command Mode

+++ escape sequence is only available during a circuit switched data (CSD) call or a packet switched connection. The +++ character sequence causes the ELS62-W to pause data mode and return to AT command mode. This allows to enter AT commands while maintaining the data connection to the remote device. By the way the same task can be performed by toggling the DTR line if [AT&D](#) is set to 1. [ATO](#) is used to resume data or PPP online mode.

To prevent the +++ character sequence from being misinterpreted as data, it must be preceded and followed by a pause of 1000 ms. The +++ characters must be entered in quick succession, all within 1000 ms.

Syntax

Exec Command				
+++				
Response(s)				
OK				
PIN	→	Last	Reference(s)	
-	-	-	ITU-T V.250 [14]	

Note

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



7.10 AT+CLCC List of current calls

The [AT+CLCC](#) execute command lists all current calls. If the command is successful, but no calls are available, no information response is sent to the TE.
Packet switched connections are not indicated.

Syntax

Test Command	
AT+CLCC=?	
Response(s)	
OK	
Exec Command	
AT+CLCC	
Response(s)	
[+CLCC: <idx>, <dir>, <stat>, <mode>, <empty>[, <number>, <type>[, <alpha>]]]	
[+CLCC: <idx>, <dir>, <stat>, <mode>, <empty>[, <number>, <type>[, <alpha>]]]	
[+CLCC: ...]	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
+ - -	3GPP TS 27.007 [45]

Parameter Description

<idx> ^(num)	
Call identification number as described in 3GPP TS 22.030 [25], subclause 6.5.5.1., 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	Circuit switched data



<empty>^(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 octet as defined by 3GPP TS 24.008 [39], subclause 10.5.4.7. For possible values and further details see **<type>** parameter specified for phonebook related AT commands such as **AT+CPBR** and **AT+CPBW**.

128	Number is restricted
161	National <number> . Network support of this type is optional.
145	Dialing string <number> includes international access code character '+'
255	Dialing string <number> contains "*", "#" characters for Supplementary Service codes. Network support of this type is optional.
129	Otherwise

<alpha>^{(str)(+CSCS)}

Alphanumeric representation of **<number>** corresponding to the entry found in phonebook(see for example **AT+CPBW**, parameters **<text>** and **<tlength>**).

If the same **<number>** is written to several phonebooks with different names the **<alpha>** representation prioritizes the name from the "SM" phonebook and next according to the order: "ME", "FD", "ON". This order of priority applies also to dialed numbers no matter which phonebook is used for dialing.

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.



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

AT+CRC controls whether or not to use the extended format of incoming call indication.
 <mode>=1 may lead to connection failure, if the application waits for default result code/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 → Last + + -	Reference(s) 3GPP TS 27.007 [45]

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)(&V)(&W)}	
0(&F)(D)	Disable extended format
1	Enable extended format



<type>^(str)

"REL ASYNC"	Asynchronous non-transparent
"FAX"	Fax call (Fax only for compatibility reasons, not supported by ELS62-W)
"VOICE"	Voice

7.12 AT+CVMOD Voice call mode

The **AT+CVMOD** selects the voice call mode for making a Mobile Originated voice call from the UE. The voice call mode can be CS_ONLY, VOIP_ONLY, CS_PREFERRED or VOIP_PREFERRED.

Syntax

Test Command AT+CVMOD=? Response(s) +CVMOD: (list of supported<voicemode>s) OK	
Read Command AT+CVMOD? Response(s) +CVMOD: <voicemode> OK	
Write Command AT+CVMOD=<voicemode> Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last + - +	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<voicemode> ^(num) (NV)	
0	CS_ONLY
1	VOIP_ONLY
2	CS_PREFERRED
3 ^(D)	VOIP_PREFERRED

Notes

- If the Call Mode is set to CS_ONLY, then the **ATD** command will make a call in CS mode.
If the Call Mode is set to VOIP_ONLY, then the **ATD** command will make a call in VoIP mode.
If the Call Mode is set to CS_PREFERRED, then the **ATD** command gives preference for CS based voice call.
If the Call Mode is set to VOIP_PREFERRED, then the **ATD** command gives preference for VoIP based voice call
- The preferences are not applicable for the emergency call.



8. Network Service Commands

The AT Commands described in this chapter are related to various network services.

8.1 AT+COPN Read operator names

The **AT+COPN** command returns the list of operator names from the UE. Each operator code **<numeric>** that has an alphanumeric equivalent **<alphan>** in the UE memory is returned.

Syntax

Test Command	
AT+COPN=?	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
Exec Command	
AT+COPN	
Response(s)	
+COPN: <numeric> , <alphan>	
[+COPN: ...]	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
+ + -	3GPP TS 27.007 [45]

Parameter Description

<numeric> ^(str)
Operator in numeric format
<alphan> ^{(str)(+CSCS)}
Operator in long alphanumeric format



8.2 AT+COPS Operator Selection

AT+COPS queries the present status of the ELS62-W's network registration and allows to determine whether automatic or manual network selection shall be used.

Three operator selection modes are available with **AT+COPS**:

- **Automatic**
ELS62-W searches for the home operator automatically. If successful the ELS62-W registers to the home network. If the home network is not found, ELS62-W goes on searching. If a permitted operator is found, ELS62-W registers to this operator.
If no operator is found the ELS62-W remains unregistered.
- **Manual**
Desired operator can be determined using the **AT+COPS** write command. If the operator is found, ELS62-W registers to it immediately. If the selected operator is forbidden, the ELS62-W remains unregistered.
- **Manual/automatic**
The UE first tries to find the operator determined via **AT+COPS** write command. If the UE 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 access 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 response to the **AT+COPS** test command is independent of the settings made with **<mode>** and **<rat>**. The **AT+COPS** test command will return a list of operators with the supported **<rat>**s.

Under certain conditions, the UE has not enough resources to perform a network scan in the background. In such cases, the **AT+COPS** test command is denied with error, for example during an ongoing attach procedure, location updates, data traffic in PS connections, voice calls, etc.

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

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

Syntax

Test Command

AT+COPS=?

Response(s)

+COPS: [list of supported (**<opStatus>**, long alphanumeric **<opName>**, short alphanumeric **<opName>**, numeric **<opName>**, **<rat>**)s], , (list of supported **<mode>**s), (list of supported **<format>**s)

OK

ERROR

+CME ERROR: **<err>**



Read Command

AT+COPS?

Response(s)

+COPS:<mode>[, <format>[, <opName>][, <rat>]]

OK

ERROR

+CME ERROR:<err>

Write Command

AT+COPS=<mode>[, <format>[, <opName>[, <rat>]]]

Response(s)

OK

ERROR

+CME ERROR:<err>

Write Command

When <mode>=0:

AT+COPS=[<mode>[, <format>[, <opName>[, <rat>]]]]

Response(s)

OK

ERROR

+CME ERROR:<err>

Write Command

When <mode>=1 or 4:

AT+COPS=<mode>[, <format>[, <opName>[, <rat>]]

Response(s)

OK

ERROR

+CME ERROR:<err>

Write Command

When <mode>=2 (deregistering from network):

AT+COPS=<mode>

Response(s)

OK

ERROR

+CME ERROR:<err>

Write Command

When <mode>=3 (changing only <format>):

AT+COPS=[<mode>[, <format>[, <opName>][, <rat>]]

Response(s)

OK

ERROR

+CME ERROR:<err>

PIN → Last

± - -

Reference(s)

3GPP TS 27.007 [45]



Parameter Description

<opStatus>^(num)

Operator Status

0	Unknown
1	Operator available
2	Current operator
3	Operator forbidden

<opName>^{(str)(&V)}

Operator Name

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

<mode>^{(num)(&V)}

0 ^(P)	Automatic mode; <opName> field is ignored.
1	Manual operator selection The AT+COPS write command requires <opName> in numeric format, i.e. <format> shall be 2. When using this mode keep in mind that only the <mode> parameter is non-volatile, but not the selected <opName> . After restarting the UE the network will be selected according to the priority order specified in 3GPP TS 23.122: "Last Registered PLMN", "Home PLMN", "Preferred PLMN" (related USIM elementary files are EF_LOCI, EF_IMSI, EF_PLMNwAcT). The same priority order applies when swapping the USIM during operation.
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	Manual / automatic selection (<opName> field shall be present); if manual selection fails, automatic mode (<mode> =0) is entered.

<rat>^{(num)(&V)}

Radio Access Technology (RAT)

The access technology selected parameters [<rat>](#) should only be used in terminals capable to register to more than one access technology. Selection of [<rat>](#) does not limit the capability to cell reselections, even though an attempt is made to select an access technology, the MT may still re-select a cell in another access technology.

The automatic [<rat>](#) selection mode can be restored any time by executing the [AT+COPS](#) write command without choosing a specific [<rat>](#), i.e. simply by omitting the [<rat>](#) 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 [<opName>](#), but [<rat>](#) omitted.

When setting [AT+COPS=0](#), the automatic [<rat>](#) selection will firstly check the preferred RAT set by [AT^SNSRAT](#). See also [AT^SNSRAT](#).

Please consider that the [AT+COPS?](#) read command does not reflect whether [<rat>](#) was omitted or explicitly set. This is because the response to the [AT+COPS?](#) read command will always indicate the currently used [<rat>](#).

0	GSM
---	-----



3	GSM w/EGPRS Only in read command response, not intended for the AT+COPS write command.
7	E-UTRAN

`<format>^(num)(&V)(&W)`

0(&F)(D)	Long alphanumeric format of <opName> .
1	Short alphanumeric format of <opName> .
2	Numeric format of <opName> . This is the 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

- Trying to change the [<rat>](#) parameter during an ongoing attach procedure causes the [AT+COPS](#) command to return an error message. The operation is temporarily not allowed until the attach procedure is complete.
- [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).



8.3 AT+CREG Network Registration Status

AT+CREG serves to monitor the ELS62-W's circuit mode network registration status. Information can be reported by the **AT+CREG?** read command and by +CREG: URCs.
For packet switched service the **AT+CGREG** command and response apply to the registration (<stat>) and location information (<lac> and <ci>) for packet switched service.
For EPS service the **AT+CEREG** command and response apply to the registration (<stat>) and location information (<tac> and <ci>) for EPS service.

Syntax

Test Command AT+CREG=? Response(s) +CREG: (list of supported <urcMode>s) OK	
Read Command AT+CREG? Response(s) +CREG: <urcMode>, <regStatus>[[, <netLac>][, <netCellId>][, <AcT>]][, <causeType>, <rejectCause>] OK ERROR +CME ERROR: <err>	
Write Command AT+CREG=<urcMode> Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last - + -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 24.008 [39]

Unsolicited Result Codes

URC 1

If <urcMode>=1 and there is a change in the UE's network registration status:

+CREG: <regStatus>

URC 2

If <urcMode>=2 and there is a change of the UE's network registration status or at least one of the additional network information elements:

+CREG: <regStatus>[[, <netLac>][, <netCellId>][, <AcT>]]

URC 3

The <urcMode>=3 further extends the URC2 with [, <causeType>, <rejectCause>], when available, when the value of <regStatus> changes.

+CREG: <regStatus>[[, <netLac>][, <netCellId>][, <AcT>]][, <causeType>, <rejectCause>]]



Parameter Description

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

[0] ^{(&F)(D)}	Disable +CREG URC.
1	Enable URC +CREG: <regStatus> to report status of network registration.
2	Enable URC +CREG: <regStatus>[, [<netLac>], [<netCellId>], [<AcT>]] to report status of network registration including location information.
3	Enable URC +CREG: <regStatus>[, [<netLac>], [<netCellId>], [<AcT>], [<causeType>, <rejectCause>]] to report status of network registration including location information and cause value information.

<regStatus>^(num)

0	Not registered, UE 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 UE is currently searching for a new operator. UE 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. • UE has no access rights to the networks available. • Networks from the SIM list of allowed networks are around, but login fails due to one of the following reasons: - #11 ... PLMN not allowed - #12 ... Location area not allowed - #13 ... Roaming not allowed in this location area After this, the search will be resumed (if automatic network search is enabled). • The Home PLMN or an allowed PLMN is available, but login is rejected by the cell (reasons: Access Class or LAC). If at least one network is available, emergency calls can be made.
3	Registration denied • If automatic network search is enabled: Authentication or registration fails after Location Update Reject due to one of the following reasons: - #2 ... IMSI unknown at HLR - #3 ... Illegal MS - #6 ... Illegal UE Either the SIM or the UE are unable to log into any network. User intervention is required. Emergency calls can be made, if any network is available. • Only if manual network search is enabled: Manual registration fails after Location Update Reject due to the following reasons: - #2 ... IMSI unknown at HLR - #3 ... Illegal MS - #6 ... Illegal UE - #11 ... PLMN not allowed



- #12 ... Location area not allowed
 - #13 ... Roaming not allowed in this location area
- No further attempt is made to search or log into a network. Emergency calls can be made if any network is available.

4	Unknown, e.g. out of GSM/LTE coverage.
5	Registered, roaming. UE is registered at a foreign network (national or international network)
11	Attached for emergency bearer services only.

`<netLac>(str)`

Two byte location area code in hexadecimal format (e.g. "00C1" equals 193 in decimal).

`<netCellId>(str)`

Cell ID in hexadecimal format:

- 16 bit for 2G
- 28 bit for 4G

`<AcT>(num)`

Radio access technology

0	GSM
3	GSM w/EGPRS
7	E-UTRAN

`<causeType>(num)`

Integer type value indicating the type of `<rejectCause>`.

0	The <code><rejectCause></code> contains an MM cause value (refer to 3GPP TS 24.008 [39]).
1	The <code><rejectCause></code> contains a manufacturer specific cause.

`<rejectCause>(num)`

Integer type value containing the cause of the failed registration.

Example

AT+CREG=1	Activate URC mode.
OK	
AT+COPS=0	Force UE to automatically search a network operator.
OK	
+CREG: 2	URC reports that UE is currently searching.
+CREG: 1	URC reports that operator has been found.



8.4 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 → Last	Reference(s)
+ - -	3GPP TS 27.007 [45]

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
According to 3GPP TS 27.007 [45] , the <rssi> value is not applicable to 4G 4G networks. Please use AT+CESQ instead, or AT^SMONI .	
<ber> ^(num)	
0..7	as RXQUAL values in the table in 3GPP TS 45.008 [47] , section 8.2.4 (for GSM network only).
99	not known or not detectable.

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.



8.5 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.
The response of AT+CPOL read command also depends on the setting of AT+CPLS.
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>, <e-utran>] +CPOL: ... OK ERROR +CME ERROR: <err>	
Write Command AT+CPOL=[<index>][, <format>[, <operator>][, <gsm>, <gsm_compact>, <utran>, <e-utran>]]] Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last + + -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<index> ^(num)	
The order number of the operator in the SIM preferred operator list.	
<format> ^(num)	
0	Long alphanumeric format <operator>
1	Short alphanumeric format <operator>
2	Numeric format <operator>
<operator> ^(str)	
The operator in the format specified in <format>.	



<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

<e-utran>^(num)

0	AcT E-UTRAN disabled
1	AcT E-UTRAN enabled

Notes

- The Access Technology selection parameters <gsm>, <gsm_compact>, <utran>, <e-utran> are required for SIM cards or UICCs containing PLMN selector with Access Technology.
- The parameter <utran> is available for compatibility reasons and has no functional influence.
- For the parameters <gsm>, <utran>, and <e-utran>, only one parameter can be set (i.e. "1" AcT xxx enabled) at a time. If two or more parameters are enabled at the same time, the AT+CPOL write command returns "+CME ERROR: Incorrect parameters".



8.6 AT+CPLS Select Preferred Operator List

AT+CPLS is used to select a preferred PLMN list defined in Elementary Files of the SIM card or active application of the USIM. The setting takes effect for the **AT+CPOL** command.

Syntax

Test Command AT+CPLS=? Response(s) +CPLS : (list of USIM supported <plmn-selector>s) OK	
Read Command AT+CPLS? Response(s) +CPLS: <plmn-selector> OK ERROR +CME ERROR: <err>	
Write Command AT+CPLS=<plmn-selector> Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last + - -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<plmn-selector> ^(num)	
0 ^(P)	User controlled PLMN with EF _{PLMNwAcT} /EF _{PLMNsel}
1	Operator controlled PLMN selector with EF _{OPLMNwAcT}
2	HPLMN selector with EF _{HPLMNwAcT}



8.7 AT+CTZR Time Zone Reporting

The **AT+CTZR** command enables and disables the time zone change event reporting. If the reporting is enabled the UE returns the unsolicited result code +CTZV: *<timezone>* or +CTZE: *<timezone>*,*<dst>*[*<time>*] or +CTZEU: *<timezone>*,*<dst>*[*<utime>*] whenever the time zone is changed.

Syntax

Test Command AT+CTZR=? Response(s) +CTZR: (list of supported <i><n></i> s) OK	
Read Command AT+CTZR? Response(s) +CTZR: <i><n></i> OK ERROR +CME ERROR: <i><err></i>	
Write Command AT+CTZR= <i><n></i> Response(s) OK ERROR +CME ERROR: <i><err></i>	
PIN → Last - + -	Reference(s) 3GPP TS 27.007 [45]

Unsolicited Result Codes

URC 1

+CTZV: *<timezone>*

The URC acknowledges to the user that the time zone has changed.

URC 2

+CTZE: *<timezone>*, *<dst>*[, *<time>*]

The extended URC acknowledges to the user that the time zone has changed.

URC 3

+CTZEU: *<timezone>*, *<dst>*[, *<utime>*]

The extended URC acknowledges to the user that the time zone has changed.

Parameter Description

<i><n></i> ^(num)	
0(&F)(P)	Disable time zone change event reporting.
1	Enable time zone change event reporting by unsolicited result code +CTZV: <i><timezone></i> .



- 2 Enable extended time zone reporting by unsolicited result code +CTZE:
`<timezone>,<dst>,<time>].`
- 3 Enable extended time zone reporting by unsolicited result code +CTZEU:
`<timezone>,<dst>,<utime>].`

`<timezone>`^(str)

Sum of the local time zone (difference between the local time and GMT expressed in quarters of an hour) plus daylight saving time.
Positive (east) or negative (west) offset from the UTC in units of 15 minutes.

`<dst>`^(num)

Daylight saving

Integer type value indicating whether `<timezone>` includes daylight savings adjustment.

- 0 `<timezone>` includes no adjustment for daylight saving time.
- 1 `<timezone>` includes +1 hour (equals 4 quarters in `<timezone>`) adjustment for daylight saving time.
- 2 `<timezone>` includes +2 hours (equals 8 quarters in `<timezone>`) adjustment for daylight saving time.

`<time>`^(str)

Local Time

String type value representing the local time. The format is "YYYY/MM/DD,hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). This parameter can be provided by the network at the time of delivering time zone information and will be present in the extended time zone reporting unsolicited result code if provided by the network.

`<utime>`^(str)

Universal Time

String type value representing the universal time. The format is "YYYY/MM/DD,hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). This parameter can be provided by the network at the time of delivering time zone information and will be present in the extended time zone reporting unsolicited result code if provided by the network.



8.8 AT+CTZU Automatic Time Zone Update

The [AT+CTZU](#) command enables and disables automatic time zone update via NITZ (if supported by the network).

When [AT+CTZU](#) is set to 1, the Real Time Clock (RTC) on the UE is updated with the network time every time when the UE receives a NITZ message. Any changes to the RTC using the command [AT+CCLK](#) will be wiped out by the network time.

When [AT+CTZU](#) is set to 0, [AT+CCLK](#) can be used to set the RTC. The newly set time will not be overwritten by the network time.

The [AT^SIND](#) command can also be used to get NITZ information, for details see "nitz" indicator. Unlike [AT+CTZU](#), [AT^SIND](#) settings have no effect for the RTC. See [AT+CCLK](#) for examples.

Syntax

Test Command	
AT+CTZU=?	
Response(s)	
+CTZU:(list of supported <n>s)	
OK	
Read Command	
AT+CTZU?	
Response(s)	
+CTZU: <n>	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
AT+CTZU=<n>	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
- + -	3GPP TS 27.007 [45]

Unsolicited Result Code

Format of the unsolicited result code:

+CTZU:<nitzUT>, <nitzTZ>[, <nitzDST>]

The URC indicates the RTC update from network time, and contains the time relevant information elements of the NITZ message.

Parameter Description

<n>^(num)(NV)	
0(&F)(D)	Disable automatic time zone update via NITZ. Suppress unsolicited result codes.
1	Enable automatic time zone update via NITZ. Output unsolicited result codes.



`<nitzUT>(str)`

Universal Time delivered as part of the NITZ message.

`<nitzTZ>(num)`

Time Zone delivered as part of the NITZ message.

Positive (east) or negative (west) offset from the UTC in units of 15 minutes.

`<nitzDST>(num)`

Adjustment for Daylight Saving Time as part of the NITZ message. Displayed only when received from network. Indicates whether `<nitzTZ>` includes daylight savings adjustment.

0	No daylight savings adjustment included.
1	+1 hour (equals 4 quarters in <code><nitzTZ></code>) adjustment for daylight saving time included.
2	+2 hours (equals 8 quarters in <code><nitzTZ></code>) adjustment for daylight saving time included.

8.9 AT^SMONI Monitoring Serving Cell

The [AT^SMONI](#) command supplies information of the serving cell.

Syntax

Test Command

AT^SMONI=?

Response(s)

OK

Exec Command

AT^SMONI

Response(s)

See: Section [8.9.1, AT^SMONI Responses](#)

OK

ERROR

+CME ERROR: <err>

PIN → Last

- - -

Note

- It requires 0.5s delay to perform [AT^SMONI](#) after executing [AT^SXRAT](#) command.

8.9.1 AT^SMONI Responses

UE is not connected:

- UE is camping on a GSM (2G) cell and registered to the network:

Syntax:

^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,PWR,RXLev,Conn_state

Example:

^SMONI: 2G,990,-75,262,03,0139,02C9,28,28,3,0,G,, -104,NOCONN

- UE is camping on a LTE (4G) cell and registered to the network:

Syntax:

^SMONI: ACT,EARFCN,Band,DL bandwidth,UL bandwidth,Mode,MCC,MNC,TAC,Global Cell ID,Physical Cell ID,Srxlev,RSRP,RSRQ,LTEA,Conn_state,CA_DL,CA_UL,RS-SINR,CSGid

Example:

^SMONI: 4G,6300,20,10,10,FDD,262,02,BF75,0345103,350,33,-94,-7,,NOCONN,,,0,

- UE is searching and could not (yet) find a suitable cell:

Example:

^SMONI: Searching

- UE is camping on a GSM cell but not registered to the network (only emergency call allowed):

Syntax:

^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,PWR,RXLev,Conn_state

Example:

^SMONI: 2G,673,-89,262,07,4EED,A500,16,16,7,4,G,, -107,LIMSRV

- UE is camping on a LTE (4G) cell but not registered to the network (only emergency call allowed):



Syntax:
`^SMONI: ACT,EARFCN,Band,DL bandwidth,UL bandwidth,Mode,MCC,MNC,TAC,Global Cell ID,Physical Cell ID,Srxlev,RSRP,RSRQ,LTEA,Conn_state,CA_DL,CA_UL,RS-SINR,CSGid`
Example:
`^SMONI: 4G,6300,20,10,10,FDD,262,02,BF75,0345103,350,33,-94,-7,,LIMSRV,,,0,`

UE has a dedicated channel (for example call in progress):

- GSM (2G) cell:

Syntax:
`^SMONI:`
`ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,PWR,RXLev,ARFCN,TS,timAdv,dBm,Q,ChMod`
Example:
`^SMONI: 2G,852,-80,262,03,4E2D,6C2D,28,32,3,5,E,, -104,816,1,3,-71,0,A_FR`

- LTE (4G) cell:

Syntax:
`^SMONI: ACT,EARFCN,Band,DL bandwidth,UL bandwidth,Mode,MCC,MNC,TAC,Global Cell ID,Physical Cell ID,TX_power,RSRP,RSRQ,LTEA,Conn_state,CA_DL,CA_UL,RS-SINR,CSGid`
Example:
`^SMONI: 4G,6300,20,10,10,FDD,262,02,BF75,0345103,350,90,-94,-7,,CONN,,,0,`

Columns for GSM (2G) Serving Cell 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 (level is limited from -110dBm to -47dBm)
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code
cell	Cell ID
C1	Coefficient for cell selection
C2	Coefficient for cell reselection
NCC	PLMN colour code
BCC	Base station colour code
GPRS	GPRS state
PWR	Maximal power level used on RACH channel in dBm This parameter is available for compatibility reasons and has no functional influence.
RxLev	Minimal receiving level (in dBm) to allow registration

Columns for GSM (2G) Dedicated Channel parameters:

Column	Description
ARFCN	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier or TCH/PDCH carrier, depending on connection status
TS	Timeslot number



Column	Description
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 LTE (4G) Serving Channel parameters:

Column	Description
ACT	Access Technology
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
Band	E-UTRA frequency band (see 3GPP 36.101)
DL bandwidth	DL bandwidth
UL bandwidth	UL bandwidth
Mode	FDD or TDD
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
TAC	Tracking Area Code (see 3GPP 23.003 Section 19.4.2.3)
Global Cell ID	Global Cell ID
Physical Cell ID	Physical Cell ID
Srxlev	RX level value for base station selection in dB (see 3GPP 25.304)
RSRP	Reference Signal Received Power (see 3GPP 36.214 Section 5.1.1.)
RSRQ	Reference Signal Received Quality (see 3GPP 36.214 Section 5.1.2.)
TX power	Used Uplink Power in 1/10 dBm
LTEA	Serving cell is LTE-A cell 0 - cell does not support Carrier Aggregation 1 - cell does support Carrier Aggregation This parameter is available for compatibility reasons and has no functional influence.
Conn_state	Connection state. Can be one of following: CONN, LIMSRV, NOCONN or SEARCH
CA_DL	Downlink cell for Carrier Aggregation 0 - Cell is currently not used for DL Carrier Aggregation 1 - Cell is currently used for DL Carrier Aggregation 2 - Cell is used for DL Carrier Aggregation (is activated) This parameter is available for compatibility reasons and has no functional influence.
CA_UL	Uplink cell for Carrier Aggregation 0 - Cell is currently not used for UL Carrier Aggregation 1 - Cell is currently not used for UL Carrier Aggregation 2 - Cell is used for UL Carrier Aggregation (is activated) This parameter is available for compatibility reasons and has no functional influence.
RS-SINR	Signal to Interference plus Noise Ratio
CSGid	Closed subscriber group identifier This parameter is available for compatibility reasons and has no functional influence.



8.9.2 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.
- "NOCONN" (No connection) - The MS is camping on a cell and registered to the network. The service state is 'idle', i.e. there is no connection established or a dedicated channel in use.
- "LIMSRV" (Limited Service) - The MS is camping on a cell but not registered to the network. Only emergency calls are allowed. The MS enters this state, for example, when
 - no SIM card is inserted, or PIN has not been given,
 - neither Home PLMN nor any other allowed PLMN are found,
 - registration request was not answered or denied by the network (use command [AT+CREG](#) to query the registration status),
 - authentication failed.

8.10 AT^SMONP Monitoring Neighbour Cells

The `AT^SMONP` supplies information of all neighbour cells.

Syntax

Test Command
<code>AT^SMONP=?</code>
Response(s)
OK
Exec Command
<code>AT^SMONP</code>
Response(s)
See: Section 8.10.1, AT^SMONP Responses
OK
PIN → 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 searching for a network the serving cell can change and the UE shows different sets of neighbour cells depending on the PLMN of the serving cell.
- Parameters for which no values are available are shown as "-".

8.10.1 AT^SMONP Responses

- In case of a GSM (2G) serving cell:*

```
Syntax:
2G:
ARFCN1, rs1, dBm1, MCC1, MNC1, NCC1, BCC1, C11, C21, LAC1, cell1, C311, C321
ARFCN2, rs2, dBm2, MCC2, MNC2, NCC2, BCC2, C12, C22, LAC2, cell2, C312, C322
...
ARFCNn, rsn, dBmn, MCCn, MNCn, NCCn, BCCn, C1n, C2n, LACn, celln, C31n, C32n
4G:
EARFCN1, RSRQ1, RSRP1, PCI1
EARFCN2, RSRQ2, RSRP2, PCI2
...
EARFCNn, RSRQn, RSRPn, PCIn
```

```
Example:
2G:
658,, -60,262,07,7,4,46,46,4EED,08B8,0,0
666,, -64,262,07,7,1,42,42,4EED,A500,0,0
1006,, -74,262,07,7,4,32,32,4EED,----,0,0
```



```
1021,, -75,262,07,7,1,31,21,4EED,08B2,0,0
702,, -78,262,07,7,3,28,28,4EED,A4F0,0,0
654,, -79,262,07,7,5,27,27,4EED,1C3A,0,0
4G:
-----,-----,-----,---
OK
```

- **In case of a 4G serving cell:**

```
Syntax:
4G:
EARFCN1,RSRQ1,RSRP1,Srxlev1,PCI1,RSSI1,Cell ID1,MCC1,MNC1,TAC1,CA_DL1,CA_UL1
EARFCN2,RSRQ2,RSRP2,Srxlev2,PCI2,RSSI2,Cell ID2,MCC2,MNC2,TAC2,CA_DL2,CA_UL2
...
EARFCNn,RSRQn,RSRPn,Srxlevn,PCIn,RSSIn,Cell IDn,MCCn,MNCn,TACn,CA_DLn,CA_ULn

2G:
ARFCN1,RSSI1,NCC1,BCC1,SRxLev1,rank1
ARFCN2,RSSI2,NCC2,BCC2,SRxLev2,rank2
...
ARFCNn,RSSIn,NCCn,BCCn,SRxLevn,rankn

Example 1:
4G:
1830,-12.6,-91,38,368,,368,262,03,C463,,
1830,-11.7,-93,36,262,,368,262,03,C463,,
1830,-10.9,-93,36,329,,368,262,03,C463,,
1830,-15.1,-96,33,261,,368,262,03,C463,,
2527,-9.5,-83,--,1,,----,---,---,---,,
2G:
----,--,----,--,
OK

Example 2:
4G:
1830,-12.6,-91,38,368,,368,262,03,C463,,
1830,-11.7,-93,36,262,,368,262,03,C463,,
1830,-10.9,-93,36,329,,368,262,03,C463,,
1830,-15.1,-96,33,261,,368,262,03,C463,,
2527,-9.5,-83,--,1,,----,---,---,---,,
2G:
----,--,----,--,
OK
```

Columns for GSM (2G) parameters:

Column	Description
ARFCN	Absolute Radio Frequency Channel Number of the BCCH carrier
rs	RSSI value 0 - 63 (RSSI = Received signal strength indication) This parameter is available for compatibility reasons and has no functional influence.
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



Column	Description
BCC	Base Station colour code
C1	cell selection criterion
C2	cell reselection criterion
LAC	Location area code
cell	Cell identifier
C31	cell reselection criterion
C32	cell reselection criterion
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)
rank	Rank of this cell as neighbor for inter-RAT cell reselection This parameter is available for compatibility reasons and has no functional influence.

Columns for LTE (4G) parameters:

Column	Description
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
RSRQ	Reference Signal Received Quality as measured by L1 in dB (see ETSI TS 136 214 version 10.1.0 Section 5.1.3.)
RSRP	Reference Signal Received Power as measured by L1 in dBm (see ETSI TS 136 214 version 10.1.0 Section 5.1.1.)
Srxlev	RX level value for base station selection in dB (see 3GPP 25.304)
PCI	Physical Cell ID
RSSI	Received Signal Strength Indication as measured by L1 in dBm This parameter is available for compatibility reasons and has no functional influence.
Cell ID	LTE Serving cell ID
MCC	Mobile Country Code
MNC	Mobile Network Code
TAC	Tracking Area Code (see 3GPP 23.003 Section 19.4.2.3)
CA_DL	Cell is a downlink cell for Carrier Aggregation 0 - Cell is currently not used for DL Carrier Aggregation 1 - Cell is currently used for DL Carrier Aggregation 2 - Cell is used for DL Carrier Aggregation (is activated) This parameter is available for compatibility reasons and has no functional influence.
CA_UL	Cell is an uplink cell for Carrier Aggregation 0 - Cell is currently not used for UL Carrier Aggregation 1 - Cell is currently used for UL Carrier Aggregation 2 - Cell is used for UL Carrier Aggregation (is activated) This parameter is available for compatibility reasons and has no functional influence.



8.11 AT^SNMON Network Monitoring

The `AT^SNMON` command can be used to monitor various network information.

Syntax

Test Command

`AT^SNMON=?`

Response(s)

```
^SNMON: "INS2G", (list of supported <action>s), (list of supported <rba2g>s)
^SNMON: "INS4G", (list of supported <action>s), (list of supported <rba4g-1>s), (list of supported
<rba4g-2>s)
OK
ERROR
+CME ERROR: <err>
```

Write Command

Start informal network scan for 2G bands. Parameter `<action>` shall be 2.

`AT^SNMON="INS2G", <action>[, <rba2g>]`

Response(s)

```
^SNMON: "INS2G", <reserved>, <rba2g>, <cell_ID>, <lac>, <plmn>, <arfcn>, <rssi>, <dbm>
```

In case of no cell found for specific band then all values behind `<rba2g>` will be omitted:

```
^SNMON: "INS2G", <reserved>, <rba2g>
```

OK

ERROR

+CME ERROR: `<err>`

Write Command

Start informal network scan for 4G bands. Parameter `<action>` shall be 2.

`AT^SNMON="INS4G", <action>[, [<rba4g-1>][, <rba4g-2>]]`

Response(s)

```
^SNMON: "INS4G", <reserved>, <rba4g-1>, <rba4g-2>, <cell_ID>, <tac>, <plmn>, <earfcn>,
<pcid>, <bwdl>, <bwup>, <rsrp>, <rsrq>
```

In case of no cell found for specific band then all values behind `<rba4g-1>` and `<rba4g-2>` will be omitted:

```
^SNMON: "INS4G", <reserved>, <rba4g-1>, <rba4g-2>
```

OK

ERROR

+CME ERROR: `<err>`

PIN → Last

- - -

Reference(s)

3GPP TS 45.008 [47]

Parameter Description

`<action>`^(num)

This parameter determines the action to be taken for the monitoring command.

- | | |
|---|----------------|
| 0 | Reserved value |
| 2 | Query values |



<reserved>^(num)

0 Value returned in scan output responses. Value has no meaning and can be ignored.

<rba2g>^{(str)(NV)}

<rba2g> determines the 2G frequency bands the UE is allowed to use. Values are given in *hexadecimal 32-bit-value order*. Every bit corresponds to a dedicated band number. Leading zeros are not necessary.

"1"	GSM 900
"2"	GSM 1800
"4"	GSM 850
"8"	GSM 1900

<rba4g-1>^{(str)(NV)}

<rba4g-1> determines 4G frequency bands the UE is allowed to use. Values are given in *hexadecimal 32-bit-value order*. Every bit corresponds to a dedicated band number. Leading zeros are not necessary. The number range of <rba4g-1> covers band 1 to band 32.

"1"	LTE 2100 (B1)
"2"	LTE 1900 (B2)
"4"	LTE 1800 (B3)
"8"	LTE 1700 (B4)
"10"	LTE 850 (B5)
"40"	LTE 2600 (B7)
"80"	LTE 900 (B8)
"80000"	LTE 800 (B20)
"8000000"	LTE 700 (B28)

<rba4g-2>^{(str)(NV)}

<rba4g-2> determines 4G frequency bands the UE is allowed to use. Values are given in *hexadecimal 32-bit-value order*. Every bit corresponds to a dedicated band number. The number range of <rba4g-2> covers band 33 to max possible band. If the UE does not support band 33 or higher, the [AT^SNMON](#) test command returns the value range 0 - 0.

"20"	LTE 2600 (B38)
"80"	LTE 2350 (B40)
"100"	LTE 2550 (B41)
"200000000"	LTE 1745 (B66)

<cell_ID>^(str)

Cell ID
16 bit length for GSM
28 bit length for LTE

<lac>^(str)

Location Area Code
Two byte location area code in hexadecimal format (e.g. "00C1" equals 193 in decimal) of the cell that was scanned.



<ta>^(num)

Tracking Area Code (see 3GPP 23.003 Section 19.4.2.3)

<plmn>^(str)

PLMN code

Public Land Mobile Network Code

<arfcn>^(num)

Absolute Radio Frequency Channel Number of the BCCH carrier.

<earfcn>^(num)

E-UTRA Absolute Radio Frequency Channel Number

<rssi>^(num)

Received signal level of the BCCH carrier. The indicated value is composed of the measured value in dBm plus an offset.

This is in accordance with a formula specified in 3GPP TS 45.008 [47]

<dbm>^(str)

Signal Strength

signal strength in dBm

<pcid>^(num)

Physical Cell ID

<bwdl>^(num)

bandwidth in download direction

This parameter is available for compatibility reasons and has no functional influence.

<bwup>^(num)

bandwidth in upload direction

This parameter is available for compatibility reasons and has no functional influence.

<rsrp>^(num)

Reference Signal Received Power as measured by L1 in dBm (see ETSI TS 136 214 version 10.1.0 Section 5.1.1.)

<rsrq>^(num)

Reference Signal Received Quality as measured by L1 in dB (see ETSI TS 136 214 version 10.1.0 Section 5.1.3.)

Note

- The time required for a network scan depends not only on the number of radio bands to be scanned, but also on ripple and existing ghost peaks on the scanned radio bands.

8.12 AT+CAVIMS Availability for voice calls with IMS

Read command returns the UEs IMS voice call availability status stored in the MT. Test command returns supported values as a compound value.

Syntax

Test Command AT+CAVIMS=? Response(s) +CAVIMS : (list of supported <mode>s) OK +CME ERROR: <err> ERROR	
Read Command AT+CAVIMS? Response(s) +CAVIMS: <mode> OK +CME ERROR: <err> ERROR	
PIN  Last - + -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<mode> ^(num)	
The UEs IMS voice call availability status	
0	Voice calls with the IMS are not available.
1	Voice calls with the IMS are available.



8.13 AT+CIREG IMS registration information

The `AT+CIREG` write command enables presentation of URC `" +CIREG: <reg_info> "` when `<n>=1` or URC `" +CIREG: <reg_info>[, <ext_info>] "` when `<n>=2` if there is a change in the UE's IMS registration information.

The `AT+CIREG` read command queries the current URC presentation status `<n>` and `<reg_info>` which indicates the IMS registration status and `<ext_info>` that shows the status of the MT's IMS capabilities. For `<ext_info>`, all relevant values are always summarized and reported as a complete set of IMS capabilities in the URC.

Syntax

Test Command	
<code>AT+CIREG=?</code>	
Response(s)	
<code>+CIREG: (list of supported <n>s)</code>	
<code>OK</code>	
Read Command	
<code>AT+CIREG?</code>	
Response(s)	
<code>+CIREG: <n>, <reg_info>[, <ext_info>]</code>	
<code>OK</code>	
Write Command	
<code>AT+CIREG=<n></code>	
Response(s)	
<code>OK</code>	
<code>ERROR</code>	
<code>+CME ERROR: <err></code>	
PIN → Last	Reference(s)
+ + -	3GPP TS 27.007 [45]

Unsolicited Result Codes

URC 1

`+CIREG: <reg_info>`

Indicates a change in the UE's IMS registration information.

URC 2

`+CIREG: <reg_info>[, <ext_info>]`

Indicates a change in the UE's IMS registration information or the status of the MT's IMS capabilities and all relevant values are always summarized and reported as a complete set of IMS capabilities.

Parameter Description

<code><n></code> ^(num)	
0	Disable reporting
1(&F)(P)	Enable reporting URC <code>" +CIREG: <reg_info> "</code>
2	Enable extended reporting URC <code>" +CIREG: <reg_info>[, <ext_info>] "</code>



<reg_info>^(num)

0	IMS not registered.
1	IMS registered.

<ext_info>^(num)

1	RTP-based transfer of voice according to MMTEL, see 3GPP TS 24.173 [87]. This functionality can not be indicated if the UE is not available for voice over PS, see 3GPP TS 24.229 [89].
2	RTP-based transfer of text according to MMTEL, see 3GPP TS 24.173 [87].
4	SMS using IMS functionality, see 3GPP TS 24.341 [101].
8	RTP-based transfer of video according to MMTEL, see 3GPP TS 24.173 [87].

The value range is from 1 to FFFFFFFF. It is a sum of hexadecimal values, each representing a particular IMS capability of the MT. The hexadecimal values 10, 20, 40 ... 80000 are reserved by the present document.



8.14 AT+CESQ Extended Signal Quality

The [AT+CESQ](#) command returns received signal quality parameters. If the current serving cell is not a GERAN cell, [<rxlev>](#) and [<ber>](#) are set to value 99. If the current serving cell is not a UTRA FDD or UTRA TDD cell, [<rscp>](#) is set to 255. If the current serving cell is not a UTRA FDD cell, [<ecno>](#) is set to 255. If the current serving cell is not an E-UTRA cell, [<rsrq>](#) and [<rsrp>](#) are set to 255.

Syntax

Test Command	
AT+CESQ=?	
Response(s)	
+CESQ: (list of supported <rxlev> s), (list of supported <ber> s), (list of supported <rscp> s), (list of supported <ecno> s), (list of supported <rsrq> s), (list of supported <rsrp> s)	
OK	
Exec Command	
AT+CESQ	
Response(s)	
+CESQ: <rxlev> , <ber> , <rscp> , <ecno> , <rsrq> , <rsrp>	
OK	
ERROR	
PIN  Last	Reference(s)
  	3GPP TS 27.007 [45]

Parameter Description

<rxlev> ^(num)	
Received signal strength level (see 3GPP TS 45.008 [47] subclause 8.1.4). For 2G networks only	
0	rssl < -110 dBm
1	-110 dBm ≤ rssi < -109 dBm
2	-109 dBm ≤ rssi < -108 dBm
...	
61	-50 dBm ≤ rssi < -49 dBm
62	-49 dBm ≤ rssi < -48 dBm
63	-48 dBm ≤ rssi
99	not known or not detectable
<ber> ^(num)	
Channel bit error rate (in percent). For 2G networks only	
0..7	as RXQUAL values in the table in 3GPP TS 45.008 [47] subclause 8.2.4
99	not known or not detectable
<rscp> ^(num)	
Received signal code power (see 3GPP TS 25.133 [42] subclauses 9.1.1.3 and 9.1.1.1.3) For 3G networks only	
255	not known or not detectable



<ecno>^(num)

Ratio of the received energy per PN chip to the total received power spectral density (see 3GPP TS 25.133 [42] subclause 9.1.2.3) For 3G networks only

255 not known or not detectable

<rsrq>^(num)

Reference signal received quality (see 3GPP TS 36.133 [49] subclause 9.1.7). For 4G networks only

0	rsrq < -19.5 dB
1	-19.5 dB ≤ rsrq < -19 dB
2	-19 dB ≤ rsrq < -18.5 dB
...	
32	-4 dB ≤ rsrq < -3.5 dB
33	-3.5 dB ≤ rsrq < -3 dB
34	-3 dB ≤ rsrq
255	not known or not detectable

<rsrp>^(num)

Reference signal received power (see 3GPP TS 36.133 [49] subclause 9.1.4). For 4G networks only

0	rsrp < -140 dBm
1	-140 dBm ≤ rsrp < -139 dBm
2	-139 dBm ≤ rsrp < -138 dBm
...	
95	-46 dBm ≤ rsrp < -45 dBm
96	-45 dBm ≤ rsrp < -44 dBm
97	-44 dBm ≤ rsrp
255	not known or not detectable



8.15 AT^SNSRAT Radio Access Technologies Selection

The `AT^SNSRAT` command specifies the Radio Access Technologies (RAT) to be used for network selection and registration. See also `AT+COPS`.

The `AT^SNSRAT` execute command will reset RATs to default values. The rule is as below: LTE > GSM.

The `AT^SNSRAT` write command allows to set the preferred RAT(s).

- The preferred RATs can be set in a prioritized order of `<1stPreferredAcT>` and `<2ndPreferredAcT>`. The settings are stored non-volatile, and will be used first for the next registration attempt. However, depending on network capability, it is possible that the UE changes to the non-preferred RAT if this more suitable.
- The preferred RATs set in `<1stPreferredAcT>` and `<2ndPreferredAcT>` cannot be the same.
- If a preferred RAT is set in `<1stPreferredAcT>` while `<2ndPreferredAcT>` is not, the unselected RATs will be ignored during network research.
- The preferred RATs is not overwritten by the `AT+COPS` Automatic mode. For example, if preferred RAT `<1stPreferredAcT>` is set by `AT^SNSRAT=7`, the radio access technology will change to LTE; then if `AT+COPS=0` (i.e. Automatic mode) is set in the next step, the `<rat>` selection will check the preferred RAT set by `AT^SNSRAT`. See also `<rat>` in `AT+COPS`.

Syntax

Test Command

`AT^SNSRAT=?`

Response(s)

`^SNSRAT:(list of supported <1stPreferredAcT>s), (list of supported (<2ndPreferredAcT>s))`

OK

ERROR

+CME ERROR: `<err>`

Read Command

`AT^SNSRAT?`

Response(s)

`^SNSRAT:<1stPreferredAcT>[, <2ndPreferredAcT>]`

OK

ERROR

+CME ERROR: `<err>`

Exec Command

`AT^SNSRAT`

Response(s)

OK

ERROR

+CME ERROR: `<err>`

Write Command

`AT^SNSRAT=<1stPreferredAcT>[, <2ndPreferredAcT>]`

Response(s)

OK

ERROR

+CME ERROR: `<err>`

PIN → Last

- ± -



Parameter Description

<1stPreferredAcT>^{(num)(NV)}

Access technology 1st preferred

0 GSM

7^(D) LTE

<2ndPreferredAcT>^{(num)(NV)}

Access technology 2nd preferred

0^(D) GSM

7 LTE



8.16 AT^SXRAT Selection of Radio Access Technology

The **AT^SXRAT** command specifies the Radio Access Technologies (RAT) to be used for network selection and registration. See also **AT+COPS**.

The **AT^SXRAT** write command allows to set the RAT and preferred RAT:

- When the UE is registered, setting only **<AcT>**=0 or 3 can be used to change the RAT instantly.
- When the UE is not registered and the SIM card is locked, **<AcT>**=0 or 3 can be set prior to entering SIM PIN1 in order to determine the RAT before registering.
- When **<AcT>**=5 is set and the **<AcT_pref>** setting is changed then the newly selected preferred RAT will be used first for the next registration attempt.
However, depending on network capability, it is possible that the UE changes to the non-preferred RAT if this more suitable.
- When **<AcT>** is changed by **AT+COPS** in latter step, the value of **<AcT>** will be set accordingly. For example, if **<AcT>** is set by **AT^SXRAT=3**, the radio access technology will change to LTE, then if **AT+COPS=0** is set in following step, the automatic **<AcT>** selection mode will be restored.
- If **<AcT_pref>** is vacant, **<AcT_pref>** will be auto selected by UE, the rule is as below: LTE > GSM.

Syntax

Test Command

AT^SXRAT=?

Response(s)

^SXRAT: [(list of present operator <AcT>), (list of present operator <AcT_pref>)]

OK

ERROR

+CME ERROR: <err>

Read Command

AT^SXRAT?

Response(s)

^SXRAT: <AcT>, <AcT_pref>

OK

ERROR

+CME ERROR: <err>

Write Command

AT^SXRAT=<AcT>[, <AcT_pref>]

Response(s)

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -



Parameter Description

<AcT>^{(num)(NV)}

Radio access technology (RAT)

0 GSM

3 LTE

5^(D) GSM / LTE dual mode
If this mode is selected additionally a preferred RAT can be configured, which is stored in NVRAM.
In dual mode, GSM and LTE Access Technology will be active and full Inter-RAT measurements and handovers are provided.

<AcT_pref>^(num)

Access technology preferred

0 RAT GSM

3^(P) RAT LTE

Note

- The functionality of [AT^SXRAT](#) duplicates that of [AT^SNSRAT](#) for compatibility reasons only. [AT^SXRAT](#) is now obsolete and may be removed from future products. Please use the [AT^SNSRAT](#) command instead."



8.17 AT^SNFOTA Firmware upgrade Over The Air

AT^SNFOTA is one of the AT commands designed for the over-the-air firmware update (FOTA) solution. Major steps for updating the firmware over the air are:

- Connect to the Internet, e.g. by using **AT+CGDCONT** with PDP context range 1 - 15 dedicated for the embedded TCP/IP stack.
- Download the firmware from an external FOTA server using **AT^SNFOTA**.
- Install the firmware from the FFS using the command **AT^SFDL=2**.
- Switch on the UE (if shut down after firmware installation from FFS has completed).

Detailed guidelines for updating the firmware over the air can be found in Application Note 17.

This chapter refers only to the **AT^SNFOTA** procedure. The tasks of **AT^SNFOTA** include:

- Specify FOTA server address, port, and file name.
- Specify CRC hash string value.
- Configure URC presentation mode.
- Configure PDP context ID for FOTA download.
- Download the firmware from an external FOTA server to the FFS, and verify the integrity of the downloaded firmware by SHA256 hash.

Syntax

Test Command

AT^SNFOTA=?

Response(s)

^SNFOTA:"url", (max. string length of <url:port/filename>)
 ^SNFOTA:"crc", (required string length of <crc>)
 ^SNFOTA:"urc", (list of supported <urcMode>s)
 ^SNFOTA:"conid", (list of supported <cid>s)
 ^SNFOTA:"act", (list of supported <action>s)
 OK

Read Command

AT^SNFOTA?

Response(s)

^SNFOTA: "url", <url:port/filename>
 ^SNFOTA: "crc", <crc>
 ^SNFOTA: "urc", <urcMode>
 ^SNFOTA: "conid", <cid>
 ^SNFOTA: "act", <action>, <error>, <progress>

Write Command

Specify FOTA server address, port, and filename.

AT^SNFOTA="url", <url:port/filename>

Response(s)

OK
 ERROR
 +CME ERROR: <err>

Write Command

Configure crc hash value.

AT^SNFOTA="crc", <crc>

Response(s)

OK



Write Command	(Continued)
Configure crc hash value.	
AT^SNFOTA="crc", <crc>	
Response(s)	
ERROR	
+CME ERROR: <err>	
Write Command	
Configure URC mode.	
AT^SNFOTA="urc", <urcMode>	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
Configure PDP context ID.	
AT^SNFOTA="conid", <cid>	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
Perform FOTA action.	
AT^SNFOTA="act", <action>	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
If <action>=0 or 2 - they are done by the UE in the background. Their results are reported by URCs.	
PIN → Last	
- - -	

Unsolicited Result Code

If <action>= 0 or 2:

^SNFOTA: "act", <action>, <error>, <progress>

Parameter Description

<url:port/filename>^{(str)(NV)}

Address of the FOTA server in the form of hostname or IP address with optional port number and path to file. Entered string may contain up to 255 characters. If port is omitted default port 80 will be used for HTTP and port 443 for HTTPS. The firmware path and file name should contain the complete path and file name on the FOTA server where to download the firmware.

It shall be provided in the following scheme: "http[s]://<address>[:<port>][/<path>]"

Example: "http:// 95.143.247.130:50000/amss.usf".

""(D) Default is empty string.



<crc>^{(str)(NV)}

SHA256 hash checksum used to verify downloaded firmware. Length of entered string must be equal 64 characters.

Example: "bfcfea8e6282039ba0c04752dec9dbf3c85a7928701f633861962e56c700d651".

“(D) Default is empty string.

<cid>^{(num)(NV)}

Parameter specifies a particular context definition (see [AT+CGDCONT](#)). This parameter is used to read network settings like APN and IP version protocol from specified context ID <cid> and utilize this configuration to establish the connection to FOTA server.

1^(D)...15

<action>^(num)

Sends request for FOTA action.

0 ^(P)	Abort Stops all communication with server.
2	Download firmware image file to the user partition of the FFS. If the previous file downloading was interrupted, the <action>=2 will check and resume downloading. The FOTA server checks whether the FOTA fragment files in the FFS is consistent with that on the FOTA server. If yes, the file downloading will be resumed; if not, the file download process will be restarted.

<error>^(num)

Possible FOTA errors reported by URCs

0 ^(P)	No error
1	Error unknown
3	Server error
5	Socket error
6	Timeout error
7	File error
8	Not enough space
10	Firmware not available
11	integrity check mismatch
12	User break
13	PDP active error

<progress>^(num)

0^(P)...100 Download progress in percent in steps of 10%.

<urcMode>^{(num)(NV)}

"^SNFOTA" URC presentation mode.

0	"^SNFOTA" URCs disabled.
1 ^(D)	"^SNFOTA" URCs enabled.



9. USIM Application Toolkit (USAT) Commands

This chapter describes AT commands and responses related to the ELS62-W's [USIM Application Toolkit \(USAT\)](#) implementation.

[USAT](#) is a technology that allows an application running on the USIM to control the GSM/LTE Engine (UE); it is specified in 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [21].

[Remote USIM Application Toolkit](#), or short [Remote-USAT](#), provides a link between an application running on the USIM and the Customer Application (TE). The purpose of [Remote-USAT](#) is to allow the TE to send AT commands to the [USAT](#) interface and to display dedicated [USAT](#) activity on the user interface of the TE. The overall scenario is illustrated in the context diagram below.

Following types of data are exchanged between the ELS62-W and the application running on the USIM:

- Proactive commands (PACs) are sent from the USIM application to the UE. Some PAC types are executed by the UE itself, comparable with AT commands. Other PAC types are immediately forwarded to the TE, e.g. "DISPLAY TEXT".
- Terminal Response is the UE's answer to the last PAC, sometimes to be provided by the TE.
- Envelope commands are sent from the UE or TE to the USIM Application, such as "MENU SELECTION".

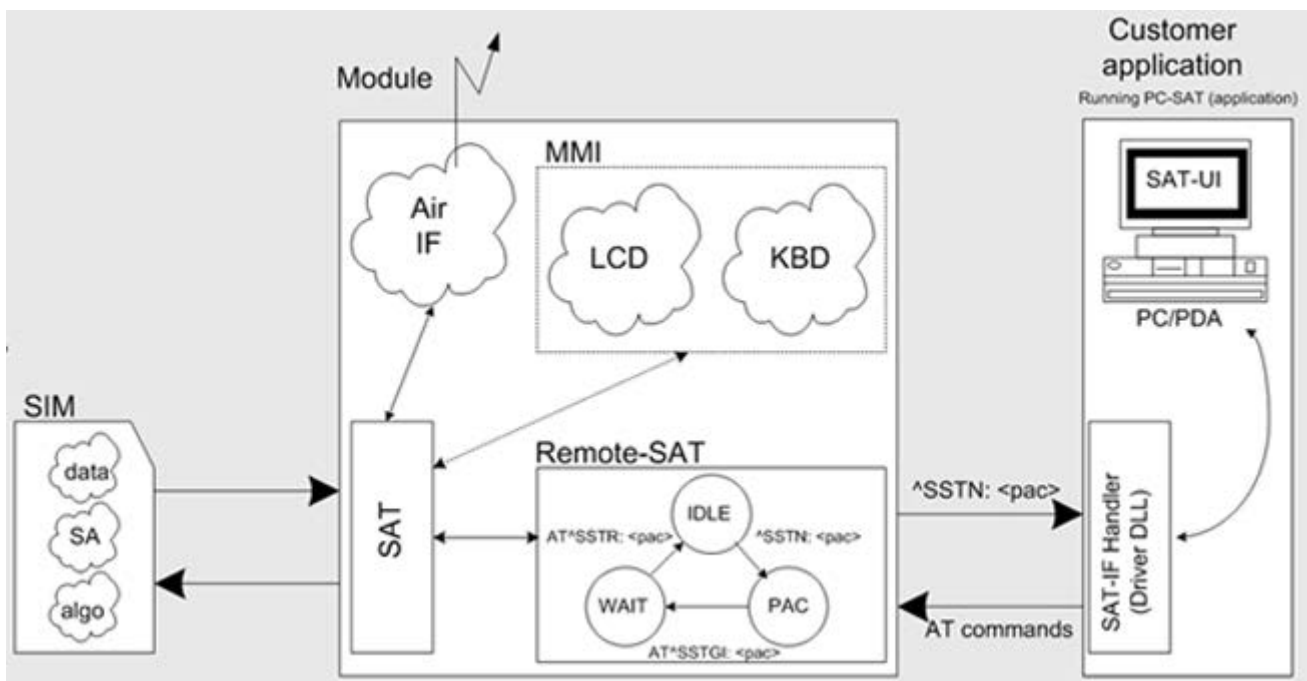


Figure 9.1: Remote-USAT Context Diagram

9.1 Usage of Remote-SAT

If USAT functionality is delivered by the USIM provider, the related USAT commands have to be handled. Otherwise other USIM functionality may not working correctly (e.g. SMS-PP downloads). Therefore two possible modes are available.



9.1.1 Automatic Response Mode (AR Mode)

If the UE operates in this (default) mode, usage of any Remote-USAT AT commands is not necessary. In this case, all commands and responses are exchanged automatically between the UE and the USIM application. The type of Terminal Response (TR) to a USAT Proactive Command issued by the USIM application used in AR mode is listed at Table 9.6, [Command Type Table](#), column "Auto Terminal Response". However, even while using AR Mode it is crucial to react on USAT REFRESH Proactive Commands, indicating that data read from the USIM has been changed!

Additionally a "+CIEV: "simdata"" URC is issued if a Refresh is rejected (<status> and <statAddInfo> are visible).

This URC is independent from [Remote-USAT](#) modes (Autoresponse mode and Explicit Response mode). This can happen if it is not possible to refresh an EF (e.g. EF_IMSI during a call). In this case the customer have to cancel all Calls as soon as possible and wait for the next Refresh command from the SIM card.

If the Refresh will not occur again, please restart the module to complete the Refresh request.

Therefore, enable handling of [AT^SIND](#), using parameter <indDescr>="simdata" to get informed about USAT REFRESH events.

Furthermore it is recommended to activate the [AT^SCKS](#) URC, because for USAT REFRESH Type SIM RESET the same internally functionality as for physical remove and insertion of the USIM is done.

To take full advantage of Remote-USAT the ER mode has to be enabled using [AT^SSTA=1](#). This setting is stored in the non-volatile memory and takes effect after next switch-on of the UE.

9.1.2 Explicit Response Mode (ER Mode)

As a Wireless Modem does not have an MMI, Remote-USAT differs from a phone implementation of USAT. It uses a special set of AT commands to pass data, e.g. a list of menu items, to the TE and to receive responses, e.g. a selected menu item.

The TE is required to monitor the status of an ongoing USAT Proactive Command (PAC) and, if required, sends appropriate AT commands, depending upon users input.

The "+CIEV: "simdata"" URC is issued if a Refresh is rejected (<status> and <statAddInfo> are visible).

This can happen if it is not possible to refresh an EF (e.g. EF_IMSI during a call). In this case the customer have to cancel all Calls as soon as possible and wait for the next Refresh command from the SIM card.

If the Refresh will not occur again, please restart the module to complete the Refresh request.

9.1.3 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 USIM can contain text which might be not displayable, e.g. Greek characters. Use the [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.

9.1.4 USIM Update Initiated by the Network

If a Customer Application (TE) uses data of the USIM 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 USIM data in the background via the [USIM Application Toolkit](#) (USAT) procedure "Data download to USIM". For a detailed description refer to 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [21]. In order to receive the information that an elementary file has been changed the TE has to activate Remote-USAT and needs to look for the USAT Proactive Command "REFRESH", Section 9.7, [AT^SSTGI](#).



9.1.5 Icon Handling

Several USAT 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 UE. The USIM indicates to the UE 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 UE is not able to display both together on the screen, then the alpha identifier or text string takes precedence over the icon.

If the USIM provides an icon identifier with a proactive command, then the UE shall inform the USIM if the icon could not be displayed by sending the response "Command performed successfully, but requested icon could not be displayed" (via AT^SSSTR).

Icon data can be fetched directly from the USIM using the [AT+CRSM](#) command, for details please refer to 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17]. Icon data can be read from the USIM on system start then cached.

9.1.6 Using SMS Related AT Commands

UE activities triggered by USAT 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 Customer Application.

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 TS 23.038 [34] 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>](#)

9.2 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 Customer Application (in case of ER mode only), and
4. internal actions of the UE (especially SAT and Call Control).



9.2.1 Remote-SAT State Transition Diagram

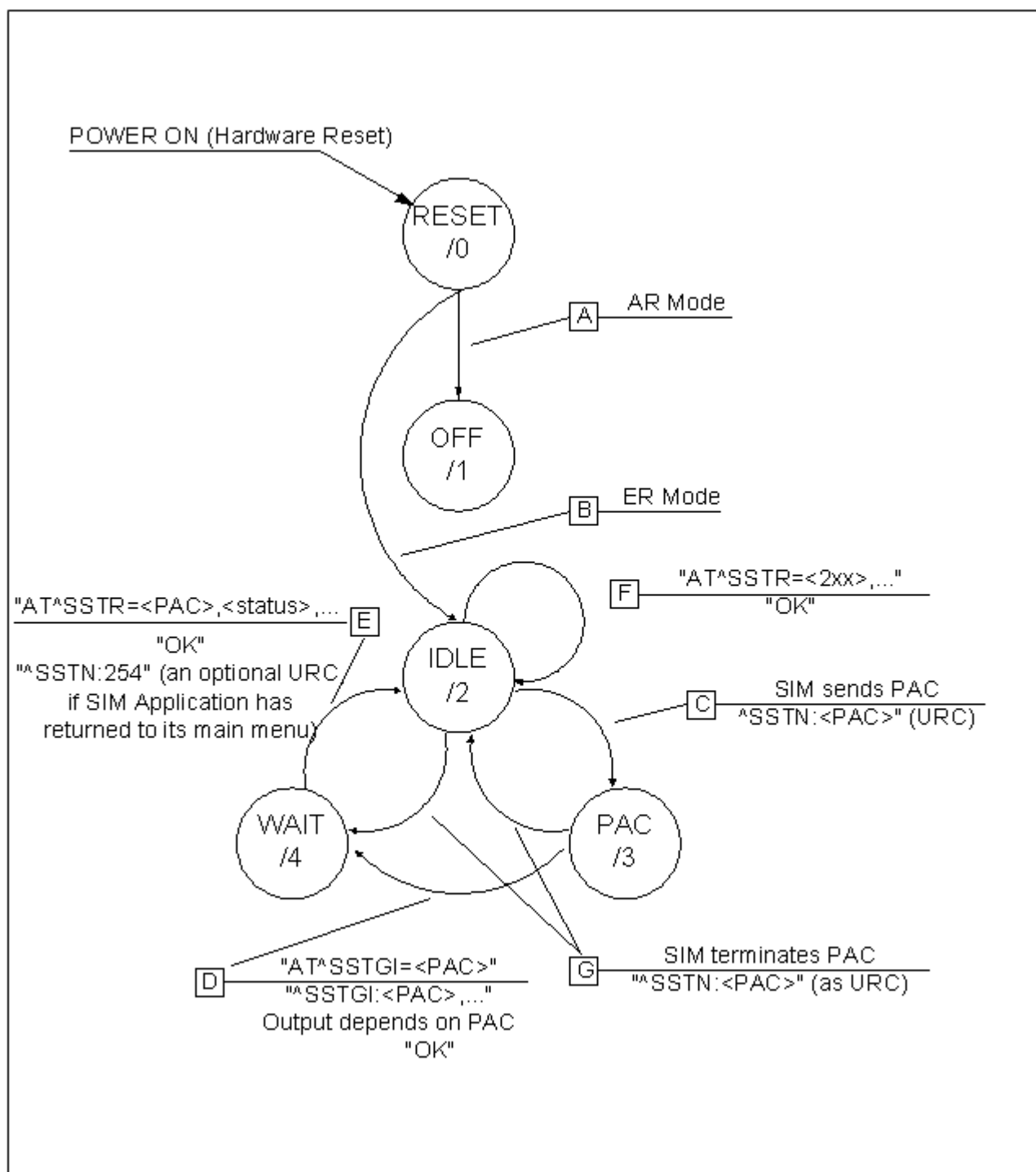


Figure 9.2: Remote-SAT State Transition Diagram



9.2.2 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 TE 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 9.1: State: RESET description

RESET: State after power on the UE.		
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 9.2: State: OFF description

OFF: UE 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 9.3: State: IDLE description

IDLE: UE 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 9.4: State: PAC description

PAC ¹ : SIM application has issued a proactive command. This event is signalled to the TE via ^SSTN: <cmdType>.		
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 9.5: 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>.



9.3 Remote-SAT Command Types

The Command Type value (cmdType) identifies the type of command or associated response passed between the TE and the UE.

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.

[USAT](#) implementation supports SAT class 3 (as specified by 3GPP TS 11.14 [\[19\]](#), 3GPP TS 31.111 [\[20\]](#), ETSI TS 102 223 [\[21\]](#) Release 99, letter class "c").

Table [9.6](#) summarizes only those command types and parameters which may appear on the user interface (UI) and thus, may require the user to take action. Command types which are transparent to the user are not listed in the table, although they are supported by UE as specified in its SAT Terminal Profile (refer to [<SatProfile>](#) and 3GPP TS 11.14 [\[19\]](#), 3GPP TS 31.111 [\[20\]](#), ETSI TS 102 223 [\[21\]](#)).

Table 9.6: Command Type Table

Command types supported by Remote-SAT; i.e. UI related						
cmdType value (dec.)	SSTGI applicable	Used as NextAction Indicator as specified in 3GPP TS 11.14 [19] , 3GPP TS 31.111 [20] , ETSI TS 102 223 [21]	SSTR required	Auto Terminal Response	Timeout Terminal Response	Command Name



9.4 AT^SSTA Remote-SAT Interface Activation

AT^SSTA write command can be used to determine the Remote-SAT activation mode `<mode>`. 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 <code><state></code> s), (list of supported <code><Alphabet></code> s)
OK
Read Command
AT^SSTA?
Response(s)
^SSTA: <code><state></code> , <code><Alphabet></code> , <code><allowedInstance></code> , <code><SatProfile></code> , <code><userTOut></code> , <code><AppType></code>
OK
Write Command
AT^SSTA= <code><mode></code> [, <code><Alphabet></code>]
Response(s)
OK
PIN → Last
- + -

Parameter Description

<state> ^(num)	
UE Remote-SAT interface states	
0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT
<Alphabet> ^{(num)(NV)}	
Setting becomes effective after restarting the UE.	
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 is only usable via the serial channel on which the Explicit Response (ER) mode was activated.

This parameter is implemented for compatibility reason only, and has no effect for ELS62-W.

<SatProfile>^(str)

SAT or USAT Terminal Profile according to 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [21]. UE 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 SAT Terminal Profile will be issued.

The profile tells the SIM Application which features (e.g. Proactive Commands) are supported by the SIM Application Toolkit implementation of the UE.

<userTOut>^(num)

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.

This parameter is implemented for compatibility reason only, and has no effect for ELS62-W.

<AppType>^(num)

SIM Application type.

This parameter shows the type of SIM application currently running.

0	(U)SIM not inserted
1	2G Application (SAT)
2	3G Application (USAT)

<mode>^{(num)(NV)}

Select Remote-SAT activation mode.

Setting becomes effective after restarting the UE. 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 UE 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 UE enters the OFF state (<state>=1) after restart.
------------------	--



9.5 ^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 UE, the TE will receive a notification. This indicates the type of proactive command issued.

AT^SSTGI must then be used by the TE to request the parameters of the proactive command from the UE. Upon receiving the ^SSTGI response from the UE, the TE 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 UE, 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 TE should avoid sending any further commands related to the terminated proactive command, e.g. AT^SSTGI or AT^SSTR.

URC 3

Notification to the TE when the SIM Application has finished a command cycle and does not issue a subsequent proactive command.

^SSTN: 254

The TE 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 (TE). 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 of the =33 command), the text should not be removed as a result of this URC.

URC 4

SIM reset notification

^SSTN: 255

Notification to the TE indicating that the SIM is lost, e.g. if a proactive command "REFRESH - SIM Reset" has been issued by the SIM Application, please refer to AT^SSTGI=1.

This URC should be used to set the Customer Application to its initial state since the SIM Application will start from the beginning, too.

The TE does not need to respond directly, i.e. related AT^SSTGI and AT^SSTR are neither required nor allowed.

After reset SIM PIN authentication is required.

Parameter Description

<cmdType>^(num)

Proactive Command number



`<cmdTerminateValue>(num)`

Defined as `<cmdType>` + terminate offset. The terminate offset equals 100.



9.6 AT^SSTGI SAT Get Information

This command shall be used upon receipt of a URC "[^SSTN](#)" to request the parameters of the Proactive Command.

Then the TE 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 some 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  Last
- + -

Parameter Description

<state> ^(num)
ELS62-W Remote-SAT interface states
0
RESET
1
OFF
2
IDLE
3
PAC
4
WAIT
<cmdType> ^(num)
Related Proactive Command



9.7 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 TE that one or more Elementary Files on the USIM have been changed as a result of a USIM application activity, usually caused by the network provider. The response to the `AT^SSTGI=1` command indicates what type of USIM refresh has occurred. The change requires that the Elementary Files of the USIM be synchronized with the equivalent information (if any) stored inside the TE. Depending on the type of USIM refresh the TE 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 → Last

- + -

Parameter Description

`<cmdType>`^(num)

1 Proactive command ID, see Section 9.3, Remote-SAT Command Types and Table 9.6.

`<commandDetails>`^(num)

For every return value of `<commandDetails>` other than 4 (USIM Reset) the TE shall complete the proactive command cycle using `AT^SSTR=1,0`.

0	USIM Initialization and Full File Change Notification
1	File Change Notification
2	USIM Initialization and File Change Notification
3	USIM Initialization
4	Value "4" means USIM Reset, but the value itself never appears. This is because value "4" is mapped to the URC " <code>^SSTN: 255</code> " which will be sent when a USIM reset occurs. In this case, the TE does not need to respond, i.e. the USIM Refresh commands <code>AT^SSTGI</code> and <code>AT^SSTR</code> are neither required nor allowed. Instead, as the USIM application restarts, the Toolkit application inside the TE should also return to initial state after receiving the URC " <code>^SSTN: 255</code> ". For more information on USIM reset and the URC " <code>^SSTN: 255</code> " refer to Section 9.5, <code>^SSTN SAT Notification</code> .
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>^(str)

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

In general, the TE only needs to take care of USIM content synchronization if it is permanently interested in the latest contents of one or more specific USIM files, e.g. because the TE has its own cache for specific USIM information. In this case, the TE needs to know exactly the paths and file IDs of these specific USIM files. Paths and file IDs can be found in 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17].

When <commandDetails> equals 0, 2 or 3 or the "^SSTN: 255" notification is received (refer to Section 9.5, ^SSTN SAT Notification), the TE shall synchronize its own cache for USIM information in any case.

When <commandDetails> equals 1, reloading the USIM information is only necessary if the TE finds that an important file is included in the Refresh <fileList>. For example, assuming that the TE is always interested in the latest contents of the "FD" (Fixed Dialing) phonebook, it has to know that EF_FDN is located at path "3F00\7F10\6F3B". Then, during normal operation, the TE should always check the Refresh <fileList>, if it includes the path and file ID of EF_FDN. An example is given below:

^SYSSTART	UE has been started.
AT+CLK="FD", 2	Request "FD" lock state.
+CLK: 1	"FD" lock is enabled.
OK	
AT+CPBS="FD"	Select the "FD" phonebook.
OK	
AT+CPBR=1	Read first "FD" phonebook entry.
+CPBR: 1, "123", 129, "ABC"	This is the "FD" phonebook content before Refresh.
OK	
^SSTN: 1	Indicates that a SIM Refresh has occurred.
AT^SSTGI=1	Request type of SIM Refresh.
^SSTGI: 1, 1, 6, 1, "3F007F106F3B"	The Refresh <fileList> includes path and file ID 3F00\7F10\6F3B which corresponds to EF_FDN, indicating that its contents may have changed.
OK	
AT^SSTR=1, 0	Terminate the proactive command.
OK	
^SSTN: 254	Session finished.
AT+CPBR=1	Read first "FD" phonebook entry.
+CPBR: 1, "0123456789", 129, "ABC"	This is the "FD" phonebook content after the Refresh.
OK	

Please keep in mind that this process is only necessary if the TE has its own cache for SIM/USIM information (e.g. SIM/USIM phonebook is cached inside the TE). If the TE does not have a cache for USIM information (e.g. USIM phonebook is read by the TE only at the user's request, directly from the USIM), it is not necessary to synchronize the content. The TE USIM content synchronization is not required for a proper operation of the UE. As long as the TE answers the "^SSTN: 1" notification with the commands AT^SSTGI=1 and AT^SSTR=1,0, the UE will use the latest USIM contents and will continue to work flawlessly, regardless of a possible TE USIM content synchronization.



9.8 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 TE of the events that it must monitor within itself. If any of these events occur the TE must report them to the UE.

Syntax

```

Write Command
AT^SSTGI=5
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <eventList>
OK
ERROR
+CME ERROR: <err>

```

PIN → Last
- + -

Parameter Description

<cmdType> ^(num)	
5	Proactive command ID, see Table 9.6, Command Type Table .
<commandDetails> ^(num)	
This byte is RFU.	
<eventList> ^(num)	
The event list tells the TE which events have to be reported to the UE via the related commands AT^SSTR=(232, 233, 235, 236)	
0...65535	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 UE
bit 6	0: Idle Screen Available not in Event List 1: Any idle screen available event has to be signaled to the UE.
bit 7	RFU
bit 8	0: Language Selection not in Event List 1: Language Selection events have to be signaled to the UE.
bit 9	0: Browser Termination not in Event List 1: Browser Termination events have to be signaled to the UE
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.



9.9 AT^SSTGI SAT Get Information - Select Item (36)

This command shall be used after receiving the URC ^SSTN: 36.

The TE 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 → 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



9.10 AT^SSTGI SAT Get Information - Set up Menu (37)

This command shall be used after receiving the URC ^SSTN: 37. The response provides the main menu of the SIM Application to the TE. It needs to be stored by the TE so that it can be displayed without invoking a proactive session.

As with every proactive command the TE 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](#).

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 → 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



9.11 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 TE 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 → Last
- + -

Parameter Description

<cmdType>^(num)

40 Proactive command ID, see [Remote-SAT Command Types](#)

<commandDetails>^(num)

This byte is RFU.

<text>^(str)

Text to be displayed when TE 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](#).



9.12 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 TE 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 TE 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 UE 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 → Last
- + -

Parameter Description

<code><cmdType></code> ^(num)	
53	Proactive command ID, see Remote-SAT Command Types
<code><commandDetails></code> ^(num)	
0...255	Used as bit field
bit 1	0: non-specific language notification 1: specific language notification
bit 2-8	RFU
<code><langText></code> ^(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[34].	

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.



9.13 AT^SSTR SAT Response

The TE 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)
^SSTR: <cmdType>[, <TerminationQualifier>, <TerminationCauseText>]
OK
PIN → Last
- + -

Parameter Description

<state> ^(num)	
ELS62-W 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 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [21].	
<TerminationQualifier> ^(num)	
0	The proactive command has been successfully finished.
1...255	The proactive command did not perform successfully.



`<TerminationCauseText>(str)`

This text has to be shown to the user for an appropriate time, e.g. 2 seconds. The text contains information regarding the termination cause, e.g. in case of a failed dialing process call barring through Call Control by SIM mechanism may be indicated.

If `<TerminationCauseText>` is an empty string and `<TerminationQualifier>` is not equal to 0, the TE may give an own indication to the user.

`<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 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [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 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [21].

9.14 AT^SSTR SAT Response - Refresh (1)

The TE 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 → Last

- + -

Parameter Description

<status>^(num)

0...255

0 Command performed successfully

<statAddInfo>^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [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.



9.15 AT^SSTR SAT Response - Set Up Event List (5)

The TE is expected to acknowledge the [AT^SSTGI](#) response with [AT^SSTR](#) to confirm that the Proactive Command has been executed. The TE acknowledges that the event list has been set up correctly.

Syntax

Write Command

```
AT^SSTR=5, <status>, [, <statAddInfo>]
```

Response(s)

OK

PIN → Last

- + -

Parameter Description

<status>^(num)

0...255

0	Command performed successfully
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<statAddInfo>^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [\[19\]](#), 3GPP TS 31.111 [\[20\]](#), ETSI TS 102 223 [\[21\]](#).

0...255



9.16 AT^SSTR SAT Response - Select Item (36)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed. The TE sends a response that can indicate the user's intentions, e.g. when the user is requesting help or selecting a menu item.

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 USIM.

Syntax

Write Command

```
AT^SSTR=36,<status>,<itemId>[,<statAddInfo>]
```

Response(s)

OK

PIN → Last

- + -

Parameter Description

`<status>`^(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Select Item 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	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE 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 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [21].

0...255



9.17 AT^SSTR SAT Response - Set Up Menu (37)

The TE 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 → Last

- + -

Parameter Description

[<status>](#)^(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Set Up Menu request.
4	Command performed successfully, but requested icon could not be displayed.
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

[<statAddInfo>](#)^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [\[19\]](#), 3GPP TS 31.111 [\[20\]](#), ETSI TS 102 223 [\[21\]](#).

0...255

Note

- 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 \(37\)](#).



9.18 AT^SSTR SAT Response - Set Up Idle Mode Text (40)

The TE 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

→

Last

-

+

-

Parameter Description

<status> ^(num)	
0...255	
0	Command performed successfully. Indicates that the user has accepted the Set Up Idle Mode Text request.
4	Command performed successfully, but requested icon could not be displayed.
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<statAddInfo> ^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [19], 3GPP TS 31.111 [20], ETSI TS 102 223 [21].	
0...255	



9.19 AT^SSTR SAT Response - Language Notification (53)

The TE is expected to acknowledge the [AT^SSTGI](#) response with [AT^SSTR](#) to confirm that the Proactive Command has been executed. The TE indicates whether the Language Notification command was correctly executed.

Syntax

Write Command

`AT^SSTR=53,<status>,,[,<statAddInfo>]`

Response(s)

OK

PIN → Last

- + -

Parameter Description

<status>^(num)

0...255

0

Command performed successfully. Indicates that the user has accepted the Language Notification request.

<statAddInfo>^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [\[19\]](#), 3GPP TS 31.111 [\[20\]](#), ETSI TS 102 223 [\[21\]](#).

0...255



9.20 AT^SSSTR SAT Event - Menu Selection (211)

The TE 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^SSSTR=211,<status>,<itemId>
```

Response(s)

```
OK
```

PIN → 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

9.21 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+cme=2
OK

// Enter the PIN code (if necessary due to SIM configuration)
at+cpin=1234
OK

// Query the Remote-SAT activation status
at^ssta?
,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 UE.

// Tell the module that the TE 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 UE only, so switch off first
AT^SMSO
OK

// Switch on UE again

// Switch on verbose error messages
at+cme=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: 144,0,010808214F0200000016FFFFFFFFFFFFFFFFFFFFFFF
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: 144,0,080802030016AAAA800285428142814281528002AAAA
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
```



10. Short Message Service (SMS) Commands

The AT Commands described in this chapter allow an external application to use the Short Message Service with the ELS62-W.

10.1 SMS parameters

This section provides an overview of parameters included in SMS related AT commands and lists references to 3GPP TS specifications.

Parameter Description

`<ackpdu>(num)`

Format is same for `<pdu>` in case of SMS, but without 3GPP TS 24.011 [38] SC address field and parameter shall be bounded by double quote characters like a normal string type parameter.

`<ct>(num)`

Command Type

3GPP TS 23.040 [35] TP-Command-Type in integer format

[0]...255

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

Destination Address

3GPP TS 23.040 [35] 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 text mode)

In case of SMS: 3GPP TS 23.040 [35] TP-User-Data in text mode responses; format:

- If `<dcs>` indicates that 3GPP TS 23.038 [34] default alphabet is used and `<fo>` indicates that 3GPP TS 23.040 [35] TP-User-Data-Header-Indication is not set: UE 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 3GPP TS 23.040 [35] TP-User-Data-Header-Indication is set: UE converts each 8-bit octet 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 case of CBS: 3GPP TS 23.041 [36] CBM Content of Message in text mode responses; format:

- If `<dcs>` indicates that 3GPP TS 23.038 [34] default alphabet is used: UE 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: UE converts each 8-bit octet into hexadecimal numbers containing two IRA characters.

`<dt>(num)`

Discharge Time

Parameter for Status Reports: 3GPP TS 23.040 [35] TP-Discharge-Time in time-string format: "yy/MM/dd,hh:mm:ss+zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone. For example, 6th of May 1994, 22:10:00 GMT+2 hours equals "94/05/06,22:10:00+08"



<index>^(num)

Integer type; value in the range of location numbers supported by the associated memory.

<length>^(num)

Message Length

For PDU mode (<mode>=0):

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).

For Text mode (<mode>=1):

In Text mode the value of the <length> parameter depends on the <dcs> parameter in following way:

- If <dcs> indicates that GSM 7 bit default alphabet is used: every character counts as 1, i.e. for "ABC" <length>= 3.
- If <dcs> indicates that 8-bit data coding scheme is used: every coded character (2 IRA characters) counts as 1, i.e. for "414243" (= "ABC") <length>= 3.
- If <dcs> indicates that UCS2 data coding scheme is used: every coded character (4 IRA characters) counts as 1, i.e. for "004100420043" (= "ABC") <length>= 3.

<mem1>^{(str)(NV)}

Memory to be used when listing, reading and deleting messages:

"SM"	SIM message storage
"ME" ^(D)	UE message storage
"MT"	Same as "ME" storage (supported for compatibility reason only)
"SR"	Status report storage

<mem2>^{(str)(NV)}

Memory to be used when writing and sending messages:

"SM"	SIM message storage
"ME" ^(D)	UE message storage
"MT"	Same as "ME" storage (supported for compatibility reason only)
"SR"	Status report storage

<mem3>^{(str)(NV)}

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" ^(D)	UE message storage
"MT"	Same as "ME" storage (supported for compatibility reason only)
"SR"	Status report storage

<mid>^(num)

Message Identifier

3GPP TS 23.041 [\[36\]](#) CBM Message Identifier in integer format



<mn>^(num)

Message Number

3GPP TS 23.040 [35] TP-Message-Number in integer format

<mr>^(num)

Message Reference

3GPP TS 23.040 [35] TP-Message-Reference in integer format

<oa>^{(str)(+CSCS)}

Originating Address

3GPP TS 23.040 [35] 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 <toa>

<page>^(num)

Page Parameter

3GPP TS 23.041 [36] CBM Page Parameter bits 4-7 in integer format

<pages>^(num)

Page Parameter

3GPP TS 23.041 [36] CBM Page Parameter bits 0-3 in integer format

<pdu>^(num)

In the case of SMS: 3GPP TS 24.011 [38] SC address followed by 3GPP TS 23.040 [35] TPDU in hexadecimal format: UE 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> 3GPP TS 23.040 [35] TP-Recipient-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by <tora>

<ra>^{(str)(+CSCS)}

Recipient Address

3GPP TS 23.040 [35] 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)(NV)}

Service Center Address

3GPP TS 24.011 [38] 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

3GPP TS 23.040 [35] TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<sn>^(num)

Serial Number

3GPP TS 23.041 [36] CBM Serial Number in integer format



<st>^(num)

Status

3GPP TS 23.040 [35] TP-Status in integer format for Status Report

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

3GPP TS 24.011 [38] 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

<toa>^(num)

Type of Originating Address

3GPP TS 24.011 [38] TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<tora>^(num)

Type of Recipient Address

3GPP TS 24.011 [38] TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<tosca>^(num)

Type of Service Center Address

3GPP TS 24.011 [38] RP SC address Type-of-Address octet in integer format (default refer <toda>)



10.2 AT+CMGD Delete short message

The **AT+CMGD** write command deletes a short message from the preferred message storage **<mem1>** location **<index>**. If **<delflag>** is present and not set to 0, the UE shall ignore **<index>** and follow the rules for **<delflag>** shown below. If deleting fails, final result code +CMS ERROR is returned.

The **AT+CMGD** test command returns the valid **<index>** locations of the preferred **<mem1>** and the supported **<delflag>** values.

Syntax

Test Command	
AT+CMGD=?	
Response(s)	
+CMGD: (list of supported <index> s), (list of supported <delflag> es)	
OK	
Write Command	
AT+CMGD= <index> [, <delflag>]	
Response(s)	
OK	
ERROR	
+CMS ERROR: <err>	
PIN → Last	Reference(s)
+ + -	3GPP TS 27.005 [44]

Parameter Description

<index>^(num)

Integer type; value in the range of location numbers supported by the associated memory. See **<index>**.

<delflag>^(num)

indicating multiple message deletion request as follows:

[0]	(Or omitted) delete the message specified in <index> .
1	Delete all read messages from preferred message storage, leaving unread messages and stored mobile originated messages (whether sent or not) untouched.
2	Delete all read messages from preferred message storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched.
3	Delete all read messages from preferred message storage, sent and unsent mobile originated messages leaving unread messages untouched.
4	Delete all messages from preferred message storage including unread messages.



Notes

- To delete multiple SMS please use concatenated `AT+CMGD=<index>` commands, for example `AT+CMGD=1;+CMGD=17;+CMGD=55`. Note that a single concatenated command line supports max. 1000 characters.
- 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.

10.3 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  Last	Reference(s)
+ + -	3GPP TS 27.005 [44]

Parameter Description

<mode> ^{(num)(&W)}	
[0] ^(&F)	PDU mode
1	Text mode



10.4 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>`, , [`<scts>`]], `<tooa>/<toda>`, `<length>`
`<data>`

[...]

OK

For SMS-STATUS-REPORTs

+CMGL: `<index>`, `<stat>`, `<fo>`, `<mr>`, [`<ra>`], [`<tora>`], `<scts>`, `<dt>`, `<st>`

Output if PDU mode `AT+CMGF=0` and command successful:

For SMS-SUBMITs and/or SMS-DELIVERs

+CMGL: `<index>`, `<stat>`, , `<length>`
`<pdu>`

[...]

OK

If error is related to ME functionality

ERROR

+CMS ERROR: `<err>`

PIN → Last

+ + -

Reference(s)

3GPP TS 27.005 [44]

Notes

- The selected `<mem1>` can contain different types of SMS (e.g. SMS-DELIVERs, SMS-SUBMITs, SMS-STATUS-REPORTs), 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.



10.5 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 (<code>AT+CMGF=1</code>) and command successful: For SMS-DELIVER +CMGR: <stat>, <oa>, , <scts>[, <toa>, <fo>, <pid>, <dcs>, <sca>, <tosca>, <length>] <data> [...] OK For SMS-SUBMIT +CMGR: <stat>, <da>, [, <toda>, <fo>, <pid>, <dcs>, [<vp>], <sca>, <tosca>, <length>] <data> [...] OK For SMS-STATUS-REPORT +CMGR: <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st> [...] OK Output if PDU mode (<code>AT+CMGF=0</code>) and command successful: For SMS-SUBMITs and/or SMS-DELIVERs +CMGR: <stat>, , <length> <pdu> [...] OK ERROR +CMS ERROR: <err>	Reference(s) 3GPP TS 27.005 [44]
PIN → Last + + -	

Notes

- If `AT+CMGR` is used to read an empty record index, the response is: OK. An empty record index here means an SMS with no content.
- If `AT+CMGR` is used to read a non-existent record index, the response is: "+CMS ERROR: 321" (invalid memory index). Using `<index>` greater than 32767, the response is: "+CMS ERROR: 538" (invalid parameter). A non-existent record index here means the index does not exist; in other words, the record does not exist in the SMS listed by `AT+CMGL`.
- 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.



10.6 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>[, <tda>]<CR> Text can be entered. <CTRL-Z>/<ESC>	
Response(s)	
+CMGS: <mr>[, <scts>]	
OK	
ERROR	
+CME 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	
+CME ERROR: <err>	
PIN → Last + - -	Reference(s) 3GPP TS 27.005 [44]

Notes

- Note that some providers do not recognize an @ symbol used in a short message. A widely used alternative is typing "*" as defined in 3GPP TS 23.040 [35].
- 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.



10.7 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> [, [<toa>/<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  Last + + -	Reference(s) 3GPP TS 27.005 [44]

Notes

- Note that some providers do not recognize an @ symbol used in a short message. A widely used alternative is typing "*" as defined in 3GPP TS 23.040 [\[35\]](#).
- 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.



10.8 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).

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 → Last

+ - -

Reference(s)

3GPP TS 27.005 [44]



10.9 AT+CNMA New Message Acknowledgement to UE/TE

The [AT+CNMA](#) write and execute commands confirm successful receipt of a new message (SMS-DELIVER or SMS-STATUS-REPORT) routed directly to the TE. If the ELS62-W does not receive acknowledgement within required time (network timeout), it sends an "RP-ERROR" message to the network. The UE will automatically disable routing to the TE by setting both [<mt>](#) and [<ds>](#) values of [AT+CNMI](#) to zero.

Syntax

Test Command	
AT+CNMA=?	
Response(s)	
+CNMA: (list of supported <n>s)	
OK	
Exec Command	
AT+CNMA	
Response(s)	
OK	
ERROR	
+CMS ERROR: <err>	
Write Command	
AT+CNMA= <n>	
Response(s)	
OK	
ERROR	
+CMS ERROR: <err>	
PIN  Last	Reference(s)
+ - -	3GPP TS 27.005 [44]

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.

Notes

- Execute and write command shall only be used when [AT+CSMS](#) parameter [<service>](#) equals 1 (= phase 2+) and an 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.
- Status Reports are network dependent and the URCs may not be delivered. The CNMA receipt can be sent only when a message is delivered directly to TE (SMS in CMT format as well as status report in CDS format).



10.10 AT+CNMI SMS Event Reporting Configuration

AT+CNMI controls details of the SMS related URC presentation. It selects the procedure how the receipt of a new SMS from the network is indicated to the TE when TE is active.

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 → Last + + -	Reference(s) 3GPP TS 27.005 [44]

Unsolicited Result Codes

URC 1

<mt>=1,2 or 3 - indication only (text and PDU mode):

+CMTI: <mem3>, <index>

Indicates that new message has been received

URC 2

<mt>=1,2or 3 - directly routed message (PDU mode enabled):

+CMT: , <length><CR><LF><pdu>

Indicates that new message has been received

URC 3

<mt>=1,2or 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)(&V)(&W)	
0	SMS related URCs are always buffered in the UE. If the buffer is full, the oldest indications are discarded and replaced with newly received indications.
1(&F)(D)	SMS related URCs are forwarded directly to the TE. However, if this is not possible because UE-TE link is reserved, e.g. during a data call, these URCs are discarded.
2	SMS related URCs are forwarded directly to the TE. However, if this is not possible because UE-TE link is reserved these URCs are buffered and flushed to the TE afterwards.
3	SMS related URCs are forwarded directly to the TE. However, if this is not possible because UE-TE link is reserved these URCs are buffered and flushed to the TE afterwards. Additionally, while UE-TE link is reserved, buffered URCs are signaled to the TE via sending a BREAK or activating the RING line, according to AT^SCFG parameters <urcRinglineCfg>, <udri> and <urcRinglineDuration>.

<mt>^(num)(&V)(&W)	
Rules for storing received short messages depend on the relevant data coding method (refer to 3GPP TS 23.038 [34]), preferred memory storage setting (AT+CPMS) and this value.	
0(&F)(D)	No SMS-DELIVER indications are routed to the TE.
1	Class 0 SMS-DELIVERs are routed directly to the TE via URC. For all other messages the following applies: If SMS-DELIVER is stored in UE, indication of the memory location is routed to the TE via URC.



- | | |
|---|---|
| 2 | SMS-DELIVERs, except class 2 messages and messages in the message waiting indication group (store message) are routed directly to the TE via URC. Class 2 messages and messages in the message waiting indication group (store message) result in indication as defined for <code><mt>=1</code> |
| 3 | Class 0 and 3 SMS-DELIVERs are routed directly to the TE via URCs defined in <code><mt>=2</code> . Messages of other data coding schemes result in indication as defined in <code><mt>=1</code> . |

`<bm>^(num)(&V)(&W)`

Rules for storing received CBMs depend on the relevant data coding method (refer to 3GPP TS 23.038 [34]), the setting of Select CBM Types (`AT+CSCB`) and this value:

- | | |
|---------------------------|---|
| <code>0(&F)(D)</code> | No CBM indications are routed to the TE. |
| 2 | New CBMs are routed directly to the TE via URC. |

`<ds>^(num)(&V)(&W)`

- | | |
|---------------------------|--|
| <code>0(&F)(D)</code> | No SMS-STATUS-REPORTs are routed to the TE. |
| 1 | SMS-STATUS-REPORTs are routed to the TE via URC. |
| 2 | If SMS-STATUS-REPORT is routed into UE, indication of the memory location is routed to the TE via URC. |

`<bfr>^(num)(&V)(&W)`

- | | |
|---------------------------|--|
| <code>0(&F)(D)</code> | UE's buffer of SMS related URCs is flushed to the TE when <code><mode></code> changes from 0 to 1, 2. (OK response is given before flushing the URCs). |
| 1 | UE's buffer of SMS related URCs is cleared when <code><mode></code> changes from 0 to 1, 2. |

`<index>^(num)`

Integer type; value in the range of location numbers supported by the associated memory

Notes

- It is not possible to route messages to more than one AT command port (have none zero settings for `<mt>` and `<ds>` on more than one AT command port). Any attempt to activate settings that conflict with existing settings on another interface, will result in "+CMS ERROR: operation not allowed".
- 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.
- Status Reports are network dependent and the URCs may not be delivered. The CNMA receipt can be sent only when a message is delivered directly to TE (SMS in CMT format as well as status report in CDS format).



10.11 AT+CPMS Preferred SMS message storage

The [AT+CPMS](#) write command selects memory storages [<mem1>](#), [<mem2>](#), [<mem3>](#) to be used for reading, writing, etc.

The [AT+CPMS](#) test command lists the supported memory storages.

The [AT+CPMS](#) read command indicates the currently selected memory storages incl. the numbers of used and total entries.

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  Last	Reference(s)
+ + -	3GPP TS 27.005 [44]

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 180 short messages, see <mem1>.
- 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 parameter <dc> and the following specification: 3GPP TS 23.038 [34].
- Due to platform limitation, <mem1>, <mem2> and <mem3> need to be set to the same storage. If different storages are set for <mem1>, <mem2> and <mem3>, the actual storage of SMS may be inconsistent with settings.
- 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.
- Status Reports are network dependent and the URCs may not be delivered. The CNMA receipt can be sent only when a message is delivered directly to TE (SMS in CMT format as well as status report in CDS format).

10.12 AT+CMMS More Messages to Send

[AT+CMMS](#) controls the continuity of the SMS relay protocol link. If the feature is enabled (and supported by the currently used network) multiple messages can be sent 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	
+CME ERROR: <err>	
PIN → Last	Reference(s)
+ + -	3GPP TS 27.005 [44]

Parameter Description

<mode> ^(num)	
[0]	Feature disabled.
1	Keep link open until the time between the response of the latest message's send command (AT+CMGS , AT+CMSS , etc.) and the next send command exceeds 1-5 seconds. Afterwards UE will close the link and automatically switches <mode> back to 0.
2	Keep link open until the time between the response of the latest message's send command (AT+CMGS , AT+CMSS , etc.) and the next send command exceeds 1-5 seconds. Afterwards UE will close the link, but will not reset <mode> to 0.

Notes

- After read command usage a delay of 5-10 seconds is required before issuing the write command, otherwise the "+CMS ERROR: 500" may appear.
- CMMS mode changes directly from 2 to 1 is not possible. To change it, first disable CMMS mode (0) and then enable (1 or 2).



10.13 AT+CSCA SMS Service Center Address

Write command updates the SMSC address, through which mobile originated SMS are transmitted. In text mode, setting is used by send and write commands. In PDU mode, setting is used by the same commands, but only when the length of the SMSC address coded into the `<pdu>` parameter equals zero.

Syntax

Test Command AT+CSCA=? Response(s) OK	
Read Command AT+CSCA? Response(s) +CSCA: <code><sca></code> , <code><tosca></code> OK	
Write Command AT+CSCA= <code><sca></code> [, <code><tosca></code>] Response(s) OK	
PIN  Last + + -	Reference(s) 3GPP TS 27.005 [44]

Notes

- The SMS service center address should be entered as specified by the service provider.
- An empty string ("") for `<sca>` is not accepted and denied with error.
- Please note, `AT+CSCA` may not write a new SMSC address into the SIM despite OK response. This behavior depends on the network provider.



10.14 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 → Last + + -	Reference(s) 3GPP TS 27.005 [44]

Parameter Description

<operation> ^(num)	
Add/delete operation	
0	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, it will not change the current settings.
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, it will not change the current settings.



`<mids>^(str)(NV)`

Cell Broadcast Message ID specification

All different possible combinations of CBM message identifiers; e.g. "0,1,5,320-478,922". The maximum length of the input string in the `AT+CSCB` write command is 50 characters (including ',' as separator and '-' in ranges). The maximum number of the active mids is 50.

""(D)

`<dcss>^(str)`

CBM data coding scheme specification

All different possible combinations of CBM data coding schemes (e.g. "0-3,5"). Maximum length of the string is 50 characters (including ',' as separator and '-' in ranges). A given `<dcss>` replaces any former value and is used for consecutive requests.

""

Default is empty string and if it is used all CBMs are received independent of their dcss.

Note

- The `<operation>` parameter shown in the `AT+CSCB` read command response retains 0.

10.15 AT+CSDH Show SMS text mode parameters

The write command sets whether or not detailed header information is shown in text mode result codes.

Syntax

Test Command AT+CSDH=? Response(s) +CSDH: (list of supported <show>s) OK	
Read Command AT+CSDH? Response(s) +CSDH: <show> OK	
Write Command AT+CSDH=<show> Response(s) OK ERROR +CMS ERROR: <err>	
PIN  Last + + -	Reference(s) 3GPP TS 27.005 [44]

Parameter Description

<show> ^{(num)(&W)}	
0 ^{(&F)(D)}	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 "+CMT", 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



10.16 AT+CSMP Set SMS Text Mode Parameters

AT+CSMP controls additional parameters needed when an SMS is sent to the network or placed in a storage if 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 the range 0... 255) or define an absolute time for validity period termination (**<vp>** is a string). The format of **<vp>** is given by **<fo>**.

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 → Last	Reference(s)
+ + -	3GPP TS 27.005 [44]

Parameter Description

<fo> ^(num)
First Octet
Depending on the command or result code: First octet of 3GPP TS 23.040 [35] SMS-DELIVER, SMS-SUBMIT, SMS-STATUS-REPORT, or SMS-COMMAND in integer format. If a valid value has been entered once, parameter can be omitted.
0...17 ^{(&F)(P)} ...255
<vp> ^(num)
Validity Period
Depending on SMS-SUBMIT <fo> setting: 3GPP TS 23.040 [35] TP-Validity-Period either in integer format or in time-string format (refer <dt>).
0...167 ^{(&F)(P)} ...255
<pid> ^(num)
Protocol Identifier
3GPP TS 23.040 [35] TP-Protocol-Identifier in integer format.
0 ^(&F) ...255



<dc>(num)(NV)

Data Coding Scheme

3GPP TS 23.038 [34] SMS Data Coding Scheme, or Cell Broadcast Data Coding Scheme in integer format.

0(&F)...247 Compressed SMS are network dependent and may not be supported properly.

Note

- <fo> can only be set as SMS-SUBMIT type in integer format.



10.17 AT+CSMS Select Message Service

Syntax

Test Command AT+CSMS=? Response(s) +CSMS: (list of supported<service>s) OK	
Read Command AT+CSMS? Response(s) +CSMS: <service>, <mt>, <mo>, <bm> OK	
Write Command AT+CSMS=<service> Response(s) +CSMS: <mt>, <mo>, <bm> OK ERROR +CMS ERROR: <err>	
PIN → Last + + -	Reference(s) 3GPP TS 27.005 [44]

Parameter Description

<service> ^(num) (&W)		
0(&F)		3GPP TS 23.040 [35] and 3GPP TS 23.041 [36] (the syntax of SMS AT commands is compatible with 3GPP TS 27.005 [44] 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		3GPP TS 23.040 [35] and 3GPP TS 23.041 [36] (the syntax of SMS AT commands is compatible with 3GPP TS 27.005 [44] 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`.

10.18 AT^SMGL List Short Messages from preferred store without setting status to REC READ

The write command allows to select a status type and lists, from the message storage [<mem1>](#), all messages that currently have the specified [<stat>](#). The major difference over the standard command [AT+CMGL](#) is that the status of the listed messages remains `u n c h a n g e d` (unread remains unread).
The execute command is the same as the write command, but uses the given default of [<stat>](#).

Syntax

Test Command
AT^SMGL=?
Response(s)
same as AT+CMGL
Exec Command
AT^SMGL
Response(s)
^SMGL: (For default values of <stat> , see "Section 10.1, SMS parameters.")
OK
Write Command
AT^SMGL= <stat>
Response(s)
same as AT+CMGL
PIN → 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 when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in an error or a short delay before the requested AT command response is returned.



11. Internet Service Commands

ELS62-W 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.

The embedded TCP/IP stack provides the following services:

1. Socket Services:
 - TCP Client in Non-Transparent or Transparent Mode
 - Transparent TCP Listener
 - Standard TCP Listener in Non-Transparent or Transparent Mode
 - Non-Transparent UDP Endpoint
 - UDP Client in Non-Transparent or Transparent Mode
2. FTP Client
3. HTTP Client
4. MQTT Client
5. CoAP (Constrained Application Protocol) Client

Step-by-step overview of how to configure and use TCP/IP communications with ELS62-W:

- Use `AT+CGDCONT` to create an Internet connection profile (= bearer). The PDP context IDs set with `<cid>` will later be used as "conId" parameter when creating a service profile with `AT^SISS`. Optionally, you can specify DNS preferences using `AT^SICS`. To activate or deactivate the bearer use the `AT^SICA` command.
- Use `AT^SISS` to create service profile(s), each identified by the `<srvProfileId>`. The service profile specifies the type of Internet service to use, e.g., Socket, FTP, HTTP.
- Once the bearer has been established with `AT^SICA`, and the service profile is created with `AT^SISS`, an Internet session can be opened by entering the `AT^SISO` write command and the desired `<srvProfileId>`. A URC indicates how to proceed. The "`^SIS`" URC with `<urcCause>` "5" shows that an opened listener or endpoint is ready. The "`^SISW`" URC means that data can be sent. The "`^SISR`" URC means that received data are available for reading. Error or event information is reported by the "`^SIS`" URC with `<urcCause>` "0".
- The next steps differ depending on the service type and the transfer mode (Non-Transparent or Transparent).
- Once a service is opened, the `AT^SISI` command shall be used to monitor the progress of the session. The command reports the service state of the used service profile and indicates the number of bytes sent and received, and, in the case of sending, the number of bytes acknowledged or unacknowledged at TCP layer.
- If an error occurs during a session you can enter the `AT^SISE` command and the `<srvProfileId>` to identify the reason. This is especially important in polling mode.
- Finally, to close an opened service, enter the `AT^SISC` write command and the `<srvProfileId>`. Then you can deactivate the bearer using `AT^SICA`.
`AT^SISH` disconnects a remote client from a Transparent TCP Listener without closing the listener (see also below).

Transparent Mode or Non-Transparent Mode:

- **Transparent Mode** is stream-oriented, i.e. a single data stream can be sent, and another single data stream can be received. Packetizing of data is done automatically by the embedded TCP/IP stack. Transparent Mode is activated with `AT^SIST` and then indicated by the "CONNECT" result code. The mode eliminates the need for `AT^SISW` and `AT^SISR` read and write sequences. Keep in mind that the used AT command port will be blocked for any other AT commands as long as Transparent Mode is active.
- **Non-Transparent Mode** is packet oriented, i.e. data is transferred in separate packets. Maximum packet size is 1500 bytes for TCP, 1460 bytes for UDP. To read and write data `AT^SISW` and `AT^SISR` sequences shall



be used. FTP, HTTP employ Non-Transparent Mode, for Socket services it is optional.

To send or receive more than 1500 bytes, the read or write action shall be repeated until the data transfer has completed. Each read or write action requires that the command response (of [AT^SISR](#) or [AT^SISW](#)) confirms that the service is ready to send or receive data. The read/write cycles can be controlled by URCs or polling. For details see below, section "URC mode and polling mode".

To end an upload data stream set the [<eodFlag>](#) in the last [AT^SISW](#) command.

- FTP, HTTP, and UDP Endpoint employ Non-Transparent Mode.
TCP Client, UDP client and Standard TCP Listener can employ both modes, and may even mix both modes in the same connection.

Listener services:

A listener is waiting for incoming remote client requests. ELS62-W supports two listener types: Transparent TCP Listener and Standard TCP Listener.

After opening a listener with [AT^SISO](#) no [^SISW](#) URC appears. Instead, the [^SIS](#) URC with [<urcCause>](#) "5" shows that the opened listener is ready and starts listening. Additionally, the states can be verified with [AT^SISI](#) which shows state "4" (Up - listening).

An incoming remote client request is indicated by the [^SIS](#) URC. For details please refer to Section 11.16, [Internet Service URC](#), especially parameters [<urcCause>](#) and [<urcInfoId>](#).

• Transparent TCP Listener:

- The Transparent TCP Listener can accept 1 remote client. The connection to the remote client does not need an additional service profile, as it uses the Transparent TCP Listener instance.
- To define a listener service profile as Transparent TCP Listener the "etx" parameter is mandatory in the address. See [AT^SISS](#).
- [AT^SISS](#) allows some specific options for the Transparent TCP Listener service, such as "autoconnect", "connecttimeout", "addrfilter";
- If autoconnect is enabled an incoming remote client is indicated by the [^SIS](#) URC with [<urcCause>](#) "3" (Transparent) and [<urcInfoId>](#) "1" (= autoconnect enabled). The request is automatically accepted. The Listener profile instantly changes to Server mode ([AT^SISO <socketState>](#) to 4 = SERVER) and opens transparent data mode (indicated by "CONNECT" result code).
- If autoconnect is disabled, the remote client connection request is indicated by the [^SIS](#) URC with [<urcCause>](#) "3" (Transparent) and [<urcInfoId>](#) "0" (= autoconnect disabled). The request can be accepted with [AT^SISO](#) or rejected with [AT^SISH](#). In all cases the same [<srvProfileId>](#) shall be used. After accepting the client the Listener profile instantly changes to Server mode ([AT^SISO <socketState>](#) to 4 = SERVER).
If a remote client connection request is not accepted within the configured 'connecttimeout', it will be rejected automatically, and the URC [^SIS](#) is sent with [<urcCause>](#) set to '4'.
- As long as one remote client is connected all other remote client requests are rejected automatically without displaying the [^SIS](#) URC. The [<rejCounter>](#) in the response of the [AT^SISO](#) read command indicates such hidden rejects.
- [AT^SISH](#) disconnects a remote client, without closing the service, allowing the Transparent TCP Listener to wait for the next remote client.
[AT^SISC](#) both disconnects the remote client and shuts down the Transparent TCP Listener.
- An example can be found in Section 11.16, [Internet Service URC](#) and Section 11.17.5, [Transparent TCP Listener: Accepting / Rejecting Incoming Remote Client](#)

• Standard TCP Listener:

- The Standard Listener can accept several remote clients. Each incoming remote client connection request is dynamically assigned to the next free service profile indicated as [<srvProfileId>](#) within the [^SIS](#) URC. [<urcCause>](#) in the [^SIS](#) URC equals "1" (Non-Transparent). The dynamically assigned profile acts as Server ([AT^SISO <socketState>](#) equals 4 = SERVER). Its [<srvProfileId>](#) shall be used to accept the remote client with [AT^SISO](#), or to reject it with [AT^SISC](#). The number of acceptable remote clients depends on the number of free service profiles.
- To transfer data it is possible to proceed with Transparent Mode using [AT^SIST](#), or Non-Transparent Mode using [AT^SISR](#) and [AT^SISW](#) read / write sequences.
- An example can be found in Section 11.16, [Internet Service URC](#) and Section 11.17.3, [Configuring Non-Transparent Listener](#)



Socket service used with UDP protocol

The significant differences between the TCP and UDP protocols imply that UDP sometimes requires particular procedures or even specific parameters. Details on how to handle UDP services can be found in extra notes or are included in the general parameter descriptions.

The ELS62-W offers following Socket service with UDP protocol:

- **UDP Client:** Intended for connections to a given remote host. In this case the IP address and the UDP port of the remote host are set as a fixed parameter in the service profile. The UDP Client can use Transparent Mode and Non-Transparent Mode.
- **Non-Transparent UDP Endpoint:** IP address and UDP port of the remote hosts are handled in each read (`AT^SISR`) and write (`AT^SISW`) request. This enables the host application to communicate with different remote hosts.
See example in Section 11.17.9, [UDP Scenario](#).

MQTT client service

The MQTT client provides basic MQTT functionality according to specification OASIS MQTT Version 3.1.1. Supported transport protocols are:

- TCP/IP - defined in URI as "mqtt://"
- TLS - defined in URI as "mqtts://"

The MQTT client support sending MQTT control packets CONNECT, DISCONNECT, PUBLISH, SUBSCRIBE and UNSUBSCRIBE.

The MQTT client handle automatically MQTT control packets CONNACK, PUBACK, PUBREC, PUBCOMP, SUBACK, UNSUBACK, PINGREQ and PINGRESP.

MQTT client Control

Setup: there are 3 types how to setup and handle MQTT connection by AT commands interface from host device:

- **Static parameters request** - parameters are setup together with connection parameters by command `AT^SISS` before opening a connection with `AT^SISO` and `<optParam>=0` or omitted. Only one request is possible to be sent during active connection which is triggered by `AT^SISO`.
- **Dynamic parameters** - request parameters are setup by `AT^SISD` only after opening connection by `AT^SISO` and `<optParam>=2`. Multiple request are allowed to be send during active connection. Trigger for sending request is done by `AT^SISU`.
- **Dynamic request** - request parameters are setup and request itself is triggered by one `AT^SISU` only after opening connection by `AT^SISO` and `<optParam>=2`. Multiple requests are allowed to send during active connection.

Triggers: the host can trigger sending request to server by:

- `AT^SISO` command - request will be send automatically after successful connection. Request parameters needs to be defined statically by `AT^SISS`. Payload could be defined by `hcContent` parameter or by `AT^SISW`.
- `AT^SISU` command - request will be send during already active connection. Request parameters need to be defined dynamically by `AT^SISD` or `AT^SISU`. Payload could be defined by `hcContent` parameter or by `AT^SISW`.
- `AT^SISC` command - used for sending DISCONNECT control packet for correct end of connection with server.

Return of OK response from module signal accepting data for sending by MQTT client but not acknowledgement from MQTT server.

Getting information about the current status of the MQTT client is possible by URCs OR by polling from the host device.

Secure connection (TLS)

All services except Listener services support server and client authentication for Transport Layer Security (TLS).



- To set TLS add "s" to the address type, such as socktpps, sockudps, ftps, https. For details see [AT^SISS](#) [<srvParmTag>](#) parameter "address".
- To create, load, delete and read customized TLS certificates use the commands [AT^SBNW](#) and [AT^SBNR](#).
- The [AT^SISS](#) session profile parameter "secopt" specifies whether or not to check certificates received from the server against the local certificate store (if at least one local certificate is set).
- The [AT^SCFG](#) subcommand "Tcp/TLS/Version" specifies the security level.
- The used certificates can be shown in text format (issuer, serial, subject, signatureAlg, thumbprint). For this purpose it is recommended to enable the "+CIEV: "is_cert" URC, see [AT^SIND](#).

URC mode or polling mode (for non-Transparent Mode only)

The ELS62-W offers two modes of controlling a Non-Transparent Mode session opened with [AT^SISO](#). To select the mode use the [AT^SCFG](#) command, parameter "Tcp/WithURCs" (refer to [<tcpWithUrc>](#)).

- URC mode (delivery default):
The progress of a Non-Transparent Mode session is URC driven. The URCs notify the host whether data can be sent or received, whether data transfer has completed, whether the service can be closed or whether an error has occurred. This mechanism eliminates the need to poll the service until the necessary progress information is received.
To enable the URC mode select: [AT^SCFG](#)="Tcp/WithURCs",on.
- Polling mode:
In polling mode, the presentation of URCs related to the Internet Services is disabled. The host is responsible to retrieve all the status information needed for controlling the Internet session. This is done by polling, where the host application keeps sending the commands [AT^SISR](#), [AT^SISW](#), [AT^SISI](#).
To enable the polling mode select: [AT^SCFG](#)="Tcp/WithURCs",off.
The disabled URCs are the following: "[^SISR](#)" URC, "[^SISW](#)" URC and "[^SIS](#)" URC for parameter [<urcCause>](#)=0 (Internet service events), but not for all other [<urcCause>](#)s (needed for listener or endpoint and therefore always enabled).

Address notation

Server addresses shall be provided as IPv4 addresses in standard dot format, e.g. "192.168.1.2", or as IPv6 addresses in standard colon format enclosed in square brackets, e.g. "[FE80::2]", or as server address names resolvable by a DNS server.

Timeouts

Timeouts are not part of the Internet AT command functionality implemented in ELS62-W and, if desired, are the responsibility of the host application. It is recommended that the host application validates URCs and AT command responses and reacts adequately, for example by sending a close message or starting a timer.



11.1 AT^SICA Internet Connection Activate or Deactivate

The [AT^SICA](#) write command can be used to activate or deactivate an Internet service connection using a PDP context defined with [AT+CGDCONT](#). To track activation errors the [AT^SIND](#) indicator "[ceer](#)" should be used.

The [AT^SICA](#) read command shows whether a connection for Internet services is active and which PDP context is used for it. If no connection is active, then the read command just returns OK.

Syntax

Test Command

AT^SICA=?

Response(s)

^SICA: (list of supported [<state>s](#)), (list of supported [<cid>s](#))

OK

ERROR

+CME ERROR: [<err>](#)

Read Command

AT^SICA?

Response(s)

[^SICA: [<cid>](#), [<state>](#)]

[^SICA: ...]

OK

ERROR

+CME ERROR: [<err>](#)

Write Command

AT^SICA=[<state>](#), [<cid>](#)

Response(s)

OK

ERROR

+CME ERROR: [<err>](#)

PIN  Last

+ - -

Parameter Description

[<state>](#)^(num)

0	Deactivate(d)
1	Activate(d)

[<cid>](#)^(num)

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



11.2 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. Keep in mind changes will be used upon next restart of the module and during PDP context activation via **AT^SICA**.

Table 11.1: Applicability of **AT^SICS <conParmTag>** values

<conParmTag>	Mandatory or optional
"dns1"	optional
"dns2"	optional
"ipv6dns1"	optional
"ipv6dns2"	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 → Last
- + -

Parameter Description

<conProfileId> ^{(num)(NV)}	
Internet connection profile as specified with AT+CGDCONT parameter <cid>. Invoking command only with this parameter will delete related DNS server address.	
<conParmTag> ^{(str)(NV)}	
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.

"ipv6dns1"

Primary IPv6 DNS server address (IP address Each group is written as 4 hexadecimal digits and the groups are separated by colons (:). The whole address is encapsulated by square brackets []).

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.

"ipv6dns1" = "" (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 IPv6 address, while the value "" is not indicated at all, no matter whether assumed by default or explicitly specified.

See also note below.

"ipv6dns2"

Secondary IPv6 DNS server address (IP address Each group is written as 4 hexadecimal digits and the groups are separated by colons (:). The whole address is encapsulated by square brackets []).

"ipv6dns2" = "" (default) means that the connection profile uses dynamic DNS assignment. Any other address means that the secondary 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 IPv6 address, while the value "" is not indicated at all, no matter whether assumed by default or explicitly specified.

<conParmValue>^{(str)(NV)}

Parameter value; type and supported content depend on related <conParmTag>.

Note

- If a 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.



11.3 AT^SIPS Internet Profile Storage

AT^SIPS saves and loads the settings of the Internet service profiles in the non-volatile memory. AT^SIPS can also be used to reset the settings to their default values without saving.

Syntax

Test Command

AT^SIPS=?

Response(s)

^SIPS: (list of supported <type>s), (list of supported <action>s), (list of supported <ProfileId>s)

OK

Write Command

AT^SIPS=<type>, <action>[, <ProfileId>]

Response(s)

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

<type>^(str)

Internet profile storage type parameter.

"service"	Handle AT^SISS parameter set.
"all"	Implemented for compatibility with other products. For ELS62-W, same effect as value "service".
"tls-session"	Reset stored TLS session data. This parameter can be used only with <action>="reset".

<action>^(str)

Internet profile storage action parameter

"reset"	Reset current profile(s) for given <type> to default settings without saving. If <ProfileId> is given only specific profile will be reset. Only the connections which are in "Down" status and the services which are in "Allocated" status could be affected.
"save"	Stores current profile(s) for given <type>. If <ProfileId> is given only specific profile will be stored.
"load"	Loads stored profile(s) for given <type>. If <ProfileId> is given only specific profile will be loaded.

<ProfileId>^(num)

Internet service profile storage identifier

0...9	Possible profile identifiers of used <type>
-------	---



11.4 AT^SISS Internet Service Setup Profile

AT^SISS specifies the Internet service profiles needed to control data connections by using AT^SICA, AT^SISO, AT^SISC, AT^SISR, AT^SISW, AT^SIST, AT^SISH, AT^SISD, AT^SISU 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, partially, 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. mandatory (= m) or optional (= o).

Table 11.2: Applicability of AT^SISS <srvParmTag> values

<srvParmTag>	Socket	FTP	HTTP	MQTT
SrvType	m	m	m	m
conId	m	m	m	m
address	m	m	m	m
address2		o	o	
address3		o	o	
address4		o	o	
tcpMR	o	o	o	o
tcpOT	o	o	o	o
cmd		m	m	m
path		o		
files		o	o	
ftpath		o		
hcContent			o	Publish: o
hcContLen			m	Publish: o
hcContBuf			o	
hcUserAgent			o	
hcProp			o	
user (as separate parameter or in address field)		m	o	o
passwd (as separate parameter or in address field)		m	o	o
alphabet	o	o	o	o
ipVer	o	o	o	o
secOpt	o	o	o	o
secConfPSK	o	o	o	o
secsni	o	o	o	o
sniname	o	o	o	o
TlsSesTypeInit	o	o	o	o



<srvParmTag>	Socket	FTP	HTTP	MQTT
TlsSesExplnit	o	o	o	o
TlsSesPers	o	o	o	o
clientId				m
keepAlive				o
willFlag				o
lastWillTopic				o
lastWillMessage				o
lastWillQos				o
lastWillRetain				o
cleanSession				o
Topic				Publish: m
Qos				Publish: o
Retain				Publish: o
TopicFilter				Subscribe: m Unsubscribe: m
TopicQos				Subscribe: o

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 → 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^SISR**, **AT^SISW**, **AT^SIST**, **AT^SISH**, **AT^SISD**, **AT^SISU**, **AT^SISE** and **AT^SISC** the **<srvProfileId>** is needed to select a specific service profile.

0...9

<srvParamTag>^(u)

Internet service profile parameter.

srvType	Type of Internet service to be configured with consecutive usage of AT^SISS . For supported values of <srvParamValue> refer to <srvParamValue-srv-Type> .
alphabet	Selects the character set for input and output of string parameters within a profile. The selected value is bound to the specific profile. This means that different profiles may use different alphabets. Unlike other parameters the alphabet can be changed no matter whether the <srvParamTag> value "srvType" has been set. For supported values of <srvParamValue> refer to <srvParamValue-alphabet> .
user	User name string for FTP, HTTP, MQTT authentication. The user name can be set by <srvParamTag> parameter "user" or as part of "address" parameter. For HTTP only simple authentication is supported. Length: 64 octets
passwd	Password string for FTP, HTTP, MQTT authentication. The password can be set by <srvParamTag> parameter "password" or as part of "address" parameter. Length: 64 octets
conId	Internet connection profile as defined with AT+CGDCONT . The value is one of the PDP context IDs set with parameter <cid> .
address	String value containing the URL for the specific service: 1. Socket Service URLs: - TCP Client URL: "socktcp[s]://<host>:<remotePort>[;etx[=<etxChar>][;timer=<value>][;bufsize=<value>]][;keepidle=<value>][;keepcnt=<value>][;keepintvl=<value>][;port=<localPort>]" - UDP Client URL: "sockudp[s]://<host>:<remotePort>[;etx[=<etxChar>][;timer=<value>][;bufsize=<value>]][;port=<localPort>]" - UDP Endpoint URL: "sockudp://:<localPort>" - Standard TCP Listener URL: "socktcp://listener:<localPort>[;keepidle=<value>][;keepcnt=<value>][;keepintvl=<value>]" - Transparent TCP Listener URL: "socktcp://listener:<localPort>;etx[=<etxChar>][;timer=<value>][;bufsize=<value>][;autoconnect='0'1'][:connecttimeout=<value>][;keepidle=<value>][;keepcnt=<value>][;keepintvl=<value>][;addrfilter=<filter>]" Socket service URL parameters: - <host>: IPv4 address in standard dot format, e.g. "192.168.1.2", or IPv6 address in standard colon format enclosed in square brackets, e.g.



- "[FE80::2]", or as FQDN.
- <remotePort>: 1 ... 2^{16} -1 for the remote port number.
 - <localPort>: 1 ... 2^{16} -1 for the local port number.
 - "etx": This parameter allows a socket service to use Transparent Mode. For the Transparent Listener "etx" is mandatory. For the Client services "etx" is optional, but required for using the Transparent Mode parameters "etxChar" and "timer". Please note that even though "etx" is set in a service profile, data transfer can be performed by a mixing Transparent Mode ([AT^SIST](#)) and Non-Transparent Mode ([AT^SISW](#) / [AT^SISR](#) cycles) in the same connection. This applies both to the Transparent Listener and to Client services.
 - "<etxChar>": Specifies the character used to change from Transparent Mode to AT Command Mode.
range: 1...15,17...255 (16 is not allowed because it is used as DLE (0x10))
If parameter is not set no escaping is configured, thus requiring either [+++](#) or DTR ON-OFF transition for changing to AT command mode. If value is set, the transmitted bytes are parsed for the DLE (0x10) character followed by the specified <etxChar> value. If both characters are found the service returns to AT command mode without transmitting these two bytes.
If you wish to send DLE characters as normal text string within your payload data the characters shall be doubled (DLE DLE).
 - "bufsize": For Transparent Mode only: Specifies maximum payload size for sending data from the IP service to the underlying IP stack with [AT^SIST](#), i.e. for limiting the length of UDP packets.
range: 1..[1460]
 - "timer": The parameter configures the Nagle algorithm, which is used in Transparent Mode.
range: 0, 20...[100]...500 milliseconds in steps of 20
Value 0 disables the Nagle algorithm.
 - "keepidle": specifies the TCP parameter TCP_KEEPIIDLE (see RFC1122, Section 4.2.3.6; not for Transparent UDP client)
range: 1...65535 seconds; disabled if no value set (default).
 - "keepcnt": specifies the TCP parameter TCP_KEEPCNT (see RFC1122, Section 4.2.3.6; not for Transparent UDP client); ignored if option "keepidle" is not set
range: 1...[9]...127
 - "keepintvl": specifies the TCP parameter TCP_KEEPIIDLE (see RFC1122, Section 4.2.3.6; not for Transparent UDP client); ignored if option "keepidle" is not set
range: 1...[75]...255 seconds
 - "autoconnect" (for Transparent TCP Listener service only):
0 ... disabled (default)
1 ... automatically accept incoming client connects
 - "connecttimeout": specifies the time after which incoming client connects are rejected automatically (for Transparent TCP Listener service only)
range: 1...[30]...180 seconds
 - "addrfilter": This option allows to filter incoming client connects based on the IP address of the client (for Transparent TCP Listener service only). It is possible to specify a maximum of 3 filters separated by commas. If the IP address of any incoming client connect does not match any of the specified filters, then the connect is rejected automatically. If the option is not specified, then all client connects are allowed.
In IPv4: Each filter is specified as 4 numbers separated by dots ("[n](#)<n>.<n>.<n>.<n>"). Each number n can be in the range between 0 and



254. It is allowed to use the wildcard "*" instead of n which matches all.
Example: "addrfilter=10.10.0.*.80.190.158.9" - allows connects from 10.10.0.81 and 80.190.158.9 but not from 10.10.17.81 and 80.190.158.10.

In IPv6: Each filter is specified by up to 8 bytes separated by colons ("

Examples: *:5678:9abc:def0:1234:5678:9ABC:D*F0

1234::

::1**4

1*34:>::3456

2. FTP Client URL

The maximum length of "address" is 511, can be extended to 2044 by using optional parameters "address2", "address3" and "address4".

Writing to "address" will delete the content of "address2", "address3" and "address4".

"ftp[s][es]://[<user>:<passwd>@]<host>[:<port>][/<path>][;dataTlsSessionReuse=<data-tls-reuse>]"

"ftp://": The default TCP port 21 for ftp server is used.

"ftps://": The default SSL port 990 for secure ftp server is used.

"ftpes://": The default SSL port 21 for explicit secure ftp server is used.

<host>: element can be an IPv4 address, or an IPv6 address enclosed in square brackets, or a DNS FQDN string.

<port>: element can be set optionally to replace the default port.

<user>: username for authentication, 64 octets. Can be set as part of "address" or separately by <srvParmTag> parameter "user".

<passwd>: password for authentication, 64 octets. Can be set as part of "address" or separately by <srvParmTag> parameter "passwd".

<path>: path of file or directory. To read a root directory or subdirectory path shall be terminated with slash: <path>/.

<data-tls-reuse>: configuration of the TLS session context reuse.

0 TLS session context reuse for data connection is disabled.
Default TLS credentials will be used.

1 (default) TLS session context reuse for data connection is enabled. It will only be applied if the TLS session resumption for the Internet services profile is enabled and server used the appropriate TLS extension for the control connection.

3. HTTP Client URL

Length: 6...511, can be extended to 2044 by using optional parameters "address2", "address3" and "address4".

Writing to "address" will delete the content of "address2", "address3" and "address4".

"http[s]://[<user>:<passwd>@]<server>[:<port>/<path>]"

<server>: element can be an FQDN, or an IPv4 address, or an IPv6 address enclosed in square brackets.

<path>: path of file or directory.

<port>: If parameter is omitted the service connects to HTTP default port 80.

<user>: username for authentication, 64 octets.

<passwd>: password for authentication, 64 octets.

"https://": Used for SSL connection.

Refer to "IETF-RFC 2616".

4. MQTT client URL

"mqtt[s]://[<user>:<passwd>@]<host>[:<port>]
[;connackTimeout=<value>]"

<host>: element can be an FQDN, or an IPv4 address, or an IPv6 address enclosed in square brackets.

<user>: username for authentication, 64 octets.

<passwd>: password for authentication, 64 octets.

<port>: If parameter is omitted the service connects to default port 1883 and for TLS default port 8883.



	"connackTimeout": Definition of max time in seconds waiting for CONNACK packet from server. range: [5]...60 seconds.
address2	Second part of address extension, max. length is 511. The parameter "address", "address2", "address3" and "address4" will be concatenated to an address with max. length of 2044 characters. When writing to parameter "address", the content of "address2" will be deleted.
address3	Third part of address extension, max. length is 511. The parameter "address", "address2", "address3" and "address4" will be concatenated to an address with max. length of 2044 characters. When writing to parameter "address", the content of "address3" will be deleted.
address4	Fourth part of address extension, max. length is 511. The parameter <address, "address2", "address3" and "address4" will be concatenated to an address with max. length of 2044 characters. When writing to parameter "address", the content of "address4" will be deleted.
cmd	1. HTTP service - "0" or "get": Send HTTP GET request to server - "1" or "post": Send HTTP POST request to server - "2" or "head": Send HTTP HEAD request to server - "3" or "put": Send HTTP PUT request to server 2. FTP service - get [<OffsetString>]: get a single file from FTP server. - put [<OffsetString>]: create and write a single file to FTP server using AT^SISW. - dir: List the directory on the FTP server and show file size. - list: List the directory on the FTP server without showing file size. - fget: Get multiple files listed in <srvParmTag> parameter "files". - fput: Send one or multiple files listed in <srvParmTag> parameter "files". - size: Request the size of the file element on the FTP server. The size result is output as "^SIS" URC. - del: Delete a file specified with <srvParmTag> parameter "files" on FTP server. - append: Append data to existing file on FTP server - unique: Selects the FTP Store Unique command to create a file name unique to the current directory. If the file name is assigned by the server then the "^SIS" URC will appear, indicating <urcInfoId> 2100 and the file name. <OffsetString> is an optional parameter for "get" and "put". It allows resuming a broken uplink or downlink transfer to resend data. The <OffsetString> value specifies the offset in number of octets to start the transfer from. Maximum length is 16 digits. For "get" the <OffsetString> value must be calculated from the <urcInfoId> 2100 of the "^SIS" URC requested before by using "size". 3. MQTT Service Types of MQTT request: - "publish": The MQTT client sends data by PUBLISH control packet request to server - "subscribe": The MQTT client that wants to receive data must subscribe to it by SUBSCRIBE control packet - "unsubscribe": The MQTT client that doesn't want to receive subscribed data any more must unsubscribe specified topic by sending UNSUBSCRIBE control packet



path	Path on the local FFS. Specifies drive prefix and pathname. Optional for FTP. Default: <code>AT^SISS=<srvProfileId>,"path", "file:///a:/"</code>.
ftpath	Specifies the path of the remote FTP server after login. If no path is set the default path will be used.
files	Specifies single or multiple files: • Name of a single file for upload from the AT command interface to a server, or download from a server to the AT command interface if the "cmd" parameter is given with "get" or "post" or "put" in case of HTTP, with "get", "put" or "del" in the case of FTP. • Name(s) of file(s) located on the FFS when "cmd" parameter is given with parameters "fput" or "fget" in case of FTP. Maximum 5 files can be handled, separated by comma.
hcContent	HTTP "POST"/"PUT": Variable mode. Optional parameter if HTTP "post" or "put" is set with <code><srvParmTag></code> parameter "cmd". Length: 1...255 bytes Can be used to transfer a small amount of data. The content of this string will only be sent if "hcContLen" = 0. To transmit a larger amount of data, "hcContLen" must be set to a non-zero value. In this case the "hcContent" string will be ignored, and data transmission from the client to the server is done with <code>AT^SISW</code>. Usage example: <code>AT^SISS=x,cmd,"POST"</code> <code>AT^SISS=x,hcContent,"This text will be sent to the server now response OK"</code> OK <code>AT^SISS=x,hcContLen,0</code> <code>AT^SISO=x</code> OK <code>^SIS: x,0,2200,"Http connect 10.42.228.61:80"</code> <code>^SISW: x,2</code> Please take care not to exceed the maximum "hcContent" length 255 bytes. Otherwise data is truncated. MQTT Client Payload: Definition of payload in case parameter "hcContLen" = 0. Length: 0...5119 Can be used to transfer a small amount of data without the need for <code>AT^SISW</code>. The content of the "hcContent" string will only be sent if "hcContLen" = 0. To transmit a larger amount of data, the "hcContLen" string shall set to a non-zero value. In this case, the "hcContent" string will be ignored, and data transmission from the client to the server is done with <code>AT^SISW</code>.
hcContLen	HTTP "POST"/"PUT": Fixed mode. Mandatory parameter if HTTP "post" or "put" is set with <code><srvParmTag></code> parameter "cmd". Length: $0 \dots 2^{31} - 1$ The content length shall be set in the header of the HTTP "Post"/"Put" request before the data part is transferred. If "hcContLen" = 0: The data given in the "hcContent" string will be posted. If "hcContLen" > 0 AND "hcContBuf" = 1: The <code>AT^SISW</code> command will be used to send data from the client to the server.



In this case, "hcContLen" specifies the total amount of data to be sent. The data can be sent in one or several parts. For each part, the transmission is triggered by the URC "[^SISW](#): x, 1", then the [AT^SISW](#) write command can be executed. After the exact number of bytes are transferred, the HTTP client will go from service state "Up" to service state "Closing" (see [AT^SISO](#) <srvState> and [AT^SISI](#) <srvState> for detail). Finally, the URC "[^SISW](#): x, 2" indicates that all data have been transferred and the service can be closed with [AT^SISC](#).

If "hcContLen" > 0 AND "hcContBuf" = 0:

[AT^SISW](#) command and "[^SISW](#): x, 1" sequences can be used to send data from the client to the server. "hcContLen" may just be 1, or any other value > 0. There is no need to set the total amount of data with "hcContLen" (the given value would be ignored). The amount of data is determined only by single [AT^SISW](#) commands. Data transmission must be terminated with end-of-data flag: [AT^SISW](#)=x,0,1.

MQTT Client Payload Length:

Definition of payload length. If this parameter is non-zero value the payload is then defined by the [AT^SISW](#) command.

Length: 0...5119

If "hcContLen" = 0 then the data given in the "hcContent" string will be posted.

If "hcContLen" > 0 then the [AT^SISW](#) command will be used to send data from the client to the server.

If this parameter is not set, default hcContLen 0 is used.

hcContBuf

Content buffer:

0 Content size unknown, all chunks given by [AT^SISW](#) are buffered. On end-of-data-flag, buffered data is send and HTTP is closed afterwards

1 (default) Content size is given by "hcConLen", sending chunk by chunk given by [AT^SISW](#) w/o buffering, closing HTTP automatically after all data are sent.

hcUserAgent

The user agent string must be set by the application to identify the mobile. Usually operation system and software version info is set with this browser identifier.

Length: 0...63

hcProp

Parameter for several HTTP settings.

Length: 0...512

The general format is 'key': <space> 'value'

Multiple settings can be given separated by "\0d\0a" sequences within the string, do not put them at the end.

Possible 'key' values are defined at HTTP/1.1 Standard RFC 2616.

tcpMR

Parameter can be used to overwrite the global [AT^SCFG](#) parameter "Tcp/Max-Retransmissions" <tcpMr> for a specific Internet Service connection profile. If the parameter is not specified the value specified with [AT^SCFG](#) will be used. Supported values <srvParmValue> for this parameter are the same as described for <tcpMr>.

Setting is not relevant for Internet Service "Socket" with type "UDP".

tcpOT

Parameter can be used to overwrite the global [AT^SCFG](#) parameter "Tcp/OverallTimeout" <tcpOt> for a specific Internet Service connection profile. If the parameter is not specified the value specified with [AT^SCFG](#) will be used. Supported values <srvParmValue> for this parameter are the same as described for <tcpOt>.

Setting is not relevant for Internet Service "Socket" with type "UDP".

ipVer

Used IP Protocol version:

This parameter limits the IP Protocol version for the Internet service when the



PDP context defined with `AT+CGDCONT` supports IPv4 and IPv6.

- 4 Values 4 (default) or 6 can be used for the following situations only:
6 An IPv4v6 PDP context is employed, and this context provides both IPv4 and IPv6 interfaces, and
- either the service acts as a listener,
 - or the client address is a hostname, and the DNS server provides both IPV4 and IPV6 addresses.
- In such case value 4 allows IPv4 addresses only, and value 6 allows IPv6 addresses only.

secopt	Security Option of IP service. Values: 1 (default) Check received certificates from server against local store, if local store has at least one certificate. 0 Do not check received certificates from server against the local store. NOTE: Local store is created with <code>AT^SBNW,is_cert</code>.
secConfPSK	Configuration of PSK mode. 0 (default) PSK automatic selection 1..10 slot PSK manual selection number
secsni	Security Option for Server Name Indication (SNI) extension (defined by RFC6066). • If parameter "secsni" is not provided then default configuration is "1", i.e. SNI extension is enabled by default. • If user does not configure <code>AT^SISS=<srvProfileId>,secsni</code> but enters <code>AT^SISS=<srvProfileId>,sniname,"name"</code>: SNI extension will be used with "name". • If user sets <code>AT^SISS=<srvProfileId>,secsni,1</code> and sets <code>AT^SISS=<srvProfileId>,sniname,"name"</code>: SNI extension will be used with "name". • If neither "secsni" nor "sniname" is configured or if user sets <code>AT^SISS=<srvProfileId>,secsni,1</code> but does not configure <code>AT^SISS=<srvProfileId>,sniname,"name"</code>: SNI extension will be used with hostname extracted from <code>AT^SISS=<srvProfileId>,address</code>. NOTE: Data related to SNI extension are sent in first client message called "Client Hello" and processed by server. 1 (default) SNI Extension will be used if TLS connection will be invoked. 0 SNI Extension will not be used.
sniname	<code>AT^SISS=<srvProfileId>,sniname,"name"</code> means that the "name" is used as server name indication during TLS connection setup. If parameter is not provided and SNI extension is enabled then the hostname value from <code>AT^SISS=<srvProfileId>,address</code> is used. Length of "name" must be greater than 0 and less than 256 characters.
TlsSesTypeInit	TLS Session Resume Type "none" TLS session resumption is disabled. Any previously stored TLS (default) session data for the service profile will be cleared. "sesid" Only SessionID resumption (no ticket resumption). "all" SessionID resumption or Ticket resumption (depending on server decision).
TlsSesExpiry	TLS Session State Expiry. Client preference of maximum expiry time of the stored TLS session state (in seconds). 0 Unlimited expiry. 1...[3600] Value of expiry time. NOTE: The expiry time can be also limited by server preferences.



TlsSesPers	TLS Session State Persistence. 0 (default) TLS session information is volatile and will not be stored to non-volatile memory. 1 TLS session information is stored non-volatile.
clientId	Unique client identification of the connection to the MQTT server. ClientId are between 1 and 23 UTF-8 encoded bytes in length, and that contain only the following characters "0123456789abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ"
keepAlive	Define keep alive time interval defined in seconds. range: [0]...65535 seconds
willFlag	Definition of will flag bit. 0: If the Will Flag is set to 0 the Will QoS and Will Retain fields in the Connect Flags must be set to zero and the Will Topic and Will Message fields must not be present in the payload. If the Will Flag is set to 0, a Will Message must not be published when this Network Connection ends: 1: If the Will Flag is set to 1 this indicates that, if the Connect request is accepted, a Will Message must be stored on the Server and associated with the Network Connection. The Will Message must be published when the Network Connection is subsequently closed unless the Will Message has been deleted by the Server on receipt of a DISCONNECT Packet:
lastWillTopic	Definition of last will topic. Length: 0...64 octets
lastWillMessage	Definition of last will message. Length: 0...128 octets
lastWillQos	Definition of Qos level of publishing last will message. 0: At most once delivery 1: At least once delivery 2: Exactly once delivery If this parameter is not set, default Qos 0 is used.
lastWillRetain	Definition if last will message is to be retained by server. 0: Retained message must not be stored as a retained message on the Server 1: The Server must store the Application Message If this parameter is not set, default Retain 0 is used.
cleanSession	Definition of session type to be initiated with server. 0: Server will try to resume current session with client 1: Server will start new clean session If this parameter is not set, default value 1 is used.
Qos	MQTT Service: Definition of Qos level of publishing application message. 0: At most once delivery 1: At least once delivery 2: Exactly once delivery If this parameter is not set, default Qos 0 is used.
Topic	Definition topic of publishing application message. Length: 0...64
Retain	Flag define if application message will be retained on server. 0: Retained message MUST NOT be stored as a retained message on the Server



	1: The Server MUST store the Application Message If this parameter is not set, default Retain 0 is used.
topicFilter	Definition of topic filter list for subscribing or unsubscribing data. Each topicFilter separated by a semicolon, the max number is 5.
topicQos	Definition of maximum Qos level at which the server can send application messages to the client for each topic filter from topicFilter list. Each topicQos separated by a semicolon, the max number is 5. If all topics should have same Qos then only one needs to be defined.

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

Parameter value; type and supported content depend on related `<srvParmTag>`.

`<srvParmValue-srvType>^(str)`

Supported Internet service type values in `<srvParmValue>` for `<srvParmTag>` value "srvType".
Before changing the "srvType" of an existing service profile be sure that the profile is closed. To verify the connection state of the service profile enter the read command `AT^SISI`. Only when `<srvState>=2` is returned for this specific service profile you can change its service type.

"Socket"	ELS62-W acting as client or server (listener) for TCP or UDP. "etx" subparameter in URL configures Transparent mode for Socket service.
"Ftp"	ELS62-W acting as FTP client.
"Http"	ELS62-W acting as HTTP client.
"Mqtt"	ELS62-W acting as MQTT client. The MQTT client supports sending MQTT control packets CONNECT, DISCONNECT, PUBLISH, SUBSCRIBE and UNSUBSCRIBE. The MQTT client handle automatically MQTT control packets CONNACK, PUBACK, PUBREC, PUBCOMP, SUBACK, UNSUBACK, PINGREQ and PINGRESP. The maximum number of configurable MQTT client is 1.
"none"	Reset Internet service profile settings. Operation is not allowed if profile is in use, i.e. it was activated via <code>AT^SISO</code>.

`<srvParmValue-alphabet>^(str)`

Supported string parameter character set selections in `<srvParmValue>` for `<srvParmTag>` value "alphabet".

"0"	Applicable character set is determined by current setting of <code>AT+CSCS</code>.
"1"	International Reference Alphabet (IRA, seven bit ASCII).

Notes

- String parameters are truncated if greater than the maximum length specified above.
- For correct input of the @ character in address parameters please refer to Section 1.7, [Supported character sets](#).



11.5 AT^SISI Internet Service Information

AT^SISI serves to monitor the status of Internet service profiles defined with AT^SISS.

The AT^SISI read command requests the current status of all defined Internet service profiles.

The AT^SISI write command requests the status of the specified Internet service profile. If the specified service profile is not defined yet, "+CME ERROR" is returned.

Syntax

Test Command

AT^SISI=?

Response(s)

[^SISI: (list of defined <srvProfileId>s)]

OK

Read Command

AT^SISI?

Response(s)

If response is related to service profile(s) created / opened on this interface:

[^SISI: <srvProfileId>, <srvState>, <rxCount>, <txCount>, <ackData>, <unackData>]

[^SISI: ...]

If response is related to service profile(s) created / opened on other interface(s):

[^SISI: <srvProfileId>, <srvParmTag>value "srvType"]

[^SISI: ...]

OK

ERROR

Write Command

AT^SISI=<srvProfileId>[, <mode>]

Response(s)

If no <mode> or if <mode>=0

^SISI: <srvProfileId>, <srvState>, <rxCount>, <txCount>, <ackData>, <unackData>

If <mode>=2

^SISI: <mode>, <srvProfileId>, <TlsSesTypeAct>, <TlsSesExpAct>, <TlsSesCipherAct>, <TlsSesVersionAct>

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -



Parameter Description

<srvProfileId>^(num)

Internet service profile identifier as defined by [AT^SIS](#) (<srvProfileId>).

0...9

<mode>^(num)

[0] Current status of all defined Internet service profiles. Has the same effect as [AT^SISI=<srvProfileId>](#) write command.

2 Display resumption information.

<TlsSesTypeAct>^(str)

Active TLS Session Resume Type

<TlsSesTypeAct> should be the same as "TlsSesTypeInit".

<TlsSesExpAct>^(num)

Active TLS Session State Expiry

<TlsSesCipherAct>^(str)

Active TLS Session Ciphersuite

<TlsSesVersionAct>^(str)

Active TLS Session Protocol Version

<srvState>^(num)

Internet service state (for details see [AT^SISO](#) parameter <srvState>).

2	Allocated
3	Connecting
4	Up
5	Closing
6	Down
7	Alerting
8	Connected

<rxCount>^(num)

Number of bytes received via [AT^SISR](#) or [AT^SIST](#) since last successful [AT^SISO](#) write command. This is the same value as displayed by the [AT^SISO](#) read command with the parameter <rxCount>.

<txCount>^(num)

Number of bytes sent via [AT^SISW](#) or [AT^SIST](#) since last successful [AT^SISO](#) write command. This is the same value as displayed by the [AT^SISO](#) read command with the parameter <txCount>.

<ackData>^(num)

Number of data bytes already sent and acknowledged at TCP layer. Value 0 indicates that no sent data is acknowledged yet.
Parameter is not applicable to HTTP, Socket with UDP, MQTT. For these services the counter is always set to 0.



`<unackData>(num)`

Number of data bytes already sent but not yet acknowledged at TCP layer. A value 0 indicates that all sent data is already acknowledged.

This is the same value as displayed in the response of the `AT^SISW` write command with the parameter `<unackData>`.

Parameter is not applicable to HTTP, Socket with UDP, MQTT. For these services the counter is always set to 0.

`<unackData>` includes the overhead needed for encryption when TLS/SSL is used.

Note

- If a service is in state "Down" the responses for `<rxCount>`, `<txCount>`, `<ackData>` and `<unackData>` are the last known values for the service in the states "Connecting", "Up/Listening", "Connected" and "Closing".

11.6 AT^SISO Internet Service Open

The `AT^SISO` write command starts an Internet service configured with `AT^SISS`. Before you can start a service it is necessary to activate the bearer with `AT^SICA`.

The command may be aborted by any character sent from the TE to the UE during execution.

Syntax

Test Command
<code>AT^SISO=?</code>
Response(s)
OK
Read Command
<code>AT^SISO?</code>
Response(s)
If response is related to service profile(s) created / opened on this interface: <code>^SISO: <srvProfileId>, <srvType>, <srvState>, <socketState>, <rxCount>, <txCount>, <locAddr>, <remAddr>[, <rejCounter>]</code> <code>[^SISO: ...]</code>
If response is related to service profile(s) created / opened on other interface(s): <code>^SISO: <srvProfileId>, <srvType></code> <code>[^SISO: ...]</code> OK
Write Command
<code>AT^SISO=<srvProfileId>[, <optParam>]</code>
Response(s)
OK
ERROR
+CME ERROR: <err>
PIN → Last
± - -

Parameter Description

`<srvProfileId>`^(num)

`<srvProfileId>` 0 ... 9 specified with `AT^SISS`.

`<srvType>`^(str)

The type of the internet service as specified by the `AT^SISS` parameter `<srvParamValue-srvType>`.

`<srvState>`^(num)

Internet service state.

Please note, that the state of an Internet service may influence the state of the serial DCD line. For details see description of value 2 for parameter `<value>` of command `AT&C`.

2	Allocated Service profile resources are allocated, i.e. at least the service type has been set (parameter <code><srvParamTag></code> , value "srvType" of <code>AT^SISS</code>). The service is not opened, but ready for configuration.
---	--



3	Connecting State after opening a service with <code>AT^SISO</code> where the connection is being established. If connection setup is successful the service proceeds to the state "4" (Up) and one of the URCs "<code>^SISW</code>" and "<code>^SISR</code>" may follow. If connection setup is not successful, the "<code>^SIS</code>" URC may appear and the service enters <code><srvState></code> 6 (Down). In the case of FTP, <code><srvState></code>=3 means that the command channel is being established. If the service profile is configured as Standard Listener, then the Listener always stays at <code><srvState></code>=3 and <code><socketState></code>=3 (LISTENER), while the <code><srvState></code> and <code><socketState></code> of the dynamically assigned service profile may change. See examples in Section 11.17.5.
4	Up The service performs its purpose. The data transfer process is the major function at this state. FTP: Data channel is up. Transparent TCP Listener service: the service is listening to remote client connection requests. Not applicable to Standard Listener. See examples in Section 11.17.6.
5	Closing Internet Service is closing the network connection. FTP: Command channel is released.
6	Down This state is entered if - the service has successfully finished its session (see note on Socket), - the remote peer has reset the connection or - the IP connection has been closed because of an error (see note below on service or network errors). If a service in this state be sure to close it with <code>AT^SISC</code> before reopening it.
7	Alerting A client tries to connect to the Transparent TCP Listener service. Not applicable to Standard Listener.
8	Connected A client is connected with the Transparent TCP Listener service. Not applicable to Standard Listener.
9	Released The client has disconnected from the Transparent TCP Listener service but there are unread data. To go back into Up/Listening state read the pending data using <code>AT^SIST</code> or discard them by using <code>AT^SISH</code>.

`<socketState>`^(num)

Socket state identifier.

1	Socket not assigned, i.e. no TCP/ UDP connection active.
2	Socket assigned as CLIENT.
3	Socket assigned as LISTENER or UDP Endpoint.
4	Socket assigned as SERVER.

`<rxCount>`^(num)

Number of bytes received via `AT^SISR` or `AT^SIST` since last successful `AT^SISO` write command.

`<txCount>`^(num)

Number of bytes sent via `AT^SISW` or `AT^SIST` since last successful `AT^SISO` write command.



<locAddr>^(str)

Recently used local IPv4 address in dotted-four-byte format and TCP port number separated by colon, e.g. "192.60.10.10:80", or recently used local IPv6 address in colon format enclosed in square brackets, e.g. "[FE80::2]" and TCP port separated by colon, e.g. "[FE80::2]:80".

<remAddr>^(str)

Remote IPv4 address in dotted-four-byte format and TCP port number, separated by colon, e.g. "192.60.10.10:80", or remote IPv6 address in colon format enclosed in square brackets, e.g. "[FE80::2]" and TCP port separated by colon, e.g. "[FE80::2]:80".
If the Socket service is configured as UDP Endpoint and has never been connected before, a remote IP address cannot be assigned and a default value will be shown instead in [AT^SISO](#) command.

<rejCounter>^(num)

Number of automatically rejected client connect attempts to a Transparent TCP Listener service because the service is already connected with a client.

<optParam>^(num)

[0]	MQTT service: Connect and use static setup defined by AT^SISS
1	Show only parameters of service profile for given <srvProfileId> .
2	MQTT service: Connect and use dynamic setup defined by AT^SISD

Notes

- If the bearer cannot be established and [AT^SISO](#) returns an error there might be a general mobile network problem. To identify the reason you can take advantage of the [AT+CEER](#) command. Using [AT+CEER](#) is especially recommended when the [<infoID>](#) parameter of the [AT^SISE](#) command equals 0.
- If a service or network error occurs during an IP session and the "[^SIS](#)" URC or the [AT^SISE](#) command display an error message, the service enters [<srvState>](#)=5 and then 6, i.e. the IP connection is closed. In this case, the service still allows reading the data stored in the buffer, but writing data is denied. After reading, close the service and open it again.
- If an FTP connection is no longer available after network loss or server shutdown a 3-minute closing timeout for each of the two used sockets takes effect, adding up to 6 minutes. The timeout is effective if the [AT^SISC](#) is not sent. Please keep in mind that this time may vary depending on the settings of [<tcpMr>](#) and [<tcpOt>](#).
- As in polling mode no error URCs are available you are advised to integrate the commands [AT^SISI](#) and [AT^SISE](#) into the command sequences for upload and download jobs. So, the [AT^SISO](#) command may be followed by [AT^SISI](#) to check that the service has entered the [<srvState>](#)=4 before sending [AT^SISR](#), [AT^SISW](#) or [AT^SIST](#). This helps you to detect errors even though the "[^SIS](#)" URCs are disabled. A typical example is that the service fails to be opened because the service profile contains a wrong destination address. In such a case, after opening with [AT^SISO](#) and OK response, the service quickly enters the states [<srvState>](#)=2, 4 and 6, with an error being returned no earlier than after sending the first [AT^SISR](#) or [AT^SISW](#) command. In URC mode, an error URC, such as "Host not found" would be received in this situation, but in polling mode the only way to detect the state is using [AT^SISI](#) or, alternatively, [AT^SISO](#).



11.7 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
<code>AT^SISC=?</code>
Response(s)
OK
Write Command
<code>AT^SISC=<srvProfileId></code>
Response(s)
OK
ERROR
+CME ERROR: <code><err></code>
PIN → Last
± - -

Parameter Description

<code><srvProfileId></code> ^(num)
0...9
<code><srvProfileId></code> specified with <code>AT^SISO</code> .



11.8 AT^SISR Internet Service Read Data

The `AT^SISR` write command can be used to read data for the specified service. It may return the following errors: The `AT^SISR` command either triggers a read operation (download) or queries the number of bytes in the internal buffer.

The "`^SISR: x, 1`" URC is also used to report status changes of the transparent TCP service while the client is in AT command mode.

The `AT^SISR` write command may return the following errors:

- "`+CME ERROR: operation failed`" if there is a problem on application, socket, PPP or network level. The `AT^SISR` command and the "`^SISR`" URC offer additional error information.
- "`+CME ERROR: operation temporary not allowed`" e.g. if the service has not network resources allocated.
- "`+CME ERROR: operation not allowed`" e.g. if the service is not configured.

Syntax

Test Command

AT^SISR=?

Response(s)

OK

Write Command

AT^SISR=<srvProfileId>, <reqReadLength>

Response(s)

^SISR: <srvProfileId>, <cnfReadLength>[, <remainUdpPacketLength>[, <Udp_RemClient>]]

Number of data bytes are sent as specified by <cnfReadLength>. If peek operator was used no data bytes are sent.

OK

ERROR

+CME ERROR: <err>

PIN → Last

± - +

Unsolicited Result Code

`^SISR: <srvProfileId>, <urcCauseId>`

Data availability status of the Internet service configured with `AT^SISR` has changed. The URC is issued when:

- data is available after opening an Internet service or
- less data was confirmed (in <cnfReadLength>) than requested (with <reqReadLength>) during the last "Read Data" operation and new data is available.

The URC is disabled in polling mode. See `AT^SCFG`, parameter "Tcp/WithURCs", <tcpWithUrc>.

Parameter Description

<srvProfileId>^(num)
 <srvProfileId> 0 ... 9 specified with `AT^SISR`. Transparent TCP Listener services are not supported.



<reqReadLength>^(num)

- | | |
|----------|---|
| 0 | Peek Operator: Query number of received bytes within internal buffers. The behaviour of the peek operator depends on the selected Internet service, i.e. it may not be supported by all IP Services. For "Socket" service configured for UDP the size of the next available UDP packet is returned. |
| 1...1500 | Requested number of data bytes to be read via the Internet service specified in <srvProfileId>. |

<cnfReadLength>^(num)

- | | |
|----|--|
| -2 | Indicates end of data. Data transfer has been finished (all data have been read) and the service can be closed with AT^SISC. |
| -1 | Applies only to HTTP: Querying number of available bytes is not supported by the HTTP service. |
| 0 | Indicates that no further data is available at the moment. |
| >0 | Number of available data bytes. The range is determined by <reqReadLength>:
If <reqReadLength> was greater than 0, then <cnfReadLength> may be less or equal to the value requested with <reqReadLength>.
If <reqReadLength> equals 0 (peek operator) the value indicated by <cnfReadLength> may be greater than 1500. |

<urcCauseId>^(num)

Indicates whether or not data is available for reading with AT^SISR and AT^SIST.

- | | |
|---|--|
| 1 | <p><i>Meaning of value "1" for all services except Transparent TCP service:</i>
Data is available and can be read by sending the AT^SISR command. The URC appears when less data was confirmed (in <cnfReadLength>) than requested (with <reqReadLength>) during the last "Read Data" operation and new data is available.</p> <p><i>Meaning of value "1" for Transparent TCP service:</i>
If the Transparent TCP service is in AT command mode the "AT^SISR: x, 1" URC notifies the client that the server has sent new data. In this case the client shall enter the AT^SIST command to go to transparent access mode and read the data.</p> |
| 2 | End of data. Data transfer has completed (all data read). The service can be closed with AT^SISC. |

<remainUdpPacketLength>^(num)

Optional third parameter of the AT^SISR write command response displayed only if the Socket service uses the UDP protocol.

The reception of each datagram must be completed before the next datagram can be received. This may be a problem if the buffer of the host application is limited and not designed to handle the maximum packet size of 1500 bytes. To compensate this, the host is advised to request, via <reqReadLength>, an amount less or equal its maximum buffer capacity and wait for the resulting AT^SISR write command response with parameter <remainUdpPacketLength>. The benefit of this approach is that the host may properly receive all parts of a UDP datagram, as after each received data part the number of remaining bytes is synchronized, until reading the datagram is finished.



If the currently read datagram is smaller than the number of bytes requested by the host the `<remainUdpPacketLength>` parameter is omitted.

Further write attempts with `AT^SISR` are denied as long as the `<remainUdpPacketLength>` is unequal 0 or is not omitted. In this case the service returns `"CME ERROR: operation of service temporary not allowed"`.

0	Indicates that all bytes of the current UDP datagram are read.
(max. data size)-1...1	Indicates that the currently read UDP datagram is not yet complete. The displayed value is the remaining number of bytes. <code><remainUdpPacketLength></code> is unequal 0 until reading all parts of the current datagram is finished.

`<Udp_RemClient>`^(str)

Service specific parameter of the `AT^SISR` write command response. If the Socket service is configured as UDP endpoint this parameter shows the IP address and the UDP port of the remote host that has sent the current UDP data. See example in Section 11.17.9, [UDP Scenario](#).

11.8.1 Example: Socket Host Reads Small Amounts of UDP Data Packets (URC Mode)

This section applies only to the Socket service using the UDP protocol. The example shows how to read UDP packets if the buffer of the host application can handle only a few bytes. There are two datagrams available for reading.

Buffer size: 6 bytes

Datagram A = 18 bytes (content "THIS_IS_DATAGRAM_A")

Datagram B = 3 bytes (content "NEW")

<code>^SISR: 0,1</code>	Service profile 0 is configured for Socket service and UDP. The URC notifies host that data is available for reading.
<code>at^sizr=0,6</code>	The host requests to read 6 bytes.
<code>^SISR: 0,6,12</code>	The first 6 bytes of datagram A are confirmed and transmitted. Another 12 bytes are still available.
<code>THIS_I</code>	
<code>OK</code>	
<code>at^sizr=0,6</code>	The host requests to read the next part of 6 bytes.
<code>^SISR: 0,6,6</code>	The next 6 bytes of datagram A are confirmed and transmitted. Another 6 bytes are still available.
<code>S_DATA</code>	
<code>OK</code>	
<code>at^sizr=0,6</code>	The host requests to read the next part of 6 bytes.
<code>^SISR: 0,6,0</code>	Last part of datagram A was received, no remainder is left.
<code>GRAM_A</code>	
<code>OK</code>	
<code>at^sizr=0,6</code>	Again, the host requests to read 6 bytes. This time, the request refers to datagram B which has only 3 bytes. As the read datagram is smaller than the size requested by the host, the response does not include the <code><remainUdpPacketLength></code> .
<code>^SISR: 0,3</code>	3 bytes are confirmed and transmitted. Datagram B was properly received.
<code>NEW</code>	
<code>OK</code>	



11.9 AT^SISW Internet Service Write Data

AT^SISW triggers a write operation (upload) and queries the amount of data already sent, but not acknowledged at the TCP layer. The URC "**^SISW**: <srvProfileId>, <urcCauseId>" will be issued if the ELS62-W 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 network level. The AT^SISE command and the "**^SIS**" URC offer additional error information.
- "+CME ERROR: operation temporary not allowed" e.g. if the service has not network resources allocated.
- "+CME ERROR: operation not allowed" e.g. if the service is not configured.

Syntax

Test Command
AT^SISW=?
Response(s)
OK
Write Command
AT^SISW=<srvProfileId>, <reqWriteLength>[, <eodFlag>[, <Udp_RemClient>]]
Response(s)
^SISW : <srvProfileId>, <cnfWriteLength>, <unackData>
Number of data bytes as specified by <cnfWriteLength>.
OK
ERROR
+CME ERROR: <err>
PIN → Last
± - +

Unsolicited Result Code

^SISW: <srvProfileId>, <urcCauseId>

The URC indicates the following status changes:

- After opening a TCP Client or UDP Client with AT^SISO the "**^SISW**" URC indicates that the service is ready to accept data. After this initial "**^SISW**" URC, the TCP Client or UDP Client can proceed in Transparent Mode or Non-Transparent Mode.
The initial "**^SISW**" URC is not issued after a Transparent Listener or UDP Endpoint was opened, because for listening services the "**^SIS**" URC will be issued.
- During AT^SISW write cycles the "**^SISW**" URC indicates that the service is ready to accept new data, or that data transfer has finished successfully.

The URC is disabled in polling mode. See AT^SCFG, parameter "Tcp/WithURCs", <tcpWithUrc>.

Parameter Description

<srvProfileId> ^(num)
<srvProfileId> 0 ... 9 specified with AT^SISS. Transparent TCP Listener services are not supported.
<reqWriteLength> ^(num)
0...1460
Specifies the number of bytes to be sent with AT^SISW or, if set to 0, requests the amount of data already sent with AT^SISW but not yet acknowledged:



- Parameter `<reqWriteLength>` may be 1...1500 bytes to specify the amount of data to be sent with `AT^SISW`.
- If parameter `<reqWriteLength>` equals 0, `AT^SISW` does not expect any data, but a normal query is performed. This allows the application to explicitly request, in particular at the end of an upload job, the amount of unacknowledged data at the TCP layer indicated by `<unackData>`.
- If Socket service is selected with UDP protocol
 - `<reqWriteLength>=0` can be used to send an empty UDP packet;
 - it is recommended that the size of each data packet be limited to 1460 bytes. Otherwise, it is possible that the following URC occurs: "`^SIS: <id>, 0, 9, The supplied buffer was too small / large`".

`<eodFlag>^(num)`

End of data indication flag.

Bit1 is related to the Internet Services, where bit2 and bit3 are related to Release Assistance Indication:

0...7 Used as bit field (bit3|bit2|bit1)

bit 1 Represents End of data is signaled to the Internet Service. See also Section 11.9.1.

[0]: No end of data. Other data may follow to be transmitted via the Internet service.

Notes:

- UDP Endpoint service: Value 0 must be set before `<Udp_RemClient>` parameter although `<eodFlag>` is not effective for UDP Endpoint.
- `<eodFlag>` is not intended and not usable for HTTP.

1: End of data is signalled to the Internet Service. Further `AT^SISW` write commands return an error response. However, reading data may be possible. The `<eodFlag>` is effective only if the `<reqWriteLength>` equals `<cnfWriteLength>`, in particular if the `<reqWriteLength>` equals 0.

End-of-data flag must be enabled for following actions:

- FTP "cmd", "put" (sending single file to FTP server)

When the UE has no more data to transmit, it waits for the network to release the connection to enter Idle mode. In order for the network to release the UE to Idle mode quickly to save power, release assistance indication (RAI) is introduced in 3GPP Release 13 for Control Plane CIoT EPS optimisation, where UE may include RAI in non-access stratum (NAS) signaling to indicate that no further uplink or downlink data transmission (bit2) or no further uplink data transmission subsequent to the uplink data transmission (bit3) is expected, thus helping the network to decide if the connection can be released.

bit 2 Represents release assistance indication: no further uplink or downlink data transmission is expected.

0: Further uplink or downlink data transmission is expected

1: No further uplink or downlink data transmission is expected

bit 3 Represents release assistance indication: only a single downlink data transmission (e.g. acknowledgement or response to uplink data) and no further uplink data transmission subsequent to the uplink data transmission is expected.

0: Both downlink and further uplink data transmission subsequent is expected

1: Only a single downlink but no further uplink data transmission subsequent to the uplink data transmission is expected

Notes:

- Bit 2 of `<eodFlag>` is meaningless to all internet service, which are based on TCP.
- Bit 2 and Bit 3 cannot be set at the same time.
- Release Assistance Indication of 3GPP Release 13 is only available for NB-IoT Networks and depends on network configuration.



<Udp_RemClient>^(str)

Service specific parameter of the **AT^SISW** write command. If the Socket service is configured as UDP endpoint this parameter is mandatory and specifies the IP address (in dotted format) and the UDP port of the remote host. For each write request another IP address and UDP port may be given. See example in Section 11.17.9, **UDP Scenario**.

<cnfWriteLength>^(num)

0...1500
Confirmed number of data bytes which can be transmitted via the Internet service configured in <srvProfileId>. This number may be less or equal to the value requested with <reqWriteLength>. The application has to deliver exactly the number of bytes indicated by <cnfWriteLength>. A 0 value means that no data can be written at this time, i.e. it serves as a flow control mechanism.

<unackData>^(num)

Number of data bytes already sent but not yet acknowledged at the TCP layer. The value is constantly changing until the entire upload job has completed. If the value equals 0 all data sent so far is acknowledged.
<unackData> includes the <cnfWriteLength> value of the pending write operation. Therefore, the very first write operation of an upload job returns identical values for <cnfWriteLength> and <unackData>. This mechanism allows the host application to easily verify whether or not the remote host has successfully received the data.
Parameter is not applicable to HTTP, Socket with UDP protocol. For these services the counter is always set to 0.
<unackData> includes the overhead needed for encryption when TLS/SSL is used.

<urcCauseId>^(num)

1	The service is ready to accept new user data.
2	Data transfer has been finished successfully and Internet service may be closed without loss of data.

Note

- Do not send any characters after **AT^SISW** command line termination (**ATS3**) until "**^SISW**" URC 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**.

11.9.1 Usage of parameter <eodFlag>

Service type	
Socket	Parameter is optional for Socket services. Not applicable to Socket with UDP protocol, i.e. value is ignored. After the service accepts the end-of-data flag the service state changes to "Closing". No further user data is accepted. After releasing the TCP link the service remains in state "Down".



Service type	
FTP	Parameter is mandatory for FTP "put" (sending single file to FTP server). After accepting the end-of-data flag the service state changes to "Closing" and starts to end the running FTP session. No further user data is accepted. After the FTP session is completed on FTP protocol level the service state switches to "Down". In case of successful completion the URC "^SISW: x,2" is generated.
HTTP	Parameter is not intended and not usable for HTTP.

11.10 AT^SIST Transparent Mode

AT^SIST activates / deactivates Transparent Mode. Transparent Mode enables the UE to transparently send or receive payload data stream either over dedicated multiplex channels or over the Modem instance.

The handling of Transparent Mode largely depends on whether you are using **AT^SIST** 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 Mode on dedicated multiplex channels 5 and 6:

In this case, enter the **AT^SIST** write command either on the Application instance or the Modem instance along with the parameters **<muxChannelId>** and **<muxChannelState>** "1". The advantage is that the Application or Modem instance remains accessible for AT commands and URCs, while Transparent 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 Mode starts, and inactive when it stops. If a transparent socket is closed (remotely by the server or locally by the client) the Transparent Mode closes automatically.

2. Using Transparent 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 UE has entered Transparent Mode and is ready to transfer payload data over the Modem interface.

There are several ways to quit Transparent Mode and revert to AT command mode on the used interface:

- **+++** escape sequence
- DTR ON-OFF transition (see **AT&D** for configuring DTR handling)
- "etxChar" parameter set within the server address (see **AT^SISS**, **<srvParmTag>** "address" for Socket service URLs).

Switching back and forth between both modes does not affect the underlying socket and has no influence on the service **<srvState>**.

If the service is released, for example with **AT^SISC** or by the remote server, and the service is in Transparent Mode (CONNECT mode) the following applies: The UE returns to AT command mode, issues the 2 bytes 0x10 (DLE) and 0x04 (EOT) before the final result code "NO CARRIER", and goes to **<srvState>** 6 ("Down") for transparent client services and to 4 ("Up/Listening") for Transparent TCP Listener services.

The result codes "CONNECT" and "NO CARRIER" are not influenced by **ATV**.

In AT command mode or after releasing the 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>**]

OK

Write Command

AT^SIST=<srvProfileId>[, <muxChannelId>, <muxChannelState>]

Response(s)

CONNECT

(indicates that the Modem interface has entered Transparent Mode. Not issued on multiplex channels 5 or 6.)

OK



Write Command (Continued)

```
AT^SIST=<srvProfileId>[, <muxChannelId>, <muxChannelState>]
```

Response(s)

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

PIN → 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 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 Mode on a dedicated multiplex channel.
 [0] Stop Transparent Mode
 1 Start Transparent Mode

Note

- If AT^SIST is running for a certain <srvProfileId>, then the commands AT^SISR and AT^SISW are not usable for the same <srvProfileId>.



11.11 AT^SISD Internet Service MQTT Dynamic Setup Profile

AT^SISD serves to set up the necessary parameters in the MQTT service profiles. Service profiles can then be used to control a data link in conjunction with AT^SISU and AT^SISE.

Command could be used only after connection is opened with AT^SISO parameter <optParam>=2. Each request parameter can be changed multiple time during active connection.

The AT^SISD write command specifies the parameters for MQTT service profile identified by <srvProfileId>.

To change the settings the write command needs to be executed for each single <dynParamTag>. All profile parameters set with AT^SISD are volatile.

The list below shows which <dynParamTag> parameters apply to MQTT service and which of them are mandatory (= m) or optional (= o).

Table 11.3: Applicability of AT^SISD <dynParamTag> values

<dynParamTag>	Mandatory or optional
Publish	
"Cmd"	m
"Qos"	o
"Topic"	m
"Retain"	o
"hcContent"	o
"hcContLen"	o
Subscribe	
"Cmd"	m
"topicFilter"	m
"topicQos"	o
Unsubscribe	
"Cmd"	m
"topicFilter"	m

Syntax

Test Command

AT^SISD=?

Response(s)

OK

Write Command

Set parameters defined by <dynParamTag> to value <dynParamValue>

AT^SISD=<srvProfileId>, "setParam", <dynParamTag>, <dynParamValue>

Response(s)

OK

ERROR

+CME ERROR: <err>



Write Command

Get current value of dynamic parameters defined by `<dynParamTag>`

AT^SISD=`<srvProfileId>`, "getParam", `<dynParamTag>`

Response(s)

^SISD: `<srvProfileId>`, `<dynParamTag>`, `<dynParamValue>`

OK

ERROR

+CME ERROR: `<err>`

Write Command

Set all dynamic parameters for service to default value

AT^SISD=`<srvProfileId>`, "cleanParam"

Response(s)

OK

ERROR

+CME ERROR: `<err>`

Write Command

Get all dynamic parameters of service

AT^SISD=`<srvProfileId>`

Response(s)

^SISD: `<srvProfileId>`, `<dynParamTag>`, `<dynParamValue>`

^SISD: ...

OK

ERROR

+CME ERROR: `<err>`

PIN → Last

- - -

Parameter Description

`<srvProfileId>`^(num)

Internet service profile identifier as defined by AT^SISS `<srvProfileId>`.

0...9

`<dynOption>`^(str)

Parameter`<dynOption>` define action in dynamic setup of request parameters.

Omitting this parameter will show all dynamic parameters of service in the response.

“setParam” Set parameter defined by `<dynParamTag>` to value `<dynParamValue>`.

“getParam” Get current value of parameter defined by `<dynParamTag>`.

“cleanParam” Set all request parameters for service to its default value.

`<dynParamTag>`^(u)

MQTT service profile parameter.

cmd refer to `<srvParmTag>`.

Qos refer to `<srvParmTag>`.

Topic refer to `<srvParmTag>`.

Retain refer to `<srvParmTag>`.

hcContent refer to `<srvParmTag>`.



hcContLen	refer to <srvParmTag> .
topicFilter	refer to <srvParmTag> .
topicQos	refer to <srvParmTag> .

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

Parameter value; type and supported content depend on related [<dynParamTag>](#).



11.12 AT^SISU MQTT Dynamic Send Request

AT^SISU serves to setup and send MQTT request.

Command could be used only after connection is opened with AT^SISO parameter <optParam>=2. Each request parameter can be changed multiple time during active connection.

The AT^SISU write command with only first parameter <srvProfileId> is used to trigger send of service request that was defined by dynamic parameters with command AT^SISD.

The AT^SISU write command with second parameter is used to define dynamic request.

All profile parameters set with AT^SISU are volatile.

Syntax

Test Command
AT^SISU=?
Response(s)
OK
Write Command
AT^SISU=<srvProfileId>[, <dynReqType>[, <dynReqValue>]]
Response(s)
OK
ERROR
+CME ERROR: <err>
PIN → Last
- - -

Parameter Description

<srvProfileId>^(num)

Internet service profile identifier as defined by AT^SISS <srvProfileId>.

0...9

<dynReqType>^(str)

Parameter <dynReqType> define type of service specific request.

“publish”	The MQTT client sends data by PUBLISH control packet request to server.
“subscribe”	The MQTT client that wants to receive data must subscribe to it by SUBSCRIBE control packet.
“unsubscribe”	The MQTT client that doesn't want to receive subscribed data anymore must unsubscribe specified topic filter by sending UNSUBSCRIBE control packet.

<dynReqValue>^{(str)(+CSCS)}

Parameter <dynReqValue> define all request parameters separated by ":" character.

- PUBLISH: Qos:Topic:Retain:hcContent:hcContLen
- SUBSCRIBE: topicFilter:topicQos
Multiple topics could be send by one subscribe request in topicFilter separated by ";". Accordingly for each topic in topicFilter different Qos can be setup in topicQos separated by ";" with preserved order. If all topics should have same Qos then only one Qos needs to be defined.



- UNSUBSCRIBE: topicFilter

Parameter value and supported content depend on related [<dynParamTag>](#). The maximum length is 384 bytes.

Example

An example of [<dynReqValue>](#) parameters separated with ":" character.

```
AT^SISU=1,"publish","1:test:1:0:10"
```



11.13 AT^SISH Disconnect Remote Client

[AT^SISH](#) is intended only for a Transparent TCP Listener service. It allows to reject an incoming remote client connection request or to disconnect an established client connection from server side.

Syntax

Test Command
AT^SISH=?
Response(s)
OK
Write Command
AT^SISH=<srvProfileId>[, <mode>]
Response(s)
OK
ERROR
+CME ERROR: <err>
PIN → Last
- - -

Parameter Description

<srvProfileId> ^(num)	
0...9	A Transparent TCP Listener service <srvProfileId> defined with AT^SISS.
<mode> ^(num)	
Specifies disconnect mode.	
[0]	Socket is closed with graceful option
1	Socket is closed without graceful option



11.14 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) or resolve the network time, NTP protocol, in UTC . The `AT^SISX` write command can be used any time while a connection profile (bearer) is active. If used while no connection is active (no profile opened) then the `AT^SISX` "Ping" command tries to use the default APN (no APN name).

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 two lines 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 or NTP service by user break. But this may temporarily block further `AT^SISX` write commands which is indicated by the error response "+CME ERROR: operation temporary not allowed". 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 supported <request>s), (range of supported <timelimit>s)`

`^SISX: "HostByName", (list of supported <conProfileId>s)`

`^SISX: "Ntp", (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: "Ping", <pingInfoType>, <conProfileId>, <ip-address>, <roundTripTime>`
`[...]`

In case of `<pingInfoType>= 2`: Packet statistic (1 row)

`^SISX: "Ping", <pingInfoType>, <conProfileId>, <sent>, <received>, <lost>, <lostPercent>`

In case of `<pingInfoType>= 3`: Time statistic (1 row)

`^SISX: "Ping", <pingInfoType>, <conProfileId>, <minRTT>, <maxRTT>, <meanRTT>`

In case of `<service>= "HostByName"`

`^SISX: "HostByName", <ip-address>`
`[...]`

In case of `<service>= "Ntp"`

`^SISX: "Ntp", <ntp>, <ntpLI>, <ntpStratum>`

OK

ERROR

+CME ERROR: <err>

PIN → Last

+ - -



Parameter Description

<service>^(str)

"Ping"	Ping host.
"HostByName"	Get first address from a host.
"Ntp"	Network time protocol.

<conProfileId>^(num)

Internet connection profile to be used as specified with [AT+CGDCONT](#) parameter **<cid>**.

<address>^(str)

In case of "Ping" or "Ntp" this is the target host as FQDN or IP address (i.e. "192.168.1.3"), in case of "HostByName" this is the FQDN to be resolved into the IP address.

<ip-address>^(str)

The IP address of the host (i.e. "192.168.1.3").

<request>^(num)

[1]...30	Number of "Ping" ICMP Echo Requests to be sent. Not supported for "HostByName".
4	IPV4 only in case of "HostByName"
6	IPV6 only in case of "HostByName"

<timelimit>^(num)

200...[5000]...10000	Amount of time, in milliseconds, to wait for an ICMP Echo Response message related to a previously sent Echo Request message. Parameter is not supported for "HostByName".
----------------------	---

<pingInfoType>^(num)

Indicate 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.

<ntp>^(num)

time in extended format UTC without time zone information ("YYYY-MM-DDThh:mm:ss")

<ntpLI>^(num)

Leap Indicator according to RFC 5905:

0: no warning

1: last minute of the day has 61 seconds

2: last minute of the day has 59 seconds

3: unknown

<ntpStratum>^(num)

Stratum according to RFC 5905:

0: unspecified or invalid

1: primary server (e.g. equipped with GPS receiver)

2-15: secondary server (via NTP)

16: unsynchronized

17-255: reserved

11.15 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 network problem might be the reason.

Syntax

Test Command
<code>AT^SISE=?</code>
Response(s)
OK
Write Command
<code>AT^SISE=<srvProfileId>[, <infoMode>]</code>
Response(s)
<code>^SISE: <srvProfileId>, <infoID>[, <info>]</code>
OK
ERROR
<code>+CME ERROR: <err></code>
PIN → Last
- - -

Parameter Description

<code><srvProfileId></code> ^(num)
Internet service profile identifier as defined by <code>AT^SISS <srvProfileId></code> .
0...9
<code><infoMode></code> ^(num)
Information Mode
[0]
Return current error status in response parameter <code><infoID></code> and <code><info></code> - current implementation.
1
Return oldest unread event in response parameter <code><infoID></code> and <code><info></code> - used for polling
<code><infoID></code> ^(num)
Reason for Internet service error. This is a subset of the <code><urcInfoId></code> s which can be found in Section 11.16, Internet Service URC.
The value 0 indicates there is no special Internet service error. In this case the application may use <code>AT+CEER</code> to check for general network problems.
<code><info></code> ^(str)
Information text related to <code><infoID></code> . This is a subset of the <code><urcInfoText></code> s which can be found in Section 11.16, Internet Service URC.



Note

- In particular cases, the `AT^SIZE` command may deliver information and warnings. This applies the following services:
FTP: Information 2100
If an error occurs the information and warning messages are overwritten by error messages.



11.16 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**.

The presentation of the "**^SIS**" URC containing the parameter **<urcCause>**=0 or **<urcCause>**=5 can be disabled or enabled depending on whether polling mode or URC mode is preferred. To do so, use the **AT^SCFG** command, parameter "Tcp/WithURCs" (refer to **<tcpWithUrc>**). However, if related to **<urcCause>**=1, 2, 3 or 4, the "**^SIS**" URC will always be delivered regardless of the setting made with **AT^SCFG**.

Unsolicited Result Code

Indicates an event, an error or an information element. The same information can be obtained via **AT^SISE**.

^SIS: <srvProfileId>, <urcCause>[, [<urcInfoId>][, <urcInfoText>]]

The URC may appear if an event or an error occurs, for example after opening an Internet service with **AT^SISO** or any time during operation. The URC also indicates a request for a mobile terminated Internet service client connection, or a failure if a mobile terminated request is rejected. Furthermore, the URC may deliver an information element resulting from a specific command given in the service profile.

A list of possible causes can be found in the tables below. The tables contain the **<urcInfoId>** and, if applicable, a specific **<urcInfoText>**. If marked with *) the precise text related to a **<urcInfoId>** varies greatly depending on the scenario and the implementation of the remote server. In these cases, only a brief explanation of the scenario can be found in the table column "Description".

Parameter Description

<urcCause>^(num)

URC cause identifier.

0	An event has occurred after opening or while using an Internet service. The event number is presented via <urcInfoId> and may be an error, a warning, an information element or a note. Optionally additional information may be supplied via <urcInfoText> .
1	Indicates that an opened Standard TCP Listener service (in Non-Transparent Mode) is receiving a connection request from a remote client. The incoming socket connection is dynamically assigned to the next free Internet service profile. In this case, the parameter <urcInfoId> inside the " ^SIS " URC equals the <srvProfileId> of the dynamically assigned service profile. This ID shall be used to accept the connection request with AT^SISO or to reject it with AT^SISC . The connection status may be requested by using the AT^SISI read or write command or the AT^SISO read command. Among other details, the response indicates the IP address of the remote client (parameter <remAddr>). This may be helpful to decide whether to accept or reject the request.
2	Incoming Socket service client connection has failed. The client request was rejected automatically because no free Internet service profile was available.
3	Indicates that an opened Transparent TCP Listener service is receiving a connection request from a remote client. The parameter <urcInfoId> then indicates whether auto answering is active for the service (<urcInfoId> =1) or not. Parameter <urcInfoText> contains the remote IP address and the port of the connecting client. Example: " ^SIS: 5,3,0,\"192.168.105.17:1712\" " means that a client from host 192.168.105.17 tries to connect from port 1712 to our listening Transparent TCP Listener with profile 5. Auto answering is disabled.
4	Indicates for a Transparent TCP Listener service, that a remote client which is allowed due to the used address filter (see option "addrfilter" for AT^SISS), was internally rejected, e.g. because the connect timeout has expired (see option "connecttimeout" for AT^SISS). The URC is not generated if the remote



client is rejected because its IP address is not matching the address filters.
If `<urcCause>` equals "4", then `<urcInfoId>` always equals "0".
This cause is also used if UE is not in Transparent Mode and a connected client has closed the connection remotely.

5 Only for TCP Listeners, Non-Transparent UDP Endpoint.
Indicates that the service is ready.

`<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). Value 1000 notifies that service profile contains invalid parameter(s).

2001 - 4000: Information related to progress of service.

4001 - 6000: Warning, but no service abort.

6001 - 8000: Notes

Additional information for Socket service: As stated above, if a Socket connection request from a remote client is received (see `<urcCause>`=1) the `<urcInfoId>` equals the `<srvProfileId>` of the dynamically assigned free service profile.

If `<urcCause>` is 3, `<urcInfoId>` is used as auto answer indicator. If the value is 0, auto answering is disabled, if the value is 1, auto answering is enabled.

`<urcInfoText>`^(str)

Information text related to `<urcCause>`. See tables below for further detail. The maximum length of an information text is 255 bytes. Any longer messages will be truncated.

If `<urcCause>` is 3, `<urcInfoText>` is used to indicate the IP address and port of the connecting client, e.g. "192.168.105.17:1712".

11.16.1 Information Elements Related to the Service Application

The following table lists the information elements which may be returned by all supported services within the "`^SIS`" URC and the command response of `AT^SISE`. It should be noted that TCP/IP socket problems may occur in all Internet service connections (Socket, Transparent TCP or Transparent UDP, FTP, HTTP).

<code><urcInfoId></code>	<code><urcInfoText></code>	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



<urcInfoId>	<urcInfoText>	Description
15	Remote host has reset the connection	Socket error
16	No buffer space available	Socket error
17	The socket is already connected	Socket error
18	For TCP/IP sockets, the socket is not connected	Socket error
19	Socket has been shut down	Socket error
20	Connection timed out	Socket error
21	Remote host has rejected the connection	Socket error
22	Remote host is unreachable	Socket error
23	An unexpected error occurred	Socket error
24	Host not found	DNS error
25	An error occurred that may be transient; a further attempt may succeed.	DNS error
26	An unrecoverable error occurred	DNS error
General Information Elements		
46	Fatal: The service has detected an unknown error	
47	*)	Indicates that the remote service has closed the connection. The host shall close the service.
48	Remote peer has closed the connection	Remote peer has closed the connection unexpectedly, and no data are available. The host shall close the service. Note that the "^SIS" URC only indicates the <urcInfoId>, but the AT^SISE command indicates both the <urcInfoId> and the <urcInfoText>.
49	Fatal: No memory is available for service action	
50	Fatal: Service has detected an internal error	
51	Application Task ID is not registered	
52	Fatal: Entity not supported	
53	No free Entity available	
54	Index not supported	
55	Service is not writeable	
56	Syntax error in URL	
57	Configuration Error	
58	No more data available	
59	Peek operation rejected	
60	Service don't accept further data	
61	Fatal: Service has no socket connection	
62	Unknown internal TLS error	SSL error
63	Wrong format of certificate data	SSL error
64	Certificate validity period is in future	SSL error
65	Certificate validity period expired	SSL error



<urcInfoId>	<urcInfoText>	Description
66	Peer certificate is not confirmed	SSL error
67	Wrong signature key format	SSL error
68	Unsupported signature key type	SSL error
69	Wrong protocol data format	SSL error
70	Wrong protocol data format	SSL error
71	No memory available for TLS	SSL error
72	Buffer error in TLS	SSL error
73	Wrong input data for RSA operation	SSL error
74	TLS/SSL protocol error	SSL error
75	Internal error in TLS	SSL error
76	Certificate format error	SSL error
77	The certificate does not exist	SSL error
78	Unknown TLS error code!	SSL error
80		Connection profile not defined.
89	PDP: can not obtain controlling task	
90	PDP: internal error 1	
91	PDP: internal error 2	
92	PDP: no authentication req	
93	PDP: internal error 3	
94	PDP: connection failed	
95	PDP: internal error 4	
96	PDP: no IP assigned	
97	PDP: no network	
98	PDP: network is not up	
99	PDP: internal error 5	
119	PDP: no DNS received	
120	DNS: no data	
121	DNS: timeout	
122	DNS: connection refused	
123	DNS: terminated lookup	
124	DNS: domain name is too long	
125	DNS: invalid server	
126	DNS: undefined error	
General Information Elements		
1000	PARA-ERR: <Info>	Notifies that service profile contains a wrong parameter. <Info> text indicates the service profile parameter that contains an error.
6001		General progress information for connection setup.

*) Text varies depending on scenario.



11.16.2 Information Elements Related to FTP Service

<urcInfoId>	<urcInfoText>	Description
Error URCs		
100	FTP-ERR: <FTP Response Str>	<FTP Response Str> text depends on FTP server implementation
Info URCs		
2100	<info>	<info> text depends on FTP server implementation

11.16.3 Information Elements Related to HTTP Service

<urcInfoId>	<urcInfoText>	Description
Error URCs		
200	HTTP-ERR: Not connected - cannot send request HTTP-ERR: failed on sending request	
Info URCs		
2200	HTTP Redirect to: <Host>:<Port> <Path>	
2201	HTTP Response <Response code> Example: ^SIS: 2,3,2201, "HTTP Response: HTTP/1.1 200 OK"	

11.16.4 Information Elements Related to MQTT Service

<urcInfoId>	<urcInfoText>	Description
Error URCs		
500	Connection refused, unacceptable protocol version	
501	Connection refused, identifier rejected	
502	Connection refused, server unavailable	
503	Connection refused, bad user name or password	
504	Connection refused, not authorized	
505	Connection closed by server	
Info URCs		
2500	Connection accepted on clean session	
2501	Connection accepted on retain session	
2510	Unsubscribed request acknowledged	
2520	Subscribed topic name	Filter topic subscribed with maximum QoS=0
2521	Subscribed topic name	Filter topic subscribed with maximum QoS=1
2522	Subscribed topic name	Filter topic subscribed with maximum QoS=2
3488	Publish received topic name	PUBLISH received with DUP=0 and Retain=0 and Payload



<urcInfoId>	<urcInfoText>	Description
3489	Publish received topic name	PUBLISH received with DUP=0 and Retain=1 and Payload
3490	Publish received topic name	PUBLISH received with DUP=1 and Retain=0 and Payload
3491	Publish received topic name	PUBLISH received with DUP=1 and Retain=1 and Payload
3492	Publish received topic name	PUBLISH received with DUP=0 and Retain=0 and NO payload
3493	Publish received topic name	PUBLISH received with DUP=0 and Retain=1 and NO payload
3494	Publish received topic name	PUBLISH received with DUP=1 and Retain=0 and NO payload
3495	Publish received topic name	PUBLISH received with DUP=1 and Retain=1 and NO payload
3520	Publish topic name	Publish acknowledged
4500	Filter topic subscribe not accepted	



11.17 Examples of how to Configure and Use Internet Service Profiles

Below you can find selective examples of how to configure and use Internet service profiles. To visualize the difference between URC mode and polling mode the operation of services (after opening with `AT^SISO`) is explained in separate examples for either mode.

11.17.1 Selecting URC Mode or Polling Mode

To enable or disable the presentation of URCs for the Internet services use the `AT^SCFG` command, type "TcpIp/WithURCs" and select "on" or "off" for parameter `<tcpWithUrc>`.

<code>at^scfg=tcp/withurcs</code>	Query the current setting.
<code>^SCFG: "Tcp/WithURCs", "on"</code>	URC mode is enabled (delivery default).
<code>OK</code>	
<code>at^scfg=tcp/withurcs,off</code>	Select polling mode (by switching off URC mode).
<code>^SCFG: "Tcp/WithURCs", "off"</code>	Polling mode is accepted.
<code>OK</code>	

11.17.2 Configuring an Internet Connection Profile

<code>AT+COPS?</code>	Checking network registration.
<code>+COPS: 0,0,"E-Plus",0</code>	ME is registered to German provider E-Plus.
<code>OK</code>	
<code>AT+CGATT=1</code>	Attaching to GPRS network (optional).
<code>OK</code>	
<code>AT+CGDCONT=1,"IP","internet.eplus.de"</code>	Specifying PDP context 1 with APN for E-Plus.
<code>OK</code>	
<code>AT^SICS=1,"dns1","198.023.097.002"</code>	Specifying primary DNS address (optional).
<code>OK</code>	
<code>AT^SICS=1,"dns2","212.023.097.003"</code>	Specifying secondary DNS address (optional).
<code>OK</code>	
<code>AT^SICA=1,1</code>	Activating PDP context 1.
<code>OK</code>	
<code>AT+CGPADDR=1</code>	Requesting dynamic IP address assigned to local client for context 1.
<code>+CGPADDR: 1,"10.129.137.217"</code>	Response returns currently assigned IP address.
<code>OK</code>	

11.17.3 Configuring Non-Transparent Listener

Keep in mind that if the host is configured as Non-Transparent Listener another service profile must be left free to be dynamically assigned as Server when the Non-Transparent Listener receives a connection request from a remote client.

Configure the service profile 4 for use as Non-Transparent Listener:

<code>AT^SISS=4,srvType,"Socket"</code>	Select service type Socket.
<code>OK</code>	
<code>AT^SISS=4,conId,"1"</code>	Select connection profile.
<code>OK</code>	



```
AT^SISS=4,address,"socktcp://lis-
tender:65534"
```

The host specifies its local port 65534 to be used for the Socket listener service. The local IP address will be dynamically assigned when the service is opened with [AT^SISO](#).

```
OK
```

Open the Listener service and query the IP address dynamically assigned to the Listener:

```
AT^SISO=4
```

Open the Listener service.

```
OK
```

```
AT^SISO?
```

Query the current status of services. All service profiles are unused, except for service profile 4 which is running in listener mode, where [<srvState>](#)=3 (listening) and [<socketState>](#)=3 (LISTENER). The response also indicates the IP address dynamically assigned to the listener.

```
^SISO: 0,""
```

```
^SISO: 1,""
```

```
^SISO: 2,""
```

```
^SISO: 3,""
```

```
^SISO: 4,"Socket",3,3,0,0,"10.10.0.187:65534","0.0.0.0:0"
```

```
^SISO: 6,""
```

```
^SISO: 7,""
```

```
^SISO: 8,""
```

```
^SISO: 9,""
```

```
OK
```

11.17.4 Configuring TCP Client for Calling a TCP Listener

Configure the client's service profile for calling a TCP Listener on another host:

```
AT^SISS=1,srvType,"Socket"
```

Select service type Socket.

```
OK
```

```
AT^SISS=1,conId,"1"
```

Select connection profile.

```
OK
```

```
AT^SISS=1,address,"socktcp://
10.10.0.187:65534"
```

Add the IP address and the TCP port of the remote host (from example in Section [11.17.3, Configuring Non-Transparent Listener](#)).

```
OK
```

11.17.5 Transparent TCP Listener: Accepting / Rejecting Incoming Remote Client

Host 1: Configure Transparent TCP Listener with Autoconnect disabled:

```
AT^SISS=1,"srvType","Socket"
```

Select service type Socket.

```
OK
```

```
AT^SISS=1,conId,"1"
```

Select connection profile.

```
OK
```

```
AT^SISS=1,"address","socktcp://lis-
tender:2000;etx=26;autoconnect=0"
```

"etx" configures Transparent mode. Autoconnect disabled.

```
OK
```

```
AT^SISS=1,"tcpMR","3"
```

```
OK
```

```
AT^SISS=1,"tcpOT","5555"
```

```
OK
```

Host 1: Open Transparent TCP Listener and query IP address dynamically assigned to Listener:



```
AT^SISO=1
OK
^SIS: 1,5
AT^SISO=1,1
^SISO:
1,"Socket",4,3,0,0,"10.10.0.187:65534","0.0.0.0:0"
OK
```

Listener ready, listening (value 5).
Query status of profile 1.
Profile is running in listener mode, where `<srvState>=4` (listening) and `<socketState>=3` (LISTENER). Dynamic IP address is shown.

Host 2: Configure TCP Client:

```
AT^SISS=0,srvType,"Socket"
OK
AT^SISS=0,conId,"1"
OK
AT^SISS=0,"address","socktcp://"
"10.10.0.187:65534"
OK
AT^SISS=0,"tcpMR","3"
OK
AT^SISS=0,"tcpOT","5555"
OK
```

Select service type Socket.
Select connection profile.
Set Listener's IP address.

Host 2: Start TCP Client

```
AT^SISO=0
OK
^SISW: 0,1
```

URC indicates that sending data is possible.

Host 1: Listener rejects incoming connection request from host 2:

```
^SIS: 1,3,0,"10.66.90.165:46723"
AT^SISH=1
OK
AT^SISO=1,1
1,"Socket",4,3,0,0,"10.10.0.187:65534","0.0.0.0:0"
OK
```

URC indicates incoming connection request.
Listener rejects connection request.
Query status of profile 1.
Listener is listening again.

Host 1: Listener accepts incoming connection request from host 2:

```
^SIS: 1,3,0,"10.66.90.165:46723"
AT^SISO=1
OK
^SISW: 1,1
AT^SISO=1,1
1,"Socket",8,4,0,0,"10.10.0.187:65534","10.66.90.165:46723",0
OK
AT^SIST=0
CONNECT
Hello ....
```

URC indicates incoming connection request.
Listener accepts connection request, profile changes to Server mode.
URC indicates that data transmission is possible.
Query status of profile 1.
Service connected (value 8) and in Server mode / value 4).
Change to transparent access mode.
Service enters transparent access mode.
For further handling see examples below, e.g. Section 11.17.11, [Opening and Closing Transparent TCP Service](#), Section 11.17.12, [Transparent TCP Client Receives Data While in AT Command Mode](#)



11.17.6 Transparent TCP Listener: Autoanswering Incoming Remote Client

Host 1: Configure Transparent TCP Listener with Autoconnect enabled.

AT^SISS=1,"srvType","Socket"	Select service type Socket.
OK	
AT^SISS=1,conId,"1"	Select connection profile.
OK	
AT^SISS=1,"address","socktcp://lis- tener:2000;etx=26;autoconnect=1"	"etx" configures Transparent mode. Autoconnect enabled.
OK	
AT^SISS=1,"tcpMR","3"	
OK	
AT^SISS=1,"tcpOT","5555"	
OK	

Host 1: Open Transparent TCP Listener and query IP address dynamically assigned to Listener:

AT^SISO=1	
OK	
^SIS: 1,5	Listener ready, listening (value 5).
AT^SISO=1,1	Query status of Listener profile.
^SISO:	Listener ready, listening (value 4). Dynamic IP
1,"Socket",4,3,0,0,"10.10.0.187:2000","0.0. 0.0:0"	address is shown.
OK	
^SISW: 1,1	

Host 2: Configure TCP Client.

AT^SISS=0,srvType,"Socket"	Select service type Socket.
OK	
AT^SISS=0,conId,"1"	Select connection profile.
OK	
AT^SISS=0,"address","socktcp:// 10.10.0.187:2000"	Set Listener's IP address.
OK	
AT^SISS=0,"tcpMR","3"	
OK	
AT^SISS=0,"tcpOT","5555"	
OK	

Host 2: Start TCP Client

```
AT^SISO=0
OK
^SISW: 0,1
```

Host 1: Transparent TCP Listener automatically accepts connection request from host 2:

^SIS: 1,3,1,"10.66.90.165:46723"	URC indicates incoming connection request.
CONNECT	Service autoconnects to client and enters Transpar- ent Mode.
Hello	For further handling see examples below, e.g. Sec- tion 11.17.11, Opening and Closing Transparent TCP Service , Section 11.17.12, Transparent TCP Client Receives Data While in AT Command Mode
	Type +++ to return to AT command mode (+++ not visible in example).
OK	
AT^SISO=1,1	Query status of profile 1.



```

^SISO:
1,"Socket",8,4,0,0,"10.10.0.187:2000","10.6
6.90.165:46723",0
OK

```

Transparent TCP Listener connected to client (value 8) and in Server mode (value 4).

11.17.7 Socket Client Sends Data via TCP Connection (Polling Mode)

The example uses service profile 0 configured for Socket service and TCP.

<pre> AT^SISO=0 OK AT^SISI=0 ^SISI: 0,3,0,0,0,0 OK AT^SISI=0 ^SISI: 0,4,0,0,0,0 OK AT^SISW=0,10 ^SISW: 0,10,10 0123456789 OK AT^SISW=0,10,1 ^SISW: 0,0,10 OK AT^SISW=0,10,1 ^SISW: 0,10,20 0123456789 OK AT^SISW=0,0,0 ^SISW: 0,0,10 OK AT^SISI=0 ^SISI: 0,5,0,20,10,10 OK AT^SISI=0 ^SISI: 0,6,0,20,20,0 OK AT^SISC=0 OK </pre>	The host opens service profile 0. Note: URC ^SISW:0,1 does not appear! The host must poll the service state by means of AT^SISI until the service is in <srvState> "Up". The service is still in <srvState> "Connecting". The service is now in <srvState> "Up" and is ready to accept data. The host requests to write 10 bytes. Response that 10 bytes can be sent and are unacknowledged. The host requests to write next 10 bytes and enables the <eodFlag>. But the service refuses the request, even the end-of-data flag remains without effect. Next try (polling). Response that the service accepts 10 bytes and this data and the previously sent data are unacknowledged. Polling to request unacknowledged data. There are 10 bytes still unacknowledged. Polling for <srvState> change ("Closing" -> "Down"). 20 bytes are transferred via serial interface, 10 bytes are acknowledged by remote peer, 10 bytes are on the way. Polling for <srvState> change ("Closing" -> "Down"). The Service is in state "Down" and all data is confirmed by the remote peer. Closing the Socket service.
---	---

11.17.8 Socket Client Sends Data via TCP Connection with URCS

The example uses service profile 0 configured for Socket service and TCP.



AT^SISO=0	The host opens service profile 0.
OK	
^SISW: 0,1	Socket service is ready for upload.
AT^SISW=0,10	The host requests to write 10 bytes.
^SISW: 0,10,10	Response that 10 bytes can be sent and are unacknowledged.
0123456789	
OK	
^SISW: 0,1	The URC indicates that the Socket service is ready to transfer more data. Data of the last AT^SISW command are transferred to the remote host.
AT^SISW=0,10,1	The host requests to write next 10 bytes and enables the <eodFlag> to notify that these are the last 10 bytes of the session.
^SISW: 0,10,20	Response that the service accepts 10 bytes and this data and the previously sent data are unacknowledged.
0123456789	
OK	
-----	Waiting for URC.
^SISW: 0,2	Data transfer has been finished.
AT^SISC=0	Closing the Socket service.
OK	

11.17.9 UDP Scenario

The following example shows a communication between a UDP endpoint (host 1) and a UDP client (host 2). Part 1 of the example refers to the UDP endpoint and shows the configuration which allows the UDP endpoint to communicate with any UDP client. Part 2 shows the settings of a UDP client. Part 3 and 4 are running in parallel: Part 3 shows the procedures on the UDP endpoint side done when communicating with a UDP client. Part 4 shows the equivalent steps done by the UDP client when communicating with the UDP endpoint.

Part 1 - host 1 is configured for use as UDP endpoint:

AT^SISS=0,srvtype,socket	Select service type Socket.
OK	
AT^SISS=0,conid,1	Select connection profile 1.
OK	
AT^SISS=0,alphabet,1	Choose ASCII alphabet.
OK	
AT^SISS=0,address,"sockudp://:6666"	Specify the local UDP port.
OK	

Part 2 - host 2 is configured for use as UDP client:

AT^SISS=1,srvtype,socket	Select service type Socket.
OK	
AT^SISS=1,conid,1	Select connection profile 1.
OK	
AT^SISS=1,alphabet,1	Choose ASCII alphabet.
OK	
AT^SISS=1,address,"sockudp://10.10.0.219:6666"	Specify the address of host 1.
OK	



Part 3 - host 1 opens the service and communicates with host 2:

AT^SISO=0	Open the service.
OK	
^SIS: 0,5	URC indicates that host 1 is waiting (on UDP port 6666).
AT^SISO=0,1	
^SISO:	Request connection status.
0,"Socket",4,3,0,0,"10.10.0.219:6666","0.0.0.0:0"	
OK	
^SISR: 0,1	URC indicates that host 2 has opened the connection to host 1 and has sent some data.
AT^SISR=0,100	Host 1 requests to read 100 bytes.
OK	
^SISR: 0,22,"10.10.0.222:6561"	Host 1 is reading the text string received from host 2 (see part 4 of the example) and gets information about the remote client, i.e. the address of host 2.
Hello, I'm the client!	
OK	
AT^SISW=0,25,0,"10.10.0.222:6561"	Host 1 starts sending 25 bytes to host 2.
^SISW: 0,25,0	Host 1 is sending the message "Hi, I'm the UDP endpoint!" (25 bytes) to host 2. As a result, host 2 is receiving the URC "^SISR: 1,1" shown below in part 4 of the example.
OK	
^SISW: 0,1	URC confirms that host 1 can send data again.
AT^SISC=0	Close the service.
OK	

Part 4 - host 2 opens the service and communicates with host 1:

AT^SISO=1	Open the service.
OK	
^SISW: 1,1	URC indicates that host 2 can send data.
AT^SISO=1,1	
^SISO:	Request connection status.
1,"Socket",4,2,0,0,"10.10.0.222:6561","10.10.0.219:6666"	
OK	
AT^SISW=1,22	Host 2 starts to write 22 bytes.
^SISW: 1,22,0	Host 2 is writing the message "Hello, I'm the client!" (22 bytes). As a result, host 1 is receiving the URC "^SISR: 0,1" shown above in part 3 of this example.
OK	
^SISW: 1,1	URC confirms that host 2 could send data.
^SISR: 1,1	URC indicates that host 2 has received data from host 1.
AT^SISR=1,100	Host 2 requests to read 100 bytes.
^SISR: 1,25	Response indicates that host 2 has received 25 characters from host 1.
Hi, I'm the UDP endpoint!	
OK	
AT^SISC=1	Close the service.
OK	



11.17.10 Creating Transparent TCP Socket Client

AT^SISS=1,srvType,"Socket"	Select service type "Socket".
OK	
AT^SISS=1,conId,1	Select connection profile 1.
OK	
AT^SISS=1,address,"socktcp://10.10.0.110:9996;etx;timer=200"	Specify server address. Add "etx" parameter to set Transparent mode.
OK	

11.17.11 Opening and Closing Transparent TCP Service

AT^SISO=1	Open Transparent TCP service.
OK	
^SISW: 1,1	URC indicates that Transparent TCP service is ready.
at^sist=1	Open transparent access mode.
CONNECT	Service is ready to send or receive data. Client is sending data, e.g Good Morning (not visible in example). Client types +++ to return to AT command mode (+++ not visible in example).
OK	
at^sisi=1	Check the service state of service profile 1.
^SISI: 1,4,0,16,16,0	Service is in state "Up" (4). 0 bytes received, 16 bytes sent and acknowledged.
OK	
AT^SISO?	Check the service state of service profile 1.
^SISO: 0,""	
^SISO:	
1,"Socket",4,2,0,16,"10.10.0.200:1024","10.10.0.108:65532"	Service is in state "Up" (4). Socket is assigned. 0 bytes received, 16 bytes sent. Local and remote IP address are assigned.
^SISO: 2,""	
^SISO: 3,""	
^SISO: 4,""	
^SISO: 5,""	
^SISO: 6,""	
^SISO: 7,""	
^SISO: 8,""	
^SISO: 9,""	
OK	
AT^SISC=1	Close the service.
OK	
at^sisi=1	Check the service state of service profile 1.
^SISI: 1,2,0,0,0,0	Service profile 1 is in state "Allocated" (2).
OK	
AT^SISO?	Check the service state of service profile 1.
^SISO: 0,""	
^SISO:	
1,"Socket",2,1,0,0,"0.0.0.0:0","0.0.0.0:0"	Service is in state "Allocated" (2). Socket not assigned.
^SISO: 2,""	
^SISO: 3,""	
^SISO: 4,""	
^SISO: 5,""	
^SISO: 6,""	



```
^SISO: 7, ""
^SISO: 8, ""
^SISO: 9, ""
OK
```

11.17.12 Transparent TCP Client Receives Data While in AT Command Mode

AT^SISO=1	Open Transparent TCP service.
OK	
^SISW: 1,1	URC indicates that Transparent TCP service is ready.
at^sist=1	Open transparent access mode.
CONNECT	Service is ready to send or receive data.
Hello	Client is reading received data.
	Client types +++ to return to AT command mode (+++ not visible in example).
OK	
^SISR: 1,1	URC indicates that new data is available for the client.
at^sist=1	Return to transparent access mode.
CONNECT	Service is ready to send or receive data.
Goodbye	Client is reading received data.
	Client types +++ to return to AT command mode (not visible in example).
OK	
at^sisi=1	Check the service state of service profile 1.
^SISI: 1,4,12,6,6,0	Service is in state "Up" (4). 12 bytes received, 6 bytes sent and acknowledged.
OK	
AT^SISO?	Check the service state of service profile 1.
^SISO: 0, ""	
^SISO:	Service is in state "Up" (4). Socket is assigned. 12 bytes received, 6 bytes sent. Local and remote IP address are assigned.
1, "Socket", 4, 2, 12, 6, "10.10.0.200:1025", "10.10.0.108:65532"	
^SISO: 2, ""	
^SISO: 3, ""	
^SISO: 4, ""	
^SISO: 5, ""	
^SISO: 6, ""	
^SISO: 7, ""	
^SISO: 8, ""	
^SISO: 9, ""	
OK	
AT^SISC=1	Close the service.
OK	
at^sisi=1	Check the service state of service profile 1.
^SISI: 1,2,0,0,0,0	Service profile 1 is in state "Allocated" (2).
OK	
AT^SISO?	Check the service state of service profile 1.
^SISO: 0, ""	
^SISO:	Service is in state "Allocated" (2). Socket not assigned.
1, "Socket", 2, 1, 0, 0, "0.0.0.0:0", "0.0.0.0:0"	
^SISO: 2, ""	
^SISO: 3, ""	



```

^SISO: 4, ""
^SISO: 5, ""
^SISO: 6, ""
^SISO: 7, ""
^SISO: 8, ""
^SISO: 9, ""
OK

```

11.17.13 Remote Server Disconnects While Transparent TCP Service is in Transparent Access Mode

<pre> AT^SISO=1 OK ^SISW: 1,1 at^sist=1 CONNECT Good Morning NO CARRIER at^sisi=1 ^SISI: 1,6,12,0,0,0 OK AT^SISO? ^SISO: 0, "" ^SISO: 1, "Socket", 6, 2, 12, 0, "10.10.0.200:1026", "10. 10.0.108:65532" ^SISO: 2, "" ^SISO: 3, "" ^SISO: 4, "" ^SISO: 5, "" ^SISO: 6, "" ^SISO: 7, "" ^SISO: 8, "" ^SISO: 9, "" OK AT^SISC=1 OK at^sisi=1 ^SISI: 1,2,0,0,0,0 OK </pre>	Open Transparent TCP service. URC indicates that Transparent TCP service is ready. Open transparent access mode. Service is ready to send or receive data. Remote server has sent data and disconnected. Client reads data. Then client gets NO CARRIER in AT command mode. Check the service state of service profile 1. Service is in state "Down" (6). 12 bytes received. Check the service state of service profile 1. Service is in state "Down" (6). Socket is assigned. 6 bytes received. 12 bytes sent. Local and remote IP address are assigned. Close the service. Check the service state of service profile 1. Service profile 1 is in state "Allocated" (2).
---	---

11.17.14 Server Disconnects While Transparent TCP Service is in AT Command Mode and Data is Pending

<pre> AT^SISO=1 OK ^SISW: 1,1 at^sist=1 CONNECT Good Morning </pre>	Open Transparent TCP service. URC indicates that Transparent TCP service is ready. Open transparent access mode. Service is ready to send or receive data. Client is reading data.
--	---



```

OK
^SISR: 1,1

at^sisi=1
OK
^SISI: 1,4,12,3,3,0

OK
AT^SISO?
^SISO: 0,""
^SISO:
1,"Socket",4,2,12,3,"10.10.0.200:1027","10.
10.0.108:65532"
^SISO: 2,""
^SISO: 3,""
^SISO: 4,""
^SISO: 5,""
^SISO: 6,""
^SISO: 7,""
^SISO: 8,""
^SISO: 9,""
OK
at^sist=1
CONNECT
Good bye
NO CARRIER
at^sisi?
^SISI: 1,6,20,3,3,0

OK
AT^SISO?
^SISO: 0,""
^SISO:
1,"Socket",20,3,"10.10.0.200:1027","10.10.0.
108:65532"
^SISO: 2,""
^SISO: 3,""
^SISO: 4,""
^SISO: 5,""
^SISO: 6,""
^SISO: 7,""
^SISO: 8,""
^SISO: 9,""
OK
AT^SISC=1
OK
at^sisi=1
^SISI: 1,2,0,0,0,0
OK
AT^SISO?
^SISO: 0,""
^SISO:
1,"Socket",2,1,0,0,"0.0.0.0:0","0.0.0.0:0"
^SISO: 2,""

```

Client types +++ to return to AT command mode (not visible in example).

Remote server has sent data and closed the connection (not visualized in this example). URC indicates that remaining data is available for reading. Check service state of service profile 1.

Service profile 1 is in state "Up" (4). 12 bytes received. 3 bytes sent and acknowledged.

Check the service state of service profile 1.

Service is in state "Up" (4). Socket is assigned. 12 bytes received. 3 bytes sent. Local and remote IP address are assigned.

Return to transparent access mode.

Service is ready to send or receive data.

Client reads remaining data. Then client gets NO CARRIER in AT command mode.

Check service state of service profile 1.

Service is in service "Down" state (6). 20 bytes received. 3 bytes sent and acknowledged.

Check the service state of service profile 1.

Service is in state "Down" (6). Socket is assigned. 20 bytes received. 3 bytes sent. Local and remote IP address are assigned.

Close the service.

Check service state of service profile 1.

Service profile 1 is in state "Allocated" (2).

Check the service state of service profile 1.

Service is in state "Allocated" (2). Socket is not assigned. Local and remote IP address not assigned.



```

^SISO: 3, ""
^SISO: 4, ""
^SISO: 5, ""
^SISO: 6, ""
^SISO: 7, ""
^SISO: 8, ""
^SISO: 9, ""
OK

```

11.17.15 FTP Download to FFS (URC Mode)

Configure the service profile 1 for FTP:

AT^SISS=1, srvType, "Ftp"	Select service type FTP.
OK	
AT^SISS=1, conId, "1"	Select connection profile 1.
OK	
AT^SISS=1, address, "ftp://ftp.heise.de/pub"	Specify FTP address.
OK	
AT^SISS=1, cmd, "fget"	Select command type download.
OK	
AT^SISS=1, user, "anonymous"	
OK	
AT^SISS=1, passwd, "tester@google.com"	
OK	
AT^SISS=1, path, "file:///a:/data/"	Specify target path on local FFS. Note: Directory "data" must created/exist before use of this profile.
OK	
AT^SISS=1, files, "INDEX"	Specify file to be downloaded.
OK	

Make an FTP connection:

AT^SISO=1	Open the service.
OK	Bearer is established, service is getting started.
^SIS: 1,0,2100, "Ftp open(ftp.heise.de:21)"	"^SIS" URC with <urcInfoId> 2100 (FTP) indicates download status.
^SIS: 1,0,2100, "220 Hallo auf ftp.heise.de."	
^SIS: 1,0,2100, "FTP Login OK"	
^SIS: 1,0,2100, "fget INDEX"	
^SIS: 1,0,2100, "FGET : INDEX 225 bytes"	
^SISR: 1,2	Download complete.
AT^SISO?	Request service state.
^SISO:	
1, "Ftp", 4, 1, 225, 0, "37.80.21.126:4113", "193.99.144.79:21"	
AT^SISC=1	Close the service.
OK	
AT^SISO?	Request service state.
^SISO:	Service is closed and reset.
1, "Ftp", 2, 1, 0, 0, "0.0.0.0:0", "0.0.0.0:0"	

11.17.16 FTP Upload Single File (URC Mode)

Configure the service profile 2 for FTP:



AT^SISS=2,"srvType","Ftp"	Select service type FTP.
OK	
AT^SISS=2,conId,"1"	Select connection profile 1.
OK	
AT^SISS=2,"address","ftp://myname:mypasswd@testnetwork/upload"	Specify FTP address with individual user name and password.
OK	
AT^SISS=2,"cmd","put"	Select command type upload for single file.
OK	
AT^SISS=2,"files","newdata.txt"	File "newdata.txt" shall be put on FFTP server.
OK	

Make an FTP connection:

AT^SISO=2	Open the service.
OK	Bearer is established, service is getting started.
^SIS: 2,0,2100,"Ftp open(testnetwork:21) "	"^SIS" URC with <urcInfoId> 2100 (FTP) status information from FTP server.
^SIS: 2,0,2100,"220 FTP server (Version 6.4/OpenBSD/Linux-ftpd-0.17) ready."	
^SIS: 2,0,2100,"FTP Login OK"	
^SIS: 2,0,2100,"put newdata.txt"	
^SISW: 2,1	URC indicates that FTP service is ready for upload.
AT^SISW=2,40	Client requests to send 40 bytes.
^SISW: 2,40,0	The write command response confirms that 40 bytes must be transferred now.
01234567890123456789012345678901234567890	User data is transferred.
OK	
^SISW: 2,1	URC indicates that the FTP service is ready to transfer more data.
AT^SISW=2,40	Client requests to send 40 bytes.
^SISW: 2,40,0	The write command response confirms that 40 bytes must be transferred now.
01234567890123456789012345678901234567890	User data is transferred.
OK	
^SISW: 2,1	URC indicates that the FTP service is ready to transfer more data.
AT^SISW=2,0,1	No more data available. <eodFlag> set. File "newdata.txt" shall be closed on FTP server.
^SISW: 2,0,0	
OK	
^SIS: 2,0,2100,"226 Transfer complete."	URC indicates that data transfer finished successfully. Connection to the FTP server closes.
^SISW: 2,2	Close the FTP service.
AT^SISC=2	
OK	

11.17.17 HTTP Download Using TLS

Configure the service profile 4 for HTTPS:

AT^SISS=4,srvType,"Http"	Select service type HTTP.
OK	
AT^SISS=4,conId,"1"	Select connection profile 1.
OK	
AT^SISS=4,address,"https://www.facebook.com"	Specify access to Facebook website (always secured).



```
OK
AT^SISS=4,cmd,"get"
OK
```

Select command type download.

Opening connection:

```
AT^SISO=4
OK
^SISS: 4,0,2200,"Http www.facebook.com:443"

^SISR: 4,1

AT^SISR=4,1000
^SISR: 4,1000
<?xml version="1.0" encoding="utf-8"?> <!DOCTYPE html PUBLIC "-//WAPFORUM//DTD XHTML
Mobile 1.0//EN" "http://www.wapforum.org

OK
AT^SISR=4,1000
^SISR: 4,1000
....
^SISR: 4,2

AT^SISC=4
OK
```

Open the service.

URC indicates that the HTTP service is ready to read data.
Read 1000 bytes.

Repeat reading data n times.

URC indicates that data transfer finished successfully. Connection to the HTTP server closes.
Close the HTTP service.

11.17.18 HTTP Post

Configure the service profile 6 for HTTP:

```
AT^SISS=6,srvType,"Http"
OK
AT^SISS=6,conId,"1"
OK
AT^SISS=6,"address","http://testnetwork/
cgi/first.pl"
OK
AT^SISS=6,"user","myuser"
OK
AT^SISS=6,"passwd","mypasswd"
OK
AT^SISS=6,cmd,"post"
OK
AT^SISS=6,"hcContent"," "
OK
AT^SISS=6,"hcContLen","60"
OK
```

Select service type HTTP.

Select connection profile 1.

Specify URL.

Specify user name.

Specify password.

Select command type download.

Parameter is ignored.

"hcContlen" specifies to send 60 bytes. Data will be sent from AT command interface.

Opening connection:

```
AT^SISO=6
OK
^SIS: 6,0,2200,"Http connect pegasus.testnetz.sw5:80"

^SISW: 6,1
```

Open the service.

URC indicates that the HTTP service is ready to send data.



AT^SISW=6,30	Send 30 bytes.
^SISW: 6,30,0	
OK	
^SISW: 6,1	URC indicates that the HTTP service is ready to send data.
AT^SISW=6,30	Send 30 bytes.
^SISW: 6,30,0	
OK	
^SISW: 6,1	URC indicates that the HTTP service is ready to send data.
^SISW: 6,2	URC confirms: all data sent to server.
^SIS: 6,0,2200,"HTTP POST: http://testnetwork/cgi/first.pl"	
^SIS: 6,0,2201,"HTTP/1.1 200 OK"	
AT^SISC=6	Close the HTTP service.
OK	

11.17.19 Ping

This example shows a Ping output. The example uses the Internet connection profile shown in [Section 11.17.2](#).

```
AT^SISX=Ping,1,"74.125.39.99",5,5000
^SISX: "Ping",1,1,"74.125.39.99",1696
^SISX: "Ping",1,1,"74.125.39.99",175
^SISX: "Ping",1,1,"74.125.39.99",174
^SISX: "Ping",1,1,"74.125.39.99",174
^SISX: "Ping",1,1,"74.125.39.99",2111
^SISX: "Ping",2,1,5,5,0,0
^SISX: "Ping",3,1,174,2111,865
OK
```

11.17.20 Resolving DNS Host Name to IP Address

This example uses the Internet connection profile shown in [Section 11.17.2](#).

```
AT^SISX=HostByName,1,"www.google.de"
^SISX: "HostByName","74.125.39.99"
OK
```

11.17.21 Configuring MQTT Client

This example configures the service profile 1 for use as MQTT client.

AT^SICA=0,1	Deactivate Context 1
OK	
AT^SISS=1,srvType,"Mqtt"	Select Service Type
OK	
AT^SISS=1,conId,"1"	Select connection profile
OK	
AT^SISS=1,address,"mqtt://broker.hivemq.com:1883;connackTimeout=30"	Add the IP address and Port of the MQTT broker
OK	
AT^SISS=1,clientId,"004401083574984"	Set Client ID (e.g. IMEI)



OK	
AT^SISS=1,cleanSession,"1"	Broker does not any subscription information or undelivered messages for the client
OK	
AT^SISS=1,ipVer,"4"	Select IP Version
OK	
AT^SISS=1,cmd,"unsubscribe"	Select MQTT command
OK	
AT^SISS=1,TopicFilter,"MQTTDemoListener"	Select Topic Filter
OK	
AT^SICA=1,1	Activate Context 1
OK	
AT^SISO=1,2	Open Service Profile 1 with use of dynamic setup defined by AT^SISD
OK	
^SIS: 1,0,8800,"Mqtt connect 18.196.16.204:1883"	Connected to MQTT Broker
^SIS: 1,0,2500,"Connection accepted on clean session."	Connection accepted on clean session
^SIS: 1,0,2510,"MQTTDemoListener"	Unsubscribed request acknowledged

11.17.22 MQTT Client: Publish and Subscribe

This example uses the Internet connection profile shown in Section [11.17.21](#).

Subscribe for TopicFilter "MQTTDemoListener":

AT^SISD=1,"cleanParam"	Broker does not any subscription information or undelivered messages for the client.
OK	
AT^SISU=1,"subscribe","MQTTDemoListener:2"	Subscribe for TopicFilter=MQTTDemoListener with QoS=2
OK	
^SIS: 1,0,2522,"MQTTDemoListener"	Filter topic subscribed with maximum QoS=2
OK	

Publish - Send Data for Topic "MQTTDemo":

AT^SISU=1,"publish","2:MQTTDemo:1:0:14"	Publish with QoS=2, Topic=MQTTDemo, Retain=1, hcContent=0, hcContLen=14 (Data will be sent by AT^SISW)
OK	
^SISW: 1,1	Service is ready to accept new user data
AT^SISW=1,14	Sent 14 Bytes to Broker
^SISW: 1,14,0	Ready to write data
Hello World! 1	Write data
OK	
^SIS: 1,0,3520,"MQTTDemo"	Publish acknowledged
^SISW: 1,2	Data transfer has been finished successfully
AT^SISU=1,"publish","2:MQTTDemo:1:0:14"	Publish with QoS=2, Topic=MQTTDemo, Retain=1, hcContent=0, hcContLen=14 (Data will be sent by AT^SISW)
OK	
^SISW: 1,1	Service is ready to accept new user data
AT^SISW=1,14	Sent 14 Bytes to Broker
^SISW: 1,14,0	Ready to write data
Hello World! 2	Write data



OK	
^SIS: 1,0,3520,"MQTTDemo"	Publish acknowledged
^SISW: 1,2	Data transfer has been finished successfully

Receive Data for subscribed TopicFilter "MQTTDemoListener":

^SIS: 1,0,3488,"topic=MQTTDemoListener; bytes=17"	Publish received from Broker
^SISR: 1,1	Data available and can be read by AT^SISR
AT^SISR=1,1500	Request to read 1500 Bytes
^SISR: 1,17	17 Bytes are available
That's all folks!	Data received from Broker
OK	
^SISR: 1,2	All data read



12. Supplementary Service Commands

The AT commands described in this chapter are related to Supplementary Services.

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

The [AT+CACM](#) read command returns the current ACM value.

The [AT+CACM](#) 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.

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 → Last	Reference(s)
+ + -	3GPP TS 27.007 [45]

Parameter Description

<acm>^(str)

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

<passwd>^(str)

SIM PIN2



12.2 AT+CMM Accumulated call meter maximum (ACMmax) set or query

The [AT+CMM](#) read command returns the current ACMmax value.

The [AT+CMM](#) 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.

Syntax

Test Command	
AT+CMM=?	
Response(s)	
OK	
Read Command	
AT+CMM?	
Response(s)	
+CMM: <acmmax>	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
AT+CMM=<acmmax>[, <passwd>]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN  Last	Reference(s)
  	3GPP TS 27.007 [45]

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



12.3 AT+CAOC Advice of Charge Information

AT+CAOC controls the Advice of Charge supplementary service function mode.

Syntax

Test Command AT+CAOC=? Response(s) +CAOC: (list of supported<urcMode>s) OK	
Read Command AT+CAOC? Response(s) +CAOC: <urcMode> OK	
Exec Command AT+CAOC Response(s) If <urcMode>=0, UE returns the current <ccmValue> value: +CAOC: <ccmValue> OK ERROR +CME ERROR: <err>	
Write Command AT+CAOC=[<urcMode>] Response(s) If <urcMode>=0, UE returns the current <ccmValue> value: +CAOC: <ccmValue> OK ERROR +CME ERROR: <err>	
PIN → Last + + -	Reference(s) 3GPP TS 27.007 [45]

Unsolicited Result Code

+CCCM: <ccmValue>

If activated a URC is sent everytime the CCM value changes, but not more often than every 10 seconds.

Parameter Description

<urcMode> ^{(num)(&V)}	
0	Query current <ccmValue> value.
[1] ^(P)	Deactivate URC reporting of <ccmValue> value.
2	Activate URC reporting of <ccmValue> value.



`<ccmValue>(str)`

Current value in hexadecimal format, e.g. "00001E" indicates decimal value 30). The three bytes are coded as ACM_{max} value on the USIM; for details refer to 3GPP TS 11.11 [\[15\]](#), 3GPP TS 31.101 [\[16\]](#), 3GPP TS 31.102 [\[17\]](#).



12.4 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 UE functionality ERROR +CME ERROR: <err>
PIN → Last + - -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 22.004 [24], 3GPP TS 22.082 [29], 3GPP TS 24.082

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. Default is an empty number.

[<type>](#)^(num)

Type of address octet

- | | |
|-----|--|
| 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 3GPP TS 22.004 [24].

- | | |
|---------------|---|
| 0 | Service unknown
Note: This value can be shown when <status> = 0. |
| 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 (only for compatibility reasons, not supported by ELS62-W) |
| 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 for voice, data and fax (fax only for compatibility reasons). |

[<sub-number>](#)^(str)

String type phone number of sub address in format specified by [<type>](#). Default is an empty sub address.

[<sub-type>](#)^(num)

Type of sub-address octet

- | | |
|-------|---|
| 145 | International access code character '+' |
| [128] | 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).
An operator defined default or the last known value may be used, depending on the network operator.

<status>^(num)

0

Call forwarding not active
Note: When <status>= 0 then ignore parameter <class>.

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 3GPP Technical 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 conditions 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 3GPP TS 27.007 [45]. For actual applicability of SS "call forwarding" to a specific service or service group (a specific <class> value) please consult table A.1 of 3GPP TS 22.004 [24].
- There is currently no release of 3GPP TS 22.004 [24], in which the call forwarding supplementary service is defined as applicable to SMS services.
- 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. The response shows the status in the order of the network response.

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).

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

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

The destination number will be registered for above default classes.

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
```



12.5 AT+CCWA Call Waiting

The **AT+CCWA** write command controls the call waiting supplementary service according to 3GPP TS 22.083 [30]. 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 → Last + - -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 22.004 [24], 3GPP TS 22.083 [30], 3GPP TS 24.083

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 3GPP TS 22.083 [30] 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 (only for compatibility reasons, not supported by ELS62-W)
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 for voice, data and fax (fax only for compatibility reasons). If the <class> parameter 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 3GPP TS 24.008 [39], subclause 10.5.4.9)

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

<CLI validity>^(num)

0	CLI valid
---	-----------



1	CLI has been withheld
2	CLI is not available

Notes

- With `AT+CHLD`, 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 data call).
- 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.
- `AT+CCWA` offers a broad range of options according to 3GPP Technical 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`.
- `AT+CCWA` has been implemented with the full set of `<class>` parameters according to 3GPP TS 27.007 [45]. For actual applicability of SS call waiting to a specific service or service group (a specific `<class>` value) please consult table A.1 of 3GPP TS 22.004 [24].
- Despite the specifications stated in 3GPP TS 22.004 [24] call waiting is not handled uniformly among all networks:
3GPP TS 22.004 [24], 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 a data `<class>` causes some networks to send a call waiting indication if a call "of any kind" comes in during an active data call, but others may (with the same settings active) indicate a waiting data 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.



12.6 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 network. The ELS62-W 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 → Last	Reference(s)
+ - -	3GPP TS 27.007 [45]

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 .
[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 .



- | | |
|---|--|
| 3 | Add a held call to the active calls in order to set up a conference (multiparty) call. |
| 4 | Connect 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 3GPP Technical 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 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 or data call. If the waiting call is a data 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 call with **ATA**. To switch back from the active data 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.
- The commands **AT+CHLD=2x** and **AT+CHLD=4** are not supported by VoLTE.

Example

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



12.7 AT+CLIP Calling Line Identification Presentation

AT+CLIP refers to the 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. It has no effect on the execution of the supplementary service CLIP in the network.

The **AT+CLIP** read command gives the status of `<clipUrcMode>`, and also triggers an interrogation of the provision status of the CLIP service according to 3GPP TS 22.081 [28] (given in `<clipStatus>`).

Syntax

Test Command AT+CLIP=? Response(s) +CLIP: (list of supported<clipUrcMode>s) OK ERROR +CME ERROR: <err>	
Read Command AT+CLIP? Response(s) +CLIP: <clipUrcMode>, <clipStatus> OK ERROR +CME ERROR: <err>	
Write Command AT+CLIP=<clipUrcMode> Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last + - -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 22.081 [28]

Unsolicited Result Code

+CLIP: <clipNumber>, <clipNumType>, , [, <clipAlpha>] [, <CLI validity>]

If CLIP is enabled (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

<code><clipUrcMode></code> ^{(num)(&V)(&W)}	
[0] ^(&F)	Suppress unsolicited result codes
1	Display unsolicited result codes
<code><clipStatus></code> ^(num)	
0	CLIP not provisioned



1	CLIP provisioned
2	Unknown

<clipNumber>^(str)

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

<clipNumType>^(num)

Type of address octet in integer format as received by the network. For further details see 3GPP TS 24.008 [39], subclause 10.5.4.7.

Most common values are:

128	Number is restricted or unknown.
161	National <clipNumber> . Network support of this type is optional.
145	Dialing string <clipNumber> includes international access code character '+'.

<clipAlpha>^(str)

String type alphanumeric representation of **<clipNumber>** 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. <clipNumber> shall be an empty string ("") and <clipNumType> value will not be significant.

When CLI is not available (**<CLI validity>**=2), **<clipNumber>** shall be an plus string ("+") and **<clipNumType>** value will be "145". Nevertheless, the UE returns value 128 for **<clipNumType>** if TON/NPI is unknown in accordance with 3GPP TS 24.008 [39], 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 to 3GPP TS 22.081 [28] and 3GPP TS 23.081), **<clipNumber>** and **<clipNumType>** is provided. Otherwise, the UE returns the same setting for **<clipNumber>** and **<clipNumType>** 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.



12.8 AT+CLIR Calling Line Identification Restriction

The [AT+CLIR](#) command refers to the 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)	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
+ - -	3GPP TS 27.007 [45]

Parameter Description

<n> ^(num)	
Parameter shows the settings for outgoing calls:	
0(&F)(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 UE is switched off or [AT+CLIR=0](#) is used.



12.9 AT+COLP Connected Line Identification Presentation

This command refers to the 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 → Last + - -	Reference(s) 3GPP TS 27.007 [45]

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.

128	Number is restricted.
161	National <code><number></code>
145	Number string <code><number></code> 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 octet

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.

12.10 AT+COLR Connected Line Identification Restriction Status

AT+COLR refers to the supplementary service COLR (Connected Line Identification Restriction) that enables a called subscriber to restrict the possibility of presentation of COL (connected line identity) to the calling party after receiving a mobile terminated call.

The **AT+COLR** execute command returns the status of the COL presentation in the network. It has no effect on the execution of the supplementary services COLR in the network.

Syntax

Test Command	
AT+COLR=?	
Response(s)	
OK	
Exec Command	
AT+COLR	
Response(s)	
+COLR: <m>	
OK	
ERROR	
+CME ERROR: <err>	
PIN  Last	Reference(s)
+ - -	3GPP TS 27.007 [45]

Parameter Description

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



12.11 AT+CPUC Price per unit and currency table

The **AT+CPUC** read command returns the current parameters of PUC.

The **AT+CPUC** 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.

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  Last	Reference(s)
+ + -	3GPP TS 27.007 [45]

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 40950000000 (4095 x 10 exp 7). 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. Parameter may be omitted only if SIM PIN2 was correctly entered before.



12.12 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 → Last	Reference(s)
+ - -	3GPP TS 27.007 [45]

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 is barred

<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) .

12.13 AT+CUSD Unstructured Supplementary Service Data

AT+CUSD allows to control the handling of Unstructured Supplementary Service Data (USSD) according to 3GPP TS 22.090 [33]. Both network and mobile initiated operations are supported. The interaction of this command with other AT commands based on other supplementary services is described in the related technical specifications.

Parameter `<ussdMode>` is used to control the presentation of "+CUSD" URCs to the TE, which will be caused by a USSD response from the network or by different network or **USAT** initiated operations. Therefore, it is recommended to always have "+CUSD" URCs enabled.

If parameter `<ussdReq>` is given, a mobile initiated USSD send request or a USSD response to a network or **USAT** initiated operation is sent to the network. A possible response USSD of the network is again presented by a subsequent "+CUSD" URC.

Syntax

Test Command AT+CUSD=? Response(s) +CUSD: (list of supported<ussdMode>s) OK	
Read Command AT+CUSD? Response(s) +CUSD: <ussdMode> OK	
Write Command AT+CUSD=<ussdMode>[, <ussdReq>[, <ussdDCS>]] Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last + - -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 22.090 [33], 3GPP TS 24.090

Unsolicited Result Code

+CUSD: <ussdStatus>[, <ussdRsp>[, <ussdDCS>]]

"+CUSD" URC indicates a USSD response from the network, respectively caused by a network or **USAT** initiated operation.

Parameter Description

<ussdMode> ^(num)	
0(&F)(P)	Disable "+CUSD" URC presentation.
1	Enable "+CUSD" URC presentation. If a USSD send request is sent via ATD this setting is activated implicitly.
2	Cancel session (not applicable to read command response).



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

Unstructured Supplementary Service Data (USSD) to be sent to the network.

If `<ussdReq>` parameter is not given, network is not interrogated. `AT+CUSSD` write command only supports setting `<ussdDCS>=15`.

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

Unstructured Supplementary Service Data (USSD) received from the network.

If `<ussdDCS>` indicates that 3GPP TS 23.038 [34] GSM 7 bit default alphabet is used, the UE converts GSM alphabet into current TE character set according to rules of 3GPP TS 27.005 [44], Annex A. See also Section 1.7, *Supported character sets*. However, in case of invalid or omitted `<ussdDCS>`, conversion of `<ussdRsp>` is not possible.

`<ussdDCS>^(num)`

3GPP TS 23.038 [34] Cell Broadcast Data Coding Scheme (default 0).

In case of an incoming USSD with invalid or omitted data coding scheme information `<ussdDCS>` will not be presented.

`<ussdStatus>^(num)`

0	No further user action required (network initiated USSD notification, or no further information needed after mobile initiated operation).
1	Further user action is required (network initiated USSD request, or further information is needed after mobile initiated operation). If <code><ussdStatus>=1</code> the user input needs to be sent via an additional <code>AT+CUSSD</code> action <code><ESC></code> .
2	USSD exchange is terminated by network.
3	A (UE local) client has responded, i.e. the interface was not idle and a busy indication was sent to the network.
4	Operation not supported (e.g. wrong input value given).
5	Network timeout.

Note

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



12.14 AT+CNAP Calling Name Presentation

AT+CNAP refers to the supplementary service CNAP (Calling Name Presentation) that enables a called subscriber to get a calling name indication (CNI) of the calling party when receiving a mobile terminated call. The **AT+CNAP** write command enables or disables the presentation of CNI at the TE. It has no effect on the execution of the supplementary service CNAP in the network. The **AT+CNAP** read command gives the status of **<n>**, and also triggers an interrogation of the provision status of the CNAP service according to 3GPP TS 22.096 (given in **<m>**). If no SIM card is available or the SIM-PIN is not entered, the command response is "ERROR".

Syntax

Test Command AT+CNAP=? Response(s) +CNAP: (list of supported<n>s) OK	
Read Command AT+CNAP? Response(s) +CNAP: <n>, <m> OK ERROR +CME ERROR: <err>	
Write Command AT+CNAP=<n> Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last ± - -	Reference(s) 3GPP TS 27.007 [45]

Unsolicited Result Code

+CNAP: <name>[, <CNI validity>]

When CNAP 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 call occurs.

Parameter Description

<n> (num)(&V)(&W)	
[0](&F)	Suppress unsolicited result codes
1	Display unsolicited result codes
<m> (num)(&V)	
Parameter shows the subscriber CNAP service status in the network and may be:	
0	CNAP not provisioned
1	CNAP provisioned
2	Unknown



`<name>(str)`

Up to 80 characters long string containing the calling party name corresponding to the entry found in phonebook; used character set is the one selected with [AT+CSCS](#).

`<CNI validity>(num)`

0	CNI valid
1	CNI has been withheld by the originator.
2	CNI is not available due to interworking problems or limitations of originating network.

When CNI is not available (`<CNI validity>=2`), `<name>` shall be an empty string ("").

13. Packet Domain Related Commands

The AT commands described in this chapter allow the Customer Application to control packet switched services in GSM/LTE networks.

13.1 AT+CGACT PDP Context Activate or Deactivate

AT+CGACT write command is used to activate or deactivate the specified PDP context(s). After 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 MT is not PS attached when the activation form of the command is executed, MT firstly performs a PS attach and then attempts to activate the specified contexts.

AT+CGACT read command returns the current activation states for all defined PDP contexts.

AT+CGACT test command is used for requesting information on supported PDP context activation states.

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 → Last

+ - -

Reference(s)

3GPP TS 27.007 [45]



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

- More than one PDP context can be active if each PDP context ID has a specific setting, e.g. the APN. Keep in mind that PDP contexts are activated automatically when the UE attaches to the PDN (Packet Data Network) and to the IMS (IP-based Multimedia Subsystem). If the UE is registered to LTE and IMS [AT+CGACT](#) shows the active state of both PDP contexts, but any attempt to deactivate them with [AT+CGACT](#) will be denied. See more information in Section 13.5.1, [Attaching to LTE Networks and Registering to IMS](#). For IP sessions, the user may activate further PDP contexts. To avoid conflicts those PDP contexts should be different from PDP contexts automatically activated along with preconfigured provider settings. Also, the user is responsible to make sure whether parallel usage of these PDP contexts is allowed by the mobile operator and by the USIM. Remember that contexts may also be activated implicitly by using other commands and during data call negotiation procedures initiated by [AT+CGDATA](#) or [ATD*99#](#).
- Contexts activated by , e.g. [AT+CGDATA](#) or [ATD*99#](#) cannot be handled by the [AT+CGACT](#) write command but their activation state is still visible via [AT+CGACT](#) read command. A write command without specifying any `<cid>` will always fail as long as some contexts are still in use by [AT+CGDATA](#) or [ATD*99#](#).
- If activation or deactivation of a context fails, then [AT+CEER](#) may provide further information about the reason.
- Please see [AT&D](#) for information on disconnecting data call.

13.2 AT+CGATT PS Attach or Detach

The [AT+CGATT](#) write 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 [AT+CGATT](#) read command returns the current Packet Domain service state.

The [AT+CGATT](#) 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 → Last	Reference(s)
+ - -	3GPP TS 27.007 [45]

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 a CS call is in progress, then the write command returns "+CME ERROR: GPRS services not allowed".



13.3 AT+CGEQOS Define EPS Quality of Service

AT+CGEQOS write command allows the UE to specify the EPS Quality of Service parameters for a PDP context or Traffic Flows. When in UMTS/GPRS the MT applies a mapping function to UMTS/GPRS Quality of Service. A special form of the write command, **AT+CGEQOS=<cid>** causes the values for context number **<cid>** to become undefined.

Syntax

Test Command AT+CGEQOS=? Response(s) +CGEQOS: (range of supported <cid>s), (range of supported <QCI>s), (range of supported <DL_GBR>s), (range of supported <UL_GBR>s), (range of supported <DL_MBR>s), (range of supported <UL_MBR>s) OK	
Read Command AT+CGEQOS? Response(s) [+CGEQOS: <cid>, <QCI>, [<DL_GBR>, <UL_GBR>], [<DL_MBR>, <UL_MBR>]] [+CGEQOS: ...] OK	
Write Command AT+CGEQOS=<cid>[, <QCI>[, <DL_GBR>, <UL_GBR>[, <DL_MBR>, <UL_MBR>]]] Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last - + -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<cid> ^(num)	
Specifies a particular EPS Traffic Flows definition in EPS and a PDP Context definition in UMTS/GPRS (see AT+CGDCONT and AT+CGDSCONT).	
1...15	
<QCI> ^(num)	
Specifies a class of EPS QoS.	
0	QCI is selected by network
1...4	Value range for guaranteed bit rate Traffic Flows
5...9	Value range for non-guaranteed bit rate Traffic Flows
<DL_GBR> ^(num)	
Indicates DL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [41]).	



<UL_GBR>^(num)

Indicates UL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [41]).

<DL_MBR>^(num)

Indicates DL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [41]).

<UL_MBR>^(num)

Indicates UL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [41]).



13.4 AT+CGDATA Enter Data State

AT+CGDATA 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 Packet Domain PDP types. 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.

During LCP/other Layer 2 Protocol negotiation PS attach and one or more PDP context activations may take place.

After data transfer is complete, and layer 2 protocol termination procedure has completed successfully, command state is reentered and MT returns the final result code **OK**.

If **<L2P>** parameter value is unacceptable to the MT it returns **ERROR** or **+CME ERROR**.

In the event of erroneous termination or a failure to start up, command state is reentered and MT returns **NO CARRIER**, or if enabled **+CME ERROR**.

As long as a GPRS data connection is active, it is not possible to establish a CS data call (incoming and outgoing).

AT+CGDATA test command is used for requesting information on the supported layer 2 protocols to be used between TE and MT.

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 → Last	Reference(s)	
+ - +	3GPP 27.007	

Parameter Description

<L2P> ^(str)	
Layer 2 protocol to be used between TE and MT.	
["PPP"]	Layer 2 protocol PPP
<cid> ^(num)	
Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).	
Secondary PDP contexts are not supported.	



13.4.1 Automatic deactivation of PDP context during dial-up PPP

From using [AT+CGDATA](#) write command or [ATD*99#](#) follows that MT issues intermediate result code CONNECT and enters V.250ter online data state. In V.250 online data state, first some LCP protocol exchange between MT and TE is performed to set up the PPP link. After successfully establishing the PPP link, the MT performs PDP context activation procedure if the context is not already activated. As a result, 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&D2](#)), the application should not toggle DTR during implicit PDP context deactivation and before "NO CARRIER" is received.

13.5 AT+CGDCONT Define PDP Context

AT+CGDCONT 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 **AT+CGDCONT** test command. A special form of the write command (**AT+CGDCONT=<cid>**) causes the values for context `<cid>` to become undefined. If context 1 is undefined on startup, it will be recreated automatically with `<PDP_type>` "IPV4V6" and all other parameters set to their defaults.

It is not allowed to undefine an already activated context.

The **AT+CGDCONT** read command returns the current settings for each defined PDP context..

Syntax

Test Command

AT+CGDCONT=?

Response(s)

```
+CGDCONT: (range of supported <cid>s), "IP", , , (list of supported <d_comp>s), (list of supported
<h_comp>s), (list of supported <IPv4AddrAlloc>s), (list of supported <emergency_indication>s), (list
of supported <P-CSCF_discovery>s), (list of supported <IM_CN_Signalling_Flag_Ind>s)
+CGDCONT: (range of supported <cid>s), "IPV6", , , (list of supported <d_comp>s), (list of supported
<h_comp>s), (list of supported <IPv4AddrAlloc>s), (list of supported <emergency_indication>s), (list
of supported <P-CSCF_discovery>s), (list of supported <IM_CN_Signalling_Flag_Ind>s)
+CGDCONT: (range of supported <cid>s), "IPV4V6", , , (list of supported <d_comp>s), (list of supported
<h_comp>s), (list of supported <IPv4AddrAlloc>s), (list of supported <emergency_indication>s), (list
of supported <P-CSCF_discovery>s), (list of supported <IM_CN_Signalling_Flag_Ind>s)
OK
ERROR
+CME ERROR: <err>
```

Read Command

AT+CGDCONT?

Response(s)

```
[+CGDCONT: <cid>, <PDP_type>, <APN>, <PDP_addr>, <d_comp>, <h_comp>[, <IPv4AddrAlloc>[,
<emergency_indication>[, <P-CSCF_discovery>[, <IM_CN_Signalling_Flag_Ind>]]]]]
[+CGDCONT: <cid>, <PDP_type>, <APN>, <PDP_addr>, <d_comp>, <h_comp>[, <IPv4AddrAlloc>[,
<emergency_indication>[, <P-CSCF_discovery>[, <IM_CN_Signalling_Flag_Ind>]]]]]
[+CGDCONT: ...]
OK
ERROR
+CME ERROR: <err>
```

Write Command

AT+CGDCONT=<cid>[, <PDP_type>[, <APN>[, <PDP_addr>[, <d_comp>[, <h_comp>[,
<IPv4AddrAlloc>[, <emergency_indication>[, <P-CSCF_discovery>[,
<IM_CN_Signalling_Flag_Ind>]]]]]]]]]

Response(s)

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

PIN → Last

- + -

Reference(s)

3GPP TS 27.007,
3GPP TS 23.003,
3GPP TS 24.301,
3GPP TS 24.301,
3GPP TS 25.323,
3GPP TS 44.065



Parameter Description

<cid>^{(num)(NV)}

PDP Context Identifier

Parameter specifies a particular PDP context definition. This parameter is used in other PDP context-related commands. The supported PDP context ID range is from 1 to 15, among which 8 PDP contexts can be configured at the maximum. (For example, PDP Context ID 1, 2, 3, 4, 11, 12, 13, and 14 can be configured, and it reaches the maximum contexts allowed.)

1...15

<PDP_type>^{(str)(NV)}

Packet Data Protocol type

Specifies the type of the packet data protocol.

"IP"	Internet Protocol (IETF STD 5)
"IPv6"	Internet Protocol, version 6 (see RFC 2460)
"IPv4V6"	Virtual <PDP_type> introduced to handle dual IP stack UE capability. (See 3GPP TS 24.301 [41]). Not applicable to PPP (dialup) connections).

<APN>^{(str)(NV)}

Access Point Name

Logical name used to select the GGSN or the external packet data network. Maximum length: 62 characters. An Access Point Name has to follow the syntax rules specified in 3GPP TS 23.003 in section 9.1. If the value is null or omitted, then the subscription value will be requested.

<PDP_addr>^{(str)(NV)}

Packet Data Protocol address

Identifies the MT in the address space applicable to PDP (e.g. IPv4 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. Due to platform limitation, the dynamic IPv6 address is obtained only after the PDP is activated by AT^SICA or AT^SWWAN.

<d_comp>^{(num)(NV)}

Data Compression

Controls the PDP data compression (applicable for Subnetwork Dependent Convergence Protocol (SNDCP) only); see 3GPP TS 44.065 and GPP TS 23.003 for details.

[0]	off
1	on

<h_comp>^{(num)(NV)}

Header Compression

Controls the PDP header compression; see 3GPP TS 44.065 and 3GPP TS 25.323 for details.

[0]	off
1	on

<IPv4AddrAlloc>^{(num)(NV)}

Numeric parameter that controls how the MT/TA requests to get the IPv4 address information.

[0]	IPv4 Address Allocation through NAS Signalling
1	IPv4 Address Allocated through DHCP



`<emergency_indication>^(num)(NV)`

Numeric parameter used to indicate whether the PDP context is for emergency bearer services or not.

- | | |
|-----|--|
| [0] | PDP context is not for emergency bearer services |
| 1 | PDP context is for emergency bearer services |

`<P-CSCF_discovery>^(num)(NV)`

Numeric parameter influences how the MT/TA requests to get the P-CSCF address, see 3GPP TS 24.229 [89] annex B and annex L.

- | | |
|-----|---|
| [0] | Preference of P-CSCF address discovery not influenced by AT+CGDCONT |
| 1 | Preference of P-CSCF address discovery through NAS Signalling |
| 2 | Preference of P-CSCF address discovery through DHCP |

`<IM_CN_Signalling_Flag_Ind>^(num)(NV)`

Numeric parameter used to indicate to the network whether the PDP context is for IM CN subsystem-related signalling only or not.

- | | |
|-----|---|
| [0] | UE indicates that the PDP context is not for IM CN subsystem-related signaling only |
| 1 | UE indicates that the PDP context is for IM CN subsystem-related signaling only |

13.5.1 Attaching to LTE Networks and Registering to IMS

To allow access to the PDN (Packet Data Network) and to the IMS (IP-based Multimedia Subsystem), the UE has to perform attach and context activation procedures. The initial PDN attach is prerequisite for LTE services. For Voice over LTE (VoLTE), the PDN attach is followed by IMS registration attempt if network support is available.

The correct APNs shall be specified *before* the UE tries to attach. For ease of use, the UE comes with preconfigured provider profiles. Depending on the selected provider configuration the UE either loads

- a standard profile intended for a great variety of operators (referred to as Fallback profile),
- or a dedicated profile preconfigured for a specific network operator.

To check the currently defined PDP contexts use the [AT+CGDCONT](#) read command. If the Fallback profile is enabled, provider profile settings are non-volatile only as long as exactly the same SIM is inserted. Changing the SIM, even though a SIM of the same issuer, always clears all profile settings.

In contrast to 2G (GSM) and 3G (UMTS) where PDN attach and context activation are performed separately, a successful LTE attach and registration procedure always includes the automatic activation of a PDN PDP context. If IMS (IP-based Multimedia Subsystem) is enabled and supported by the network, the IMS PDP context will also be activated when the UE attaches to LTE.

Many network operators allow to assign the 1st PDP context to the PDN APN, and the 2nd to the IMS APN. This way, the 1st PDP context serves both for LTE attach and Internet access. For ELS62-W this means that the [AT+SWWAN](#) command can simply reuse the 1st PDP context to establish data connections to the Internet. PDP contexts defined for IMS or IMS Emergency signalling cannot be used for [AT+SWWAN](#).

NOTE: Only few operators require separate APNs for LTE attach and for Internet access, for example German Telecom and China Mobile. Therefore, the profile preconfigured for the German Telecom inside the UE defines the 1st PDP context only for Internet access without usage for LTE attach, while the 2nd PDP context is assigned to IMS and used for LTE attach. The benefit is that German Telecom subscribers may also set up [AT+SWWAN](#) connections at the 1st PDP context. For China Mobile, the 3rd PDP context is preconfigured for LTE attach.

How to trigger the attach procedure:

To ensure that the UE properly attaches to LTE it is necessary to retain the auto attach ability, by default enabled with [AT+SCFG="GPRS/AutoAttach"](#). This way, the UE automatically tries to attach to LTE and IMS after SIM



PIN1 authentication has completed. Manual attach / detach procedures by `AT+CGATT` are not recommended for LTE and IMS, and should be used only for GSM and UMTS.

To verify whether LTE attach and IMS registration were successful use the following AT commands:

- `AT+CGACT?` read command shows the automatically activated PDP contexts for PDN and IMS.
- `AT+CGPADDR` shows the IP addresses dynamically assigned to each PDP context.
- `AT+CGCONTRDP` shows the APNs, EPS bearer IDs, IP addresses.

As long as the UE is attached and registered to LTE any attempt to deactivate the active PDP context (e.g. `AT+CGACT=0,1`) will be denied with "+CME ERROR: operation not allowed". The detach command `AT+CGATT=0` is accepted but will cause the UE to deregister from LTE.

Likewise, an active PDP context assigned to IMS can neither be deactivated.

LTE attach with no APN

If no PDN APN is specified (for most operators at `<cid> 1`) when the UE attaches to LTE, the network will automatically select the so called default APN, specified in the HSS, to establish the initial context (PDN connection/default bearer). Although the LTE attach procedure will be successful in that case, the context for the default APN might be configured with restrictions concerning the transmission of data, depending on operator settings.

LTE attach with wrong APN

If a wrong PDN APN is configured during the LTE attach procedure, e.g. if an application allows the user to change SIM cards and the APN was not set correctly after the SIM change, the LTE attach will be rejected by the network. As result, the RAT type LTE will be disabled by the UE for a limited amount of time and the UE will only use 2G and 3G RAT types for PS access. The duration while RAT type LTE is disabled depends on network configuration (timer T3402, default 12 minutes).

Recommendations for LTE attach

When using LTE auto attach, the application shall ensure that the correct PDN APN is specified *before* the UE attaches to LTE. To do so, use the command `AT+CGDCONT=<cid>,<PDP_type>,<APN>`.

If the application cannot ensure that the correct PDN APN is configured *before* the UE attempts to attach to LTE, the application shall employ one of the following command sequences:

- `AT+COPS=2` to deregister from the network, `AT+CGDCONT` to set the APN, then `AT+COPS=0` to force a new network registration, thus enabling a new LTE auto attach attempt. If running, the T3402 timer will be stopped by `AT+COPS=0`.
- `AT+COPS=2` to deregister from the network, `AT+CGDCONT` to set the APN, then `AT+CFUN=1,1` to restart the UE (since the `AT+CGDCONT` setting is non-volatile).



13.6 AT+CEREG EPS Network Registration Status

The **AT+CEREG** write command enables presentation of URC "+CEREG: <stat>" when <n>=1 and UE's EPS network registration status in LTE changes, or URC "+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>]]" when <n>=2 and the current network cell in LTE changes.

The parameters <AcT>, <tac> and <ci> are provided only if available. The value <n>=3 further extends the URC with [<cause_type>,<reject_cause>], when available, when the value of <stat> changes. The **AT+CEREG** execute command restores default value "0" for parameter <n>.

The **AT+CEREG** read command queries the current URC presentation status and <stat> which shows whether the network has currently indicated the registration of the ME. Location information elements <tac> and <ci> are returned only if <n>=2 and ME is registered to the network.

Syntax

Test Command AT+CEREG=? Response(s) +CEREG: (list of supported <n>s) OK	
Read Command AT+CEREG? Response(s) +CEREG: <n>, <stat>[, [<tac>], [<ci>], [<AcT>]] OK	
Exec Command AT+CEREG Response(s) OK	
Write Command AT+CEREG=<n> Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last + + -	Reference(s) 3GPP TS 27.007 [45]

Unsolicited Result Codes

URC 1

+CEREG: <stat>

Indicates a change in the UE's EPS network registration status.

URC 2

+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>]]

Indicates a change in the UE's EPS network registration status or a change of the network cell including location information.



URC 3

+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>][, <cause_type>, <reject_cause>]]

Indicates a change in the UE's EPS network registration status or a change of the network cell including location information and EMM cause value.

Parameter Description

<n> ^(num)	
0(&F)(P)	Disable network registration unsolicited result code
1	Enable network registration URC "+CEREG: <stat>"
2	Enable network registration URC "+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>]]"
3	Enable network registration URC "+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>][, <cause_type>, <reject_cause>]]"
<stat> ^(num)	
0	Not registered, ME is not currently searching an operator to register to.
1	Registered, home network.
2	Not registered, but ME is currently trying to attach or searching an operator to register to.
3	Registration denied.
4	Unknown, e.g. out of LTE coverage.
5	Registered, roaming.
11	Attached for emergency bearer services only.
<tac> ^(str)	
Two byte tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)	
<ci> ^(str)	
Four byte LTE cell ID in hexadecimal format.	
<AcT> ^(num)	
Radio access technology	
0	GSM (not applicable)
3	GSM w/EGPRS (not applicable)
7	E-UTRAN
<cause_type> ^(num)	
Indicates the type of <reject_cause>.	
0	Indicates that <reject_cause> contains an EMM cause value (see 3GPP TS 24.301 [41] Annex A)
1	Indicates that <reject_cause> contains a manufacturer-specific cause
<reject_cause> ^(num)	
Contains the cause of the failed registration. The value is of type as defined by <cause_type>.	



13.7 AT+CGEQOSRDP EPS Quality of Service Read Dynamic Parameters

The write command returns Quality of Service parameters of the active PDP context associated to the provided context identifier `<cid>`.

If the parameter `<cid>` is omitted, the Quality of Service parameters for all secondary and non-secondary active PDP contexts are returned.

The test command returns a list of `<cid>`s associated with active PDP contexts.

Parameters of both network and MT/TA initiated PDP contexts will be returned.

Syntax

Test Command

AT+CGEQOSRDP=?

Response(s)

+CGEQOSRDP: (list of `<cid>`s associated with active contexts)

OK

Exec Command

AT+CGEQOSRDP

Response(s)

[+CGEQOSRDP: `<cid>`, `<QCI>`, [`<DL_GBR>`, `<UL_GBR>`], [`<DL_MBR>`, `<UL_MBR>`][, `<DL_AMBR>`, `<UL_AMBR>`]]

[+CGEQOSRDP: ...]

OK

ERROR

+CME ERROR: `<err>`

Write Command

AT+CGEQOSRDP=`<cid>`

Response(s)

[+CGEQOSRDP: `<cid>`, `<QCI>`[, `<DL_GBR>`, `<UL_GBR>`][, `<DL_MBR>`, `<UL_MBR>`][, `<DL_AMBR>`, `<UL_AMBR>`]]

[+CGEQOSRDP: ...]

OK

ERROR

+CME ERROR: `<err>`

PIN → Last

+ - -

Reference(s)

3GPP TS 27.007 [45]

Parameter Description

`<cid>`^(str)

Specifies a particular EPS Traffic Flows definition in EPS and a PDP Context definition in UMTS/GPRS (see [AT+CGDCONT](#) and [AT+CGDSCT](#)).

`<QCI>`^(num)

Specifies a class of EPS QoS.

0	QCI is selected by network
1...4	Value range for guaranteed bit rate Traffic Flows
5...9	Value range for non-guaranteed bit rate Traffic Flows
128...254	Value range for for Operator-specific QCIs



<DL_GBR>^(num)

Indicates DL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI.

<UL_GBR>^(num)

Indicates UL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI.

<DL_MBR>^(num)

Indicates DL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI.

<UL_MBR>^(num)

Indicates UL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI.

<DL_AMBR>^(num)

Indicates DL APN aggregate MBR. The value is in kbit/s.

<UL_AMBR>^(num)

Indicates UL APN aggregate MBR. The value is in kbit/s.

Notes

- If multiple lines in a response belong to the same PDN connection they contain the same <DL_AMBR> <UL_AMBR> values.
- The <cid> for network-initiated PDP contexts will have values outside the ranges (including values of 100 and above) indicated for the <cid> in the test form of the commands AT+CGDCONT and AT+CGDSCONT.

13.8 AT+CGEREP Packet Domain Event Reporting

The **AT+CGEREP** write command enables or disables sending of unsolicited result codes, +CGEV URCs from MT to TE in the case of certain events occurring in the Packet Domain MT or the network.

Parameter **<mode>** controls the processing of unsolicited result codes specified within this command. **<bfr>** controls the effect on buffered codes when **<mode>** 1 or 2 is entered. If a setting is not supported by the MT, ERROR or +CME ERROR: is returned.

The **AT+CGEREP** read command returns the current **<mode>** and buffer settings.

The **AT+CGEREP** test command returns the modes and buffer settings supported by the MT as compound values.

Syntax

Test Command	
AT+CGEREP=?	
Response(s)	
+CGEREP: (list of supported <mode> s), (list of supported <bfr> s)	
OK	
Read Command	
AT+CGEREP?	
Response(s)	
+CGEREP: <mode> , <bfr>	
OK	
Write Command	
AT+CGEREP=[<mode>], [<bfr>]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
+ + -	3GPP TS 27.007 [45]

Unsolicited Result Codes

URC 1

+CGEV: NW DEACT **<PDP_type>**, **<PDP_addr>** [, **<cid>**]

The network has forced a context deactivation. The **<cid>** that was used to activate the context is provided if known to the MT.

URC 2

+CGEV: ME DEACT **<PDP_type>**, **<PDP_addr>** [, **<cid>**]

The UE has forced a context deactivation. The **<cid>** that was used to activate the context is provided if known to the MT.

URC 3

+CGEV: NW DETACH

The network has forced a PS detach.

URC 4

+CGEV: ME DETACH

The UE has forced a PS detach.



URC 5

+CGEV: NW CLASS <class>

The network has forced a change of MS class. The highest available class is reported.

URC 6

+CGEV: ME CLASS <class>

The UE has forced a change of MS class. The highest available class is reported.

URC 7

+CGEV: ME ACT <pcid>, <cid>, <event-type>

The network has responded to an ME initiated context activation. The <cid> for this context is provided to the TE in addition to the associated primary <pcid>.

URC 8

+CGEV: NW MODIFY <cid>, <change-reason>, <event-type>

The network has modified a context. The associated <cid> is provided to the TE in addition to the <change-reason> and <event-type>. The format of the parameter <cid> is found in command AT+CGDCONT or AT+CGDSCONT. Due to platform limitation, the <event-type> is not supported.

URC 9

+CGEV: NW PDN DEACT <cid>

The network has deactivated a context. The context represents a PDN connection in LTE or a Primary PDP context in GERAN. The associated <cid> for this context is provided to the TE. The format of the parameter <cid> is found in command AT+CGDCONT.

URC 10

+CGEV: ME PDN DEACT <cid>

The UE has deactivated a context. The context represents a PDN connection in LTE or a Primary PDP context in GERAN. The <cid> for this context is provided to the TE. The format of the parameter <cid> is found in command AT+CGDCONT.

URC 11

+CGEV: NW ACT <pcid>, <cid>, <event-type>

The network has activated a context. The <cid> for this context is provided to the TE in addition to the associated primary <pcid>. The format of the parameters <pcid> and <cid> are found in command AT+CGDSCONT.

URC 12

+CGEV: ME MODIFY <cid>, <change-reason>, <event-type>

The UE has modified a context. The associated <cid> is provided to the TE in addition to the <change-reason> and <event-type>.

URC 13

+CGEV: ME PDN ACT <cid>[, <reason>]

The UE has activated a context. The context represents a Primary PDP context in GSM/LTE. The <cid> for this context is provided to the TE. This event is sent either in result of explicit context activation request (AT+CGACT), or in result of implicit context activation request associated to attach request (AT+CGATT=1).

URC 14

+CGEV: EPS PDN ACT <cid>

The network has activated a context. The context represents a Primary PDP context in E-UTRAN. The <cid> for this context is provided to the TE. The format of the parameter <cid> is found in command AT+CGDCONT.

Parameter Description

<mode>^(num)

0 ^(P)	Buffer unsolicited result codes in the MT. Currently 3 +CGEV URCs can be buffered. If MT result code buffer is full, the oldest ones will be discarded. No codes are forwarded to the TE.
1	Discard unsolicited result codes when MT TE link is reserved (e.g. AT command port is in use, e.g. in online mode or in waiting state due to AT command processing); otherwise forward them directly to the TE.
2	Buffer unsolicited result codes in the MT when MT TE link is reserved (AT command port is in use, e.g. in online mode or in waiting state due to AT command processing) and flush them to the TE when MT TE link becomes available; otherwise forward them directly to the TE. Currently 3 +CGEV URCs can be buffered. If MT result code buffer is full, the oldest URCs will be discarded.

<bfr>^(num)

0	MT buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered
1	MT buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1 or 2 is entered (OK response will be given before flushing the codes). Buffer is empty afterwards.

<class>^(str)

Parameter indicates the GPRS mobile class.

"B"	Class B
"CG"	Class C in GPRS mode
"CC"	Class C in circuit switched mode

<reason>^(num)

Indicates the reason why the context activation request for PDP type IPv4v6 was not granted. This parameter is only included if the requested PDP type associated with <cid> is IPv4v6, and the PDP type assigned by the network for <cid> is either IPv4 or IPv6.

0	IPV4 only allowed
1	IPV6 only allowed
2	Single address bearers only allowed
3	Single address bearers only allowed and MT initiated context activation for a second address type bearer was not successful.

<change-reason>^(num)

Integer type parameter indicates what kind of change occurred.

0	Not available
1	TFT only changed
2	Qos only changed
3	Both TFT and QoS changed

<event-type>^(num)

Integer type parameter indicates whether this is an informational event or whether the TE has to acknowledge it.

0	Informational event
---	---------------------



13.9 AT+CGPADDR Show PDP Address

The [AT+CGPADDR](#) exec command returns a list of PDP addresses for all defined contexts.

The [AT+CGPADDR](#) 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. If no [<cid>](#) is specified, the addresses for all defined contexts are returned.

The [AT+CGPADDR](#) test command returns a list of defined [<cid>](#)s.

Syntax

Test Command	
AT+CGPADDR=?	
Response(s)	
[+CGPADDR: (list of defined <cid> s)]	
OK	
Exec Command	
AT+CGPADDR	
Response(s)	
[+CGPADDR: <cid> [, <PDP_address_1> [, <PDP_address_2>]]]	
[+CGPADDR: ...]	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
AT+CGPADDR=[<cid> [, <cid> [, ...]]]	
Response(s)	
[+CGPADDR: <cid> [, <PDP_address_1> [, <PDP_address_2>]]]	
[+CGPADDR: ...]	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
+ + -	3GPP 27.007

Parameter Description

[<cid>](#)^(num)

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

[<PDP_address_1>](#)^(str)

A string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. If address is not available parameter is omitted.

Parameter specifies the assigned address as a dot-separated numeric (0-255) parameter of the form "a1.a2.a3.a4" for IPv4 and "a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16" for IPv6. The settings of [AT+CGPIAF](#) can influence the format of the IPv6 address.



`<PDP_address_2>(str)`

A string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. Parameter is displayed only when both IPv4 and IPv6 addresses are assigned, with `<PDP_address_1>` containing the IPv4 address and this parameter the IPv6 address.

Parameter specifies the assigned IPv6 address as a dot-separated numeric (0-255) parameter of the form "a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16".

Due to platform limitation, the dynamic IPv6 address is obtained only after the PDP is activated by `AT^SICA` or `AT^SWWAN`.

The settings of `AT+CGPIAF` can influence the format of this parameter.

13.10 AT+CGSCONTRDP Secondary PDP Context Read Dynamic Parameters

The write command returns `<p_cid>` and `<bearer_ID>` for an active secondary PDP context with the context identifier `<cid>`.

If the parameter `<cid>` is omitted, the `<cid>`, `<p_cid>` and `<bearer_ID>` are returned for all active secondary PDP contexts. In EPS, the Traffic Flow parameters are returned.

The test command returns a list of `<cid>`s associated with active secondary PDP contexts.

Syntax

Test Command

AT+CGSCONTRDP=?

Response(s)

+CGSCONTRDP: (list of `<cid>`s associated with active contexts)

OK

Exec Command

AT+CGSCONTRDP

Response(s)

[`<cid>`, `<p_cid>`, `<bearer_ID>`]

[`<cid>`, `<p_cid>`, `<bearer_ID>`]

[...]

OK

ERROR

+CME ERROR: `<err>`

Write Command

AT+CGSCONTRDP=`<cid>`

Response(s)

[+CGSCONTRDP: `<cid>`, `<p_cid>`, `<bearer_ID>`]

[+CGSCONTRDP: `<cid>`, `<p_cid>`, `<bearer_ID>`]

[+CGSCONTRDP: ...]

OK

ERROR

+CME ERROR: `<err>`

PIN → Last

+ - -

Reference(s)

3GPP TS 27.007 [45]

Parameter Description

`<cid>`^(num)

Specifies a particular active secondary PDP context or Traffic Flows definition. The parameter is used in other PDP context-related commands (see the [AT+CGDCONT](#) and [AT+CGDSCONT](#)).

`<p_cid>`^(num)

Specifies a particular PDP context definition or default EPS context Identifier which has been specified by use of the [AT+CGDSCONT](#) command (see the [AT+CGDSCONT](#) command).

`<bearer_ID>`^(num)

Identifies the bearer, EPS Bearer in EPS and NSAPI in UMTS/GPRS.



Note

- The `<cid>` for network-initiated PDP contexts will have values outside the ranges (including values of 100 and above) indicated for the `<cid>` in the test form of the commands `AT+CGDCONT` and `AT+CGDSCONT`.



13.11 AT+CGCONTRDP PDP context read dynamic parameters

The [AT+CGCONTRDP](#) write command returns dynamic parameters for the active non-secondary PDP context specified with [<cid>](#).

The [AT+CGCONTRDP](#) execute command returns dynamic parameters for all active non-secondary PDP contexts. For contexts of [<PDP_type>](#) "IPV4V6" the response of exec and write command will have two lines per [<cid>](#). First line describes the IPV4 dynamic parameters followed by another line with the IPV6 dynamic parameters.

Syntax

Test Command AT+CGCONTRDP=? Response(s) +CGCONTRDP: (list of supported <cid>s) associated with active contexts OK	
Exec Command AT+CGCONTRDP Response(s) +CGCONTRDP: <cid>, <Bearer_ID>, <APN>[, <LocalAddr and SubNetMask>], <GwAddr>[, <DNS_prim_addr>], <DNS_sec_addr>], <P_CSCF_prim_addr>], <P_CSCF_sec_addr>]]]]] +CGCONTRDP: <cid>, <Bearer_ID>, <APN>[, <LocalAddr and SubNetMask>], <GwAddr>[, <DNS_prim_addr>], <DNS_sec_addr>], <P_CSCF_prim_addr>], <P_CSCF_sec_addr>]]]]] [+CGCONTRDP: ...] OK ERROR +CME ERROR: <err>	
Write Command AT+CGCONTRDP=<cid> Response(s) +CGCONTRDP: <cid>, <Bearer_ID>, <APN>[, <LocalAddr and SubNetMask>], <GwAddr>[, <DNS_prim_addr>], <DNS_sec_addr>], <P_CSCF_prim_addr>], <P_CSCF_sec_addr>]]]]] OK ERROR +CME ERROR: <err>	
PIN → Last + - -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

[<cid>](#)^(num)

Specifies a particular non-secondary PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. See [AT+CGDCONT](#).

[<Bearer_ID>](#)^(num)

Identifies the bearer, EPS Bearer in EPS and NSAPI.

[<APN>](#)^(str)

Access Point Name

Logical name used to select the GGSN or the external packet data network.



<LocalAddr and SubNetMask>^(str)

Shows the IP address and subnet mask of the UE in the format specified by [AT+CGPIAF](#).

<GwAddr>^(str)

Shows the Gateway Address of the UE in the format specified by [AT+CGPIAF](#).

<DNS_prim_addr>^(str)

Shows the IP address of the primary DNS server.
The settings of [AT+CGPIAF](#) influences the format of this parameter.

<DNS_sec_addr>^(str)

Shows the IP address of the secondary DNS server.
The settings of [AT+CGPIAF](#) influences the format of this parameter.

<P_CSCF_prim_addr>^(str)

Shows the IP address of the primary P-CSCF server.
The settings of [AT+CGPIAF](#) influences the format of this parameter.

<P_CSCF_sec_addr>^(str)

Shows the IP address of the secondary P-CSCF server.
The settings of [AT+CGPIAF](#) influences the format of this parameter.

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

[AT+CGQMIN](#) 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 [AT+CGQMIN](#) write command specifies a profile for the context identified by the context identification parameter, [<cid>](#).

A special form of the write 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.

The [AT+CGQMIN](#) test command returns values supported as a compound value.

The [AT+CGQMIN](#) read command returns the current settings for each context for which a QOS was explicitly specified.

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)
+CGQMIN: "IPv6", (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)
+CGQMIN: "IPv4V6", (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 → Last

- + -

Reference(s)

3GPP TS 27.007 [45]

Parameter Description

[<cid>](#)^{(num)(NV)}

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



<precedence>^{(num)(NV)}

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)(NV)}

Delay class

The delay parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the Packet Domain 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)(NV)}

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)(NV)}

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)(NV)}

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

Notes

- Definitions of parameters can be found in 3GPP 23.107.
- All QOS settings are non-volatile and independent of [AT&F](#) and [ATZ](#).
- If <reliability> value 1 is received, it is interpreted as value 2.



13.13 AT+CGREG Packet Domain Network Registration Status

The **AT+CGREG** write command enables the presentation of the URC "+CGREG: <stat>" when <n>=1 and ME's Packet Domain network registration status in GSM changes, or URC "+CGREG: <stat>[, <lac>][, <ci>][, <AcT>]" when <n>=2 and the current network cell in GSM 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.

Location information elements <lac>, <ci> and <AcT> are sent only if available, if <n>=2 and if ME is registered to the network.

Syntax

Test Command	
AT+CGREG=?	
Response(s)	
+CGREG: (list of supported <n>s)	
OK	
Read Command	
AT+CGREG?	
Response(s)	
+CGREG: <n>, <stat>[, <lac>], [<ci>], [<AcT>]	
OK	
Write Command	
AT+CGREG=<n>	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
+ + -	3GPP 27.007

Unsolicited Result Codes

URC 1

+CGREG: <stat>

Indicates a change in the ME's Packet Domain network registration status.

URC 2

+CGREG: <stat>[, <lac>][, <ci>][, <AcT>]

Indicates a change in the ME's Packet Domain network registration status or a change of the network cell including location information.

Parameter Description

<n> ^(num)	
0(&F)(P)	Disable Packet Domain network registration URC
1	Enable Packet Domain network registration URC "+CGREG: <stat>"
2	Enable Packet Domain network registration URC "+CGREG: <stat>[, <lac>][, <ci>][, <AcT>]"



<stat>^(num)

0	Not registered, ME is not currently searching an operator to register to.
1	Registered, home network.
2	Not registered, but ME is currently trying to attach or searching an operator to register to.
3	Registration denied.
4	Unknown
5	Registered, roaming.

<lac>^(str)

Two byte location area code in hexadecimal format.

<ci>^(str)

Cell ID in hexadecimal format:
- 16 bit for 2G

<AcT>^(num)

Radio access technology

0	GSM
3	GSM w/EGPRS
7	E-UTRAN (Not applicable)



13.14 AT+CGSMS Select Service for MO Short Messages

AT+CGSMS specifies the service or service preference that the MT will use to send MO (mobile originated) short 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 → Last	Reference(s)
+ + -	3GPP 27.007

Parameter Description

<service>	(num)(&V)(NV)
A numeric parameter which indicates the service or service preference to be used.	
0	Packet Domain
1	Circuit switched
2	Packet Domain preferred (use circuit switched SMS transfer if mobile is not PS attached)
3 ^(D)	Circuit switched preferred (use Packet Domain if circuit switched is not available)



13.15 ATD*99# Request Packet Domain 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.

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.

During LCP/other Layer 2 Protocol negotiation PS attach and one or more PDP context activations may take place if they have not already been performed using the [AT+CGATT](#) and [AT+CGACT](#) commands.

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 [13.4.1, Automatic deactivation of PDP context during dial-up PPP](#))

As long as a GPRS data connection is active, it is not possible to establish a CS data call (incoming and outgoing).

[ATD*99#](#) is blocked when the Fixed Dialing lock is enabled and the number "*99#" is not present in the "FD" phonebook (see [AT+CLCK](#) SIM Fixed Dialing lock). In this case "+CME ERROR: call barred" is returned. Please note, this is the only extended error code supported.

Syntax

Exec Command	
ATD*99[* [* [<cid>]]]#	
Response(s)	
CONNECT	
NO CARRIER	
ERROR	
PIN → Last	Reference(s)
+ - +	3GPP TS 27.007 [45]

Parameter Description

<cid>^(num)

Parameter specifies a particular PDP context definition (see [AT+CGDCONT](#) parameter <cid>). Secondary PDP contexts are not supported.



13.16 AT+CEMODE Modes of Operation for EPS

AT+CEMODE indicates the mode of operation for EPS (Evolved Packet System), see 3GPP TS 24.301 [41].
AT+CEMODE read command returns the mode of operation set by the TE, independent of the current serving cell capability and independent of the current serving cell Access Technology.
AT+CEMODE test command is used for requesting information on the supported mode of operation.

Syntax

Test Command AT+CEMODE=? Response(s) +CEMODE: (list of supported <mode>s) OK ERROR +CME ERROR: <err>	
Read Command AT+CEMODE? Response(s) +CEMODE: <mode> OK ERROR +CME ERROR: <err>	
Write Command AT+CEMODE=<mode> Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last + - -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<mode> ^(num)	
Indicates the mode of operation.	
0	PS mode 2 of operation
1 ^(P)	CS/PS mode 1 of operation
2	CS/PS mode 2 of operation
3	PS mode 1 of operation



13.17 AT+CGDSCONT Define Secondary PDP Context

The [AT+CGDSCONT](#) write command specifies PDP context parameter values for a Secondary PDP context identified by the context identification parameter [<cid>](#). The number of PDP 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+CGDSCONT=<cid>](#) causes the values for context number [<cid>](#) to become undefined. The [AT+CGDSCONT](#) read command returns the current settings for each defined context. The [AT+CGDSCONT](#) test command returns values supported as a compound value.

Syntax

Test Command AT+CGDSCONT=? Response(s) +CGDSCONT: (range of supported <cid>s), (list of <pcid>s for defined primary contexts), (list of supported <d_comp>s), (list of supported <h_comp>s) OK ERROR +CME ERROR: <err>	Read Command AT+CGDSCONT? Response(s) +CGDSCONT: [<cid>, <pcid>, <d_comp>, <h_comp>] [+CGDSCONT: <cid>, <pcid>, <d_comp>, <h_comp>] [+CGDSCONT: ...] OK ERROR +CME ERROR: <err>
Write Command AT+CGDSCONT=<cid>[, <pcid>[, <d_comp>[, <h_comp>]]] Response(s) OK ERROR +CME ERROR: <err>	PIN → Last - + - Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<cid>^{(num)(NV)} PDP Context Identifier Parameter specifies a particular PDP context definition and is used in other PDP context-related commands. The supported PDP context ID range is from 1 to 15, among which 8 PDP contexts can be configured at the maximum. (For example, PDP Context ID 1, 2, 3, 4, 11, 12, 13, and 14 can be configured, and it reaches the maximum contexts allowed.) 1...15
--



<pcid>^{(num)(NV)}

Primary PDP Context Identifier

Parameter specifies a particular PDP context definition which has been specified by use of the [AT+CGDCONT](#) command. The list of permitted values is returned by the test form of the command.

1...15

<d_comp>^{(num)(NV)}

Data Compression

Controls the PDP data compression (applicable for Subnetwork Dependent Convergence Protocol (SND CP) only) 3GPP TS 44.065

[0]	off
1	on

<h_comp>^{(num)(NV)}

Header Compression

Controls the PDP header compression 3GPP TS 44.065, 3GPP TS 25.323

[0]	off
1	on



13.18 AT+CGTFT Traffic Flow Template

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. TFTs shall be used for PDP-type IP and PPP only. For PDP-type PPP a TFT is applicable only when IP traffic is carried over PPP. If PPP carries header-compressed IP packets, then a TFT cannot be used.

The read command returns the current settings for all Packet Filters for each defined context.

The write command allows the TE to specify a Packet Filter - PF for a Traffic Flow Template - TFT that is used in the GGSN for routing of down-link packets onto different QoS flows towards the TE. The concept is further described in the 3GPP TS 23.060. A TFT consists of from one and up to two Packet Filters, each identified by a unique `<filterid>`. A Packet Filter also has an `<precedence>` that is unique within all TFTs associated with all PDP contexts that are associated with the same PDP address.

The write command specifies a Packet Filter that is to be added to the TFT stored in the MT and used for the context identified by the context identification parameter, `<cid>`. The specified TFT will be stored in the GGSN only at activation or MS-initiated modification of the related context. Since this is the same parameter that is used in the `AT+CGDCONT` and `AT+CGDSCONT` commands, the `+CGTFT` command is effectively an extension to these commands. The Packet Filters consist of a number of parameters, each of which may be set to a separate value. A special form of the write command, `AT+CGTFT=<cid>` causes all of the Packet Filters in the TFT for context number `<cid>` to become undefined. At any time there may exist only one PDP context with no associated TFT amongst all PDP contexts associated to one PDP address. At an attempt to delete a TFT, which would violate this rule, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the `AT+CMEE` command.

Syntax

Test Command

AT+CGTFT=?

Response(s)

```
+CGTFT: <pdptype>, (list of supported <filterid>s), (list of supported <precedence>s), , (list of
supported <protocolno>s), (list of supported <destportrange>s), (list of supported
<srcportrange>s), (list of supported <ipsecidx>s), (list of supported <tos>s), (list of supported
<flowlabel>s)
OK
```

Read Command

AT+CGTFT?

Response(s)

```
[+CGTFT: <cid>, <filterid>, <precedence>, <rem_addr_subnet_mask>, <protocolno>,
<destportrange>, <srcportrange>, <ipsecidx>, <tos>, <flowlabel>]
[+CGTFT: ...]
```

Write Command

AT+CGTFT=[<cid>[, <filterid>, <precedence>[, <rem_addr_subnet_mask>[, <protocolno>[, <destportrange>[, <srcportrange>[, <ipsecidx>[, <tos>[, <flowlabel>]]]]]]]]]

Response(s)

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

PIN → Last

- + -

Reference(s)

3GPP TS 27.007 [45]



Parameter Description

<cid>^(num)

Parameter specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

1...15

Please note, PDP Context ID: 15 and 16 are used by platform internally and cannot be set.

<filterid>^(num)

Packet filter identifier

Parameter specifies a packet filter identifier.

1...16

<precedence>^(num)

Evaluation Precedence Index

Parameter specifies a evaluation precedence index.

0...255

<rem_addr_subnet_mask>^(str)

Remote address and subnet mask

The string is given as dot-separated numeric (0-255) parameters on the form:

"a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or

"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16" for IPv6.

The settings of [AT+CGPIAF](#) can influence the format of this parameter.

<protocolno>^(num)

Protocol number

Parameter specifies the protocol number (ipv4) / next header (ipv6).

0...255

<destportrange>^(str)

Destination port range

Parameter specifies the destination port range.

"0.0"... "65535.65535"

<srcportrange>^(str)

Source port range

Parameter specifies the source port range.

"0.0"... "65535.65535"

<ipsecidx>^(num)

IPsec security parameter index

Parameter specifies the IPsec security parameter index (spi).

0...FFFFFFFF



<tos>^(str)

Type of service and mask/traffic class

Parameter specifies the type of service (tos)(ipv4) and mask/traffic class (ipv6).

"0.0"... "255.255"

<flowlabel>^(num)

Flow label

Parameter specifies the flow label (ipv6).

0...FFFF

<pdptype>^(str)

PDP type

Parameter specifies the PDP type.

"IP" Internet Protocol (IETF STD 5)

"IPV6" Internet Protocol, version 6 (see RFC 2460)

"IPV4V6" Virtual <pdptype> introduced to handle dual IP stack UE capability. (See 3GPP TS 24.301)

Notes

- Some of the above listed attributes may coexist in a Packet Filter while others mutually exclude each other, the possible combinations are shown in 3GPP TS 23.060.
- Due to platform limitation, when PDP is activated, the value saved by AT+CGTFT write command will be deleted.



13.19 AT+CGTFTRDP Traffic Flow Template Read Dynamic Parameters

The write command returns the relevant information about Traffic Flow Template for an active secondary or non-secondary PDP context specified by `<cid>` together with the additional network assigned values when established by the network.

The exec command returns the relevant information about the Traffic Flow Templates for all active secondary and non-secondary PDP contexts.

Parameters of both network and MT/TA initiated PDP contexts will be returned.

The test command returns a list of `<cid>`s associated with active secondary and non-secondary contexts.

Syntax

Test Command	
AT+CGTFTRDP=?	
Response(s)	
+CGTFTRDP: (list of <code><cid></code> s associated with active contexts)	
OK	
Exec Command	
AT+CGTFTRDP	
Response(s)	
[+CGTFTRDP: <code><cid></code> , <code><filterid></code> , <code><precedence></code> , <code><rem_addr_subnet_mask></code> , <code><protocolno></code> , <code><local-portrange></code> , <code><remote-portrange></code> , <code><ipsecidx></code> , <code><tos></code> , <code><flowlabel></code> , <code><direction></code> , <code><NW-filterID></code>]	
[+CGTFTRDP: ...]	
OK	
ERROR	
+CME ERROR: <code><err></code>	
Write Command	
AT+CGTFTRDP= <code><cid></code>	
Response(s)	
[+CGTFTRDP: <code><cid></code> , <code><filterid></code> , <code><precedence></code> , <code><rem_addr_subnet_mask></code> , <code><protocolno></code> , <code><local-portrange></code> , <code><remote-portrange></code> , <code><ipsecidx></code> , <code><tos></code> , <code><flowlabel></code> , <code><direction></code> , <code><NW-filterID></code>]	
[+CGTFTRDP: ...]	
OK	
ERROR	
+CME ERROR: <code><err></code>	
PIN → Last + - -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<code><cid></code> ^(num)
Specifies a particular secondary or non secondary PDP context definition or Traffic Flows definition (see AT+CGDCONT and AT+CGDSCONT commands). (see notes for network initiated PDP context)
1...15



`<filterid>^(num)`

Packet filter identifier

Specifies a packet filter identifier. (see notes for network initiated PDP context)

1...16

`<precedence>^(num)`

Evaluation Precedence Index

Specifies a evaluation precedence index.

0...255

`<rem_addr_subnet_mask>^(str)`

Remote address and subnet mask

The string is given as dot-separated numeric (0-255) parameters on the form:

"a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or

"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16" for IPv6.

The settings of [AT+CGPIAF](#) can influence the format of this parameter.

`<protocolno>^(num)`

Protocol number

Specifies the protocol number (ipv4) / next header (ipv6).

0...255

`<local-portrange>^(str)`

Local port range

The string is given as dot-separated numeric (0-65535) parameters on the form "f.t".

`<remote-portrange>^(str)`

Remote port range

The string is given as dot-separated numeric (0-65535) parameters on the form "f.t".

`<ipsecidx>^(num)`

IPsec security parameter index

Specifies the IPsec security parameter index (spi) in hexadecimal format.

00000000...FFFFFFFF

`<tos>^(str)`

Type of service and mask/traffic class

Specifies the type of service (tos)(ipv4) and mask/traffic class (ipv6) and mask. The string is given as dot-separated numeric (0-255) parameters on the form "f.t".

`<flowlabel>^(num)`

Flow label

Parameter specifies the flow label in hexadecimal format (valid for ipv6 only).

00000...FFFFFF



`<direction>(num)`

Specifies the transmission direction in which the Packet Filter will be applied.

0	Pre Release 7 TFT Filter
1	Uplink
2	Downlink
3	Bidirectional (Used for Uplink and Downlink)

`<NW-filterID>(num)`

NW Packet filter identifier

Parameter specifies a packet filter identifier. In EPS the value is assigned by the network when established.

1...16

Notes

- Some of the listed attributes can coexist in a Packet Filter while others mutually exclude each other. The possible combinations are shown in 3GPP TS 23.060 [27].
- The `<cid>` for network-initiated PDP contexts will have values outside the ranges (including values of 100 and above) indicated for the `<cid>` in the test form of the commands `AT+CGDCONT` and `AT+CGDSCONT`.
- `<filterid>` values for network initiated PDP contexts can have values outside the ranges indicated.

13.20 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>[, <user>, <passwd>]

Response(s)

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

PIN → Last

- + -

Parameter Description

<cid>^{(num)(NV)}

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

<auth_type>^{(num)(NV)}

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)(NV)}

Parameter specifies the password used for authentication. It is required for the authentication types PAP and CHAP.

Maximum length: 127 characters.



`<user>^(str)(NV)`

Parameter specifies the user name used for authentication. It is required for the authentication types PAP and CHAP.

Maximum length: 127 characters.



13.21 AT^SGCONF Configuration of GPRS related Parameters

AT^SGCONF configures the used E/GPRS Multislot Classes. Four Multislot Classes are supported for GPRS respectively EGPRS.

Syntax

Test Command

AT^SGCONF=?

Response(s)

^SGCONF: (list of supported <llc_pdu_length_U>s), (list of supported <llc_pdu_length_I>s), (list of supported <GPRS_msc_class>es), (list of supported <EGPRS_msc_class>es), (list of supported <msClassChangeMode>s)
OK

Read Command

AT^SGCONF?

Response(s)

^SGCONF: <llc_pdu_length_U>, <llc_pdu_length_I>, <GPRS_msc_class>, <EGPRS_msc_class>, <msClassChangeMode>
OK

Write Command

AT^SGCONF=[<llc_pdu_length_U>][, [<llc_pdu_length_I>][, [<GPRS_msc_class>][, [<EGPRS_msc_class>][, <msClassChangeMode>]]]]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

<llc_pdu_length_U>^(num)

The maximum number of octets in an information field of Unnumbered (U) frames.

0^(P) No negotiation with network (A fixed number of octets will be used).

<llc_pdu_length_I>^(num)

The maximum number of octets in an information field of Combined Information (I) frames.

0^(P) No negotiation with network (A fixed number of octets will be used).

<GPRS_msc_class>^{(num)(NV)}

GPRS Multislot Class. The value can be one of the classes indicated with the Test command.

8	GPRS Multislot Class 8
10	GPRS Multislot Class 10
11	GPRS Multislot Class 11
12 ^(D)	GPRS Multislot Class 12



`<EGPRS msclass>^(num)(NV)`

EGPRS Multislot Class. The value can be one of the classes indicated with the Test command.

8	EGPRS Multislot Class 8
10	EGPRS Multislot Class 10
11	EGPRS Multislot Class 11
12 ^(D)	EGPRS Multislot Class 12

`<msClassChangeMode>^(num)`

Parameter specifies whether the changed parameters `<GPRS msclass>` or `<EGPRS msclass>` shall be effective after restart of the UE or immediately.

0	Changed Multislot Class(es) settings will be applied with the next restart of UE.
---	---

13.22 AT^SWWAN PDP Context Activate or Deactivate

[AT^SWWAN](#) write command can be used to activate or deactivate a WWAN connection for a PDP context defined with [AT+CGDCONT](#).

UE supports one WWAN adapter (also referred to as a Wireless Adapter).

[AT^SWWAN](#) read command shows whether a WWAN connection is active and which PDP context is used for it. If no WWAN connection is active, then read command just returns OK. To track activation errors [AT^SIND](#) indicator "ceer" can be used.

Syntax

Test Command

AT^SWWAN=?

Response(s)

^SWWAN: (list of supported <state>s), (list of supported <cid>s), (list of supported <WWAN adapter>s)
OK
ERROR
+CME ERROR: <err>

Read Command

AT^SWWAN?

Response(s)

[^SWWAN: <cid>, <state>[, <WWAN adapter>]]
OK
ERROR
+CME ERROR: <err>

Write Command

Activate/Deactivate WWAN connection

AT^SWWAN=<action>, <cid>[, <WWAN adapter>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN → Last

+ - -

Parameter Description

<action>^(num)

0	Deactivate
1	Activate

<state>^(num)

0 ^(P)	Deactivated
1	Activated

<cid>^(num)

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



<WWAN adapter>^(num)

1

First WWAN adapter

If parameter <WWAN adapter> is omitted in the [AT+SWWAN](#) write command, the first WWAN adapter will be used.

Notes

- PDP contexts already activated by other commands as for example [AT+CGACT](#) cannot be reused for WWAN, except in LTE mode where the PDP context activated for LTE attach can also be used to start a WWAN connection. However, please note that some providers do not allow reusing this PDP context for data connectivity via Internet (e.g. German Telecom, China Mobile). For more information please refer to Section [13.5.1, Attaching to LTE Networks and Registering to IMS](#).
- PDP contexts defined for IMS and Emergency APNs cannot be used for WWAN connections. To check the currently defined PDP contexts use the [AT+CGDCONT](#) read command. The preconfigured APNs largely depend on the provider configuration, some APNs refer to IMS or SOS, others do not. Therefore, it is recommended to check especially the [AT+CGDCONT](#) parameter <P-CSCF_discovery> that is enabled (value 1) only in PDP contexts for IMS or IMS Emergency signalling.
- If activation or deactivation of a WWAN connection fails, then [AT+CEER](#) may provide further information about the reason.

13.23 AT+CGPIAF Select Printing IP address format

AT+CGPIAF specifies the format to print IPV6 address parameters of other AT commands. See RFC 4291 for details of the IPV6 address format.

The +CGPIAF parameters **<format>**, **<subnet>**, **<lzeros>** and **<czeros>** affect the following commands and parameters:

- in **AT+CGTFT** and **AT+CGTFTTRDP**, the **<rem_addr_subnet_mask>**;
- in **AT+CGDCONT**, the **<PDP_addr>**;
- in **AT+CGPADDR**, the **<PDP_address_1>** and **<PDP_address_2>**;
- in **AT+CGCONTRDP**, the **<LocalAddr and SubNetMask>**, **<GwAddr>**, **<DNS_prim_addr>**, **<DNS_sec_addr>**, **<P_CSCF_prim_addr>** and **<P_CSCF_sec_addr>**.

The read command returns the current command parameter settings.
The test command returns supported parameter values.

Syntax

Test Command	
AT+CGPIAF=?	
Response(s)	+CGPIAF: (list of supported <format> s), (list of supported <subnet> s), (list of supported <lzeros> s), (list of supported <czeros> s)
OK	
Read Command	
AT+CGPIAF?	
Response(s)	+CGPIAF: <format> , <subnet> , <lzeros> , <czeros>
OK	
Write Command	
AT+CGPIAF=[<format> [, <subnet> [, <lzeros> [, <czeros>]]]]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
+ + -	3GPP 27.007

Parameter Description

<format> ^(num)	
A numeric parameter which decides the IPV6 address format. Relevant for all AT command parameters that can hold an IPV6 address.	
0(&F)(P)	Use IPv4-like dot-notation. IP address, and subnetwork mask if applicable, are dot-separated, e.g. "32.1.13.184.0.0.205.48.0.0.0.0.0.0.0.0.255.255.255.255.255.255.240.0.0.0.0.0.0" for parameters holding address and subnet mask and "32.1.13.184.0.0.205.48.0.0.0.0.0.0.0.0" for other IP address parameters.



- 1 Use IPv6-like colon-notation. IP address, and subnetwork mask if applicable and when given explicitly, are separated by a space, e.g.
 "2001:0DB8:0000:CD30:0000:0000:0000:0000
 FFFF:FFFF:FFFF:FFF0:0000:0000:0000:0000"
 for parameters holding address and subnet mask and
 "2001:0DB8:0000:CD30:0000:0000:0000:0000"
 for other IP address parameters.

<subnet>^(num)

A numeric parameter which decides the subnet-notation for parameters that hold remote address and subnet mask, e.g. <rem_addr_subnet_mask>. Setting does not apply if <format>= 0.

- 0(&F)(P) Both IP Address and subnet mask are stated explicitly, separated by a space, e.g.
 "2001:0DB8:0000:CD30:0000:0000:0000:0000
 FFFF:FFFF:FFFF:FFF0:0000:0000:0000:0000".
- 1 The printout format is applying / (forward slash) subnet-prefix Classless Inter-Domain Routing (CIDR) notation, e.g.
 ":0DB8:0000:CD30:0000:0000:0000:0000/60"

<lzeros>^(num)

A numeric parameter which decides whether leading zeros are omitted or not. Setting does not apply if <format>= 0.

- 0(&F)(P) Leading zeros are omitted, e.g. "2001:DB8:0:CD30:0:0:0:0".
- 1 Leading zeros are included, e.g.
 "2001:0DB8:0000:CD30:0000:0000:0000:0000".

<czeros>^(num)

A numeric parameter which decides whether 1-n instances of 16-bit zero-values are replaced by only '::'. This applies only once. Setting does not apply if <format>= 0.

- 0(&F)(P) No zero compression, e.g. "2001:DB8:0:CD30:0:0:0:0".
- 1 Use zero compression, e.g. "2001:DB8:0:CD30::".



13.24 AT+CGCMOD PDP Context Modify

The [AT+CGCMOD](#) write command can be used to modify the specified PDP context(s) with respect to QoS profiles and TFTs. If no [<cid>](#)s are specified then all active contexts will be modified, provided the used mobile network supports that form of context modification.

If modification of a context fails, then [AT+CEER](#) may provide further informations about the reason.

The [AT+CGCMOD](#) test command returns a list of [<cid>](#)s associated with active contexts which could be modified.

Syntax

Test Command	
AT+CGCMOD=?	
Response(s)	
+CGCMOD: (list of <cid> s associated with active contexts)	
OK	
ERROR	
+CME ERROR: <err>	
Exec Command	
AT+CGCMOD	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
AT+CGCMOD= <cid> [, <cid> [, ...]]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN  Last + - -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<cid> ^(num)
Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).
1...15



14. USIM related Commands

AT commands described in this chapter are related to the Universal Subscriber Identity Module (USIM) connected to the ELS62-W.

14.1 AT+CCID USIM Card Identification Number

AT+CCID serves to query the USIM card identification number. This information is retrieved from USIM Elementary File EF_{ICCID}. For details refer to 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17].

Syntax

Test Command

AT+CCID=?

Response(s)

OK

Exec Command

AT+CCID

Response(s)

+CCID: <ICCID>

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

<ICCID>^(str)

ICCID (Integrated Circuit Card ID) of the USIM card



14.2 AT+CRSM Restricted USIM Access

AT+CRSM offers easy access of the Elementary Files on the USIM. Access to the USIM database is restricted to the commands listed with parameter `<command>`.

All parameters of **AT+CRSM** are used as defined by the specifications listed below. ELS62-W handles internally all required USIM interface locking and file selection routines.

As response to the command, the ELS62-W sends the actual USIM information parameters and response data. "+CME ERROR" may be returned if the command cannot be passed to the USIM, e.g. if the USIM is not inserted. Failures to execute the command on the USIM will be reported by the `<sw1>` and `<sw2>` parameters.

Syntax

Test Command <pre>AT+CRSM=?</pre> Response(s) <pre>OK</pre>	
Write Command <pre>AT+CRSM=<command>[, <fileID>[, <P1>, <P2>, <P3>[, <data>[, <pathId>]]]]</pre> Response(s) <pre>+CRSM: <sw1>,<sw2>[,<response>] OK ERROR +CME ERROR: <err></pre>	
PIN → Last <pre>- + -</pre>	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17] ETSI TS 102 221 [18]

Parameter Description

<code><command></code> ^(num)	
USIM command number.	
176	READ BINARY
178	READ RECORD
192	GET RESPONSE
214	UPDATE BINARY
220	UPDATE RECORD
242	STATUS
<code><fileID></code> ^(num)	
Identifier for an elementary data file on USIM, if used by <code><command></code> .	
<code><P1></code> ^(num)	
Parameter to be passed on by the ELS62-W to the USIM.	
0...255	



<P2>^(num)

Parameter to be passed on by the ELS62-W to the USIM.

0...255

<P3>^(num)

Parameter to be passed on by the ELS62-W to the USIM.

0...255

<data>^(str)

Information which shall be written to the USIM (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 file ID is allocated to several applications on the UICC and this way used twice or even more times. Therefore, to access UICC files of USIM 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 USIM 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 USIM 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.

14.3 AT+CSIM Generic USIM Access

AT+CSIM allows direct control of the USIM.

Compared to the restricted USIM access command AT+CRSM, the definition of AT+CSIM allows to take more control over the USIM interface.

However, the [USIM Application Toolkit](#) functionality is not supported by AT+CSIM. Therefore the following USIM 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 → Last - + -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17] ETSI TS 102 221 [18]

Parameter Description

<length>^(num)

Number of characters in <command> or <response> string.

The number is two times the actual length of the <command> or <response>.

<command>^(str)

Command passed on by the ELS62-W to the USIM.

Parameter length: maximum 261 Bytes.

<response>^(str)

Response data of the command returned by the USIM.

Parameter length: maximum 258 Bytes.

Notes

- Access to datafields via SELECT is only allowed to files according to 3GPP TS 11.11 [\[15\]](#), 3GPP TS 31.101 [\[16\]](#), 3GPP TS 31.102 [\[17\]](#).
- The parameter length of 261 Bytes may arise in Case 4 Command APDU's. Please refer to ETSI TS 102 221 [\[18\]](#) table 10.2.



Example

The following examples show SELECT and GET RESPONSE commands.

```
AT+CSIM=14,"A0A40000027F10"  
+CSIM: 4,"9F19"
```

SELECT DF-Telecom.
Command successful. Indicates that x19 bytes response data are available and can be requested by using GET RESPONSE.

```
OK  
AT+CSIM=14,"A0A40000026F3A"  
+CSIM: 4,"9F0F"
```

SELECT EF-ADN (Abbreviated dialing numbers).
Command successful. Indicates that x0F bytes response data are available and can be requested by using GET RESPONSE.

```
OK  
AT+CSIM=10,"A0C000000F"
```

GET RESPONSE command requests x0F bytes EF-ADN data.

```
+CSIM: 34,"000002306F3A040011F0220102011C9000"  
OK
```



14.4 AT+CCHO Open logical channel

AT+CCHO asks the UE to open a communication session with USIM. The UICC will open a new logical channel for the selected application identified by **<dfname>** and the UE shall return **<sessionid>** as response. The UE shall restrict the communication between the TE and the UICC to this logical channel.

The **<sessionid>** shall be used when sending commands with the Generic Logical Channel access **AT+CGLA** command. It will also be used with **AT+CCHC** to close the channel.

Syntax

Test Command	
AT+CCHO=?	
Response(s)	
OK	
Write Command	
AT+CCHO=<dfname>	
Response(s)	
+CCHO: <sessionid>	
OK	
ERROR	
+CME ERROR: <err>	
PIN  Last	Reference(s)
- + -	3GPP TS 27.007 [45], 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17]

Parameter Description

<dfname> ^(str)
All selectable applications in USIM are referenced by DF name coded on 1 to 16 bytes.
<sessionid> ^(num)
A session Id to be used in order to target a specific application on USIM using logical channels mechanism.



14.5 AT+CCHC Close logical channel

AT+CCHC asks the UE to close a communication session with the USIM. The UE shall close the previously opened logical channel, and no more commands can be sent on this logical channel. The UICC will close the logical channel when receiving this command.

Syntax

Test Command	
AT+CCHC=?	
Response(s)	
OK	
Write Command	
AT+CCHC=<sessionid>	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last - + -	
Reference(s)	
3GPP TS 27.007 [45], 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17]	

Parameter Description

<sessionid> ^(num)
Session Id to be used in order to target a specific application on the USIM using the logical channels mechanism. The number is the <sessionid> returned by the channel open command AT+CCHO .



14.6 AT+CGLA Generic logical channel access

AT+CGLA allows direct control of the USIM by a remote application on the TE. The UE manages the channel relevant bits of the class byte depending on the `<sessionid>` and then sends the `<command>` as it is to the USIM. The UE takes care of processing USIM information within the frame specified by GSM/UMTS. For parameter and USIM result coding please refer to 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17].

Syntax

Test Command	
AT+CGLA=?	
Response(s)	
OK	
Write Command	
AT+CGLA=<sessionid>, <length>, <command>	
Response(s)	
+CGLA: <length>,<response>	
OK	
ERROR	
+CME ERROR: <err>	
PIN → Last	Reference(s)
- + -	3GPP TS 27.007 [45], 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17]

Parameter Description

`<sessionid>`^(num)

Identifier of the session to be used in order to send the APDU commands to the USIM. The number is the `<sessionid>` returned by the channel open command **AT+CCHO**.

`<length>`^(num)

Number of characters of `<command>` or `<response>` string.

`<command>`^(str)

Command passed on by the UE to the USIM.

`<response>`^(str)

Response data of the command returned by the USIM.



14.7 AT^SSET USIM Data Ready Indication

After power-up and personalization (PIN entry if required) ELS62-W starts reading data from the USIM. `AT^SSET` controls the presentation of "`^SSIM READY`" URC which indicates that the UE has finished this initial reading. Afterwards all AT commands that depend on USIM data can be used, e.g. phonebook and SMS related AT commands.

Syntax

Test Command
<code>AT^SSET=?</code>
Response(s)
<code>^SSET:(list of supported <n>s)</code>
<code>OK</code>
Read Command
<code>AT^SSET?</code>
Response(s)
<code>^SSET: <n></code>
<code>OK</code>
<code>ERROR</code>
<code>+CME ERROR: <err></code>
Write Command
<code>AT^SSET=<n></code>
Response(s)
<code>OK</code>
<code>ERROR</code>
<code>+CME ERROR: <err></code>
PIN → Last
- + -

Unsolicited Result Code

`^SSIM READY`

This URC indicates that the UE has finished its initial USIM access.

Any attempt to access phonebook, SMS or other USIM data before having received the "`^SSIM READY`" URC, may either result in a "+CME: SIM busy" message or, in some cases, a couple of seconds delay before the command is executed.

Parameter Description

<n> (num)(&V)(&W)	
URC presentation mode	
0(&F)	Disable " <code>^SSIM READY</code> " URC.
1	Enable " <code>^SSIM READY</code> " URC.



14.8 AT^SCKS Query USIM and Chip Card Holder Status

AT^SCKS write command enables or disables the presentation of URCs to report the connection status of the USIM.

AT^SCKS read command returns the URC presentation mode and the status of the USIM connection.

Also refer to **AT^SIND**, which supplies indicator "simstatus" to monitor the USIM status.

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 → Last
- + -

Unsolicited Result Code

^SCKS: <SimStatus>

If the USIM connection status has changed an unsolicited result code (URC) is issued.

Parameter Description

<mode>^(num)(&V)(&W)	
0(&F)	Disable URC " ^SCKS ".
1	Enable URC " ^SCKS ".
<SimStatus>^(num)(&V)	
0	USIM is not inserted.
1	USIM inserted.
2	Possible reasons: The USIM interface hardware has been deactivated to prevent possible damage (e.g. if a USIM with invalid or unsupported electrical specifications has been detected). The USIM interface can be reactivated only by restarting the UE, e.g. with " AT+CFUN= n,1 ".



- In case a 5V USIM is inserted it might be possible that the USIM is not functional at all. As a result, URC "**^SCKS**: 0" occurs.

Note

- If `<mode>=1` ("**^SCKS**" URC enabled) is stored to the user profile with **AT&W** it may happen that the "**^SCKS**" URC shows up after the "**^SYSSTART**" URC although the (U)SIM connection status has not changed.

15. Phonebook Commands

The AT command(s) described in this chapter allow the external application to access

- the phonebooks on the attached Subscriber Identity Module (SIM)
- the subscriber's own number on the attached Subscriber Identity Module (SIM)

15.1 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 "LD" phonebook 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 → Last

± + -

Reference(s)

3GPP TS 27.007 [45]

Parameter Description

<storage>^(str)

"SM" ^{(&F)(P)}	USIM phonebook Capacity: depending on USIM Location: USIM
"FD"	Fixed dialing phonebook Capacity: depending on USIM Location: USIM
"LD"	Last number dialed phonebook. Stores all call numbers dialed with ATD. Capacity: Depending on USIM Location: USIM AT+CPBW command is not applicable to this storage.
"EN"	Emergency number Capacity: depending on USIM or ME Location: USIM or ME Can be accessed without entering PIN. AT+CPBW command is not applicable to this storage.
"ON"	MSISDN list Availability and capacity: depending on USIM Location: USIM

<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 USIM PIN authentication, the USIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.
- The following call history rule applies to the phonebook type "LD":
When the same number is dialed several times in direct succession, the "LD" phonebooks will store each entry, resulting in double or multiple "LD" phonebook entries related to this number.
Likewise, the phonebook will store each entry when calls from the same number are received several times.
- 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. [ATD](#) For more details about emergency numbers see notes in [ATD](#) dial command.



- Emergency number ("EN") phonebook can be accessed (using `AT+CPBS="EN"`) without entering PIN usually used by `AT+CPIN="PIN1"`. Then `AT+CPBS` read command and `AT+CPBR` write command are also possible without entering PIN.
- "LD" phonebook is only supported when corresponding Elementary File is available on USIM. Elementary Files belonging to "LD" phonebook are optional on USIM.
- The `<text>` assigned to a phone `<number>` is stored to the "LD" phonebook 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" phonebook. ABCD can be used as DTMF digits within a `ATD` dial string, but cannot be saved due to BCD limitations.
- After having locked or unlocked the "FD" phonebook using the command `AT+CLCK="FD",1 or 0,"PIN2"` the refresh mechanism takes some seconds, therefore it is not possible to see the "SM" phonebook shortly after entering the lock or unlock command.
- The "SM" phonebook may or may not be available when FD lock is activated (see `AT+CLCK`), depending on USIM and its configuration.
- "LD" phonebook stores all call numbers dialed with ATD (except `*#` sequences). For details see Section 20.1, [Star-Hash \(*#\) Network Commands](#).

15.2 AT+CPBF Find phonebook entries

The [AT+CPBF](#) write command searches the current phonebook for alphanumeric field entries starting with the given [<findtext>](#) string. The write command response returns all found entries sorted in alphanumeric order. Entry fields returned are [<location>](#) number, phone [<number>](#) stored there (of format [<type>](#)) and [<text>](#) associated with the number.

The [AT+CPBF](#) test command returns the maximum lengths of [<nlength>](#) and [<tlength>](#) fields.

For extended USIM phonebook features there are several additional parameters ([<group>](#), [<adnumber>](#), [<adtype>](#), [<secondtext>](#), [<email>](#), [<sip_uri>](#) and [<tel_uri>](#)) possible.

Syntax

Test Command

AT+CPBF=?

Response(s)

+CPBF: [<nlength>](#), [<tlength>](#)[, [<glength>](#), [<slength>](#), [<elength>](#), [<siplength>](#),
[<tellength>](#)]

OK

ERROR

+CME ERROR: [<err>](#)

Write Command

AT+CPBF=[<findtext>](#)

Response(s)

+CPBF: [<location>](#), [<number>](#), [<type>](#), [<text>](#)[, [<group>](#), [<adnumber>](#), [<adtype>](#),
[<secondtext>](#), [<email>](#), [<sip_uri>](#), [<tel_uri>](#)]

OK

ERROR

+CME ERROR: [<err>](#)

PIN → 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). For possible values and further details see [<type>](#) parameter specified for [AT+CPBR](#) and [AT+CPBW](#).

[<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](#).



<group>^{(str)(+CSCS)}

Indication of a group the entry may belong to. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response <glength>. 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](#).

<adnumber>^(str)

Additional phone number in format specified by <adtype>. Parameter must be present, although it may be an empty string. Alphabetic characters are not permitted. The <adnumber> may contain dialstring modifiers "*", "#", "+" or "P".

<adtype>^(num)

Additional type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi).

If <adtype> is not specified the unknown <adtype>=129 is used. Supported values are:

128	Restricted <adnumber> includes unknown type and format.
145	Dialing string <adnumber> must include international access code character "+".
161	National number <adnumber>. The network support for this type is optional.
209	Dialing string <adnumber> will be saved as ASCII string.
255	Dialing string <adnumber> is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
129	Unknown number <adnumber>.

<secondtext>^{(str)(+CSCS)}

Second text assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response <slength>. 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](#).

<email>^{(str)(+CSCS)}

Email field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response <elength>. 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](#).

<sip_uri>^{(str)(+CSCS)}

SIP number field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response <siplength>. 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](#).

<tel_uri>^{(str)(+CSCS)}

TEL number field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response <tellength>. 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](#).

<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 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 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17], Annex B.

<glength>^(num)

Maximum length of **<group>** assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter **<tlength>**.

<slength>^(num)

Maximum length of **<secondtext>** assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter **<tlength>**.

<elength>^(num)

Maximum length of **<email>** assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter **<tlength>**.

<siplength>^(num)

Maximum length of **<sip_uri>** assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter **<tlength>**.

<tellength>^(num)

Maximum length of **<tel_uri>** assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter **<tlength>**.

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.
- The search in the dialed calls (DC) phonebook is not supported.
- For extended USIM phonebook features please check with **AT+CPBF** test command which parameters are possible.
- The handling of extended USIM phonebook features is controlled by the user (e.g. saved phonebook entries cannot be dialed, no handling of '+' in international numbers, no support for Supplementary Service, i.e. '**#' codes, etc.).

Examples

EXAMPLE 1



```
AT+CPBF=?
```

```
+CPBF: 40,16
```

```
AT+CPBF="Charlie"
```

```
+CPBF:1,"+999999",145,"Charlie"
```

First run the [AT+CPBF](#) test command to find out the lengths of [<nlength>](#) and [<tlength>](#) in the active phonebook.

ELS62-W returns the supported values, where 40 is the maximum length of the phone number and 16 is the maximum length of the associated text.

Then use the [AT+CPBF](#) write command to find any [<text>](#) string in the phonebook.

EXAMPLE 2

The following example shows the extended parameters when using an USIM.

Please have a look to the sample of write (via [AT+CPBW](#)) and read (via [AT+CPBR](#)) phonebook entry of location 10.

```
AT+CPBF="A"
```

```
+CPBF:
```

```
10,"07032002",129,"Alec","z","+311028128",145,"Boss","alec.user@here.com","sip:+49-30-123@domain","tel:+49-30-123"
```

15.3 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 parentheses.

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.

For extended USIM phonebook features there are several additional parameters (<group>, <adnumber>, <adtype> <secondtext>, <email>, <sip_uri> and <tel_uri>) possible.

Syntax

Test Command AT+CPBR=? Response(s) +CPBR: (1-<maxloc>), <nlength>, <tlength>[, <glength>, <slength>, <elength>, <siplength>, <tellength>] OK ERROR +CME ERROR: <err>	
Write Command AT+CPBR=<location1>[, <location2>] Response(s) [+CPBR: <location1>, <number>, <type>, <text>[, <group>, <adnumber>, <adtype>, <secondtext>, <email>, <sip_uri>, <tel_uri>]] [+CPBR: <location2>, <number>, <type>, <text>[, <group>, <adnumber>, <adtype>, <secondtext>, <email>, <sip_uri>, <tel_uri>]] OK ERROR +CME ERROR: <err>	
PIN → Last ± + -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 24.008 [39], 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17]

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 `<max-loc>`, the list of entries will be output and terminated with "OK". If `<location2>` exceeds the range indicated by the test command parameter `<maxloc>`, the list of entries will be output but 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). Possible values are:

128	Restricted <code><number></code> includes unknown type and format.
145	Dialing string <code><number></code> includes international access code character '+'. National number <code><number></code> . Network support of this type is optional.
161	
209	Dialing string <code><number></code> 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 <code><number></code> contains "*", "#" characters for Supplementary Service codes. 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](#).

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

Indication of a group the entry may belong to. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response `<glength>`. 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](#).

`<adnumber>(str)`

Additional phone number in format specified by `<adtype>`. Parameter must be present, although it may be an empty string. Alphabetic characters are not permitted. `<adnumber>` may contain dialstring modifiers "*", "#" or "+".

`<adtype>(num)`

Additional type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi).

If `<adtype>` is not specified the unknown `<adtype>`=129 is used. Supported values are:

128	Restricted <code><adnumber></code> includes unknown type and format.
145	Dialing string <code><adnumber></code> must include international access code character "+". National number <code><adnumber></code> . The network support for this type is optional.
161	



209	Dialing string <adnumber> will be saved as ASCII string.
255	Dialing string <adnumber> is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
129	Unknown number <adnumber> .

[<secondtext>](#)^{(str)(+CSCS)}

Second text assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response [<slength>](#). 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](#).

[<email>](#)^{(str)(+CSCS)}

Email field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response [<elength>](#). 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](#).

[<sip_uri>](#)^{(str)(+CSCS)}

SIP number field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response [<siplength>](#). 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](#).

[<tel_uri>](#)^{(str)(+CSCS)}

TEL number field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response [<tellength>](#). 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 location number for 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 [<type>](#)=209.

[<tlength>](#)^(num)

Maximum amount of memory of [<text>](#) assigned to the telephone number in bytes. The value is shown in the [AT+CPBR](#) test command response. For details please see [AT+CPBW](#) parameter [<tlength>](#).

[<glength>](#)^(num)

Maximum length of [<group>](#) assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter [<tlength>](#).

[<slength>](#)^(num)

Maximum length of [<secondtext>](#) assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter [<tlength>](#).



<elength>^(num)

Maximum length of <email> assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter <tlength>.

<siplength>^(num)

Maximum length of <sip_uri> assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter <tlength>.

<tellength>^(num)

Maximum length of <tel_uri> assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter <tlength>.

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.
- When a supplementary service command was stored to the phonebook along with a "+" within the phone number please note that the UE 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](#) read command. [ATD](#) For more details about emergency numbers see notes in [ATD](#) dial command.
- Emergency number ("EN") phonebook can be accessed (using [AT+CPBS="EN"](#)) without entering PIN usually used by [AT+CPIN="PIN1"](#). Then [AT+CPBS](#) read command and [AT+CPBR](#) write command are also possible without entering PIN.
- There is no restriction reading unsupported values for <type>.
- For extended USIM phonebook features please check with [AT+CPBR](#) test command which parameters are possible.
- The handling of extended USIM phonebook features is controlled by the user (e.g. saved phonebook entries cannot be dialed, no handling of '+' in international numbers, no support for Supplementary Service, i.e. '*' codes, etc.).

Examples

EXAMPLE 1

```
AT+CPBR=?
```

```
+CPBR: (1-100),20,17
```

```
AT+CPBR=1,3
```

```
+CPBR: 1,"+999999",145,"Charlie"
```

```
+CPBR: 2,"+777777",145,"Bill"
```

```
+CPBR: 3,"+888888",145,"Arthur"
```

First run the [AT+CPBR](#) test command to find out the maximum range of entries stored in the active phonebook.

ELS62-W 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.

Then use the [AT+CPBR](#) write command to display the phonebook entries sorted by location numbers.

EXAMPLE 2

The following example shows the extended parameters when using an USIM.

Please have a look to the sample of write (via [AT+CPBW](#)) and read (via [AT+CPBR](#)) phonebook entry of location 10.



```
AT+CPBR=10
```

```
+CPBR:
```

```
10,"07032002",129,"Alec","z","+311028128",145,"Boss","alec.user@here.com","sip:+49-30-123@domain","tel:+49-30-123"
```



15.4 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 parentheses.

For extended USIM phonebook features there are several additional parameters (**<group>**, **<adnumber>**, **<adtype>** **<secondtext>**, **<email>**, **<sip_uri>** and **<tel_uri>**) possible.

Syntax

Test Command AT+CPBW=? Response(s) +CPBW: (1-<maxloc>), <nlength>, (list of supported <type>s), <tlength>[, <glength>, <slength>, <elength>, <siplength>, <tellength>] OK ERROR +CME ERROR: <err>	
Write Command AT+CPBW=[<location>][, <number>[, <type>[, <text>[, <group>[, <adnumber>[, <adtype>[, <secondtext>[, <email>[, <sip_uri>[, <tel_uri>]]]]]]]]] Response(s) OK ERROR +CME ERROR: <err>	
PIN → Last + + -	Reference(s) 3GPP TS 27.007 [45], 3GPP TS 24.008 [39], 3GPP TS 11.11 [15], 3GPP TS 31.101 [16], 3GPP TS 31.102 [17]

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. The <number> may contain dialstring modifiers "*", "#", "+" or "P". If other printable special characters or alphabetic characters are used the entry needs to be saved with <type>=209. 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). If **<type>** is not specified:

- if **<number>** starts with "+", **<type>** 145 is used
- otherwise, **<type>** 129 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. Note that phonebook entries saved with this type cannot be dialed.
255	Dialing string <number> contains "*", "#" characters for Supplementary Service codes. Network support of this type is optional.
129	Unknown number. If <number> contains a leading "+", the "+" sign will be 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](#).

<group>^{(str)(+CSCS)}

Indication of a group the entry may belong to. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response **<glength>**. 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](#).

<adnumber>^(str)

Additional phone number in format specified by **<adtype>**. Parameter must be present, although it may be an empty string. Alphabetic characters are not permitted. The **<adnumber>** may contain dialstring modifiers "*", "#", "+" or "P".

<adtype>^(num)

Additional type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi).

If **<adtype>** is not specified the unknown **<adtype>**=129 is used. Supported values are:

128	Restricted <adnumber> includes unknown type and format.
145	Dialing string <adnumber> must include international access code character "+".
161	National number <adnumber> . The network support for this type is optional.
209	Dialing string <adnumber> will be saved as ASCII string.
255	Dialing string <adnumber> is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
129	Unknown number <adnumber> .

<secondtext>^{(str)(+CSCS)}

Second text assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response **<slength>**. 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](#).



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

Email field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response `<elength>`. 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](#).

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

SIP number field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response `<siplength>`. 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](#).

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

TEL number field assigned to the phonebook entry. Parameter must be present, although it may be an empty string. The maximum length of this parameter is given in the test command response `<tellength>`. 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 $2 \times \text{<nlength>}$ 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 amount of memory of `<text>` assigned to the telephone number in bytes. The value is shown in the [AT+CPBW](#) test command response.

An internal optimization mechanism enables the UE to choose the most efficient method of storing `<text>`: Depending on the entered `<text>` characters, the UE internally converts them either to GSM or UCS2 alphabet, no matter which character set the TE is using for input and output (configured with [AT+CSCS](#)). For example, if [AT+CSCS](#)="UCS2" and, therefore, the TE enters the letter "A" as "0041" (two bytes) it is possible that the UE converts it to GSM alphabet, thus requiring only one byte of memory.

Note that escape sequences used in GSM coding require two bytes. Example: The € symbol will be stored as escape sequence "\1Be" in GSM, and "20AC" in UCS2.

For strings in UCS2 there are three different coding schemes. For detailed descriptions please refer to 3GPP TS 11.11 [\[15\]](#), 3GPP TS 31.101 [\[16\]](#), 3GPP TS 31.102 [\[17\]](#), Annex B.

`<glength>^(num)`

Maximum length of `<group>` assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter `<tlength>`.

`<slength>^(num)`

Maximum length of `<secondtext>` assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter `<tlength>`.



<elength>^(num)

Maximum length of <email> assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter <tlength>.

<siplength>^(num)

Maximum length of <sip_uri> assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter <tlength>.

<tellength>^(num)

Maximum length of <tel_uri> assigned to the phonebook entry. For GSM or UCS2 character coding details see parameter <tlength>.

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 for more details [AT+CPBS](#) select command which phonebook <storage> is possible to write by the user.
- For extended USIM phonebook features please check with [AT+CPBW](#) test command which parameters are possible.
- The handling of extended USIM phonebook features is controlled by the user (e.g. saved phonebook entries cannot be dialed, no handling of '+' in international numbers, no support for Supplementary Service, i.e. '**#' codes, etc.).
- 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, "432P76554*654#", 129, "John"
+CPBR: 7, "432P76554*654#", 129, "Eve"
+CPBR: 8, "+432P76554*654#", 145, "Tom"
+CPBR: 9, "432!P-765 () &54*654#", 209, "Richard"
```



EXAMPLE 5

The following example shows the extended parameters when using an USIM.

Please have a look to the sample of write (via [AT+CPBW](#)) and read (via [AT+CPBR](#)) phonebook entry of location 10.

```
AT+CPBW=10,"07032002",129,"Alec","z","+311028128",145,"Boss","alec.user@here.com","  
sip:+49-30-123@domain","tel:+49-30-123"  
AT+CPBR=10  
+CPBR:  
10,"07032002",129,"Alec","z","+311028128",145,"Boss","alec.user@here.com","sip:+49-  
30-123@domain","tel:+49-30-123"
```



15.5 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 → Last	Reference(s)
+ + -	3GPP TS 27.007 [45]

Parameter Description

<alpha> ^(str)
Optional alphanumeric string associated with <number>.
<number> ^(str)
Phone number in format specified by <type>.
<type> ^(num)
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.
- The subscribers own number(s) are stored in the "ON" phonebook and can be set using the [AT+CPBW](#) command.
- 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. Audio Commands

The AT Commands described in this chapter are related to the ELS62-W's audio interface.

IMPORTANT: Audio AT commands offer full functionality only if the Digital Audio Interface is enabled with `AT^SCFG="GPIO/mode/DAI","std"`. If DAI resources are not available (`AT^SCFG="GPIO/mode/DAI" = "gpio" or "rsv"`) then the Test command format is usable for all DAI related audio AT commands, but Read / Write / Exec commands are blocked and will respond "+CME ERROR: operation not allowed". The two commands `AT+VTD` and `AT+VTS` are usable regardless of "GPIO/mode/DAI" settings.

16.1 AT+CMUT Mute control

The `AT+CMUT` command mutes the microphone input during a voice call. The `AT+CMUT` write command can be used in all audio modes (incl. audio mode 1). See `AT^SNFS` for more details on the various audio modes.

When a voice call is made, or the audio mode is changed with `AT^SNFS` during an active voice call, mute mode will automatically be switched off (+CMUT: 0). After the voice call has finished +CMUT: 1 will be set again.

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 → Last - + -	Reference(s) 3GPP TS 27.007 [45]

Parameter Description

<mute> ^(num)	
0	Mute off
1 ^(P)	Mute on



16.2 AT+VTS DTMF and tone generation

AT+VTS is intended to send ASCII character which cause the Mobile Switching Center (MSC) to transmit DTMF tone to a remote subscriber. The command can only be used during active voice calls and offers the following options:

- AT+VTS=<dtmf>[,<duration>]** allows to send a single DTMF tone. The duration can be individually determined during the call.
If **<duration>** is not given the duration is determined by **AT+VTD**.

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 → Last	Reference(s)
- - -	3GPP TS 27.007 [45]

Parameter Description

<dtmf>^(str)

Single ASCII character in the set 0...9,#,*, A, B, C, D. The string single ASCII character must be enclosed in quotation marks ("...").

<duration>^(num)

Tone duration 20ms with tolerance. After startup, tone duration will be 300 ms.

The minimum duration of DTMF signals is 20ms. DTMF tones below 20ms cannot be generated.

20...300^(P)...1000



16.3 AT+VTD Tone duration

This command refers to an integer `<duration>` that defines the length of tones transmitted with the `AT+VTS` command.

Syntax

Test Command	
AT+VTD=?	
Response(s)	
+VTD: (list of supported<duration>s)	
OK	
Read Command	
AT+VTD?	
Response(s)	
<duration>	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
AT+VTD=<duration>	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN  Last	Reference(s)
- - -	3GPP TS 27.007 [45]

Parameter Description

<duration> ^(num)
Duration of the DTMF signal in 20ms with tolerance. After startup, tone duration will be 300 ms.
20...300 ^(P) ...1000



16.4 AT^SAIC Audio Interface Configuration

AT^SAIC can be used to configure the analog or digital audio interface as PCM and as I²S. Further information regarding audio functionality is available in the "ELS62-W Hardware Interface Description" [2].

Syntax

Test Command

AT^SAIC=?

Response(s)

^SAIC: (list of supported <io>s), (list of supported <mic>s), (list of supported <ep>s), (list of supported <bclk>s), (list of supported <mode>s), (list of supported <frame_mode>s), (list of supported <clk_mode>s), (list of supported <sample_rate>s), (list of supported <sample_format>s)
OK

Read Command

AT^SAIC?

Response(s)

^SAIC: <io>, <mic>, <ep>, <bclk>, <mode>, <frame_mode>, <clk_mode>, <sample_rate>, <sample_format>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SAIC=<io>, <mic>, <ep>, <bclk>, <mode>, <frame_mode>, <clk_mode>, <sample_rate>, <sample_format>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

<io>^{(num)(NV)}

Input and output selection

Setting takes effect after next restart.

1 ^(D)	Digital input and output (PCM)
2	Analog input and output
3	Digital input and output (I ² S)

<mic>^{(num)(NV)}

Microphone selection

1 ^(D)	Microphone 1
------------------	--------------

<ep>^{(num)(NV)}

Select differential earpiece amplifier

1 ^(D)	Selects the earpiece amplifier 1
------------------	----------------------------------



<bclk>^{(num)(NV)}

Parameter configures the Bit Clock (BCLK) signal for PCM and I²S.
Parameter is always mandatory, but only effective if **<io>=1** (PCM).
On the I²S bus BCLK is always either 256 kHz at 8 kHz sample rate, or 512 kHz at 16 kHz sample rate, regardless of the value selected with **<bclk>**.

The parameter value is dependent of **<sample_rate>**.

1	256 kHz Bit Clock if <sample_rate>= 0 512 kHz Bit Clock if <sample_rate>= 1
2	512 kHz Bit Clock if <sample_rate>= 0 1024 kHz Bit Clock if <sample_rate>= 1
3 ^(D)	2048 kHz Bit Clock if <sample_rate>= 0 4096 kHz Bit Clock if <sample_rate>= 1

<mode>^{(num)(NV)}

Master mode for PCM and I²S. It specifies BCLK and FSC signals as output (Master).
Parameter is always mandatory.

0 ^(D)	Master mode
------------------	-------------

<frame_mode>^{(num)(NV)}

Parameter configures the Frame Synchronization (FSC) signal.
Parameter is always mandatory, but only effective if **<io>=1** (PCM).
I²S always uses a 32 bit stereo voice signal (16 bit word length) regardless of the value selected with **<frame_mode>**.

0 ^(D)	Long frame
1	Short frame

<clk_mode>^{(num)(NV)}

Clock mode

1 ^(D)	BCLK signal will be provided only during digital audio activity (non permanent).
------------------	--

<sample_rate>^{(num)(NV)}

Sample rate.

0 ^(D)	8 kHz
1	16 kHz

<sample_format>^{(num)(NV)}

Sample format.

0 ^(D)	16 bits per sample
------------------	--------------------

Note

- The delivery default values of **AT^SAIC** are ^SAIC: 1,1,1,3,0,0,1,0,0 for every audio mode, and may be overridden from non-volatile setting.



16.5 AT^SNFI Set microphone path parameters

AT^SNFI controls microphone settings. The AT^SNFI read and write command parameters are related to the active audio mode set with AT^SNFS.

Syntax

Test Command

AT^SNFI=?

Response(s)

^SNFI: (list of supported <inVolStep>s), (list of supported <inpgaStep>s), (list of supported <adclStep>s)

OK

Read Command

AT^SNFI?

Response(s)

^SNFI: <inVolStep>, <inpgaStep>, <adclStep>

OK

ERROR

+CME ERROR: <err>

Write Command

AT^SNFI=<inVolStep>, <inpgaStep>, <adclStep>

Response(s)

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

<inVolStep>^(num)

0...48

Microphone gain ranging from from -36 dB to 12 dB, adjustable in steps of 1 dB. (0 = -36 dB, 1 = -35 dB, 48 = 12 dB).

This parameter is valid for all supported interfaces, it can be set to different values for different interfaces in one audio mode.

<inpgaStep>^(num)

0...4

Microphone path gain ranging from 0 dB to 24 dB, adjustable in steps of 6 dB. (0 = 0 dB, 1 = 6 dB, 4 = 24 dB)

This parameter is only valid when the Analog interface is selected, it will not be displayed and has no effect for the Digital interface.

<adclStep>^(num)

0^(P)

Fixed value.



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](#) are volatile for the current audio mode.
- Parameters `and` are used only when analog interface (see [AT^SAIC](#)) is chosen.



16.6 AT^SNFO Set audio output parameter (loudspeaker path)

AT^SNFO controls the audio output path amplification. The AT^SNFO read and write command parameters are related to the active audio mode set with AT^SNFS.

Syntax

Test Command

AT^SNFO=?

Response(s)

^SNFO: (list of supported <outVolStep>s), (list of supported <sideToneStep>s), (list of supported <spkStep>s)

OK

Read Command

AT^SNFO?

Response(s)

^SNFO: <outVolStep>, <sideToneStep>, <spkStep>

OK

ERROR

+CME ERROR: <err>

Write Command

AT^SNFO=<outVolStep>, <sideToneStep>, <spkStep>

Response(s)

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

<outVolStep>^(num)

0...11

The volume of the output path can be adjusted from -36 dB to 0 dB. Parameter value 0 has the special meaning to act as mute.

For <audMode> 1, 2, and 3

The selectable gains of analog and digital audio interfaces are:

Mute, -36dB, -32dB, -28dB, -24dB, -20dB, -16dB, -12dB, -8dB, -4dB, 0dB, 0dB.

For <audMode> 4, 5, and 6

The selectable gains of analog audio interface are:

Mute, -30dB, -27dB, -24dB, -21dB, -18dB, -15dB, -12dB, -9dB, -6dB, -3dB, 0dB.

The selectable gains of digital audio interface are:

mute, -15dB, -12dB, -9dB, -6dB, -3dB, -0dB, -0dB, -0dB, -0dB, 0dB.

This parameter is valid for all supported interfaces, it can be set to different values for different interfaces in one audio mode.

<sideToneStep>^(num)

0^(P)

Fixed value.



`<spkStep>^(num)`

0^(P)

Fixed value.

Note

- 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!



16.7 AT^SNFS Select audio hardware set

AT^SNFS specifies the audio mode required for the connected equipment.

The AT^SNFS write command serves to set the audio mode required for the connected equipment.

The AT^SNFS read command indicates the currently selected audio mode.

The settings of AT^SAIC as well as AT^SNFI and AT^SNFO are individual for each audio mode set with AT^SNFS. Therefore, changing the audio mode may also change the configuration of AT^SAIC, AT^SNFI and AT^SNFO. To tune device specific audio settings for an audio mode first select the audio mode with AT^SNFS and then select the desired AT^SAIC, AT^SNFI and AT^SNFO settings. All audio settings are volatile. It is recommended to configure the interface settings for all employed audio modes during initialization after module startup. Further information regarding audio functionality is available in the "ELS62-W Hardware Interface Description" [2].

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 → Last
- + -

Parameter Description

<audMode> ^(num)	
1 ^(P)	Audio mode 1: Standard mode. Optimized for the reference handset that can be connected to the audio interface (see "ELS62-W Hardware Interface Description" for information on this handset). Note: The powerup default parameters are determined for type approval.
2	Audio mode 2: Echo canceller and noise suppressor are preset for basic handsfree usage.
3	Audio mode 3: Echo canceller and noise suppressor are preset for user headset usage.
4	Audio mode 4: Reserved value.



- 5 Audio mode 5: Reserved value.
- 6 Audio mode 6: Direct access to speech codec. Echo canceller and noise suppressor are disabled for transparent applications.



16.8 AT^SRTC Ring tone configuration

The **AT^SRTC** read command returns the current **<type>** and current **<volume>**. The read command can be used while test playback is off or on. In the latter case, see execute command for details.

The **AT^SRTC** execute command is intended only for testing. It starts to play a melody from the audio output currently selected with **AT^SAIC**. To deactivate test playback use **AT^SRTC** again. During test playback, you can enter the write command to select another melody and adjust the volume. Also, you can enter the read command to check the type and volume of the current ring tone, and to view the status of playback (on / off).

The **AT^SRTC** write command chooses the type and volume of ring tones. The selected **<type>** and **<volume>** are stored non-volatile. The only exception is **<type>=0** which is not stored because it is intended only to quickly stop the tone currently played. So **<type>=0** only stops immediately the audible ring tone, but does not terminate the RING URC. In this case the **AT^SRTC** write command returns only OK.

Syntax

Test Command

AT^SRTC=?

Response(s)

^SRTC: (list of supported) **<type>**s, (list of supported) **<volume>**s
OK

Read Command

AT^SRTC?

Response(s)

^SRTC: **<type>**, **<volume>**, **<status>**
OK
ERROR
+CME ERROR: **<err>**

Exec Command

AT^SRTC

Response(s)

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

Write Command

AT^SRTC=**<type>**[, **<volume>**]

Response(s)

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

PIN → Last

- + -



Parameter Description

<type>^{(num)(NV)}

Type of ring tone. You have a choice of 8 different ring tones and melodies. All will be played from the audio output selected with the `AT^SAIC` command. `<type>=0` is only intended for stopping of current ringtone playback.

0	Stops the currently played tone immediately
1	Sequence 1
2	Sequence 2
3 ^(D)	Sequence 3
4	Sequence 4
5	Sequence 5
6	Sequence 6
7	Sequence 7
8	Sequence 8

<volume>^{(num)(NV)}

Volume of ring tone, varies from low to high.

0 ^(D)	Mute
1	Very low
2	Low
3	Middle
4	High

<status>^(num)

Status of test ringing. Indicates whether or not a melody is currently being played back for testing.

0	Switched off
1	Switched on

Note

- Before first using ring tones note that the following settings apply:
We have chosen to let you decide your own preferences when you start using ring tones. Therefore, factory setting is `^SRTC: 3,0,0` (ring tones are muted). To activate ring tones for the very first time, first enter the write command and simply change the volume. After applying a firmware update the volume and type selected before the firmware update will be preserved.



17. Hardware related Commands

All AT commands described in this chapter are related to the hardware interface of the ELS62-W. Further information regarding this interface is available in the ["ELS62-W Hardware Interface Description, Revision 02.200"](#).

17.1 AT+CCLK Real Time Clock

[AT+CCLK](#) controls the real time clock (RTC) of ELS62-W.

If a network supports automatic time update, the RTC is constantly updated with the network time. Any changes to the RTC using the command [AT+CCLK](#) will be wiped out by the network time. If a network does not support automatic time update, the RTC can be set using [AT+CCLK](#).

Each time the UE is restarted, it may take up to two seconds to reinitialize the RTC and to update the current time. Therefore, it is recommended to delay the usage of [AT+CCLK](#) and [AT+CALA](#) after restart.

If the clock is set into the past, it is recommended to reset the UE using [AT+CFUN](#) to avoid blocked calls because of the autocall restriction.

The current setting of the clock is retained if the UE enters Power Down mode via [AT^SMSO](#) or restarts using [AT+CFUN](#). However, it will be reset to its factory default value if the UE is totally disconnected from power.

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 → Last	Reference(s)
- + -	3GPP TS 27.007 [45]

Parameter Description

<time>^{(str)(NV)}

Real time clock setting

Format is "yy/mm/dd, hh:mm:ss+zz", where the characters yy indicate the two last digits of the year, followed by month (mm), day (dd), hour (hh, 24 hour format), minutes (mm), seconds (ss), and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -96...+96).

For the write command the year can only set between 2000 and the end of 2037. For example, the 6th of July 2017 at ten past ten in the evening, GMT+2 equates to "17/07/06,22:10:00+08".

The factory delivery value, which is also used if the UE was totally disconnected from power, is "70/01/



01,00:00:00+32", where "70" here stands for "1970".

The factory delivery value, which is also used if the UE was totally disconnected from power, is "80/01/06,00:00:00", where "80" here stands for "1980".

So `<time>` values as response of the read command are ambiguous if the year part is `> "79"`. To be sure that in such cases the correct time is used, it should be set explicitly using the `AT+CCLK` write command.

Note

- If automatic time zone update is enabled and a time zone update occurs additional time zone information will be appended to parameter `<time>` in the format `+CCLK: "yy/mm/dd,hh:mm:ss+zz"` or `+CCLK: "yy/mm/dd,hh:mm:ss-zz"`. Time zone is displayed only when enabled with `AT+CTZU` and provided by the network. See `AT+CTZU` for more information.

Please note that the `AT+CCLK` command, the `AT+CTZU` URC and the `AT^SIND "nitz"` URC employ different formats of time and time zone indication. The formats are compliant with 3GPP TS 27.007 [45].

The time zone parameter (zz of `AT+CCLK`, `<nitzTZ>` of `AT+CTZU` and `<nitzTZ>` of `AT^SIND "nitz"`) is given as a positive (east) or negative (west) offset from the UTC in units of 15 minutes. Depending on the network the `AT+CTZU` URC and the `AT^SIND "nitz"` URC may additionally show the daylight saving time (DST) expressed in hours. This parameter is not appended to the `AT+CCLK` response.

Example:

The local time Berlin 17/09/21, 11:37:24 is equivalent to following network triggered time indication:

Response `+CCLK: "yy/mm/dd,hh:mm:ss+zz"`

`+CCLK: "17/09/21,09:37:24+08"` (= UTC + 2 hours time zone offset)

URC: `+CTZU: <nitzUT>,<nitzTZ>[,<nitzDST>]`

`+CTZU: "17/09/21,09:37:18",+08,1` (= UTC + 2 hours time zone offset and 1 hour DST)

URC: `+CIEV: "nitz",<nitzUT>,<nitzTZ>[,<nitzDST>]`

`+CIEV: "nitz","17/09/21,09:37:18",+08,1` (= UTC + 2 hours time zone offset and 1 hour DST)



17.2 AT+CALA Alarm Configuration

AT+CALA allows to set an alarm time for the ELS62-W. For further details on the UE's real time clock (RTC) refer to ["ELS62-W Hardware Interface Description, Revision 02.200"](#). When the alarm time is reached and alarm is executed the UE presents an Unsolicited Result Code (URC), and the alarm time is reset to "00/01/01,00:00:00". The alarm can adopt two functions, depending on whether or not you switch the UE off after setting the alarm:

- Reminder message: You can use the alarm function to generate reminder messages. For this purpose, set the alarm as described below and do not switch off or power down the UE. When executed the message comes as "+CALA" URC which optionally may include a user defined `<text>`.
- Alarm mode: You can use the alarm function to restart the UE when powered down. For this purpose, set the alarm as described below. Then power down the UE via **AT+SMSO**. When the alarm time is reached the UE will power on with Normal Functionality level, which is indicated by "^SYSSTART" URC presentation. An additional "+CALA" URC with user defined `<text>` can be configured.

AT+CALA test command returns the supported array index values `<n>`, the supported alarm types `<type>` and the maximum length of the text `<tlength>`.

AT+CALA read command returns the current alarm settings.

Syntax

Test Command

AT+CALA=?

Response(s)

+CALA: (list of supported `<n>`s), (list of supported `<type>`s), (supported `<tlength>`)

OK

ERROR

+CME ERROR: `<err>`

Read Command

AT+CALA?

Response(s)

+CALA: `<time>`, `<n>`, `<type>`, `<text>`

+CALA: `<time>`, `<n>`, `<type>`, `<text>`

+CALA: ...

OK

ERROR

+CME ERROR: `<err>`

Write Command

AT+CALA=`<time>`[, `<n>`[, `<type>`[, `<text>`]]]

Response(s)

OK

ERROR

+CME ERROR: `<err>`

PIN → Last

- + -

Reference(s)

3GPP TS 27.007 [45]

Unsolicited Result Codes

URC 1

+CALA: [`<text>`]

Indicates reminder message.



URC 2

```
^SYSSTART
+CALA: [<text>]
```

Indicates UE wake-up at functionality level [AT+CFUN=1](#) (Normal mode).

URC 3

```
^SYSSTART AIRPLANE MODE
+CALA: [<text>]
```

Indicates UE wake-up at functionality level [AT+CFUN=0](#) or [AT+CFUN=4](#) (Airplane mode).

Parameter Description

<time>^(str)

Format is "yy/MM/dd,hh:mm:ss". For example, 6th of July 2015, 22:10:00 equals to "15/07/06,22:10:00". See also [AT+CCLK](#).

To clear a given alarm before its scheduled time simply enter an empty string "" for parameter **<time>**. This will also clear a given **<text>**.

<n>^(num)

Integer type value indicating the array index of the alarm.

[0]...4

<type>^(num)

Integer type value indicating the type of the alarm.

0 Alarm indication: text message on AT command instance

<text>^(str)

String type value indicating the text to be displayed when alarm time is reached; maximum length is **<tlength>**. By factory default, **<text>** is undefined.

Note: **<text>** will be stored to the non-volatile flash memory when the device enters the Power Down mode via [AT+SMO](#). Once saved, it will be available upon next power-up, until you overwrite it by typing another text. This eliminates the need to enter the full string when setting a fresh alarm.

<text> should not contain characters which are coded differently in ASCII and GSM (e.g. umlauts), see also "Supported character sets" and "GSM alphabet tables".

<tlength>^(num)

Integer type value indicating the maximum length of **<text>**. The maximum length is 16.

Notes

- After the alarm was executed the parameter **<time>** of [AT+CALA](#) will be reset to "00/01/01,00:00:00", but **<text>** will be preserved as described above.
- If UE is totally disconnected from power supply, [AT+CALA](#) will be reset to "00/01/01,00:00:00".

Examples

EXAMPLE 1

You may want to configure a reminder message for July 31, 2015, at 9.30h, including the message "Good Morning".

```
AT+CALA="15/07/31,09:30:00",0,0,"Good Morning"
OK
```

Do not switch off the UE. When the alarm occurs the UE returns the following URC:



```
+CALA: Good Morning
```

EXAMPLE 2

To set a fresh alarm using the same message as in Example 1, simply enter date and time. `<n>`, `<type>` and `<text>` can be omitted:

```
AT+CALA="15/07/31,08:50:00"  
OK
```

When the alarm is executed the URC comes with the same message:

```
+CALA: Good Morning
```

EXAMPLE 3

To enable the UE to wake up into Alarm mode, e.g. on July 20, 2015, at 8.30h, enter

```
AT+CALA="15/07/20,08:30:00"  
OK
```

Next, power down the UE:

```
AT^SMSO  
OK
```

When the alarm is executed the UE wakes up to functionality level (`AT+CFUN`) which was valid before power down and displays a URC. If available, this line is followed by the individual `<text>` most recently saved.

```
^SYSSTART  
+CALA: Good Morning
```



17.3 AT^SBV Battery/Supply Voltage

[AT^SBV](#) allows to monitor the supply (or battery) voltage of the module. The voltage is periodically measured. The displayed value is averaged.

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 [\[2\]](#). If the measured average voltage drops below or rises above the given voltage thresholds the UE will report alert messages by sending the "^SBC" URCs listed in Section [1.8.1](#), [Common URCs](#).

Syntax

Test Command

AT^SBV=?

Response(s)

OK

ERROR

+CME ERROR: [<err>](#)

Exec Command

AT^SBV

Response(s)

^SBV: [<Voltage>](#)

OK

ERROR

+CME ERROR: [<err>](#)

PIN  Last

- + -

Parameter Description

[<Voltage>](#)^(num)

Supply (or battery) voltage in mV



17.4 AT^SCTM Critical Operating Temperature Monitoring

AT^SCTM allows to monitor the operating temperature range of the ELS62-W device. Refer to "ELS62-W Hardware Interface Description" [2] for specifications on critical temperature ranges.

The 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 during a guard period of 2 minutes after ELS62-W 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. If level "2" or "-2" URCs occur ELS62-W will trigger shutdown within 5 seconds, unless the temperature returns to a valid operating level ("1", "0", "-1").

URCs indicating alert levels "1" or "-1" are intended to enable the user to take appropriate precautions, such as protect ELS62-W 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 ELS62-W device.
- The processor 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 → Last

- + -

Unsolicited Result Code

URCs will be automatically sent to the TE when the temperature reaches or exceeds the critical level, or when it is back to normal.

^SCTM_B: <UrcCause>

URC for ELS62-W device temperature warning.



Parameter Description

<UrcMode>^{(num)(NV)}

URC presentation mode. Setting will be stored in the non-volatile memory.

- | | |
|---|---|
| 0 | 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)(NV)}

- | | |
|------------------|--|
| 0 ^(P) | Suppress output of <temp> in read command. |
| 1 | Output <temp> in test and read command. |

<temp>^(num)

Processor 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:

- | | |
|--------------------------|---|
| <code>^SCTM_B: 1</code> | Caution: Module close to overtemperature limit. |
| <code>^SCTM_B: 2</code> | Alert: Module is above overtemperature limit and switches off. |
| <code>^SCTM_B: -1</code> | Caution: Module close to undertemperature limit. |
| <code>^SCTM_B: -2</code> | Alert: Module is below undertemperature limit and switches off. |

EXAMPLE 2

URC issued when the temperature is back to normal (URC is output once):

- | | |
|-------------------------|------------------------------------|
| <code>^SCTM_B: 0</code> | Module back to normal temperature. |
|-------------------------|------------------------------------|



17.5 AT^SLED LED Feature

AT^SLED controls the LED function provided by the ELS62-W's SYNC ELS62-W's STATUS line, which acts as an output and can be used to control a connected LED. The electrical specifications of the status line and advice on how to connect the LED circuit can be found in [2].

The LED indicates the operating states listed below:

Table 17.1: ELS62-W Status and Mode Indication via LED

ELS62-W Status	<mode>=1	<mode>=2 <flash>= default	<mode>=2 <flash>= user defined
- GSM PS data transfer - LTE data transfer	Permanently on	10 ms on / 1990 ms off	<flash> ms on / 1990 ms off
UE registered to a network. No call, no data transfer	Permanently on	10 ms on / 3990 ms off	<flash> ms on / 3990 ms off
Limited Network Service (e.g. because no SIM/USIM, no PIN or during network search)	500 ms on / 500 ms off	500 ms on / 500 ms off	500 ms 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 → Last

- + -

Parameter Description

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

LED operating mode

Parameter is global for all instances.

0(&F)(D)

LED feature is disabled.



- 1 LED lights steadily when the UE is registered to the network and either awake or in power saving state.
- 2 LED is flashing when the UE is in Limited Service or registered with a network and either awake or in power saving state. The duration of flashing can be configured using the parameter `<flash>`.

```
<flash>(num)(&V)(&W)
```

LED flash period

1...10^(D)...50

LED flash period (in milliseconds) if `<mode>=2`.



18. General Purpose I/O (GPIO) Pin related Commands

This chapter describes the AT commands used to access and configure the GPIO pins of ELS62-W.

Please also refer to [2] for electrical specifications of the GPIO pins.

18.1 AT^SPIO GPIO Driver Open/Close

AT^SPIO write command opens and closes the General Purpose I/O (GPIO) driver. The command must be executed before any GPIO related command can be used.

The command does not reserve any GPIO lines, only the driver required for their management will be started.

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  Last
- + -

Parameter Description

<mode> ^{(num)(NV)}	
0	Close General purpose I/O driver
1	Open General purpose I/O driver



18.2 AT^SCPIN Pin Configuration

The `AT^SCPIN` write command serves to configure GPIOs.

Keep in mind that each GPIO can be assigned only one function. This means that if configured for GPIO handling with `AT^SCPIN` this GPIO is locked for any alternative function, and vice versa. Mutually exclusive functions are:

- When GPIO direction is set as Input, GPIO PIN configuration (eg. None, Pull-up, Pull-down, Keep) is taken from `AT^SGPINCA`.

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 → Last

- + -

Parameter Description

`<mode>`^{(num)(NV)}

0	Close pin
1	Open pin

`<pin_id>`^{(num)(NV)}

Pin identifier

0	GPIO1
1	GPIO2
2	GPIO3
4	GPIO5
5	GPIO6
6	GPIO7
7	GPIO8
10	GPIO11
11	GPIO12
12	GPIO13
15	GPIO16
16	GPIO17
17	GPIO18
18	GPIO19



19	GPIO20
20	GPIO21
21	GPIO22
22	GPIO23
23	GPIO24

`<direction>(num)(NV)`

Parameter `<direction>` is mandatory when opening a pin, but can be omitted when closing a pin.

0	Input
1	Output

`<startValue>(num)(NV)`

Can be set only for outputs.

[0]	Low
1	High

Notes

- Please refer to `AT^SPIO` for information on opening and closing the pin.
- For closing a pin with the write command (`<mode>=0`), the parameter `<direction>` is not needed.
- Before changing the configuration of a pin, make sure to close the pin.



18.3 AT^SGIO Get IO state of a specified pin

AT^SGIO write command returns the state of selected GPIO Pin. **AT^SGIO** requires GPIO drivers opened using **AT^SPIO** and **AT^SCPIN**. GPIO Pin must be set as input using **AT^SCPIN** first, otherwise command will return error.

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  Last
- + -

Parameter Description

<io_id>^(num)
<pin_id> shows supported GPIO.

<value>^(num)
State read on this <io_id>.

0	Low for <pin_id>
1	High for <pin_id>



18.4 AT^SSIO Set IO state of a specified pin

AT^SSIO write command sets the state of GPIO Pin. AT^SSIO requires GPIO drivers opened using AT^SPIO and AT^SCPIN. GPIO Pin must be set as output using AT^SCPIN first, otherwise command will return error.

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 → Last

- + -

Parameter Description

<io_id>^(num)

This is an already configured <pin_id>.

<value>^{(num)(NV)}

State to be set for this <io_id>.

0 Low for <pin_id>

1 High for <pin_id>



18.5 AT^SGPINCA Pin Configuration

The [AT^SGPINCA](#) write command configures the internal pull-up or pull-down constant current source of an GPIO, which is configured as input. Keep in mind that some GPIO lines share functions with other interfaces. For details, see [AT^SCFG](#) "GPIO/mode/xxx" settings, and following AT command(s): [AT^SLED](#).

Syntax

Test Command
AT^SGPINCA=?
Response(s)
^SGPINCA: (list of supported <pin_in_id>s), (list of supported <pinconf>s)
OK

Write Command
AT^SGPINCA=<pin_in_id>, <pinconf>
Response(s)
^SGPINCA: <pin_in_id>, <pinconf>
OK
ERROR
+CME ERROR: <err>

PIN  Last
- + -

Parameter Description

<pinconf> ^{(str)(NV)}	
Pin pull configuration	
"NONE"	GPIO configured as input
"KEEP"	GPIO is configured as Input and Keep This means GPIO is configured as Input with a bus-keeper, which is a latch circuit of an I/O cell to hold the last value (before entering tristate) on a tristate bus by inserting very weak pullup or pulldown.
"PD"	GPIO is configured as Input and Pull down (PD)
"PU"	GPIO is configured as Input and Pull Up (PU)

<pin_in_id> ^(num)	
Supported GPIO	
<pin_id> shows supported GPIO.	

Note

- Setting will be stored non-volatile and become effective after a power-cycle, and will remain effective until GPIO is configured as input.



19. Miscellaneous Commands

The AT Commands described in this chapter are related to various areas.

19.1 ATS3 Command Line Termination

[ATS3](#) is implemented for compatibility reasons only, and has no effect on module behaviour.

Syntax

Read Command	
ATS3?	
Response(s)	
<n>	
OK	
Write Command	
ATS3=<n>	
Response(s)	
OK	
ERROR	
PIN → Last	Reference(s)
- + -	ITU-T V.250 [14]

Parameter Description

<n>^(num)(&V)
000...013^(&F)...127

Notes

- Read command will return default value n=13.
- Write command will return OK or ERROR. OK - when parameter <n> is in range, ERROR otherwise.
- Despite OK returned in case of any parameter from range, no changes will be made.



19.2 ATS4 Response Formatting

[ATS4](#) is implemented for compatibility reasons only, and has no effect on module behaviour.

Syntax

Read Command	
ATS4?	
Response(s)	
<n>	
OK	
Write Command	
ATS4=<n>	
Response(s)	
OK	
ERROR	
PIN  Last	Reference(s)
- + -	ITU-T V.250 [14]

Parameter Description

<n> ^{(num)(&V)}
000...010 ^(&F) ...127

Notes

- Read command will return default value n=10.
- Write command will return OK or ERROR. OK - when parameter <n> is in range, ERROR otherwise.
- Despite OK returned in case of any parameter from range, no changes will be made.

19.3 ATS5 Command Line Editing

ATS5 is implemented for compatibility reasons only, and has no effect on module behaviour.

Syntax

Read Command	
ATS5?	
Response(s)	
<n>	
OK	
Write Command	
ATS5=<n>	
Response(s)	
OK	
ERROR	
PIN ➤ Last	Reference(s)
- + -	ITU-T V.250 [14]

Parameter Description

<n>^(num)(&V)
000...008^(&F)...127

Notes

- Read command will return default value n=8.
- Write command will return OK or ERROR. OK - when parameter <n> is in range, ERROR otherwise.
- Despite OK returned in case of any parameter from range, no changes will be made.



19.4 AT^SBNW Binary Write

Syntax

Test Command

AT^SBNW=?

Response(s)

^SBNW:(list of supported <type>s), (list of supported <subtype>s)

OK

Write Command

Cipher suites user file modification:

AT^SBNW="ciphersuites", <ciphersuites_length>

Response(s)

CONNECT

CIPHERSUITES: SEND FILE ...

Indicates that UE has entered binary data mode. Data can be transferred.

When Ciphersuites file data are transferred and updated, or error occurs the UE returns one of following answers:

CIPHERSUITES: LENGTH ERROR

CIPHERSUITES: FILE WRITE ERROR

CIPHERSUITES: SUITE NOT FOUND

CIPHERSUITES: UNDEFINED ERROR

CIPHERSUITES: INTERNAL ERROR

CIPHERSUITES: I/O ERROR

OK

ERROR

+CME ERROR: <err>

Write Command

Cipher suites user file removal:

AT^SBNW="ciphersuites", 0

Response(s)

CIPHERSUITES: DELETE CIPHERSUITES FILE...

CIPHERSUITES: DONE

OK

ERROR

+CME ERROR: <err>

Write Command

Certificate management for secure connection of client IP services.

AT^SBNW="is_cert", <subtype>

Response(s)

CONNECT

SECURE CMD READY: SEND COMMAND ...

(Indicates that UE has entered binary data mode. Secure command data can be transferred.)

When secure command data is processed the UE will send one of following answers:

SECURE CMD LENGTH ERROR

SECURE CMD ERROR

SECURE CMD END OK

OK

ERROR

+CME ERROR: <err>



Write Command

Certificates for local UE management.

AT^SBNW="management_cert", <subtype>

Response(s)

CONNECT

SECURE CMD READY: SEND COMMAND ...

(Indicates that UE has entered binary data mode. Secure command data can be transferred.)

When secure command data is processed the UE will send one of following answers:

SECURE CMD LENGTH ERROR

SECURE CMD PUBLIC CERTIFICATE IS CORRUPTED

SECURE CMD PRIVATE KEY WAS REMOVED

SECURE CMD SERVICE TIMEOUT ERROR

SECURE CMD TO MANY DATA ERROR

SECURE CMD ERROR

SECURE CMD END OK

OK

ERROR

+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

<type>^(str)

"ciphersuites"	Command for IOverAT TLS Cipher Suite file management.
"is_cert"	Secure Command Mode (Manage Certificates). For embedded TCP IP services the certificates shall be created in DER format.
"management_cert"	Secure command mode for managing certificates for UE management. See AT^SSECUA and AT^SSECUC .

<subtype>^(num)

1	Start Secure Command Block Transfer mode
---	--

<ciphersuites_length>^(num)

Number of characters of ciphersuite names.



19.5 AT^SFDL Enter Firmware Download Mode

[AT^SFDL](#) allows the application manufacturer to download ELS62-W 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 and ASC1.

The ELS62-W 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 16: Updating ELS62-W Firmware](#)" [4]. An example for developing an appropriate download program is included.

Syntax

Test Command

AT^SFDL=?

Response(s)

^SFDL: (list of supported <mode>s)
OK

Write Command

Start firmware update mode.
AT^SFDL=<mode>[, <file>]

Response(s)

^SFDL: <status>
OK
ERROR
+CME ERROR: <err>

PIN → Last
- + +

Parameter Description

<mode>^(num)

Parameter to start the firmware update using [AT^SFDL=2](#) write command.

2	Launches firmware update mode to replace the ELS62-W's existing firmware with a new firmware provided on the internal flash.
---	--

<file>^(str)

File name of the firmware to be updated. By default, the .usf file downloaded via FOTA is used.

<status>^(str)

Firmware update status.



19.6 AT^SFSA Flash File System Access

AT^SFSA provides access to the Flash File System. The following functionalities are supported:

- Reading global status information, available storage and max. storage size
- Creating and deleting files and directories
- Reading file status information, e.g. file size, optional date
- Renaming files and directories
- Copying files and directories
- Listing directory contents
- Computation and displaying CRC of a given file
- Reading and writing an arbitrary amount of data per call
- Providing random access to the file data and a seek function

Flash File System Requirements:

AT^SFSA="gstat" could show the free memory space (see <FreeSpace>). The file system is block structured so its value will decrease only in full block multiples. The block size is 4096 bytes.

The entire memory space comprises user data and internal resources. So the more files/folders you create, the more internal data is used from the system, and the less memory will be available for user data.

Ensure not to fill up the file system to its limits, otherwise an error code ^SFSA: 28 will be returned.

Please consider the following rules for an efficient FFS management:

- The maximum number of directories altogether in the root directory and all subdirectories is limited to 100, otherwise the net service functionalities may run into trouble.
- The maximum number of files is about 1000 altogether in the root directory and all subdirectories.
- The maximum subdirectory depth is 5.
- Allowed characters for path and file names:
 - Characters allowed: A - Z, a - z, digits, underscore, and special characters used in file URL format defined in IETF RFCs 1738 (except "*", "") and 2396.
 - Characters space are allowed only when enclosed in quotation marks, e.g. "a:/directory/my file.txt" or "a:/directory/my file.txt", otherwise will be discarded.
 - Character "/" is a separator for directories and files, e.g. "/directory/my_sub_dir/my_file.txt".
 - Character "." and ".." are illegal for directory names, "." as part of a file name is allowed. The ".." could only be used to access one upper level folder, e.g. "../my_file.txt".
 - File and directory names are case-sensitive.
 - Path names start with drive prefix "a:/" or "A:/".
- The maximum length of files and paths (incl. drive prefix "a:/" or "A:/") is 128 GSM characters.
- If the file is in open status, it must be closed first before executing other file operations such as copy, rename and remove.
- It is not recommended to exceed above limitations.

Syntax

Test Command

AT^SFSA=?

Response(s)

^SFSA: "close", (range of <fh>)

^SFSA: "copy", (max. string length of <source_path>), (max. string length of <destination_path>), (list of supported <CopyFlag>s)

^SFSA: "crc", (max. string length of <path>)

^SFSA: "gstat", (list of supported <drive>s)

^SFSA: "ls", (max. string length of <path>)



Test Command

(Continued)

AT^SFSA=?

Response(s)

```
^SFSA: "mkdir", (max. string length of <path>)
^SFSA: "open", (max. string length of <path>), (range of <flag>)
^SFSA: "read", (range of <fh>), (range of <size>)
^SFSA: "remove", (max. string length of <path>)
^SFSA: "rename", (max. string length of <path>), (max. string length of <new_name>)
^SFSA: "rmdir", (max. string length of <path>)
^SFSA: "seek", (range of <fh>), (range of <offset>), (list of supported <SeekFlag>)
^SFSA: "stat", (max. string length of <path>)
^SFSA: "write", (range of <fh>), (range of <size>)
OK
```

Write Command

Close a file. The file has to be successfully opened before.

AT^SFSA="close", <fh>

Response(s)

In case of success:

^SFSA: <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>

Write Command

Copy a file given by the <source_path> parameter to the file given by the <destination_path>. Both names should not be identical, otherwise copy operation returns error "path already exists".

AT^SFSA="copy", <source_path>, <destination_path>[, <CopyFlag>]

Response(s)

In case of success:

^SFSA: <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>

Write Command

Compute CRC of a file.

AT^SFSA="crc", <path>

Response(s)

In case of success:

^SFSA: <crc>, <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>



Write Command

Read global status of FFS.

AT^SFSA="gstat", <drive>

Response(s)

In case of success:

^SFSA: <StorageSize>

^SFSA: <FreeSpace>

^SFSA: <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>

Write Command

List content of a directory.

AT^SFSA="ls", <path>

Response(s)

In case of success:

[^SFSA: <name>]

[...]

^SFSA: <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>

Write Command

Create a directory. The directory in which the new directory should be created must already exist, i.e. the creation of intermediate sub-directories is not supported.

AT^SFSA="mkdir", <path>

Response(s)

In case of success:

^SFSA: <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>

Write Command

Open a file.

AT^SFSA="open", <path>, <flag>

Response(s)

In case of success:

^SFSA: <fh>, <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>



Write Command

Read from a file. The file has to be opened for reading before.

The command returns **<nbytes>** bytes of binary data read from the file.

The number of bytes actually read can be equal or smaller than the requested number of bytes given by the **<size>** parameter.

AT^SFSA="read", **<fh>**, **<size>**

Response(s)

In case of success:

^SFSA: **<nbytes>**, **<result>**

[Binary data of **<nbytes>** bytes]

OK

In case of error:

^SFSA: **<result>**

ERROR

+CME ERROR: **<err>**

Write Command

Remove a file. The file has to be closed.

AT^SFSA="remove", **<path>**

Response(s)

In case of success:

^SFSA: **<result>**

OK

In case of error:

^SFSA: **<result>**

ERROR

+CME ERROR: **<err>**

Write Command

Rename a file or directory.

AT^SFSA="rename", **<path>**, **<new_name>**

Response(s)

In case of success:

^SFSA: **<result>**

OK

In case of error:

^SFSA: **<result>**

ERROR

+CME ERROR: **<err>**

Write Command

Remove a directory. The directory has not to be empty.

AT^SFSA="rmdir", **<path>**

Response(s)

In case of success:

^SFSA: **<result>**

OK

In case of error:

^SFSA: **<result>**

ERROR

+CME ERROR: **<err>**



Write Command

Move the pointer of the current position in a file.

AT^SFSA="seek", <fh>, <offset>[, <SeekFlag>]

Response(s)

In case of success:

^SFSA: <new offset>, <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>

Write Command

Read file or directory status.

AT^SFSA="stat", <path>

Response(s)

In case of success:

^SFSA: <FileSize>

^SFSA: <DateLastAccess>

^SFSA: <DateLastModification>

^SFSA: <DateLastFileStatChange>

^SFSA: <StatAttribute>

^SFSA: <result>

OK

In case of error:

^SFSA: <result>

ERROR

+CME ERROR: <err>

Write Command

Write to a file. *The file has to be opened before writing.*

If invoking is successfully:

- ME enters data entry mode and awaits certain number of <size> bytes to write.

- A timer will be started to guard the input period.

- Serial interface prompts "CONNECT".

At this time, could input binary data over the serial interface. If current position in the file is not set to the end, the data will be overwritten.

There are three ways to quit the data entry mode and revert to AT command mode:

1) the exact number of bytes has been received by the ME (see the <size> parameter).

2) timeout has expired. The timeout value for reception of each character is 30 seconds.

3) inline break "+++" is entered to abort the data input before the certain number of <size> bytes input.

In case of timeout, the command ends with <result> 214.

AT^SFSA="write", <fh>, <size>

Response(s)

In case of success:

CONNECT

[<size> bytes of binary data]

^SFSA: <size>

^SFSA: <result>

OK

In case of error:

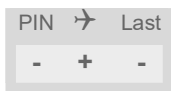
^SFSA: <size>

^SFSA: <result>

ERROR

+CME ERROR: <err>





Parameter Description

`<fh>(num)`

File handle

The file handle is returned by the system in the open command. It has then to be used in the following requests, e.g. read, write, close, seek. The number of opened files is limited to 32.

0...31

`<path>(str)`

Path to a file or a directory

For naming restrictions please see above rules for efficient FFS management.

`<source_path>(str)`

Path to a source file

For naming restrictions please see above rules for efficient FFS management.

`<destination_path>(str)`

Path to a destination file

For naming restrictions please see above rules for efficient FFS management.

`<name>(str)`

Name of a file or a directory

The list command shows directory names with appended slash.

For naming restrictions please see above rules for efficient FFS management.

`<new_name>(str)`

New name of a file or a directory

The new name of directory or file which should be renamed.

For naming restrictions please see above rules for efficient FFS management.

`<flag>(num)`

File access flags

All available flags are divided into two groups: primary and optional. To select the desired flag combination, calculate the sum of the values and use the resulting value. Writing data to file can take up to 180 seconds due to internal flash file system data processing.

Primary group:

- | | |
|---|---|
| 1 | Write. When set it is still allowed to read out the file content. After applying it on the file with read-only or hidden attribute, the file attribute will not be changed. |
| 2 | Read/write. Has priority over the read-only, hidden and write flags, when set in combination with them. After applying it on the file with read-only or hidden attribute, the file attribute will be cleared. |



32	Hidden.
64	Read-only.
Optional group:	
4	Append. Set the current position in the file to the end of the file. This flag is automatically set by default when opening a file, unless "Truncate" is set instead. If append flag is not used, current position will be set to the beginning of the file.
8	Create. Create the file if it does not exist. Otherwise the existing file will be opened.
16	Truncate. Truncate the file to the size 0. This truncate operation is not applicable on a file which has Read-only attribute and has priority over Append, Write and Read/Write when set in combination with them. The file will first be truncated to size 0, then other operation will take effect. Depending on the file size, truncating may take a couple of seconds.

<SeekFlag>^(num)

Seek flags

Determines how the new position is calculated.

[0]	Offset from the beginning of the file. The new position in the file equals <offset>. The offset has to be positive or zero.
1	Offset from the current file position. The new position in the file equals the current position + <offset>. The <offset> can be positive, zero or negative. In case the new position exceeds the allowed range for the <offset> parameter, the pointer goes to 0 or to the possible maximum position.
2	Offset from the end of the file. The new position in the file equals the file size + <offset>. The offset has to be negative or zero. In case the new position exceeds the allowed range for the <offset> parameter, the pointer goes to 0 or to the possible maximum position.

<CopyFlag>^(num)

Copy flags

Determines whether or not copy works as force copy behavior, when destination path entry already exists.

[0]	Performs normal copy, reporting error when destination path entry already exists.
1	Performs force copy, replacing destination path entry which already exists. Even when using force copy, the two path <path> and <destination_path> should not be identical, otherwise copy operation will return error "path already exists"; If force copy failed during operation, the <destination_path>'s entry file will be removed without recovery.

<result>^(num)

Result code

The result of the operation. The codes below 200 are proprietary file system error codes.

0	success
1	path not found
2	file not found
3	open file error
4	close file error
5	create file error
6	delete file error



7	truncate file error
8	rename file error
9	invalid file descriptor
10	file size error
11	change file attribute error
12	list file error
13	invalid access
14	create directory error
15	remove directory error
16	path already exists
17	file already exists
22	seek to negative file pointer attempted
23	seek to invalid file pointer attempted
24	no more file descriptors available
28	no free space available
30	sharing violation
100	invalid drive
101	invalid path
102	invalid file name
103	generic internal error
104	path too long
105	file name too long
201	command not recognized
202	incorrect parameter
203	incorrect number of input parameters
204	input parameter out of range
205	input stream open error
206	output stream open error
207	input stream read error
208	output stream write error
209	input stream close error
210	output stream close error
211	data transfer abort
214	data transfer error: timeout expired
215	data transfer error: internal error
216	directory listing error: no such directory
217	busy
218	internal error
219	unknown error

<StatAttribute>^(num)

Status information attribute

Attributes of files or directories. Bitmask is composed of sum of the following values:

0	Regular file
16	Directory

<size>^(num)

Number of bytes to read or write.

[reference] available read size.

1...file size

[reference] available write size.

1...free space size

<FileSize>^(num)

File size

The size of the file. 32-bit value.

0...4294967295

<StorageSize>^(num)

Storage Size

Maximum storage size of FFS.

<FreeSpace>^(num)

Free space

Free space on FFS.

<offset>^(num)

The current position in a file. 32-bit signed value.

-2147483630...2147483630

<new offset>^(num)

The new position in a file. 32-bit signed value.

file size - 1...negative value of file size

<crc>^(num)

CRC check-sum computed on a file. 16-bit value.

The check-sum is calculated using the initial value 65535 (hex 0xFFFF). The polynomial generator is $x^{16} + x^{12} + x^5 + 1$ and the final XOR value equals 65535 (hex 0xFFFF). The low-bit order is used for the whole calculation (the least-significant bit at the leftmost position in a byte).

0...65535



`<nbytes>(num)`

Number of bytes

The number of bytes to read.

1...file size

The number of bytes to write.

1...free space size

`<drive>(str)`

Default "A:". This parameter may be omitted.

`<DateLastAccess>(str)`

Date of last file access. Identical with `<DateLastModification>`. 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"

`<DateLastModification>(str)`

Date of last file modification

Date of last file modification is updated when the file is closed. 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"

`<DateLastFileStatChange>(str)`

Date of last file status change

Updated when closing file if file was modified. 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"

Note

- The "Append" flag (`<flag>= 4`) is automatically set by default when opening a file by `AT^SFSA="open"`. Because of this reason, when writing to a file, the newly written data are appended to the end of the file by default, regardless of the current position set by `AT^SFSA="seek"`.

19.7 AT^SRVCFG Service Configuration Settings

The `AT^SRVCFG` can be used to query and configure various settings of extra services supported by the ELS62-W.

The `AT^SRVCFG` write command queries a configuration parameter (if no value is input) or sets its value(s). Input of parameter names is always coded in GSM character set.

Syntax

Test Command
AT^SRVCFG=?
Response(s)
^SRVCFG: "MODS", (list of supported <service_tag>s)
OK

Write Command
Query/Configure Module Service settings.
AT^SRVCFG="MODS", <service_tag>[, <service_tag_value>]
Response(s)
^SRVCFG: "MODS", <service_tag>, <service_tag_value>[, <response_code>[, <MODS_Error_Message>]]
OK
ERROR
+CME ERROR: <err>

PIN → Last
- - -

Parameter Description

<service_tag> ^(str)	
Parameter Name for Module Service	
Indicate additional service function, and <service_tag_value> indicate corresponding service function parameter. It is the name of the specific parameter to be read (when 3rd parameter is not provided) or to be written (when 3rd parameter is provided):	
"fwdownload/deferLimit"	specifies maximum number of times in <service_tag_value> the module will not initiate automatic firmware download after new URL has been provided. Counter will be decreased after LwM2M client received each of LwM2M Server download request until reach to value 0 to perform the firmware download. Counter will be reset to previous configure setting after successful firmware download. The value range is [0...255], value "0" ^(D) means download will always be automatically downloaded. Value in range [1...254] means the download will be conditional for these number of times and value "255" means that download will always be conditional.
"conId"	specifies the PDP context configuration id to be used for IoT Service Agent connection.
"lifetime"	to specify the lifetime of the registration in seconds for this lwm2m client, with the range [30 .. 31536000].
"urc"	to configure if URCs should be generated (<service_tag_value>="on" to enable URC, <service_tag_value>="off" to disable URC).



`<service_tag_value>^(str)`

Parameter Value for Module Service

When this parameter is omitted, the write command returns the actual setting of the given `<service_tag>`.

`<response_code>^(num)`

Response Code for Module Service

0	Configuration done successfully
1	Error occurred during configuration

`<MODS_Error_Message>^(str)`

Error Message for Module Service

This parameter will give more information when `<response_code>=1`:

“LwM2M context not initialized or no server specified”

“LwM2M context not initialized or no server/wrong PDN specified”

“LwM2M context not initialized or no server/wrong address specified”

“LwM2M context not initialized or client is busy”

19.8 AT^SRVCTL Extra Service Control

AT^SRVCTL provides access to extra services. The following services are supported:

- Module Service: a M2M middleware service seamlessly connects ELS62-W modules to the IoT Service Agent. The Module Service exposes a set of easy-to-use functions for Firmware update over the Air.

Syntax

Test Command

AT^SRVCTL=?

Response(s)

^SRVCTL: "MODS", (list of supported <action>s)

OK

Write Command

Control the Module Service.

AT^SRVCTL="MODS", <action>

Response(s)

^SRVCTL: "MODS", <action>, <response_code>[, <MODS_Service_Message>]

OK

ERROR

+CME ERROR: <err>

PIN → Last

- - -

Parameter Description

<action>^(str)

Actions for Module Service

The functionality provided by Module Service.

"start"	Start the Module Service.
"stop"	Stop the Module Service.
"status"	Display the Module Service status.

<response_code>^(num)

Response Code for Module Service

0	Success for <action>="start" or "stop", "not running" for <action>="status".
1	Error <action>="start" or "stop", "running" for <action>="status".

<MODS_Service_Message>^(str)

Service Message for Module Service

This parameter will give more information when <response_code>=1.



19.9 AT^SRVACT Extra Service Action

AT^SRVACT provides access to extra services. The following services are supported:

- Module Service (MODS) is part of the IoT Service Agent and supports the actions "fwdownload" and "fwupdate" and "update" which can be controlled by server and module side.

The related FOTA actions "firmware download" and "firmware update" options can be configured (see AT^SRVCFG):

- Unconditional pull download - in case the server has provided URI for FW download (i.e pull method) then download will start immediately. This is the default IoT Service Agent configuration option.
- Conditional pull download - in case the server has provided URI for FW download (i.e pull method) then download will only start after it is initiated by the host application.
- Conditional update - the host application is informed that new firmware has been downloaded and can initiate the firmware update. This is the default setting. The server does trigger the download but does not trigger the firmware update;
- Unconditional update - the Module Service will update the module firmware independently on the host application status, when the server triggers the firmware update. This can happen immediately after firmware download.

Related register action "update" has no other options.

Syntax

Test Command

```
AT^SRVACT=?
```

Response(s)

```
^SRVACT: "MODS", (list of supported <service_procedure>s), (list of supported <service_action>s)
OK
```

Write Command

```
AT^SRVACT="MODS", <service_procedure>[, <service_action>]
```

Response(s)

When <service_action> is "start":

```
^SRVACT: , "MODS", <service_procedure>, <response_code>[, <MODS_Service_message>[,
<MODS_status_additional_info>]]
```

When <service_action> is "status":

```
^SRVACT: "MODS", <service_procedure>, <response_code>[, <service_status>[,
<MODS_status_additional_info>]]
```

OK

ERROR

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

PIN → Last

- - -

Unsolicited Result Code

Indicates an event, an error or an information element. The URC may appear if an event, a state change, or an error occurs.

For example when starting fwdownload/fwupdate or when error occurs during fwdownload/fwupdate, or result of registration update action.

URC content will depend on specific services action implemented in the module.

URC to inform about the MODS client service procedure handling.

```
^SRVACT: "MODS", <service_procedure>, <urc_service_status>[,
<MODS_status_additional_info>]
```



Parameter Description

<service_procedure>^(str)

Actions for Module Service

"fwdownload"	to start the download firmware in case the URL has been provided by the server and client is configured not to start download automatically (URL provided by server cannot be changed) - In case IoT Service Agent supports conditional FW download.
"fwupdate"	to start the firmware update procedure in case the firmware is downloaded and server has not initiated firmware update (only the firmware file downloaded using IoT Service Agent can be used for the update and thus filename is not provided as parameter).
"update"	to trigger update of the registration on LWM2M server (LWM2M registration update procedure). This allows the application to perform update in most suitable moment (e.g. when it wakes up in order to send application data).

<service_action>^(str)

Optional parameter defining additional possible actions on the procedure

"start"	initiate the procedure (default action if not specified for the <service_procedure>). ;
"status"	get the procedure status (only support <service_procedure>="fwdownload" / <service_procedure>="fwupdate" query, don't support <service_procedure>="update");

<response_code>^(str)

Response Code for Module Service

"0"	Success
"1"	Error

<MODS_Service_message>^(str)

Service message

General service message or error description of a procedure when [<service_action>="start"](#), otherwise shall contain error description.

<service_status>^(str)

Indicate the procedure's service status

General service status of a procedure when [<service_action>="status"](#), shall be one of the following:

"init"	initial inactive state, procedure running so <response_code>=1 ;
"ready"	procedure is ready to be executed (e.g. firmware URI is available and FW is ready to be download), procedure running so <response_code>=1 ;
"progress"	download progress percentage, with downloading percentage information provided in <MODS_status_additional_info> , the URC will be printed in every 5 percent increased. Procedure is ongoing so <response_code>=1 ;
"status"	procedure is ongoing (e.g. firmware is being downloaded), procedure running so <response_code>=1 ; if <service_procedure> is "fwdownload", <service_status> could be "to download", for server initiate the download but is not starting yet; if <service_procedure> is "fwupdate", <service_status> could be "to update", for client initiate the update but is not starting yet;



"finished"	procedure finished successfully, procedure not running so <code><response_code>=0;</code>
"error"	procedure finished with an error, procedure not running so <code><response_code>=0;</code>

`<MODS_status_additional_info>`^(str)

Additional information related with `<MODS_Service_message>` or `<service_status>` (such as progress of the download or error description).

`<urc_service_status>`^(str)

Indicate the procedure's service status for URC.

When "fwdownload" and "fwupdate" `<service_procedure>` is executing:

"init"	the firmware download procedure is starting with URL information provided in <code><MODS_status_additional_info></code> ;
"ready"	procedure is ready to be initiated; If <code><service_procedure></code> is "fwdownload", <code><MODS_status_additional_info></code> could be "to download", for server initiate the download but is not starting yet; If <code><service_procedure></code> is "fwupdate", <code><MODS_status_additional_info></code> could be "to update", for client initiate the update but is not starting yet;
"progress"	download progress percentage, with downloading percentage information provided in <code><MODS_status_additional_info></code> , the URC will be printed in every 5 percent increased;
"finished"	procedure finished successfully;
"error"	procedure finished with an error. <code><MODS_status_additional_info></code> contains addition status information;

19.9.1 ^SRVACT Procedure URC List

The following table lists the Procedure URC information elements which may be returned by supported services.

URC format
^SRVACT: "MODS","fwdownload","init"
^SRVACT: "MODS","fwdownload","ready","to download"
^SRVACT: "MODS","fwdownload","start","https://..."
^SRVACT: "MODS","fwdownload","progress","10%"
.....
^SRVACT: "MODS","fwdownload","progress","90%"
^SRVACT: "MODS","fwdownload","progress","100%"
^SRVACT: "MODS","fwdownload","finished","download success"
^SRVACT: "MODS","fwdownload","error","download failed - not enough space"
^SRVACT: "MODS","fwdownload","error","download failed - out of ram"
^SRVACT: "MODS","fwdownload","error","download failed - network lost"
^SRVACT: "MODS","fwdownload","error","download failed - integrity check failed"
^SRVACT: "MODS","fwdownload","error","download failed - unsupported protocol"
^SRVACT: "MODS","fwdownload","error","download failed - unsupported package"
^SRVACT: "MODS","fwdownload","error","download failed - invalid URI"



URC format

^SRVACT: "MODS","fwdownload","error","download failed - unsupported protocol"

^SRVACT: "MODS","fwdownload","error","download failed - unsupported package"

^SRVACT: "MODS","fwdownload","error","download failed - too many reboots"

^SRVACT: "MODS","fwdownload","error","download failed - unknown"

^SRVACT: "MODS","fwupdate","ready","to update"

^SRVACT: "MODS","fwupdate","progress","starting update"

^SRVACT: "MODS","fwupdate","error","update failed"

19.10 AT^SBNR Binary Read

Syntax

Test Command

AT^SBNR=?

Response(s)

^SBNR: (list of supported <type>s), (list of supported <subtype>s)

OK

Read Command

AT^SBNR?

Response(s)

OK

Write Command

Lists ciphersuites which are recommended and advertised by default by the module for IPoverAT TLS if there are no user defined (current) ciphersuites.

AT^SBNR="ciphersuites", "default"

Response(s)

(default CYASSL ciphers string)

OK

Write Command

Lists all ciphersuites supported by the module for IPoverAT TLS.

AT^SBNR="ciphersuites", "all"

Response(s)

(all ciphersuites)

OK

Write Command

Lists ciphersuites which are defined by the user and advertised for IPoverAT TLS. Accepted values are listed by the "all" subcommand.

AT^SBNR="ciphersuites", "current"

Response(s)

(default CYASSL ciphers string)

OK

Write Command

If <type>= "is_cert":

Read certificates for secure connection of client IP services.

AT^SBNR="is_cert"

Response(s)

^SBNR:<index>, <size>, <issuer>, <serial number>, <subject>, <signature>, <thumbprint algorithm>, <thumbprint>, <expiry date>

[...]

OK

If error is related to ME functionality:

ERROR

+CME ERROR: <err>

If certificate file is corrupted:

<index>, certificate is corrupted



Write Command

If `<type>= "management_cert"`:

Read certificate for local UE management.

AT[^]SBNR="management_cert"

Response(s)

[^]SBNR:<index>, <size>, <issuer>, <serial number>, <subject>, <signature>, <thumbprint algorithm>, <thumbprint>, <expiry date>

[...]

OK

If error is related to ME functionality:

ERROR

+CME ERROR: <err>

PIN → Last

- + -

Parameter Description

`<type>`^(str)

"ciphersuites"	IPoverAT TLS Cipher suites
"is_cert"	Read certificate details
"management_cert"	Read module management certificate details. See AT[^]SSECUA and AT[^]SSE-CUC .

`<status>`^(num)

For list of certificates to be removed (`<status>=0`) only the parameters used to match the certificate will be output in the AT[^]SBNR response, all other parameters will be empty except for `<replace-index>` that will indicate preloaded certificate index to replace the revoked certificate if such is configured.

0	Read list of revoked certificates to be removed or replaced from is cert store.
1	Read list of certificates to be added to store or empty.

`<index>`^(num)

Certificate index

0...30	Index 0 is handled as client certificate (only 1 allowed). Indexes from 1 to 30 are handled as server certificates.
--------	---

`<size>`^(str)

Size of certificate file in bytes

`<issuer>`^(str)

Certificate issuer

`<serial number>`^(str)

Serial number of certificate

`<subject>`^(str)

Subject of certificate



`<signature>^(str)`

Signature of certificate

`<thumbprint algorithm>^(str)`

Thumbprint algorithm of certificate

`<thumbprint>^(str)`

Thumbprint of certificate

`<expiry date>^(str)`

Expiry date of certificate

`<replace-index>^(num)`

Replace Index

20. Appendix

20.1 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 3GPP TS 22.030 [\[25\]](#).

Table 20.1: Star-Hash (*#) Command Overview

Star-Hash Code	Functionality	Response, also refer to Table 20.3
Phone Security		
*#06#	Query IMEI	<IMEI> OK
**04[2]*oldPin[2]*newPin[2]*new-Pin[2]#	Change SIM password	+CME ERROR: <err> / OK
**05[2]*unblKey[2]*newPin[2]*new-Pin[2]#	Change/Unblocking SIM password	+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 : <n>,<m> OK (see: AT+COLP)
*#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)



Star-Hash Code	Functionality	Response, also refer to Table 20.3
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
(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 20.2: Abbreviations of Codes and Parameters used in Table 20.1

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 (only for compatibility reasons) SMS SMS+Fax (only for compatibility reasons) SMS+Fax+Voice (only for compatibility reasons) 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 10 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 20.3: 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
<fac>	Facility lock, refer to AT+CLCK
<reason>	Call forwarding reason

For exact specification of format and parameters for Star-Hash commands refer to Table 3.2 of 3GPP TS 22.004 [24], and Annex C of 3GPP TS 22.030 [25].

Table 20.4: Star-Hash Commands for Supplementary Services

Star-Hash Code	Abbreviations in Table 20.1	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



20.2 Available AT Commands and Dependency on SIM PIN

- ∅ ... Command not available
 - ... Command does not require PIN1
 + ... Command requires PIN1
 ± ... Command sometimes requires PIN1

Table 20.5: Available AT Commands and Dependency on SIM PIN

AT Command	Exec	Test	Read	Write
Configuration Commands				
AT&F	-	∅	∅	∅
AT&V	-	∅	∅	∅
AT&W	-	∅	∅	∅
ATQ	-	∅	∅	∅
ATV	-	∅	∅	∅
ATZ	+	∅	∅	∅
AT+CFUN	∅	-	-	-
AT^SMSO	-	-	∅	-
AT+CMEE	∅	-	-	-
AT+CSCS	∅	-	-	-
AT^SCFG	∅	-	-	-
AT^SPOW	∅	-	-	-
AT+GCAP	+	+	∅	∅
Status Control Commands				
AT+CEER	+	+	∅	+
AT^SCEER	+	+	∅	+
AT^SIND	∅	-	-	-
AT+CPAS	-	-	∅	∅
Serial Interface Control Commands				
AT\Q	-	∅	∅	∅
AT&C	-	∅	∅	∅
AT&D	-	∅	∅	∅
AT&S	-	∅	∅	∅
ATE	-	∅	∅	∅
AT+ICF	∅	-	-	-
AT+IPR	∅	-	-	-
AT+CMUX	∅	-	-	-
Security Commands				
AT+CPIN	∅	-	-	-
AT^SPIC	-	-	-	-
AT+CLCK	∅	+	∅	+



AT Command	Exec	Test	Read	Write
AT+CPWD	Ø	+	Ø	+
AT^SCSL	Ø	±	Ø	±
AT^SSECUA	Ø	-	Ø	-
AT^SSECUC	Ø	-	Ø	-
AT^SSECRUN	Ø	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
AT^SINFO	Ø	-	-	-
Call related Commands				
ATA	+	Ø	Ø	Ø
ATD	±	Ø	Ø	Ø
ATDL	+	Ø	Ø	Ø
ATH	-	Ø	Ø	Ø
AT+CHUP	-	-	Ø	Ø
AT^SHUP	Ø	+	Ø	+
ATS0	Ø	Ø	-	+
ATO	-	Ø	Ø	Ø
+++	-	Ø	Ø	Ø
AT+CLCC	+	+	Ø	Ø
AT+CRC	+	+	+	+
AT+CVMOD	Ø	+	+	+
Network Service Commands				
AT+COPN	+	+	Ø	Ø
AT+COPS	Ø	+	+	±
AT+CREG	Ø	-	-	-
AT+CSQ	+	+	Ø	Ø
AT+CPOL	Ø	+	+	+
AT+CPLS	Ø	+	+	+
AT+CTZR	Ø	-	-	-
AT+CTZU	Ø	-	-	-
AT^SMONI	-	-	Ø	Ø



AT Command	Exec	Test	Read	Write
AT^SMONP	-	-	Ø	Ø
AT^SNMON	Ø	-	Ø	-
AT+CAVIMS	Ø	-	-	Ø
AT+CIREG	Ø	+	+	+
AT+CESQ	+	+	Ø	Ø
AT^SNSRAT	-	-	-	-
AT^SXRAT	Ø	-	-	-
AT^SNFOTA	Ø	-	-	-
USIM Application Toolkit (USAT) Commands				
AT^SSTA	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^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	-
Short Message Service (SMS) Commands				
AT+CMGD	Ø	+	Ø	+
AT+CMGF	Ø	+	+	+
AT+CMGL	+	+	Ø	+
AT+CMGR	Ø	+	Ø	+
AT+CMGS	Ø	+	Ø	+
AT+CMGW	+	+	Ø	+
AT+CMSS	Ø	+	Ø	+
AT+CNMA	+	+	Ø	+
AT+CNMI	Ø	+	+	+
AT+CPMS	Ø	+	+	+
AT+CMMS	Ø	+	+	+
AT+CSCA	Ø	+	+	+
AT+CSCB	Ø	+	+	+
AT+CSDH	Ø	+	+	+



AT Command	Exec	Test	Read	Write
AT+CSMP	Ø	+	+	+
AT+CSMS	Ø	+	+	+
AT^SMGL	+	+	Ø	+
Internet Service Commands				
AT^SICA	Ø	+	+	+
AT^SICS	Ø	-	-	-
AT^SIPS	Ø	-	Ø	-
AT^SISS	Ø	-	-	-
AT^SISI	Ø	-	-	-
AT^SISO	Ø	-	-	+
AT^SISC	Ø	-	Ø	+
AT^SISR	Ø	-	Ø	+
AT^SISW	Ø	-	Ø	+
AT^SIST	Ø	-	-	-
AT^SISD	Ø	-	Ø	-
AT^SISU	Ø	-	Ø	-
AT^SISH	Ø	-	Ø	-
AT^SISX	Ø	+	Ø	+
AT^SISE	Ø	-	Ø	-
Supplementary Service Commands				
AT+CACM	Ø	+	+	+
AT+CAMM	Ø	+	+	+
AT+CAOC	+	+	+	+
AT+CCFC	Ø	+	Ø	+
AT+CCWA	Ø	+	+	+
AT+CHLD	Ø	+	Ø	+
AT+CLIP	Ø	+	+	+
AT+CLIR	Ø	+	+	+
AT+COLP	Ø	+	+	+
AT+COLR	+	+	Ø	Ø
AT+CPUC	Ø	+	+	+
AT+CSSN	Ø	+	+	+
AT+CUSD	Ø	+	+	+
AT+CNAP	Ø	-	+	-
Packet Domain Related Commands				
AT+CGACT	Ø	+	+	+
AT+CGATT	Ø	+	+	+
AT+CGEQOS	Ø	-	-	-
AT+CGDATA	Ø	+	Ø	+
AT+CGDCONT	Ø	-	-	-



AT Command	Exec	Test	Read	Write
AT+CEREG	+	+	+	+
AT+CGEQOSRDP	+	+	Ø	+
AT+CGEREP	Ø	+	+	+
AT+CGPADDR	+	+	Ø	+
AT+CGSCONTRDP	+	+	Ø	+
AT+CGCONTRDP	+	+	Ø	+
AT+CGQMIN	Ø	-	-	-
AT+CGREG	Ø	+	+	+
AT+CGSMS	Ø	+	+	+
ATD*99#	+	Ø	Ø	Ø
AT+CEMODE	Ø	+	+	Ø
AT+CGDSCONT	Ø	-	-	-
AT+CGTFT	Ø	-	-	-
AT+CGTFTTRDP	+	+	Ø	+
AT^SGAUTH	Ø	-	-	-
AT^SGCONF	Ø	-	-	-
AT^SWWAN	Ø	+	+	+
AT+CGPIAF	Ø	+	+	+
AT+CGCMOD	+	+	Ø	+
USIM related Commands				
AT+CCID	-	-	Ø	Ø
AT+CRSM	Ø	-	Ø	-
AT+CSIM	Ø	-	Ø	-
AT+CCHO	Ø	-	Ø	-
AT+CCHC	Ø	-	Ø	-
AT+CGLA	Ø	-	Ø	-
AT^SSET	Ø	-	-	-
AT^SCKS	Ø	-	-	-
Phonebook Commands				
AT+CPBS	±	+	±	±
AT+CPBF	Ø	+	Ø	+
AT+CPBR	Ø	±	Ø	±
AT+CPBW	Ø	+	Ø	+
AT+CNUM	+	+	Ø	Ø
Audio Commands				
AT+CMUT	Ø	-	-	-
AT+VTS	Ø	-	Ø	-
AT+VTD	Ø	-	-	-
AT^SAIC	Ø	-	-	-
AT^SNFI	Ø	-	-	-



AT Command	Exec	Test	Read	Write
AT^SNFO	Ø	-	-	-
AT^SNFS	Ø	-	-	-
AT^SRTC	-	-	-	-
Hardware related Commands				
AT+CCLK	Ø	-	-	-
AT+CALA	Ø	-	-	-
AT^SBV	-	-	Ø	Ø
AT^SCTM	Ø	-	-	-
AT^SLED	Ø	-	-	-
General Purpose I/O (GPIO) Pin related Commands				
AT^SPIO	Ø	-	Ø	-
AT^SCPIN	Ø	-	Ø	-
AT^SGIO	Ø	-	Ø	-
AT^SSIO	Ø	-	Ø	-
AT^SGPINCA	Ø	-	Ø	-
Miscellaneous Commands				
ATS3	Ø	Ø	-	-
ATS4	Ø	Ø	-	-
ATS5	Ø	Ø	-	-
AT^SBNW	Ø	-	Ø	-
AT^SFDL	Ø	-	Ø	-
AT^SFSA	Ø	-	Ø	-
AT^SRVCFG	Ø	-	Ø	-
AT^SRVCTL	Ø	-	Ø	-
AT^SRVACT	Ø	-	Ø	-
AT^SBNR	Ø	-	-	-



20.3 Availability of AT Commands Depending on Operating Mode of ME

- ... AT command not supported
 - + ... AT command supported
 - ± ... AT command partially supported
- See description of AT command for details.

Table 20.6: Availability of AT Commands Depending on Operating Mode of ME

AT Command	Normal Mode	→
Configuration Commands		
AT&F	+	+
AT&V	+	+
AT&W	+	+
ATQ	+	+
ATV	+	+
ATZ	+	+
AT+CFUN	+	+
AT^SMSO	+	+
AT+CMEE	+	+
AT+CSCS	+	+
AT^SCFG	+	+
AT^SPOW	+	+
AT+GCAP	+	+
Status Control Commands		
AT+CEER	+	+
AT^SCEER	+	-
AT^SIND	+	+
AT+CPAS	+	+
Serial Interface Control Commands		
AT\Q	+	+
AT&C	+	+
AT&D	+	+
AT&S	+	+
ATE	+	+
AT+ICF	+	+
AT+IPR	+	+
AT+CMUX	+	+
Security Commands		
AT+CPIN	+	+
AT^SPIC	+	+
AT+CLCK	+	±



AT Command	Normal Mode	→
AT+CPWD	+	±
AT^SCSL	+	+
AT^SSECUA	+	+
AT^SSECUC	+	+
AT^SSECRUN	+	+
Identification Commands		
ATI	+	+
AT+CGMI	+	+
AT+GMI	+	+
AT+CGMM	+	+
AT+GMM	+	+
AT+CGMR	+	+
AT+GMR	+	+
AT+CGSN	+	+
AT+GSN	+	+
AT+CIMI	+	+
AT^SINFO	+	+
Call related Commands		
ATA	+	-
ATD	+	-
ATDL	+	-
ATH	+	-
AT+CHUP	+	-
AT^SHUP	+	-
ATS0	+	-
ATO	+	-
+++	+	-
AT+CLCC	+	-
AT+CRC	+	+
AT+CVMOD	+	-
Network Service Commands		
AT+COPN	+	+
AT+COPS	+	-
AT+CREG	+	+
AT+CSQ	+	-
AT+CPOL	+	+
AT+CPLS	+	-
AT+CTZR	+	+
AT+CTZU	+	+



AT Command	Normal Mode	→
AT^SMONI	+	-
AT^SMONP	+	-
AT^SNMON	+	-
AT+CAVIMS	+	+
AT+CIREG	+	+
AT+CESQ	+	-
AT^SNSRAT	+	±
AT^SXRAT	+	+
AT^SNFOTA	+	-
USIM Application Toolkit (USAT) Commands		
AT^SSTA	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
Short Message Service (SMS) Commands		
AT+CMGD	+	+
AT+CMGF	+	+
AT+CMGL	+	+
AT+CMGR	+	+
AT+CMGS	+	-
AT+CMGW	+	+
AT+CMSS	+	-
AT+CNMA	+	-
AT+CNMI	+	+
AT+CPMS	+	+
AT+CMMS	+	+
AT+CSCA	+	+
AT+CSCB	+	+



AT Command	Normal Mode	→
AT+CSDH	+	+
AT+CSMP	+	+
AT+CSMS	+	+
AT^SMGL	+	+
Internet Service Commands		
AT^SICA	+	-
AT^SICS	+	+
AT^SIPS	+	+
AT^SISS	+	+
AT^SISI	+	+
AT^SISO	+	-
AT^SISC	+	-
AT^SISR	+	-
AT^SISW	+	-
AT^SIST	+	-
AT^SISD	+	-
AT^SISU	+	-
AT^SISH	+	-
AT^SISX	+	-
AT^SISE	+	-
Supplementary Service Commands		
AT+CACM	+	+
AT+CAMM	+	+
AT+CAOC	+	+
AT+CCFC	+	-
AT+CCWA	+	-
AT+CHLD	+	-
AT+CLIP	+	-
AT+CLIR	+	-
AT+COLP	+	-
AT+COLR	+	-
AT+CPUC	+	+
AT+CSSN	+	-
AT+CUSD	+	-
AT+CNAP	+	-
Packet Domain Related Commands		
AT+CGACT	+	-
AT+CGATT	+	-
AT+CGEQOS	+	+



AT Command	Normal Mode	→
AT+CGDATA	+	-
AT+CGDCONT	+	+
AT+CEREG	+	+
AT+CGEQOSRDP	+	-
AT+CGEREP	+	+
AT+CGPADDR	+	+
AT+CGSCONTRDP	+	-
AT+CGCONTRDP	+	-
AT+CGQMIN	+	+
AT+CGREG	+	+
AT+CGSMS	+	+
ATD*99#	+	-
AT+CEMODE	+	-
AT+CGDSCONT	+	+
AT+CGTFT	+	+
AT+CGTFTRDP	+	-
AT^SGAUTH	+	+
AT^SGCONF	+	+
AT^SWWAN	+	-
AT+CGPIAF	+	+
AT+CGCMOD	+	-
USIM related Commands		
AT+CCID	+	+
AT+CRSM	+	+
AT+CSIM	+	+
AT+CCHO	+	+
AT+CCHC	+	+
AT+CGLA	+	+
AT^SSET	+	+
AT^SCKS	+	+
Phonebook Commands		
AT+CPBS	+	+
AT+CPBF	+	+
AT+CPBR	+	+
AT+CPBW	+	+
AT+CNUM	+	+
Audio Commands		
AT+CMUT	+	+
AT+VTS	+	-



AT Command	Normal Mode	→
AT+VTD	+	-
AT^SAIC	+	+
AT^SNFI	+	+
AT^SNFO	+	+
AT^SNFS	+	+
AT^SRTC	+	+
Hardware related Commands		
AT+CCLK	+	+
AT+CALA	+	+
AT^SBV	+	+
AT^SCTM	+	+
AT^SLED	+	+
General Purpose I/O (GPIO) Pin related Commands		
AT^SPIO	+	+
AT^SCPIN	+	+
AT^SGIO	+	+
AT^SSIO	+	+
AT^SGPINCA	+	+
Miscellaneous Commands		
ATS3	+	+
ATS4	+	+
ATS5	+	+
AT^SBNW	+	+
AT^SFDL	+	+
AT^SFSA	+	+
AT^SRVCFG	+	-
AT^SRVCTL	+	-
AT^SRVACT	+	-
AT^SBNR	+	+



20.4 AT Command Settings storable with AT&W

Table 20.7: Settings Stored to User Profile

AT Command	Stored Parameters
Configuration Commands	
ATQ	<n>
ATV	<value>
AT+CMEE	<errMode>
Status Control Commands	
AT^SIND	<dtmfSrc>
Serial Interface Control Commands	
AT\Q	<n>
AT&C	<value>
AT&D	<value>
AT&S	<value>
ATE	<value>
Call related Commands	
ATS0	<n>
AT+CRC	<mode>
Network Service Commands	
AT+COPS	<format>
AT+CREG	<urcMode>
Short Message Service (SMS) Commands	
AT+CMGF	<mode>
AT+CNMI	<mode>, <mt>, <bm>, <ds>, <bfr>
AT+CSDH	<show>
AT+CSMS	<service>
Supplementary Service Commands	
AT+CLIP	<clipUrcMode>
AT+CNAP	<n>
USIM related Commands	
AT^SSET	<n>
AT^SCKS	<mode>
Hardware related Commands	
AT^SLED	<mode>, <flash>



20.5 Factory Default Settings Restorable with AT&F

Table 20.8: Factory Default Settings Restorable with AT&F

AT Command	Factory Defaults
Configuration Commands	
ATQ	<n>=0
ATV	<value>=1
AT+CMEE	<errMode>=0
AT+CSCS	<charSet>="GSM"
Status Control Commands	
AT^SIND	<dtmfSrc>=1
Serial Interface Control Commands	
AT\Q	<n>=3
AT&C	<value>=1
AT&D	<value>=2
AT&S	<value>=0
ATE	<value>=1
AT+ICF	<format>=3
Call related Commands	
ATS0	<n>=000
AT+CRC	<mode>=0
Network Service Commands	
AT+COPS	<format>=0
AT+CREG	<urcMode>=0
AT+CTZR	<n>=0
AT+CTZU	<n>=0
AT+CIREG	<n>=1
Short Message Service (SMS) Commands	
AT+CMGF	<mode>=0
AT+CNMI	<mode>=1, <mt>=0, <bm>=0, <ds>=0, <bfr>=0
AT+CSDH	<show>=0
AT+CSMP	<fo>=17, <vp>=167, <pid>=0, <dcs>=0
AT+CSMS	<service>=0
Supplementary Service Commands	
AT+CLIP	<clipUrcMode>=0
AT+CLIR	<n>=0
AT+CSSN	<n>=0, <m>=0
AT+CUSD	<ussdMode>=0



AT Command	Factory Defaults
AT+CNAP	<n>=0
Packet Domain Related Commands	
AT+CEREG	<n>=0
AT+CGREG	<n>=0
AT+CGPIAF	<format>=0, <subnet>=0, <lzeros>=0, <czeros>=0
USIM related Commands	
AT^SSET	<n>=0
AT^SCKS	<mode>=0
Phonebook Commands	
AT+CPBS	<storage>="SM"
Hardware related Commands	
AT^SLED	<mode>=0
Miscellaneous Commands	
ATS3	<n>=013
ATS4	<n>=010
ATS5	<n>=008



20.6 Summary of Unsolicited Result Codes (URC)

Table 20.9: Summary of Unsolicited Result Codes (URC)

AT Command	URC
Unsolicited Result Code Presentation	
	RING
	NO CARRIER
	^SBC: Undervoltage Warning
	^SBC: Undervoltage Shutdown
	^SBC: Overvoltage Warning
	^SBC: Overvoltage Shutdown
	^SHUTDOWN
	^SYSLOADING START
	^SYSLOADING FINISHED
Configuration Commands	
AT+CFUN	^SYSSTART
AT+CFUN	^SYSSTART AIRPLANE MODE
AT+CFUN	^SYSLOADING START
AT+CFUN	^SYSLOADING FINISHED
Status Control Commands	
AT^SCEER	^SCEER: <causeGroup>, <causeReason>
AT^SIND	+CIEV: <indDescr>, <indValue>
AT^SIND	+CIEV: <indDescr>, <cmdType>, <commandDetails>[, <pathLen>, <fileNum>, <fileList>[, <status>, <statAddInfo>]]
AT^SIND	+CIEV: <indDescr>, <nitzUT>, <nitzTZ>[, <nitzDST>]
AT^SIND	+CIEV: <indDescr>, <indValue>, <lstaEdvs>, <lstaRssi>
AT^SIND	+CIEV: <indDescr>, <indValue>, <lstaNo>, <lstaMin>, <lstaMax>, <lsta-Mean>, <lstaVar>
AT^SIND	+CIEV: <indDescr>, <indValue>, <lstaFrRep>, <lstaBandScnd>, <lsta-FrMin>, <lstaFrMax>, <lstaMin>, <lstaMax>, <lstaMean>, <lstaGrade>
AT^SIND	+CIEV: <indDescr>, <ceerRelCauseGroup>, <ceerReport>
AT^SIND	+CIEV: <indDescr>, <dtmfChar>, <dtmfSrc>
AT^SIND	+CIEV: <indDescr>, <srvProfileId>, <issuer>, <serialNumber>, <sub-ject>, <signatureAlgorithm>, <thumbprintAlgorithm>, <thumbprint>
AT^SIND	+CIEV: <indDescr>, <srvProfileId>, <pskurl>, <pskid>, <pskhint>, <cer-tificate>
Security Commands	
AT^SSECUA	^SSECUA: "CertStore/TLS/UpdateServerCerts", <index>, <action> [...]
Call related Commands	
AT+CRC	RING



AT Command	URC
AT+CRIC	+CRIC: <type>
Network Service Commands	
AT+CREG	+CREG: <regStatus>
AT+CREG	+CREG: <regStatus>[[, <netLac>][, <netCellId>][, <AcT>]]
AT+CREG	+CREG: <regStatus>[[, <netLac>][, <netCellId>][, <AcT>][, <causeType>, <rejectCause>]]
AT+CTZR	+CTZV: <timezone>
AT+CTZR	+CTZE: <timezone>, <dst>[, <time>]
AT+CTZR	+CTZEU: <timezone>, <dst>[, <utime>]
AT+CTZU	+CTZU: <nitzUT>, <nitzTZ>[, <nitzDST>]
AT+CIREG	+CIREG: <reg_info>
AT+CIREG	+CIREG: <reg_info>[, <ext_info>]
AT^SNFOTA	^SNFOTA: "act", <action>, <error>, <progress>
USIM Application Toolkit (USAT) Commands	
^SSTN SAT Notification	^SSTN: <cmdType>
^SSTN SAT Notification	^SSTN: <cmdTerminateValue>
^SSTN SAT Notification	^SSTN: 254
^SSTN SAT Notification	^SSTN: 255
Short Message Service (SMS) Commands	
AT+CNMI	+CMTI: <mem3>, <index>
AT+CNMI	+CMT: , <length><CR><LF><pdu>
AT+CNMI	+CMT: <oa>, , <scts>[, <toa>, <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: <srvProfileId>, <urcCause>[, [<urcInfoId>][, <urcInfoText>]]
Supplementary Service Commands	
AT+CAOC	+CCCM: <ccmValue>
AT+CCWA	+CCWA: <calling number>, <type of number>[, <class>][, , <CLI validity>]



AT Command	URC
AT+CLIP	+CLIP: <clipNumber>, <clipNumType>, , [, <clipAlpha>][, <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: <ussdStatus>[, <ussdRsp>[, <ussdDCS>]]
AT+CNAP	+CNAP: <name>[, <CNI validity>]
Packet Domain Related Commands	
AT+CEREG	+CEREG: <stat>
AT+CEREG	+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>]]
AT+CEREG	+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>][, <cause_type>, <reject_cause>]]
AT+CGEREP	+CGEV: NW DEACT <PDP_type>, <PDP_addr>[, <cid>]
AT+CGEREP	+CGEV: ME DEACT <PDP_type>, <PDP_addr>[, <cid>]
AT+CGEREP	+CGEV: NW DETACH
AT+CGEREP	+CGEV: ME DETACH
AT+CGEREP	+CGEV: NW CLASS <class>
AT+CGEREP	+CGEV: ME CLASS <class>
AT+CGEREP	+CGEV: ME ACT <pcid>, <cid>, <event-type>
AT+CGEREP	+CGEV: NW MODIFY <cid>, <change-reason>, <event-type>
AT+CGEREP	+CGEV: NW PDN DEACT <cid>
AT+CGEREP	+CGEV: ME PDN DEACT <cid>
AT+CGEREP	+CGEV: NW ACT <pcid>, <cid>, <event-type>
AT+CGEREP	+CGEV: ME MODIFY <cid>, <change-reason>, <event-type>
AT+CGEREP	+CGEV: ME PDN ACT <cid>[, <reason>]
AT+CGEREP	+CGEV: EPS PDN ACT <cid>
AT+CGREG	+CGREG: <stat>
AT+CGREG	+CGREG: <stat>[, <lac>][, <ci>][, <AcT>]
USIM related Commands	
AT^SSET	^SSIM READY
AT^SCKS	^SCKS: <SimStatus>
Hardware related Commands	
AT+CALA	+CALA: [<text>]
AT+CALA	^SYSSTART +CALA: [<text>]
AT+CALA	^SYSSTART AIRPLANE MODE +CALA: [<text>]
AT^SCTM	^SCTM_B: <UrcCause>
Miscellaneous Commands	
AT^SRVACT	^SRVACT: "MODS", <service_procedure>, <urc_service_status>[, <MODS_status_additional_info>]



20.7 Alphabetical List of AT Commands

Table 20.10: Alphabetical List of AT Commands

AT Command	Description	Section and Page
+++	Escape from Data Mode to AT Command Mode	Section 7.9, page 156
AT&C	Set Data Carrier Detect (DCD) line mode	Section 4.2, page 100
AT&D	Set Data Terminal Ready (DTR) line mode	Section 4.3, page 101
AT&F	Reset AT Command Settings to Factory Default Values	Section 2.1, page 30
AT&S	Set Data Set Ready (DSR) line mode	Section 4.4, page 102
AT&V	Display current Configuration	Section 2.2, page 31
AT&W	Store AT Command Settings to User Defined Profile	Section 2.3, page 32
AT+CACM	Accumulated call meter (ACM) reset or query	Section 12.1, page 331
AT+CALA	Alarm Configuration	Section 17.2, page 450
AT+CAMM	Accumulated call meter maximum (ACMmax) set or query	Section 12.2, page 332
AT+CAOC	Advice of Charge Information	Section 12.3, page 333
AT+CAVIMS	Availability for voice calls with IMS	Section 8.12, page 188
AT+CCFC	Call forwarding number and conditions control	Section 12.4, page 335
AT+CCHC	Close logical channel	Section 14.5, page 412
AT+CCHO	Open logical channel	Section 14.4, page 411
AT+CCID	USIM Card Identification Number	Section 14.1, page 406
AT+CCLK	Real Time Clock	Section 17.1, page 448
AT+CCWA	Call Waiting	Section 12.5, page 339
AT+CEER	Extended Error Report	Section 3.1, page 76
AT+CEMODE	Modes of Operation for EPS	Section 13.16, page 388
AT+CEREG	EPS Network Registration Status	Section 13.6, page 368
AT+CESQ	Extended Signal Quality	Section 8.14, page 191
AT+CFUN	ELS62-W Functionality Level	Section 2.7, page 36
AT+CGACT	PDP Context Activate or Deactivate	Section 13.1, page 357
AT+CGATT	PS Attach or Detach	Section 13.2, page 359
AT+CGCMOD	PDP Context Modify	Section 13.24, page 405
AT+CGCONTRDP	PDP context read dynamic parameters	Section 13.11, page 379
AT+CGDATA	Enter Data State	Section 13.4, page 362
AT+CGDCONT	Define PDP Context	Section 13.5, page 364
AT+CGDSCONT	Define Secondary PDP Context	Section 13.17, page 389
AT+CGEQOS	Define EPS Quality of Service	Section 13.3, page 360
AT+CGEQOSRDP	EPS Quality of Service Read Dynamic Parameters	Section 13.7, page 370
AT+CGEREP	Packet Domain Event Reporting	Section 13.8, page 372
AT+CGLA	Generic logical channel access	Section 14.6, page 413
AT+CGMI	Request manufacturer identification	Section 6.2, page 138
AT+CGMM	Request model identification	Section 6.4, page 139
AT+CGMR	Request revision identification of software status	Section 6.6, page 140
AT+CGPADDR	Show PDP Address	Section 13.9, page 375
AT+CGPIAF	Select Printing IP address format	Section 13.23, page 403



AT Command	Description	Section and Page
AT+CGQMIN	Quality of Service Profile (Minimum acceptable)	Section 13.12 , page 381
AT+CGREG	Packet Domain Network Registration Status	Section 13.13 , page 384
AT+CGSCONTRDP	Secondary PDP Context Read Dynamic Parameters	Section 13.10 , page 377
AT+CGSMS	Select Service for MO Short Messages	Section 13.14 , page 386
AT+CGSN	Request International Mobile Equipment Identity (IMEI)	Section 6.8 , page 141
AT+CGTFT	Traffic Flow Template	Section 13.18 , page 391
AT+CGTFTTRDP	Traffic Flow Template Read Dynamic Parameters	Section 13.19 , page 394
AT+CHLD	Call Hold and Multiparty	Section 12.6 , page 342
AT+CHUP	Hang up call	Section 7.5 , page 151
AT+CIMI	Request International Mobile Subscriber Identity (IMSI)	Section 6.10 , page 142
AT+CIREG	IMS registration information	Section 8.13 , page 189
AT+CLCC	List of current calls	Section 7.10 , page 157
AT+CLCK	Facility Lock	Section 5.3 , page 117
AT+CLIP	Calling Line Identification Presentation	Section 12.7 , page 344
AT+CLIR	Calling Line Identification Restriction	Section 12.8 , page 346
AT+CMEE	Error Message Format	Section 2.9 , page 39
AT+CMGD	Delete short message	Section 10.2 , page 238
AT+CMGF	Select SMS message format	Section 10.3 , page 240
AT+CMGL	List SMS messages from preferred store	Section 10.4 , page 241
AT+CMGR	Read SMS messages	Section 10.5 , page 242
AT+CMGS	Send Short Message	Section 10.6 , page 243
AT+CMGW	Write Short Messages to Memory	Section 10.7 , page 244
AT+CMMS	More Messages to Send	Section 10.12 , page 252
AT+CMSS	Send short messages from storage	Section 10.8 , page 245
AT+CMUT	Mute control	Section 16.1 , page 435
AT+CMUX	Multiplex mode	Section 4.8 , page 109
AT+CNAP	Calling Name Presentation	Section 12.14 , page 355
AT+CNMA	New Message Acknowledgement to UE/TE	Section 10.9 , page 246
AT+CNMI	SMS Event Reporting Configuration	Section 10.10 , page 247
AT+CNUM	Read own numbers	Section 15.5 , page 434
AT+COLP	Connected Line Identification Presentation	Section 12.9 , page 347
AT+COLR	Connected Line Identification Restriction Status	Section 12.10 , page 349
AT+COPN	Read operator names	Section 8.1 , page 162
AT+COPS	Operator Selection	Section 8.2 , page 163
AT+CPAS	Activity Status	Section 3.4 , page 98
AT+CPBF	Find phonebook entries	Section 15.2 , page 420
AT+CPBR	Read from phonebook	Section 15.3 , page 424
AT+CPBS	Select phonebook memory storage	Section 15.1 , page 417
AT+CPBW	Write into phonebook	Section 15.4 , page 429
AT+CPIN	PIN Authentication	Section 5.1 , page 111
AT+CPLS	Select Preferred Operator List	Section 8.6 , page 173
AT+CPMS	Preferred SMS message storage	Section 10.11 , page 250



AT Command	Description	Section and Page
AT+CPOL	Preferred Operator List	Section 8.5 , page 171
AT+CPUC	Price per unit and currency table	Section 12.11 , page 350
AT+CPWD	Change Password	Section 5.4 , page 122
AT+CRC	Set Cellular Result Codes for incoming call indication	Section 7.11 , page 159
AT+CREG	Network Registration Status	Section 8.3 , page 167
AT+CRSM	Restricted USIM Access	Section 14.2 , page 407
AT+CSCA	SMS Service Center Address	Section 10.13 , page 253
AT+CSCB	Select Cell Broadcast Message Indication	Section 10.14 , page 254
AT+CSCS	Character Set	Section 2.10 , page 43
AT+CSDH	Show SMS text mode parameters	Section 10.15 , page 256
AT+CSIM	Generic USIM Access	Section 14.3 , page 409
AT+CSMP	Set SMS Text Mode Parameters	Section 10.16 , page 257
AT+CSMS	Select Message Service	Section 10.17 , page 259
AT+CSQ	Signal Quality	Section 8.4 , page 170
AT+CSSN	Supplementary service notifications	Section 12.12 , page 351
AT+CTZR	Time Zone Reporting	Section 8.7 , page 174
AT+CTZU	Automatic Time Zone Update	Section 8.8 , page 176
AT+CUSD	Unstructured Supplementary Service Data	Section 12.13 , page 353
AT+CVMOD	Voice call mode	Section 7.12 , page 161
AT+GCAP	Capabilities List	Section 2.13 , page 75
AT+GMI	Request manufacturer identification	Section 6.3 , page 138
AT+GMM	Request model identification	Section 6.5 , page 139
AT+GMR	Request revision identification of software status	Section 6.7 , page 140
AT+GSN	Request International Mobile Equipment Identity (IMEI)	Section 6.9 , page 141
AT+ICF	Serial Interface Character Framing	Section 4.6 , page 104
AT+IPR	Bit Rate	Section 4.7 , page 106
AT+VTD	Tone duration	Section 16.3 , page 437
AT+VTS	DTMF and tone generation	Section 16.2 , page 436
AT\Q	Flow Control	Section 4.1 , page 99
AT^SAIC	Audio Interface Configuration	Section 16.4 , page 438
AT^SBNR	Binary Read	Section 19.10 , page 487
AT^SBNW	Binary Write	Section 19.4 , page 467
AT^SBV	Battery/Supply Voltage	Section 17.3 , page 453
AT^SCEER	Extended Error Report	Section 3.2 , page 80
AT^SCFG	Extended Configuration Settings	Section 2.11 , page 44
AT^SCKS	Query USIM and Chip Card Holder Status	Section 14.8 , page 415
AT^SCPIN	Pin Configuration	Section 18.2 , page 459
AT^SCSL	Customer SIM Lock	Section 5.5 , page 125
AT^SCTM	Critical Operating Temperature Monitoring	Section 17.4 , page 454
AT^SFDL	Enter Firmware Download Mode	Section 19.5 , page 469
AT^SFSA	Flash File System Access	Section 19.6 , page 470
AT^SGAUTH	Set Type of Authentication for PDP-IP Connections	Section 13.20 , page 397



AT Command	Description	Section and Page
AT^SGCONF	Configuration of GPRS related Parameters	Section 13.21 , page 399
AT^SGIO	Get IO state of a specified pin	Section 18.3 , page 461
AT^SGPINCA	Pin Configuration	Section 18.5 , page 463
AT^SHUP	Hang up call(s) indicating a specific 3GPP TS 24.008 release cause	Section 7.6 , page 152
AT^SICA	Internet Connection Activate or Deactivate	Section 11.1 , page 266
AT^SICS	Internet Connection Settings	Section 11.2 , page 267
AT^SIND	Extended Indicator Control	Section 3.3 , page 87
AT^SINFO	Information Output	Section 6.11 , page 143
AT^SIPS	Internet Profile Storage	Section 11.3 , page 269
AT^SISC	Internet Service Close	Section 11.7 , page 287
AT^SISD	Internet Service MQTT Dynamic Setup Profile	Section 11.11 , page 297
AT^SISE	Internet Service Error Report	Section 11.15 , page 306
AT^SISH	Disconnect Remote Client	Section 11.13 , page 302
AT^SISI	Internet Service Information	Section 11.5 , page 281
AT^SISO	Internet Service Open	Section 11.6 , page 284
AT^SISR	Internet Service Read Data	Section 11.8 , page 288
AT^SISS	Internet Service Setup Profile	Section 11.4 , page 270
AT^SIST	Transparent Mode	Section 11.10 , page 295
AT^SISU	MQTT Dynamic Send Request	Section 11.12 , page 300
AT^SISW	Internet Service Write Data	Section 11.9 , page 291
AT^SISX	Internet Service Execution	Section 11.14 , page 303
AT^SLED	LED Feature	Section 17.5 , page 456
AT^SMGL	List Short Messages from preferred store without setting status to REC READ	Section 10.18 , page 261
AT^SMONI	Monitoring Serving Cell	Section 8.9 , page 178
AT^SMONP	Monitoring Neighbour Cells	Section 8.10 , page 182
AT^SMSO	Switch Off ELS62-W	Section 2.8 , page 38
AT^SNFI	Set microphone path parameters	Section 16.5 , page 440
AT^SNFO	Set audio output parameter (loudspeaker path)	Section 16.6 , page 442
AT^SNFOTA	Firmware upgrade Over The Air	Section 8.17 , page 197
AT^SNFS	Select audio hardware set	Section 16.7 , page 444
AT^SNMON	Network Monitoring	Section 8.11 , page 185
AT^SNSRAT	Radio Access Technologies Selection	Section 8.15 , page 193
AT^SPIC	Display PIN Counter	Section 5.2 , page 113
AT^SPIO	GPIO Driver Open/Close	Section 18.1 , page 458
AT^SPOW	Set UART Mode and SLEEP Mode on UART	Section 2.12 , page 73
AT^SRTC	Ring tone configuration	Section 16.8 , page 446
AT^SRVACT	Extra Service Action	Section 19.9 , page 483
AT^SRVCFG	Service Configuration Settings	Section 19.7 , page 480
AT^SRVCTL	Extra Service Control	Section 19.8 , page 482
AT^SSECRUN	Signature Authentication for Protected Commands in Secure Mode	Section 5.8 , page 134



AT Command	Description	Section and Page
AT^SSECUA	Internet Service Certificate Store Actions	Section 5.6, page 127
AT^SSECUC	Internet Service Certificate Store Update Configuration	Section 5.7, page 130
AT^SSET	USIM Data Ready Indication	Section 14.7, page 414
AT^SSIO	Set IO state of a specified pin	Section 18.4, page 462
AT^SSTA	Remote-SAT Interface Activation	Section 9.4, page 208
AT^STGI	SAT Get Information	Section 9.6, page 212
AT^STGI	SAT Get Information - Refresh (1)	Section 9.7, page 213
AT^STGI	SAT Get Information - Set Up Event List (5)	Section 9.8, page 215
AT^STGI	SAT Get Information - Select Item (36)	Section 9.9, page 216
AT^STGI	SAT Get Information - Set up Menu (37)	Section 9.10, page 218
AT^STGI	SAT Get Information - Set up Idle Mode Text (40)	Section 9.11, page 220
AT^STGI	SAT Get Information - Language Notification (53)	Section 9.12, page 221
AT^SSTR	SAT Response	Section 9.13, page 222
AT^SSTR	SAT Response - Refresh (1)	Section 9.14, page 224
AT^SSTR	SAT Response - Set Up Event List (5)	Section 9.15, page 225
AT^SSTR	SAT Response - Select Item (36)	Section 9.16, page 226
AT^SSTR	SAT Response - Set Up Menu (37)	Section 9.17, page 227
AT^SSTR	SAT Response - Set Up Idle Mode Text (40)	Section 9.18, page 228
AT^SSTR	SAT Response - Language Notification (53)	Section 9.19, page 229
AT^SSTR	SAT Event - Menu Selection (211)	Section 9.20, page 230
AT^SWWAN	PDP Context Activate or Deactivate	Section 13.22, page 401
AT^SXRAT	Selection of Radio Access Technology	Section 8.16, page 195
ATA	Connect to Incoming Call	Section 7.1, page 146
ATD	Mobile originated call to specified number	Section 7.2, page 147
ATD*99#	Request Packet Domain service	Section 13.15, page 387
ATDL	Redial last number used	Section 7.3, page 149
ATE	AT Command Echo	Section 4.5, page 103
ATH	Disconnect existing data connection	Section 7.4, page 150
ATI	Display product identification information	Section 6.1, page 136
ATO	Switch from command mode to data mode / PPP online mode	Section 7.8, page 155
ATQ	Result Code Presentation Mode	Section 2.4, page 33
ATS0	Set number of rings before automatically answering a call	Section 7.7, page 154
ATS3	Command Line Termination	Section 19.1, page 464
ATS4	Response Formatting	Section 19.2, page 465
ATS5	Command Line Editing	Section 19.3, page 466
ATV	Result code format mode	Section 2.5, page 34
ATZ	Restore AT Command Settings from User Defined Profile	Section 2.6, page 35





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