THALES

Cinterion® PLPS9-W

AT Command Set

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1. Introduction

1.1 Scope of the document

This document presents the AT Command Set for
PLPS9-W GSM/UMTS/LTE Mobile Engine, Release 01.002.

Before using the PLPS9-W or upgrading to a new firmware version please read the latest product information provided in "PLPS9-W Release Notes, Version 01.002".

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

PLPS9-W features packet switched (PS) data capability, but does not support circuit switched (CS) data transmission. Hoewever, for reasons of compatibility with other products, and for compliance with 3GPP TS specificatiions, some AT commands imply parameters or values related to CS data capability.

1.2 Related documents

[1] PLPS9-W Release Notes, Version 01.002
[2] PLPS9-W Hardware Interface Description, Version 01.002
[3] User's Guide: Getting Started with PLPS9-W
[4] Application Note 16: Updating PLPS9-W Firmware
[5] Bluetooth Special Interest Group: SIM Access Profile (SAP) Interoperability Specification
[6] Application Note 39: USB Interface Description for PLPS9-W
[7] Application Note 90: Controlling Functionality Levels of Cinterion® Modules
[8] MPSS.AT LTE RF Software Overview
[9] Controlling Rx Chains on LTE
[10] 3GPP TR 21.905 (descendant of 3GPP TR 01.04): Vocabulary for 3GPP Specifications
[11] 3GPP TS 27.010 (descendant of 3GPP TS 07.10): Terminal Equipment to User Equipment (TE-UE) multiplexer protocol
[12] Multiplex Driver Developer's Guide
[13] International Organization for Standardization (ISO): ISO/IEC10646: 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
[14] The Unicode Consortium: Mapping of ETSI GSM 03.38 7-bit default alphabet characters into Unicode [.TXT!]
[15] ITU-T V.24 List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)
[16] ITU-T V.250 Serial asynchronous automatic dialling and control
[17] 3GPP TS 11.11: Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
[18] 3GPP TS 31.101: UICC-terminal interface; Physical and logical characteristics
[19] 3GPP TS 31.102: Characteristics of the Universal Subscriber Identity Module (USIM) application
[20] ETSI TS 102 221: Smart Cards; UICC-Terminal interface; Physical and logical characteristics
[21] 3GPP TS 11.14: Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
[22] 3GPP TS 31.111: Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)
[23] ETSI TS 102 223: Smart Cards; Card Application Toolkit (CAT)
[24] 3GPP TS 31.124: Mobile Equipment (ME) conformance test specification - Universal Subscriber Identity Module Application Toolkit (USAT) conformance test specification
[25] 3GPP TS 22.002 (descendant of 3GPP TS 22.02): Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)
[26] 3GPP TS 22.004 (descendant of 3GPP TS 02.04): General on supplementary services
[27] 3GPP TS 22.030 (descendant of 3GPP TS 02.30): Man-Machine Interface (MMI) of the Mobile Station (MS)
[28] 3GPP TS 22.060 (descendant of 3GPP TS 02.60): General Packet Radio Service (GPRS); Service description; Stage 1
[29] 3GPP TS 23.060 (descendant of 3GPP TS 03.60): General Packet Radio Service (GPRS); Service description; Stage 2
[30] 3GPP TS 22.081 (descendant of 3GPP TS 02.81): Line Identification Supplementary Services; Stage 1
[31] 3GPP TS 22.082 (descendant of 3GPP TS 02.82): Call Forwarding (CF) Supplementary Services; Stage 1
[32] 3GPP TS 22.083 (descendant of 3GPP TS 02.83): Call Waiting (CW) and Call Holding (HOLD); Supplementary Services; Stage 1
[33] 3GPP TS 22.085 (descendant of 3GPP TS 02.85): Closed User Group (CUG) supplementary services; Stage 1
[34] 3GPP TS 22.088 (descendant of 3GPP TS 02.88): Call Barring (CB) supplementary services; Stage 1
[35] 3GPP TS 22.090 (descendant of 3GPP TS 02.90): Unstructured Supplementary Service Data (USSD);

Stage 1

[36] 3GPP TS 23.038 (descendant of 3GPP TS 03.38): Alphabets and language specific information

[37] 3GPP TS 23.040 (descendant of 3GPP TS 03.40): Technical realization of the Short Message Service (SMS)

[38] 3GPP TS 23.041 (descendant of 3GPP TS 03.41): Technical realization of Cell Broadcast Service (CBS)

[39] 3GPP TS 23.107: Quality of Service (QoS) concept and architecture

[40] 3GPP TS 24.011 (descendant of 3GPP TS 04.11): Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface

[41] 3GPP TS 24.008 (descendant of 3GPP TS 04.08): Mobile radio interface Layer 3 specification; Core network protocols; Stage 3

[42] 3GPP TS 24.080 (descendant of 3GPP TS 04.80): Mobile radio interface layer 3 supplementary services specification; Formats and coding

[43] 3GPP TS 24.301 Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS)

[44] 3GPP TS 25.101 User Equipment (UE) radio transmission and reception (FDD)

[45] 3GPP TS 25.133 Requirements for support of radio resource management

[46] 3GPP TS 25.304 User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode

[47] 3GPP TS 25.331 Radio Resource Control (RRC)

[48] 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)

[49] 3GPP TS 27.007 (descendant of 3GPP TS 07.07): AT command set for User Equipment (UE)

[50] 3GPP TS 27.060 (descendant of 3GPP TS 07.60): Mobile Station (MS) supporting Packet Switched Services

[51] 3GPP TS 22.101 (descendant of 3GPP TS 02.07 and 3GPP TS 02.40): Service principles

[52] Common PCN Handset Specification (CPHS) v4.2 [.ZIP!]

[53] 3GPP TS 45.008 (descendant of GSM 05.08): Radio subsystem link control

[54] 3GPP TS 36.101 Evolved Universal Terrestrial Radio Access (E-UTRA)

[55] 3GPP TS 36.133 Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management

[56] 3GPP TS 27.071: Mandatory speech CODEC speech processing functions; AMR speech Codec; General description

[57] Documents posted on website of USB Implementers Forum

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

1.3 Document Conventions

Throughout this document PLPS9-W is also referred to as GSM/UMTS/LTE Mobile 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 PLPS9-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 [10].

1.3.1 Quick Reference Table

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

PIN: Is the AT command PIN protected?
- **+** Yes
- **-** No
- **±** Usage is dependent on conditions specified for the command, or not all command types are PIN protected (for example write command PIN protected, read command not).

Note: The table provided in Section 21.2, `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

PLPS9-W features 5 AT command ports mapped to
- the USB Modem (AT command port 1),
- the USB serial ports 1 - 3 (AT command ports 2 - 4)
- the serial interface ASC0 (AT command port 5).

If Multiplex mode is started on any AT command port 1 - 5 the number of AT command ports is 1 - 8.
For more details see AT^SQPORT and AT+CMUX and AT^SGPSC "Nmea/Interface".

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 oline 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 [16], 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 [16]).
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 PLPS9-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 PLPS9-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 PLPS9-W's signal lines refer to the Hardware Interface Description [2].

Leaving hardware flow control unconsidered the Customer Application (TE) is coupled with the PLPS9-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 PLPS9-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 PLPS9-W the opportunity to the transmission of pending URCs and get necessary service.
- The TE shall communicate with the PLPS9-W using activated echo (ATE1), i.e. the PLPS9-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 PLPS9-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 "ò" 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.

1.7 Supported character sets

PLPS9-W supports three character sets: *GSM 7 bit*, also referred to as GSM alphabet or SMS alphabet (3GPP TS 23.038 [36]) *UCS2 16 bit* (ISO-10646 [13]), and *IRA* (International Reference Alphabet, ITU T T.50). See AT+CSCS for information about selecting the character set. Character tables can be found below.

Explanation of terms

- 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 PLPS9-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 "|" 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 PLPS9-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 [36]) supported by the PLPS9-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" [14].

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	¡ 00A1	P 0050	¿ 00BF	p 0070
0	0	0	1	1	£ 00A3	_ 005F	! 0021	1 0031	A 0041	Q 0051	a 0061	q 0071
0	0	1	0	2	$ 0024	Φ 03A6	" 0022	2 0032	B 0042	R 0052	b 0062	r 0072
0	0	1	1	3	¥ 00A5	Γ 0393	# 0023	3 0033	C 0043	S 0053	c 0063	s 0073
0	1	0	0	4	è 00E8	Λ 039B	¤ 00A4	4 0034	D 0044	T 0054	d 0064	t 0074
0	1	0	1	5	é 00E9	Ω 03A9	% 0025	5 0035	E 0045	U 0055	e 0065	u 0075
0	1	1	0	6	ù 00F9	Π 03A0	& 0026	6 0036	F 0046	V 0056	f 0066	v 0076
0	1	1	1	7	ì 00EC	Ψ 03A8	' 0027	7 0037	G 0047	W 0057	g 0067	w 0077
1	0	0	0	8	ò 00F2 [3]	Σ 03A3	(0028	8 0038	H 0048	X 0058	h 0068	x 0078
1	0	0	1	9	ç 00E7	Θ 0398	) 0029	9 0039	I 0049	Y 0059	i 0069	y 0079
1	0	1	0	10/A	LF [LF] [2]	Ξ 039E	* 002A	: 003A	J 004A	Z 005A	j 006A	z 007A
1	0	1	1	11/B	Ø 00D8	[1]	+ 002B	; 003B	K 004B	Ä 00C4	k 006B	ä 00E4
1	1	0	0	12/C	ø 00F8	Æ 00C6	, 002C	< 003C	L 004C	Ö 00D6	l 006C	ö 00F6
1	1	0	1	13/D	CR [CR] [2]	æ 00E6	- 002D	= 003D	M 004D	Ñ 00D1	m 006D	ñ 00F1
1	1	1	0	14/E	Å 00C5	ß 00DF	. 002E	> 003E	N 004E	Ü 00DC	n 006E	ü 00FC
1	1	1	1	15/F	å 00E5	É 00C9	/ 002F	? 003F	O 004F	§ 00A7	o 006F	à 00E0

Figure 1.1: Main character table of GSM 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 "ò" 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 and Remote SAT, 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. Hyperterminal®).
Character value must be in range from 0 to 127 because of 7-bit GSM alphabet.
To reach maximum SMS text length of 160 characters in 140 bytes space characters will be compressed on SIM. This must be set using the parameter <dcs> of AT+CSMP (add 64).
Example: "ABCDEFGH" typed is sent and stored uncompressed as → 4142434445464748'H (stored compressed as 41E19058341E91'H)

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

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

Case 4
Every GSM character is sent as 4 IRA characters representing one UCS2 character.
Example: To store text "ABC" using UCS2 character set you have to type "004100420043".
This is sent as 30'H,30'H,34'H,31'H, 30'H,30'H,34'H,32'H, 30'H,30'H,34'H,33'H → detected as IRA representation of 3 UCS2 characters, converted to GSM character set and stored as 41'H, 42'H, 43'H.
Maximum input is 640 IRA characters representing 160 UCS2 characters when compression is active. These are converted to 160 GSM 7-bit characters.
Without compression only 140 GSM characters can be stored which are put in as 560 IRA characters.
Values of UCS2 characters must be smaller than 80'H (128 decimal) to be valid GSM characters.
Number of IRA characters must be a multiple of four. Problems:
- "41" → Error, there are four IRA characters (two bytes) needed
- "0000" → Error, not an UCS2 character
- "4142" → Error, value of UCS2 character > 7F'H
- "008B" → Error, value of UCS2 character > 7F'H
  This affects the maximum input length of a string)

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

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

1.8 Unsolicited Result Code Presentation

URC stands for Unsolicited Result Code and is a report message issued by the PLPS9-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 21.6, 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"
- "NOCARRIER"
- "BUSY"
- "^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"
  - "^SBC: Overvoltage Warning"
  - "^SBC: Overvoltage Shutdown"
- "^SHUTDOWN"

URC 1

```
NO CARRIER
```

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

```
BUSY
```

Indicates end of call to the TE if call was released from remote party, release cause user busy is received, indication is configured accordingly by ATX=4 and call dialing command was already finished by any final command response.

URC 4

```
^SBC: Undervoltage
```

The URC indicates that the UE is close to the undervoltage threshold. If undervoltage persists the UE keeps sending the URC several times before switching off automatically.

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.

1.9 Errors and Messages

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

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

A result error code terminates the execution of the command and prevents the execution of all remaining commands that may follow on the same command line.

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

See also:

- Section 2.8.1, CME/CMS Error Code Overview
- Section 2.5.1, 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 PLPS9-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 PLPS9-W's asynchronous serial interface (UART).
For a list of affected parameters refer to Section 21.5, Factory Default Settings Restorable with AT&F.

Syntax

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

PIN	✈	Last
-	+	-

Reference(s)
ITU-T V.250 [16]

Parameter Description

<value>(num)	
[0]	Reset parameters in Section 21.5, 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.

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

ACTIVE PROFILE:
E1 Q0 V1 X0 &C1 &D2 &S0 \Q3 S0:000 +CR: 0 +CRC: 0 +CMGF: 0 +CSDH: 0 +CNMI: 0,0,0,0,1 +IPR: 115200 +ICF: 3 +CMEE: 2 +CSMS: 0,1,1,1 ^SLCC: 0 ^SCKS: 0,1 ^SSET: 0 +CREG: 0,1 +CEREG: 0,1 +CLIP: 0 +CGSMS: 3 +COPS: 0[,<format>,<opName>,<rat>] 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 PLPS9-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 21.4, 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 PLPS9-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, than 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 [16]

Parameter Description

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

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

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

2.6 ATX Result Code Selection

ATX determines whether or not the PLPS9-W transmits particular result codes to the TE.
ATX also controls whether or not the UE verifies the presence of a dial tone when it begins dialing, and if engaged tone (busy signal) detection is enabled.

Syntax

Exec Command

ATX[<value>]

Response(s)

OK
ERROR

PIN	✈	Last
+	+	-

Reference(s)

ITU-T V.250 [16]

Parameter Description

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

2.7 ATZ Restore AT Command Settings from User Defined Profile

First ATZ resets the AT command settings to their factory default values, similar to AT&F. Afterwards the AT command settings are restored from a user defined profile in non-volatile memory of PLPS9-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 PLPS9-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

2.8 AT+CMEE Error Message Format

AT+CMEE controls the format of error result codes that indicates errors related to PLPS9-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).
The AT+CMEE exec command performs a write command with factory default parameter setting.

Syntax

Test Command

```
AT+CMEE=?
```

Response(s)

```
+CMEE: (list of supported<errMode>s)
OK
```

Read Command

```
AT+CMEE?
```

Response(s)

```
+CMEE: <errMode>
OK
```

Exec Command

```
AT+CMEE
```

Response(s)

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

Write Command

```
AT+CMEE=<errMode>
```

Response(s)

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

PIN	✈	Last
-	+	-

Reference(s)

3GPP TS 27.007 [49], 3GPP TS 27.005 [48]

Parameter Description

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

0	Disable result code, i.e. only "ERROR" will be displayed.
1	Enable error result code with numeric values.
2(&F)(D)	Enable error result code with verbose (string) values.

2.8.1 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
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed - emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
100	unknown

Table 2.3: 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
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

<err> Code	Text (if AT+CMEE=2)
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
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

<err> Code	Text (if AT+CMEE=2)
340	no +CNMA acknowledgement expected
500	unknown error
512	user abort
538	invalid parameter

2.9 AT+CSCS Character Set

AT+CSCS write command informs the PLPS9-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 [49]

Parameter Description

<charSet>(str)	
"GSM"(&F)(P)	GSM default alphabet (3GPP TS 23.038 [36], subclause 6.2.1).
"UCS2"	16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]). UCS2 character strings are converted to hexadecimal numbers in the range 0000 to FFFF; e.g. "004100620063" equates three 16-bit characters with decimal values 65, 98 and 99.
"IRA"	International reference alphabet (ITU T T.50).

2.10 AT+CFUN PLPS9-W Functionality Level

AT+CFUN controls PLPS9-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 <fun>s), (list of supported <rst>s)
OK
ERROR
+CME ERROR: <err>
```

Read Command

```
AT+CFUN?
```

Response(s)

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

Write Command

```
AT+CFUN=<fun>[, <rst>]
```

Response(s)

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

PIN	✈	Last
-	+	-

Reference(s)

3GPP TS 27.007 [49]

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.

Parameter Description

<fun>(num)

This parameter determines the functionality level of the UE.
It is possible to enable the UE to store the setting of this parameter persistently via AT^SCFG="MEopMode/CFUN", <volaCFUN>.

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 and enters extended Airplane Mode, which is indicated via "^SYSSTART AIRPLANE MODE" URC. 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 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 and enters Airplane mode, which is indicated via "^SYSSTART AIRPLANE MODE" URC. 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 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.

2.11 AT+GCAP Capabilities List

AT+GCAP displays a list of basic capabilities supported by the PLPS9-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 [16]

Parameter Description

<name>(str)

e.g. +GCAP: +CGSM

2.12 AT^SMSO Switch Off PLPS9-W

AT^SMSO initiates PLPS9-W's power-off procedure. Do not send any other AT command after this.
For further detail please refer to [2].

Syntax

Test Command

```
AT^SMSO=?
```

Response(s)

```
OK
```

Exec Command

```
AT^SMSO
```

Response(s)

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

PIN	✈	Last
-	+	+

2.13 AT^SCFG Extended Configuration Settings

AT^SCFG can be used to query and configure various settings of the PLPS9-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: "Audio/SvTone", (list of supported <toneoff>s)
^SCFG: "Call/ECC", (list of supported <ecc>s)
^SCFG: "Call/Speech/Codec", (list of supported <scc>s)
^SCFG: "GPRS/Auth", (list of supported <gauth>s)
^SCFG: "GPRS/AutoAttach", (list of supported <gaa>s)
^SCFG: "GPRS/MTU/Size", (range of supported <mtusize>s)
^SCFG: "GPRS/MTU/Mode", (list of supported <nwmode>s)
^SCFG: "MEopMode/CFUN", (list of supported <volaCFUN>s)
^SCFG: "MEopMode/CregRoam", (list of supported <mrs>s)
^SCFG: "MEopMode/DTM/Mode", (list of supported <dtm>s)
^SCFG: "MEopMode/ExpectDTR", (list of supported <expDtrSet>s), (list of supported <expDtrPort>s)
^SCFG: "MEopMode/Fgi/Split", (list of supported <fgi_split_mode>s)
^SCFG: "MEopMode/IMS", (list of supported <ims>s)
^SCFG: "MEopMode/NonBlock/Cops", (list of supported <com>s)
^SCFG: "MEopMode/PowerMgmt/LCI", (list of supported <lci>s), (list of supported <gpio>s)
^SCFG: "MEopMode/Prov/AutoSelect", (list of supported <provAutoSelect>s)
^SCFG: "MEopMode/Prov/Cfg", (list of supported <provCfg>s)
^SCFG: "MEopMode/PwrSave", (list of supported <PwrSaveMode>s), (list of supported <PwrSavePeriod>s), (list of supported <PwrSaveWakeup>s), (list of supported <PwrSaveCPU>s), (list of supported <PwrSaveSet>s)
^SCFG: "MEopMode/SRPOM", (list of supported <srpom>s)
^SCFG: "MEopMode/USB/KeepData", (list of supported <usbKeepDataSet>s), (list of supported <usbKeepDataPort>s)
^SCFG: "MEShutdown/OnIgnition", (list of supported <msi>s)
^SCFG: "MEShutdown/Timer", (range of supported <shutdownRemainingTime>values)
^SCFG: "Misc/CId", (max. string length of <CId>)
^SCFG: "Radio/Band/2G", (list of supported <rba2g>s), , (list of supported <rbe>s)
^SCFG: "Radio/Band/3G", (list of supported <rba3g>s), , (list of supported <rbe>s)
^SCFG: "Radio/Band/4G", (list of supported <rba4g-1>s), (list of supported <rba4g-2>s), (list of supported <rbe>s)
^SCFG: "Radio/Band/Ext4G", (list of supported <rbaext4g-1>s), (list of supported <rbaext4g-2>s)
^SCFG: "Radio/Band/TdScdma", (list of supported <rbaTdScdma>s), , (list of supported <rbe>s)
^SCFG: "Radio/CNS", (list of supported <cns>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/3G", (list of supported <PL_mode>s), (list of supported <PL_profile>s), (list of supported <PL_band3g>s), , (list of supported <PL_limit3g>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/Mtpl/TdScdma", (list of supported <PL_mode>s), (list of supported <PL_profile>s), (list of supported <PL_bandTdScdma>s), , (list of supported <PL_limitTdScdma>s)
^SCFG: "Radio/OutputPowerReduction", (list of supported <ropr>s)
^SCFG: "RemoteWakeUp/Event/ASC", (list of supported <RemWakeLine>s)
^SCFG: "RemoteWakeUp/Event/URC", (list of supported <RemWakeLine>s)

Test Command (Continued)

AT^SCFG=?

Response(s)

^SCFG: "RemoteWakeUp/Event/USB", (list of supported <RemWakeLine>s)
^SCFG: "RemoteWakeUp/Ports", (list of supported <RemWakePortSet>s), (list of supported <RemWakePort>s)
^SCFG: "RemoteWakeUp/Pulse", (range of supported <RemWakePulse>s)
^SCFG: "SIM/CS", (list of supported <CS>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: "SMS/4GPref", (list of supported <SmsDomain>s)
^SCFG: "SMS/AutoAck", (list of supported <SmsAcknl>s)
^SCFG: "SMS/Retrm", (list of supported <SmsRetrmTimeout>s)
^SCFG: "URC/Ringline", (list of supported <urcRinglineCfg>s)
^SCFG: "URC/Ringline/ActiveTime", (list of supported <urcRinglineDuration>s)
OK

Read Command

AT^SCFG?

Response(s)

^SCFG: "Audio/Loop", <al>
^SCFG: "Audio/SvTone", <toneoff>
^SCFG: "Call/ECC", <ecc>
^SCFG: "Call/Speech/Codec", <scc>
^SCFG: "GPRS/Auth", <gauth>
^SCFG: "GPRS/AutoAttach", <gaa>
^SCFG: "GPRS/MTU/Size", <mtusize>
^SCFG: "GPRS/MTU/Mode", <nwmode>
^SCFG: "MEopMode/CFUN", <volaCFUN>, <storedCFUN>
^SCFG: "MEopMode/CregRoam", <mrs>
^SCFG: "MEopMode/DTM/Mode", <dtm>
^SCFG: "MEopMode/ExpectDTR", "current"[, <expDtrPort>$_1$[, <expDtrPort>$_2$[, ...]]]
^SCFG: "MEopMode/ExpectDTR", "powerup"[, <expDtrPort>$_1$[, <expDtrPort>$_2$[, ...]]]
^SCFG: "MEopMode/Fgi/Split", <fgi_split_mode>
^SCFG: "MEopMode/IMS", <ims>
^SCFG: "MEopMode/NonBlock/Cops", <com>
^SCFG: "MEopMode/PowerMgmt/LCI"[, <lci>[, <gpio>]]
^SCFG: "MEopMode/Prov/AutoSelect", <provAutoSelect>
^SCFG: "MEopMode/Prov/Cfg", <provCfg>
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSavePeriod>, <PwrSaveWakeup>, "CPU-A", "powerup"
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSavePeriod>, <PwrSaveWakeup>, "CPU-A", "current"
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSavePeriod>, <PwrSaveWakeup>, "CPU-M", "powerup"
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSavePeriod>, <PwrSaveWakeup>, "CPU-M", "current"
^SCFG: "MEopMode/SRPOM", <srpom>
^SCFG: "MEopMode/USB/KeepData", "current"[, <usbKeepDataPort>$_1$[, <usbKeepDataPort>$_2$[, ...]]]
^SCFG: "MEopMode/USB/KeepData", "powerup"[, <usbKeepDataPort>$_1$[, <usbKeepDataPort>$_2$[, ...]]]
^SCFG: "MEShutdown/OnIgnition", <msi>
^SCFG: "MEShutdown/Timer", <shutdownRemainingTime>
^SCFG: "Misc/CId", <CId>
^SCFG: "Radio/Band/2G", <rba2g>

Read Command (Continued)

AT^SCFG?

Response(s)

^SCFG: "Radio/Band/3G", <rba3g>
^SCFG: "Radio/Band/4G", <rba4g-1>[, <rba4g-2>]
^SCFG: "Radio/Band/Ext4G", <rbaext4g-1>[, <rbaext4g-2>]
^SCFG: "Radio/Band/TdScdma", <rbaTdScdma>
^SCFG: "Radio/CNS", <cns>
^SCFG: "Radio/Mtpl", <PL_mode>[, <PL_profile>]
^SCFG: "Radio/Mtpl/2G", <PL_mode>[, <PL_profile>]
^SCFG: "Radio/Mtpl/3G", <PL_mode>[, <PL_profile>]
^SCFG: "Radio/Mtpl/4G", <PL_mode>[, <PL_profile>]
^SCFG: "Radio/Mtpl/TdScdma", <PL_mode>[, <PL_profile>]
^SCFG: "Radio/OutputPowerReduction", <ropr>
^SCFG: "RemoteWakeUp/Event/ASC", <RemWakeLine>
^SCFG: "RemoteWakeUp/Event/URC", <RemWakeLine>
^SCFG: "RemoteWakeUp/Event/USB", <RemWakeLine>
^SCFG: "RemoteWakeUp/Ports", "current"[, <RemWakePort>$_1$[, <RemWakePort>$_2$[, ...]]]
^SCFG: "RemoteWakeUp/Ports", "powerup"[, <RemWakePort>$_1$[, <RemWakePort>$_2$[, ...]]]
^SCFG: "RemoteWakeUp/Pulse", <RemWakePulse>
^SCFG: "SIM/CS", <CS>
^SCFG: "Serial/USB/DDD" , <usbDeviceDescr>, <usbDescrIndex>, <usbLangId>, <usbVendorId>, <usbProductId>, <usbManufacturer>, <usbProduct>, <usbSerialNo>
^SCFG: "SMS/4GPref", <SmsDomain>
^SCFG: "SMS/AutoAck", <SmsAcknl>
^SCFG: "SMS/Retrm", <SmsRetrmTimeout>
^SCFG: "URC/Ringline", <urcRinglineCfg>
^SCFG: "URC/Ringline/ActiveTime", <urcRinglineDuration>
OK

Write Command

Configure Audio Loop.

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

Response(s)

^SCFG: "Audio/Loop", <al>
OK
ERROR
+CME ERROR: <err>

Write Command

Deactivation of supervisory tones.

AT^SCFG="Audio/SvTone"[, <toneoff>]

Response(s)

^SCFG: "Audio/SvTone", <toneoff>
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

Write Command (Continued)

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

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

Response(s)

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

Configure PPP authentication.

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

Response(s)

^SCFG: "GPRS/Auth", <gauth>
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

Control persistence of AT+CFUN parameter <fun>.

AT^SCFG="MEopMode/CFUN"[, <volaCFUN>]

Response(s)

^SCFG: "MEopMode/CFUN", <volaCFUN>, <storedCFUN>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SCFG="MEopMode/CregRoam"[, <mrs>]

Response(s)

^SCFG: "MEopMode/CregRoam", <mrs>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SCFG="MEopMode/DTM/Mode"[, <dtm>]

Response(s)

^SCFG: "MEopMode/DTM/Mode", <dtm>
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

The AT command switches PLPS9-W "Enable Split FGI – LTE-FDD/-TDD"

AT^SCFG="MEopMode/Fgi/Split"[, <fgi_split_mode>]

Response(s)

^SCFG: "MEopMode/Fgi/Split", <fgi_split_mode>
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

AT^SCFG="MEopMode/NonBlock/Cops"[, <com>]

Response(s)

^SCFG: "MEopMode/NonBlock/Cops", <com>
OK
ERROR
+CME ERROR: <err>

Write Command

Power Management control by Low Current Indicator (LC_IND line).

AT^SCFG="MEopMode/PowerMgmt/LCI"[, <lci>[, <gpio>]]

Response(s)

^SCFG: "MEopMode/PowerMgmt/LCI"[, <lci>[, <gpio>]]
OK
ERROR
+CME ERROR: <err>

Write Command

Auto select provider profile.

AT^SCFG="MEopMode/Prov/AutoSelect"[, <provAutoSelect>]

Response(s)

^SCFG: "MEopMode/Prov/AutoSelect", <provAutoSelect>
OK
ERROR
+CME ERROR: <err>

Write Command

Provider profile configuration.

AT^SCFG="MEopMode/Prov/Cfg"[, <provCfg>]

Response(s)

^SCFG: "MEopMode/Prov/Cfg", <provCfg>
OK
ERROR
+CME ERROR: <err>

Write Command

Extended power saving control.

AT^SCFG="MEopMode/PwrSave"[, <PwrSaveMode>][, <PwrSavePeriod>][, <PwrSaveWakeup>][, <PwrSaveCPU>, <PwrSaveSet>]

Response(s)

^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSavePeriod>, <PwrSaveWakeup>, "CPU-A", "powerup"
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSavePeriod>, <PwrSaveWakeup>, "CPU-A", "current"
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSavePeriod>, <PwrSaveWakeup>, "CPU-M", "powerup"
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSavePeriod>, <PwrSaveWakeup>, "CPU-M", "current"
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
ERROR
+CME ERROR: <err>

Write Command

AT^SCFG="MEopMode/USB/KeepData"[, <usbKeepDataSet>[, <usbKeepDataPort>$_1$[, <usbKeepDataPort>$_2$[, ...]]]]

Response(s)

^SCFG: "MEopMode/USB/KeepData", "current"[, <usbKeepDataPort>$_1$[, <usbKeepDataPort>$_2$[, ...]]]
^SCFG: "MEopMode/USB/KeepData", "powerup"[, <usbKeepDataPort>$_1$[, <usbKeepDataPort>$_2$[, ...]]]
OK
ERROR
+CME ERROR: <err>

Write Command

Enable/disable shutdown by ignition line.

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

Response(s)

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

Write Command

Query/Configure the timer controlled shutdown.

AT^SCFG="MEShutdown/Timer"[, <shutdownRemainingTime>]

Response(s)

^SCFG: "MEShutdown/Timer", <shutdownRemainingTime>
OK
ERROR
+CME ERROR: <err>

Write Command

Query/Configure Customer Id.

AT^SCFG="Misc/CId"[, <CId>]

Response(s)

^SCFG: "Misc/CId", <CId>
OK
ERROR
+CME ERROR: <err>

Write Command

Enable/disable 2G radio bands.

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

Response(s)

^SCFG: "Radio/Band/2G", <rba2g>
OK
ERROR
+CME ERROR: <err>

Write Command

Enable/disable 3G radio bands.

`AT^SCFG="Radio/Band/3G"[, <rba3g>][, ,<rbe>]`

Response(s)

`^SCFG: "Radio/Band/3G", <rba3g>`
`OK`
`ERROR`
`+CME ERROR: <err>`

Write Command

Enable/disable 4G radio bands.

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

Response(s)

`^SCFG: "Radio/Band/4G", <rba4g-1>[, <rba4g-2>]`
`OK`
`ERROR`
`+CME ERROR: <err>`

Write Command

Enable/disable extended 4G radio bands.

`AT^SCFG="Radio/Band/Ext4G"[, <rbaext4g-1>, <rbaext4g-2>]`

Response(s)

`^SCFG: "Radio/Band/Ext4G", <rbaext4g-1>[, <rbaext4g-2>]`
`OK`
`ERROR`
`+CME ERROR: <err>`

Write Command

Enable/disable TD-SCDMA radio bands.

`AT^SCFG="Radio/Band/TdScdma"[, <rbaTdScdma>][, ,<rbe>]`

Response(s)

`^SCFG: "Radio/Band/TdScdma", <rbaTdScdma>`
`OK`
`ERROR`
`+CME ERROR: <err>`

Write Command

Enable/Disable Continuous Network Search

`AT^SCFG="Radio/CNS"[, <cns>]`

Response(s)

`^SCFG: "Radio/CNS", <cns>`
`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/3G"
"Radio/Mtpl/4G"
"Radio/Mtpl/TdScdma"

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/3G"[, <PL_mode>[, <PL_profile>, <PL_band3g>, , <PL_limit3g>]]

Response(s)

^SCFG: "Radio/Mtpl/3G", <PL_mode>[, <PL_profile>, <PL_band3g>, , <PL_limit3g>]

In case of <PL_mode>=2 and <PL_profile> one profile configuration is printed out
^SCFG: "Radio/Mtpl/3G", <PL_mode>, <PL_profile>, <PL_band3g>, , <PL_limit3g>
^SCFG: ["Radio/Mtpl/3G", <PL_mode>, <PL_profile>, <PL_band3g>, , <PL_limit3g>]
^SCFG: ["Radio/Mtpl/3G", ...]

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/3G"[, <PL_mode>[, <PL_profile>, <PL_band3g>, , <PL_limit3g>]]

Response(s)

In case of <PL_mode>=2 full profile configuration (1-8) is printed out
^SCFG: "Radio/Mtpl/3G", <PL_mode>, <PL_profile>, <PL_band3g>, , <PL_limit3g>
^SCFG: ["Radio/Mtpl/3G", <PL_mode>, <PL_profile>, <PL_band3g>, , <PL_limit3g>]
^SCFG: ["Radio/Mtpl/3G", <PL_mode>, <PL_profile>, <PL_band3g>, , <PL_limit3g>]
^SCFG: ["Radio/Mtpl/3G", ...]

In case of <PL_mode>=3 and <PL_profile>, <PL_band3g>,,<PL_limit3g>
^SCFG: "Radio/Mtpl/3G", <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>
^SCFG: "Radio/Mtpl/4G", <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/TdScdma"[, <PL_mode>[, <PL_profile>, <PL_bandTdScdma>, , <PL_limitTdScdma>]]

Response(s)

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

In case of <PL_mode>=2 and <PL_profile> one profile configuration is printed out
^SCFG: "Radio/Mtpl/TdScdma", <PL_mode>, <PL_profile>, <PL_bandTdScdma>, , <PL_limitTdScdma>
^SCFG: ["Radio/Mtpl/TdScdma", <PL_mode>, <PL_profile>, <PL_bandTdScdma>, , <PL_limitTdScdma>]
^SCFG: ["Radio/Mtpl/TdScdma", ...]

In case of <PL_mode>=2 full profile configuration (1-8) is printed out
^SCFG: "Radio/Mtpl/TdScdma", <PL_mode>, <PL_profile>, <PL_bandTdScdma>, , <PL_limitTdScdma>
^SCFG: ["Radio/Mtpl/TdScdma", <PL_mode>, <PL_profile>, <PL_bandTdScdma>, , <PL_limitTdScdma>]
^SCFG: ["Radio/Mtpl/TdScdma", <PL_mode>, <PL_profile>, <PL_bandTdScdma>, , <PL_limitTdScdma>]
^SCFG: ["Radio/Mtpl/TdScdma", ...]

In case of <PL_mode>=3 and <PL_profile>, <PL_bandTdScdma>,,<PL_limitTdScdma>
^SCFG: "Radio/Mtpl/TdScdma", <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

Configure line that shall be toggled when UE has data to be transferred to the TE while RTS is inactive.

AT^SCFG="RemoteWakeUp/Event/ASC"[, <RemWakeLine>]

Response(s)

^SCFG: "RemoteWakeUp/Event/ASC", <RemWakeLine>
OK
ERROR
+CME ERROR: <err>

Write Command

Configure line that shall be toggled when a URC is issued.

AT^SCFG="RemoteWakeUp/Event/URC"[, <RemWakeLine>]

Response(s)

^SCFG: "RemoteWakeUp/Event/URC", <RemWakeLine>
OK

Write Command (Continued)

Configure line that shall be toggled when a URC is issued.

AT^SCFG="RemoteWakeUp/Event/URC"[, <RemWakeLine>]

Response(s)

ERROR
+CME ERROR: <err>

Write Command

Configure line that shall be toggled to wake up the TE when a Remote Wakeup Event occurs on USB.

AT^SCFG="RemoteWakeUp/Event/USB"[, <RemWakeLine>]

Response(s)

^SCFG: "RemoteWakeUp/Event/USB", <RemWakeLine>
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

Configure duration of Wakeup Event pulse.

AT^SCFG="RemoteWakeUp/Pulse"[, <RemWakePulse>]

Response(s)

^SCFG: "RemoteWakeUp/Pulse", <RemWakePulse>
OK
ERROR
+CME ERROR: <err>

Write Command

Select the USIM to be used.

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

Response(s)

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

Select SMS domain preference (CS or IMS).

AT^SCFG="SMS/4GPref"[, <SmsDomain>]

Response(s)

^SCFG: "SMS/4GPref", <SmsDomain>
OK
ERROR
+CME ERROR: <err>

Write Command

Enable / disable automatic acknowledgement of a directly routed incoming SMS without entering AT+CNMA.

AT^SCFG="SMS/AutoAck"[, <SmsAcknl>]

Response(s)

^SCFG: "SMS/AutoAck", <SmsAcknl>
OK
ERROR
+CME ERROR: <err>

Write Command

Configure SMS retransmission timeout.

AT^SCFG="SMS/Retrm", <SmsRetrmTimeout>

Response(s)

^SCFG: "SMS/Retrm", <SmsRetrmTimeout>
OK
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>

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

`<toneoff>`(str)(NV)

Supervisory tone and other locally generated tones off

This parameter can be used to deactivate a supervisory and locally generated tone.
The value range is "0"..."2047". To deselect certain tones calculate the sum of the values of all deactivated tones. For example, for RINGING "2" and CONGESTION "8" please enter the value "10".

“ 0“(D)	No tone is deactivated.
“ 1“	DIAL TONE deactivated.
“ 2“	RINGING deactivated.
“ 4“	BUSY deactivated.
“ 8“	CONGESTION deactivated.
“ 16“	DROPPED deactivated.
“ 32“	WAITING deactivated.
“ 64“	RADIO_ACK deactivated.
“ 128“	AUTHENTICATION deactivated.
“ 256“	UNOBTAINABLE deactivated.
“ 512“	ATTENTION deactivated.
“1024“	all other locally generated tones deactivated.
“2047“	all supervisory tones and other locally generated tones are deactivated.

`<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.

<scc>(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.
“2“	The speech codecs AMR WB are disabled for voice calls.

<gauth>(str)

PPP authentication mechanism

Setting can be used to configure which authentication algorithm the ATD*99# will apply, during the PPP startup phase, for PDP contexts not yet activated.
For contexts activated with AT+CGACT please use the AT command AT^SGAUTH to configure the authentication method.

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

<gaa>(str)(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 12.1.1, 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(D)	Ask network for MTU size
1	Don't ask network for MTU size and use default value

<mtusize>(num)(NV)

MTU size, in bytes, must match with current network provider requirements. The value is set automatically by modules auto-selection of network provider profiles if activated (see AT^SCFG "MEopMode/Prov/AutoSelect"). It is used also for MBIM interface USB enumeration parameter wMTU (see [6]).

1280...1430(D)...4096

<volaCFUN>(str)(NV)

Volatile +CFUN Mode

Parameter determines whether AT+CFUN parameter <fun> is stored persistently.

“0“	Setting of AT+CFUN parameter <fun> is stored persistently.
“1“(D)	Setting of AT+CFUN parameter <fun> is volatile, i.e. changes are not reestablished after next UE restart.

<storedCFUN>(str)(NV)

Stored +CFUN Mode

Indicates setting of AT+CFUN parameter <fun> which will be used for next UE restart.

<mrs>(str)(NV)

Modified Roaming Status

This parameter enables or disables the modified roaming status displayed by AT+CREG. If it is enabled, the registration status is "registered to home network" instead of "registered, roaming", when the registered PLMN and the Home PLMN from USIM Elementary File EF_{IMSI} are mapped to the same network name in the PLPS9-W internal operator list.
Please consider this configuration has no influence to the commands AT^SIND="roam" and AT+CGREG!

“0“(D)	Disable the Modified Roaming Status Display.
“1“	Enable the Modified Roaming Status Display.

<dtm>(str)(NV)

DTM Mode

This parameter controls the Dual Transfer Mode.

“0“	DTM and EDTM are disabled.
“1“(D)	DTM is enabled and EDTM is disabled.
“2“	DTM and EDTM are enabled.

<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, or a "SetInterface(AltSet)" request to a USB CDC MBIM. 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, all ports are listed in the AT^SCFG "MEopMode/ExpectDTR" read command responses, meaning that the "MEopMode/ExpectDTR" feature is activated for all ports.

“acm0“(D)	Refers to USB0, AT^SQPORT <id> 1
“acm1“(D)	Refers to USB1, AT^SQPORT <id> 2
“acm2“(D)	Refers to USB2, AT^SQPORT <id> 3
“acm3“(D)	Refers to USB3, AT^SQPORT <id> 4
“diag“(D)	for future use and currently not taken over in current configuration.
“mbim“(D)	Refers to MBIM
“asc0“(D)	Refers to ASC0, AT^SQPORT <id> 5

Examples:
Default: UE expects the DTR signal on all ports.
Advantage: If a port is not connected or not opened any data available before DTR activation will be discarded.
AT^SCFG?
....
^SCFG: "MEopMode/ExpectDTR","current","acm0","acm1","acm2","acm3","mbim",,"asc0"
^SCFG: "MEopMode/ExpectDTR","powerup","acm0","acm1","acm2","acm3","diag","mbim","asc0"
....
OK
If the Customer Application implements a driver for a given port (in this example for the USB modem) then this port can be removed from the "MEopMode/ExpectDTR","powerup" list:
AT^SCFG="MEopMode/ExpectDTR","powerup","acm1","acm2","acm3","diag","mbim","asc0"
^SCFG: "MEopMode/ExpectDTR","current","acm0","acm1","acm2","acm3","mbim",,"asc0"
^SCFG: "MEopMode/ExpectDTR","powerup","acm1","acm2","acm3","diag","mbim","asc0"
OK
AT+CFUN=1,1
OK
^SYSSTART
AT^SCFG="MEopMode/ExpectDTR"
^SCFG: "MEopMode/ExpectDTR","current","acm1","acm2","acm3","mbim","asc0"
^SCFG: "MEopMode/ExpectDTR","powerup","acm1","acm2","acm3","diag","mbim","asc0"
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>.

<fgi_split_mode>(str)(NV)

split feature group indication

This parameter controls split feature group indication.
The feature is used in networks, which support the split FGI – LTE-FDD/-TDD (3GPP 36.331 – "tdd-Add-UE-EUTRA-Capabilities-r9 UE-EUTRA-CapabilityAddXDD-Mode-r9”)

“0“	disable
“1“	enable

<com>(str)(NV)

AT+COPS operation mode

Parameter determines whether to use the UE's standard AT+COPS write command (default) or the non-blocking AT+COPS write command. In non-blocking mode the AT+COPS write command immediately returns OK. In this mode, the AT command interface will not be blocked till the search is finished. The status of the search will be indicated by the "+CREG" URC.

"0"(D)	Normal mode The standard mode of AT+COPS write command.
"1"	Non-blocking mode AT+COPS write command immediately returns OK.

<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.

<lci>(str)

Low Current Indicator

Setting can be used to enable or disable the Low Current Indicator using the line specified with parameter <gpio>. For details refer to "PLPS9-W Hardware Interface Description, Version 01.002".

"disabled"(P)	Low Current Indicator is disabled.
"enabled"	Low Current Indicator is enabled.

<gpio>(str)

Low Current Indicator GPIO

Parameter specifies the GPIO used as Low Current Indicator.
If Low Current Indicator is enabled with parameter <lci>, the used GPIO cannot be assigned to other functions such as GPIO handler (see AT^SCPIN) or Remote Wakeup line (see <RemWakeLine>) or GPIO1 configured as DR_SYNC line (see AT^SGPSC, <DRSyncVal>). Vice versa, if assigned to another function a GPIO cannot be configured as Low Current Indicator. AT^SCPIN parameter <pin_id> shows supported GPIOs.

Do not assign GPIO1 as Low Power Indicator.

Please note, this paramter is only required when <lci>="enabled".

<provAutoSelect>(str)(NV)

Autoselect provider profile

The AT^SCFG "MEopMode/Prov/AutoSelect" parameter <provAutoSelect> enables / disables the autoselection of provider profiles. Setting takes effect after next restart.

The UE comes with two types of preconfigured provider profiles:

- *Dedicated provider profiles distinguished by the IIN field (Issuer Identification Number) of the ICCIDs in the SIM:*
  Each provider profile loads a set of non-volatile provider specific settings, such as PDP contexts defined with AT+CGDCONT, as well as IMS and VoLTE settings if applicable for the specific provider.
- *One Fallback profile intended for all other providers:*

The fallback profile comes with default PDP contexts. It depends on the provider whether default PDP contexts will do. If not, the TE will be required to define provider specific PDP contexts.

All preconfigured provider profiles are listed by the AT^SCFG=? test command and by ATI61. The currently selected provider profile is indicated by the <provCfg> parameter of the AT^SCFG "MEopMode/Prov/Cfg" read command response, by ATI61 and by the <provCur> parameter of the AT^SIND "prov" indicator. For profile settings refer to: AT+CAVIMS, AT+CVMOD, AT+CGDCONT, <ims> of AT^SCFG "MEopMode/IMS", <SmsDomain> of AT^SCFG "SMS/4GPref".
It is the responsibility of the Customer Application manufacturer to use a desired profile.

“on“(D)	Autoselection is on. The provider profile changes automatically when the inserted SIM card matches one of the provider profiles preconfigured in the UE.
“off“	Autoselection is off. The provider profile can be set manually using the AT^SCFG "MEopMode/Prov/Cfg" write command.

If autoselection is "on", provider profile settings are non-volatile as long as the same SIM or a SIM of the same provider is inserted. Otherwise, if a different provider configuration is selected, or a SIM of a different provider is inserted the existing profile will be cleared before the new profile can be loaded. This applies, in particular, to all PDP contexts defined by AT+CGDCONT, no matter whether loaded as part of a preconfigured provider profile, or set by the TE.
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.

The provider profile status is reported by the URC +CIEV: prov,<provMm>,<provCur> (see AT^SIND "prov"). The URC is enabled by powerup default. The URC reports the current provider profile status after UE restart and any change of the provider profile configuration when autoselection is "on".
If the ICCID IIN of the inserted SIM matches one of the dedicated preconfigured provider profiles <provMm> equals 0.
If the ICCID IIN of the inserted SIM does not match any dedicated preconfigured provider profile <provMm> equals 1. For the fallback provider profile <provMm> is always 1.

<provCfg>(str)(NV)

Provider configuration

The AT^SCFG "MEopMode/Prov/Cfg" parameter <provCfg> controls the provider profiles.
It is not allowed to manually change the provider profile when <provAutoSelect> value is "on". Any attempt to do so will be denied with result code "+CME ERROR: operation temporary not allowed".

“fallb*“(D)	This value represents the fallback provider profile. Can be used if the inserted SIM card does not match the provider profiles preconfigured in the UE. The "*" is only a sign. Do not use this "*" in the provider profile name when setting the fallback provider profile.
“tmode“	*EXAMPLE !* Provider T-Mobile
“vdfde“	*EXAMPLE !* Provider Vodafone
“...“	Next possible provider ...
“...“	Next possible provider ...

<PwrSaveMode>(str)(NV)

Power Save Mode

AT^SCFG "MeOpMode/PwrSave" settings allow to control the PLPS9-W's power saving behavior.
See also "PLPS9-W Hardware Interface Description, Version 01.002" for additional advice on power saving requirements.

The UE integrates two CPUs, one referred to as CPU-A or application processor, the other one referred to as CPU-M or modem processor. Specific power saving functions are executed on each CPU. To save power each CPU enters a Low Power Mode (LPM) whenever possible. For maximum power saving both CPUs must be in LPM. There are two ways to wake up the CPUs: event triggered and timer controlled.
The AT^SCFG "MeOpMode/PwrSave" subcommand specifies the following settings:

- whether a CPU shall enter LPM at all (set with <PwrSaveMode>)
- how long a CPU may remain in LPM = max. LPM time (set with <PwrSavePeriod>)
- how long a CPU shall run before it is allowed to enter LPM again = min. active time (set with <PwrSave-Wakeup>).

If different maximum LPM times are given and one is an integer multiple of the other one the software tries to synchronize the wake-up at maximum LPM time.

“disabled“(D)	LPM is disabled. Under no circumstances the UE will enter its power save (SLEEP) state.
“enabled“	LPM is enabled for given CPU. This mode enables the UE to enter LPM when no activity occurs on any port. Please note that, regardless of this setting, power saving will always be disabled until 5 seconds after powerup. For further detail refer to parameter <PwrSaveSet>.

<PwrSavePeriod>(str)(NV)

Maximum Power Save Period

If <PwrSaveMode> is "enabled" the <PwrSavePeriod> value specifies the maximum duration the given CPU is allowed to stay in LPM.

Value range for CPU-A:

"0"(D)..."36000"	Maximum LPM time. 0 = No limit, CPU-M may stay in LPM until an event triggered wakeup occurs. 1...36000 = maximum LPM time of CPU-M in in 1/10 seconds.

Value range for CPU-M:

"0"(D)..."36000"	Maximum LPM time. 0 = No limit, CPU-M may stay in LPM until an event triggered wakeup occurs. 1...36000 = maximum LPM time of CPU-M in in 1/10 seconds.

<PwrSaveWakeup>(str)(NV)

Minimum awake time

"0"(D)..."36000"	Minimum delay in 1/10 seconds before the UE enters power save mode (SLEEP) again after a wakeup event.

<PwrSaveCPU>(str)

PowerSaveCPU

The <PwrSaveCPU> parameter allows to configure power saving for the application or modem processor. If the parameter is omitted in the write command the CPU-A is assumed as default.

[“CPU-A“]	APPS processor (Linux is running here)
“CPU-M“	Modem processor (radio protocol stack is executed here)

<PwrSaveSet>(str)

The <PwrSaveSet> parameter specifies whether the "MeOpMode/PwrSave" configuration is non-volatile or volatile.
Please note that each time after starting the UE, power saving will be disabled until 5 seconds after the "^SYS-START" URC, regardless of the power save configuration set before powerup. Also, note that during this time any changes to power save settings will not be accepted. After this time the configuration selected before powerup becomes effective, and changing the configuration is also allowed.

“powerup“(D)	Power save configuration is non-volatile (written to flash), and becomes effective immediately and 5 seconds after the "^SYSSTART" URC.
“current“	Power save configuration is volatile (not written to flash), and becomes effective immediately. The powerup configuration won't be changed.

<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.
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.
“99“	RPM has an inconsistent setting. This parameter is not writable. Therefore this value will be denied with result code "+CME ERROR: operation not allowed".

<usbKeepDataSet>(str)

The <usbKeepDataSet> parameter specifies whether the "MEopMode/USB/KeepData" configuration set with <usbKeepDataPort> is non-volatile or volatile.

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

<usbKeepDataPort>(str)

On ports not listed with <usbKeepDataPort> calls or data connections pending at this time will not be dropped while VUSB is removed (USB DISCONNECT). Any data, already pending at this time or becoming pending while VUSB is removed, are kept till they are picked up by the host. Module will not drop calls or data connections pending at that time on such port only because VUSB has been removed. The supported ports are reported by the AT^SCFG test command in the line for "MEopMode/USB/KeepData". By delivery default the "MEopMode/USB/KeepData" feature is activated for all ports.

“acm0“(D)	Refers to USB0, AT^SQPORT <id> 1
“acm1“(D)	Refers to USB1, AT^SQPORT <id> 2
“acm2“(D)	Refers to USB2, AT^SQPORT <id> 3
“acm3“(D)	Refers to USB3, AT^SQPORT <id> 4
“diag“(D)	for future use and currently not taken over in current configuration.
“mbim“(D)	Refers to MBIM
“asc0“(D)	Refers to ASC0AT^SQPORT <id> 5

<msi>(str)(NV)

Parameter determines the switching mode of the ignition line (IGT): The line may either be used only to switch on the UE, or to toggle it on and off. For details refer to "PLPS9-W Hardware Interface Description, Version 01.002".

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

<shutdownRemainingTime>(str)

Remaining time for timer controlled shutdown

Remaining time in minutes until PLPS9-W is powered down automatically. The timer is based on the real time clock of the PLPS9-W (see AT+CCLK).
Please note, that changing the real time clock using AT+CCLK influences the remaining time for an activated automatic shutdown timer. Setting the time into the past will increase the remaining time, setting the time into the future will decrease the remaining time. If the real time clock is set to a time later than the expiration time of the active automatic shutdown timer, then the automatic shutdown is disabled.

“off“(P)	Automatic shutdown is disabled
“0“	Automatic shutdown within the next minute
"1"..."525600"	Automatic shutdown after specified number of minutes

<CId>(str)(+CSCS)(NV)

Customer Id

Setting allows customers to store an identification string. It is not used by the UE itself. The maximum length of the string is 290 characters (GSM or UCS2 or IRA depending on the setting of AT+CSCS). The delivery value is an empty string.

<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.
Additional parameter <rbe> is available for compatibility reasons and has no functional influence. This parameter is optional and does not need to be used. It could be omitted in the future.

Note: The AT^SCFG=? test command shows the minimum and maximum band values.
Switching off all 2G bands using AT^SCFG="Radio/Band/2G","0" is possible.
Switching off all bands returns an error. At least one remaining band must be activated.

<rba3g>(str)(NV)

<rba3g> determines the 3G 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“	WCDMA 2100 (BC1)
“4“	WCDMA 1800 (BC3)
“10“	WCDMA 850 (BC5)
“20“	WCDMA 800 (BC6)

“80“	WCDMA 900 (BC8)
“40000“	WCDMA 850 (BC19)

Factory default of <rba3g> 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, <rba3g> may be one of the supported single values listed below.
Any change of <rba3g> will take effect immediately and will also be effective after next UE restart. So, <rba3g> is a parameter that may be used to read out the current band combination any time.
Additional parameter <rbe> is available for compatibility reasons and has no functional influence. This parameter is optional and does not need to be used. It could be omitted in the future.

Note: The AT^SCFG=? test command shows the minimum and maximum band values.
Switching off all 3G bands using AT^SCFG="Radio/Band/3G","0" is possible.
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)
“4“	LTE 1800 (B3)
“10“	LTE 850 (B5)
“40“	LTE 2600 (B7)
“80“	LTE 900 (B8)
“20000“	LTE 850 (B18)
“40000“	LTE 800 (B19)
“80000“	LTE 800 (B20)
“2000000“	LTE 850 (B26)
“8000000“	LTE 700 (B28)
“80000000“	LTE (B32)

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.
Additional parameter <rbe> is available for compatibility reasons and has no functional influence. This parameter is optional and does not need to be used. It could be omitted in the future.

Note: The AT^SCFG=? test command shows the minimum and maximum band values.
Switching off all 4G bands using AT^SCFG="Radio/Band/4G","0","0" is possible.
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 bands higher as 32 the AT^SCFG test command returns the value range 0 - 0, and the AT^SCFG read command response does not display <rba4g-2>.

“2“	LTE (B34)
“20“	LTE 2600 (B38)
“40“	LTE 1900 (B39)
“80“	LTE 2350 (B40)
“100“	LTE 2550 (B41)

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.
Additional parameter <rbe> is available for compatibility reasons and has no functional influence. This parameter is optional and does not need to be used. It could be omitted in the future.

Note: The AT^SCFG=? test command shows the minimum and maximum band values.
Switching off all 4G bands using AT^SCFG="Radio/Band/4G","0","0" is possible.
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.

<rbaext4g-1>(str)(NV)

<rbaext4g-1> configures that extended 4G frequency bands from <rba4g-1> may also be used. Values are given in *hexadecimal 32-bit-value order.* Every bit corresponds to a dedicated band number. The number range of <rbaext4g-1> covers band 1 to band 32.

All extended 4G frequency bands are switched off by factory setting of <rbaext4g-1>. Extended bands are not usually supported by <rba4g-1> and are usually bands with restrictions: for example, lack of approval or only downlink supported bands.
Therefore, changes to the extended 4G band configuration are recommended only if the subscriber wishes to use the extended bands for certain carrier aggregation combinations or is located in a country by allowing bands to be used without approval. In such case, <rbaext4g-1> may be one of the supported single values listed below.
Any change to this parameter will take effect after UE restart. So, <rbaext4g-1> is a parameter that may be used to read out the current band combination any time, but the read value is used for reinitializing the UE after next restart.
All enabled extended 4G frequency bands can be additional used from <rba4g-1> after next restart.

Note: The AT^SCFG=? test command shows the minimum and maximum extended 4G band values.

<rbaext4g-2>(str)(NV)

<rbaext4g-2> configures that extended 4G frequency bands from <rba4g-2> may also be used. 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 <rbaext4g-2> covers band 33 to max possible band. If the UE does not support bands higher as 32 the AT^SCFG test command returns the value range 0 - 0, and the AT^SCFG read command response does not display <rbaext4g-2>.

“100“	LTE 2550 (B41), lack of approval

All extended 4G frequency bands are switched off by factory setting of <rbaext4g-2>. Extended bands are not usually supported by <rba4g-2> and are usually bands with restrictions: for example, lack of approval or only downlink supported bands.
Therefore, changes to the band configuration are recommended only if the subscriber wishes to use the extended bands for certain carrier aggregation combinations or is located in a country by allowing bands to be used without approval. In such case, <rbaext4g-2> may be one of the supported single values listed below.
Any change to this parameter will take effect after UE restart. So, <rbaext4g-2> is a parameter that may be used to read out the current band combination any time, but the read value is used for reinitializing the UE after next restart.
All enabled extended 4G frequency bands can be additional used from <rba4g-2> after next restart.

Note: The AT^SCFG=? test command shows the minimum and maximum extended 4G band values.

Note: When using the parameter <rbaext4g-2> at least also parameter <rbaext4g-1> must be used.

<rbaTdScdma>(str)(NV)

Parameter determines TD-SCDMA frequency band usage of the UE in *hexadecimal 32-bit-value order* and every bit corresponds to a dedicated band number. Factory default of <rbaTdScdma> 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, <rbaTdScdma> may be one of the supported single values listed below.
Any change of <rbaTdScdma> will take effect immediately and will also be effective after next UE restart. So, <rbaTdScdma> is a parameter that may be used to read out the current band combination any time.
Additional parameter <rbe> is available for compatibility reasons and has no functional influence. This parameter is optional and does not need to be used. It could be omitted in the future.

“1“	TD-SCDMA 2000 Band A (B34)
“20“	TD-SCDMA 1900 Band F (B39)

Note: The AT^SCFG=? test command shows the minimum and maximum band values.
Switching off all TD-SCDMA bands using AT^SCFG="Radio/Band/TdScdma","0" is possible.
Switching off all bands returns an error. At least one remaining band must be activated.

<rbe>(str)

Radio Band Enable: Set radio bands immediately active

The additional <rbe> parameter is available for compatibility reasons and has no functional influence. This parameter is optional and does not need to be used. It could be omitted in the future.

“0“	takes no effect.
“1“	takes no effect.

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

<cns>(str)

Continuous Network Search Mode

This parameter can be used to influence the time the UE takes to register to the network.

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

Note: To monitor the search process it may be useful to have the "+CREG" URC enabled.

<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 WCDMA use "Radio/Mtpl/3G".
- for TD-SCDMA use "Radio/Mtpl/TdScdma".
- for LTE use "Radio/Mtpl/4G".

A profile contains all supported bands
- for GSM see <PL_band2g>,
- for WCDMA see <PL_band3g>,
- for TD-SCDMA see <PL_bandTdScdma>,
- 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 WCDMA see <PL_limit3g>,
- for TD-SCDMA see <PL_limitTdScdma>,
- 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.
Changing limit values of a profile with <PL_mode> 3 takes effect after UE restart only. Activating and deactivating power limitation with <PL_mode> 1 or 0, takes effect instantly. The <PL_mode> is volatile, therefore output power limitaton is deactivated after UE restart.
For an example on how to configure and trigger instant power limitation see below *Example* section.

Bands WCDMA 850 (BC5) and WCDMA 800 (BC6) are changed in combination.

"0"(P)	Power limitation deactivated (no further parameters are possible).
"1"	Power limitation activated. <PL_profile> 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 <PL_mode>= 1. 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 <PL_profile> 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_band3g>(str)

Radio Band 3G

Parameter specifies the 3G frequency bands of the UE in *hexadecimal 32-bit-value order.* Every bit corresponds to a dedicated band number.

“1“	WCDMA 2100 (BC1)
“4“	WCDMA 1800 (BC3)
“10“	WCDMA 850 (BC5)
“20“	WCDMA 800 (BC6)
“80“	WCDMA 900 (BC8)
“40000“	WCDMA 850 (BC19)

<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)
“4“	LTE 1800 (B3)
“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)
“20000“	LTE 850 (B18)
“40000“	LTE 800 (B19)
“80000“	LTE 800 (B20)
“2000000“	LTE 850 (B26)
“8000000“	LTE 700 (B28)
“80000000“	LTE (B32) is downlink (DL) only, no uplink (UL).

`<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).
“2“	LTE (B34)
“20“	LTE 2600 (B38)
“40“	LTE 1900 (B39)
“80“	LTE 2350 (B40)
“100“	LTE 2550 (B41)

`<PL_bandTdScdma>`(str)

Radio Band TD-SCDMA

Parameter specifies the TD-SCDMA 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“	TD-SCDMA 2000 B34 (BANDA)
“20“	TD-SCDMA 1900 B39 (BANDF)

`<PL_limit2g>`(str)(NV)

Power Limitation 2G

This parameter is used to set the power limit.
Setting takes effect after next restart.

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

`<PL_limit3g>`(str)(NV)

Power Limitation 3G

This parameter is used to set the power limit.
Setting takes effect after next restart.

"18"..."24"	Power limit value in dBm for WCDMA bands.

`<PL_limit4g>`(str)(NV)

Power Limitation 4G

This parameter is used to set the power limit.
Setting takes effect after next restart.

"18"..."24"	Power limit value in dBm for LTE bands.

<PL_limitTdScdma>(str)(NV)

Power Limitation TD-SCDMA

This parameter is used to set the power limit.
Setting takes effect after next restart.

"18"..."24"	Power limit value in dBm for TD-SCDMA bands.

<PL_limit_psk>(str)(NV)

Power Limitation 8 PSK (only for GSM)

This parameter is used to set the power limit 8 PSK.
Setting takes effect after next restart.

"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.

“4“(D)	No power reduction with GMSK and 8PSK.
“5“	2 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.
“6“	4 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.
“7“	6 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.
“8“	Max. power reduction for GSMK and 8PSK (6dB for 4 Tx).

<RemWakeLine>(str)(NV)

Remote Wakeup line

This parameter is part of the AT^SCFG subcommands "RemoteWakeUp/Event/ASC", "RemoteWakeUp/Event/URC" and "RemoteWakeUp/Event/USB" specifying the lines that may be used for Remote Wakeup, also referred to as host wakeup.
If no call, data or message transfer is in progress, the external host application (the TE) may shut down its own module interfaces or other components in order to save power. If a call, data, or other request (URC) arrives, the TE can be notified of this event and be woken up by a state transition of a configurable remote wakeup line. Available as Remote Wakeup lines are all GPIO signals.
When configuring a GPIO as Remote Wakeup line keep in mind that it is locked for other functions, such as GPIO handler (see AT^SCPIN) or Low Current Indicator (see AT^SCFG "MEopMode/PowerMgmt/LCI" parameter <lci>) or GPIO1 configured as DR_SYNC line (see AT^SGPSC, <DRSyncVal>).

Types of event:

- "RemoteWakeUp/Event/ASC": UE has any kind of data (incl. URCs) on the ASC0 interface to be transferred to the TE while RTS0 is inactive (e.g. due to Sleep state or Flow Control).
- "RemoteWakeUp/Event/URC": The selected hardware line is toggled each time when a URC is generated, no matter whether or not the TE is in power saving state.
- "RemoteWakeUp/Event/USB": UE has any kind of data (incl. URCs) on a USB port to be transferred to the TE while USB is in SUSPEND state or DETACHED as specified in the "USB Specification Revision 2.0/3.0". The USB port has to be specified via <RemWakePort>.
  Note: If no hardware line is configured for this event type a remote wakeup as specified in the "USB Specifi-

cation Revision 2.0/3.0" is executed. Both mechanisms are mutually exclusive.

The <RemWakeLine> parameter determines the line(s) that shall be toggled. They are active high. For each Remote Wakeup event type you have the choice to specify the same line or different lines for all event types. The pulse duration of the Remote Wakeup signal is configurable via <RemWakePulse>.

“none“(D)	No hardware line is configured as Remote Wakeup signal.
“GPIO1“	GPIO1 toggles when the assigned event occurs.
“GPIO3“	GPIO3 toggles when the assigned event occurs.
“GPIO4“	GPIO4 toggles when the assigned event occurs.
“GPIO5“	GPIO5 toggles when the assigned event occurs.
“GPIO6“	GPIO6 toggles when the assigned event occurs.
“GPIO7“	GPIO7 toggles when the assigned event occurs.
“GPIO8“	GPIO8 toggles when the assigned event occurs.
“GPIO11“	GPIO11 toggles when the assigned event occurs.
“GPIO12“	GPIO12 toggles when the assigned event occurs.
“GPIO13“	GPIO13 toggles when the assigned event occurs.
“GPIO14“	GPIO14 toggles when the assigned event occurs.
“GPIO15“	GPIO15 toggles when the assigned event occurs.
“GPIO16“	GPIO16 toggles when the assigned event occurs.
“GPIO17“	GPIO17 toggles when the assigned event occurs.
“GPIO22“	GPIO22 toggles when the assigned event occurs.

<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 when an event configured with AT^SCFG subcommands "RemoteWakeUp/Event/ASC" or "RemoteWakeUp/Event/USB" occurs.
The supported ports are reported by the AT^SCFG test command in the line for "RemoteWakeUp/Ports". The setting is only for data, therefore the parameter is not relevant for the event type "RemoteWakeUp/Event/URC".

“acm0“(D)	Refers to USB0, AT^SQPORT <id> 1
“acm1“(D)	Refers to USB1, AT^SQPORT <id> 2
“acm2“(D)	Refers to USB2, AT^SQPORT <id> 3
“diag“(D)	for future use and currently not taken over in current configuration.
“acm3“(D)	Refers to USB3, AT^SQPORT <id> 4
“mbim“(D)	Refers to MBIM
“asc0“(D)	Refers to ASC0, AT^SQPORT <id> 5

<RemWakePulse>(str)(NV)

Remote Wakeup Pulse Duration

Parameter specifies the pulse duration for a Remote Wakeup Event in 10ms steps.

"1"..."10"(D)..."100"

<CS>(str)(NV)

Card slot / USIM

The AT^SCFG subcommand "SIM/CS" specifies the (U)SIM interface currently used. Usage of this command depends on whether the host application is designed to include an additional second (U)SIM interface and whether or not Remote SIM Access is employed. Only one of the supported (U)SIM interfaces can be used at a time. For details on how to connect the first and the second (U)SIM interface please refer to "PLPS9-W Hardware Interface Description, Version 01.002".

“NOSIM“	No USIM is used, no matter whether a USIM is present in one of the slots.
“SIM1“(D)	First (U)SIM slot is enabled regardless of whether a (U)SIM card is inserted. Access to another (U)SIM inserted in slot 2 or activated via AT^SRSA is deactivated.
“SIM2“	Second (U)SIM slot is enabled regardless of whether a (U)SIM card is inserted. Access to another (U)SIM inserted in slot 1 or activated via AT^SRSA is deactivated.
“RSA“	(U)SIM of the RSA server is enabled. The value "RSA" has to be set before activating RSA with AT^SRSA. As long as the SAP client mode is enabled via AT^SRSA the <CS> value cannot be changed. After disabling the SAP client mode via AT^SRSA the <CS> value can be changed to any other value.

To check the status of the (U)SIM and the (U)SIM interface you can take advantage of several URCs, such as AT^SIND "simstatus", AT^SCKS, AT^SSET.
When the configuration changes the UE tries to start the selected (U)SIM interface no matter whether a CCIN line is populated. Therefore, please note that the AT^SIND "simstatus" indicator and the AT^SCKS URCs will show up 3 times when the selected (U)SIM slot is empty. Both URCs will show a sequence of values 0, 1, 0 (e.g. "^SCKS: 0", "^SCKS: 1", "^SCKS: 0" and "+CIEV: simstatus,0", "+CIEV: simstatus,1", "+CIEV: simstatus,0"). If a (U)SIM is inserted both URCs will show value 1.

<SmsDomain>(str)(NV)

The AT^SCFG "SMS/4GPref" specifies which technology to use for SMS transmission in LTE networks.
The same function is also integrated in the AT^SCFG "MEopMode/IMS" subcommand (see AT^SCFG and <ims> parameters). Both commands are synchronized when one of them was changed.
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.

“IMS“(D)	SMS over IMS.
“CSPS“	SMS over Circuit Switched domain. Disables IMS for SMS, i.e. no IMS registration will be performed for SMS.

<SmsAcknl>(str)

SMS auto acknowledge

Parameter activates or deactivates the ability to automatically acknowledge an incoming short message directly routed to the TE.

“0“(P)	No automatic acknowledgement.

“1“	UE will automatically acknowledge an incoming short message directly routed to the TE / immediately displayed. This eliminates the need for the user to manually acknowledge such messages with AT+CNMA. Please keep in mind that you may lose an incoming short message if the interface is blocked.

<SmsRetrmTimeout>(num)(NV)

SMS retransmission timeout in seconds
If the UE fails to send an MO short message, a new attempt of re-transmitting it will be done after <SmsRetrmTimeout>. The total period during which the UE tries to send a short message is 180 seconds - after this time an attempt to send the message is dropped.

1...45(D)

<usbDeviceDescr>(str)(+CSCS)(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)(+CSCS)(NV)

Descriptor Index

“0“(D)	Not to be changed. Use always 0.

<usbLangId>(str)(+CSCS)(NV)

Language ID

If parameter <usbLangId> is not specified, the default value of the UE's standard USB Device Descriptor configuration applies (US English).
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.

<usbVendorId>(str)(+CSCS)(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)(+CSCS)(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)(+CSCS)(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)(+CSCS)(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)(+CSCS)(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 4 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.
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 line to wake up the TE refer to "PLPS9-W Hardware Interface Description, Version 01.002".

“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.

“2“(D)	Ring line will be activated for about 1s.
“on“	Ring line is always activated.
“off“	Ring line is always deactived.

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.
^SCFG: "Radio/Mtpl/2G","0"              Instant power limitation is still disabled.
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.
^SCFG: "Radio/Mtpl/2G","0"              Instant power limitation is still disabled.
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.
^SCFG: "Radio/Mtpl/2G","0"              Instant power limitation is still disabled.
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.
^SCFG: "Radio/Mtpl/2G","0"              Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/2G",2,1             Query profile 1 settings.
......                                  The response returns the old values as above (there-
                                        fore 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/3G" subcommand.
See parameters <PL_mode>, <PL_profile>, <PL_band3g>, <PL_limit3g>.

```
^SYSSTART
AT^SCFG="Radio/Mtpl/3G"                     Read "Radio/Mtpl/3G" mode.
^SCFG: "Radio/Mtpl/3G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/3G",2,1                 Query profile 1 settings. Delivery default settings are
                                            shown:
^SCFG: "Radio/Mtpl/3G","2","1","00000001",,"24"
^SCFG: "Radio/Mtpl/3G","2","1","00000004",,"24"
^SCFG: "Radio/Mtpl/3G","2","1","00000010",,"24"
^SCFG: "Radio/Mtpl/3G","2","1","00000020",,"24"
^SCFG: "Radio/Mtpl/3G","2","1","00000080",,"24"
^SCFG: "Radio/Mtpl/3G","2","1","00040000",,"24"
OK
AT^SCFG="Radio/Mtpl/3G",3,1,1,,23           Profile 1: Configure max. RF output power limit of
                                            WCDMA 2100 (BC1) band to 23dBm.
^SCFG: "Radio/Mtpl/3G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/3G",3,1,4,,23           Profile 1: Configure max. RF output power limit of
                                            WCDMA 1800 (BC3) band to 23dBm.
^SCFG: "Radio/Mtpl/3G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/3G",3,1,10,,23          Profile 1: Configure max. RF output power limit of
                                            WCDMA 850 (BC5) band to 23dBm.
^SCFG: "Radio/Mtpl/3G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/3G",3,1,20,,23          Profile 1: Configure max. RF output power limit of
                                            WCDMA 800 (BC6) band to 23dBm.
^SCFG: "Radio/Mtpl/3G","0"                  Instant power limitation is still disabled.
OK
```

```
AT^SCFG="Radio/Mtpl/3G",3,1,80,,23          Profile 1: Configure max. RF output power limit of
                                            WCDMA 900 (BC8) band to 23dBm.
^SCFG: "Radio/Mtpl/3G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/3G",3,1,40000,,23       Profile 1: Configure max. RF output power limit of
                                            WCDMA 850 (BC19) band to 23dBm.
^SCFG: "Radio/Mtpl/3G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/3G",2,1                 Configure profile 1 settings.
......                                      The response returns the old values as above (there-
                                            fore omitted in this example).
AT+CFUN=1,1                                 Restart UE to enable the profile 1 settings configured
                                            above.
OK
^SYSSTART
AT^SCFG="Radio/Mtpl/3G"                     Read "Radio/Mtpl/3G" mode.
^SCFG: "Radio/Mtpl/3G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/3G",2,1                 Configure profile 1 settings. Changed values are
                                            shown now.
^SCFG: "Radio/Mtpl/3G","2","1","00000001",,"23"
^SCFG: "Radio/Mtpl/3G","2","1","00000004",,"23"
^SCFG: "Radio/Mtpl/3G","2","1","00000010",,"23"
^SCFG: "Radio/Mtpl/3G","2","1","00000020",,"23"
^SCFG: "Radio/Mtpl/3G","2","1","00000080",,"23"
^SCFG: "Radio/Mtpl/3G","2","1","00040000",,"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
```

EXAMPLE 4

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","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000004","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000010","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000040","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000080","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","00020000","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","00040000","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","00080000","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","02000000","00000000","24"
```

```
^SCFG: "Radio/Mtpl/4G","2","1","08000000","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","80000000","00000000","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000002","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000020","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000040","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000080","24"
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000100","24"
OK
AT^SCFG="Radio/Mtpl/4G",3,1,1,0,23          Profile 1: Configure max. RF output power limit of
                                            LTE B1 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,4,0,23          Profile 1: Configure max. RF output power limit of
                                            LTE B3 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,10,0,23         Profile 1: Configure max. RF output power limit of
                                            LTE B5 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,40,0,23         Profile 1: Configure max. RF output power limit of
                                            LTE B7 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,80,0,23         Profile 1: Configure max. RF output power limit of
                                            LTE B8 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,20000,0,23      Profile 1: Configure max. RF output power limit of
                                            LTE B18 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,40000,0,23      Profile 1: Configure max. RF output power limit of
                                            LTE B19 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,80000,0,23      Profile 1: Configure max. RF output power limit of
                                            LTE B20 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,2000000,0,23    Profile 1: Configure max. RF output power limit of
                                            LTE B26 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,8000000,0,23    Profile 1: Configure max. RF output power limit of
                                            LTE B28 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,80000000,0,23   Profile 1: Configure max. RF output power limit of
                                            LTE B32 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,0,2,23          Profile 1: Configure max. RF output power limit of
                                            LTE B34 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"                  Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/4G",3,1,0,20,23         Profile 1: Configure max. RF output power limit of
                                            LTE B38 band to 23dBm.
```

^SCFG: "Radio/Mtpl/4G","0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl/4G",3,1,0,40,23	Profile 1: Configure max. RF output power limit of LTE B39 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl/4G",3,1,0,80,23	Profile 1: Configure max. RF output power limit of LTE B40 band to 23dBm.
^SCFG: "Radio/Mtpl/4G","0"	Instant power limitation is still disabled.
OK	
AT^SCFG="Radio/Mtpl/4G",3,1,0,100,23	Profile 1: Configure max. RF output power limit of LTE B41 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","00000004","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","00020000","00000000","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00040000","00000000","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00080000","00000000","23"	
^SCFG: "Radio/Mtpl/4G","2","1","02000000","00000000","23"	
^SCFG: "Radio/Mtpl/4G","2","1","08000000","00000000","23"	
^SCFG: "Radio/Mtpl/4G","2","1","80000000","00000000","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000002","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000020","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000040","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000080","23"	
^SCFG: "Radio/Mtpl/4G","2","1","00000000","00000100","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	

EXAMPLE 5

The example shows how to query or configure output power limitation using the AT^SCFG "Radio/Mtpl/TdScdma" subcommand.
See parameters <PL_mode>, <PL_profile>, <PL_bandTdScdma>, <PL_limitTdScdma>.

```
^SYSSTART
AT^SCFG="Radio/Mtpl/TdScdma"                Read "Radio/Mtpl/TdScdma" mode.
^SCFG: "Radio/Mtpl/TdScdma","0"             Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/TdScdma",2,1            Query profile 1 settings. Delivery default settings are
                                            shown:
^SCFG: "Radio/Mtpl/TdScdma","2","1","00000001",,"24"
^SCFG: "Radio/Mtpl/TdScdma","2","1","00000020",,"24"
OK
AT^SCFG="Radio/Mtpl/TdScdma",3,1,1,,23      Profile 1: Configure max. RF output power limit of
                                            TD-SCDMA 2000 B34 (BANDA) band to 23dBm.
^SCFG: "Radio/Mtpl/TdScdma","0"             Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/TdScdma",3,1,20,,23     Profile 1: Configure max. RF output power limit of
                                            TS-SCDMA 1900 B39 (BANDF) band to 23dBm.
^SCFG: "Radio/Mtpl/TdScdma","0"             Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/TdScdma",2,1            Configure profile 1 settings.
......                                      The response returns the old values as above (there-
                                            fore omitted in this example).
AT+CFUN=1,1                                 Restart UE to enable the profile 1 settings configured
                                            above.
OK
^SYSSTART
AT^SCFG="Radio/Mtpl/TdScdma"                Configure "Radio/Mtpl/TdScdma" mode.
^SCFG: "Radio/Mtpl/TdScdma","0"             Instant power limitation is still disabled.
OK
AT^SCFG="Radio/Mtpl/TdScdma",2,1            Read profile 1 settings. Changed values are shown
                                            now.
^SCFG: "Radio/Mtpl/TdScdma","2","1","00000001",,"23"
^SCFG: "Radio/Mtpl/TdScdma","2","1","00000020",,"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
```

2.14 AT^SFUN PLPS9-W Modem Software Functionality

AT^SFUN can be used to control the system of PLPS9-W.

Each system may have a configuration on its own. Changes saved on system is are mostly not saved on the other one.

Syntax

Test Command

```
AT^SFUN=?
```

Response(s)

```
OK
```

Read Command

```
AT^SFUN?
```

Response(s)

```
^SFUN: "SysImgV", <RunningSys>
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT^SFUN=<System>
```

Response(s)

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

PIN ✈ Last

- + -

Parameter Description

<System>(num)	
2	Toggle UE system and restart other UE. Active system will not be changed for that matter. To check which system is running use AT^SFUN read command.
3	Set the UE's system as the active one. Active one will be used after next UE powerup or reset.

<RunningSys>(str)	
Running system	
“0“	System 0 is running
“1“	System 1 is running

3. Status Control Commands

The AT Commands described in this chapter allow the external application to obtain various status information from the PLPS9-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 [49]
3GPP TS 24.008 [41]

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
No cause information available (default)
Phone is offline
No service available
Network release, no reason given
Received incoming call
Client ended call
UIM not present
Access attempt already in progress
Access failure, unknown source
Concur service not supported by network
No response received from network
GPS call ended for user call
SMS call ended for user call
Data call ended for emergency call
Rejected during redirect or handoff
Lower-layer ended call
Call origination request failed
Client rejected incoming call
Client rejected setup indication
Network ended call
No funds available
No service available
Full service not available
Maximum packet calls exceeded
Video connection lost
Video protocol closed after setup
Video protocol setup failure
Internal error

CS network cause
Unassigned/unallocated number
No route to destination
Channel unacceptable
Operator determined barring
Normal call clearing
User busy
No user responding
User alerting, no answer
Call rejected
Number changed
Non selected user clearing
Destination out of order
Invalid/incomplete number
Facility rejected
Response to status enquiry
Normal, unspecified
No circuit/channel available
Network out of order
Temporary failure
Switching equipment congestion
Access information discarded
Requested circuit/channel not available
Resources unavailable, unspecified
Quality of service unavailable
Requested facility not subscribed
Incoming calls barred within the CUG
Bearer capability not authorized
Bearer capability not available
Service/option not available
Bearer service not implemented
ACM >= ACM max
Requested facility not implemented
Only RDI bearer is available
Service/option not implemented
Invalid transaction identifier value
User not member of CUG
Incompatible destination
Invalid transit network selection
Recovery on timer expiry
Interworking, unspecified

CS network reject
IMSI unknown in HLR
Illegal MS
IMSI unknown in VLR
IMEI not accepted
Illegal ME
GPRS services not allowed
GPRS and non GPRS services not allowed
MS identity cannot be derived
Implicitly detached
PLMN not allowed
Location area not allowed
Roaming not allowed
GPRS services not allowed in PLMN
No suitable cells in location area
MSC temporary not reachable
Network failure
MAC failure
Synch failure
Congestion
GSM authentication unacceptable
Service option not supported
Requested service option not subscribed
Service option temporary out of order
Not Authorized for this CSG
SMS provided via GPRS in this routing area
Call cannot be identified
No PDP context activated
Semantically incorrect message
Invalid mandatory information
Message type non-existent
Message type not compatible with state
Conditional IE error
Information element non-existent
Message not compatible with state
Protocol error, unspecified
RR release indication
RR random access failure
RRC release indication
RRC close session indication
RRC open session failure
Low level failure

CS network reject
Low level failure no redial allowed
Invalid SIM
No service
Timer T3230 expired
No cell available
Wrong state
Access class blocked
Abort message received
Other cause
Timer T303 expired
No resources
Release pending
Invalid user data

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

PS network cause
LLC or SNDCP failure
Insufficient resources
Missing or unknown APN
Unknown PDP address or PDP type
User authentication failed
Activation rejected by GGSN
Activation rejected, unspecified
Service option not supported
Requested service option not subscribed
Service option temporary out of order

PS network cause
NSAPI already used (not sent)
Regular deactivation
QoS not accepted
Network failure
Reactivation required
Feature not supported
Semantic error in the TFT operation
Syntactical error in the TFT operation
Unknown PDP context
PDP context without TFT already activated
Semantic errors in packet filter
Syntactical errors in packet filter
Invalid transaction identifier
Semantically incorrect message
Invalid mandatory information
Message non-existent/not implemented
Message type not compatible with state
IE non-existent/not implemented
Conditional IE error
Message not compatible with state
Protocol error, unspecified

Other release cause
Call barred

PS LTE cause
Operator Determined Barring
Insufficient resources
Unknown or missing APN
Unknown PDN type
User authentication failed
Request rejected by Serving GW or PDN GW
Request rejected, unspecified
Service option not supported
Requested service option not subscribed
Service option temporarily out of order
PTI already in use
Regular deactivation
EPS QoS not accepted
Network failure
Reactivation required
Feature not supported

PS LTE cause
Semantic error in the TFT operation
Syntactical error in the TFT operation
Invalid EPS bearer identity
Semantic errors in packet filter(s)
Syntactical errors in packet filter(s)
EPS bearer context without TFT already activated
PTI mismatch
Last PDN disconnection not allowed
PDN type IPV4 only allowed
PDN type IPV6 only allowed
Single address bearers only allowed
ESM information not received
PDN connection does not exist
Multiple PDN connection for given APN not allowed
Collision with network initiated request
Unsupported QCI value
Invalid PTI value
Symantically invalid message
Invalid mandatory information
Message type non-existent or not implemented
Message type not compatible with the protocol state
Information element non-existent or not implemented
Conditional IE error
Message not compatible with the protocol state
Protocol error, unspecified
APN restriction value incompatible with active EPS bearer context
No Failure

PS LTE local cause
IMSI unknown in HSS
Illegal UE
IMEI not accepted
Illegal ME
EPS services not allowed
EPS services and non-EPS services not allowed
UE identity cannot be derived by the network
Implicitly Detached
PLMN not allowed
Tracking area not allowed
Roaming not allowed in this tracking area
EPS services not allowed in this PLMN
No Suitable cells in tracking area

PS LTE local cause
MSC temporarily not reachable
Network failure
CS Domain Not available
ESM failure
MAC failure
Synch failure
Congestion
UE security capabilities mismatch
Security mode rejected, unspecified
Not Authorized for this CSG
Non-EPS authentication unacceptable
CS fallback call EST not allowed
CS domain temporarily not allowed
No EPS bearer context activated
Unknown EPS bearer context
Semantically incorrect message
Invalid mandatory information
Message type non-existent or not implemented
Message type not compatible with the protocol state
Information element non-existent or not implemented
Conditional IE error
Message not compatible with the protocol state
Protocol error, unspecified
Released AT RRC
Signal Connection Released
EMM detached
EMM attach failed
EMM attach started
NAS service request failed
ESM activate dedicated bearer reactivater by network
Lower layer failure
ESM sync up with network
Network activater dedicated bearer with ID of deffered bearer
BAD OTA message
DS rejected the call
Context transferred due to IRAT
DS explicit deactivation
ESM MSGR failure
Local Cause not Available
Rejected due to connected state
Nas Service request failed, no throttle
EMM T3417 expired

PS LTE local cause
EMM T3417 ext expired
Nas LRRC UL data CNF failure TXN
Nas LRRC UL data CNF failure HO
Nas LRRC UL data CNF failure CONN release
Nas LRRC UL data CNF failure RLF
Nas LRRC UL data CNF failure control Not CONN
NAS LRRC connection EST success
NAS LRRC connection EST failure
NAS LRRC connection EST failure, aborted
NAS LRRC connection EST failure, access barrer
NAS LRRC connection EST failure, CELL resel
NAS LRRC connection EST failure, config failure
NAS LRRC connection EST failure, timer expired
NAS LRRC connection EST failure, link failure
NAS LRRC connection EST failure, not camped
NAS LRRC connection EST failure, SI failure
NAS LRRC connection EST failure, CONN reject
NAS LRRC connection release normal
NAS LRRC connection release RLF
NAS LRRC connection release CRE failure
NAS LRRC connection release QOS during CRE
NAS LRRC connection release aborted
NAS LRRC connection release SIB read error
NAS LRRC connection release aborted IRAT Success
Nas Reject LRRC radio link failure
Nas service request failure, LTE network reject
Nas detach with reattach, LTE network detach
NAS detach without reattach, LTE network detach

PS LTE SIP cause
SIP End bad req wait invite
SIP End bad req wait reinvite
SIP End invalid remote URII
SIP End remote unsupp media type
SIP End peer not reachable
SIP End network no resp time out
SIP End network no resp hold fail
SIP End data connecxtion lost
SIP End upgrade downgrade rej
SIP End 403 forbidden
SIP End LTE hard fail
SIP End no network response

PS LTE SIP cause
SIP End upgrade downgrade cancelled
SIP End upgrade downgrade failed
SIP End CC reject
SIP End 486 busy here
SIP End IRAT pending call
SIP End emergency only
SIP End BSR in progress
SIP End BSR complete GSM
SIP End BSR complete WCDMA
SIP End 200 answered elsewhere

SIP Release Causes
no reason
100 Trying
180 Ringing
181 Call Is Being Forwarded
182 Queued
183 Session Progress
182 Queued
183 Session Progress
200 OK
180 Ringing
300 Multiple Choices
301 Moved Permanently
302 Moved Temporarily
305 Use Proxy
380 Alternative Service
400 Bad Request
401 Unauthorized
402 Payment Required
403 Forbidden
404 Not Found
406 Not Acceptable
408 Request Timeout
410 Gone
413 Request Entity Too Large
414 Request-URI Too Large
415 Unsupported Media Type
416 Unsupported URI Scheme
420 Bad Extension
421 Extension Required
423 Interval Too Brief

SIP Release Causes
480 Temporarily not available
481 Call Leg/Transaction Does Not Exist
482 Loop Detected
483 Too Many Hops
484 Address Incomplete
485 Ambiguous
486 Busy Here
487 Request Terminated
488 Not Acceptable Here
491 Request Pending
493 Undecipherable
500 Internal Server Error
501 Not Implemented
502 Bad Gateway
503 Service Unavailable
504 Server Time-out
505 SIP Version not supported
513 Message Too Large
600 Busy Everywhere
603 Decline
604 Does not exist anywhere
606 Not Acceptable

ITU Q.850 Release Cause
1 Unallocated number
2 No route to specified transit network
3 No route to destination
4 Send special information tone
5 Misdialled trunk prefix
6 Channel unacceptable
7 Call awarded and being delivered in an established channel
8 Preemption
9 Preemption - circuit reserved for reuse
14 QoR: ported number
16 Normal call clearing
17 User busy
18 No user responding
19 No answer from user
20 Subscriber absent
21 Call rejected
22 Number changed
23 Redirection to new destination

ITU Q.850 Release Cause
24 Call rejected due to feature at the destination
25 Exchange routing error
26 Non-selected user clearing
27 Destination out of order
28 Invalid number format
29 Facility rejected
30 Response to STATUS ENQUIRY
31 Normal, unspecified
34 No circuit/channel available
38 Network out of order
40 Permanent frame mode connection operational
41 Temporary failure
42 Switching equipment congestion
43 Access information discarded
44 Requested circuit or channel not available
46 Precedence call blocked
47 Resource unavailable, unspecified
49 Quality of service not available
50 Requested facility not subscribed
53 Outgoing calls barred within CUG
54 Incoming calls barred within CUG
55 Bearer capability not authorized
58 Inconsistency in designated outgoing access information and subscriber class
62 Service or option not available, unspecified
63 Bearer capability not implemented
65 Channel type not implemented
69 Requested facility not implemented
70 Only restricted digital information bearer capability is available
79 Service or option not implemented, unspecified
81 Invalid call reference value
82 Identified channel does not exist
83 A suspended call exists, but this call identity does not
84 Call identity in use
85 No call suspended
86 Call having the requested call identity has been cleared
87 User not member of CUG
88 Incompatible destination
90 Non-existent CUG
91 Invalid transit network selection
95 Invalid message, unspecified
96 Mandatory information element is missing
97 Message type non-existent or not implemented

ITU Q.850 Release Cause
98 Message not compatible with call state or message type non-existent or not implemented
99 Information element /parameter non existent or not implemented
100 Invalid information element contents
101 Message not compatible with call state
102 Recovery on timer expiry
103 Parameter non-existent or not implemented, passed on
110 Message with unrecognized parameter, discarded
111 Protocol error, unspecified
127 Interworking, unspecified

3.2 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 PLPS9-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>="sendsms"
^SIND: sendsms, <mode>, <indValue>, <SmsMr>

In case of <indDescr>="eons"
^SIND: eons, <mode>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>

In case of <indDescr>="nitz"
^SIND: nitz, <mode>, <nitzUT>, <nitzTZ>[, <nitzDST>]

In case of <indDescr>="steerroam"
^SIND: steerroam, <mode>

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>="simlocal"
^SIND: simlocal, <mode>, $<indValue>_{slot\_1}$, $<indValue>_{slot\_2}$

In case of <indDescr>="simread"
^SIND: simread, <mode>, <simreadCfgEfBitMask>, <simreadEfBitMask>

In case of <indDescr>="voiceprompt"
^SIND: voiceprompt, <mode>, <indDescr>[, <vp_play_state>, <vp_rec_state>]

In case of <indDescr>="ltebot"
^SIND: ltebot, <mode>, <ltebotTimerstat>, <ltebotReason>, <APN>[, <ltebotReasonTxt>]

In case of <indDescr>="prov"
^SIND: prov, <mode>, <provMm>, <provCur>

OK

Read Command (Continued)

AT^SIND?

Response(s)

ERROR
+CME ERROR: <err>

Write Command

AT^SIND=<indDescr>, <mode>

Response(s)

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

In case of: <indDescr>="eons" and <mode>=2
^SIND: eons, <mode>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>

In case of: <indDescr>="nitz" and <mode>=2
^SIND: nitz , <mode>, <nitzUT>, <nitzTZ>[, <nitzDST>]

In case of: <indDescr>="ltebot" and <mode>=2
^SIND: ltebot, <mode>, <ltebotTimerstat>, <ltebotReason>, <APN>[, <ltebotReasonTxt>]
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="simread", <mode>[, <simreadCfgEfBitMask>]

Response(s)

^SIND: simread, <mode>, <simreadCfgEfBitMask>, <simreadEfBitMask>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SIND="sendsms", <mode>

Response(s)

^SIND: sendsms, <mode>, <indValue>, <SmsMr>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SIND="prov", <mode>

Response(s)

^SIND: prov, <mode>, <provMm>, <provCur>
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 "sendsms" indicator:

+CIEV: <indDescr>, <indValue>, <SmsMr>

The URC indicates that the UE has finished executing the AT commands for sending a short message.

URC 3

Formats of the "simdata" indicators:
For every USAT Proactive Command (PAC) tracked by AT^SIND="simdata" two different types of URCs are issued.

The first "+CIEV: "simdata"" URC is generated when a PAC is received from the (U)SIM Application. Its format follows the AT^SSTGI response, therefore showing different parameters for the PAC REFRESH and for the PACs OPEN_CHANNEL and CLOSE_CHANNEL.

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

- PAC REFRESH
  "+CIEV: "simdata"" URC is issued, e.g. indicating that the content of one or more Elementary Files has been changed or the USIM performs a warm start (REFRESH type RESET).

URC 4

+CIEV: <indDescr>, <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>

- PACs OPEN_CHANNEL and CLOSE_CHANNEL
  "+CIEV: "simdata"" URC is issued to indicate ongoing BIP activity.

URC 5

The second "+CIEV: "simdata"" URC is generated when PAC processing is completed by the UE and the Terminal Response is sent to the (U)SIM Application. Parameters <status> and <statAddInfo> reflect the content of the Terminal Response, similar to the AT^SSTR response. This allows the Customer Application to track problems with these PACs.

+CIEV: <indDescr>, <cmdType>, <commandDetails>, , , , , <status>, <statAddInfo>

- PACs REFRESH, OPEN_CHANNEL and CLOSE_CHANNEL "+CIEV: "simdata"" URC is indicated by <cmdType>=1 + terminate offset, which is equal to 100, similar to "^SSTN".

URC 6

Format of the "eons" indicator:

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

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

URC 7

Format of the "nitz" indicator:

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

URC 8

Format of the "steerroam" indicator:

+CIEV: <indDescr>

URC 9

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 10

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 11

In case <indValue> equals "11" or "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 12

Format of the "ceer" indicator:

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

URC 13

Format of the "simlocal" indicator:

+CIEV: <indDescr>, $<indValue>_{slot\_1}$, $<indValue>_{slot\_2}$

URC 14

Format of the "simread" indicator:

+CIEV: <indDescr>, <simreadEf>

The URC indicates that the UE has finished reading one of the Elementary Files on the (U)SIM specified with <simreadCfgEfBitMask> in the AT^SIND write command. For each Elementary File type one single URC will be issued.

URC 15

Format of the "ltebot" indicator:

```
+CIEV: <indDescr>, <ltebotTimerstat>, <ltebotReason>, <APN>[,
<ltebotReasonTxt>]
```

URC 16

Format of the "voiceprompt" indicator:

```
+CIEV: <indDescr>, <indValue>[, <vp_play_state>, <vp_rec_state>]
```

Reports status change and errors of the audio handler for voiceprompts.

URC 17

Format of the "prov" indicator:

```
+CIEV: <indDescr>, <provMm>, <provCur>
```

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.

“signal“	Channel bit error rate of the signal received: The parameter is always set to value 99. See also `AT+CSQ`.
“service“	Service availability: 0 Not registered to any network. 1 Registered to home network or, if "roam"=1 then registered to another network.
“sounder“	Sounder activity: Reports every event that causes the UE to generate a tone. 0 Tone generator not active. 1 Tone generator active. Value 1 means for example: Incoming call - UE is ringing. Note that in this case the URC "`+CIEV`: sounder" will be output only if ringing tones are enabled with `AT^SRTC`. Waiting call - UE generates waiting call tone if call waiting is enabled. Outgoing call - UE generates BUSY tone. Playback of ringing tones when tested with `AT^SRTC`.
“message“	Unread short message at memory location `<mem1>`. Refer to `AT+CPMS`. 0 No unread message(s) available. 1 Unread message(s) available.
“call“	Call in progress: 0 No call. 1 At least one MO or MT call is in state "active" (connection established).
“roam“	Roaming indicator: 0 Registered to home network or not registered. 1 Registered to other network.
“smsfull“	Capacity of storage for received short messages: 0 The short message memory location `<mem3>` is still free or has just become free again. Refer to `AT+CPMS`. 1 All memory locations of `<mem3>` are used up.
“sendsms“	Short message sending status: 0 No error, short message successfully sent. 1 Short message not sent.

If enabled the "+CIEV: sendsms" URC indicates that the UE has finished executing the AT commands for sending a short message.

"audio" Activity of the built-in audio unit:
0 Audio unit not active.
1 Audio unit is active.

"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 types REFRESH, OPEN_CHANNEL and CLOSE_CHANNEL:

- 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 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19].
  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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23]. 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 (Autoresponse mode and Explicit Response mode) indicating that the content of one or more Elementary Files has been changed.
- "+CIEV: "simdata"" URCs are also generated if PAC types OPEN_CHANNEL or CLOSE_CHANNEL are issued by the (U)SIM Application as part of its Bearer Independent Protocol (BIP) to access the Internet. This allows the Customer Application to track the BIP status and to indicate problems with these PACs to the TE.

For every PAC tracked by AT^SIND="simdata" two different types of URCs are issued:
First "+CIEV: "simdata"" URC is generated for the PAC received from the (U)SIM and second "+CIEV: "simdata"" URC containing the processing result of the Terminal Response sent to it.
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.

"eons" Enhanced Operator Name String (EONS):
The Enhanced Operator Name String indicator feature allows the PLPS9-W to output various operator names for different PLMN identities. It also allows the output of a different operator name based on a subset of the registered network by using a range of Location Area Codes (LACs) or a single LAC. See also 3GPP TS 22.101 [51].
The EONS tables are stored in the USIM and will be read after SIM PIN authentication.
Following USIM Elementary Files are affected by the EONS feature:
EF_{SST} (USIM Service Table) - describes which features are active.
EF_{OPL} (Operator PLMN List) - contains the PLMN identification and location ID together with the index of the corresponding PNN record
EF_{PNN} (PLMN Network Name) - contains the full and short form version of the network name for the registered PLMN

The name displayed by the <eonsOperator> parameter depends on various sources of information prioritized in the list below. The highest priority has option 1. If an option is not available the next lower option from the list determines the displayed name. The priority is indicated by the <indValue> parameter.
Prioritized sources determining the name displayed by <eonsOperator>:

<indValue> 0	Not registered.
<indValue> 1	Operator name from EF_{OPL} and EF_{PNN} in alphanumeric format.
<indValue> 2	Operator name in long or short format according to Common PCN Handset Specification (CPHS) [52] depending on availability and content of $EF_{ONString}$ (Operator Name String) and $EF_{OPShort}$ (Operator Name Short form).
<indValue> 3	Operator name received over the network via NITZ service in long and short alphanumeric format.
<indValue> 4	Operator name found in the UE's AT+COPN list, given in alphanumeric format.
<indValue> 5	Broadcast MCC-MNC (numeric format which consists of a 3-digit country code plus a 2- or 3-digit network code).
<indValue> 6	CSG (Closed Subscriber Group) Lookup.

“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 [41], ch. 9.2.15a and 9.4.19).
The AT^SIND test command indicates the maximum length of the "nitz" <indValue>. The network usually sends a NITZ indicator when the mobile attaches to the network, when it enters a location area with different time zone or when a daylight change occurs.
A NITZ indicator may consist of the following parameters: Universal Time (UT), local Time Zone (TZ), Daylight Saving Time (DST). All information elements of MMI/GMMI are optional and therefore, the presentation of the parameters <nitzUT>, <nitzTZ>, <nitzDST> varies with the network. For example, the network may send all three parameters UT, TZ, DST, or only UT and TZ or only TZ.

UT is indicated in usual date/time format and represents the current world time (GMT) at the moment when sent.
TZ is given as a positive (east) or negative (west) offset from UT in units of 15 minutes.
DST shows the number of hours added to the local TZ because of daylight saving time (summertime) adjustment. Usually DST is 1 hour but it can be also 2 hours in certain locations.

Example for time and time zone with DST:
+CIEV: nitz,"04/07/23,13:39:20",-28,1
In this example TZ is -28, showing a time offset of -7 hours (west) to Universal Time/GMT (which never changes for DST). DST is 1 which indicates that one hour was added to TZ because of Daylight Saving Time. If a network does not send the DST parameter the TZ value would be -32 (8 hours west) as would be done in winter:
+CIEV: nitz,"04/11/23,13:39:20",-32

Please be aware that although the last NITZ value can be looked up again via "AT^SIND=nitz,2" the returned values may be out of date. Especially the UT value is obsolete because there is no internal NITZ clock and therefore no continuation of UT.

NITZ values are lost when the 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 PLPS9-W to register to the network.
4 Personalization info ready - CHV (Card Holder Verification) data have been verified (if required).
5 USIM initialization completed - UE has finished reading USIM data.

“simlocal“

Availability of the physically connected USIM:
0 USIM removed.
1 USIM inserted.
The availability of the (U)SIM is shown for the (U)SIM interfaces configurable with AT^SCFG="SIM/CS" parameter <CS>.
If RSA is active: The AT^SIND "simlocal" indicator refers to the unused local USIM. The status of the remote USIM currently used for the RSA connection is controlled by AT^SCKS.
If RSA is inactive: The AT^SIND "simlocal" indicator refers to the currently used local USIM. In this case the value is identical to the AT^SCKS value, except for AT^SCKS value 2.

“psinfo“

Packet Switched status:
"psinfo" indicates the status of the UE related to packet switched data calls. Please consider that some providers don't support the indication of HSDPA/HSUPA.
0 GPRS/EGPRS not available in currently used cell
1 GPRS available in currently used cell
2 GPRS attached
3 EGPRS available in currently used cell
4 EGPRS attached
5 Camped on WCDMA cell
6 WCDMA PS attached
7 Camped on HSDPA capable cell
8 PS attached in HSDPA capable cell
9 Camped on HSDPA/HSUPA capable cell
10 PS attached in HSDPA/HSUPA capable cell
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 PLPS9-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. 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 UMTS):
URC is issued for statistic parameters of signal strength distribution across the band.
11 Radio link signal strength distribution.
If UE is out of service the URC with <indValue> equals "11" will be output for each raw and list frequency scan.
It includes statistic parameters of signal strength distribution across the band similar to the URC with <indValue> equals "1" (for 2G).

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 similar to the URC with <indValue> equals "11" (for 3G).

“pacsp“

PLMN mode bit status:
:
"pacsp" indicates the parsed PLMN mode bit value of the USIM Elementary File EF_{CSP} (Customer Service Profile) according to Common PCN Handset Specification (CPHS) [52].
0 CSP PLMN mode bit off
1 CSP PLMN mode bit on
99 CSP PLMN mode bit not defined or USIM Elementary File EF_{CSP} not accessible
The contents of the USIM Elementary File EF_{CSP} may be changed by the network in the background at any time via USIM Application Toolkit (USAT) procedure "Data download to USIM". For a detailed description please refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].
Please note that URC presentation <mode> for this indicator is stored to non-volatile memory with AT&W, restored with ATZ and reset to '0' (disabled) by AT&F.

“steerroam“

Steering-of-roaming:
The "steerroam" indicator supports so called "steering-of-roaming" ("SOR") techniques of some providers.
If a UE roaming within a certain country tries to register to a VPLMN (visited PLMN), the VPLMN will ask the HLR of the subscribers home operator for authorization credentials of the subscriber. Steering-of-roaming means that instead of sending those credentials, the HLR sends back an error message which will make the VPLMN send back a location update reject to the UE. This location updating procedure is described in 3GPP TS 24.008 [41] chapter 4.4.4.9.
When UE is attempting to register into a PLMN and get updating rejected with reject cause 17 then UE stays in limited service on the configured network, UE

may reattempt network registration four times, and after that UE will inform the TE via Steering-of-roaming indication URC +CIEV: "steerroam" that the registration attempt has failed.
When the UE is in manual PLMN selection mode (see AT+COPS) the TE has to start a new manual PLMN search to select a different network or switch to automatic PLMN selection mode.
When UE is in automatic PLMN selection mode (see AT+COPS) UE itself attempts a PLMN search to select a different network.

“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>. Please note that URC presentation <mode> for this indicator is stored to non-volatile memory with AT&W, restored with ATZ and reset to '0' (disabled) by AT&F.
“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>. Please note that URC presentation <mode> for this indicator is stored to non-volatile memory with AT&W, restored with ATZ and reset to '0' (disabled) by AT&F.
“pagingcoor“	Paging coordination: Paging coordination is a network feature which allows the network to page (alert) the UE about incoming CS calls while the UE is receiving PS data transmissions The indicator notifies the UE of the capabilities currently present in the network, i.e. it can show one of the single values listed below or the sum of some of them. 0 No coordination 1 WCDMA 2 NMO 1 4 DTM support 8 BSS PAGING COORD 16 LTE 99 Undefined e.g. transitional state or PS data not supported by the network
“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, wherease 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.
“voiceprompt“	Reports status change of the audio handler for voiceprompts controlled by AT^SAFH. 0 Playback and recording are both inactive. 1 Playback is active, recording is inactive.

2 Playback is inactive, recording is active.
13 Playback and record ongoing.
In addition to the <indValue> values listed above the parameters <vp_play_state> and <vp_rec_state> indicate further states or errors. Both show up together, but one of the two may report 0 if there is no related error.

“simread“

Notification of end of reading Elementary Files on the (U)SIM:
If enabled the URC "CIEV: simread, <simreadEf>" indicates that the UE has completed reading and verifying the accessibility of a specific Elementary File (EF) on the (U)SIM.
The purpose of this URC is that the access to selected Elementary Files will be reported earlier than the access to the entire (U)SIM as indicated by the "^SSIM READY" URC (see AT^SSET). The resulting time advantage can be used, for example, to cut the time until the UE is able to set up an emergency call.
See also parameters <simreadEfBitMask> and <simreadCfgEfBitMask>.

“ltebot“

Status of LTE back-off timer:
The "ltebot" indicator shows up each time when the T3402 timer starts (<ltebotTimerstat> 1) and expires (<ltebotTimerstat> 0). It notifies the user whether the UE is backing off from LTE. For details on the T3402 timer please refer to see 3GPP TS 24.301 [43], table 10.2.
The duration of the timer is 12 minutes. During this period the UE will not try to attach to LTE unless a manual AT+CGATT=0 and AT+CGATT=1 is performed. Yet, before the timer expires, it is possible that the UE registers with UMTS or GSM UMTS instead of LTE.
The "ltebot" indicator is almost exclusively triggered by a wrong APN (in case of no LTE rights on the subscription or no LTE coverage, it is not started).
The indicator includes the following parameters: <ltebotTimerstat>, <ltebotReason>, <APN>, <ltebotReasonTxt>. The values of <ltebotReason> and the content of <ltebotReasonTxt> are operator dependent.
Examples for wrong APN given with AT+CGDCONT:
+CIEV: ltebot,1,33,"invalid name","Requested service option not subscribed"
+CIEV: ltebot,1,27,"invalid name","Unknown or missing APN"

In addition to the "ltebot" indicator, you can activate the "ceer" indicator that also shows the reason when the the UE fails to attach to the LTE.
Example for wrong APN given with AT+CGDCONT:
+CIEV: ceer,7,"Unknown or missing APN"

“prov“

Provider configuration mismatch:
The "prov" indicator delivers the provider configuration mismatch status via URC.
+CIEV: prov,<provMm>,<provCur>
The AT^SIND test command indicates the maximum length of the "prov" <indValue>.
For provider configuration details see ATI61.
Changing the provider configuration is done by AT^SCFG parameter "MEopMode/Prov/Cfg" (see <provCfg>).
Please note that URC presentation <mode>=1 for this indicator is enabled by powerup default.

<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>.
Please note, that some indicator types allow the <mode> to be stored to non-volatile memory with AT&W, restored with ATZ and reset to '0' (disabled) by AT&F. See indicator descriptions whether or not AT&W, AT&F and ATZ are effective.

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.

<aidList>(str)

String containing a list of USIM Application Ids on which the ongoing PAC Refresh will be performed. If the list is empty PAC Refresh will be performed on the current USIM Application.

<SmsMr>(num)

Reference of short message most recently sent. See parameter <mr> of AT+CMSS.

<eonsOperator>(str)(+CSCS)

Operator name determined by the source of information. The source is indicated as <indValue>. All possible sources (<indValue>) are listed in the description of the "eons" indicator.

<servProvider>(str)(+CSCS)

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

<servProviderType>(num)

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

0	Service Provider Name will not be displayed (EF_{SPN} is empty or not available).
1	Service Provider Name will be displayed. RPLMN is the HPLMN.
2	Service Provider Name will be displayed. One entry of SPDI list is equal to the RPLMN.

<nitzUT>(str)(+CSCS)

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

<nitzTZ>(num)

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

<nitzDST>(num)

Adjustment for Daylight Saving Time as part of the "nitz" Indicator. 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>.

3G:

0	Unknown
1	WCDMA 2100 (BC1)
3	WCDMA 1800 (BC3)
5	WCDMA 850 (BC5)
6	WCDMA 800 (BC6)
8	WCDMA 900 (BC8)

19	WCDMA 850 (BC19)
100	List Frequency Scan (LFS)
4G:	
0	Unknown
1	LTE 2100 (B1)
3	LTE 1800 (B3)
5	LTE 850 (B5)
7	LTE 2600 (B7)
8	LTE 900 (B8)
18	LTE 850 (B18)
19	LTE 800 (B19)
20	LTE 800 (B20)
26	LTE 850 (B26)
28	LTE 700 (B28)
32	LTE (B32)
34	LTE (B34)
38	LTE 2600 (B38)
39	LTE 1900 (B39)
40	LTE 2350 (B40)
41	LTE 2550 (B41)

`<lstaFrMin>`(num)

Refer to `<indDescr>`.
3G:
Lowest DL UARFCN reported in the scan. Please see 3GPP TS 25.101 [44] chapter 5.4.4.
4G:
Lowest DL EARFCN reported in the scan. Please see 3GPP TS 36.101 [54] chapter 5.4.4.

`<lstaFrMax>`(num)

Refer to `<indDescr>`.
3G:
Highest DL UARFCN reported in the scan. Please see 3GPP TS 25.101 [44] chapter 5.4.4.
4G:
Highest DL EARFCN reported in the scan. Please see 3GPP TS 36.101 [54] chapter 5.4.4.

`<lstaGrade>`(num)

Grade derived from the `<lstaMean>` value of the power scan results. Refer to `<indDescr>`.

`<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.
4	PS Internal Cause.
5	PS Network Cause.
6	Other Release Cause.
7	PS LTE Cause.
8	PS LTE Local Cause.
9	PS LTE SIP Cause.
40	ITU Q.850 Release Cause.
41	SIP 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".

Example: Activating <ceerRelCauseGroup>s 4, 5 and 6:

```
AT^SIND=ceer,1,4
^SIND: ceer,1,4          # Response shows selected <ceerRelCauseGroup> value.
OK
AT^SIND=ceer,1,5
^SIND: ceer,1,4,5        # Response shows all <ceerRelCauseGroup> values currently selected.
OK
AT^SIND=ceer,1,6
^SIND: ceer,1,4,5,6      # Response shows all <ceerRelCauseGroup> values currently selected.
OK
```

<ceerReport>(str)

Release cause information given by the network in textual format.

<simreadCfgEfBitMask>(num)

As part of AT^SIND write command, this parameter determines the type(s) of EF to be read when the UE is reading data from the (U)SIM. You may set the value of a specific EF type, or sum up the values of the EF types you may want to be reported. With <mode>= 0 the parameter <simreadCfgEfBitMask> will be set to "0". Parameter <simreadCfgEfBitMask> can only be set if <mode>= 1.

0(P)	No USIM Elementary File.
1	USIM Elementary File EF_{SMS}.
2	USIM Elementary File EF_{FDN}.
4	USIM Elementary File EF_{SDN}.
255	All USIM Elementary Files listed above. This value can be set only in the write command, it will not be reported in the URC "CIEV: simread, <simreadEf>".

<simreadEfBitMask>(num)

As part of AT^SIND read or write command, this parameter indicates the Elementary Files (EF) already read from the (U)SIM. The value is either a single EF type, or the sum of the EF types already read, or 0.

0	No USIM Elementary File read.
1	USIM Elementary File EF_{SMS}.
2	USIM Elementary File EF_{FDN}.
4	USIM Elementary File EF_{SDN}.

<simreadEf>(num)

As part of the URC CIEV: simread, the <simreadEf> parameter reports a specific EF type that the UE has just read. For each Elementary File type one single URC will be issued.

1	USIM Elementary File EF_{SMS}.
2	USIM Elementary File EF_{FDN}.
4	USIM Elementary File EF_{SDN}.

<ltebotTimerstat>(num)

Status of LTE back-off timer.

0	LTE back-off timer is not running, UE is using LTE (if available).
1	LTE back-off timer (12 minute T3402 timer) is running. The UE will not try to attach to LTE until it expires.

<ltebotReason>(num)

Rejection cause value given from the network that caused the module to back-off from LTE. Value is dependent on the operator. Value is 0 if attached to LTE.

<APN>(str)

Last APN attempted for LTE attachment, successful or otherwise.

<ltebotReasonTxt>(str)

Rejection cause value <ltebotReason> in text form. Displayed only if text form is available. Text is dependent on operator.

<vp_play_state>(num)

States of voiceprompt playback.

0	No playback error.
1	Voice playback started.
2	Voice playback terminated.
3	Voice playback error: unspecified
4	Voice playback error: cannot open file.
5	Voice playback error: cannot read file.
6	Voice playback error: unknown file format.
7	Voice playback error: broken file.
8	Voice playback exceeds file size.

<vp_rec_state>(num)

States of voiceprompt recording.

0	No recording error.
1	Recording started.
3	Record quota reached.
4	Record error unspecified.
5	Record error cannot open file.
6	Record error cannot write file.

<provMm>(num)

Provider configuration mismatch.

0	No provider mismatch.
1	Provider mismatch.

<provCur>(str)

Current provider. The fallback configuration is indicated by a "*".

“fallb*“	Fallback provider profile.
“tmode“	*EXAMPLE !* Provider T-Mobile
“vdfde“	*EXAMPLE !* Provider Vodafone
“...“	Next possible provider ...
“...“	Next possible provider ...

Notes

- If the AT^SIND indicator "lsta" URC's <indValue> equals "1" and <lstaNo> is low, the following assumptions are possible:
  - Low <lstaMean> indicates out of coverage
  - High <lstaVar> indicates industrial interference
  - High (or middle depending on distance from jammer) <lstaMean> and low <lstaVar> indicates jamming.
- If the AT^SIND indicator "lsta" URC's <indValue> equals "1" and <lstaNo> is high, the following assumption is possible:
  - High <lstaMean> and low <lstaVar> indicates jamming.
- If the AT^SIND indicator "lsta" URC's <indValue> equals "11" or "21" and <lstaNo> is low, the following assumption is possible:
  - Low <lstaMean> and low <lstaGrade> indicates out of coverage.
- If the AT^SIND indicator "lsta" URC's <indValue> equals "11" or "21" and <lstaNo> is high, the following assumption is possible:
  - High <lstaMean> and high <lstaGrade> indicates jamming.

3.3 AT+CPAS Activity Status

AT+CPAS execute command queries PLPS9-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 [49]

Parameter Description

<pas>(num)

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

3.4 AT+WS46 Select wireless network

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

Syntax

Test Command

AT+WS46=?

Response(s)

+WS46: (list of supported<n>s)
OK

Read Command

AT+WS46?

Response(s)

+WS46:<n>
OK

Write Command

AT+WS46=<n>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Reference(s)

3GPP TS 27.007 [49]

Parameter Description

<n>(num)	
12	GSM digital cellular (GERAN only)
22	UTRAN only
25	3GPP Systems (GERAN, UTRAN and E-UTRAN)
28	E-UTRAN only
29	GERAN and UTRAN

3.5 AT^S171 Call Release Cause Information Query

AT^S171 queries call release causes for VoLTE and 2G/3G CS voice calls. On start of every call the cause will be reset to "No cause information available".

Syntax

Test Command

```
AT^S171=?
```

Response(s)

```
OK
```

Exec Command

```
AT^S171
```

Response(s)

```
^S171: <specific_result_code>
OK
ERROR
```

PIN	✈	Last
-	+	-

Parameter Description

<specific_result_code>(str)

Release Causes:
"No cause information available"
"Normal call clearing"
"SIP BYE Q.850 16 Normal call clearing"
"SIP BYE SIP End 200 answered elsewhere"
"SIP BYE no reason"
"Client ended call"

4. Serial Interface Control Commands

The AT Commands described in this chapter allow the external application to determine various settings related to the PLPS9-W's serial interface.

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

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

Syntax

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

PIN	✈	Last
+	+	-

Parameter Description

<value>(num)(&V)(&W)	
1(&F)(D)	DCD line shall be on only when data carrier signal is present.

4.2 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.

Syntax

Exec Command

AT&D[<value>]

Response(s)

OK

PIN	✈	Last
+	+	-

Parameter Description

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

[0]	ME ignores status of DTR line.
2(&F)(D)	ON->OFF on DTR: Disconnect data call or PPP and change to command mode. During OFF state of the DTR line the auto-answer function (see ATS0) is disabled.

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

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

Syntax

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

PIN ✈	Last
-	+ -

Reference(s)
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.

4.4 ATE AT Command Echo

ATE controls if the PLPS9-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

4.5 ATO Switch from command mode to data mode

ATO is the corresponding command to the toggle command +++ 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)

V.250

Parameter Description

<n>(num)

[0]	Switch from command mode to data mode

4.6 AT+CMUX Multiplex mode

Multiplex mode according to 3GPP TS 27.010 [11] enables a serial interface to be multiplexed into virtual channels. It can be used on any available AT command port on:

- a USB interface;
- the serial interface ASC0;

In either case the current AT command port will be mapped to the first multiplex channel. New AT command ports will be opened in addition and mapped to the multiplex channels beginning with channel 2. The AT^SQPORT command can be used to print the AT command port ID of the currently used instance. The third multiplex channel is dedicated to GPS and will be used if NMEA output is switched on with AT^SGPSC while Multiplex mode is active.

For the host hardware, customers have to create their own multiplex programs conforming to the multiplexer protocol. To help system integrators save the time and expense of designing multiplexer applications, THALES DIS AIS Deutschland GmbH offers WinMux, a ready-to-use multiplex driver for Windows. Another approach is to develop customized solutions based on the sources of the WinMux driver.

The WinMux driver and its source files can be supplied on request. Please contact your local distributor to obtain the latest installation software and user's guide.

AT+CMUX write command is used to enter Multiplex mode. Setup of the logical channels is initiated by the TE, i.e. the TE acts as initiator. This means that the TE shall ensure that logical channels are established before any further actions on the channels can be started. There is a timeout of five seconds, if the multiplexer protocol is enabled but no multiplexer control channel is established. Afterwards PLPS9-W returns to AT command mode. The parameter maximum frame size (N1) according to 3GPP TS 27.010 [11] 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 [49]
3GPP TS 27.010 [11]

Parameter Description

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

4.6.1 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. It is recommended to set hardware flow control (AT\Q3) before starting Multiplex mode.

4.7 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)

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.

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 [16]

Parameter Description

<format>(num)

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

4.8 AT+IPR Bit Rate

AT+IPR allows to query and set the bit rate of the PLPS9-W's asynchronous serial interface (UART).
The test command returns 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 PLPS9-W for details about timing).
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 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)(&V)(NV)

Bit rate per second (bps)

4800

9600

19200

38400

57600

115200(D)

230400

460800
921600

4.9 AT^SQPORT Query Port Id

AT^SQPORT enables the Customer Application to query the IDs of the AT command ports.
The AT^SQPORT test command shows the IDs of the supported AT command ports. The number varies depending on whether Multiplex mode is started.
The AT^SQPORT read command shows the ID of the AT command port the Customer Application it is connected to.

Syntax

Test Command

```
AT^SQPORT=?
```

Response(s)

(range of available <id>s)
OK

Read Command

```
AT^SQPORT?
```

Response(s)

```
^SQPORT: <id>
OK
```

Exec Command

```
AT^SQPORT
```

Response(s)

```
^SQPORT: <id>
OK
```

PIN	✈	Last
-	+	-

Parameter Description

<id>(num)

Depending on whether Multiplex mode is started either 1 - 5 or 1 - 8 AT command ports are available. Multiplex mode can be established on any AT command port 1 - 5, no matter whether the underlying interface is USB or ASC0. Only one instance of the multiplexer can run at the same time and will serve 4 multiplex channels. The first multiplex channel will run on the same AT command port, on which Multiplex mode was started. The other three multiplex channels will run additional AT command ports 6 - 8.

All ports (1 - 8) are running independently and in parallel. Every service can be established on any AT command port.

1	ID of AT command port 1 mapped to USB port 0 (modem).
2	ID of AT command port 2 mapped to USB port 1.
3	ID of AT command port 3 mapped to USB port 2. By delivery default used for NMEA data output, see AT^SGPSC "Nmea/Interface".
4	ID of AT command port 4 mapped to USB port 3.
5	ID of AT command port 5 mapped to serial interface ASC0.
6	ID of AT command port 6 mapped to second multiplex channel.
7	ID of AT command port 7 mapped to third multiplex channel.
8	ID of AT command port 8 mapped to fourth multiplex channel.

4.10 AT\Q Flow Control

AT\Q allows to configure flow control on the PLPS9-W's asynchronous serial interface ASC0 (UART).

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 interface. AT\Q settings have no effect on the USB ports because the USB protocol integrates a flow control mechanism of its own.

Syntax

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

PIN	✈	Last
-	+	-

Parameter Description

<n>(num)(&V)(&W)	
3(&F)(D)	RTS/CTS hardware flow control

Note

- 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.

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 PLPS9-W to store the entered password. This may be for example the SIM PIN1 to register to a GSM/UMTS/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 [49]

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 corprorate personalisation un-blocking password

Notes

- Successful PIN authentication only confirms that the entered PIN was recognized and correct. The output of the result code OK does not necessarily imply that the mobile is registered to the desired network.
  Typical example: PIN was entered and accepted with OK, but the 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.
  PLPS9-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+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: ...]
If <mode>= 4 and no Network Lock "PN" is set:
+CLCK: ""
If <mode>= 4 and Network Lock "PN" is effective:
+CLCK: <data>[: <data>: <data>: ...]
If <mode>= 5,<password> and no Network Lock "PN" is set:
OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
+	±	-

Reference(s)

3GPP TS 27.007 [49],
3GPP TS 22.004 [26],
3GPP TS 22.088 [34],
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. Parameter <data> 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.
"+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".

“PN“

Network Personalization.
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/UICC cards from the given operators. The lock is activated by specifying the mobile country codes and mobile networks codes on command line.
The Customer SIM Lock feature is protected by depersonalization key. UE asks for <password> when other than specified operator SIM/UICC card is inserted.
<password>: PH-NET PIN.
This 8-digit code is 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 PH-NET 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 ! Parameter <class> is not applicable.
Network Personalisation ("PN") is also applicable with AT^SCSL command.

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.
4	Request Customer Network lock status. Required parameters: <facility>="PN",<mode>=4.
5	Set Customer Network lock into prepared state (Autolock). In this case, the Network lock data will be read from the first inserted SIM card and stored. Required parameters: <facility>="PN",<mode>=5,<password>. Setting takes effect after next restart.

<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.
The <password> for <facility>="PN" 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 [26]. Values related to data connectivity are listed for compatibility reasons, but are not supported by PLPS9-W.

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 PLPS9-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 compatibilty 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. Parameter is mandatory for Network Personalization ("PN").
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. Network Personalisation ("PN") is also applicable with `AT^SCSL` command.

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 [49]. 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 [26].
- 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.
- For "PN" (Network Personalisation) value of `<facility>` parameter refer to `AT^SCSL` command.

Examples

EXAMPLE 1

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

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

AT+CLCK="SC",0,"9999"	Unlocks SIM card.
OK	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:

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

EXAMPLE 2

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

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

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

AT+CLCK="PS",1,"55555555"	Locks the UE to the current SIM card.
OK	

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	"PS" phone lock password is required.
OK	
AT+CPIN="55555555"	
OK	"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"`	"PS" phone lock password has to be provided again.
`OK`	Now the UE can be used with any SIM card, without the need of the phone lock password.

EXAMPLE 3

Phone locked to Network (<facility>="PN"):

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

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

`AT+CLCK="PN",1,"66666666",`	Locks the UE to Network "262.01".
`,"262.01"`	
`OK`	

Optionally, query the status of the phone locked to Network:

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

Optionally, query the status of the locked Network (string is empty when no Network locked):

```
AT+CLCK="PN",4
+CLCK: "262.01"
OK
```

Optionally, activate the phone locked to Network using Autolock:

`AT+CLCK="PN",5,"66666666"`	Locks the UE to current Network.
`OK`	Setting takes effect after next restart.

To operate the UE with the Network for which "PN" lock was activated:

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

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

`AT+CPIN?`	
`+CPIN: NET PIN`	
`OK`	
`AT+CPIN="1111"`	
`OK`	PIN authentication accepted.
`AT+CPIN?`	
`+CPIN: PH-NET PIN`	"PN" phone lock password is required.
`OK`	
`AT+CPIN="66666666"`	
`OK`	"PN" phone lock password has been accepted. UE is fully operational now.

To deactivate the phone locked to Network:

`AT+CLCK="PN",0,"66666666"`	"PN" phone lock password has to be provided again.
`OK`	Now the UE can be used with any SIM card, without the need of the phone lock password.

5.3 AT+CPWD Change Password

AT+CPWD allows to define a new password for a password protected <facility> lock function. Each password is a string of digits, the length of which varies with the associated <facility>. The test command returns a list of pairs which represent the available facilities and the maximum length of the associated password. See AT 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 [49]

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. <password length>: 4 to 8 digits.
“P2“	SIM PIN 2, e.g. required for authentication with facility lock "FD" (cf. AT+CLCK). If incorrectly entered three times, the SIM PUK 2 is required to perform authentication. Input of the SIM PUK 2 password is possible only with AT command AT+CPIN or ATD. <password length>: 4 to 8 digits.

Supplementary Service Call Barring:

The call barring supplementary service allows to specify conditions under which calls will be disallowed by the network.
The availability of the supplementary services varies with the network. To benefit from call barring the client will need to subscribe them, though a limited number of call barring types may be included in the basic tariff package.
<password length>: ThenNetwork password needs to be supplied from the network provider or network operator. Usually there is one 4 digit password which applies to all call barring options. For details contact your provider.

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

<password length>(num)

4...8	Length of password. The range of permitted length for a password depends on the associated <facility>. It is available from the test command response, or in the description of parameter <facility>. If the entered password is longer then the maximum password length it will be stripped to the maximum length and the remaining digits will be ignored.

<old password>(str)

Password specified for the facility.
Parameter <old password> can be ignored if no old password was allocated to the facility.
Take into account that a password may have already been set by factory, or that the service is subject to a password issued by the provider. See notes above or contact provider.

<new password>(str)

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

EXAMPLE 2

To change PIN2

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

EXAMPLE 3

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

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

5.4 AT^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 pass-
                                     word.
OK
```

EXAMPLE 3

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

```
+CREG: 0
at+cpin="1234"
OK
+CREG: 2

+CREG: 1                             The mobile ist properly registered to the network.
at+cpin?
+CPIN: READY                         The AT+CPIN? read command confirms that SIM
                                     PIN1 authentication was successful.
at^spic
^SPIC: 3                             As SIM PIN1 authentication was successful, the
                                     counter relates to SIM PIN2 and correctly indicates
                                     that the user has 3 attempts to enter SIM PIN2.
OK
AT^SPIC?                             Likewise, the read command notifies that the ME is
                                     waiting for SIM PIN2.
^SPIC: SIM PIN2
OK
at+clck="SC",0,"456789"              First attempt to enter a wrong SIM PIN1.
+CME ERROR: incorrect password
at^spic
^SPIC: 3                             SIM PIN1 authentication is still valid, and the counter
                                     relates to SIM PIN2.
at+clck="SC",0,"456789"              Second attempt to enter a wrong SIM PIN1.
+CME ERROR: incorrect password
at^spic
^SPIC: 3                             SIM PIN1 authentication is still valid, and the counter
                                     relates to SIM PIN2.
at+clck="SC",0,"456789"              Third attempt to enter a wrong SIM PIN1.
+CME ERROR: incorrect password

+CREG: 0                             SIM PIN1 authentication is no longer valid.
at^spic
^SPIC: 10                            This time, after the SIM PIN1 code has been dis-
                                     abled, 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".

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

<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.

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

6. Identification Commands

The AT Commands described in this chapter allow the external application to obtain various identification information related to the PLPS9-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
PLPS9-W
REVISION xx.yyy
OK

Exec Command

ATI1

Response(s)

Cinterion
PLPS9-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

ATI3

Response(s)

L-REVISION xx.zzz.cc
OK

Exec Command

ATI8

Response(s)

C-REVISION ccccc.vv
OK

Exec Command

ATI61

Response(s)

[<provCfg> <mdmSwVer>]
[<provCfg> <mdmSwVer>]
[...]
xxx.<cProvCfg>
MIMG <mdmImage>
OK

Exec Command

ATI176

Response(s)

<imeisv_number>
OK

PIN ✈ Last

± + -

Reference(s)

ITU-T V.250 [16]

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

ATI2 command requires SIM-PIN to be provided.

<provCfg>(text)

Possible provider configuration.
For details on how to change the provider configuration see AT^SCFG parameter "MEopMode/Prov/Cfg" (see <provCfg>).
The fallback configuration is indicated by a "*".

<mdmSwVer>(text)

Modem software version number.

<cProvCfg>(text)

Current provider configuration.

<mdmImage>(text)

Modem image.

<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 [49].

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.

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 [49]

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 [16]

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)
PLPS9-W OK

PIN	✈	Last
-	+	-

Reference(s)
3GPP TS 27.007 [49]

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)
PLPS9-W OK

PIN	✈	Last
-	+	-

Reference(s)
ITU-T V.250 [16]

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 [49]

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 [16]

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 [49]

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 [16]

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 [49]

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: "OSS"
^SINFO: "ProvCfg/Ident", <ProvCfgIdent>
OK
ERROR
+CME ERROR: <err>

Write Command

Open Source Software

AT^SINFO="OSS"

Response(s)

^SINFO: "OSS", <OpenSourceSoftware>
OK
ERROR
+CME ERROR: <err>

Write Command

Display Provider Configuration

AT^SINFO="ProvCfg/Ident"

Response(s)

^SINFO: "ProvCfg/Ident", <ProvCfgIdent>
OK
ERROR
+CME ERROR: <err>

PIN ✈ Last
- + -

Parameter Description

<OpenSourceSoftware>(str)

Open Source Software (OSS).
AT read command prints out in plain text all information about free and open source software used in module firmware. The text being printed out includes following information:
- List of product variants the information printed out applies to.
- For each addressed software package the package name, copyright information, used licenses and text of associated licenses.
- Other instructions and information resulting from licensing of used free or open source software packages.
The text being printed out might be huge in number of lines of text. It is on UE to be able to deal with text output of this dimension.

<ProvCfgIdent>(str)

Provider Configuration Identification.

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 PLPS9-W to an incoming voice 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

```
ATA
```

Response(s)

In case of voice call, if successfully connected:

```
OK
```

If incoming call is not available, i.e. already disconnected or hung up:

```
NO CARRIER
```

PIN	✈	Last
+	-	+

Reference(s)

ITU-T V.250 [16]

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 calls. The termination character ";" is mandatory. 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

ATD<n>[<mgsm>];

Response(s)

If voice call successful or not:
OK
When sending *# sequences response is specific to *# sequence. For details see Section 21.1, Star-Hash (*#) Network Commands
If no dialtone (parameter setting ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If a connection cannot be set up:
NO DIALTONE
BUSY
NO CARRIER
NO ANSWER
ERROR
+CME ERROR: <err>

PIN	✈	Last
±	-	-

Reference(s)

ITU-T V.250 [16]

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.

<mgsm>(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".
  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 ATD><mem><index> Mobile originated call using specific memory and index number

This ATD command variant can be used to dial a number by specifying the phonebook and an index stored in this phonebook. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services.

The command may be aborted by any character sent from the TE to the UE during execution. Abortion is not possible during some states of connection setup such as handshaking.

See ATX for setting result code and call monitoring parameters.

Syntax

Exec Command

ATD>"<mem><index>" ;

Response(s)

If voice call successful or not:
OK
When sending *# sequences:
Response specific to *# sequence. For details see Section 21.1, Star-Hash (*#) Network Commands.
If no dialtone (parameter setting ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If connection cannot be set up:
NO DIALTONE
BUSY
NO CARRIER
NO ANSWER
ERROR
+CME ERROR: <err>

PIN	✈	Last
+	-	-

Reference(s)

ITU-T V.250 [16]

Parameter Description

<mem>(text)

Phonebook storage:
For detailed description of storages see AT+CPBS.

FD	Fixed dialing phonebook
SM	SIM phonebook
ON	MSISDN list
ME	Mobile equipment phonebook
LD	Last number dialed phonebook
MC	Missed (unanswered received) calls list
RC	Received calls list
EN	Emergency numbers
DC	Dialed calls list
VM	CPHS voice mailbox phonebook

<index>(num)

Integer type memory location in the range of locations available in the selected memory, i.e. the index number returned by AT+CPBR.
DTMF transmission: If the dial string stored in the memory contains the call modifier "P" the digits after this call modifier till the end are handled as DTMF tones, which are transmitted at connect state for voice calls. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

Examples

EXAMPLE 1

To query the location number of a phonebook entry:

```
AT+CPBR=1,15
+CPBR: 1,"+999999",145,"Charlie"
+CPBR: 2,"+777777",145,"Bill"
...
+CPBR: 15,"+888888",145,"Arthur"
```

UE returns the entries stored in the active phonebook.

EXAMPLE 2

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

```
ATD>"SM15";
OK
```

EXAMPLE 3

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

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

EXAMPLE 4

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

```
ATD>"ME15";
OK
```

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

This ATD command variant can be used to dial a number by selecting an index from the active phonebook. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services.

The command may be aborted by any character sent from the TE to the UE during execution. Abortion is not possible during some states of connection setup such as handshaking.

See ATX for setting result code and call monitoring parameters.

Syntax

Exec Command

ATD><index>;

Response(s)

If voice call successful or not:
OK
When sending *# sequences:
Response specific to *# sequence. For details see Section 21.1, Star-Hash (*#) Network Commands.
If no dialtone (parameter setting ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If connection cannot be set up:
NO DIALTONE
BUSY
NO CARRIER
NO ANSWER
ERROR
+CME ERROR: <err>

PIN	✈	Last
+	-	-

Reference(s)

ITU-T V.250 [16]

Parameter Description

<index>(num)

Integer type memory location in the range of locations available in the active memory, i.e. the index number returned by AT+CPBR.
DTMF transmission: If the dial string stored in the memory contains the call modifier "P" the digits after this call modifier till the end are handled as DTMF tones, which are transmitted at connect state for voice calls. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

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

This ATD command variant can be used to search all PLPS9-W phonebooks for a given string and dial the found number. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services.

The command may be aborted by any character sent from the TE to the UE during execution. Abortion is not possible during some states of connection setup such as handshaking.

See ATX for setting result code and call monitoring parameters.

Syntax

Exec Command

ATD><str>;

Response(s)

If voice call successful or not:
OK
When sending *# sequences:
Response specific to *# sequence. For details see Section 21.1, Star-Hash (*#) Network Commands.
If no dialtone (parameter setting ATX2 or ATX4):
NO DIALTONE
If busy (parameter setting ATX3 or ATX4):
BUSY
If connection cannot be set up:
NO DIALTONE
BUSY
NO CARRIER
NO ANSWER
ERROR
+CME ERROR: <err>

PIN	✈	Last
+	-	-

Reference(s)

ITU-T V.250 [16]

Parameter Description

<str>(str)(+CSCS)

String type value ("x"), which should equal to an alphanumeric field in at least one phonebook entry in the searched memories. The string must contain at least one character. Used character set should be the one selected with AT+CSCS. <str> can contain escape sequences as described in chapter "Supported character sets".
If AT+CSCS is set to "UCS2", with respect to the coding of UCS2-characters only phonebook entries that contain an alphanumeric string with a size less than the half of the parameter <tlength> from AT+CPBW can be dialed.

DTMF transmission: If the dial string stored in the memory contains the call modifier "P" the digits after this call modifier till the end are handled as DTMF tones, which are transmitted at connect state for voice calls. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

7.6 AT+CHUP Hang up call

AT+CHUP cancels all voice calls.

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 [49]

7.7 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 [41] release cause specified by the user. Calls will be terminated regardless of their current call status, which may be any of the states listed with AT+CLCC.

Syntax

Test Command

```
AT^SHUP=?
```

Response(s)

```
OK
```

Write Command

```
AT^SHUP=<cause>[, <cn>]
```

Response(s)

```
OK
ERROR
NO CARRIER
```

PIN	✈	Last
-	-	-

Parameter Description

<cause>(num)

Release cause

3GPP TS 24.008 [41] release cause to be indicated to the network.
The PLPS9-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 [41] release cause "unassigned (unallocated) number"
16	Send 3GPP TS 24.008 [41] release cause "normal call clearing "
17	Send 3GPP TS 24.008 [41] release cause "user busy "
18	Send 3GPP TS 24.008 [41] release cause "no user responding "
21	Send 3GPP TS 24.008 [41] release cause "call rejected"
27	Send 3GPP TS 24.008 [41] release cause "destination out of order "
31	Send 3GPP TS 24.008 [41] release cause "normal, unspecified"
88	Send 3GPP TS 24.008 [41] 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.
1...7	Terminate the specific call number <cn>.

Note

- 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.

7.8 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)

```
<n>
OK
ERROR
```

Write Command

```
ATS0=<n>
```

Response(s)

```
OK
ERROR
```

PIN	✈	Last
-	-	-

Reference(s)

ITU-T V.250 [16]

Parameter Description

<n>(num)(&V)(&W)	
000(&F)(D)	Automatic answer mode is disabled.
001-255	Enable automatic answering after specified number of rings.

7.9 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.

Syntax

Test Command

```
AT+CLCC=?
```

Response(s)

```
OK
```

Exec Command

```
AT+CLCC
```

Response(s)

```
[+CLCC: <idx>, <dir>, <stat>, <mode>, <mpty>[, <number>, <type>[, <alpha>]]]
[+CLCC: <idx>, <dir>, <stat>, <mode>, <mpty>[, <number>, <type>[, <alpha>]]]
[+CLCC: ...]
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
+	-	-

Reference(s)

3GPP TS 27.007 [49]

Parameter Description

<idx>(num)

Call identification number as described in 3GPP TS 22.030 [27], 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

<mpty>(num)

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

<number>(str)

Phone number in format specified by <type>

<type>(num)

Type of address octet as defined by 3GPP TS 24.008 [41], 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.

7.10 AT^SLCC Extended list of current calls

AT^SLCC covers essentially the same information as the 3GPP TS 27.007 [49] command AT+CLCC, with the following extensions:

- The additional write command allows to activate event reporting for the list of current calls.
- The additional read command returns an indication whether event reporting is active for the current interface.
- The exec command returns, like AT+CLCC, a list of current calls. If the command is successful, but no calls are available, no information response is sent to the TE.

Syntax

Test Command

```
AT^SLCC=?
```

Response(s)

```
^SLCC: (list of supported<n>s)
OK
```

Read Command

```
AT^SLCC?
```

Response(s)

```
^SLCC: <n>
OK
```

Exec Command

```
AT^SLCC
```

Response(s)

```
[^SLCC:<idx>, <dir>, <stat>, <mode>, <mpty>, <Reserved>[, <number>, <type>[, <alpha>]]]
[^SLCC:<idx>, <dir>, <stat>, <mode>, <mpty>, <Reserved>[, <number>, <type>[, <alpha>]]]
[^SLCC:...]
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT^SLCC=<n>
```

Response(s)

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

PIN	✈	Last
-	-	-

Unsolicited Result Code

Unsolicited Call Status information

if the list of current calls is empty:

```
^SLCC:
```

if one or more calls are currently in the list:

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

^SLCC:

URC "^SLCC" displays the list of current calls as displayed with the execute command AT^SLCC. The list is displayed in the state it has at the time of display, not in the state it had when the signal was generated. The URC's occurrence indicates call status changes for any of the calls in the list of current calls.
If multiple displays of identical list configurations occur, this happens because of short intermediate states of the list, that have already been overridden by new transitions and states. Thus, it is guaranteed that the configuration displayed is always the current configuration at the time of the last display.
The list of active calls displayed with this URC will always be terminated with an empty line preceded by prefix "^SLCC: ", in order to indicate the end of the list.

Parameter Description

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

0(&F)(D)	Presentation of URC "^SLCC" disabled
1	Presentation of URC "^SLCC" enabled

<idx>(num)

Call identification number as described in subclause 6.5.5.1 of 3GPP TS 22.030 [27]. 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

<mpty>(num)

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

<Reserved>(num)

0	Reserved

<number>(str)

Phone number in format specified by <type>

<type>(num)

Type of address octet as defined by 3GPP TS 24.008 [41], 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
145	Dialing string <number> includes international access code character '+'
161	National number
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>).
Due to time constraints on the necessary evaluation of the phonebook, this parameter may show a default value during early call phases (e.g. for <stat>= "dialing", "incoming" or "alerting"), even if a phonebook entry is present for the number concerned.
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.

Notes

- Some parameters of the AT+CHLD command, as well as some situations where the call status in the network changes very quickly (e.g. the transition between <stat>= "unknown", "dialing" and "alerting" for a call to a reachable subscriber within the registered network) may lead to quasi-simultaneous changes to the states of one or several calls in the list, possibly leading to multiple displays of identical list configurations.
- If multiple displays of identical list configurations occur, this happens because of intermediate states of the list, that have already been overridden by new transitions and states. Thus, it is guaranteed that the configuration displayed in such cases is the current configuration at the time of the last display.
- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

7.11 AT+CR Service reporting control

AT+CR configures the PLPS9-W whether or not to transmit an intermediate result code +CR: <serv> to the TE when a call is being set up.
<mode>=1 may lead to connection failure, if the application waits for default result code/URC.

Syntax

Test Command

AT+CR=?

Response(s)

+CR: (list of supported<mode>s)
OK
ERROR

Read Command

AT+CR?

Response(s)

+CR: <mode>
OK
ERROR

Write Command

AT+CR=<mode>

Response(s)

OK
ERROR

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.007 [49]

Intermediate Result Code

If enabled, an intermediate result code is transmitted during connect negotiation when the PLPS9-W has determined speed and quality of service to be used, before any error control or data compression reports are transmitted, and before any final result code (e.g. CONNECT) appears.

+CR: <serv>

Parameter Description

<mode>(num)(&V)(&W)	
0(&F)(D)	Disable
1	Enable

<serv>(str)	
“REL ASYNC“	Asynchronous non-transparent
“GPRS“	GPRS
“SYNC“	Fax call (Fax only for compatibility reasons, not supported by PLPS9-W)

7.12 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 [49]

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 PLPS9-W)
“VOICE“	Voice

7.13 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 [49]

Parameter Description

<voicemode>(num)(NV)	
0	CS_ONLY
1	VOIP_ONLY
2	CS_PREFFERED
3(D)	VOIP_PREFFERED

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 <numericn> 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: <numericn>,<alphan>
[+COPN: ...]
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.007 [49]

Parameter Description

<numericn>(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 PLPS9-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
  PLPS9-W searches for the home operator automatically. If successful the PLPS9-W registers to the home network. If the home network is not found, PLPS9-W goes on searching. If a permitted operator is found, PLPS9-W registers to this operator.
  If no operator is found the PLPS9-W remains unregistered.
- Manual
  Desired operator can be determined using the AT+COPS write command. If the operator is found, PLPS9-W registers to it immediately. If the selected operator is forbidden, the PLPS9-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 case, the AT+COPS test command is denied with error, for example during location update, data traffic in PS connections, voice call 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 and 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 [49]

Parameter Description

<opStatus>(num)

Operator Status

0	Unknown
1	Operator available
2	Current operator
3	Operator forbidden

<opName>(str)(+CSCS)(&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)(NV)

Only Parameter values 0 and 1 are stored in the non-volatile memory of the PLPS9-W.

0(D)	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. After setting command AT+COPS=2 wait for <regStatus> 0, e.g. indicated by the "+CREG: 0" URC before executing any further network service related AT commands.
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. This mode cannot be selected in restricted mode (see note below).

<rat>(num)(&V)(NV)

Radio Access Technology (RAT)

By delivery default, the <rat> parameter is set to an automatic selection mode which enables the UE to select either UTRAN (UMTS) or GSM GSM or E-UTRAN, depending on the network coverage. This automatic mode for selecting <rat> remains enabled until you explicitly set either 0 for GSM or 2 for UTRAN either 0 for GSM or 7 for E-UTRAN This means, setting the <rat> parameter is a restriction, i.e. it forces the UE to select either UTRAN only or or GSM only GSM only or E-UTRAN only. The selected <rat> value will be stored in the non-volatile memory. If the selected <rat> is not available, the UE cannot register to a network.
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.
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

2	UTRAN
3	GSM w/EGPRS Only in read command response, not intended for the AT+COPS write command.
4	UTRAN w/HSDPA Only in read command response, not intended for the AT+COPS write command.
6	UTRAN w/HSDPA and HSUPA 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).

Note

- 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+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 [49]

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

Note

- The Access Technology selection parameters <gsm>, <gsm_compact>, <utran>, <e-utran> are required for SIM cards or UICCs containing PLMN selector with Access Technology.

8.4 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 [49]

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 $EF_{HPLMNwAcT}$

8.5 AT+CREG Network Registration Status

AT+CREG serves to monitor the PLPS9-W's network registration status. Information can be reported by the AT+CREG? read command and by +CREG: URCs.

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>]]
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 [49]

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>]]

Parameter Description

<urcMode>(num)(&V)(&W)	
[0](&F)	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. Parameters <netLac>, <netCellId> <AcT> will only be displayed if available.

<regStatus>(num)(&V)	
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/UMTS/LTE coverage.
5	Registered, roaming. UE is registered at a foreign network (national or international network)

`<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 3G or 4G

`<AcT>`(num)

Radio access technology

0	GSM
2	UTRAN
3	GSM w/EGPRS
4	UTRAN w/HSDPA
6	UTRAN w/HSDPA and HSUPA
7	E-UTRAN

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.

8.6 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 [49]

Parameter Description

<rxlev>(num)

Received signal strength level (see 3GPP TS 45.008 [53] subclause 8.1.4). For 2G networks only

0	rssi < -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 [53] subclause 8.2.4
99	not known or not detectable

<rscp>(num)

Received signal code power (see 3GPP TS 25.133 [45] subclauses 9.1.1.3 and 9.1.1.1.3) For 3G networks only

0	rscp < -120 dBm
1	-120 dBm ≤ rscp < -119 dBm
2	-119 dBm ≤ rscp < -118 dBm

...	
94	-27 dBm ≤ rscp < -26 dBm
95	-26 dBm ≤ rscp < -25 dBm
96	-25 dBm ≤ rscp
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 [45] subclause 9.1.2.3) For 3G networks only

0	Ec/Io < -24 dB
1	-24 dB ≤ Ec/Io < -23.5 dB
2	-23.5 dB ≤ Ec/Io < -23 dB
...	
47	-1 dB ≤ Ec/Io < -0.5 dB
48	-0.5 dB ≤ Ec/Io < 0 dB
49	0 dB ≤ Ec/Io
255	not known or not detectable

`<rsrq>`(num)

Reference signal received quality (see 3GPP TS 36.133 [55] 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 [55] 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

8.7 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 [49]

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 [49], the <rssi> value is not applicable to 3G and 4G networks. Please use AT+CESQ instead, or AT^SMONI.

Note for 3G only: With a view to employing AT+CSQ also for 3G networks the PLPS9-W has been designed to show a <rssi> value derived from the 3G specific RSCP parameter shown by AT^SMONI. Nevertheless, please consider that connection quality in 3G networks is depending on further factors. For example, despite good <rssi> or RSCP values for signal quality, data throughput may vary depending on the number of subscribers sharing the same cell. It is therefore recommended to use also AT^SMONI which delivers additional information, in particular the values RSCP, EC/n0, SQual and SRxLev RX level.

<ber>(num)

0..7	as RXQUAL values in the table in 3GPP TS 45.008 [53], 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.

8.8 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>] whenever the time zone is changed.

Syntax

Test Command

AT+CTZR=?

Response(s)

+CTZR: (list of supported <n>s)
OK

Read Command

AT+CTZR?

Response(s)

+CTZR: <n>
OK
ERROR
+CME ERROR: <err>

Write Command

AT+CTZR=[<n>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Reference(s)

3GPP TS 27.007 [49]

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.

Parameter Description

<n>(num)	
0(&F)(P)	Disable time zone change event reporting.
1	Enable time zone change event reporting by unsolicited result code +CTZV: <timezone>.
2	Enable extended time zone reporting by unsolicited result code +CTZE: <timezone>,<dst>,[<time>].

<timezone>(num)

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 respresenting the local time. The format is "YY/MM/DD,hh:mm:ss", expressed as integers representing year (YY), 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.

8.9 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 [49]

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)	
0(&F)(P)	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 <nitzTZ>) adjustment for daylight saving time included.
2	+2 hours (equals 8 quarters in <nitzTZ>) adjustment for daylight saving time included.

8.10 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 8.10.1, AT^SMONI Responses OK

PIN ✈	Last
- -	-

Note

- Keep in mind LAC,TAC and Cell ID are written in hexadecimal numeral system.

8.10.1 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,ARFCN,TS,timAdv,dBm,Q,ChM
od
Example:
^SMONI: 2G,990,-75,262,03,0139,02C9,28,28,3,0,G,0,-104,NOCONN
```

- UE is camping on a UMTS (3G FDD) cell and registered to the network:

```
Syntax:
^SMONI: ACT MODE,UARFCN,PSC,EC/Io,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,CSGid,TransportCh,
SF,Slot,EC/Io,RSCP,ComMod,HSUPA,HSDPA
Example:
^SMONI: 3G FDD,10737,131,-7.5,-103,260,01,7D3D,C80BC9A,21,11,--,NOCONN
```

- UE is camping on a UMTS (3G TD-SCDMA) cell and registered to the network:

```
Syntax:
^SMONI: ACT MODE,UARFCN,CPID,MCC,MNC,LAC,cell,EC/n0,RSSI,RSCP,TimAdv
Example:
^SMONI: 3G TDS,10054,0,460,04,002D,75BCD15,-2.27,-76.21,-78.48,0,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,Phys-
ical Cell ID,Srxlev,RSRP,RSRQ,LTEA,Conn_state
```

```
Example:
^SMONI: 4G,6300,20,10,10,FDD,262,02,BF75,0345103,350,33,-94,-7,0,NOCONN
```

- UE is searching and could not (yet) find a suitable GSM (2G) cell:

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

- UE is searching and could not (yet) find a suitable UMTS (3G) or 3G FDD cell:

```
Syntax:
^SMONI: ACT(MODE),UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,CSGid,Trans-
portCh, SF,Slot,EC/n0,RSCP,ComMod,HSUPA,HSDPA
Example:
^SMONI: 3G,SEARCH,SEARCH
or
^SMONI: 3G FDD,SEARCH,SEARCH
```

- UE is searching and could not (yet) find a suitable UMTS (3G TDS) cell:

```
Syntax:
^SMONI: ACT MODE,UARFCN,CPID,MCC,MNC,LAC,cell,EC/n0,RSSI,RSCP,TimAdv
Example:
^SMONI: 3G TDS,SEARCH,SEARCH
```

- UE is searching and could not (yet) find a suitable LTE (4G) cell:

```
Syntax:
^SMONI: ACT,EARFCN,Band,DL bandwidth,UL bandwidth,Mode,MCC,MNC,TAC,Global Cell ID,Phys-
ical Cell ID,Srxlev,RSRP,RSRQ,LTEA,Conn_state
Example:
^SMONI: 4G,SEARCH
```

- 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,ARFCN,TS,timAdv,dBm,Q,ChM
od
Example:
^SMONI: 2G,673,-89,262,07,4EED,A500,16,16,7,4,G,5,-107,LIMSRV
```

- UE is camping on a UMTS (3G FDD) cell but not registered to the network (only emergency call allowed):

```
Syntax:
^SMONI: ACT Mode,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,CSGid,TransportCh,
SF,Slot,EC/n0,RSCP,ComMod,HSUPA,HSDPA
Example:
^SMONI: 3G FDD,10564,96,-7.5,-79,262,02,0143,00228FF,-92,-78,--,LIMSRV
```

- UE is camping on a UMTS (3G TD-SCDMA) cell but not registered to the network (only emergency call allowed):

```
Syntax:
^SMONI: ACT MODE,UARFCN,CPID,MCC,MNC,LAC,cell,EC/n0,RSSI,RSCP,TimAdv
Example:
^SMONI: 3G TDS,10054,0,460,04,002D,75BCD15,-2.36,-76.14,-78.50,0,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,Phys-
ical Cell ID,Srxlev,RSRP,RSRQ,LTEA,Conn_state
Example:
^SMONI: 4G,6300,20,10,10,FDD,262,02,BF75,0345103,350,33,-94,-7,0,LIMSRV
```

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,ChM
od
Example:
^SMONI: 2G,852,-80,262,03,4E2D,6C2D,28,32,3,5,E,0,-104,816,1,3,-71,0,A_FR
```

- UMTS (3G FDD) cell:

```
Syntax:
^SMONI: ACT MODE,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,CSGid,TransportCh,
SF,Slot,EC/n0,RSCP,ComMod,HSUPA,HSDPA
Example:
^SMONI: 3G FDD,10737,131,-5,-93,260,01,7D3D,C80BC9A,21,11,--,DPCH,256,4,-5,-93,0,00,00
```

- UMTS (3G TD-SCDMA) cell:

```
Syntax:
^SMONI: ACT MODE,UARFCN,CPID,MCC,MNC,LAC,cell,EC/n0,RSSI,RSCP,TimAdv
Example:
^SMONI: 3G TDS,10054,89,460,04,002D,75BCD15,-2.18,-76.39,-78.56,42,CONN
```

- LTE (4G) cell:

```
Syntax:
^SMONI: ACT,EARFCN,Band,DL bandwidth,UL bandwidth,Mode,MCC,MNC,TAC,Global Cell ID,Phys-
ical Cell ID,TX_power,RSRP,RSRQ,LTEA,Conn_state,CA
Example:
^SMONI: 4G,6300,20,10,10,FDD,262,02,BF75,0345103,350,90,-94,-7,1,CONN,1
```

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 base station selection
C2	Coefficient for base station selection
NCC	PLMN colour code
BCC	Base station colour code
GPRS	GPRS state

Column	Description
PWR	Maximal power level used on RACH channel in dBm
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
TS	Timeslot number
timAdv	Timing advance in bits
dBm	Receiving level of the traffic channel carrier in dBm
Q	Receiving quality (0-7)
ChMod	Channel mode (--: Signalling, S_HR: Half rate, S_FR: Full rate, S_EFR: Enhanced Full Rate, A_HR: AMR Half rate, A_FR: AMR Full rate)

Columns for UMTS (3G FDD) Serving Cell parameters:

Column	Description
ACT MODE	Access Technology and used Mode
UARFCN	UARFCN (UTRAN Absolute Radio Frequency Channel Number) of the BCCH carrier
PSC	Primary Scrambling Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code, see note
cell	Cell ID
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)
CSGid	Closed Subscriber Group id

Columns for UMTS (3G TD-SCDMA) Serving Cell parameters:

Column	Description
ACT MODE	Access Technology and used Mode
UARFCN	UARFCN (UTRAN Absolute Radio Frequency Channel Number) of the BCCH carrier
CPID	Cell Parameters Id
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code, see note

Column	Description
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSSI	Received Signal Strength Indicator
RSCP	Received Signal Code Power in dBm
TimAdv	Timing Advanced

Columns for UMTS (3G FDD) Dedicated Channel parameters:
Note: Transport channels in downlink are considered.

Column	Description
TransportCh	Transport Channel Type (DPCH, FDPCH, HSDSCH, EDCH)
SF	Spreading Factor (4,8,16,32,64,128,256,512)
Slot	Slot Format for DPCH (0-16) (see 3GPP TS 25.211 V7.10.0 Table 11) Slot Format for FDPCH (0-9) (see 3GPP TS 25.211 V7.10.0 Table 16C)
EC/n0	Carrier to noise ratio in dB
RSCP	Received Signal Code Power in dBm
ComMod	Compressed Mode (0-1) (indicates valid transmission gap pattern)
HSUPA	HSUPA Status (a.k.a. E-DCH Status) indicated by xy: x = Cell Capability Indicator: 0 - HSUPA capability not indicated, 1 - HSUPA Capable Cell. Please consider that some providers/MNOs don't support this flag and that it is provided "for display indication only". See 3GPP TS 25.331 [47] (later than version 6.9.0) section 10.2.48.8.8. y = UE Call Status: 0 - HSUPA inactive, 1 - HSUPA active
HSDPA	HSDPA Status (a.k.a. HSDSCH Status) indicated by xy: x = Cell Capability Indicator: 0 - HSDPA capability not indicated, 1 - HSDPA Capable Cell, 2 - HSDPA+ Capable Cell. Please consider that some providers/MNOs don't support this flag and that it is provided "for display indication only". See 3GPP TS 25.331 [47] (later than version 6.8.0), section 10.2.48.8.8. y = UE Call Status: 0 - HSDPA inactive, 1 - HSDPA suspended, 2 - HSDPA active, 3 - Unknown

Columns for LTE (4G) Serving Channel parameters:
Note: LTE TDD and LTE FDD are delivering the same parameters.

Column	Description
ACT MODE	Access Technology and used Mode
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
Band	E-UTRA frequency band (see 3GPP 36.101)
DL bandwith	DL bandwith
UL bandwith	UL bandwith
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)

Column	Description
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
Conn_state	Connection state. Can be one of following: CONN, LIMSRV, NOCONN or SEARCH
CA	(only displayed in dedicated mode) 0 - Secondary Cell for Carrier Aggregation is not activated 1 - Secondary Cell for Carrier Aggregation is activated

8.10.2 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.

8.11 AT^SMONP Monitoring Neighbour Cells

The AT^SMONP supplies information of active cells and all neighbour cells. The active cell information will be delivered additively because an UE can be situated in Soft Handover or Softer Handover.

Syntax

Test Command

AT^SMONP=?

Response(s)

OK

Exec Command

AT^SMONP

Response(s)

See: Section 8.11.1, 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 "-".

8.11.1 AT^SMONP Responses

- *In case of a GSM (2G) serving cell:*

Syntax:

2G:

$ARFCN_1$,rs_1,dBm_1,MCC_1,MNC_1,NCC_1,BCC_1,$C1_1$,$C2_1$,LAC_1,$cell_1$,$C31_1$,$C32_1$

$ARFCN_2$,rs_2,dBm_2,MCC_2,MNC_2,NCC_2,BCC_2,$C1_2$,$C2_2$,LAC_2,$cell_2$,$C31_2$,$C32_2$

...

$ARFCN_n$,rs_n,dBm_n,MCC_n,MNC_n,NCC_n,BCC_n,$C1_n$,$C2_n$,LAC_n,$cell_n$,$C31_n$,$C32_n$

3G:

$UARFCN_1$,PSC_1,$EC/n0_1$,$RSCP_1$

$UARFCN_2$,PSC_2,$EC/n0_2$,$RSCP_2$

...

$UARFCN_n$,PSC_n,$EC/n0_n$,$RSCP_n$

4G:

$EARFCN_1$,$RSRQ_1$,$RSRP_1$,PCI_1

$EARFCN_2$,$RSRQ_2$,$RSRP_2$,PCI_2

...

$EARFCN_n$,$RSRQ_n$,$RSRP_n$,PCI_n

```
Example:
2G:
658,51,-60,262,07,7,4,46,46,4EED,08B8,0,0
666,47,-64,262,07,7,1,42,42,4EED,A500,0,0
1006,37,-74,262,07,7,4,32,32,4EED,----,0,0
1021,36,-75,262,07,7,1,31,21,4EED,08B2,0,0
702,33,-78,262,07,7,3,28,28,4EED,A4F0,0,0
654,32,-79,262,07,7,5,27,27,4EED,1C3A,0,0
3G:
-----,---,-----,----
4G:
-----,-----,----,---
OK
```

- *In case of a 3G serving cell:*

```
Syntax:
3G:
UARFCN1,PSC1,EC/n01,RSCP1,SQual1,SRxLev1,set1,rank1
UARFCN2,PSC2,EC/n02,RSCP2,SQual2,SRxLev2,set2,rank2
...
UARFCNn,PSCn,EC/n0n,RSCPn,,SQualn,SRxLevn,setn,rankn

2G:
ARFCN1,RSSI1,NCC1,BCC1,SRxLev1,rank1
ARFCN2,RSSI2,NCC2,BCC2,SRxLev2,rank2
...
ARFCNn,RSSIn,NCCn,BCCn,SRxLevn,rankn

4G:
EARFCN1,RSRQ1,RSRP1,Srxlev1,PCI1,TDD1
EARFCN2,RSRQ2,RSRP2,Srxlev2,PCI2,TDD2
...
EARFCNn,RSRQn,RSRPn,Srxlevn,PCIn,TDDn


Example:
3G:
10786,49,-7.0,-75,22,37,AS,-9
10786,161,-24.0,-121,0,0,--,0
10786,54,-24.0,-121,0,0,--,0
10786,51,-24.0,-121,0,0,--,0
10786,62,-24.0,-121,0,0,--,0
10786,159,-24.0,-121,0,0,--,0
2G:
----,----,-,-,----,------
4G:
-----,-----,----,--,---,-
OK
```

- *In case of a 4G serving cell:*

```
Syntax:
4G:
EARFCN1,RSRQ1,RSRP1,Srxlev1,PCI1,RSSI1,Cell ID1,MCC1,MNC1,TAC1,DL_CAC1,UL_CAC1
EARFCN2,RSRQ2,RSRP2,Srxlev2,PCI2,RSSI2,Cell ID2,MCC2,MNC2,TAC2,DL_CAC2,UL_CAC2
...
```

```
EARFCN_n,RSRQ_n,RSRP_n,Srxlev_n,PCI_n,RSSI_n,Cell ID_n,MCC_n,MNC_n,TAC_n,DL_CAC_n,UL_CAC_n

2G:
ARFCN_1,RSSI_1,NCC_1,BCC_1,SRxLev_1,rank_1
ARFCN_2,RSSI_2,NCC_2,BCC_2,SRxLev_2,rank_2
...
ARFCN_n,RSSI_n,NCC_n,BCC_n,SRxLev_n,rank_n

3G:
UARFCN_1,PSC_1,EC/n0_1,RSCP_1,SQual_1,SRxLev_1,set_1,rank_1
UARFCN_2,PSC_2,EC/n0_2,RSCP_2,SQual_2,SRxLev_2,set_2,rank_2
...
UARFCN_n,PSC_n,EC/n0_n,RSCP_n,,SQual_n,SRxLev_n,set_n,rank_n


Example 1:
4G:
1830,-12.6,-91,38,368,-60,368,262,03,C463,0
1830,-11.7,-93,36,262,-72,368,262,03,C463,0
1830,-10.9,-93,36,329,-73,368,262,03,C463,0
1830,-15.1,-96,33,261,-72,368,262,03,C463,0
2527,-9.5,-83,--,1,-57,----,---,---,----,1
2G:
----,--,----,-,-,----,-
3G:
-----,---,-----,----,--
OK

Example 2:
4G:
1830,-12.6,-91,38,368,-60,368,262,03,C463,0,0
1830,-11.7,-93,36,262,-72,368,262,03,C463,0,0
1830,-10.9,-93,36,329,-73,368,262,03,C463,0,0
1830,-15.1,-96,33,261,-72,368,262,03,C463,0,0
2527,-9.5,-83,--,1,-57,----,---,---,----,1,0
2G:
----,--,----,-,-,----,-
3G:
10564,---,-----,----,--
10688,---,-----,----,--
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)
dBm	Receiving level in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
NCC	Network colour Code
BCC	Base Station colour code
C1	cell selection criterion

Column	Description
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

Columns for UMTS (3G) parameters:

Column	Description
UARFCN	UTRAN Absolute Radio Frequency Channel Number of the BCCH carrier
PSC	Primary Scrambling Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)
set	3G neighbour cell set (AS: ASET, SN: Sync Nset, AN: Async Nset)
rank	Rank of this cell as neighbor for inter-RAT cell reselection

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
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)
DL_CAC	Indication, if the 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)
UL_CAC	Indication, if the 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)

All parameters for Carrier Aggregation are displayed in accordance with signaling by the radio network.

8.12 AT^SNMON Network Monitoring

The AT^SNMON command can be used to monitor various network information.

Syntax

Test Command

AT^SNMON=?

Response(s)

^SNMON: "PDM", (list of supported <action>s), (list of supported <ta>s), (list of supported <nom>s), (list of supported <rac>s), (list of supported <dsac_avail>s), (list of supported <dsac_cs>s), (list of supported <dsac_ps>s), (list of supported <tac_avail>s), (range of supported <tac>s)
OK
ERROR
+CME ERROR: <err>

Write Command

Start Packet Data Monitor. <action> shall be 2.

AT^SNMON="PDM", <action>

Response(s)

[^SNMON: "PDM", <reserved>, <ta>, <nom>, <rac>, <dsac_avail>, <dsac_cs>, <dsac_ps>, <tac_avail>, <tac>]
OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	-	-

Reference(s)

3GPP TS 45.008 [53]

Parameter Description

<action>(num)

This parameter determines the action to be taken for the monitoring command.

0	Reset values
2	Query values

<reserved>(num)

0	Value returned in scan output responses. Value has no meaning and can be ignored.

<tac>(num)

Tracking Area Code (see 3GPP 23.003 Section 19.4.2.3)

<ta>(num)

Timing Advance (TA)

-1(P)	Information is not available
0...63	

`<nom>`(num)

Network Operation Mode (NOM)

-1(P)	Information is not available
1	NOM1
2	NOM2
3	NOM3

`<rac>`(num)

Routing Area Code (RAC)

-1	Information is not available

0...255

`<dsac_avail>`(num)

Domain Specific Access Control (DSAC) availibility

0	DSAC not available
1	DSAC available

`<dsac_cs>`(num)

Cell access status for CS domain

-1(P)	Information is not available
1	Normal access
2	Emergency calls only
3	No calls allowed
4	All calls allowed

`<dsac_ps>`(num)

Cell access status for PS domain

-1(P)	Information is not available
1	Normal access
2	Emergency calls only
3	No calls allowed
4	All calls allowed

`<tac_avail>`(num)

Tracking Area Code (TAC) availibility

0	TAC not available
1	TAC available

`<tac>`(num)

Tracking Area Code (TAC)

Hexadecimal encoded Tracking Area Code (see 3GPP 23.003 Section 19.4.2.3)

0000...FFFF

8.13 AT^SNCSGLS Operator CSG lists on USIM

The AT^SNCSGLS command supplies the CSG (Closed Subscriber Group) lists from USIM EF_{OCSGL}.

Syntax

Test Command

```
AT^SNCSGLS=?
```

Response(s)

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

Exec Command

```
AT^SNCSGLS
```

Response(s)

```
^SNCSGLS: <mcc>,<mnc>,<csgId>,<cti>
[^SNCSGLS: ...]
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
+	+	-

Parameter Description

<mcc>(str)

Mobile Country Code

<mnc>(str)

Mobile Network Code

<csgId>(str)

CSG ID belonging to the Operator CSG lists

<cti>(num)

CSG type indicator

8.14 AT^SNCSGSC Closed Subscriber Group Network Scan

AT^SNCSGSC queries the present status of the PLPS9-W's CSG networks registration and allows to register to a specific macro cell as well as query the current used macro cell.

The AT^SNCSGSC test command lists sets of six parameters, each representing a macro cell present in the network.
A set consists of

- numeric format representation of the operator country code
- numeric format representation of the operator network code
- an hexadecimal number indicating the macro cell id.
- an integer indicating the access technology of the operator.
- an integer indicating the access properties of the macro cell.
- an integer indicating the signal strength.

Reponse to AT^SNCSGSC read command depends on the registration status. If the UE is registered the response returns the currently registered status. Any of the parameters may be unavailable and will then be an empty field (-). The <mcc>,<mnc>,<netLac>,<netCellId>,<rat> are vaild if module is registered or camped to network. If <csgId> is not empty (-) it means that current serving cell is a femtocell with CSG support.

The AT^SNCSGSC write command forces an attempt to select and register to a manual selected macro cell. This result does not mean that registration to CSG cell is done with success or not. In order to get information if registration to CSG was done, it is needed to set the command AT+CREG= 2 before CSG registration. After executing the AT^SNCSGSC write command wait for URC with information that ME is registered to new cell. After that, it can be checked if this cell is CSG via AT^SNCSGSC read command. The network name can be checked via AT+COPS command.

Syntax

Test Command

AT^SNCSGSC=?

Response(s)

^SNCSGSC: [list of supported (<mcc>, <mnc>, <csgId>, <rat>, <cat>, <rssi>)]
OK
ERROR
+CME ERROR:<err>

Read Command

AT^SNCSGSC?

Response(s)

^SNCSGSC:<mcc>, <mnc>, <csgId>, <rat>, <netLac>, <netCellId>
OK
ERROR
+CME ERROR:<err>

Write Command

AT^SNCSGSC=<mcc>, <mnc>, <csgId>, <rat>

Response(s)

OK
ERROR
+CME ERROR:<err>

PIN	✈	Last
-	-	-

Parameter Description

<rat>(num)	
0	GSM
1	UTRAN

<cat>(num)	
0	Unknown CSG list
1	Allowed CSG list
2	Operator CSG list

8.15 AT^SNRSRP Neighbour Reference Signal Received Power

The AT^SNRSRP command returns neighbour 4G cell info: PCI, EARFCN, and RSRP.

Syntax

Test Command

```
AT^SNRSRP=?
```

Response(s)

```
OK
```

Read Command

```
AT^SNRSRP?
```

Response(s)

in 4G network:

```
^SNRSRP: <pci>, <earfcn>, <rsrp>
OK
ERROR
```

no network or not 4G:

```
^SNRSRP:
OK
ERROR
```

PIN	✈	Last
+	-	-

Parameter Description

<pci>(num)

Physical Cell ID

<earfcn>(num)

E-UTRA Absolute Radio Frequency Channel Number

<rsrp>(num)

Reference Signal Received Power (in dBm). See 3GPP 36.214 section 5.1.1

8.16 AT^SNRSRQ Neighbour Reference Signal Received Quality

The AT^SNRSRQ command returns neighbour 4G cell info: PCI, EARFCN, and RSRQ.

Syntax

Test Command

AT^SNRSRQ=?

Response(s)

OK

Read Command

AT^SNRSRQ?

Response(s)

in 4G network:

^SNRSRQ: <pci>, <earfcn>, <rsrq>
OK
ERROR

no network or not 4G:

^SNRSRQ:
OK
ERROR

PIN	✈	Last
+	-	-

Parameter Description

<pci>(num)

Physical Cell ID

<earfcn>(num)

E-UTRA Absolute Radio Frequency Channel Number

<rsrq>(num)

Reference Signal Received Quality (in dB). See 3GPP 36.214 section 5.1.2

8.17 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 [49]

Parameter Description

<mode>(num)

The UEs IMS voice call availability status

0	Voice calls with the IMS are not available.
1	IMS registration was successful. Voice calls with the IMS are available.

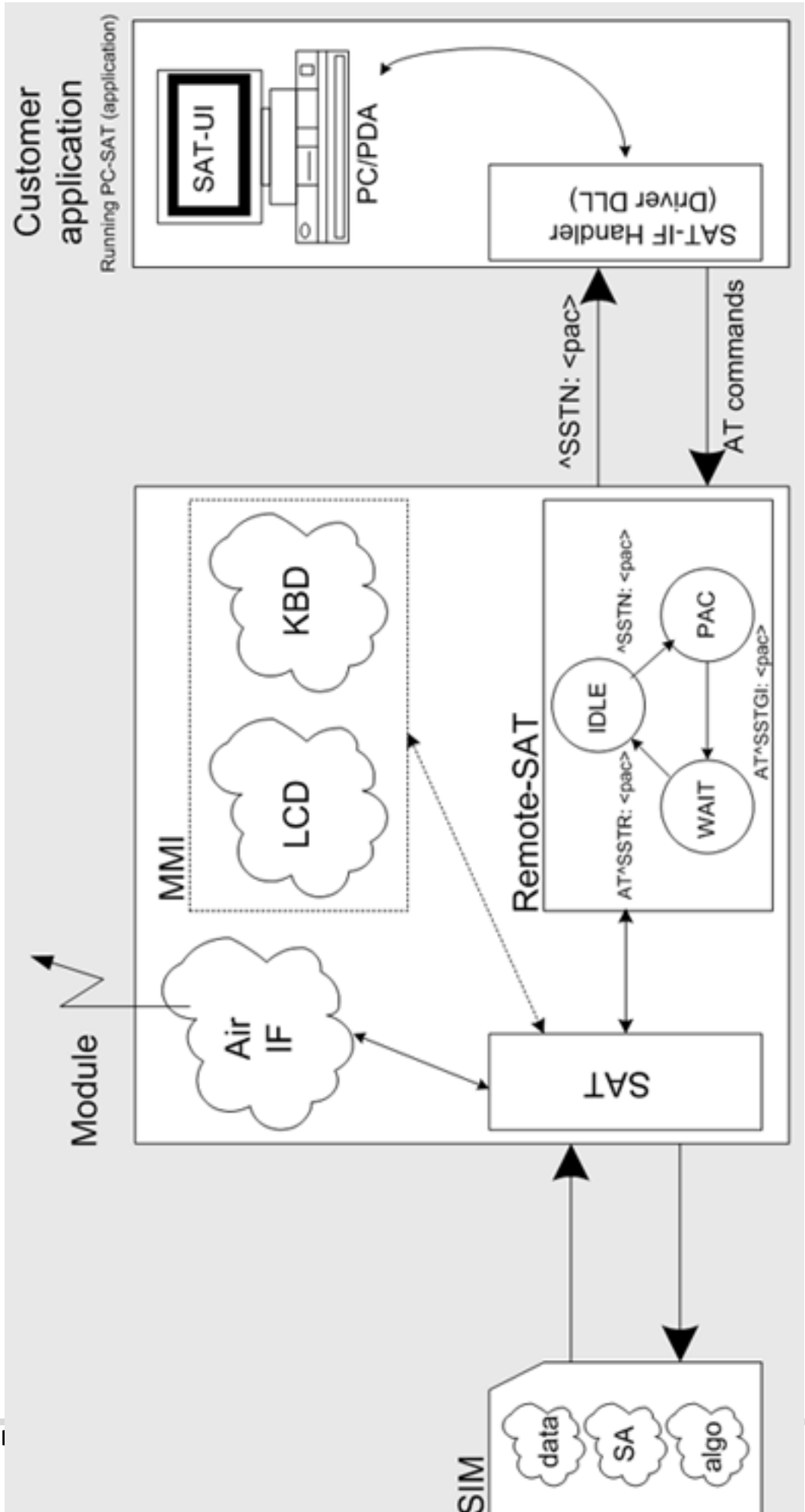
9. USIM Application Toolkit (USAT) Commands

This chapter describes AT commands and responses related to the PLPS9-W's USIM Application Toolkit (USAT) implementation.

USAT is a technology that allows an application running on the USIM to control the GSM/UMTS/LTE Mobile Engine (UE); it is specified in 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].
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 PLPS9-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".


Customer application
Running PC-SAT (application)
SAT-UI
PC/PDA
SAT-IF Handler (Driver DLL)
^SSTN: <pac>
AT commands
MMI
KBD
LCD
Remote-SAT
IDLE
PAC
WAIT
^SSTN: <pac>
AT^SSTR: <pac>
AT^SSTGI: <pac>
Module
Air IF
SAT
SIM
data
SA
algo

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 occour 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 occour 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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23]. 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^SSTR).

Icon data can be fetched directly from the USIM using the AT+CRSM command, for details please refer to 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19]. 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 [36] 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

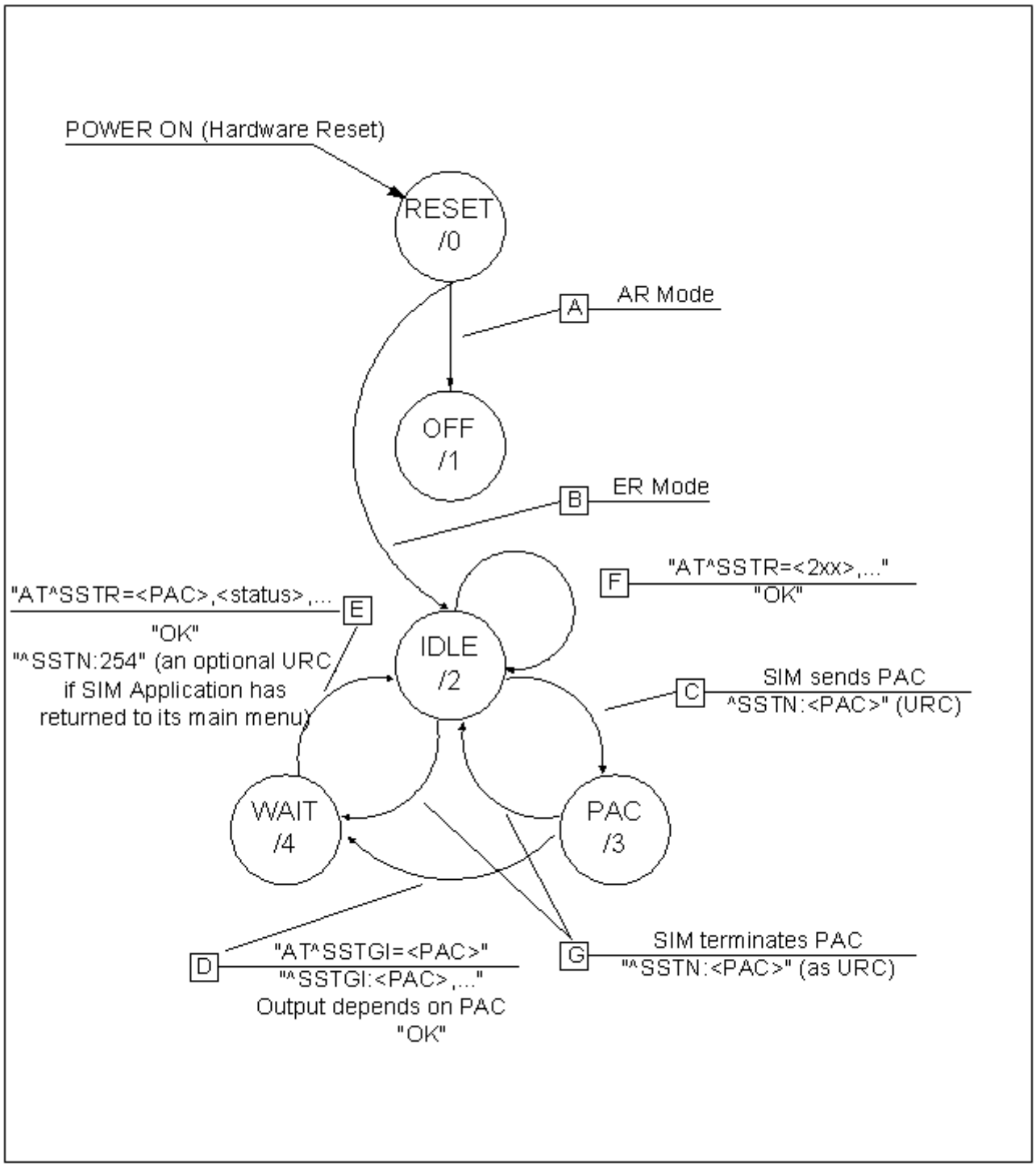


Figure 9.2: Remote-SAT State Transition Diagram

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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23] Release 99, letter class "c").

Table 9.6: Command Type Table

Proactive Toolkit commands vs. Terminal Responses			
Proactive Toolkit command (AT^SSTR=<cmdType>)	Terminal Response in Automatic Response Mode (see AT^SSTA=0)	Terminal Response user choices in Explicit Response Mode (see AT^SSTR=<cmdType>,<status>)	Terminal Response after user timeout in Explicit Response Mode (see URC ^SSTN: <cmdTerminateValue>)
REFRESH (1)	0,4	0	0
SET UP EVENT LIST (5)	0	0, 32, 48, 132	132
SET UP CALL (16)	0,4	0, 4, 16, 20, 32, 34, 35, 48, 132	132
SEND SS (17)	0,4	0, 4, 20, 32, 48, 132	132
SEND USSD (18)	0,4	0, 4, 20, 32, 48, 132	132
SEND SHORT MESSAGE (19)	0,4	0, 4, 32, 48, 132	132
SEND DTMF (20)	0,4	0, 4, 16, 32, 48, 132	132
LAUNCH BROWSER (21)	0,4,48	0, 4, 32, 34, 38, 48, 132, 138, 238, 239	132
PLAY TONE (32)	0,4	0, 4, 16, 32, 48, 132	132
DISPLAY TEXT (33)	0,4	0, 4, 16, 17, 18, 32, 48, 132	132
GET INKEY (34)	48	0, 4, 16, 17, 18, 19, 32, 48, 132	18
GET INPUT (35)	48	0, 4, 16, 17, 18, 19, 32, 48, 132	18
SELECT ITEM (36)	48	0, 4, 16, 17, 18, 19, 32, 48, 132	18
SET UP MENU (37)	0,4	0, 4, 32, 48, 132	132
SET UP IDLE MODE TEXT (40)	0,4	0, 4, 32, 48, 132	132
LANGUAGE NOTIFICATION (53)	0	0	0
OPEN CHANNEL (64)	0,4	0, 4, 16, 32, 48, 132	132
CLOSE CHANNEL (65)	0,4	0, 4, 16, 32, 48, 132	132
RECEIVE DATA (66)	0,4	0, 4, 16, 32, 48, 132	132
SEND DATA (67)	0,4	0, 4, 16, 32, 48, 132	132

9.4 AT^SSTA Remote-SAT Interface Activation

AT^SSTA write command can be used to determine the Remote-SAT activation mode <mode> and, if Explicit Response mode is enabled, to activate the Remote-SAT interface. Removing and inserting the SIM does not affect the activation status.
SAT commands which are not using the AT interface (non-MMI related SAT commands, e.g. PROVIDE LOCAL INFORMATION) are executed without activating Remote-SAT.
The read command can be used to request the current operating status and the used alphabet of the Remote-SAT interface.

Syntax

Test Command

AT^SSTA=?

Response(s)

^SSTA: (list of supported <state>s), (list of supported <Alphabet>s)
OK

Read Command

AT^SSTA?

Response(s)

^SSTA: <state>, <Alphabet>, <allowedInstance>, <SatProfile>, <userTOut>, <AppType>
OK

Write Command

AT^SSTA=<mode>[, <Alphabet>]

Response(s)

OK

PIN	✈	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 (i.e. "^SSTN" URC, AT^SSTGI and AT^SSTR sequence) is only usable via the serial channnel on which the Explicit Response (ER) mode was activated.
To change the serial channel execute AT^SSTA=1 on the desired channel and perform a restart.

0	Not applicable
1	SAT may be started on this instance via the write version of this command.

<SatProfile>(str)

SAT or USAT Terminal Profile according to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].
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.

<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.
1	Explicit Response (ER) mode. This mode is intended for use with an MMI. If ER mode is enabled the MMI is required to handle, via UE's Remote-SAT interface, all commands and responses transmitted to or from the SIM or USIM. If ER mode is enabled the UE enters the IDLE state (<state>=2) after reboot.

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 <immediateResponse> of the AT^SSTGI=33 command), the text should not be removed as a result of this URC.

URC 4

SIM reset notification

^SSTN: 255

Notification to the 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)

PLPS9-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 "^SSTN: 255" 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 AT^SSTGI and AT^SSTR 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 "^SSTN: 255". For more information on USIM reset and the URC "^SSTN: 255" refer to Section 9.5, ^SSTN SAT Notification.
5...255	Reserved values

<pathLen>(num)

Number of bytes coded in <fileList>

<fileNum>(num)

Number of updated Elementary Files (EF) with path given in <fileList>

<fileList>(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 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19] and ETSI TS 102 221 [20].

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+CLCK="FD",2	Request "FD" lock state.
+CLCK: 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 it's 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 - Set Up Call (16)

This command shall be used after receiving the URC ^SSTN: 16. If the SIM Application attempts to set up a call it uses this response to inform the TE of the call parameters.

The sequence of events is as follows:
1. After the Remote-SAT notification 16 was issued the TE has to request the command parameter using AT^SSTGI=16.
2. If the SIM Application does not supply a confirmation text or icon parameter, the TE gives other information to the user, e.g. the telephone number. In this case refer to step 4.
3. If the SIM Application supplies a non empty confirmation text or icon parameter, the TE uses only these to ask the user whether or not he wishes to set up the call.
4. If the user confirms to set up the call, the response AT^SSTR=16,0 shall be sent.
5. If the user denies to set up the call, the response AT^SSTR=16,34 shall be sent.
6. After confirmation phase the TE may present a dialing animation on the screen until a mandatory parameter line ^SSTR: 16, <TermQualifier>, <TerminationCauseText> is issued.
7. If <TermQualifier> is not equal to 0 the call setup process has not been successfully. If <TerminationCause-Text> is not an empty string, this text shall be shown to the user for an appropriate time, e.g. 2 seconds. The text contains information regarding the dial termination cause, e.g. call barring through Call Control by SIM mechanism. If <TerminationCauseText> is an empty string, the TE shall give an own indication to the user.
8. If <TermQualifier> is equal to 0, the call setup process has been started:
If <TerminationCauseText> is not an empty string, this text shall be used to inform the user during the call setup. If <TerminationCauseText> is an empty string, <callSetupText> and/or <confirmationIconId> shall be used to inform the user during call setup. However, if <callSetupText> contains no data, too, no indication shall be shown.
9. The TE shall give the user an opportunity to end an ongoing call, set up by the Proactive Command. In this case the TE shall send an AT command to hang up the call.

Syntax

Write Command

```
AT^SSTGI=16
```

Response(s)

```
^SSTGI: <cmdType>, <commandDetails>, <confirmationText>, <calledNumber>,
<callSetupText>, <confirmationIconQualifier>, <confirmationIconId>,
<callSetupIconQualifier>, <callSetupIconId>
OK
ERROR
+CME ERROR: <err>
```

PIN ✈ Last

- + -

Parameter Description

<cmdType>(num)	
16	Proactive command ID, see Table 9.6, Command Type Table.

<commandDetails>(num)	
0	Set up call, but only if not currently busy on another call
1	Set up call, but only if not currently busy on another call, with redial
2	Set up call, putting all other calls (if any) on hold
3	Set up call, putting all other calls (if any) on hold, with redial
4	Set up call, disconnecting all other calls (if any)

5	Set up call, disconnecting all other calls (if any), with redial
6...255	Reserved Values

`<confirmationText>`(str)

String for user confirmation stage

`<calledNumber>`(num)

String containing called number

`<callSetupText>`(str)

String for call set up stage

`<confirmationIconQualifier>`(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<confirmationIconId>`(num)

0...255

0	No Icon

`<callSetupIconQualifier>`(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<callSetupIconId>`(num)

0...255

0	No Icon

Note

- If the Fixed Dialling Number service is enabled, the number included in the SET UP CALL proactive command shall not be checked against those of the FDN list.

9.10 AT^SSTGI SAT Get Information - Send SS (17)

This command shall be used after receiving the URC ^SSTN: 17
The module is sending a supplementary service request to the network, and is alerting the user of this. Text and an icon identifier shall be passed to the TE to display to the user.

Syntax

Write Command

`AT^SSTGI=17`

Response(s)

`^SSTGI: <cmdType>[, <commandDetails>][, <text>], <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN	✈	Last
-	+	-

Parameter Description

<cmdType>(num)

17	Proactive command ID, see Table 9.6, Command Type Table.

<commandDetails>(num)

This byte is RFU.

<text>(str)

String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is sending an SS request.
If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

9.11 AT^SSTGI SAT Get Information - Send USSD (18)

This command shall be used after receiving the URC ^SSTN: 18
The module is sending an unstructured supplementary service request to the network, and is alerting the user of this.
Text and an icon identifier shall be passed to the TE to display to the user.

Syntax

Write Command

`AT^SSTGI=18`

Response(s)

`^SSTGI: <cmdType>[, <commandDetails>][, <text>], <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN	✈	Last
-	+	-

Parameter Description

`<cmdType>`(num)

18	Proactive command ID, see Table 9.6, Command Type Table.

`<commandDetails>`(num)

This byte is RFU.

`<text>`(str)

String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is sending a USSD request.
If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

`<iconQualifier>`(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<iconId>`(num)

0...255	
0	No Icon

9.12 AT^SSTGI SAT Get Information - Send Short Message (19)

This command shall be used after receiving the URC ^SSTN: 19
The SIM Application is sending a Short Message and the TE is informed of this. The user can be passed a string containing information to display.

Syntax

Write Command

`AT^SSTGI=19`

Response(s)

`^SSTGI: <cmdType>, <commandDetails>, <textInfo>, <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN	✈	Last
-	+	-

Parameter Description

`<cmdType>`(num)

19	Proactive command ID, see Table 9.6, Command Type Table.

`<commandDetails>`(num)

This byte is RFU.

`<textInfo>`(str)

String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is sending a short message.
If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

`<iconQualifier>`(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<iconId>`(num)

0...255	
0	No Icon
1	An icon is provided by the SIM, the icon indicated in the command may be used by the UE to inform the user, in addition to, or instead of the alpha identifier, as indicated with the icon qualifier.

9.13 AT^SSTGI SAT Get Information - Send DTMF (20)

This command shall be used after receiving the URC ^SSTN: 20
The SIM Application is sending DTMF tones to the network, and can provide the TE with some information about this.
Text and an icon identifier can be passed to the TE to display to the user.

Syntax

Write Command

```
AT^SSTGI=20
```

Response(s)

```
^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
-	+	-

Parameter Description

<cmdType>(num)

20	Proactive command ID, see Table 9.6, Command Type Table.

<commandDetails>(num)

This byte is RFU.

<text>(str)

String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is performing a SEND DTMF command. If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

9.14 AT^SSTGI SAT Get Information - Launch Browser (21)

This command shall be used after receiving the URC ^SSTN: 21.
If the SIM Application attempts to start an Internet Browser, it uses this response to inform the TE of the launch parameters.

The sequence of events is as follows:
1. After the Remote-SAT notification 21 was issued the TE shall ask for the command parameters via AT^SSTGI=21.
2. The UE shall ask the user for confirmation using the Alpha Identifier/Icon Identifier (user confirmation phase) if present, when it receives a LAUNCH BROWSER command which requests to connect the existing browser session to a new URL or to terminate a browser session.
3. If the user confirms to start the browser, the response AT^SSTR=21,0 shall be sent.
4. If the user rejects to start the browser, the response AT^SSTR=21,34 shall be sent.
5. The SIM Application will end the proactive session.
6. The UE shall request content using the given URL. However, if no URL string is supplied a default URL shall be used.
7. If the response AT^SSTR=21,0 was issued, the browser session may still be active while a next proactive command is issued. Therefore the end of the browser session shall be reported to the UE via browser termination event command asynchronously if determined by the event list.
For details please refer to AT^SSTR.

Syntax

Write Command

AT^SSTGI=21

Response(s)

^SSTGI: <cmdType>, <commandDetails>, <confirmationText>, <confirmationIconQualifier>, <iconId>, <browserIdentity>, <url>, <bearerList>, <fileRefList>, <gatewayIdentity>
OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Parameter Description

<cmdType>(num)

21	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)

This byte is RFU.

<confirmationText>(str)

String for user confirmation stage

<confirmationIconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text

	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<iconId>`(num)

0...255	
0	No Icon

`<browserIdentity>`(num)

0...255	Browser to be used
0	Default Browser shall be used.
1...255	RFU

`<url>`(str)

String containing URL to be used by the TE to request content. The way the UE requests content using the URL is out of the scope of the present document. This is specified in RFC 1738 Annex K for example.

`<bearerList>`(str)

“00“	SMS
“01“	CSD
“02“	USSD
“03“	GPRS
"04"..."FF"	RFU

`<fileRefList>`(str)

String containing full path to the provisioning file. The first byte contains the number of files. Every comma separated path is the concatenation of file identifiers starting from the Master File (e.g. 3F007F206FXY). The file contains a single unambiguous set of parameters required to make the connection. The content of the file is expected to be consistent with the format defined for provisioning information for the requested type of browser.

`<gatewayIdentity>`(str)

String containing the Gateway/Proxy Identity which gives to the mobile the name/identity of the Gateway/Proxy to be used for connecting to the URL. This Gateway/Proxy identity is required when the bearer data object is present.

9.15 AT^SSTGI SAT Get Information - Play Tone (32)

This command shall be used after receiving the URC ^SSTN: 32.
The UE has been instructed to generate an audible tone, and may pass to the TE some information to support this.

Syntax

Write Command

`AT^SSTGI=32`

Response(s)

`^SSTGI: <cmdType>, <commandDetails>, <infoText>, <tone>, <durationUnit>, <duration>, <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN ✈ Last
- + -

Parameter Description

`<cmdType>`(num)

32	Proactive command ID, see `Remote-SAT Command Types`

`<commandDetails>`(num)

This byte is RFU.

`<infoText>`(str)

String to accompany tone

`<tone>`(str)

Tone generated by the UE

"01"..."08"	Standard supervisory tones:
“01“	Dial tone
“02“	Called subscriber busy
“03“	Congestion
“04“	Radio path acknowledge
“05“	Radio path not available / Call dropped
“06“	Error / Special information
“07“	Call waiting tone
“08“	Ringing tone
"16"..."18"	UE proprietary tones:
“16“	General beep
“17“	Positive acknowledgement tone
“18“	Negative acknowledgement or error tone

<durationUnit>(num)	
0	Minutes
1	Seconds
2	Tenth of Seconds

<duration>(num)	
1...255	Duration of tone, expressed in units

<iconQualifier>(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)	
0...255	
0	No Icon

9.16 AT^SSTGI SAT Get Information - Display Text (33)

This command shall be used after receiving the URC ^SSTN: 33. The TE gets a message to be displayed to the user. The message can have different display characteristics.

Syntax

Write Command

`AT^SSTGI=33`

Response(s)

`^SSTGI: <cmdType>, <commandDetails>, <text>, <immediateResponse>, <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN	✈	Last
-	+	-

Parameter Description

`<cmdType>`(num)	
33	Proactive command ID, see Section 9.3, `Remote-SAT Command Types` and Table 9.6.

`<commandDetails>`(num)	
0...255	Used as bit field
bit 1	0: Normal priority (see note). 1: High priority (see note).
bit 2-7	RFU
bit 8	0: Clear message after a delay. 1: Wait for user to clear message.

`<text>`(str)

String to be displayed

`<immediateResponse>`(num)

This parameter indicates whether the UE should sustain the display beyond sending the TERMINAL RESPONSE.

0	Send TERMINAL RESPONSE when text is cleared from screen.
1	Send TERMINAL RESPONSE immediately and continue to display the text until one of the following events occurs: • A subsequent proactive command is received, containing display data. • A short delay notified with `<commandDetails>` has expired. • User intervention.

	• A higher priority event occurs, e.g. a mobile terminated call. No further TERMINAL RESPONSE shall be sent when the UE removes the text from the display, regardless of the cause. If the <immediateResponse> parameter equals "1" the subsequent "^SSTN: 254" URC should not be used to clear the text from the screen - in this case the text should remain on the screen until one of the above events occurs.

<iconQualifier>(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text. 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)	
0...255	
0	No Icon

Notes

- The MMI shall reject normal priority text commands if the screen is currently used for more than its normal standby display, e.g. if the MMI is in sub-menu. If the command is rejected, the MMI sends the TERMINAL RESPONSE message to the SIM (UE currently unable to process command - screen busy).
- High priority text shall be displayed on the screen immediately, except if a priority conflict of the alerting events occurs, e.g. incoming call or a URC if the battery needs to be charged, see 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

9.17 AT^SSTGI SAT Get Information - Get Inkey (34)

This command shall be used after receiving the URC ^SSTN: 34.
The TE is asked to prompt the user for an input, which is a single character. Help can be requested by the user, if available.

Syntax

Write Command

```
AT^SSTGI=34
```

Response(s)

```
^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
-	+	-

Parameter Description

<cmdType>(num)	
34	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)	
0...255	Used as bit field
bit 1	0: Digits only (0 9, *, # and +)
	1: Alphabet set
bit 2	0: SMS default alphabet (GSM character set)
	1: UCS2 alphabet
bit 3	0: Character sets defined by bit 1 and bit 2 are enabled
	1: Character sets defined by bit 1 and bit 2 are disabled and the "Yes/No" response is requested
bit 4-7	RFU
bit 8	0: No help information available
	1: Help information available

<text>(str)
String as prompt for text.

<iconQualifier>(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<iconId>`(num)

0...255

0	No Icon

9.18 AT^SSTGI SAT Get Information - Get Input (35)

This command shall be used after receiving the URC ^SSTN: 35.
The TE is asked to prompt the user for an input, of a specified length and type, e.g. digits only. Help can be requested by the user, if available.

Syntax

Write Command

`AT^SSTGI=35`

Response(s)

`^SSTGI: <cmdType>, <commandDetails>, <text>, <responseMin>, <responseMax>[, <defaultText>], <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN ✈ Last
- + -

Parameter Description

`<cmdType>`(num)

35	Proactive command ID, see `Remote-SAT Command Types`

`<commandDetails>`(num)

0...255	Used as bit field
bit 1	0: Digits only (0 9, *, # and +)
	1: Alphabet set
bit 2	0: SMS default alphabet (GSM character set)
	1: UCS2 alphabet
bit 3	0: UE may echo user input on the display
	1: User input shall not be revealed in any way (see note)
bit 4	0: User input to be in unpacked format
	1: User input to be in SMS packed format
bit 5-7	RFU
bit 8	0: No help information available
	1: Help information available

`<text>`(str)

String as prompt for text

`<responseMin>`(num)

0...255	Minimum length of user input.

`<responseMax>`(num)

0...255	Maximum length of user input.

<defaultText>(str)

String supplied as default response text

<iconQualifier>(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)	
0...255	
0	No Icon

Note

- Hidden entry mode (see 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23]) is only available when using digit input. In hidden entry mode only characters ('0', '9', '*' and '#') are allowed.

9.19 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

9.20 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

9.21 AT^SSTGI SAT Get Information - Set up Idle Mode Text (40)

This command shall be used after receiving the URC ^SSTN: 40.
It provides text and optionally an icon to be displayed by the 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`.

9.22 AT^SSTGI SAT Get Information - Language Notification (53)

This command shall be used after receiving the URC ^SSTN: 53.
It provides text to inform the 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

<cmdType>(num)	
53	Proactive command ID, see Remote-SAT Command Types

<commandDetails>(num)	
0...255	Used as bit field
bit 1	0: non-specific language notification
	1: specific language notification
bit 2-8	RFU

<langText>(str)

Language code string provided as a pair of alpha-numeric characters, defined in ISO 639. Each alphanumeric character is coded on one byte using the SMS default 7-bit coded alphabet as defined in 3GPP TS 23.038[36].

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.

9.23 AT^SSTGI SAT Get Information - Open Channel (64)

The SIM Application is opening a data session for the Bearer Independent Protocol, and can provide the TE with some information about this.
Text and an icon identifier can be passed to the TE for display to the user.

Syntax

Write Command

`AT^SSTGI=64`

Response(s)

`^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN	✈	Last
-	+	-

Parameter Description

`<cmdType>`(num)

64	Proactive command ID, see Table 9.6, Command Type Table.

`<commandDetails>`(num)

This byte is RFU.

`<text>`(str)

String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is performing an Open Channel command.
If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

`<iconQualifier>`(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<iconId>`(num)

0...255	
0	No Icon

9.24 AT^SSTGI SAT Get Information - Close Channel (65)

The SIM Application is closing a data session for the Bearer Independent Protocol, and can provide the TE with some information about this.
Text and an icon identifier can be passed to the TE for display to the user.

Syntax

Write Command

`AT^SSTGI=65`

Response(s)

`^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN	✈	Last
-	+	-

Parameter Description

`<cmdType>`(num)

65	Proactive command ID, see Table 9.6, Command Type Table.

`<commandDetails>`(num)

This byte is RFU.

`<text>`(str)

String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is performing a Close Channel command.
If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

`<iconQualifier>`(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<iconId>`(num)

0...255	
0	No Icon

9.25 AT^SSTGI SAT Get Information - Receive Data (66)

The SIM Application receives data in an open session for the Bearer Independent Protocol, and can provide the TE with some information about this.
Text and an icon identifier can be passed to the TE for display to the user.

Syntax

Write Command

```
AT^SSTGI=66
```

Response(s)

```
^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
-	+	-

Parameter Description

<cmdType>(num)

66	Proactive command ID, see Table 9.6, Command Type Table.

<commandDetails>(num)

This byte is RFU.

<text>(str)

String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is performing an Open Channel command.
If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

<iconQualifier>(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>(num)

0...255	
0	No Icon

9.26 AT^SSTGI SAT Get Information - Send Data (67)

The SIM Application sends data in an open session for the Bearer Independent Protocol, and can provide the TE with some information about this.
Text and an icon identifier can be passed to the TE for display to the user.

Syntax

Write Command

`AT^SSTGI=67`

Response(s)

`^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>`
`OK`
`ERROR`
`+CME ERROR: <err>`

PIN	✈	Last
-	+	-

Parameter Description

`<cmdType>`(num)

67	Proactive command ID, see Table 9.6, Command Type Table.

`<commandDetails>`(num)

This byte is RFU.

`<text>`(str)

String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is performing an Open Channel command.
If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

`<iconQualifier>`(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text
	1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<iconId>`(num)

0...255	
0	No Icon

9.27 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)

PLPS9-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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

<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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

<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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

9.28 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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

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.

9.29 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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.30 AT^SSTR SAT Response - Set Up Call (16)

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=16, <status>, , [, <statAddInfo>]

Response(s)

^SSTR: 16, <TerminationQualifier>, <TerminationCauseText>
OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
20	USSD/SS Transact terminated by user
32	UE currently unable to process command
34	User did not accept the proactive command. Indicate that the user has denied the call request
35	User cleared down call before connection or network release
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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

Note

- After confirmation phase the TE may show a dialling animation on the screen until a mandatory response parameter is issued.
  ^SSTR: <cmdType>, <TerminationQualifier>, <TerminationCauseText>

9.31 AT^SSTR SAT Response - Send SS (17)

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=17, <status>

Response(s)

^SSTR: 17, <TerminationQualifier>, <TerminationCauseText>
OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)	
0...4	
0	Command performed successfully. Indicate that the user has accepted the SS request.
4	Command performed successfully, but requested icon could not be displayed.

9.32 AT^SSTR SAT Response - Send USSD (18)

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=18, <status>

Response(s)

^SSTR: 18, <TerminationQualifier>, <TerminationCauseText>
OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)	
0...4	
0	Command performed successfully. Indicate that the user has accepted the USSD request.
4	Command performed successfully, but requested icon could not be displayed.

9.33 AT^SSTR SAT Response - Send Short Message (19)

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=19, <status>

Response(s)

^SSTR: 19, <TerminationQualifier>, <TerminationCauseText>
OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)	
0...4	
0	Command performed successfully. Indicate that the user has accepted the SMS request.
4	Command performed successfully, but requested icon could not be displayed.

9.34 AT^SSTR SAT Response - Send DTMF (20)

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=20, <status>, , [, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the Send DTMF request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by 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

<statAddInfo>(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.35 AT^SSTR SAT Response - Launch Browser (21)

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=21, <status>, , [, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Launch Browser request.
4	Command performed successfully, but requested icon could not be displayed.
32	UE currently unable to process command
34	User did not accept the proactive command. Indicates that the user has denied the Launch Browser request
38	Launch Browser generic error with additional information "No specific cause can be given".
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy
138	Launch Browser generic error with additional information "Bearer unavailable".
238	Launch Browser generic error with additional information "Browser unavailable".
239	Launch Browser generic error with additional information "UE unable to read the provisioning data".

<statAddInfo>(num)

For the general result "Launch Browser generic error code", it is mandatory for the UE to provide additional information.

0...255

0	"No specific cause can be given"
1	"Bearer unavailable"
2	"Browser unavailable"
3	"UE unable to read the provisioning data"

9.36 AT^SSTR SAT Response - Play Tone (32)

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=32, <status>, , [, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Play Tone request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session was terminated by user.
32	UE or TE currently unable to process command.
48	Command beyond UE's (respectively TE's) capabilities.
132	TE currently unable to process command because screen is busy.

<statAddInfo>(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

Note

- This command starts playing the tone by the UE. It is possible for the TE to stop playing the tone via user break, i.e. issue any character whilst the command is running.

9.37 AT^SSTR SAT Response - Display Text (33)

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=33, <status>, , [, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Display Text request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
32	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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.38 AT^SSTR SAT Response - Get Inkey (34)

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=34, <status>, , <inputString>[, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Get Inkey 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

<inputString>(str)

User response entered as a string parameter

<statAddInfo>(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

Notes

- Coding of any input character is related to the selected alphabet:
  - Input of a character in case of GSM character set requests one byte, e.g. "Y".
  - Input of any characters in UCS2 alphabet requests a 4 byte set, e.g. "0059" is coding the same character "Y".
  - If, as a user response, a binary choice (Yes/No) is requested by the SIM application using bit 3 of the <commandDetails> parameter the valid content of the <inputString> is:
    a) GSM alphabet: "Y" or "y" (positive answer) and "N" or "n" (negative answer).
    b) UCS2 alphabet "0079" or "0059" (positive answer) and "006E" or "004E" (negative answer). For more detailed information refer to AT^SSTGI.
  - Coding of an empty string is done as a "\1b" string with every alphabet.

- The <Alphabet> parameter of AT^SSTA determines the alphabet used on the AT command interface, while the value reported by the <commandDetails> bit 2 of the AT^SSTGI=34 command determines the set of characters allowed. If these alphabet settings are different, the following applies:
  Example: If UCS2 alphabet is selected with AT^SSTA and the <commandDetails> bit 2 of the AT^SSTGI=34 command is reported as "SMS default alphabet (GSM character set)" any input has to be done in UCS2 alphabet. However, take care to enter only UCS2 characters for which equivalent characters are defined in the SMS (GSM) default alphabet. In this case, the ME will correctly translate the given UCS2 data into a TERMINAL RESPONSE coded in SMS (GSM) default alphabet. See also Section 1.7.2, UCS2 and GSM character coding and conversion.

9.39 AT^SSTR SAT Response - Get Input (35)

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=35, <status>, , <inputString>[, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Get Input 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

<inputString>(str)

User response entered as a string, length depends on the <responseMin> and <responseMax> values returned by the related AT^SSTGI=35 command.

<statAddInfo>(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

Notes

- Coding of any input character is related to the selected alphabet:
  - Input of a character in case of GSM character set requests one byte, e.g. "Y".
  - Input of any characters in UCS2 alphabet requests a 4 byte set, e.g. "0059" is coding the same character "Y".
  - Coding of an empty string is done as a "\1b" string with every alphabet.

- The <Alphabet> parameter of AT^SSTA determines the alphabet used on the AT command interface, while the value reported by the <commandDetails> bit 2 of the AT^SSTGI=35 command determines the set of characters allowed. If these alphabet settings are different, the following applies:
  Example: If UCS2 alphabet is selected with AT^SSTA and the <commandDetails> bit 2 of the AT^SSTGI=35 command is reported as "SMS default alphabet (GSM character set)" any input has to be done in UCS2 alphabet. However, take care to enter only UCS2 characters for which equivalent characters are defined in the SMS (GSM) default alphabet. In this case, the UE will correctly translate the given UCS2 data into a TERMINAL RESPONSE coded in SMS (GSM) default alphabet. See also Section 1.7.2, UCS2 and GSM character coding and conversion.

9.40 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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.41 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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

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).

9.42 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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.43 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 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.44 AT^SSTR SAT Response - Open Channel (64)

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=64, <status>, , [, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Open Channel request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by 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

<statAddInfo>(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.45 AT^SSTR SAT Response - Close Channel (65)

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=65, <status>, , [, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Close Channel request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by 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

<statAddInfo>(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.46 AT^SSTR SAT Response - Receive Data (66)

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=66, <status>, , [, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Receive Data request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by 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

<statAddInfo>(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.47 AT^SSTR SAT Response - Send Data (67)

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=67, <status>, , [, <statAddInfo>]

Response(s)

OK

PIN	✈	Last
-	+	-

Parameter Description

<status>(num)

0...255

0	Command performed successfully. Indicates that the user has accepted the Send Data request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by 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

<statAddInfo>(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].

0...255

9.48 AT^SSTR 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^SSTR=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

9.49 AT^SSTR SAT Event - User Activity (232)

Sent by the customer application to indicate that a key has been pressed.

Syntax

Write Command
AT^SSTR=232
Response(s)
OK

PIN	✈	Last
-	+	-

9.50 AT^SSTR SAT Event - Idle Screen Available (233)

Sent by the customer application to indicate that the screen has become idle.

Syntax

Write Command
AT^SSTR=233
Response(s)
OK

PIN	✈	Last
-	+	-

9.51 AT^SSTR SAT Event - Language Selection (235)

Sent by the customer application to indicate that the customer application has changed the language.
The last value given via this command is also provided to the SIM as response to the proactive command "Provide Local Information (Language Setting)".

Syntax

Write Command

`AT^SSTR=235, , , <inputString>`

Response(s)

`OK`

PIN	✈	Last
-	+	-

Parameter Description

`<inputString>`(str)

Two character language tag, e.g. "en" for English or "de" for German. Default value is "en".

9.52 AT^SSTR SAT Event - Browser Termination (236)

Sent by the customer application to indicate that the internet browser application has been terminated.

Syntax

Write Command

`AT^SSTR=236, , , <TermCause>`

Response(s)

`OK`

PIN	✈	Last
-	+	-

Parameter Description

`<TermCause>`(num)

Browser Termination Cause

0...255

0	User termination
1	Error termination

9.53 AT^SSTR SAT Event - Terminate Command (254)

This command allows the TE to finish an ongoing proactive command session. As a result, the UE will attempt to return to IDLE mode. This is done by sending repeatedly a Terminal Response ("ME currently unable to process command") to the SIM (see 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23]), if issued in states PAC or WAIT. No action is performed if the interface is already in IDLE state, however, the command returns "OK".
The reaction to the Terminal Response depends on the SIM application: The UE may either be kept in IDLE state or requested to perform another action.

Syntax

Write Command

`AT^SSTR=254`

Response(s)

`OK`

PIN	✈	Last
-	+	-

9.54 Examples for Using Remote-SAT

To give you an idea of how to start and use Remote-SAT, you may follow the steps described below:

```
// Start after switch on the module
at
OK

// Switch on verbose error messages
at+cmee=2
OK

// Enter the PIN code (if necessary due to SIM configuration)
at+cpin=1234
OK

// Query the Remote-SAT activation status
at^ssta?
^SSTA: 1,0,1,"FFFFFFFF7F1F00DFFF00001FE20000000360",300,1 for USIM (3G)
or
^SSTA: 1,0,1,"7FFFFFFF7F0F00DFFF00001FE200000003",300,1 for SIM (2G).
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+cmee=2
OK

// Enter the PIN code (if necessary due to SIM configuration)
at+cpin=1234
OK

// Receiving the first proactive command (if the mounted SIM carries a SIM Application)
^SSTN:37

// Requesting parameter details
at^sstgi=37

// These are the details:
^SSTGI: 37,0,3,"SAT Special Menu",0,1,1,0
^SSTGI: 37,1,"News",0,0
^SSTGI: 37,2,"EMail",0,0
^SSTGI: 37,3,"Banking",0,0

OK

// To query the status of the proactive command
at^sstr=37,0

OK
```

// SAT indicates that the proactive session has ended and enters its main menu (which should then be opened on the screen by an MMI): ^SSTN:254

// Selecting item number 1 of the menu sent before:
at^sstr=211,0,1

OK

// Receiving the next proactive command:
^SSTN:36

// Requesting more information...
at^sstgi=36

// ... and get it:
^SSTGI: 36,0,12,"Rubriken >",0,0,1,1,0
^SSTGI: 36,1,"News >",0,0
^SSTGI: 36,2,"Stock Infos>",0,0
^SSTGI: 36,3,"Aktien D >",0,0
^SSTGI: 36,4,"Aktien INT >",0,0
^SSTGI: 36,5,"Sports >",0,0
^SSTGI: 36,6,"1.BL-Clubs >",0,0
^SSTGI: 36,7,"Unterhaltung>",0,0
^SSTGI: 36,8,"Horoskop >",0,0
^SSTGI: 36,9,"Wetter D >",0,0
^SSTGI: 36,10,"Wetter INT >",0,0
^SSTGI: 36,11,"Wetter spez>",0,0
^SSTGI: 36,63,"Extras >",0,0

OK

// Remember to acknowledge:
at^sstr=36,0,63

OK

// And again: Receiving the next proactive command:
^SSTN:36
// ...

Examples

EXAMPLE 1

```
// Switch on verbose error messages
at+cmee=2
OK
```

EXAMPLE 2

```
// Enter the PIN code
at+cpin=1234
OK
```

EXAMPLE 3

```
// Start Remote-SAT
at^ssta=1,0
OK
```

EXAMPLE 4

```
// Proactive command "GET INKEY" is issued by the SIM
^SSTN: 34
```

EXAMPLE 5

```
// Get complete data
at^sstgi=34
^SSTGI: 34,0,"<COLOUR-ICON>",1,2
OK
```

EXAMPLE 6

```
// Use GET RESPONSE command (192) to analyze SIM file EF-IMG (hex. 4F20)
at+crsm=192,20256,0,0,15
+CRSM: 144,0,000000644F20040014F04401020114
OK
```

EXAMPLE 7

```
// Use READ RECORD command (178) to get its content
at+crsm=178,20256,2,4,20
+CRSM: 144,0,010808214F0200000016FFFFFFFFFFFFFFFFFFFF
OK
```

EXAMPLE 8

```
// Use READ BINARY command (176) to get content of image instance data file (e.g. hex 4F02)
at+crsm=176,20226,0,0,22
+CRSM: 144,0,080802030016AAAA800285428142814281528002AAAA
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 PLPS9-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 [40] 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 [37] TP-Command-Type in integer format

[0]...255

<da>(str)(+CSCS)

Destination Address

3GPP TS 23.040 [37] 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 [37] TP-User-Data in text mode responses; format:

- If <dcs> indicates that 3GPP TS 23.038 [36] default alphabet is used and <fo> indicates that 3GPP TS 23.040 [37] 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 [37] TP-User-Data-Header-Indication is set: UE converts each 8-bit octet into hexadecimal numbers con-taining two IRA characters (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65).

In case of CBS: 3GPP TS 23.041 [38] CBM Content of Message in text mode responses; format:

- If <dcs> indicates that 3GPP TS 23.038 [36] 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 hexa-decimal numbers containing two IRA characters.

<dt>(num)

Discharge Time

Parameter for Status Reports: 3GPP TS 23.040 [37] 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"

<ieia>(num)

IEIa (Information Element Identifier octet) of the concatenated SMS.

8	Concatenated short messages, 8-bit reference number
16	Concatenated short messages, 16-bit reference number

<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.

For concatenated SMS messages the maximum length will be reduced by the length of the user data header with respect to <ieia> (6 bytes for <ieia>=8 and 7 bytes for <ieia>=16). In the case of 8-bit data, the maximum length of the short message field is: 140 octets - (6 or 7) = 134 or 133. In the case of GSM 7 bit default alphabet data, the maximum length of the short message is (140 - (6 or 7))*8/7 = 153 or 152 characters. In the case of 16 bit UCS2 data, the maximum length of the short message is: (140 - (6 or 7))/2)= 67 or 66 characters.

<max>(num)

Maximum number of all segments to be concatenated into one SMS, beginning with 1.
<max>=0 means: ignore the value. This will result in a non-concatenated SMS.

0...255

<mem1>(str)(NV)

Memory to be used when listing, reading and deleting messages:

“SM“	SIM message storage
“ME“	UE message storage
“MT“	Same as "ME" storage
“SR“	Status report storage Received status reports are not stored by the module. Therefore, AT+CMGR, AT+CMGL, AT^SMGR, AT^SMGL commands will show only status reports previously stored to the "SR" memory.

<mem2>(str)(NV)

Memory to be used when writing and sending messages:

“SM“	SIM message storage
“ME“	UE message storage

“MT“	Same as "ME" storage
“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“	UE message storage
“MT“	Same as "ME" storage
“SR“	Status report storage

`<mid>`(num)

Message Identifier

3GPP TS 23.041 [38] CBM Message Identifier in integer format

`<mn>`(num)

Message Number

3GPP TS 23.040 [37] TP-Message-Number in integer format

`<mr>`(num)

Message Reference

3GPP TS 23.040 [37] TP-Message-Reference in integer format

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

Originating Address

3GPP TS 23.040 [37] TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by `<tooa>`

`<page>`(num)

Page Parameter

3GPP TS 23.041 [38] CBM Page Parameter bits 4-7 in integer format

`<pages>`(num)

Page Parameter

3GPP TS 23.041 [38] CBM Page Parameter bits 0-3 in integer format

`<pdu>`(num)

In the case of SMS: 3GPP TS 24.011 [40] SC address followed by 3GPP TS 23.040 [37] 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 [37] TP-Recipient-Address Ad-dress-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by `<tora>`

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

Recipient Address

3GPP TS 23.040 [37] 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>`

<ref>(num)

Reference number to identify all segments of the concatenated SMS (i.e. the number needs to be the same for each segment).

0...255	8 bit reference number <ieia>=8
0...65535	16 bit reference number <ieia>=16

<sca>(str)(+CSCS)(NV)

Service Center Address

3GPP TS 24.011 [40] 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 [37] TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<seq>(num)

Sequence number of the concatenated SMS beginning with 1. The number must be incremented by one for each segment of the concatenated short message.
<seq>=0 means: ignore the value. This will result in a non-concatenated SMS.

0...255

<sn>(num)

Serial Number

3GPP TS 23.041 [38] CBM Serial Number in integer format

<st>(num)

Status

3GPP TS 23.040 [37] 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 [40] TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)

0...255

<tooa>(num)

Type of Originating Address

3GPP TS 24.011 [40] TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<tora>(num)

Type of Recipient Address

3GPP TS 24.011 [40] TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<tosca>(num)

Type of Service Center Address

3GPP TS 24.011 [40] RP SC address Type-of-Address octet in integer format (default refer <toda>)

10.2 AT+CMGC Send an SMS command

Syntax

Test Command

AT+CMGC=?

Response(s)

OK

Write Command

If text mode (see AT+CMGF=1)

AT+CMGC=<fo>, <ct>[, <pid>[, <mn>[, <da>[, <toda>]]]]<CR> Text can be entered <CTRL-Z>/<ESC>

Response(s)

+CMGC: <mr>[, <scts>]
If sending fails
ERROR
+CMS ERROR: <err>

Write Command

If PDU mode (see AT+CMGF=0)

AT+CMGC=<length><CR> PDU can be entered <CTRL-Z>/<ESC>

Response(s)

+CMGC: <mr>[, <ackpdu>]
OK
ERROR
+CMS ERROR: <err>

PIN	Last
+	- -

Reference(s)

3GPP TS 27.005 [48]

Note

- After invoking the commands AT+CMGW, AT+CMGS or AT+CMGC it is necessary to wait for the prompt ">" before entering text or PDU.

10.3 AT+CMGD Delete short message

The AT+CMGD write command deletes a short message from the preferred message storage <mem1> location <index>.

Syntax

Test Command

AT+CMGD=?

Response(s)

+CMGD: (list of used <index>s)
OK

Write Command

AT+CMGD=<index>

Response(s)

OK
ERROR
+CMS ERROR: <err>

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.005 [48]

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.

10.4 AT+CMGF Select SMS message format

The AT+CMGF command specifies the input and output format of the short messages.

Syntax

Test Command

AT+CMGF=?

Response(s)

+CMGF: (list of supported<mode>s)
OK

Read Command

AT+CMGF?

Response(s)

+CMGF: <mode>
OK

Write Command

AT+CMGF=<mode>

Response(s)

OK

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.005 [48]

Parameter Description

<mode>(num)(&V)(&W)	
[0](&F)	PDU mode
1	Text mode

10.5 AT+CMGL List SMS messages from preferred store

The write command returns messages with status value <stat> from message storage <mem1> to the TE. If the status of the message is 'received unread', the status in the storage changes to 'received read'.
The execute command is the same as the write command with the given default for <stat>.

Syntax

Test Command

AT+CMGL=?

Response(s)

+CMGL: (list of supported <stat>s)
OK

Exec Command

AT+CMGL

Response(s)

+CMGL: (see write command for default of <stat>)
OK

Write Command

AT+CMGL=<stat>

Response(s)

Output if text mode (AT+CMGF=1) and command successful:
For SMS- SUBMITs and/or SMS-DELIVERs
+CMGL: <index>, <stat>, <oa>/<da>, , [<scts>][, <tooa>/<toda>, <length>]
<data>
[...]
OK

For SMS-Commands
+CMGL: <index>, <stat>, <fo>, <ct>
[...]
OK

Output if PDU mode AT+CMGF=0 and command successful:
For SMS-SUBMITs and/or SMS-DELIVERs
+CMGL: <index>, <stat>, , <length>
<pdu>
[...]
OK

If error is related to ME functionality
ERROR
+CMS ERROR: <err>

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.005 [48]

Notes

- The selected <mem1> can contain different types of SMs (e.g. SMS-DELIVERs, SMS-SUBMITs and SMS-COMMANDs), the response may be a mix of the responses of different SM types. TE application can recognize the response format by examining the third response parameter.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.
- Status reports are not stored by the module and therefore are not displayed by AT+CMGR and AT+CMGL commands.

10.6 AT+CMGR Read SMS messages

The write command returns SMS message with location value <index> from message storage <mem1> to the TE. If status of the message is 'received unread', status in the storage changes to 'received read'.

Syntax

Test Command

AT+CMGR=?

Response(s)

OK

Write Command

AT+CMGR=<index>

Response(s)

Output if text mode (AT+CMGF=1) and command successful:
For SMS-DELIVER

+CMGR: <stat>, <oa>, , <scts>[, <tooa>, <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-Commands

+CMGR: <stat>, <fo>, <ct>[, <pid>[<mn>], [<da>], [<toda>], <length>
<data>]
[...]
OK

Output if PDU mode (AT+CMGF=0) and command successful:
For SMS-SUBMITs and/or SMS-DELIVERs

+CMGR: <stat>, , <length>
<pdu>
[...]
OK
ERROR
+CMS ERROR: <err>

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.005 [48]

Notes

- If AT+CMGR is used to read an empty record the response is: OK.
- If AT+CMGR is used to read a non-existent record index the response is: "+CMS ERROR: 321" (invalid memory index).
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.
- Status reports are not stored by the module and therefore are not displayed by AT+CMGR and AT+CMGL commands.

10.7 AT+CMGS Send Short Message

The write command transmits a short message from TE to network (SMS-SUBMIT).
After invoking the write command wait for the prompt ">" and then start to write the message. To send the message simply enter <CTRL-Z>.
To abort sending use <ESC>. Abortion is acknowledged with "OK", though the message will not be sent.
The message reference <mr> is returned to the TE on successful message delivery. The value can be used to identify the message in a delivery status report provided as an unsolicited result code.

Syntax

Test Command

AT+CMGS=?

Response(s)

OK

Write Command

If text mode (see AT+CMGF=1)

AT+CMGS=<da>[, <toda>]<CR> Text can be entered. <CTRL-Z>/<ESC>

Response(s)

+CMGS: <mr>[, <scts>]
OK
ERROR
+CMS ERROR: <err>

Write Command

If PDU mode (see AT+CMGF=0)

AT+CMGS=<length><CR> PDU can be entered. <CTRL-Z>/<ESC>

Response(s)

+CMGS: <mr>[, <ackpdu>]
OK
ERROR
+CMS ERROR: <err>

PIN	✈	Last
+	-	-

Reference(s)

3GPP TS 27.005 [48]

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 [37].
- 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+CMGW Write Short Messages to Memory

The execute and write commands transmit a short message (either SMS-DELIVER or SMS-SUBMIT) from TE to memory storage <mem2>. Memory location <index> of the stored message is returned. Message status will be set to 'stored unsent' unless otherwise given in parameter <stat>.
After invoking the execute or write command wait for the prompt ">" and then start to write the message. To save the message simply enter <CTRL-Z>.
To abort writing use <ESC>. Abortion is acknowledged with "OK", though the message will not be saved.

Syntax

Test Command

AT+CMGW=?

Response(s)

OK

Exec Command

If text mode (see AT+CMGF=1):

AT+CMGW

Response(s)

<CR> Text can be entered. <CTRL-Z>/<ESC>
+CMGW: <index>
OK
ERROR
+CMS ERROR: <err>

Write Command

If text mode (see AT+CMGF=1):

AT+CMGW=<oa>/<da>[, [<tooa>/<toda>][, <stat>]]<CR> Text can be entered. <CTRL-Z>/<ESC>

Response(s)

+CMGW: <index>
OK
ERROR
+CMS ERROR: <err>

Write Command

If PDU mode (see AT+CMGF=0):

AT+CMGW=<length>[, <stat>]<CR> PDU can be entered. <CTRL-Z>/<ESC>

Response(s)

+CMGW: <index>
OK
If writing fails see notes below.

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.005 [48]

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 [37].
- 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.

10.9 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
+CMS ERROR: <err>

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.005 [48]

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 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 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).

10.10 AT+CMSS Send short messages from storage

The write command sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND).
If new recipient address <da> is given for SMS-SUBMIT, it shall be used instead of the one stored with the message. Reference value <mr> is returned to the TE on successful message delivery. Value can be used to identify message upon unsolicited delivery status report result code.
If the optional parameter <da> is given, the old status of the short message at <index> remains unchanged (see <stat>).

Syntax

Test Command

AT+CMSS=?

Response(s)

OK

Write Command

If text mode (AT+CMGF=1):

AT+CMSS=<index>[, <da>[, <toda>]]

Response(s)

+CMSS: <mr>[, <scts>]
OK
If sending fails
ERROR
+CMS ERROR: <err>

Write Command

If PDU mode (AT+CMGF=0):

AT+CMSS=<index>[, <da>[, <toda>]]

Response(s)

+CMSS: <mr>[, <ackpdu>]
OK
ERROR
+CMS ERROR: <err>

PIN	✈	Last
+	-	-

Reference(s)

3GPP TS 27.005 [48]

10.11 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 PLPS9-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.

Please see AT^SCFG subcommand "Sms/AutoAck", parameter <SmsAcknl>, for options of automatically acknowledging incoming short messages rather than using AT+CNMA.

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 [48]

Parameter Description

<n>(num)

Parameter required only for PDU mode.

0	Command operates similarly as in text mode.
1	Send positive (RP-ACK) acknowledgement to the network. Accepted only in PDU mode.
2	Send negative (RP-ERROR) acknowledgement to the network. Accepted only in PDU mode.

Note

- 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.

10.12 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 [48]

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>=1,2 or 3 - directly routed message (PDU mode enabled):

+CMT: <length><CR><LF><pdu>

Indicates that new message has been received

URC 3

<mt>=1,2 or 3 - directly routed message (text mode enabled):

+CMT: <oa>, , <scts>[, <tooa>, <fo>, <pid>, <dcs>, <sca>, <tosca>, <length>]<CR><LF><data>

Indicates that new message has been received

URC 4

<bm>=2 (PDU mode enabled):

+CBM: <length><CR><LF><pdu>

Indicates that new cell broadcast message has been received

URC 5

<bm>=2 (text mode enabled):

+CBM: <sn>, <mid>, <dcs>, <page>, <pages><CR><LF><data>

Indicates that new cell broadcast message has been received

URC 6

<ds>=1 (PDU mode enabled):

+CDS: <length><CR><LF><pdu>

Indicates that new SMS status report has been received

URC 7

<ds>=1 (text mode enabled):

+CDS: <fo>, <mr>[, <ra>][, <tora>], <scts>, <dt>, <st>

Indicates that new SMS status report has been received

Parameter Description

<mode>(num)(&V)(&W)	
0(&F)(D)	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	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. Additionally, while UE-TE link is reserved, buffered URCs can be signaled to the TE by activating the RING line, according to parameters AT^SCFG "URC/Ringline" <urcRinglineCfg> and AT^SCFG "URC/Ringline/ActiveTime" <urcRinglineDuration>.

<mt>(num)(&V)(&W)	
Rules for storing received short messages depend on the relevant data coding method (refer to 3GPP TS 23.038 [36]), 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 <mt>=1
3	Class 0 and 3 SMS-DELIVERs are routed directly to the TE via URCs defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1.

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

Rules for storing received CBMs depend on the relevant data coding method (refer to 3GPP TS 23.038 [36]), the setting of Select CBM Types (AT+CSCB) and this value:

0(&F)(D)	No CBM indications are routed to the TE.
2	New CBMs are routed directly to the TE via URC.

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

0(&F)(D)	No SMS-STATUS-REPORTs are routed to the TE. Also see notes.
1	SMS-STATUS-REPORTs are routed to the TE via URC.

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

1(&F)(D)	UE's buffer of SMS related URCs is cleared when <mode> 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.
- Received status reports are not stored by the module. Therefore, AT+CMGR, AT+CMGL, AT^SMGR, AT^SMGL commands will show only status reports previously stored to the "SR" memory.

10.13 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 [48]

Parameter Description

<used1>(num)

Number of messages currently in <mem1>

<used2>(num)

Number of messages currently in <mem2>

<used3>(num)

Number of messages currently in <mem3>

<total1>(num)

Number of messages storable in <mem1>

<total2>(num)

Number of messages storable in <mem2>

<total3>(num)

Number of messages storable in <mem3>

Notes

- The Mobile Equipment storage "ME" offers space for 255 short messages, see <mem1>.
- 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 <dcs> and the following specification: 3GPP TS 23.038 [36].
- While <mem3> equals "SM" and <mem1> equals "ME" it is possible that, after deleting short messages from "ME", the freed space on "ME" is reclaimed for new incoming short messages, when there is no space left on the "SM" storage. As it is often the clients concern to have received short messages stored only to the SIM card, inconsistent settings should be generally avoided. This can be achieved simply by using the same memory for all parameters.
- 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.

10.14 AT+CPNER Notification event reporting

AT+CPNER handles reporting of primary and secondary notification events when received from the network. Primary and secondary notification events are used for public warning systems like ETWS (Earthquake and Tsunami Warning Systems). The primary notification is intended to deliver the information as quickly as possible with minimal amount of data. The secondary notification may convey additional <GeoScope> data.
Duplicate primary notifications will be discarded by the UE regardless of the <reporting> setting.
Read command returns the current settings.
Test command returns supported values as a compound value.

Syntax

Test Command

```
AT+CPNER=?
```

Response(s)

```
+CPNER: (list of supported<reporting>s)
```

Read Command

```
AT+CPNER?
```

Response(s)

```
+CPNER: <reporting>
OK
```

Write Command

```
AT+CPNER=[<reporting>]
```

Response(s)

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

PIN	✈	Last
-	+	-

Reference(s)

3GPP TS 27.007 [49]

Unsolicited Result Codes

URC 1

```
+CPNERU: <MessageID>, <SerialNumberPrimary>, <WarningType>
```

URC 2

```
^SSNERU: <ServiceID>, <SerialNumberSecondary>, <GeoScope>
```

Parameter Description

<reporting>(num)

Controlling reporting of primary notification events

[0](P)	Disable primary and secondary notification events.
1	Enable reporting of primary notification events without security information via URC "+CPNERU" and secondary notification events via URC "^SSNERU".

<MessageID>(str)

The parameter contains the message identifier (2 bytes) of the primary notification in hexadecimal characters (4 digits with leading zeros if required).

<SerialNumberPrimary>(str)

The parameter contains the serial number (2 bytes) of the primary notification in hexadecimal characters (4 digits with leading zeros if required).

<WarningType>(str)

The parameter contains the warning type (2 bytes) of the primary notification in hexadecimal characters (4 digits with leading zeros if required).

<ServiceID>(str)

The parameter contains the service identifier (2 bytes) in hexadecimal characters (4 digits with leading zeros if required).

<SerialNumberSecondary>(str)

The parameter contains the serial number (2 bytes) in hexadecimal characters (4 digits with leading zeros if required).

<GeoScope>(str)

The parameter contains the geographic scope type (2 bytes) in hexadecimal characters (4 digits with leading zeros if required).

“0000“	Immediate Cell.
“0001“	Public Land Mobile Network.
“0002“	Location area defined by Location Area Code.
“0003“	Normal Cell.

Note

- The notification is considered a duplicate of the previous if it has equal <MessageID> and <SerialNumberPrimary> and arrives from the same PLMN. A primary notification message stored to detect duplication is cleared automatically after three hours of not receiving any message.

10.15 AT+CSCA SMS Service Center Address

Write command updates the SMSC address, through which mobile originated SMs are transmitted. In text mode, setting is used by send and write commands. In PDU mode, setting is used by the same commands, but only when the length of the SMSC address coded into the <pdu> parameter equals zero.

Syntax

Test Command

```
AT+CSCA=?
```

Response(s)

```
OK
```

Read Command

```
AT+CSCA?
```

Response(s)

```
+CSCA: <sca>, <tosca>
OK
```

Write Command

```
AT+CSCA=<sca>[, <tosca>]
```

Response(s)

```
OK
```

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.005 [48]

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.

10.16 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 [48]

Parameter Description

<operation>(num)

Add/delete operation

0(&F)(P)	Add new message types defined in <mids> to the list of accepted message types by ME and replace types defined in <dcss>. In case of using this operation code without parameters default (0-65535) range will be added to the list of <mids>.
1	Delete message types defined in <mids> from the list of accepted message types by ME and replace types defined in <dcss>. In case of using this operation code without parameters all <mids>s will be deleted. (for more see notes)

<mids>(str)(NV)

Cell Broadcast Message ID specification

All different possible combinations of CBM message identifiers; e.g. "0,1,5,320-478,922". Maximum length of the input string in the AT+CSCB write command is 50 characters (including ',' as separator and '-' in ranges).

""(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.

""(&F)(P)

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 the value last used in the write command. This way, the read command response always reflects the last action done: 0 means that the last action was adding new channel(s), 1 means that the last action was deleting channel(s).

10.17 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
+CME ERROR: <err>
```

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.005 [48]

Parameter Description

<show>(num)(&V)(&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

10.18 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 [48]

Parameter Description

<fo>(num)

First Octet

Depending on the command or result code: First octet of 3GPP TS 23.040 [37] 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 [37] TP-Validity-Period either in integer format or in time-string format (refer <dt>).

0...167(&F)(P)...255

<pid>(num)(NV)

Protocol Identifier

3GPP TS 23.040 [37] TP-Protocol-Identifier in integer format.

0(&F)...255

<dcs>(num)(NV)

Data Coding Scheme

3GPP TS 23.038 [36] 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

- When storing a SMS DELIVER from the TE to the preferred memory storage in text mode (using the AT+CMGW write command), <vp> field can be used for <scts>.

10.19 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 [48]

Parameter Description

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

0(&F)	3GPP TS 23.040 [37] and 3GPP TS 23.041 [38] (the syntax of SMS AT commands is compatible with 3GPP TS 27.005 [48] 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 [37] and 3GPP TS 23.041 [38] (the syntax of SMS AT commands is compatible with 3GPP TS 27.005 [48] Phase 2+ version; the requirement of <service> setting 1 is mentioned under corresponding command descriptions).

<mt>(num)(&V)

Mobile Terminated Messages:

0	Type not supported
1	Type supported

<mo>(num)(&V)

Mobile Originated Messages:

0	Type not supported
1	Type supported

<bm>(num)(&V)

Broadcast Type Messages:

0	Type not supported
1	Type supported

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.

10.20 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 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.

10.21 AT^SMGR Read short message without setting status to REC READ

The AT^SMGR command is a proprietary command which has the same syntax as AT+CMGR. The only functional difference is that the status "REC UNREAD" of a short message is not overwritten to "REC READ".

Syntax

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

Write Command
AT^SMGR=<index>
Response(s)
see AT+CMGR

PIN	✈	Last
+	+	-

Note

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned.

10.22 AT^SSDA Set SMS Display Availability

AT^SSDA determines whether to display an incoming Class 0 short message directly to the user or to store it automatically in the SMS memory. This means, for Class 0 short messages, AT^SSDA overrides the AT+CNMI <mt> settings.
For all other short message classes AT^SSDA is not effective, i.e. they will be indicated as specified with AT+CNMI.

In case of Class 0 SMS, the <da> setting modifies the AT+CNMI functionality for <mt> as follows:

- If AT^SSDA=0:
  The UE handles Class 0 short messages as though there was no message class: SMS-DELIVER is stored in the UE and indication of the memory location is routed to the TE via URC. This approach is compliant with 3GPP TS 23.038 [36].
- If AT^SSDA=1:
  Class 0 SMS-DELIVERs are routed directly to the TE via URC.

Syntax

Test Command

```
AT^SSDA=?
```

Response(s)

```
^SSDA:(list of supported <da>s)
OK
```

Read Command

```
AT^SSDA?
```

Response(s)

```
^SSDA:<da>
OK
```

Write Command

```
AT^SSDA=<da>
```

Response(s)

```
OK
```

PIN	✈	Last
-	+	-

Parameter Description

<da>(num)(NV)

Display Availability

0	Application is not able to display incoming short message
1(&F)(D)	Application is able to display incoming short message

Note

- If the ME operates on different instances () avoid different settings for routing and indicating short messages. For example, if messages shall be routed directly to one instance of the TE (set with AT+CNMI, AT^SSDA), it is not possible to activate the presentation of URCs with AT+CNMI on another instance. Any attempt to activate settings that conflict with existing settings on another interface, will result in "+CME ERROR", or accordingly "+CMS ERROR".

10.23 AT^SCML List Concatenated Short 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>. See notes of AT+CMGL.

Syntax

Test Command

AT^SCML=?

Response(s)

^SCML: (list of supported <stat>s)
OK

Exec Command

AT^SCML

Response(s)

^SCML: (see write command for default of <stat>)
OK

Write Command

AT^SCML=<stat>

Response(s)

Output if text mode (AT+CMGF=1) and command successful:
For SMS-SUBMITs and/or SMS-DELIVERs
^SCML: <index>, <stat>, <oa>/<da>, , [<scts>][, <tooa>/<toda>, <length>][, <seq>, <max>, <ieia>, <ref>]
<data>
[...]
OK

For SMS-STATUS-REPORTs
^SCML: <index>, <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st>
[...]
OK

For SMS-Commands
^SCML: <index>, <stat>, <fo>, <ct>
[...]
OK

Output if PDU mode (AT+CMGF=0) and command successful:
For SMS- SUBMITs and/or SMS-DELIVERs
^SCML: <index>, <stat>, , <length>
<pdu>
[...]
OK

If error is related to ME functionality
ERROR
+CMS ERROR: <err>

PIN	✈	Last
+	+	-

10.24 AT^SCMR Read Concatenated Short Messages

The write command returns the message with location value <index> 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'. See notes of AT+CMGR.

Syntax

Test Command

AT^SCMR=?

Response(s)

OK

Write Command

AT^SCMR=<index>

Response(s)

Output if text mode (AT+CMGF=1) and command successful:
For SMS-DELIVER

^SCMR: <stat>, <oa>, , <scts>[, <tooa>, <fo>, <pid>, <dcs>, <sca>, <tosca>, <length>][, <seq>, <max>, <ieia>, <ref>]
<data>
[...]
OK

For SMS-SUBMIT

^SCMR: <stat>, <da>, [, <toda>, <fo>, <pid>, <dcs>, [<vp>], <sca>, <tosca>, <length>][, <seq>, <max>, <ieia>, <ref>]
<data>
[...]
OK

For SMS-STATUS-REPORT

^SCMR: <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st>
<data>
[...]
OK

For SMS-Commands

^SCMR: <stat>, <fo>, <ct>[, <pid>, [<mn>], [<da>], [<toda>], <length>]
<data>
[...]
OK

Output if PDU mode (AT+CMGF=0) and command successful:
For SMS-SUBMITs and/or SMS-DELIVERs

^SCMR: <stat>, , <length>
<pdu>
[...]
OK

ERROR
+CMS ERROR: <err>

PIN ✈ Last
+ + -

10.25 AT^SCMS Send Concatenated Short Messages

Sending a concatenated message is similar to sending a "normal" message, except that each segment of the concatenated message must be identified by the additional parameters <seq>, <ieia> and <ref>. To send all segments of the message one by one, the AT^SCMS write command must be executed for each segment.
The write command transmits one segment of a concatenated 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>. After the prompt a timer will be started to observe the input.
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^SCMS=?

Response(s)

OK

Write Command

Command syntax for text mode (see AT+CMGF=1):

AT^SCMS=<da>, [<toda>], <seq>, <max>, <ieia>, <ref><CR> Text can be entered <CTRL-Z>/<ESC>

Response(s)

^SCMS: <mr>[, <scts>]
OK
If sending fails
ERROR
+CMS ERROR: <err>

PIN	✈	Last
+	-	-

Notes

- See notes provided for AT+CMGS.
- Command is only available if AT+CMGF=1.

10.26 AT^SCMW Write Concatenated Short Messages to Memory

Writing a concatenated message to the memory is similar to writing a "normal" message, except that each segment of the concatenated message must be identified by the additional parameters <seq>, <ieia> and <ref>. To store all segments of the message one by one, the AT^SCMW write command must be executed for each segment.
The write commands transmits one segment of a concatenated SMS (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>.

Syntax

Test Command

AT^SCMW=?

Response(s)

OK

Write Command

If text mode (see AT+CMGF=1)

AT^SCMW=<oa>/<da>, [<tooa>/<toda>][, <stat>], <seq>, <max>, <ieia>, <ref><CR> Text can be entered. <CTRL-Z>/<ESC>

Response(s)

^SCMW: <index>
OK
If writing fails
ERROR
+CMS ERROR: <err>

PIN	✈	Last
+	+	-

Notes

- Command is only available if AT+CMGF=1.
- To send or delete a concatenated short message please use the known SMS commands, see AT+CMSS for sending and AT+CMGD for deleting.
- See notes provided for AT+CMGW.

11. Supplementary Service Commands

The AT commands described in this chapter are related to Supplementary Services.

11.1 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 [49],
3GPP TS 22.004 [26],
3GPP TS 22.082 [31],
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
[0]	May rejected by network

<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 [26].

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 PLPS9-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 compatibilty 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
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 condtions permanently enabled (e.g. forwarding to a mailbox if the mobile is not reachable). In this case, erasure or deactivation of call forwarding for these conditions will not be successful, even if the CCFC request is answered with response "OK".
- The command has been implemented with the full set of <class> parameters according to 3GPP TS 27.007 [49]. 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 [26].
- There is currently no release of 3GPP TS 22.004 [26], 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 reponse 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
```

11.2 AT+CCWA Call Waiting

The AT+CCWA write command controls the call waiting supplementary service according to 3GPP TS 22.083 [32]. 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 [49],
3GPP TS 22.004 [26],
3GPP TS 22.083 [32],
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 [32] 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 PLPS9-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 compatibilty 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 [41], 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 [49]. 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 [26] .
- Despite the specifications stated in 3GPP TS 22.004 [26] call waiting is not handled uniformly among all networks:
  3GPP TS 22.004 [26], 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.

11.3 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 PLPS9-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 [49]

Parameter Description

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

3	Add a held call to the active calls in order to set up a conference (multiparty) call.
4	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.

11.4 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 [49]

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.

11.5 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 [49]

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).

11.6 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 [35]. 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 [49],
3GPP TS 22.090 [35],
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 or handled by Remote-USAT (in ER mode) 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+CUSD 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 [36] 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 [48], 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 [36] Cell Broadcast Data Coding Scheme (default 15).
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 <ussdStatus>=1 the user input needs to be sent via an additional AT+CUSD action <ESC>.
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.

11.7 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 [30] (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 [49],
3GPP TS 22.081 [30]

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

<clipUrcMode>(num)(&V)(&W)	
[0](&F)	Suppress unsolicited result codes
1	Display unsolicited result codes

<clipStatus>(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 [41], 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 [41], 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 [30] 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.

11.8 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 [49]

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 <number>
145	Number string <number> includes international access code character '+'.
129	Otherwise

<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. Packet Domain Related Commands

The AT commands described in this chapter allow the Customer Application to control packet switched services in GSM/UMTS/LTE networks.

12.1 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.

The default settings of AT+CGDCONT as well as AT^SGAPN depend on the loaded network provider profile. For details see AT^SCFG "MEopMode/Prov/Cfg" parameter <provCfg> and AT^SCFG "MEopMode/Prov/AutoSelect" parameter <provAutoSelect>.

PDP contexts can be associated with APN Classes configurable with AT^SGAPN. Please note that changing the PDP context definitions with AT^SGAPN will also affect the settings of AT+CGDCONT.

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), "PPP", , , (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 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.

1...16

<PDP_type>(str)(NV)

Packet Data Protocol type

Specifies the type of the packet data protocol.
Changing the PDP type with AT+CGDCONT will also change the AT^SGAPN value.

“IP“	Internet Protocol (IETF STD 5)
“PPP“	Point to Point Protocol (IETF STD 51)
“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). 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: 100 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.
Changing the APN with AT+CGDCONT will also change the AT^SGAPN value.

<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. The read command will continue to return the null string even if an address has been allocated during the PDP startup procedure. A string consisting of the values 0.0.0.0 for IPV4 or 0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0 for IPV6 has the same meaning as a null string. The allocated address may be read using AT+CGPADDR.

`<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
2	V.42bis

`<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
2	RFC1144
3	RFC2507
4	RFC3095

`<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

`<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 +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

12.1.1 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 service in 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.

For details on provider configurations see ATI61 and the AT^SCFG subcommands "MEopMode/Prov/Cfg" and "MEopMode/Prov/AutoSelect". To check the currently defined PDP contexts use the AT+CGDCONT read command.

If provider profile autoselection is on, provider profile settings are non-volatile as long as the same SIM or a SIM of the same provider is inserted. Otherwise, if a different provider configuration is selected, or a SIM of a different provider is inserted the existing profile will be cleared before the new profile can be loaded. This applies to all PDP contexts defined with AT+CGDCONT, no matter whether loaded as part of a preconfigured provider profile, or set by the TE.
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.
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. For China Mobile the 5th 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). To get notifications on the T3402 timer you can take advantage of the AT^SIND "ltebot" indicator.

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).

12.2 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 [49]

Parameter Description

<cid>(num)(NV)

PDP Context Identifier

Parameter specifies a particular PDP context definition and is used in other PDP context-related commands.

1...16

<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...16

<d_comp>(num)(NV)

Data Compression

Controls the PDP data compression (applicable for Subnetwork Dependent Convergence Protocol (SNDCP) only) 3GPP TS 44.065

[0]	off
1	on
2	V.42bis

<h_comp>(num)(NV)

Header Compression

Controls the PDP header compression 3GPP TS 44.065, 3GPP TS 25.323

[0]	off
1	on
2	RFC1144
3	RFC2507
4	RFC3095

12.3 AT+CGTFT Traffic Flow Template

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 [49]

Command Description

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line. 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 +CGDCONT and +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, +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.

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...16

`<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...FFFFF

<pdptype>(str)

PDP type

Parameter specifies the PDP type.

“IP“	Internet Protocol (IETF STD 5)
“PPP“	Point to Point Protocol (IETF STD 51)
“IPV6“	Internet Protocol, version 6 (see RFC 2460)
“IPV4V6“	Virtual <pdptype> introduced to handle dual IP stack UE capability. (See 3GPP TS 24.301)

Note

- 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.

12.4 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 [49]

Parameter Description

<state>(num)

Indicates the state of PS attachment.

0(P)	Detached
[1]	Attached

12.5 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. If no <cid>s are specified the activation/deactivation form of the command activates/deactivates all defined 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 [49]

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 12.1.1, 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, e.g. AT+CGDATA or ATD*99#.
- If activation or deactivation of a context fails, then AT+CEER may provide further informations about the reason.
- If no <cid>s are specified (AT+CGACT=<state> is sent), the module may respond with a +CME ERROR, although all defined contexts are activated/deactivated. The maximum number of active contexts may depend on network and network provider.
- Please see AT&D for information on disconnecting data call.

12.6 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. This may include performing a PS attach and one or more PDP context activations. Commands following the AT+CGDATA command in the AT command line will not be processed by the MT.
If the write command is successful, the MT issues the intermediate result code CONNECT and enters V.250 online data state.
The application that initiates the PPP mode must be designed to start all LCP configure requests in accordance with TS 27.060 par 9.1. Otherwise the MT remains, after the CONNECT, infinitely in a waiting state.
After data transfer is complete, and 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.

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.
If parameter is not specified, then the first defined primary context is used.

12.6.1 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.

12.7 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".
The settings of AT+CGPIAF can influence the format of this parameter.

12.8 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+CGTFTRDP, 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.
"32.1.13.184.0.0.205.48.0.0.0.0.0.0.0.0.255.255.255.255.255.255.255.240.0.0.0.0.0.0.0.0"
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::".

12.9 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 [49]

Unsolicited Result Codes

URC 1

```
+CGEV: REJECT <PDP_type>, <PDP_addr>
```

A network request for PDP context activation occurred when the MT was unable to report it to the TE with a +CRING unsolicited result code and was automatically rejected.

URC 2

```
+CGEV: NW REACT <PDP_type>, <PDP_addr>[, <cid>]
```

The network has requested a context reactivation. The <cid> that was used to reactivate the context is provided if known to the MT.

URC 3

```
+CGEV: NW 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: 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.

URC 8

+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 / UTRAN. The associated <cid> for this context is provided to the TE. The format of the parameter <cid> is found in command AT+CGDCONT.

URC 9

+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 / UTRAN. The <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 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 11

+CGEV: ME PDN ACT <cid>[, <reason>]

The UE has activated a context. The context represents a Primary PDP context in GSM/UMTS/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).

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.

“A“	Class A (highest)
“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

12.10 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 or UMTS changes, or URC "+CGREG: <stat>[, <lac>][, <ci>][, <AcT>]" when <n>=2 and the current network cell in GSM or UMTS 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
- 28 bit for 3G

<AcT>(num)

Radio access technology

0	GSM
2	UTRAN
3	GSM w/EGPRS
4	UTRAN w/HSDPA
5	UTRAN w/HSUPA
6	UTRAN w/HSDPA and w/HSUPA
7	E-UTRAN

12.11 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 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 [49]

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.

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>]]"

<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.

<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)
2	UTRAN (not applicable)
3	GSM w/EGPRS (not applicable)
4	UTRAN w/HSDPA (not applicable)
5	UTRAN w/HSUPA (not applicable)
6	UTRAN w/HSDPA and w/HSUPA (not applicable)
7	E-UTRAN

12.12 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 [49]

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 in UMTS/GPRS.

<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.

12.13 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)

```
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 [49]

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.

12.14 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 <cid>s associated with active contexts)
OK
```

Exec Command

```
AT+CGTFTRDP
```

Response(s)

```
[+CGTFTRDP: <cid>, <filterid>, <precedence>, <rem_addr_subnet_mask>, <protocolno>,
<local-portrange>, <remote-portrange>, <ipsecidx>, <tos>, <flowlabel>, <direction>,
<NW-filterID>]
[+CGTFTRDP: ...]
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT+CGTFTRDP=<cid>
```

Response(s)

```
[+CGTFTRDP: <cid>, <filterid>, <precedence>, <rem_addr_subnet_mask>, <protocolno>,
<local-portrange>, <remote-portrange>, <ipsecidx>, <tos>, <flowlabel>, <direction>,
<NW-filterID>]
[+CGTFTRDP: ...]
OK
ERROR
+CME ERROR: <err>
```

PIN	Last
+	-

Reference(s)

3GPP TS 27.007 [49]

Parameter Description

<cid>(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...16

<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...FFFFF

<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 [29].
- 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.

12.15 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 UTMS/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 [49]

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...16

<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 [43]).

<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 [43]).

<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 [43]).

<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 [43]).

12.16 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 [49]

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+CGDSCONT).

<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.

12.17 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(D)	Circuit switched
2	Packet Domain preferred (use circuit switched SMS transfer if mobile is not PS attached)
3	Circuit switched preferred (use Packet Domain if circuit switched is not available)

12.18 AT+CNMPSD No more PS data

The AT+CNMPSD command indicates that no application on the MT is expected to exchange data. Upon receiving this command, the final result code OK is returned. When in UTRAN, if further conditions defined in 3GPP TS 25.331 [47] are met, this can cause transmission of a SIGNALLING CONNECTION RELEASE INDICATION message with the cause "UE Requested PS Data session end".

Syntax

Test Command

```
AT+CNMPSD=?
```

Response(s)

```
OK
```

Exec Command

```
AT+CNMPSD
```

Response(s)

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

PIN	✈	Last
+	-	+

Reference(s)

3GPP 27.007

12.19 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. PS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the AT+CGATT and AT+CGACT commands.
To confirm acceptance of the command before entering the V.250 online data state command will respond with CONNECT.
The application that initiates the PPP mode must be designed to start all LCP configure requests in accordance with TS 27.060 par 9.1. Otherwise the MT remains, after the CONNECT, infinitely in a waiting state.
When the layer 2 protocol has terminated, either as a result of an orderly shut down of the PDP or an error, the MT enters V.250 command state and returns NO CARRIER (for details refer to Section 12.6.1, Automatic deactivation of PDP context during dial-up PPP).
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.

Syntax

Exec Command

```
ATD*99[* [<called_address>][* [<L2P>][* [<cid>]]]]#
```

Response(s)

```
CONNECT
NO CARRIER
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
+	-	+

Reference(s)

3GPP TS 27.007 [49]

Parameter Description

<called_address>(str)

IP V4 address in the form w.x.y.z, which identifies the called party; if it is provided, the MT will automatically set up a virtual call to the specified address after the context has been activated.

<L2P>(num)

Layer 2 protocol to be used between the TE and MT.

[1]	layer 2 protocol PPP

<cid>(num)

Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).
Secondary PDP contexts are not supported.
If parameter is not specified, then the first defined primary context is used.

12.20 AT^SGAPN Configure APN class settings

Command allows to query or set APN class parameters for PDP contexts.
The AT^SGAPN test command returns the supported ranges of the APN class parameters.
The read command returns the current values for the APN class parameters for all defined PDP contexts.
The write command can be used to set the APN class parameters for a PDP context already defined by AT+CGDCONT and identified by the context identifier <cid>. If a context is newly defined by using AT+CGDCONT, then its APN class is 0, the APN bearer is "ANY", it is enabled and its inactivity timer is disabled.
When parameter settings are changed for an active context, it is necessary to close and reestablish the connection to make the changes take effect.

The default settings of AT^SGAPN as well AT+CGDCONT depend on the loaded network provider profile. For details see AT^SCFG "MEopMode/Prov/Cfg" parameter <provCfg> and AT^SCFG "MEopMode/Prov/AutoSelect" parameter <provAutoSelect>.

Syntax

Test Command

AT^SGAPN=?

Response(s)

^SGAPN: (list of supported <cid>s), (list of supported <apnClass>s), (list of supported <apnType>s), , (list of supported <bearer>s), (list of supported <enabledFlag>s), (range of supported <inactivityTimeout>s)
OK
ERROR
+CME ERROR: <err>

Read Command

AT^SGAPN?

Response(s)

[^SGAPN: <cid>, <apnClass>, <apnType>, <APN>, <bearer>, <enabledFlag>, <inactivityTimeout>]
[^SGAPN: ...]
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SGAPN=<cid>, <apnClass>[, <apnType>[, <APN>[, <bearer>[, <enabledFlag>[, <inactivityTimeout>]]]]]

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>).

1...16

<apnClass>(num)(NV)

Parameter specifies an APN class.

0...16

<APN>(str)(NV)

Access Point Name

Parameter specifies the logical name used to select the GGSN or the external packet data network. It is the same parameter as the AT+CGDCONT parameter <APN>.
Changing this parameter using AT^SGAPN will also change the AT+CGDCONT value.

<apnType>(str)(NV)

Parameter specifies the type of the APN. It is the same parameter as the AT+CGDCONT parameter <PDP_type>.
Changing this parameter using AT^SGAPN will also change the AT+CGDCONT value.

“IP“

“PPP“

“IPV6“

“IPV4V6“

<bearer>(str)(NV)

Parameter specifies the APN bearer.

“GSM“

“WCDMA“

“LTE“

“ANY“

<enabledFlag>(str)(NV)

Parameter specifies whether an APN is enabled or not. A disabled APN can not be used to establish a connection.

“Enabled“

“Disabled“

<inactivityTimeout>(num)(NV)

For each APN exists an inactivity timer. If enabled, then for connections without data transfer the connection will be terminated after the timer expires.

0	Inactivity timer disabled
1...122820	Inactivity timeout value in s

12.21 AT^SGAUTH Set Type of Authentication for PDP-IP Connections

AT^SGAUTH specifies the authentication protocol, password and user name to be given if a Packet Domain network requires authentication and the subscriber uses AT+CGACT for PDP context activation.

See also parameter <gauth> provided by the configuration command AT^SCFG. This parameter specifies the authentication protocol applied by AT+CGDATA or ATD*99# during the PPP startup phase if no PDP context is activated yet.

Syntax

Test Command

```
AT^SGAUTH=?
```

Response(s)

```
^SGAUTH:(range of supported<cid>s), (list of supported <auth_type>s), ,
OK
ERROR
+CME ERROR: <err>
```

Read Command

```
AT^SGAUTH?
```

Response(s)

```
^SGAUTH:<cid>, <auth_type>[, <user>]
^SGAUTH:<cid>, <auth_type>[, <user>]
...
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT^SGAUTH=<cid>[, <auth_type>[, <passwd>, <user>]]
```

Response(s)

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

PIN	✈	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. USIM related Commands

AT commands described in this chapter are related to the Universal Subscriber Identity Module (USIM) connected to the PLPS9-W.

Note:
If using data from the USIM please bear in mind that the content of all Elementary Files is *subject to change* at any moment!
This is because the network can change the USIM's data in the background via USIM Application Toolkit (USAT) procedure "Data download to USIM". For a detailed description please refer to 3GPP TS 11.14 [21], 3GPP TS 31.111 [22], ETSI TS 102 223 [23].
To get informed that changing Elementary Files has taken place the Customer Application (TE) needs to hook up USAT Proactive Command "REFRESH". For more information please refer to Chapter 9., USIM Application Toolkit (USAT) Commands and Section 9.7, AT^SSTGI in particular.

13.1 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. PLPS9-W handles internally all required USIM interface locking and file selection routines.
As response to the command, the PLPS9-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.

Please beware of *possible changes to Elementary Files* by the network at any time, refer Chapter 13., USIM related Commands.

Syntax

Test Command

```
AT+CRSM=?
```

Response(s)

```
OK
```

Write Command

```
AT+CRSM=<command>[, <fileID>[, <P1>, <P2>, <P3>[, <data>][, <pathId>]]]
```

Response(s)

```
+CRSM: <sw1>,<sw2>[,<response>]
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
-	+	-

Reference(s)

3GPP TS 27.007 [49], 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19] ETSI TS 102 221 [20]

Parameter Description

`<command>`(num)

USIM command number.

176	READ BINARY
178	READ RECORD
192	GET RESPONSE
214	UPDATE BINARY
220	UPDATE RECORD
242	STATUS

`<fileID>`(num)

Identifier for an elementary data file on USIM, if used by `<command>`.

`<P1>`(num)

Parameter to be passed on by the PLPS9-W to the USIM.

0...255

`<P2>`(num)

Parameter to be passed on by the PLPS9-W to the USIM.

0...255

`<P3>`(num)

Parameter to be passed on by the PLPS9-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.

13.2 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 [49], 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19] ETSI TS 102 221 [20]

Parameter Description

<length>(num)

Number of characters in <command> or <response> string.

<command>(str)

Command passed on by the PLPS9-W to the USIM.
Parameter length: maximum 260 Bytes.

<response>(str)

Response data of the command returned by the USIM.
Parameter length: maximum 258 Bytes.

Note

- Access to datafields via SELECT is only allowed to files according to 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19].

Examples

EXAMPLE 1

The following examples show SELECT and GET RESPONSE commands for a 2G SIM card.

`AT+CSIM=14,"A0A40000027F10"`	SELECT DF-Telecom.
`+CSIM: 4,"9F19"`	Command successful. Indicates that x19 bytes response data are available and can be requested by using GET RESPONSE.
`OK`	
`AT+CSIM=14,"A0A40000026F3A"`	SELECT EF-ADN (Abbreviated dialing numbers).
`+CSIM: 4,"9F0F"`	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`	

EXAMPLE 2

The following examples show SELECT and GET RESPONSE commands for a 3G USIM card.

`AT+CSIM=14,"00A40004023F00"`	SELECT Master File (MF).
`+CSIM: 4,"6138"`	Command successful. Indicates that x38 bytes response data are available and can be requested by using GET RESPONSE.
`OK`	
`AT+CSIM=10,"00C0000038"`	GET RESPONSE command requests x38 bytes MF data.
`+CSIM: 116,"6236.......A9000"`	(Response truncated here.)
`OK`	

13.3 AT^SATR Query SIM's Answer to Reset Data

AT^SATR performs multiple USIM related commands. It serves to trigger a USIM restart and query of Answer to Reset (ATR) data. The ATR data string of up to 33 bytes sent from the USIM to the UE, contains information about the USIM and the supported data transfer protocols. For ATR coding refer to 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19].

Syntax

Test Command

```
AT^SATR=?
```

Response(s)

```
OK
```

Write Command

```
AT^SATR=<command>
```

Response(s)

In case of <command>="GetAtr"

```
^SATR: <response>
OK
ERROR
+CME ERROR: <err>
```

For all other Commands

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

PIN	✈	Last
-	+	-

Parameter Description

<command>(str)

List of possible subcommands provided by AT^SATR.

“RestartSim“	Restart the currently inserted USIM.
“GetAtr“	Retrieve the Answer to Reset (ATR) data of the currently inserted USIM.
“SimPowerDown“	Perform USIM power down.
“SimPowerUp“	Perform USIM power up.

<response>(str)

GetAtr Response

Answer to Reset (ATR) data of currently inserted USIM.

13.4 AT^SCID USIM Identification Number

AT^SCID serves to query the USIM identification number. This information is retrieved from USIM elementary file EF_{ICCID}; for details refer to 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19].

Syntax

Test Command

```
AT^SCID=?
```

Response(s)

```
OK
```

Exec Command

```
AT^SCID
```

Response(s)

```
^SCID: <cid>
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
-	+	-

Parameter Description

<cid>(text)

USIM identification number.

13.5 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.
3	If during power up the USIM returns status words 6F00h (Technical problem, no precise diagnosis) to three consecutive APDUs sent by PLPS9-W, the USIM interface hardware has been deactivated. The USIM interface can be reactivated only by restarting the UE, e.g. via "AT+CFUN= n,1".

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.

13.6 AT^SSET USIM Data Ready Indication

After power-up and personalization (PIN entry if required) PLPS9-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

```
AT^SSET=?
```

Response(s)

```
^SSET:(list of supported <n>s)
OK
```

Read Command

```
AT^SSET?
```

Response(s)

```
^SSET: <n>
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT^SSET=<n>
```

Response(s)

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

PIN	✈	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 "^SSIM READY" URC.
1	Enable "^SSIM READY" URC.

14. Remote USIM Access (RSA) Commands

This chapter introduces AT commands and responses related to the PLPS9-W Remote USIM Access (RSA) feature.

The necessary protocols and procedures are implemented according to Bluetooth SAP [5]. As stated there it is possible for a SAP client to use a USIM in an external device connected via a wireless link. The external device can either be a mobile phone, a PDA or any other mobile equipment that may act as a USIM card holder. The SIM Access Profile (Bluetooth SAP [5]) specifies the communication between the UE and a USIM according to 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19].

Figure 14.1, Basic Remote SIM Access Usage Scenario via Bluetooth illustrates an access scenario via Bluetooth:
Since the UE itself - acting as SAP client - does not control the Bluetooth wireless link, the communication with the remote USIM needs to be routed via an external Customer Application. The external application establishes and controls the Bluetooth connection. It maps data received over a serial interface channel to data transferred over a Bluetooth interface and vice versa.

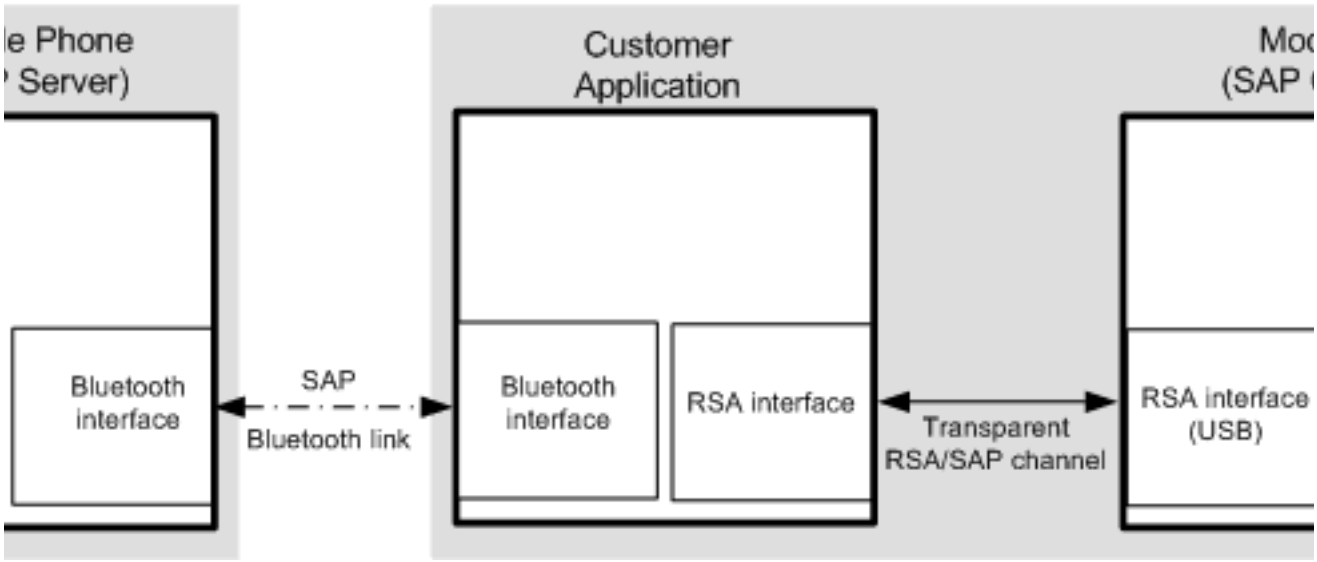


Figure 14.1: Basic Remote SIM Access Usage Scenario via Bluetooth

The PLPS9-W can operate as SAP client. A brief description of the configuration is given below.

SAP Server
A SAP server has direct (galvanic) access to a USIM. It acts as a USIM card reader which assists the SAP client in accessing and controlling this USIM via a serial link.

SAP Client
After RSA activation, the SAP client starts sending SAP CONNECTION_REQ messages (refer to). The SAP client still uses its local USIM until an SAP server responds and the parameter negotiation has been accomplished successfully. When the SAP client recognizes from the received ATR data that the USIM of the SAP server is appropriate and supports the correct transmission protocols, it starts switching to the server's USIM. The "^SRSA" URC indicates that the server's USIM is accessible. Now, the SAP client can enter the USIM PIN of the server's USIM. Both sides start to exchange APDU data.
When the USIM PIN authentication has been completed, the SAP client can register to the cellular network - via the USIM provided by the SAP server.
Optionally, the SAP client should be configured to present additional URCs reporting detailed status information during connection setup, such as the URCs "^SCKS" and "+CREG".
When the SAP client switches to a remote USIM, it needs to load data from the USIM first. The duration of the initial data load varies depending on the USIM. Users should be aware that during this time USIM related AT commands (e.g. Phonebook or SMS commands) cannot be used. Therefore, it is recommended to activate the "^SSIM READY" which indicates when the USIM is accessible. See AT^SSET for detail.

14.1 AT^SRSA Remote USIM Access (RSA) Activation

AT^SRSA write command enables and disables Remote USIM Access (RSA) connections and allows to control the PLPS9-W's USIM usage scheme.
AT^SRSA read command queries the current RSA status. Every line indicates a configured RSA connection, if any.

Syntax

Test Command

AT^SRSA=?

Response(s)

^SRSA: (list of supported <devId>s) , (list of supported <sapRole>s) , (list of supported <sapInst>s) , (list of supported <dataForm>s) , (list of supported <beaconPer>s) , (list of supported <discType>s)
OK

Read Command

AT^SRSA?

Response(s)

[^SRSA: <devId>, <sapRole>, <connState>, <sapInst>, <dataForm>, <beaconPer>]
OK

Write Command

AT^SRSA=<devId>, <sapRole>[, <sapInst>[, <dataForm>[, <beaconPer>[, <discType>]]]]

Response(s)

^SRSA: <actResult>
OK

PIN	✈	Last
-	-	-

Reference(s)

Bluetooth SAP [5]

Unsolicited Result Code

^SRSA: <devId>, <sapRole>, <connState>, <linkChangeCause>

This URC is generated if either the USIM usage scheme or the SAP connection status has changed due to SAP message communication or AT command control.

Parameter Description

<actResult>(num)

Activation result

0	No Error Parameters valid, SAP mode change initiated. However, actual mode change is signaled via URC "^SRSA". Other values indicate invalid activation requests, no SAP mode change is initiated in the following cases:
1	Error unspecified.
2	Error activation command is busy.
3	Error activation started with serial multiplex mode is off.
4	Error activation started on invalid serial multiplex channel.
5	Error device Id is already known.
6	Error SAP mode is already active.
7	Error invalid parameter.

8	Error unused device Id.
9	Error invalid USIM slot. For details please see AT^SCFG="Sim/CS".

<devId>(num)

Device identification

Arbitrary number assigned on RSA activation by the host. Used for all subsequent RSA communication (AT commands and URCs) during the activated session. Different numbers shall be used for SAP server and client.

1...100

<sapRole>(num)

USIM usage scheme of the UE

0(P)	Local USIM If this parameter value is used with write command meaning depends on parameter <discType>.
2	SAP client Enables Remote USIM Access and configures the UE as SAP client. The SAP client starts sending CONNECT_REQ messages periodically. The intervals between sending CONNECT_REQ messages are set with <beaconPer>. The SAP client deregisters from the network if a local USIM was used before and switches to the remote USIM after receiving all of the following messages from the SAP server: • the SAP message CONNECT_RESP, • the SAP message STATUS_IND • and, finally, the SAP message ATR_RESP received after the appropriate request was issued by the client. Under following conditions, the SAP client will not send CONNECT_REQ messages, nor will it switch to the remote USIM: • during any calls (voice or data), • if a GPRS context is activated, • if Remote USIM Application Toolkit is activated (AT^SSTA) and a proactive command is ongoing.

<sapInst>(num)

SAP instance

The SAP instance used to exchange the SAP data. A number as returned by AT^SQPORT parameter <id> has to be used. Parameter is mandatory if <sapRole> is set to 2 (SAP client) and <discType> is not given. It is not allowed to use the same instance as the currently executing AT^SRSA. The specified instance is not allowed to execute an AT command currently.

1...5	The ID of the SAP instance used to exchange the SAP data if Multiplex mode is not started. See AT^SQPORT parameter <id>.
1...8	The ID of the SAP instance used to exchange the SAP data if Multiplex mode is started on one of the AT command ports 1 - 5. See AT^SQPORT parameter <id>.

<dataForm>(num)

SAP message data format

[1]	SAP transparent binary format. SAP messages are transmitted as specified by Bluetooth SAP [5]. This data format enables the Customer Application to directly exchange USIM data with a Bluetooth stack.

<beaconPer>(num)

Beacon period

0...[6]...100	Specifies the number of seconds the SAP client waits before sending the next CONNECT_REQ message. A 0 value leads to a one-time connection request. This parameter is applicable for SAP client activation only.

<discType>(num)

SAP disconnection type

This parameter is only applicable if <sapRole> equals 0.
Calls or active GPRS contexts via a remote USIM will be lost due to missing USIM access. Use of AT+CLCC is recommended to query call states before RSA deactivation.

0	Hold SAP role SAP connection is going to be disabled. The UE remains in SAP mode and is ready to (re)establish an SAP connection. If an SAP connection was ongoing a URC "^SRSA: <devId>, <sapRole>, <connState>, <linkChangeCause>" with <connState>= 0 is issued. • The SAP client saves the USIM data temporarily held in the UE's memory to the remote USIM and sends the DISCONNECT_REQ message to the server. If requested the client restarts sending CONNECTION_REQ messages. If a local USIM is attached the UE will use it to register to the network until a server offers its USIM again.
[1]	Stop SAP operation SAP connection is disabled and UE is forced to local USIM mode. A URC "^SRSA: <devId>, <sapRole>, <connState>, <linkChangeCause>" with <sapRole>= 0 and <connState>= 0 is issued. • The SAP client exclusively sends the DISCONNECT_REQ message to the server. Without saving temporarily held data to a remote USIM or waiting for DISCONNECT_RESP the client immediately returns to local USIM mode.

<connState>(num)

SAP connection state

0	No SAP connection established.
1	SAP connection ongoing, i.e. peers exchange messages.

<linkChangeCause>(num)

SAP link change cause

0	Link changed, no diagnostic given.
10	Error, server unable to connect.
11	Error, server does not support maximum message size.
12	Error, maximum message size sent by client too small.
13	Error, network deregistration of local UE refused due to ongoing network activity. Refer to note below.
14	Error, network deregistration of remote UE refused due to ongoing network activity.
20	Error, card not accessible.
21	Error, card removed.
22	Error, wrong ATR.
23	Error, data not available.

24	Error, not supported.
25	Error, no reason.
30	Error, server response timeout.

Causes 10 to 30 are present for SAP client only.

Note

- Due to a permanently established "Default Bearer" if using LTE, a connection to a remote USIM via Remote USIM Access will be denied with <linkChangeCause> 13 (Error, network deregistration of local UE refused due to ongoing network activity) as long as the PS connection exists. The TE controlling the SAP client therefore should trigger a context deactivation via AT+CGATT=0.

14.2 Related AT Commands

The following commands might be of interest while using the RSA feature.

- AT^SCKS
  This AT command is used to check the current status of the USIM (local or remote).
- AT^SSET
  After power on and personalization (USIM PIN entry if required), the UE starts reading data from the USIM. Please keep in mind that after entering the USIM PIN, even after the TE sends "OK", subsequent commands that need access to data stored on the USIM may be blocked for up to 30 seconds. It may take even longer to access the remote USIM depending on the establishment of the RSA communication link. Therefore, it is recommended to take advantage of the "^SSIM READY" URC enabled with the AT^SSET command. This URC notifies the user when the process of reading USIM has completed. Afterwards all commands regarding to USIM data files can be used, e.g. the SMS and phonebook commands.
- AT^SLCC
  This command is recommended for querying the state of current calls. A list of all active calls will be returned. This is especially important when the user wants to terminate the SAP connection using AT^SRSA=<devId>,<sapRole>,,,,<discType>; with <sapRole> set to 0 and <discType> set to 1. All calls or active GPRS contexts established via remote USIM will be terminated and the UE will use the locally attached USIM card.
- AT^SIND="simlocal",1
  "+CIEV:" "simlocal" URCs indicate the availability of a locally (i.e. physically) connected USIM.
- AT^SIND="simstatus",1
  "+CIEV:" "simstatus" URCs indicate the current status of a locally (i.e. physically) or remotely connected USIM.
- USIM data storage
  It is recommended that all user relevant data are stored on the USIM only. For example, added phonebook and SMS entries in the client's storage are not accessible after a RSA connection.

15. Phonebook Commands

The AT commands described in this chapter allow the external application to access the phonebooks located in the PLPS9-W's memory or 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 "MC", "RC", "DC" and "LD" phonebooks will be deleted.

AT+CPBS

Response(s)

OK
ERROR
+CME ERROR: <err>

Write Command

AT+CPBS=<storage>

Response(s)

OK
ERROR
+CME ERROR: <err>

Write Command

For write access to FD phonebook

AT+CPBS=<storage>, <pin>

Response(s)

OK

Write Command (Continued)

For write access to FD phonebook

AT+CPBS=<storage>,<pin>

Response(s)

ERROR
+CME ERROR: <err>

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.007 [49]

Parameter Description

<storage>(str)	
"SM"(&F)(P)	USIM phonebook Capacity: depending on USIM Location: USIM
"DC"	Dialed calls list Capacity: max. 20 entries Location: ME AT+CPBW command is not applicable to this storage.
"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.
"MC"	Missed (unanswered received) voice calls list Capacity: max. 20 entries Location: ME AT+CPBW command is not applicable to this storage.
"ME"	Mobile equipment phonebook Capacity: max. 500 entries Location: ME
"RC"	Received voice calls list Capacity: max. 20 entries Location: ME 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
"VM"	CPHS voice mailbox phonebook Capacity: depending on USIM Location: USIM
"SD"	Service dialing number phonebook. Read only. 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 types "DC", "LD", "MC" and "RC":
  When the same number is dialed several times in direct succession the "DC" and "LD" phonebook will store each entry, resulting in double or multiple "DC" and "LD" phonebook entries related to this number.
  Likewise, the "MC" or "RC" 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.
- Missed and received calls which are not presented to the called party are not stored in MC and RC phonebook.
- "LD" phonebook is only supported when corresponding Elementary File is available on USIM. Elementary Files belonging to "LD" phonebook are optional on USIM.
- If <tlength> of the number dialed and stored in the ME phonebook is higher then allowed for the "LD" phonebook then the "LD" phonebook doesn't store this number. In this case, use the "DC" phonebook.
- The <text> assigned to a phone <number> is stored to the "DC", "LD", "MC" and "RC" phonebooks only if the complete comparison with the number delivered by the network provider is successful.
- When a dial string includes DTMF digits, the DTMF digits are not saved at the "LD" or "DC" phonebook. ABCD can be used as DTMF digits within a ATD dial string, but cannot be saved due to BCD limitations.
- 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" and "DC" phonebooks stores all call numbers dialed with ATD (except *# sequences). For details see Section 21.1, Star-Hash (*#) Network Commands.

15.2 AT+CPBR Read from phonebook

AT+CPBR serves to read one or more entries from the phonebook selected with AT command AT+CPBS.

The AT+CPBR test command returns the location range supported by the current phonebook storage, the maximum length of <number> field and the maximum length of <text> field.
Note: Length information may not be available while SIM storage is selected. If storage does not offer format information, the format list contains empty parenthesizes.

The AT+CPBR write command determines the phonebook entry to be displayed with <location1> or a location range from <location1> to <location2>. Hence, if no <location2> is given only the entry at <location1> will be displayed.
If no entries are found at the selected location "+CME ERROR: not found" will be returned.

Syntax

Test Command

```
AT+CPBR=?
```

Response(s)

```
+CPBR: (1-<maxloc>), <nlength>, <tlength>
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT+CPBR=<location1>[, <location2>]
```

Response(s)

```
[+CPBR: <location1>, <number>, <type>, <text>]
[+CPBR: <location2>, <number>, <type>, <text>]
OK
ERROR
+CME ERROR: <err>
```

PIN ✈ Last

± + -

Reference(s)

3GPP TS 27.007 [49], 3GPP TS 24.008 [41], 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19]

Parameter Description

<location1>(num)

The first (lowest) location number within phonebook memory where to start reading. The maximum range supported by the current phonebook is given in the test command response.
If <location1> exceeds the upper bound <maxloc> (as indicated by the test command), command will respond with "+CME ERROR: invalid index".

<location2>(num)

The last (highest) location number within phonebook memory where to stop reading. The maximum range supported by the current phonebook is given in the test command response.
If both <location1> and <location2> are in the range indicated by the test command parameter <maxloc>, the list of entries will be output and terminated with "OK". If <location2> exceeds the range indicated by the test command parameter <maxloc>, the command returns only "+CME ERROR: invalid index".

<number>(str)

Phone number in format specified by <type>, it may be an empty string.

<type>(num)

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with ATD><mem><index> is, depending on the network, not always possible (refer to 3GPP TS 24.008 [41], subclause 10.5.4.7 for details). See also <type> of AT+CPBW.
Possible values are:

128	Restricted <number> includes unknown type and format.
145	Dialing string <number> includes international access code character '+'.
161	National number <number>. Network support of this type is optional.
209	Dialing string <number> has been saved as ASCII string and includes non-digit characters other than "*", "#", "+" or "P". Note that phonebook entries saved with this type cannot be dialed.
255	Dialing string <number> 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.

<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>.

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 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.
- There is no restriction reading unsupported values for <type>.

Example

AT+CPBR=?	First run the AT+CPBR test command to find out the maximum range of entries stored in the active phonebook.
+CPBR: (1-100),20,17	PLPS9-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.
AT+CPBR=1,3 +CPBR: 1,"+999999",145,"Charlie" +CPBR: 2,"+777777",145,"Bill" +CPBR: 3,"+888888",145,"Arthur"	Then use the AT+CPBR write command to display the phonebook entries sorted by location numbers.

15.3 AT+CPBW Write into phonebook

The AT+CPBW write command can be used to create, edit and delete a phonebook entry at a <location> of the active storage selected with AT+CPBS.
If <storage>="FD" (SIM fixed dialing numbers) is selected, PIN2 authentication has to be performed prior to any write access.

The AT+CPBW test command returns the location range supported by the current storage, the maximum length of the <number> field, the range of supported <type> values and the maximum length of the <text> field. Note: The length may not be available while SIM storage is selected. If storage does not offer format information, the format list contains empty parenthesizes.

Syntax

Test Command

```
AT+CPBW=?
```

Response(s)

```
+CPBW: (1-<maxloc>), <nlength>, (list of supported <type>s), <tlength>
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT+CPBW=[<location>][, <number>[[, <type>][, <text>]]]
```

Response(s)

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

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.007 [49], 3GPP TS 24.008 [41], 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19]

Parameter Description

<location>(num)

Location number within phonebook memory. The maximum range supported by each storage type is indicated in the test command response. If <location> is not given, the first free entry will be used.
If <location> is given as the only parameter, the phonebook entry specified by <location> is deleted.

<number>(str)

Phone number in format specified by <type>. Parameter must be present, although it may be an empty string. Alphabetic characters are not permitted. The <number> may contain dialstring modifiers "*", "#", "+" or "P".
If other printable special 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). Please consider that for types other than 129 or 145 dialing from phonebook with ATD><mem><index> is, depending on the network, not always possible (refer 3GPP TS 24.008 [41], subclause 10.5.4.7 for details).
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.

<maxloc>(num)

Maximum number of locations supported by the currently selected storage. For phonebooks located on SIM, this value varies depending on the SIM card. See AT+CPBS for typical values.

<nlength>(num)

Maximum length of phone number for "normal" locations. Depending on the storage, a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is 2*<nlength> digits for normal numbers, but only <nlength> digits for numbers saved with parameter <type>= 209. If all extended locations of the selected phonebook are used up, then any attempt to write a number which requires extended memory will be denied with "+CME ERROR: memory full".

<tlength>(num)

Maximum 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 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19], Annex B.

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.
- 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"
```

15.4 AT+CSVM Set voice mail number

The number to the voice mail server is set by AT+CSVM command.
The parameters <number> and <type> can be left out if the parameter <mode> is set to 0. The read command returns the status (enabled <mode>=1 or disabled <mode>=0), the currently selected voice mail <number> and the <type>.
The test command returns supported <mode>s and <type>s.

Syntax

Test Command

```
AT+CSVM=?
```

Response(s)

```
+CSVM: (list of supported <mode>s), (list of supported<type>s)
OK
ERROR
+CME ERROR: <err>
```

Read Command

```
AT+CSVM?
```

Response(s)

```
+CSVM: <mode>, <number>, <type>
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT+CSVM=<mode>[, <number>[, <type>]]
```

Response(s)

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

PIN	✈	Last
+	+	-

Reference(s)

3GPP TS 27.007 [49]

Parameter Description

<mode>(num)

0	Disable the voice mail number
1	Enable the voice mail number

<number>(str)

Phone number in format specified by <type>. Parameter must be present when setting (<mode>=1) the voice mail number. Alphabetic characters are not permitted. The <number> may contain dialstring modifiers "*", "#", "+" or "P".
If other printable non-alphabetic characters are used the entry needs to be saved with <type>=209. 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.

<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 the unknown <type>=129 is used. If <number> contains a leading "+" <type>=145 (international) is used.
Please consider that for types other than 129 or 145 dialing from phonebook with ATD><mem><index> is, depending on the network, not always possible (refer to 3GPP TS 24.008 [41], subclause 10.5.4.7 for details).
See also <type> of AT+CPBW.
Possible values are:

128	Restricted <number> includes unknown type and format.
145	Dialing string <number> includes international access code character "+".
161	National number <number>. The network support for this type is optional.
209	Dialing string <number> will be saved as ASCII string. This is the default value, if <type> is not specified explicitly and characters other than "*", "#", "+" or "P" are included in <number>. Note that phonebook entries saved with this type cannot be dialed.
255	Dialing string <number> is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
129	Unknown number. If <type> is unknown and the <number> contains a leading "+", then this sign is removed.

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.
- "VM" phonebook is only supported when corresponding Elementary File is available on USIM. Elementary Files belonging to "VM" phonebook are optional on USIM.
- If "VM" phonebook is available on USIM and has no write access it is not possible to use AT+CSVM write command.

Examples

EXAMPLE 1

Make a new voice mail number entry

AT+CSVM=1,"1234567890"	The <type> is not specified therefore the unknown <type>=129 is used.
OK	The voice mail number is written to UE.

EXAMPLE 2

Delete the voice mail number entry

AT+CSVM=0	The parameters <number> and <type> are not necessary.
OK	The voice mail number is deleted on UE.

EXAMPLE 3

Read an empty voice mail number entry

```
AT+CSVM?
+CSVM: 0,"",128
OK
```

15.5 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.

Syntax

Test Command

```
AT+CPBF=?
```

Response(s)

```
+CPBF: <nlength>, <tlength>
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT+CPBF=<findtext>
```

Response(s)

```
+CPBF: <location>, <number>, <type>, <text>
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	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.

<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. If the <text> string is given in IRA characters, each character corresponds to one octet. In some cases, e.g. escape sequence, it is not possible to store the full <tlength> on SIM.
For a detailed description please refer to 3GPP TS 11.11 [17], 3GPP TS 31.101 [18], 3GPP TS 31.102 [19], Annex B.

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.

Example

AT+CPBF=?	First run the AT+CPBF test command to find out the lengths of <nlength> and <tlength> in the active phonebook.
+CPBF: 40,16	PLPS9-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.
AT+CPBF="Charlie"	Then use the AT+CPBF write command to find any <text> string in the phonebook.
+CPBF:1,"+999999",145,"Charlie"	

15.6 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 [49]

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. GNSS Commands

PLPS9-W integrates a GNSS engine (Global Navigation Satellite System) which supports GPS (Global Positioning Sytem) and GLONASS (Globalnaja Nawigazionnaja Sputnikowaja Sistema) and GALILEO and Beidou and QZSS (Quasi-Zenith Satellite System) based on the NMEA 0183 protocol.

To configure, activate or deactivate the GNSS engine, to choose Standalone GNSS or A-GNSS operation, to start, stop and configure the NMEA output, to select the NMEA output frequency, please use the AT^SGPSC command.

The GNSS receiver is always capable of receiving signals from all supported satellite systems, and decides on its own whether to calculate the position from GPS only, or any combination of the systems. The AT^SGPSC subcommands "Nmea/GPS", "Nmea/Glonass", "Nmea/Galileo" and "Nmea/Beidou" and "Nmea/QZSS" can be used to enable or disable the output of NMEA sentence types, but they do not switch off their usage for position calculation. Only the output of GALILEO and Beidou and QZSS data will instantly be disabled when the UE gets a GPS position fix over US territory. Apart from that, it is possible to enable or disable Galileo, Glonass, Beidou and QZSS capabilities of the GNSS receiver. See AT^SGPSC subcommands "Engine/Galileo", "Engine/Glonass", "Engine/Beidou", "Engine/Qzss".
The GNSS receiver is also capable of receiving SBAS signals (Satellite Based Augmentation Systems). See AT^SGPSC subcommand "Engine/Sbas".

A-GNSS (Assisted GNSS) will improve the startup performance, i.e. the Time to First Fix (TTFF), if the GNSS engine has not yet precise location and time information. For A-GNSS, valid GpsOneXTRA assistance data shall be stored to the UE's FFS and injected into the GNSS receiver by using the AT^SBNW command. The assistance data files can be downloaded via HTTP from one of the GpsOneXTRA servers. For PLPS9-W please use the xtra2.bin file which includes GPS and GLONASS.
The XTRA data is valid up to 7 days, although after 3 days the accuracy would start to degrade faster. We recommend to update XTRA data every 2 days. To check the validity of the injected XTRA data you can use the AT^SGPSC parameter <InfoXtraDurationMinutes>. In most cases, however, it will be sufficient to activate the GNSS driver since the GNSS engine dynamically determines the best startup scenario depending on the available position, time, Almanac and/or Ephemeris data.

NMEA data will be printed to the dedicated NMEA instance depending on the <NmeaInterface> settings. The dedicated NMEA instance does not accept AT commands. If the serial port ASC0 is selected for NMEA output please consider that NMEA data is transmitted at a fixed bit rate of 115200 bps regardless of the AT+IPR value set on ASC0.
In addition, the commands AT^SGPSC="Nmea/Output/","last" and AT^SGPSC="Nmea/Output/","gpsdataurc" and AT^SGPSC="Nmea/URC","on" can be used to get all GNSS information on the AT command instances(s), eliminating the need to poll the dedicated NMEA instance.

The UE may connect to an active or passive GNSS antenna. Active GNSS antennas need an extra power supply which can be switched on or off with AT^SGPSC. Take care that the antenna is capable of GPS and GLONASS as well (if required). Details on how to connect and handle active or passive antennas can be found in [2].

16.1 GNSS NMEA Sentences

A standard NMEA sentence set consists of the sentences listed below. Each single sentence starts with $ prefix and a Talker ID followed by a three letter Sentence ID. Both IDs are followed by data fields separated by comma. The data is provided in ASCII format.

For GPS, the Talker ID is GP. The UE supports the following GPS related NMEA sentence types:

- GPGGA - GPS Fix Data, i.e. Time, Position and fix related data of GNSS receiver
- GPRMC - Recommended minimum data for GPS
- GPGSV - Number of satellites in view, elevation, azimuth and CNR for each satellite. Max. 16 satellites (= 4 satellites per GPGSV row, and max. 4 GPGSV rows in each NMEA sentence set).
- GPGSA - GPS DOP (Dilution of Precision) and active satellites
- GPVTG - Vector track and speed over the ground
- GPGNS - Fix Data, i.e. Time, Position and fix related data
- GPDTM - Local geodetic datum and datum offsets from reference datum

For GLONASS, the Talker ID is "GL". The UE supports the following GLONASS related NMEA sentence types

- GLRMC - Recommended minimum data for GLONASS
- GLGSV - Number of satellites in view, elevation, azimuth and CNR for each satellite. Max. 16 satellites (= 4 satellites per GLGSV row, and max. 4 GLGSV rows in each NMEA sentence set).
- GLGSA - GLONASS DOP (Dilution of Precision) and active satellites
- GLVTG - Vector track and speed over the ground
- GLGNS - Fix Data, i.e. Time, Position and fix related data
- GLDTM - Local geodetic datum and datum offsets from reference datum

For GALILEO, the Talker ID is "GA". The UE supports the following GALILEO related NMEA sentence types:

- GARMC - Recommended minimum data for GLONASS
- GAGSV - Number of satellites in view, elevation, azimuth and CNR for each satellite. Max. 16 satellites (= 4 satellites per GAGSV row, and max. 4 GAGSV rows in each NMEA sentence set)
- GAGSA - GALILEO DOP (Dilution of Precision) and active satellites
- GAVTG - Vector track and speed over the ground
- GAGNS - Fix Data, i.e. Time, Position and fix related data
- GADTM - Local geodetic datum and datum offsets from reference datum

For Beidou, the Talker ID is "BD". The UE supports the following BEIDOU related NMEA sentence types:

- BDRMC - Recommended minimum data for BEIDOU
- BDGSV - Number of satellites in view, elevation, azimuth and CNR for each satellite. Max. 16 satellites (= 4 satellites per BDGSV row, and max. 4 BDGSV rows in each NMEA sentence set)
- BDGSA - BEIDOU DOP (Dilution of Precision) and active satellites
- BDVTG - Vector track and speed over the ground
- BDGNS - Fix Data, i.e. Time, Position and fix related data
- BDDTM - Local geodetic datum and datum offsets from reference datum

For QZSS, the Talker ID is "QZ". The UE supports the following QZSS related NMEA sentence types:

- QZRMC - Recommended minimum data for QZSS
- QZGSV - Number of satellites in view, elevation, azimuth and CNR for each satellite. Max. 16 satellites (= 4 satellites per QZGSV row, and max. 4 QZGSV rows in each NMEA sentence set)
- QZGSA - QZSS DOP (Dilution of Precision) and active satellites
- QZVTG - Vector track and speed over the ground
- QZGNS - Fix Data, i.e. Time, Position and fix related data
- QZDTM - Local geodetic datum and datum offsets from reference datum

Talker ID "GN" indicates that GPS is used in combination with GLONASS, GALILEO, BEIDOU, QZSS . The UE supports the following NMEA sentence types for mixed usage:

- GNRMC - Recommended minimum data for GNSS
- GNGSA - GPS/GLONASS /GALILEO/BEIDOU/QZSS DOP (Dilution of Precision) and active satellites
- GNVTG - Vector track and speed over the ground
- GNGNS - Fix Data, i.e. Time, Position and fix related data
- GNDTM - Local geodetic datum and datum offsets from reference datum

The following NMEA sentence can additionally be presented in WGS-84 system or PZ-90 system depending on the <Pz90Val> setting of the AT^SGPSC command.
The Talker ID indicates the actually used satellite system. The position in the PZ-90 system is calculated from data provided by employed GNSS systems. Due to that it does not require GLONASS to be enabled.

- --GGA - GPS Fix Data, i.e. Time, Position and fix related data of GNSS receiver
- --RMC - Recommended minimum data for GNSS
- --GNS - Fix Data, i.e. Time, Position and fix related data
- --VTG - Vector track and speed over the ground
- --GSA - GPS/GLONASS/GALILEO/Beidou/QZSS DOP (Dilution of Precision) and active satellites
- --GSV - Number of satellites in view, elevation, azimuth and CNR for each satellite.
- --DTM - Local geodetic datum and datum offsets from reference datum

The following NMEA sentences can be enabled using <DeadReckoningVal> of the AT^SGPSC command.
The device prefix "PC" is for Thales related data.

- PCWMV - a proprietary Thales NMEA sentence
- GPZDA - consists of NMEA 0183 standard Time and Date
- GPGRS - consists of the GPS Range Residuals

The PCWMV sentence will be decoded in the following way:
PCWMV,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>*CS

Meaning of PCWMV fields:
<1> East velocity (m/s)
<2> North velocity (m/s)
<3> Up velocity (m/s)
<4> Position standard deviation estimate (m)
<5> Latitude uncertainty (m)
<6> Longitude uncertainty (m)
<7> Vertical uncertainty (m)
<8> Velocity uncertainty (m/s)
CS Checksum.

Note:
The GNSS engine does not allow to disable the usage of GPS satellites, in contrast to GLONASS, GALILEO, Beidou, QZSS satellites which can be enabled or disabled with AT^SGPSC "Engine/...." subcommands. The GNSS engine always tries first to use GPS satellites to obtain a position fix, while other satellite systems may be used additionally depending on their AT^SGPSC settings and depending on GNSS power saving. If power saving is effective and the GPS signal is sufficient to get a fix, the GNSS engine automatically deactivates the usage and output of satellite systems in order to save power see Section 16.3.1.1, Dynamic Power Optimization (DPO). Therefore, attention should be paid to specific side effects, in case the output of GPS NMEA sentences is disabled with AT^SGPSC "Nmea/GPS" <GpsVal> "off": Even though a position fix is obtained, no NMEA sentences are output as long as only GPS was used for calculation. NMEA sentences of other satellite systems will be output only if enabled and used for calculation.

16.2 GNSS Power Saving Considerations

If GNSS is switched on (see AT^SGPSC parameters <EngineVal> and <OutVal>), GPS and GLONASS and GALILEO and Beidou may altogether be employed for position calculation.
Usage of GLONASS or GALILEO or Beidou is added only if needed to get position fix. If the GPS signal is sufficient to get a fix, the GNSS engine automatically deactivates the usage and output of GLONASS, GALILEO, Beidou in order to reduce power consumption. The output of GPS sentences can also be switched off. See AT^SGPSC parameters <GlonassVal>, <GalileoVal>, <BeidouVal>, <GpsVal>.

16.3 AT^SGPSC GNSS Configuration

AT^SGPSC is a configuration command that can be used to set GNSS parameters and to switch the GNSS engine on and off.

Syntax

Test Command

AT^SGPSC=?

Response(s)

^SGPSC: "Engine", (list of supported <EngineVal>s)
^SGPSC: "Engine/Beidou", (list of supported <EngineBeidouVal>s)
^SGPSC: "Engine/Galileo", (list of supported <EngineGalileoVal>s)
^SGPSC: "Engine/Glonass", (list of supported <EngineGlonassVal>s)
^SGPSC: "Engine/Qzss", (list of supported <EngineQzssVal>s)
^SGPSC: "Info", (list of supported <InfoType>s), (list of supported <InfoUrcVal>s), (list of supported <InfoUrcMinutes>s)
^SGPSC: "Nmea/Beidou", (list of supported <BeidouVal>s)
^SGPSC: "Nmea/Data", (list of supported <NmeaDataUrcMask>s)
^SGPSC: "Nmea/Data/Format", (list of supported <DataFormat>s)
^SGPSC: "Nmea/Data/RawMask", (list of supported <DataRawMask>s)
^SGPSC: "Nmea/DeadReckoning", (list of supported <DeadReckoningVal>s)
^SGPSC: "Nmea/DRSync", (list of supported <DRSyncVal>s)
^SGPSC: "Nmea/ExtGSV", (list of supported <ExtGSV>s)
^SGPSC: "Nmea/Freq", (list of supported <FreqVal>s)
^SGPSC: "Nmea/FreqMs", (list of supported <FreqMsVal>s)
^SGPSC: "Nmea/Galileo", (list of supported <GalileoVal>s)
^SGPSC: "Nmea/Glonass", (list of supported <GlonassVal>s)
^SGPSC: "Nmea/GPS", (list of supported <GpsVal>s)
^SGPSC: "Nmea/Interface", (list of supported <NmeaInterface>s)
^SGPSC: "Nmea/Output", (list of supported <OutVal>s)
^SGPSC: "Nmea/PZ90", (list of supported <Pz90Val>s)
^SGPSC: "Nmea/Qzss", (list of supported <QzssVal>s)
^SGPSC: "Nmea/Sbas", (list of supported <SbasVal>s)
^SGPSC: "Nmea/Urc", (list of supported <FixUrcVal>s)
^SGPSC: "Nmea/Version", (list of supported <Major NmeaVersion>s), (list of supported <Minor NmeaVersion>s)
^SGPSC: "Power/Antenna", (list of supported <AntVal>s)
^SGPSC: "Power/CPU, (list of supported <CpuVal>s)
^SGPSC: "Power/Psm", (list of supported <PsmVal>s)
^SGPSC: "Raw/Version", (list of supported <RawVersion>s)
^SGPSC: "Sens/MinElevAngle", (list of supported <Degree>s)
OK
ERROR
+CME ERROR: <err>

Read Command

AT^SGPSC?

Response(s)

^SGPSC: "Engine", <EngineState>
^SGPSC: "Engine/Beidou", <EngineBeidouVal>
^SGPSC: "Engine/Galileo", <EngineGalileoVal>
^SGPSC: "Engine/Glonass", <EngineGlonassVal>
^SGPSC: "Engine/Qzss", <EngineQzssVal>
^SGPSC: "Info", "Urc"[, <InfoUrcVal>][, <InfoUrcMinutes>]
^SGPSC: "Nmea/Beidou", <BeidouVal>

Read Command (Continued)

AT^SGPSC?

Response(s)

^SGPSC: "Nmea/Data", <NmeaDataUrcMask>
^SGPSC: "Nmea/Data/Format", <DataFormat>
^SGPSC: "Nmea/Data/RawMask", <DataRawMask>
^SGPSC: "Nmea/DeadReckoning", <DeadReckoningVal>
^SGPSC: "Nmea/DRSync", <DRSyncVal>
^SGPSC: "Nmea/ExtGSV", <ExtGSV>
^SGPSC: "Nmea/Freq", <FreqVal>
^SGPSC: "Nmea/FreqMs", <FreqMsVal>
^SGPSC: "Nmea/Galileo", <GalileoVal>
^SGPSC: "Nmea/Glonass", <GlonassVal>
^SGPSC: "Nmea/GPS", <GpsVal>
^SGPSC: "Nmea/Interface", <NmeaInterface>
^SGPSC: "Nmea/Output", <OutVal>
^SGPSC: "Nmea/PZ90", <Pz90Val>
^SGPSC: "Nmea/Qzss", <QzssVal>
^SGPSC: "Nmea/Sbas", <SbasVal>
^SGPSC: "Nmea/Urc", <FixUrcVal>
^SGPSC: "Nmea/Version", <Major NmeaVersion>, <Minor NmeaVersion>
^SGPSC: "Power/Antenna", <AntVal>
^SGPSC: "Power/CPU, <CpuVal>
^SGPSC: "Power/Psm", <PsmVal>
^SGPSC: "Raw/Version", <RawVersion>
^SGPSC: "Sens/MinElevAngle", <Degree>
OK
ERROR
+CME ERROR: <err>

Write Command

Activating or deactivating GNSS engine.

AT^SGPSC="Engine"[, <EngineVal>]

Response(s)

^SGPSC: "Engine", <EngineState>
OK
ERROR
+CME ERROR: <err>

Write Command

Activating or deactivating Beidou capability.

AT^SGPSC="Engine/Beidou"[, <EngineBeidouVal>]

Response(s)

^SGPSC: "Engine/Beidou", <EngineBeidouVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Activating or deactivating Galileo capability.

AT^SGPSC="Engine/Galileo"[, <EngineGalileoVal>]

Response(s)

^SGPSC: "Engine/Galileo", <EngineGalileoVal>
OK

Write Command (Continued)

Activating or deactivating Galileo capability.

AT^SGPSC="Engine/Galileo"[, <EngineGalileoVal>]

Response(s)

ERROR
+CME ERROR: <err>

Write Command

Activating or deactivating Glonass capability.

AT^SGPSC="Engine/Glonass"[, <EngineGlonassVal>]

Response(s)

^SGPSC: "Engine/Glonass", <EngineGlonassVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Activating or deactivating QZSS capability.

AT^SGPSC="Engine/Qzss"[, <EngineQzssVal>]

Response(s)

^SGPSC: "Engine/Qzss", <EngineQzssVal>
OK
ERROR
+CME ERROR: <err>

Write Command

If <InfoType>= "Urc": Configuring "^SGPSE" URC type "XTRA file invalidity notification".

AT^SGPSC="Info", "Urc"[, <InfoUrcVal>][, <InfoUrcMinutes>]

Response(s)

^SGPSC: "Info", "Urc", <InfoUrcVal>[, <InfoUrcMinutes>]
OK
ERROR
+CME ERROR: <err>

Write Command

If <InfoType>= "Xtra": Requesting validity of XTRA file.

AT^SGPSC="Info", "Xtra"

Response(s)

^SGPSC: "Info", "Xtra", <InfoXtraWeek>, <InfoXtraMinute>, <InfoXtraDurationMinutes>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring output of BEIDOU sentences.

AT^SGPSC="Nmea/Beidou"[, <BeidouVal>]

Response(s)

^SGPSC: "Nmea/Beidou", <BeidouVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring URC output for NMEA data

AT^SGPSC="Nmea/Data"[, <NmeaDataUrcMask>]

Response(s)

^SGPSC: "Nmea/Data", <NmeaDataUrcMask>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring GNSS data format

AT^SGPSC="Nmea/Data/Format"[, <DataFormat>]

Response(s)

^SGPSC: "Nmea/Data/Format", <DataFormat>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring GNSS data format

AT^SGPSC="Nmea/Data/RawMask"[, <DataRawMask>]

Response(s)

^SGPSC: "Nmea/Data/RawMask", <DataRawMask>
OK
ERROR
+CME ERROR: <err>

Write Command

Setting dead reckoning related NMEA output.

AT^SGPSC="Nmea/DeadReckoning"[, <DeadReckoningVal>]

Response(s)

^SGPSC: "Nmea/DeadReckoning", <DeadReckoningVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring DR Sync line.

AT^SGPSC="Nmea/DRSync"[, <DRSyncVal>]

Response(s)

^SGPSC: "Nmea/DRSync", <DRSyncVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Enabling extended NMEA sentences.

AT^SGPSC="Nmea/ExtGSV"[, <ExtGSV>]

Response(s)

^SGPSC: "Nmea/ExtGSV", <ExtGSV>
OK
ERROR
+CME ERROR: <err>

Write Command

Setting frequency of position requests.

AT^SGPSC="Nmea/Freq"[, <FreqVal>]

Response(s)

^SGPSC: "Nmea/Freq", <FreqVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Setting frequency of position requests in milliseconds.

AT^SGPSC="Nmea/FreqMs"[, <FreqMsVal>]

Response(s)

^SGPSC: "Nmea/Freq", <FreqMsVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring output of GALILEO sentences.

AT^SGPSC="Nmea/Galileo"[, <GalileoVal>]

Response(s)

^SGPSC: "Nmea/Galileo", <GalileoVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring output of GLONASS sentences.

AT^SGPSC="Nmea/Glonass"[, <GlonassVal>]

Response(s)

^SGPSC: "Nmea/Glonass", <GlonassVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring output of GPS sentences.

AT^SGPSC="Nmea/GPS"[, <GpsVal>]

Response(s)

^SGPSC: "Nmea/GPS", <GpsVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring dedicated NMEA interface.

AT^SGPSC="Nmea/Interface"[, <NmeaInterface>]

Response(s)

^SGPSC: "Nmea/Interface", <NmeaInterface>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring output of NMEA sentences.

AT^SGPSC="Nmea/Output"[, <OutVal>]

Response(s)

^SGPSC: "Nmea/Output", <OutVal>
OK
ERROR
+CME ERROR: <err>

If <OutVal> is "last":
[^SGPSC: ...]
[Last NMEA sentence set received from internal buffer]
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring NMEA output for GLONASS PZ-90 Geodetic Reference System

AT^SGPSC="Nmea/PZ90"[, <Pz90Val>]

Response(s)

^SGPSC: "Nmea/PZ90", <Pz90Val>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring output of QZSS sentences.

AT^SGPSC="Nmea/Qzsss"[, <QzssVal>]

Response(s)

^SGPSC: "Nmea/Qzss", <QzssVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring output of SBAS sentences.

AT^SGPSC="Nmea/Sbas"[, <SbasVal>]

Response(s)

^SGPSC: "Nmea/Sbas", <SbasVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring "^SGPSE" URC type "Position fix notification".

AT^SGPSC="Nmea/Urc"[, <FixUrcVal>]

Response(s)

^SGPSC: "Nmea/Urc", <FixUrcVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Read NMEA protocol version

AT^SGPSC="Nmea/Version"

Response(s)

^SGPSC: "Nmea/Version", <Major NmeaVersion>, <Minor NmeaVersion>
OK
ERROR
+CME ERROR: <err>

Write Command

Configuring antenna supply.

AT^SGPSC="Power/Antenna"[, <AntVal>]

Response(s)

^SGPSC: "Power/Antenna", <AntVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Selecting speed mode of GNSS receiver.

AT^SGPSC="Power/CPU"[, <CpuVal>]

Response(s)

^SGPSC: "Power/CPU", <CpuVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Activating Sleep mode for GNSS engine (Power Save Mode).

AT^SGPSC="Power/Psm"[, <PsmVal>]

Response(s)

^SGPSC: "Power/Psm", <PsmVal>
OK
ERROR
+CME ERROR: <err>

Write Command

Read Location Service version

AT^SGPSC="Raw/Version"

Response(s)

^SGPSC: "Raw/Version", <RawVersion>
OK
ERROR
+CME ERROR: <err>

Write Command

Configure the Minimum GNSS Elevation Angle.

AT^SGPSC="Sens/MinElevAngle"[, <Degree>]

Response(s)

^SGPSC: "Sens/MinElevAngle", <Degree>
OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Parameter Description

<EngineVal>(str)

Parameter of the AT^SGPSC "Engine" write command. Switches the GNSS engine on or off.

"0"(P)	GNSS engine off.
"1"	Start GNSS engine without employing GpsOneXTRA assistance data. The GNSS engine dynamically determines the best startup scenario depending on the available position, time, Almanac and/or Ephemeris data. However, please consider that if GpsOneXTRA assistance data is still injected (due to previously used mode 2), this data might still be effective. To enable cold start in such case first delete assistance data using AT^SBNW="agps",-1 before employing AT^SGPSC="Engine","1".
"2"	Start GNSS engine in A-GNSS mode by employing the GpsOneXTRA assistance data previously stored to the FFS and injected to the GNSS engine with AT^SBNW. Remember that the RTC is correctly set (AT+CCLK) to Greenwich Mean Time (GMT): 0. Using mode 2 without GpsOneXTRA assistance data: If the following conditions are met you can use mode 2 instead of mode 1 even though GpsOneXTRA assistance data were not injected beforehand: Take care that the RTC is set to Greenwich Mean Time (GMT). If Ephemeris data is still valid, mode 2 enables faster TTFF than mode 1. If Ephemeris data has expired, TTFF is about the same in mode 2 or mode 1.
"delete"	Delete all GNSS data in the engine.

<EngineState>(str)

Parameter of the AT^SGPSC "Engine" read and write command responses. Shows the GNSS engine state.

"0"	GNSS engine off.
"1"	GNSS engine on.

<EngineGalileoVal>(str)(NV)

Parameter of the AT^SGPSC "Engine/Galileo" write command. Configures Galileo capabilities of the GNSS receiver. Changed setting takes effect after restarting the GNSS engine

"0"	Galileo capability disabled.
"1"(D)	Galileo capability enabled. GNSS receiver checks the position to find out whether Galileo can be used in this area. This requires a position fix.

<EngineBeidouVal>(str)(NV)

Parameter of the AT^SGPSC "Engine/Beidou" write command. Configures Beidou capabilities of the GNSS receiver. Changed setting takes effect after restarting the GNSS engine

"0"	Beidou capability disabled.
"1"(D)	Beidou capability enabled. GNSS receiver checks the position to find out whether Beidou can be used in this area. This requires a position fix.

<EngineGlonassVal>(str)(NV)

Parameter of the AT^SGPSC "Engine/Glonass" write command. Configures Glonass capabilities of the GNSS receiver. Changed setting takes effect after restarting the GNSS engine

“0“	Glonass capability disabled.
“1“(D)	Glonass capability enabled.

<EngineQzssVal>(str)(NV)

Parameter of the AT^SGPSC "Engine/Qzss" write command. Configures QZSS capabilities of the GNSS receiver. Changed setting takes effect after restarting the GNSS engine

“0“	QZSS capability disabled.
“1“(D)	QZSS capability enabled.

<InfoType>(str)

Parameter of the AT^SGPSC "Info" write command. Specifies the type of information which will be requested.

“Xtra“	Check the validity of the XTRA file which was successfully injected in the GNSS engine before. The write command AT^SGPSC="Info","Xtra" requests the validity of the injected XTRA.bin file and returns the parameters <InfoXtraWeek>, <InfoXtraMinute> and <InfoXtraDurationMinutes>.
“Urc“	Refers to the "^SGPSE" URC type "XTRA file invalidity notification". The URC shall be enabled / disabled by setting the <InfoUrcVal> parameter. Depending on the <InfoUrcMinutes> parameter, the URC will be emitted either before or at the moment when the validity of the injected XTRA file expires. XTRA file validity is checked at 1 minute frequency. The calculation uses AT+CCLK time. This must be GMT0.

<InfoXtraWeek>(str)

Parameter of the AT^SGPSC "Info" write command. Shows the GNSS week (time stamp since 1st epoch January 6th, 1980 Sunday 0:00) inside the injected XTRA.bin file. Together with <InfoXtraMinute> the value can be used to manually calculate the time difference to GMT0 time.

<InfoXtraMinute>(str)

Parameter of the AT^SGPSC "Info" write command. Shows the GNSS minutes of the current week inside the injected XTRA.bin file. When manually calculating the time difference to GMT0 time, this value has to be added to the <InfoXtraWeek> value.

"0"..."10080"	Time in minutes.

<InfoXtraDurationMinutes>(str)

Parameter of the AT^SGPSC "Info" write command. Counts down the validity duration of the currently injected XTRA file in minutes.
The calculation uses AT+CCLK time. This must be GMT0.

“0“	No saved XTRA file or the saved XTRA file is no longer valid.
"1"..."10080"	Validity of injected XTRA file in minutes.

<InfoUrcVal>(str)

Parameter of the AT^SGPSC "Info" write command. Enables / disables the "^SGPSE" URC type "XTRA file invalidity notification". Parameter <InfoUrcMinutes> is applicable only if parameter <InfoUrcVal> is set to "on".

“off“(P)	Disable the "^SGPSE" URC type "XTRA file invalidity notification".
“on“	Enable the "^SGPSE" URC type "XTRA file invalidity notification".

<InfoUrcMinutes>(str)

Parameter of the AT^SGPSC "Info" write command. Specifies the number of minutes the "^SGPSE" URC type "XTRA file invalidity notification" shall show up before the validity of the injected XTRA file expires.

["0"]	URC shall show up exactly at the time when the validity of the injected XTRA file has expired.
"1"..."10080"	Number of minutes the URC shall show up before the validity of the injected XTRA file expires.

<FreqVal>(str)

Parameter of the AT^SGPSC "Nmea/Freq" subcommand. Specifies the frequency of position requests (in seconds).
If a position fix is available the GNSS engine will start to output NMEA messages at the given <FreqVal>.
If there is no position fix yet, then NMEA data will be output usually every second, regardless of the specified frequency and until the position fix is found. This applies, for example, after starting the GNSS engine (see <EngineVal>) and the output of data is activated (see <OutVal>), or when a position fix was lost for some reason (due to poor signal quality).

"1"(P)..."65534"	NMEA data is output every n seconds. If <FreqVal> equals 1 it is possible to further increase the frequency by using the parameter <FreqMsVal> of the AT^SGPSC "Nmea/FreqMs" subcommand. During the NMEA output intervals, the GNSS engine enters IDLE mode and saves power, even when <PsmVal> mode is disabled. Therefore, setting the GNSS engine into IDLE state is a trade-off between trying to save power and maintaining or getting a position fix. The longer the time set with <FreqVal>, the more time will be required to get a position fix.

<FreqMsVal>(str)

Parameter of the AT^SGPSC "Nmea/FreqMs" subcommand. It can be used to increase the frequency of position requests by setting intervals below 1 second. Therefore, <FreqMsVal> can be changed only when <FreqVal> is 1. If <FreqVal> is set to a value other than 1, <FreqMsVal> automatically changes to 1000 ms.
For frequencies below 1 second, the parameter <CpuVal> of the AT^SGPSC "Power/CPU" subcommand has to be changed to "max" in order to increase the CPU speed of the GNSS receiver.
If a position fix is available the GNSS engine will start to output NMEA messages at the given <FreqMsVal>.
If there is no position fix yet, then NMEA data will be output usually every second, regardless of the specified frequency and until the position fix is found. This applies, for example, after starting the GNSS engine (see <EngineVal>) and the output of data is activated (see <OutVal>), or when a position fix was lost for some reason (due to poor signal quality).
During the NMEA output intervals, the GNSS engine enters IDLE mode and saves power, even when <PsmVal> mode is disabled.
Therefore, setting the GNSS engine into IDLE state is a trade-off between trying to save power and maintaining or getting a position fix.

"100"	100ms (up to 10 Hz tracking)
"200"	200ms (up to 5 Hz tracking - 5 fixes per second)
"500"	500ms (up to 2 Hz tracking - 2 fixes per second)
"1000"(P)	1000ms - 1 Hz tracking

<GpsVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/GPS" subcommand. This setting can only be changed when the GNSS engine is off (see parameter <EngineVal>).

"off"	Disables the output of GPS sentences.
"on"(D)	Enables the output of GPS sentences.

<GlonassVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Glonass" subcommand. This setting can only be changed when the GNSS engine is off (see parameter <EngineVal>).

"off"	Disables the output of GLONASS sentences. Nevertheless, GLONASS data is still received by the GNSS engine as long as required for positional calculations. See also Section 16.2, GNSS Power Saving Considerations for details on power saving.
"on"(D)	Enables the output of GLONASS sentences, but only as long as used for position fix.

<GalileoVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Galileo" subcommand. Setting can only be changed when the GNSS engine is off (see parameter <EngineVal>).

"off"	Disables the output of GALILEO sentences. Nevertheless, GALILEO data is still received by the GNSS engine as long as required for positional calculations. See also Section 16.2, GNSS Power Saving Considerations for details on power saving.
"on"(D)	Enables the output of GALILEO sentences, but only as long as used for position fix.

<BeidouVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Beidou" subcommand. Setting can only be changed when the GNSS engine is off (see parameter <EngineVal>).

"off"	Disables the output of BEIDOU sentences. Nevertheless, BEIDOU data is still received by the GNSS engine as long as required for positional calculations. See also Section 16.2, GNSS Power Saving Considerations for details on power saving.
"on"(D)	Enables the output of BEIDOU sentences, but only as long as used for position fix.

<QzssVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Qzss" subcommand. Setting can only be changed when the GNSS engine is off (see parameter <EngineVal>). Changed setting takes effect after restarting the GNSS engine.

"off"	Disables the output of QZSS sentences. Nevertheless, QZSS data is still received by the GNSS engine as long as required for positional calculations. See also Section 16.2, GNSS Power Saving Considerations for details on power saving.
"on"(D)	Enables the output of QZSS sentences, but only as long as used for position fix.

<SbasVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Sbas" subcommand. Satellite-Based Augmentation Systems (SBAS) including WAAS, EGNOS, and MSAS are designed to augment the performance of GNSS systems by broadcasting information from geostationary satellites. SBAS systems do not provide specific NMEA sentences. They only broadcast additional information for improving the fix accuracy and avoiding errors in the system. Currently, SBAS is supported only in combination with GPS.
Setting can only be changed when the GNSS engine is off (see parameter <EngineVal>). Changed setting takes effect after restarting the GNSS engine.

"off"	Disables usage of SBAS for GNSS accuracy.
"on"(D)	Enables usage of SBAS for GNSS accuracy.

<ExtGSV>(str)(NV)

Parameter of the AT^SGPSC "Nmea/ExtGSV" subcommand.

"off"(D)	Disables the output of decimals in GSV elements Elevation, Azimuth, SNR/ CN0. $GLGSV,3,1,10,73,25,324,45,66,48,101,52,82,58,307,51,80,30,261,43*64
"on"	Enables the output of decimals in GSV elements Elevation, Azimuth, SNR/ CN0. Example: $GLGSV,3,1,10,73,25.3,324.8,42.0,66,48.5,99.8,47.9,82,59.1,309.4,47.3,80, 29.5,260.2,40.2*59

<Pz90Val>(str)(NV)

Parameter of the AT^SGPSC "Nmea/PZ90" subcommand. Configures support for the PZ-90 Geodetic Reference System. If enabled all positional sentences (--GGA, --RMC, --GNS, --VTG, --GSA, --DTM) are converted from WGS-84 system to PZ-90 system. See Section 16.1, GNSS NMEA Sentences.

"off"(D)	Disables the conversion of positional sentences from WGS-84 system to PZ-90 system. WGS-84 system is employed.
"on"	Enables the conversion of positional sentences from WGS-84 system to PZ-90 system.

The setting can only be changed when the GNSS engine is off (see parameter <EngineVal>).

<DeadReckoningVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/DeadReckoning" subcommand. Configures additional NMEA output of Dead Reckoning related information (see Section 16.1, GNSS NMEA Sentences).
Parameter is global for all interfaces, non-volatile and will not be reset by AT&F.
The setting can only be changed when the GNSS engine is off (see parameter <EngineVal>).

"off"(D)	No output of Dead Reckoning related data.
"on"	The additional NMEA sentences for Dead Reckoning will be output.

<DRSyncVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/DRSync" subcommand. Enables or disables a 1PPS (pulse per second) signal which can be used as an accurate clock signal.

When enabled 1 pulse per second coming from the GNSS receiver's own signal clock is generated on the DR_SYNC line which is available as an alternative function of GPIO1. The accuracy is +/-5 ms, pulse length is 1 ms. The 1PPS signal is provided as long as synchronized with the satellite clock, and continues after GNSS signal loss.
The 1PPS signal will be accurate only if the GNSS engine is active. Therefore, when using the 1PPS signal, the <FreqVal> interval should not exceed 5 sec to avoid that the GNSS engine enters IDLE state. Also, DPO shall be disabled (<PsmVal>=0), and <OutVal> shall be set to "on" or "buffered".
This parameter can only be changed when the GNSS engine is off (see parameter <EngineVal>). Changed settings take effect only after next UE restart. Parameter is global for all interfaces, non-volatile and will not be reset by AT&F.
When the DR_SYNC line is enabled, GPIO1 is not usable by GPIO related commands (see AT^SCPIN). Both functions are mutually exclusive.

"off"(D)	1PPS signal on DR_SYNC line is disabled.
"on"	1PPS signal on DR_SYNC line is enabled.

<NmeaInterface>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Interface" subcommand. Configures which AT command port is switched to NMEA data mode. A number as returned by AT^SQPORT parameter <id> has to be used.
If an AT command port is switched to NMEA mode, then this is indicated by a "CONNECT NMEA" URC on this AT command port. If the AT command port is switched backed from NMEA mode to normal AT command mode, then this is indicated by "OK".
All URCs for an AT command port switched to NMEA mode are disabled.
It is not possible to switch an AT command port to NMEA mode, when this AT command port is currently executing an AT command. Otherwise you will get a "+CME ERROR: operation temporary not allowed".
It is not possible to change the setting of this parameter if the dedicated NMEA mode is active (value of AT^SGPSC "Nmea/Output" parameter <OutVal> is set to "on"). Otherwise you will get a "+CME ERROR: operation temporary not allowed".
The setting of this parameter is non-volatile. So if you set some AT command port to NMEA mode, then this is also active after the next restart/new start. This will be indicated by the "CONNECT NMEA" URC but without a "^SYSSTART" URC before.
Parameter is global for all interfaces and will not be reset by AT&F.

“0“	No AT command port switched to NMEA data mode.
"1"..."3"(D)..."8"	The ID of the AT command port switched to NMEA data mode. Possible IDs are listed in the AT^SQPORT test command response. IDs 6 to 8 are Multiplex channels, hence usable only while Multiplex mode is active.

<OutVal>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Output" subcommand. Configures the output of NMEA sentences (see Section 16.1, GNSS NMEA Sentences) and RAW data.

“off“(D)	No output. If the GNSS engine is set to Sleep mode via <PsmVal>=1 then please note that after switching <OutVal> from "off" to "on" the GNSS engine may take a couple of seconds to transmit a position fix.
“on“	This option can be enabled no matter whether AT^SGPSC "Nmea/Data/Format" parameter <DataFormat> set to "Nmea" or "Raw". NMEA sentences or RAW data will be output on the dedicated NMEA port at the frequency set with <FreqVal>. This value is only usable if AT^SGPSC "Nmea/Interface" parameter <NmeaInterface> is not set to "0".
“last“	This option is allowed only for AT^SGPSC "Nmea/Data/Format" parameter <DataFormat> set to "Nmea". It can be used to query any time the NMEA sentence set most recently received by the GNSS engine and stored in an internal buffer. The benefit is that the NMEA data is instantly returned on the AT command instance where command was executed, eliminating the need to poll the dedicated NMEA instance. The response comes as one NMEA sentence set containing the sentences defined in Section 16.1, GNSS NMEA Sentences. It is provided in ASCII format (incl. "$" character).
“gpsdataurc“	This option is allowed only for if AT^SGPSC "Nmea/Data/Format" parameter <DataFormat> is set to "Nmea". It enables the output of NMEA sentences as "^SGPSE" URC type 3 ("NMEA sentence)". As a result, all NMEA sentences selected with AT^SGPSC "Nmea/Data" parameter <NmeaDataUrcMask> will be printed to the AT command ports with enabled "^SGPSE" URCs (see AT^SGPSE for details). For each single NMEA sentence, there will be a single URC. At the frequency specified with <FreqVal>, the GNSS engine will send a set of URCs for each set of NMEA sentences.

<NmeaDataUrcMask>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Data" subcommand. Applies only for AT^SGPSC "Nmea/Data/Format" parameter <DataFormat> set to "Nmea".
Determines the type of NMEA sentences presented via "^SGPSE" URC type 3 ("NMEA sentence") if <OutVal> is set to "gpsdataurc".
Precondition for showing the URCs is that the output of the corresponding satellite system is also enabled via, <GpsVal> <GlonassVal>, <GalileoVal>, <BeidouVal>, <QzssVal>.
To select the NMEA sentence types, you can set one of the single values listed below, or the sum created from arbitrary set of valid single-choices. By default, all types are enabled with value 255.

“0“	No presentation of NMEA data by URC.
“1“	All NMEA sentences with Talker ID $GP are enabled.
“2“	All NMEA sentences with Talker ID $GL are enabled.
“4“	All NMEA sentences with Talker ID $GA are enabled.
“8“	All NMEA sentences with Talker ID $BD are enabled.
“16“	All NMEA sentences with Talker ID $QZ are enabled.
“255“(D)	All available NMEA sentences are enabled (only for usage as command line parameter; in command response always the sum of the single values of the really enabled sentences is printed).

<DataFormat>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Data/Format" subcommand. Determines the format of GNSS data if <OutVal> is set to "on".
The setting can only be changed when the GNSS engine is off (<EngineVal>= "0").

“Nmea“(D)	NMEA sentences.
“Raw“	Raw data in binary format.

<DataRawMask>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Data/RawMask" subcommand. Determines the type of RAW data report if AT^SGPSC "Nmea/Output" parameter <OutVal> is set to "on", and if AT^SGPSC "Nmea/Data/Format" parameter <DataFormat> is set to "raw".
Precondition for showing the RAW data is that the output of the corresponding satellite system is also enabled via <GlonassVal>, <GalileoVal>, <BeidouVal>, <GpsVal>.
To select RAW data report types, you can set one of the single values listed below, or the sum created from arbitrary set of valid single-choices. By default, all types are enabled with value 255.

“0“	No data output.
“1“	Only Polynominal report enabled.
“2“	Only measurement report enabled.
“4“	Only SV info enabled.
“8“	Only position report enabled.
“255“(D)	All options are enabled (only for usage as command line parameter; in command response always the sum of the single values of the really enabled sentences is printed).

<FixUrcVal>(str)

Parameter of the AT^SGPSC "NMEA/URC" subcommand. Enables / disables the "^SGPSE" URC type "Position fix notification" that reports changes of the positioning fix state. For details see "^SGPSE" parameter <PositionStatus>. The advantage is that the information on the positioning state is displayed on an AT command instance (not on the NMEA instance).

“off“(P)	Disable URC.
“on“	Enable URC.

<AntVal>(str)(NV)

Parameter of the AT^SGPSC "Power/Antenna" subcommand. Configures the GNSS antenna power supply. This parameter can only be changed when the GNSS engine is off (see parameter <EngineVal>). Changing from "auto" mode to "on"/"off" modes or vice versa requires the UE to be restarted.

“off“	Antenna power off.
“on“	Antenna power supply always on (3.05 V).
“auto“(D)	Antenna power will be automatically switched on or off depending on GNSS engine activity. This mode automatically becomes always active after the GNSS engine was activated with <EngineVal> or if an E-911 emergency call was established by Control Plane.

<PsmVal>(str)(NV)

Parameter of the AT^SGPSC "Power/Psm" subcommand. Activates Sleep mode for the GNSS engine.
If Sleep mode is enabled with <PsmVal>= "1" it might be possible that GLONASS is not used for positioning when signal quality is good (NMEA sentences will not be output in this case).
See Section 16.3.1.1, Dynamic Power Optimization (DPO) for details.

“0“(D)	Off.
“1“	On. This setting requires: • AT^SGPSC "Nmea/FreqMs" <FreqMsVal> value is "1000" • AT^SGPSC "Nmea/DRSync" <DRSyncVal> value is "off" • AT^SGPSC "Nmea/Sbas" <SbasVal> value is "off" • AT^SGPSC "Nmea/Data/Format" <DataFormat> value is "Nmea"

<CpuVal>(str)(NV)

Parameter of the AT^SGPSC "Power/CPU" subcommand. Selects the CPU speed mode of the GNSS receiver.

“std“(D)	Standard mode.
“max“	Maximum speed mode. Shall be enabled only when the NMEA output frequency is below 1 second as configured with parameter <FreqMsVal> of the AT^SGPSC "Nmea/FreqMs" subcommand.

<Degree>(str)(NV)

Minimum GNSS Elevation Angle

Parameter of the AT^SGPSC "Sens/MinElevAngle" subcommand. Configures the Minimum GNSS Elevation Angle. The value can only be changed when the GNSS engine is off (see parameter <EngineVal>). Restart the UE for the change to take effect.

"5"(D)..."45"	Minimum GNSS Elevation Angle.

<RawVersion>(str)(NV)

Parameter of the AT^SGPSC "Raw/Version" subcommand. Shows the version number of the Location Service in the form "<major version>.<minor version>".

<Major NmeaVersion>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Version" subcommand. Shows the major version number of the NMEA protocol.

<Minor NmeaVersion>(str)(NV)

Parameter of the AT^SGPSC "Nmea/Version" subcommand. Shows the minor version number of the NMEA protocol.

Note

- During cold start of GNSS engine and when the output of Nmea GPS sentences is disabled, the module may stop sending empty frames on Nmea port for short time until it receives a position fix from the requested system (other than GPS). This is caused by AT^SGPSC Nmea configuration which blocks GPS sentences and at the beginning only GPS position fix is obtained.

16.3.1 Power Saving Considerations

The purpose of this section is to explain the modes provided by PLPS9-W to minimize current consumption while maintaining or getting a position fix. The settings can be made by using the command AT^SGPSC="Power/Psm",<PsmVal>.

16.3.1.1 Dynamic Power Optimization (DPO)

DPO is a power saving feature which attempts to turn off GNSS RF and other components when the components are not needed. DPO takes effect when enabled with <PsmVal>, when there is good GNSS signal visibility, and when the receiver has sufficient navigational data to perform a fix (either has GpsOneXTRA assistance data or has decoded it off-the-air). By delivery default of PLPS9-W, DPO is disabled (AT^SGPSC="Power/Psm",<PsmVal>= "0").

Preconditions for DPO to turn on:

- Have ephemeris for all SVs -> 26 dB-Hz or recent (<3.5 days) almanac corrections for those SVs provided by GpsOneXTRA assistance data.
- Health or UTC information is not transmitted over-the-air (i.e., not in subframe 4 of page 18, or subframes 4 and 5 of page 25).
- Valid position and HEPE is less than 50 m and also less than QoS timeout of 60 seconds.
- 6 SVs > 37 dB-Hz or 4 SVs > 26 dB-Hz and have almanac and health for all SVs.

Benefits and impact:

- The GNSS engine is not on continuously and the SV or navigational data cannot be decoded at that time.
- If GNSS is switched on (see AT^SGPSC parameters <EngineVal> and <OutVal>), GPS and GLONASS and GALILEO and Beidou and QZSS may altogether be employed for position calculation.
  Usage of GLONASS or GALILEO or Beidou or QZSS is added only if needed to get position fix. If the GPS signal is sufficient to get a fix, the GNSS engine automatically deactivates the usage and output of GALILEO, Beidou, QZSS in order to reduce power consumption. The output of GPS sentences can also be switched off. See AT^SGPSC parameters, <GpsVal> <GlonassVal>, <GalileoVal>, <BeidouVal>, <QzssVal>.
- TTFF and yield should not be impacted.

16.4 AT^SGPSE GNSS Event Notification

AT^SGPSE serves to monitor GNSS events. Information can be reported by the AT^SGPSE read command and by "^SGPSE" URCs.

Syntax

Test Command

AT^SGPSE=?

Response(s)

^SGPSE: (list of supported<urcMode>s), (list of supported<BufferStatus>s), (list of supported<BufferCount>s), (list of supported<PositionStatus>s), (list of supported<InfoUrcMinutes>s)
OK

Read Command

AT^SGPSE?

Response(s)

^SGPSE: <urcMode>, <BufferStatus>, <BufferCount>, <PositionStatus>, <InfoUrcMinutes>
OK

Write Command

AT^SGPSE=<urcMode>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Unsolicited Result Codes

URC 1

NMEA buffer notification (<UrcType> 0):

^SGPSE: <UrcType>, <BufferStatus>, <BufferCount>

URC 2

Position fix notification (<UrcType> 1):

^SGPSE: <UrcType>, <PositionStatus>

URC 3

XTRA file invalidity notification (<UrcType> 2):

^SGPSE: <UrcType>, <InfoUrcMinutes>

URC 4

NMEA data output (<UrcType> 3):

^SGPSE: <UrcType>, <NMEA_sentence>
[^SGPSE: <UrcType>, <NMEA_sentence>]
...

Parameter Description

<urcMode>(num)(NV)	
0(D)	Disable ^SGPSE URCs.
1	Enable ^SGPSE URCs. Keep in mind that each ^SGPSE <UrcType> has to be enabled with a specific AT^SGPSC subcommand.

<UrcType>(num)	
0	URC type "NMEA buffer notification". This URC type is enabled by setting the AT^SGPSC "Nmea/Output" subcommand with parameter <OutVal>= "buffered". The buffer mechanism and the URC are disabled if <OutVal>= "on" or "off". If the NMEA buffering mechanism is active (see <OutVal>), two URCs will be generated: The first URC will show up when approximately 80% of the buffer is filled. This way, the application has enough time to wake up and select <OutVal>= "on" in order to read and empty the buffer and get new NMEA sentences. The second URC will show up when the buffer is full.
1	URC type "Position fix notification". This URC type is enabled by setting the AT^SGPSC "Nmea/Urc" subcommand with parameter <FixUrcVal>= "on". <FixUrcVal>= "off" disables the URC. The URC is emitted each time when the state of the positioning fix changes, i.e. when the fix becomes valid or invalid.
2	URC type "XTRA file invalidity notification". This URC type is enabled by setting the AT^SGPSC subcommand "Info" with <InfoType>= "Urc" and <InfoUrcVal>= "on". Parameter <InfoUrcMinutes> specifies the number of minutes the URC shall show up before the injected XTRA file validity expires. <InfoUrcVal>= "Off" disables the URC.
3	URC type "NMEA sentence". If this URC type is enabled NMEA sentences will be handled as URCs. They will be printed to the URC destination instance, eliminating the need of the dedicated NMEA instance. For each single NMEA sentence, there will be a single URC. At the frequency specified with <FreqVal>, the UE will send a set of URCs for each set of NMEA sentences. This URC type is enabled by setting the AT^SGPSC "Nmea/Output" subcommand with parameter <OutVal>= "gpsdataurc". The types of NMEA sentences have to be configured with AT^SGPSC "Nmea/Data" parameter <NmeaDataUrcMask>.

<BufferStatus>(num)	
Status of NMEA buffer	
0	Buffer fill status is 80%.
1	Buffer is full. If the buffer is not emptied buffering stops to retain the data buffered data. This allows the TE to store the buffered data, e.g. for position tracking.

<BufferCount>(num)
GNSS NMEA buffer count
Number of bytes located in NMEA buffer

<PositionStatus>(num)	
0	Engine has no position fix.
1	Engine gets a fix position.

<InfoUrcMinutes>(num)	
0	Injected XTRA file is invalid.
1...10080	Injected XTRA file will be invalid in <InfoUrcMinutes> minutes.

<NMEA_sentence>(num)

A single NMEA sentence starting with $ prefix, exactly as defined in Section 16.1, GNSS NMEA Sentences.

16.5 Examples of How to Configure and Use GNSS

Below you can find selective examples of how to configure and use the PLPS9-W's integrated GNSS engine.

16.5.1 Loading Xtra.Bin File and Activating A-GNSS Start Mode

To take advantage of A-GNSS ensure that valid GpsOneXTRA assistance data (in short XTRA file) is available. To do so, first download a new GpsOneXTRA binary file via HTTP from one of the gpsOneXtra assistance web-servers. Save the received xtra*.bin file to your local memory and check the exact file size.
- http://xtra1.gpsonextra.net/xtra2.bin
- http://xtra2.gpsonextra.net/xtra2.bin
- http://xtra3.gpsonextra.net/xtra2.bin

Next, use AT+CCLK to set the RTC. Then, use AT^SBNW to store the GpsOneXTRA assistance data on the FFS. If AT^SBNW returns the responses "AGPS END OK" and "OK" the XTRA file will be injected to the GNSS engine. Finally, use AT^SGPSC to switch on the GNSS engine.

AT+CCLK="12/01/20,13:15:57" OK	Set PLPS9-W RTC to Greenwich Mean Time (instead of local time).
AT^SGPSC="Engine","0" ^SGPSC: "Engine","0" OK	Deactivate the GNSS engine.
AT^SBNW=agps,-1 CONNECT AGPS READY: RESET GPS ENGINE AND DELETE XTRA FILE ... AGPS: END OK OK	Optional: Remove existing xtra.bin file from GNSS receiver and FFS.
AT^SBNW="agps",59734 CONNECT	Write new XTRA file to FFS. File size is 59734 bytes.
AGPS READY: SEND FILE ... AGPS: END OK OK	New XTRA file is successfully stored to the FFS and injected into the GNSS engine.
AT^SGPSC="Power/Antenna","on" ^SGPSC: "Power/Antenna","on" OK	For active antenna only: Switch on antenna power supply.
AT^SGPSC="Engine","2" ^SGPSC: "Engine","1" OK	Switch on GNSS engine by using the injected XTRA file. The response confirms that the GNSS engine is active.
AT^SGPSC="NMEA/Output","on" ^SGPSC: "Nmea/Output","on" OK	NMEA output is enabled by power-up default, therefore setting this command is necessary only if NMEA output was deactivated before.

NMEA output will instantly start on the dedicated NMEA port. The example shows a position fix.

```
....
$GPGGA,123521.0,5232.017893,N,01316.443884,E,1,05,3.7,198.0,M,43.0,M,,*5C
$GPVTG,,T,0.0,M,0.0,N,0.0,K,A*0D
$GPRMC,123521.0,A,5232.017893,N,01316.443884,E,0.0,,270711,,,A*44
$GPGSA,A,3,09,14,25,27,29,,,,,,,,6.4,3.7,5.2*36
$GPGSV,3,1,12,01,,,29,02,19,122,19,09,50,142,26,14,38,288,26*46
$GPGSV,3,2,12,25,43,265,38,27,38,140,36,29,09,205,31,04,24,075,*78
$GPGSV,3,3,12,12,82,293,,17,11,043,,32,03,347,,30,,,*4B
$GPGGA,123522.0,5232.017872,N,01316.443885,E,1,06,1.9,198.0,M,43.0,M,,*5E
....
```

16.5.2 Trying to Load Invalid XTRA File

AT^SBNW=agps,-1	Optional: Remove existing xtra.bin file from FFS.
CONNECT	
AGPS READY: RESET GPS ENGINE AND DELETE FILE ...	
AGPS END OK	
OK	
AT^SBNW="agps",47616	Write new XTRA file to FFS. Specified number of bytes is greater than actual XTRA file size.
CONNECT	
AGPS READY: SEND FILE ...	Wrong check sum. File not saved.
BAD CRC	
ERROR	

16.5.3 Starting GNSS without Aiding

AT^SGPSC="Power/Antenna","on"	For active antenna only: Switch on antenna power supply.
^SGPSC: "Power/Antenna","on"	
OK	
AT^SGPSC="Engine","1"	Switch on GNSS engine.
^SGPSC: "Engine","1"	
OK	
AT^SGPSC="NMEA/Output","on"	NMEA output is active by power-up default, therefore setting this command is necessary only if NMEA output was deactivated before.
^SGPSC: "Nmea/Output","on"	
OK	

NMEA output will instantly start on the dedicated NMEA port. The example shows a position fix.

```
....
$GPGGA,123521.0,5232.017893,N,01316.443884,E,1,05,3.7,198.0,M,43.0,M,,*5C
$GPVTG,,T,0.0,M,0.0,N,0.0,K,A*0D
$GPRMC,123521.0,A,5232.017893,N,01316.443884,E,0.0,,270711,,,A*44
$GPGSA,A,3,09,14,25,27,29,,,,,,,,6.4,3.7,5.2*36
$GPGSV,3,1,12,01,,,29,02,19,122,19,09,50,142,26,14,38,288,26*46
$GPGSV,3,2,12,25,43,265,38,27,38,140,36,29,09,205,31,04,24,075,*78
$GPGSV,3,3,12,12,82,293,,17,11,043,,32,03,347,,30,,,*4B
$GPGGA,123522.0,5232.017872,N,01316.443885,E,1,06,1.9,198.0,M,43.0,M,,*5E
....
```

16.5.4 Cold Start

To trigger a cold start first clear current GNSS data inside GNSS receiver. Do not shut down or restart the UE afterwards. Simply switch on the GNSS engine.
This example uses AT^SGPSC defaults, such as <OutVal>="on", <FreqVal>=1 (1 second frequency interval).,<AntVal>="auto" for antenna power.

AT^SBNW=agps,-1	Clear current GNSS data inside GNSS receiver.
CONNECT	
AGPS READY: RESET GPS ENGINE AND DELETE FILE ...	
AGPS END OK	
OK	
AT^SGPSC="Engine","1"	Switch on GNSS engine.
^SGPSC: "Engine","1"	
OK	

NMEA output will instantly start on the dedicated NMEA port. The example shows a position fix.

```
....
$GPGGA,,,,,,0,,,,,,,,*66
$GPRMC,,V,,,,,,,,,,N*53
$GPGSV,3,1,11,02,19,045,35,04,45,295,33,05,16,071,40,09,,,33*44
$GPGSV,3,2,11,12,10,116,25,23,08,317,24,26,30,295,33,29,80,064,36*7C
$GPGSV,3,3,11,33,,,37,06,01,033,,14,,,*4F
$GPVTG,,T,,M,,N,,K,N*2C
$GPGSA,A,1,,,,,,,,,,,,,,*1E
$GPGGA,,,,,,0,,,,,,,,*66
$GPRMC,,V,,,,,,,,,,N*53
$GPGSV,3,1,11,02,19,045,36,04,45,295,34,05,16,071,41,09,,,34*46
$GPGSV,3,2,11,12,10,116,25,23,08,317,27,26,30,295,33,29,80,064,36*7F
$GPGSV,3,3,11,33,,,37,06,01,033,,14,,,*4F
$GPGGA,175612.0,5232.068356,N,01316.494305,E,1,03,6.5,43.8,M,43.0,M,,*60
$GPVTG,,T,0.0,M,0.0,N,0.0,K,A*0D
$GPRMC,175612.0,A,5232.068356,N,01316.494305,E,0.0,,120416,,,A*44
$GPGSA,A,3,02,26,29,,,,,,,,,8.9,6.5,6.1*3A
$GPGSV,3,1,11,02,19,045,36,04,45,295,34,05,16,071,41,09,,,34*46
$GPGSV,3,2,11,12,10,116,25,23,08,317,26,26,30,295,33,29,80,064,37*7F
$GPGSV,3,3,11,33,,,37,06,01,033,,14,,,*4F
$GPGGA,175613.0,5232.067004,N,01316.494489,E,1,03,2.1,41.6,M,43.0,M,,*65
$GPVTG,,T,0.0,M,0.0,N,0.0,K,A*0D
$GPRMC,175613.0,A,5232.067004,N,01316.494489,E,0.0,,120416,,,A*4D
$GPGSA,A,2,02,26,29,,,,,,,,,2.3,2.1,1.0*3D
$GPGSV,4,1,15,02,19,045,35,04,45,295,34,05,16,071,41,09,,,32*40
$GPGSV,4,2,15,12,10,116,24,23,08,317,24,26,30,295,33,29,80,064,37*7F
$GPGSV,4,3,15,33,,,38,06,01,033,,16,10,295,,20,08,122,*45
$GPGSV,4,4,15,21,16,192,,25,48,120,,31,51,233,*4F
....
```

17. Audio Commands

The AT Commands described in this chapter are related to the PLPS9-W's audio interface.

17.1 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), and during a voice call only. 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 [49]

Parameter Description

<mute>(num)	
0	Mute off
1(P)	Mute on

17.2 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 be used in alert state and during active voice calls and offers the following variants:

- AT+VTS=<dtmf>[,<duration>] allows to send a single DTMF tone. The duration can be indvidually determined during the call.
  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 [49]

Parameter Description

<dtmf>(str)

Single ASCII character in the set 0...9,#,*, A, B, C, D. The string must be enclosed in quotation marks ("...").

<duration>(num)

Tone duration in 1/10 seconds with tolerance.

The minimum duration of DTMF signals is 300ms. DTMF tones below 300ms cannot be generated.

1...255

17.3 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 [49]

Parameter Description

<duration>(num)

Duration of the DTMF signal in 1/10 seconds with tolerance.

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

17.4 AT^SAFH Audio File Handling

AT^SAFH can be used to play and record sound, e.g. speech to be played as voice prompt through the UE's speaker path. The command allows three different methods:

1. *Recording and playing audio via AT^SAFH=<audioAction>:*
   This option can be used to record sound or speech of up to 60 seconds. The record is stored in an internal non-volatile memory, and can be played back using AT^SAFH=<audioAction>. Only one audio file can be stored. Each AT^SAFH record action overwrites the existing audio file. The UE does not offer file handling options for recorded audio.
2. *Playing AMR or AMR-WB files via AT^SAFH=<audioAction>,</vp/<sound_index>>:*
   This option can be used to play back audio files previously stored to the module's FFS through AT^SBNW subcommand "sound". To list the stored audio files use the AT^SBNR subcommand "sound". AT^SAFH does not support recording AMR or AMR-WB files.
   - File size:
     The maximum size of a single file uploaded via AT^SBNW subcommand "sound" is 200,000 bytes.
     The storage of indexed files is limited to 3,000,000 bytes. This covers an overall playback time at highest bit rate of 8 minutes for AMR-WB and 30 minutes for AMR.

Supported file formats:

- AMR:
  Bit rates 4750, 5150, 5900, 6700, 7400, 7950, 10020 and 12200 kbps at a sample rate of 8000Hz with 16 bit resolution, single channel, compliant with RFC4867 but limited to mono and single channel header.
- AMR-WB:
  Bit rates 6600, 8850, 12650, 14250, 15850, 18250, 19850, 23050, 23850 kbps at a sample rate of 16000Hz with 16 bit resolution, single channel, compliant with RFC4867 but limited to mono and single channel header.
- The file format is detected by reading the header of the file. Therefore the filename extension is not significant for format recognition.

The AT^SIND command provides the "voiceprompt" indicator to notify the user when playback or recording starts and stops, or an error has occurred.

The microphone used for recording and the loudspeaker used for playback are selected by the audio interface configuration command AT^SAIC.

Syntax

Test Command

```
AT^SAFH=?
```

Response(s)

```
^SAFH: (list of supported <audioAction>s),(max length of </vp/<sound_index>>)
OK
```

Read Command

```
AT^SAFH?
```

Response(s)

```
^SAFH: <audioHandlerStatus>
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT^SAFH=<audioAction>[, </vp/<sound_index>>]
```

Response(s)

```
OK
```

Write Command (Continued)

AT^SAFH=<audioAction>[, </vp/<sound_index>>]

Response(s)

ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Reference(s)

3GPP TS 26.071 [56]

Parameter Description

<audioAction>(num)

Audio file handling command

0	Start playback
1	Stop playback
2	Start recording
3	Stop recording

<audioHandlerStatus>(num)

Audio handler status

0(P)	Idle, no operation in progress
1	Playback is in progress
2	Recording is in progress
3	Playback and recording are in progress

</vp/<sound_index>>(str)

Index of AMR or AMR-WB file on module's FFS

Index of the AMR or AMR-WB file stored on module's FFS with AT^SBNW subcommand "sound". The internal directory name /vp/ is hardcoded and cannot be changed. Therefore, the syntax of the parameter is: /vp/ followed by the index without separator, e.g. /vp/0, /vp/1, /vp/2 ... /vp/100.

Examples

EXAMPLE 1

Enabling URCs.

AT^SIND=audio,1 ^SIND: audio,1,0 OK AT^SIND=voiceprompt,1 ^SIND:voiceprompt,1,0 OK	Enable presentation of +CIEV indicators "audio" and "voiceprompt".

EXAMPLE 2

Recording an audio stream of up to 60 seconds.

AT^SAFH=2 OK +CIEV: audio,1 +CIEV: voiceprompt,2 AT^SAFH=3	Start recording speech spoken into the microphone of the active audio interface. Audio path is activated. Recording is started. Stop recording.

```
OK
+CIEV: audio,0                          Audio path is deactivated.
+CIEV: voiceprompt,0                    Recording stopped.
AT^SAFH?                                Read status.
^SAFH: 0                                Idle mode.
```

EXAMPLE 3

Playing the recorded speech, and stopping playback.

```
AT^SAFH=0                               Start playback of recorded speech.
OK
+CIEV: audio,1                          Audio path is activated.
+CIEV: voiceprompt,1                    Playback is started.
AT^SAFH=1                               Stop playback.
OK
+CIEV: audio,0                          Audio path is deactivated.
+CIEV: voiceprompt,0,2,0                URC confirms that playback was terminated by user.
                                        No error occurred.
```

EXAMPLE 4

Playing speech, without giving stop command AT^SAFH=1.

```
AT^SAFH=0                               Start playback of recorded speech. Wait until play-
                                        back stops.
OK
+CIEV: audio,1                          Audio path is activated.
+CIEV: voiceprompt,1                    Playback is started.
                                        Playback stops when speech ends.
+CIEV: audio,0                          Audio path is deactivated.
+CIEV: voiceprompt,0                    Playback stopped.
AT^SAFH?                                Read status.
^SAFH: 0                                Idle mode.
OK
```

EXAMPLE 5

Loading AMR or AMR-WB files to UE's FFS.

```
AT^SBNW="sound",1,57344                 Load file to index 1. File size is 57344 bytes.
CONNECT                                 Audio file can be transferred.
SOUND READY: SEND FILE
SOUND: END OK                           Transfer completed.
OK
AT^SBNW="sound",2,15990                 Load file to index 2. File size is 15990 bytes.
CONNECT                                 Audio file can be transferred.
SOUND READY: SEND FILE
SOUND: END OK                           Transfer completed.
OK
AT^SBNW="sound",3,92778                 Load file to index 3. File size is 92778 bytes.
CONNECT                                 Audio file can be transferred.
SOUND READY: SEND FILE
SOUND: END OK                           Transfer completed.
OK
AT^SBNW="sound",4,14289                 Load file to index 4. File size is 14289 bytes.
CONNECT                                 Audio file can be transferred.
SOUND READY: SEND FILE
SOUND: END OK                           Transfer completed.
OK
AT^SBNR="sound"                         List files on FFS.
```

^SBNR: 1,57344 ^SBNR: 2,15990 ^SBNR: 3,92778 ^SBNR: 4,14289 OK	Index and size of each file are listed.

EXAMPLE 6

Removing AMR or AMR-WB file from UE's FFS.

AT^SBNW="sound",4,0	Remove file at index 4 from FFS. File size parameter is 0.
SOUND READY: DELETE SOUND FILE	UE tries to delete audio file.
SOUND: END OK	Audio file has been deleted.
OK	

EXAMPLE 7

Playing AMR or AMR-WB files from FFS, and stopping playback.

AT^SAFH=0,"/vp/3"	Start playback of file located at index 3 on FFS.
OK	
+CIEV: audio,1	Audio path is activated.
+CIEV: voiceprompt,1	Playback is started.
AT^SAFH=1	Stop playback.
OK	
+CIEV: audio,0	Audio path is deactivated.
+CIEV: voiceprompt,0,2,0	URC confirms that playback was terminated by user. No error occurred.
AT^SAFH?	Read status.
^SAFH: 0	Idle mode.
OK	

17.5 AT^SAIC Audio Interface Configuration

AT^SAIC can be used to configure the digital audio interface as PCM and as I²S. Further information regarding audio functionality is available in the "PLPS9-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)
OK

Read Command

AT^SAIC?

Response(s)

^SAIC: <io>, <mic>, <ep>, <bclk>, <mode>, <frame_mode>, <clk_mode>, <sample_rate>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SAIC=<io>, <mic>, <ep>, <bclk>, <mode>, <frame_mode>, <clk_mode>[, <sample_rate>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Parameter Description

<io>(num)

Input and output selection

4	Digital input and output (PCM)
5(P)	Digital input and output (I²S)

<mic>(num)

Microphone selection

1(P)	Microphone 1

<ep>(num)

Select differential earpiece amplifier

1(P)	Selects the earpiece amplifier 1

<bclk>(num)

Parameter configures the Bit Clock (BCLK) signal for PCM and I²S.
Parameter is always mandatory, but only effective if <io>=4 (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>.

0	256 kHz Bit Clock if <sample_rate>= 1
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(P)	2048 kHz Bit Clock if <sample_rate>= 0 4096 kHz Bit Clock if <sample_rate>= 1

<mode>(num)

Master or Slave mode for PCM and I²S. Specifies if BCLK and FSC signals are either output (Master) or input (Slave).
Parameter is always mandatory.

0(P)	Master mode
1	Slave mode

<frame_mode>(num)

Parameter configures the Frame Synchronization (FSC) signal.
Parameter is always mandatory, but only effective if <io>=4 (PCM).
I²S always uses a 32 bit stereo voice signal (16 bit word length) regardless of the value selected with <frame_mode>.

0(P)	Short frame
1	Long frame

<clk_mode>(num)

Clock mode

If <io>=4 (PCM):
On the PCM interface this parameter configures the mode of the BCLK signal.

0	BCLK signal will be provided permanently when the digital audio path is configured. Please note that if the BCLK signal is permanently provided the UE will no longer enter its power save (SLEEP) state.
1(P)	BCLK signal will be provided only during digital audio activity (non permanent).

If <io>=5 (I²S):
On the I²S bus this parameter configures the mode of the optional Bit Clock output signal.

0	I²S Bit Clock is permanently on. Please note that if the BCLK signal is permanently provided the UE will no longer enter its power save (SLEEP) state.
1(P)	I²S Bit Clock will be automatically provided only during audio activity (non-pernament).

<sample_rate>(num)

Sample rate. Parameter is optional.

0	8 kHz
1(P)	16 kHz

Note

- The default values of AT^SAIC after restart of ME are ^SAIC: 5,1,1,3,0,0,1,1 for every audio mode.

17.6 AT^SNFG Generate Tone

The AT^SNFG write command generates a 'local tone' via the selected audio output device.
Beside the duration up to 2 combinations of frequency can be used to compose a local tone.

Syntax

Test Command

AT^SNFG=?

Response(s)

^SNFG: (list of supported <duration>s), (list of supported <gain>s), (list of supported <frequency>s), (list of supported <frequency>s)
OK

Write Command

AT^SNFG=<duration>, <gain>, <frequency>[, <frequency>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Parameter Description

<duration>(num)	
1...65535	Duration in milliseconds.
0	Mutes the currently played tone immediately.
65535	Activates a tone with infinite duration.

<gain>(num)	
1...43	Gain of the tone generator belonging to a frequency, ranging from -42 dB to 0 dB. 43 gain levels adjustable in steps of 1dB. (1 = -42 dB, 43 = 0dB)

<frequency>(num)	
200...3400	Frequency in 1 Hz steps. Audible bandwidth is limited due to the voice band filters.

Notes

- Response of the command is always "OK" as long as the input parameters are valid.
- Tone priorities
  There is no prioritization of any tone of sound types, such as the Local tones generated with AT^SNFG as well as Ring tones, Supervisory tones, Call Progress tones, tones invoked by SAT, RTC tones and DTMF tones. This means that if any kind of tone our sound is started then it will simply stop other tones or sounds.
- To suspend a local tone from playing use "AT^SNFG=0".
- Local tones started by this AT command trigger the audio related indicators provided by AT interface in the way as these indicators are defined by AT^SIND commands.

- Local tone generation works during and out of a call. If a tone is started after call establishing then speech and this tone will be mixed. If a tone is started before call establishing then the tone might be no longer audible although the internal processing of the tone is still running. The duration of the tone remains valid, i.e. a non-infinite tone will stop after the given duration and an infinite tone keeps playing. The URC "+CIEV: sounder" will indicate this behavior.
- Tones played by AT^SNFG cannot be muted by AT^SCFG="Audio/SvTone".

17.7 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 <micAmp1>s), (list of supported <micAmp2>s), (list of supported <micTxVol>s)
OK

Read Command

AT^SNFI?

Response(s)

^SNFI: <micAmp1>, <micAmp2>, <micTxVol>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SNFI=<micAmp1>, <micAmp2>, <micTxVol>

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Parameter Description

<micAmp1>(num)	
0(P)	Fixed value

<micAmp2>(num)	
16(P)	Fixed value

<micTxVol>(num)	
16384(P)	Fixed value

17.8 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 <cdcRxGain>s) , (list of supported <rxVol>s) , (list of supported <stGain>s) , (list of supported <rxVolStep>s) , (list of supported <toneVolStep>s)
OK

Read Command

AT^SNFO?

Response(s)

^SNFO: <cdcRxGain>, <rxVol>, <stGain>, <rxVolStep>, <toneVolStep>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SNFO=<cdcRxGain>, <rxVol>, <stGain>[, <rxVolStep>][, <toneVolStep>]

Response(s)

OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Parameter Description

<cdcRxGain>(num)

57(P)	Fixed value.

<rxVol>(num)

33(P)	Fixed value.

<stGain>(num)

0(P)	Fixed value.

<rxVolStep>(num)

<rxVolStep> configures the speaker volume step. Parameter is effective only for PCM and I²S.

0(P)...5	6 volume levels ranging from -15 dB to 0 dB, adjustable in steps of 3 dB. (0 = 0dB, 5 = -15 dB)

<toneVolStep>(num)

<toneVolStep> configures the tone generator volume step for locally generated supervisory tones and SAT tones.

1...43(P)	43 volume levels ranging from -42 dB to 0 dB, adjustable in steps of 1 dB. (1 = -42 dB, 43 = 0 dB)

17.9 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.
Further information regarding audio functionality is available in the "PLPS9-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 "PLPS9-W Hardware Interface Description" for information on this handset). Note: The powerup default parameters are determined for type approval.
2	Audio mode 2: Reserved value.
3	Audio mode 3: Reserved value.
4	Audio mode 4: Reserved value.
5	Audio mode 5: Reserved value.
6	Audio mode 6: Echo canceller and noise suppressor are preset for transparent applications.

17.10 AT^SRTC Ring tone configuration

The AT^SRTC test command returns a list of ranges for parameter <event>, <number> and <volume>.

The AT^SRTC read command returns the currently set ring tone melody <number> and ring tone volume <volume> for the incoming <event> voice call.

The AT^SRTC write command allows to configure the parameters ring tone melody <number> and ring tone volume <volume> for the ring tone event <event> voice call.

The AT^SRTC execution command is intended for testing. It starts to test the settings currently selected for <event>=1 (incoming calls). To stop test playback use AT^SRTC again. To try different settings use the AT^SRTC write command, select another configuration and start the AT^SRTC execution command once again. An incoming or outgoing call stops the test started by using the AT^SRTC execution command.

Syntax

Test Command

```
AT^SRTC=?
```

Response(s)

```
^SRTC:(list of supported <event>s) , (list of supported <number>s) , (list of supported <volume>s)
OK
```

Read Command

```
AT^SRTC?
```

Response(s)

```
^SRTC: 0, <number>, <volume>
^SRTC: 1, <number>, <volume>
^SRTC: 2, <number>, <volume>
OK
ERROR
+CME ERROR: <err>
```

Exec Command

```
AT^SRTC
```

Response(s)

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

Write Command

```
AT^SRTC=<event>, <number>, <volume>
```

Response(s)

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

PIN	✈	Last
-	+	-

Parameter Description

<event>(num)

Ring tone melodies for the following events. Melody will be played from the audio output.

0	Ringing alert for incoming voice calls.

1	For testing only.
2	Reserved value.

<number>(num)

Type or number of ring tone melody. You have a choice of ring tone melody or mute. Ring tone melody will be played from the audio output. <number>=0 is only intended for muting.

0(P)	No ringing alert melody.
1	Melody #1 active.
2	Melody #2 active.
3	Melody #3 active.
4	Melody #4 active.
5	Melody #5 active.
6	Melody #6 active.
7	Melody #7 active.
8	Melody #8 active.
9	Melody #9 active.

<volume>(num)

The volume of ring tone melodies varies from 0 dB to mute.

0(P)	Mute.
1	Volume level 1, set to -12dB.
2	Volume level 2, set to -8dB.
3	Volume level 3, set to -4dB.
4	Volume level 4, set to 0dB.

18. Hardware related Commands

All AT commands described in this chapter are related to the hardware interface of the PLPS9-W. Further information regarding this interface is available in the "PLPS9-W Hardware Interface Description" [2].

18.1 AT+CCLK Real Time Clock

AT+CCLK controls the real time clock (RTC) of PLPS9-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 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.
Changing the RTC influences an active automatic shutdown timer (see AT^SCFG parameter <shutdownRemainingTime> for details).
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 [49]

Parameter Description

<time>(str)(NV)

Real time clock setting

Format is "yy/mm/dd,hh:mm:ss", 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) and seconds (ss).
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 equates to "17/07/06,22:10:00".

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 reponse 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 [49].
  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 daving 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)

18.2 AT^SAD Antenna Configuration

AT^SAD controls usage of the module's UMTS/LTE (RX) diversity/MIMO antenna.

For RX antenna diversity, the AT^SAD command enables verification of receive paths. RX antenna diversity means usage of two antennas and two receiver paths to provide significant gains in performance. The gains depend on how 'decoupled' the antennas are from each other. Transmitter (TX) signal is always transferred via primary antenna.

Syntax

Test Command

```
AT^SAD=?
```

Response(s)

```
^SAD: (list of supported <sadMode>s)
OK
```

Write Command

```
AT^SAD=<sadMode>[, <componentCarrier>]
```

Response(s)

```
^SAD: <sadValue>[, <componentCarrierValue>]
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
-	+	-

Parameter Description

<componentCarrier>(num)

This parameter is used for selecting available Component Carrier (CC, Carrier Aggregation)

0(D)	PCC (Primary CC)
1	SCC1 - Secondary CC number 1
2	SCC2 - Secondary CC number 2
3	SCC3 - Secondary CC number 3
4	SCC4 - Secondary CC number 4

<componentCarrierValue>(num)

The meaning of this parameter depends on given <sadMode>. For <sadMode>=[10, 11, 13], <component-CarrierValue> returns the currently stored configuration of the component carrier which will be used after next restart of the UE. For <sadMode>=12, <componentCarrierValue> returns the current non-volatile memory setting (range 0 to 4).

<sadMode>(num)

This parameter controls usage of the RX diversity antenna.

<sadMode> RX antenna diversity related settings 10, 11, 13 are stored in the non-volatile memory, any change takes effect after next UE power-up. An error is returned if write access to non-volatile storage fails.

10	Testing mode: Disable RX diversity functionality. Activate only the first antenna for RX operation, i.e. use the primary (main) antenna for RX operation. The secondary (diversity) receiver path is switched off.

11(D)	Enable RX diversity functionality by activating both antennas for RX operation.
12	Query RX diversity functionality setting. <sadValue> returns the currently stored configuration.
13	Testing mode: The primary (main) antenna port is used as TX chain. However, the related receiver path is switched off. Only the secondary (diversity) antenna is activated for RX operation.

<sadValue>(num)

The meaning of this parameter depends on given <sadMode>.

For <sadMode>=[10, 11, 13] <sadValue> returns the currently stored configuration of the RX diversity functionality, which will be used after next restart of the UE.
For <sadMode>=12 <sadValue> returns the current non-volatile memory setting (range 10, 11, 13).

18.3 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

18.4 AT^SCTM Critical Operating Temperature Monitoring

AT^SCTM allows to monitor the operating temperature range of the PLPS9-W device. Refer to "PLPS9-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: URC presentation depends on setting of <UrcMode>= 0 (disabled) or 1 (enabled). During guard period PLPS9-W will not switch off, even if the critical temperature limit is exceeded.

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 PLPS9-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 PLPS9-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 PLPS9-W device.
- The board temperature (in degree Celsius) if parameter <tempCtrl>=1.

Syntax

Test Command

```
AT^SCTM=?
```

Response(s)

```
^SCTM:(list of supported <UrcMode>s)[, (range of <temp>in Celsius)]
OK
```

Read Command

```
AT^SCTM?
```

Response(s)

```
^SCTM: <UrcMode>, <UrcCause>[, <temp>]
OK
ERROR
+CME ERROR: <err>
```

Write Command

```
AT^SCTM=<UrcMode>[, <tempCtrl>]
```

Response(s)

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

PIN	✈	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 PLPS9-W device temperature warning.

Parameter Description

<UrcMode>(num)	
URC presentation mode. Setting will not be stored during power-down, i.e. after next restart default setting will be restored.	
0(&F)(P)	Disable URC presentation (except for <UrcCause> equal to -2 or +2).
1	Enable URC presentation.

<UrcCause>(num)	
-2	Below lowest temperature limit (causes switch-off after 5 s time).
-1	Below low temperature alert limit.
0	Normal operating temperature.
1	Above upper temperature alert limit.
2	Above uppermost temperature limit (causes switch-off after 5 s time).

<tempCtrl>(num)	
0(P)	Suppress output of <temp> in read command.
1	Output <temp> in test and read command.

<temp>(num)
Board temperature in Celsius. Is comprised between the lowest temperature warning level and the uppermost temperature warning level.

Examples

EXAMPLE 1

URCs issued when the operating temperature is out of range:

^SCTM_B: 1	Caution: Module close to overtemperature limit.
^SCTM_B: 2	Alert: Module is above overtemperature limit and switches off.
^SCTM_B: -1	Caution: Module close to undertemperature limit.
^SCTM_B: -2	Alert: Module is below undertemperature limit and switches off.

EXAMPLE 2

URC issued when the temperature is back to normal (URC is output once):

^SCTM_B: 0	Module back to normal temperature.

18.4.1 Deferred shutdown

In the following cases, automatic shutdown will be deferred if a critical temperature limit is exceeded:

- While an emergency call is in progress.
- During a 2 minutes guard period after powerup. This guard period has been introduced in order to allow for the user to make an emergency call. The start of any one of these calls extends the guard period until the end of the call. Any other network activity may be terminated by shutdown upon expiry of the guard time.

While in a "deferred shutdown" situation, the engine continues to measure the temperature and to deliver alert messages, but deactivates the shutdown functionality. Once the guard period is expired or the call is terminated, full temperature control will be resumed. If the temperature is still out of range, the UE switches off immediately (without another alert message).

CAUTION!
Automatic shutdown is a safety feature intended to prevent damage to the module. Extended usage of the deferred shutdown facilities provided may result in damage to the module, and possibly other severe consequences.

18.5 AT^SSPI Configure I2C

AT^SSPI enables PLPS9-W to be connected to external I²C devices.
The I²C datastream is mapped through an internal I²C driver to and from an ASCII hex protocol which can be exchanged with an external application via V24.
The AT^SSPI write command configures and activates the I²C interface and changes from command mode into data mode. All values must be given in hexadecimal format (0 - 9, A - F) without "0x". For further details, please refer to Section 18.5.1, Transmitting Data over AT Interface.

Syntax

Test Command

AT^SSPI=?

Response(s)

^SSPI:(list of supported <basicConfiguration>s)
OK

Read Command

AT^SSPI?

Response(s)

^SSPI: <connectionState>,<basicConfiguration>
OK
ERROR
+CME ERROR: <err>

Write Command

AT^SSPI=[<basicConfiguration>]

Response(s)

CONNECT
(indicates that ME has entered data mode)
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	+

Parameter Description

<connectionState>(num)

Parameter returned by the AT^SSPI? read command.
Indicates whether or not the I²C channel is used. When the channel is open and the ME is in data mode , the read command can only be used if one of the remaining interfaces is available.

[0]	Not connected (channel closed). All following parameters are the factory settings ^SSPI: 0,0010.
1	Connected (channel open, ME in data mode). All following parameters are the values currently used, for example ^SSPI: 1,0010.

<basicConfiguration>(num)

Parameter <basicConfiguration> is a 16 bit word which contains four subparameters to control the following functions:

Subparameter	Bit	Hexadecimal	Selected function
Interface type	D15 - D12	0	I²C bus
Port	D11 - D8	0	Internal port
Data transfer rate	D7 - D4	0 1	I²C at 100 kbps I²C at 400 kbps
Protocol	D3 - D0	0	ASCII (hex coding)

18.5.1 Transmitting Data over AT Interface

This section provides information on the protocol used for data transmission to or from I²C devices and explains the data mode. It is assumed that you are familiar with the I²C specification.
Throughout this section the following document conventions are used to mark the direction of send and receive:
Transfer Message: AT → I²C device driver
Response Message: AT ← I²C device driver

Open / Close channel
To change from command mode to data mode use the AT^SSPI write command. To close down the channel and return to command mode send the ASCII code # (0x23).

Open ASCII protocol for I²C communication over AT interface:
The protocol allows using a Terminal program for the communication between the UE and the I²C slave device. To visualize transferred characters and response data it is recommended to run the Terminal program in chat mode or to switch on local echo. For transfer and response, special characters are defined, such as Start and Stop to mark a single message and Close to disconnect the data channel. All valid special characters are listed below:

Table 18.1: Special characters for ASCII coding

Direction AT - Driver	Function in protocol	Special character	Hex value	Description
→	Start Transfer Message	<	0x3C	Special character sent to the I²C driver to start sending.
→	Stop Transfer Message	>	0x3E	Special character sent to the I²C driver to stop sending.
→	Repeated Start Message	*	0x2A	Triggers a Repeated Start condition.
→	Channel Close	#	0x23	For signalling. Channel Close can be sent any time inside or outside a transmit or receive message. Causes the transfer to be aborted and takes the ME back to AT command mode.
←	Start Response Message	{	0x7B	Special character sent to the I²C driver to mark the beginning of a Response Message.
←	Stop Response Message	}	0x7D	Special character sent to the I²C driver to mark the end of a Response Message.
←	Protocol error	!	0x21	For signalling.Reports to the AT interface that the Transfer Frame does not comply with the protocol definition (syntax error).

Direction AT - Driver	Function in protocol	Special character	Hex value	Description
←	Transmission OK (in I²C protocol referred to as ACK)	+	0x2B	Notifies the AT interface that data were successfully transmitted or , on the I²C bus, the I²C Slave Address was recognized.
←	Transmission error (in I²C protocol referred to as NAK)	-	0x2D	Notifies the AT interface that data transmission failed or the I²C Slave Address was not recognized.

Message syntax
Each Message consists of a Start and Stop character, a Message ID, further protocol data and user data. The notation of all elements is explained below.

Notation of Message ID

- All ASCII characters between 0x00...0x7F. It is recommended to use only the characters 0...9, A...Z, a...z.
- Length of the Message ID: only one character

Notation of protocol data (except Message ID) and user data:

- Hex (0...9, a...f, A...F)
- Without "0x" (0x01 → 01)
- Each hex value consists of 2 characters (1 → 01)
- Without delimiters such as comma, semicolon, space etc. (0xAE 0x01 0xA5 → AE01A5)
- In a Transfer Message, the number of all characters after the Message ID shall be even. If it is odd, a protocol error will be reported. This applies to the I²C Slave Address and all subsequent written user data. Keep in mind that the number of all characters transmitted between Start < and Stop > of the Transfer Frame shall always be odd because the ID is one character only.
- Length of I²C Slave Address and user data: ≤ 2048 bytes
- The first element of each message is the Start character (< for Transfer, { for the Response). Accordingly, the last character of a message is the Stop character (> for Transfer, } for the Response).
  The second element of each message is the Message ID (1 character). The Message ID serves the user to distinguish among different messages. It is only relevant on protocol level (between AT interface and I²C device driver), i.e. it is not sent to the I²C slave device.
  Each transfer to the device is followed by a Response Message sent from the driver to the AT interface. The response includes the Message ID and either OK ("+") or error characters ("-" or "!"). A successful response to a Read Message contains the OK character and the read data. If an error occurs on the I²C bus, the response consists of an error character.
  After each Transfer Message, wait for the Response Message before sending the next Transfer Message.
  All characters entered outside a valid message (i.e. not input between Start character < and Stop character >) are ignored.

Structure of Messages on the I²C Bus

Table 18.2: Structure of Transfer and Response Messages on the I²C bus

Frame	Format
Write Transfer Message	*<ID SlaveAddress Data>* Maximum length: 2048 bytes for I²C bus Slave Address and written data. LSB of I²C bus Slave Address = "0".
Read Transfer Message	*<ID SlaveAddress ReadLength>* Read Length ≤ 2048 bytes. LSB I²C of Slave Address = "1".

Frame	Format
Transfer Message with Repeated Start condition	*<ID SlaveAddress Data * … * SlaveAddress ReadLength>* Transfer Message with Repeated Start condition may contain one or more Write Requests and maximum one Read Request that must be placed at the end of Transfer Message.
Response Write OK Read of x bytes OK NAK if Read or Write transmission fails Protocol error near x^{th} byte	 *{ID + }* *{ID + Data}* *{ID - 0}* *{ID ! xxxx}*

- On the I²C bus, read and write data are handled in two separate frames transmitted one after the other. This is because the I²C bus has only two bus lines, I2CDAT for the serial data and I2CCLK for the serial clock. Write data are packed into a Transfer Frame. Read data are packed into a Response Frame. The Transfer Frame contains a Receive or Transmit Request (R/W Request) for the I²C master.
- In a Transfer Message (Read or Write), the third element is the 7-bit I²C Slave Address (2 characters) that identifies each single device connected to the bus. The 8th bit of this byte is the LSB that determines the direction of a message. If the LSB is "0" the master will write information to the selected slave. If the LSB is "1" the master will read information sent from the slave.
- In a Read Transfer Message on the I²C bus, the size of the expected data must be specified explicitly. This is an element of 4 characters stating the number of bytes to be read. It must be placed after the I²C Slave Address.
- It is possible to send one or more Write Requests and maximum one Read Request without sending Stop signal on I²C bus between them using Repeated Start condition. If Transfer Message with Repeated Start condition contains Read Request it must be placed as last request in the Transfer Message. In such case read data is packed into a Response Frame.

18.5.2 Error Handling on the I²C Bus

Protocol error:
If a protocol error is detected the ASCII value "!" is sent to the AT interface. A protocol error occurs if:

- any data / address characters do not equal 0...9, a...f and A...F
- the length of a read word is smaller or greater than 16 bits
- the number of ASCII data is odd (e.g. "af1" instead of "af01")
- the Read or Write request is greater than 2KB (0x0800).

Acknowledge:
Once a transmission has completed successfully (Write or Read), the special character "+" (ACK) is included in the Response sent to the AT interface. During a Write Transfer, the I²C driver acknowledges each transferred byte, but the Response contains only one ACK which is transmitted only if all bytes are successfully transferred. During a Read Transfer, an ACK is sent when the I²C slave device notifies that it has recognized the I²C Slave Address.

Not Acknowledge:
During a Transmit Transfer, a NAK is given when the I²C Slave Device notifies a failure to receive neither the I²C Slave Address nor a data byte. In this case, a Stop Condition is sent to the I²C device. During a Receive Transfer, a NAK is transmitted only when the I²C does not receive any response for the I²C Slave Address. The I²C device never acknowledges the validity of the received data (by sending an ACK the master acknowledges each received byte to the slave).

18.5.3 Example: Using I²C Bus

As stated above, it is recommended to run the Terminal program in chat mode or to use the local echo. First, activate the I²C interface:

AT^SSPI=0010 CONNECT	The first group of characters forms the <basicConfiguration>, where the first "0" sets I²C, the second "0" is the internal port, the digit "1" sets 400 kbps bit rate on the I²C bus, and the next "0" selects ASCII coding. Note: If omitted all above parameters are assumed by default. Therefore, instead of AT^SSPI=0010 it is sufficient to only enter AT^SSPI= The CONNECT response shows that the module has entered data mode and is ready to transmit data.

The module is in data mode now. This allows you to send a Write Transfer Message:

<aAE000102030405060708090A0B0C0D0E0F>	Write Transfer Frame, where a = ID, AE = Slave Address and write request.
{a+}	Write Response Message, where a = ID.
<bAF0010>	Read Transfer Message, where b = ID, AF = Slave Address and read request, 0010 = number of expected bytes.
{b+000102030405060708090A0B0C0D0E0F}	Read Response Message, where b = ID.
<cAE0001020304050607*AF0008>	Transfer Message with Repeated Start condition, where a = ID. Contains one Write Request where AE = Slave Address and one Read Request where AF=Slave Address, 0008 = number of expected bytes.
{c+0001020304050607}	Response Message, where c = ID.
#	To quit data mode and return to command mode enter the Close character # .
OK	The response OK confirms that the ME is back to command mode and ready to accept any AT commands.

If the ME is in command mode, the response to the read command contains the factory settings.

AT^SSPI? ^SSPI: 0,0010 OK	The read command returns the connection state "not connected" (Channel closed) and the factory settings for I²C.

If the ME is in data mode, the response to the read command contains the current settings.

AT^SSPI? ^SSPI: 1,0010	The read command returns the connection state "connected" (Channel open) and the current settings for I²C.

18.6 AT^SRADC Configure and Read A/D Converter

AT^SRADC controls the UE's Analog-to-Digital Converter (ADC). This allows to measure the voltage of external devices connected to the ADC input lines.
AT^SRADC write command configures the parameters required for ADC measurement and returns the measurement result(s). The value(s) can be delivered once on request by using the single measurement mode, or periodically by specifying a measurement interval.
For details refer to "PLPS9-W Hardware Interface Description, Version 01.002".

Syntax

Test Command

AT^SRADC=?

Response(s)

^SRADC: (list of supported <ch>s), (list of supported <op>s), (list of supported <it>s)
OK

Read Command

AT^SRADC?

Response(s)

^SRADC: <ch>, <op>, <it>
[^SRADC: <ch>, <op>, <it>]
[^SRADC: ...]
OK

Write Command

Single measurement (with automatic channel open and close):

AT^SRADC=<ch>

Response(s)

^SRADC: <ch>, <count>, <value>
OK
ERROR
+CME ERROR: <err>

Write Command

Periodic measurement:

AT^SRADC=<ch>, <op>[, <it>]

Response(s)

[^SRADC: <ch>, <count>, <value>]
OK
ERROR
+CME ERROR: <err>

PIN	✈	Last
-	+	-

Unsolicited Result Code

ADC measurement URC (only used in periodic measurement mode).

^SRADC: <ch>, <count>, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>]]]]]]]]]

Parameter Description

<ch>(num)

ADC channel

0	First ADC channel (ADC1_IN)
1	Second ADC channel (ADC2_IN)
2	Not supported by the UE.
3	Fourth ADC channel (ADC4_IN)
4	Fifth ADC channel (ADC5_IN)

<op>(num)

Operation

Open or close ADC channel for measurement.
If parameter is not specified, then single measurement mode is initiated (with open and close of channel). Single measurement is not allowed if the channel is already open.

[0]	Close ADC channel (value of parameter <it> is ignored).
1	Open ADC channel

<it>(num)

Measurement interval

Parameter is used only if operation <op> is 1 (Open).

Single Measurement Mode:

[0]	Performs a single measurement (incl. close of channel).

Measurement interval in ms for Periodic Measurement Mode:

Measurement interval and URC output:
The URC output interval is miminum 1000 ms. This means if the measurement interval <it> is smaller than 1000 ms, then every second one URC will be output containing several measurement values. If <it> is equal 1000 ms or greater, each URC contains exactly one single measurement value. See examples below.

URC buffer mechanism:
If the interface is not free (e.g., during execution of an AT command) measurement values are buffered. Up to 5 URCs can be buffered, each containing up to 11 measurement values. After freeing the interface, all buffered URCs will be printed out. Loss of measured values, if any, is indicated by an additional 6th URC containing the value "32767". See example below.

Possible values in milliseconds (ms):

100

200

250

500

1000...30000

<value>(num)

Measurement value

Measurement value in mV

<count>(num)	
1...11	Number of measured samples In single measurement mode: <count> is always 1. In periodic measurement mode: <count> is the number of <value>s indicated by the URC "^SRADC". The higher the sample rate set with <it>, the more measured values are reported within the URC "^SRADC".

Examples

EXAMPLE 1

Single measurement

```
AT^SRADC=0                          Open the first ADC channel for single measurement.
^SRADC: 0,1,78
OK
```

EXAMPLE 2

Periodic measurement at low sample rate (5s):

```
AT^SRADC=0,1,5000                   Start periodic measurement mode on the first ADC
^SRADC: 0,1,76                      channel. Samples are taken every 5s. Every 5s the
^SRADC: 0,1,78                      URC "^SRADC" appears to report the measured volt-
^SRADC: 0,1,76                      ages. The second parameter represents the number
                                    of measured samples, in this case only one.
^SRADC: 0,1,76
AT^SRADC=0,0                        Stop the periodic measurement
OK
```

EXAMPLE 3

Periodic measurement at high sample rate (250ms):

```
AT^SRADC=0,1,250                    Start periodic measurement on the first ADC chan-
^SRADC: 0,4,76,76,77,76             nel. Samples are taken every 250ms. Every second
^SRADC: 0,4,76,76,75,76             a URC "^SRADC" appears to report the measured
^SRADC: 0,5,77,77,76,76,76          voltage. The number of samples is 4 or 5.
^SRADC: 0,4,76,76,75,76
AT^SRADC=0,0
OK                                  Stop the periodic measurement
```

EXAMPLE 4

Handling of "^SRADC" URCs and AT command execution on the same interface:

```
AT^SRADC=0,1,250                    Start periodic measurement mode on the first ADC
^SRADC: 0,4,76,76,77,76             channel. Samples are taken every 250ms.
^SRADC: 0,5,77,77,76,76,76
^SRADC: 0,4,76,76,75,76
^SRADC: 0,4,76,76,75,76
AT^SRADC?                           Input of AT command and <CR> takes some sec-
                                    onds.
^SRADC: 0,1,250
^SRADC: 1,0,0
OK
^SRADC:                             Some URCs were buffered during command input
0,11,75,75,75,75,75,75,75,75,75,75  and sent after completion.
^SRADC: 0,8,75,75,75,75,75,75,75,77
^SRADC: 0,1,75
^SRADC: 0,4,76,76,75,76             More URCs are delivered.
^SRADC: 0,4,76,76,75,76
^SRADC: 0,5,77,77,76,76,76
^SRADC: 0,4,76,76,77,76
```

```
^SRADC: 0,4,76,76,75,76
AT^SRADC?                                   Input of AT command and <CR> takes 90s.
^SRADC: 0,1,250
^SRADC: 1,0,0
OK
^SRADC:                                     some URCs were buffered during command input
0,11,75,75,75,75,75,75,75,75,75,75,75       and sent after completion
^SRADC:
0,11,73,74,73,74,73,73,73,74,74,73,73
^SRADC: 0,11,74,73,74,73,73,73,73,73,73,73,73
^SRADC: 0,11,73,73,74,74,73,73,74,73,73,74,74
^SRADC: 0,11,73,73,73,73,73,73,73,74,74,73,73
^SRADC: 0,8,73,73,74,73,73,73,73,32767      The URC indicates lost measurement results.
^SRADC: 0,4,74,74,73,73                     More URCs are delivered.
^SRADC: 0,4,75,75,75,75
......
```

19. General Purpose I/O (GPIO) Pin related Commands

This chapter describes the AT commands used to access and configure the GPIO pins of PLPS9-W.

Please also refer to [2] for electrical specifications of the GPIO pins.

19.1 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.

Please note that AT^SPIO is deprecated and implemented only for compatibility reasons. The command returns OK, regardless of given parameter.

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)	
0	Close General purpose I/O driver
1	Open General purpose I/O driver

19.2 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:

- Configuring a GPIO with AT^SCPIN.
  - Using a GPIO configured as input with AT^SCPIN to wake up the UE from power saving. Suitable GPIOs (unless otherwise assigned): GPIO3, GPIO4, GPIO5, GPIO6, GPIO7, GPIO8, GPIO16, GPIO22. Reporting of level state changes at the specified GPIO shall be enabled with AT^SCPOL.
- Configuring a GPIO as Remote Wakeup line to wake up the TE (see AT^SCFG, <RemWakeLine>).
- Configuring GPIO1 as DR_SYNC line (see AT^SGPSC, <DRSyncVal>).
- Configuring a GPIO as Low Current Indicator (see AT^SCFG "MEopMode/PowerMgmt/LCI", <lci> and <gpio>).
- 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)	
0	Close pin
1	Open pin

<pin_id>(num)	
Pin identifier	
1	GPIO1
3	GPIO3
4	GPIO4
5	GPIO5
6	GPIO6
7	GPIO7
8	GPIO8

11	GPIO11
12	GPIO12
13	GPIO13
14	GPIO14
15	GPIO15
16	GPIO16
17	GPIO17
22	GPIO22

`<direction>`(num)

Parameter `<direction>` is mandatory when opening a pin, but can be omitted when closing a pin.

0	Input
1	Output

`<startValue>`(num)

Can be set only for outputs.

[0]	Low
1	High

Notes

- For closing a pin with the write command (`<mode>`=0), the parameter `<direction>` is not needed.
- Before changing the configuration of a pin be sure to close the pin.

19.3 AT^SCPOL GPIO Level Polling Configuration

AT^SCPOL serves to control automatic level polling and reporting for PLPS9-W's GPIOs.
After polling has been activated for a specified GPIO, its latest level state transition will be reported via "^SCPOL" URC.

GPIO monitoring is interrupt handled. If a state transition is detected at a configured GPIO, a debouncing routine will start. The signal state has to stay stable for at least 90 ms for proper detection of a state change.

If PLPS9-W stays in power save (SLEEP) state, a transition at GPIO3, GPIO4, GPIO5, GPIO6, GPIO7, GPIO8, GPIO16, GPIO22. will wake up the UE.
For all other GPIOs the state detection will only be triggered when the UE suspends power saving state for another reason.
Refer to AT^SCFG, "MeOpMode/PwrSave" parameter <PwrSaveMode> and <PwrSaveWakeup> which allow to fine-tune power saving behaviour of the UE.

Syntax

Test Command

```
AT^SCPOL=?
```

Response(s)

```
^SCPOL:(list of supported <mode>s), (list of supported <ioId>s)
OK
```

Write Command

```
AT^SCPOL=<mode>,<ioId>
```

Response(s)

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

PIN	✈	Last
-	+	-

Unsolicited Result Code

```
^SCPOL: <ioId>, <value>
```

Parameter Description

<mode>(num)	
0(P)	Disable level polling for a general purpose I/O pin.
1	Enable level polling for a general purpose I/O pin.

<ioId>(num)

This can be either an already configured or an already opened <pin_id>.

<value>(num)

Level state transition detected on <ioId>.

0	<pin_id> is in low state.
1	<pin_id> is in high state.

19.4 AT^SGIO Get IO state of a specified pin

AT^SGIO write command returns the state of selected GPIO Pin.

Syntax

Test Command

AT^SGIO=?

Response(s)

^SGIO:(list of supported <io_id>s)
OK

Write Command

AT^SGIO=<io_id>

Response(s)

^SGIO: <value>
OK
ERROR
+CME ERROR: <err>

PIN	✈	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>

19.5 AT^SSIO Set IO state of a specified pin

AT^SSIO write command sets the state of GPIO Pin. AT^SSIO requires GPIO Pin to be open and set as ouput 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)

State to be set for this <io_id>.

0	Low for <pin_id>
1	High for <pin_id>

19.6 AT^SGPINCA Pin Configuration

The AT^SGPINCA write command configures the internal pull-up, pull-down, keeper or none. The configuration updated with AT^SGPINCA will take effect after AT^SCPIN write command is used. Keep in mind that some GPIO lines share functions with other interfaces.

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)

Pin pull configuration

"NONE"(P)	GPIO configured as input
"KEEP"	GPIO is configured as Input and Keep
"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.

20. Miscellaneous Commands

The AT Commands described in this chapter are related to various areas.

20.1 A/ Repeat Previous Command Line

Repeat previous AT command line.
In general, after beginning a command line with character "a" or "A" a second character "t", "T" or "/" has to follow. "/" acts as line terminating character. In case of using a wrong second character, it is necessary to start again with character "a" or "A".

Syntax

Exec Command
A/
Response(s)

PIN	✈	Last
-	+	-

Reference(s)
V.250

20.2 +++ Escape from Data Mode to AT Command Mode

The +++ character sequence causes the PLPS9-W to pause data mode and return to AT command mode. 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.

+++ is not supported in Packet Switched and PPP connections.

Syntax

Exec Command
+++
Response(s)
OK

PIN	✈	Last
-	-	-

Reference(s)

ITU-T V.250 [16]

20.3 AT^SBNR Binary Read

Syntax

Test Command

AT^SBNR=?

Response(s)

OK

Read Command

AT^SBNR?

Response(s)

OK

Write Command

If <type>= "ciphersuites": Gets the accepted values by default for IPoverAT TLS Cipher suites:

AT^SBNR="ciphersuites", "default"

Response(s)

(default CYASSL ciphers string)
OK

Write Command

If <type>= "ciphersuites": Gets the user-accepted values for IPoverAT TLS Cipher suites, or default values if not defined:

AT^SBNR="ciphersuites", "current"

Response(s)

(ciphersuite user file contents)
OK
If no user values defined:
No Cipher Suites file found or loaded
Default Cipher Suites:
(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-algorithm>, <thumbprint-algorithm>, <thumbprint>
[...]
OK
If error is related to ME functionality:
ERROR
+CME ERROR: <err>
If certificate file is corrupted:
<index>, certificate is corrupted

Write Command

Read status of AMR files stored on FFS.

AT^SBNR="sound"

Response(s)

^SBNR: [<sound_index>, <sound_size>]
^SBNR: [<sound_index>, <sound_size>]

Write Command (Continued)

Read status of AMR files stored on FFS.

AT^SBNR="sound"

Response(s)

[^SBNR: ...]
OK
ERROR

PIN	✈	Last
-	+	-

Parameter Description

<type>(str)

“ciphersuites“	IPoverAT TLS Cipher suites
“is_cert“	Read certificate details
“sound“	Status of AMR files intended for playback via AT^SAFH. See AT^SBNW for details about wrting AMR files to the FFS.

<index>(num)

Certificate index

0...10	Index 0 is handled as client certificate (only 1 allowed). Indexes from 1 to 10 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-algorithm>(str)

Signature algorithm of certificate

<thumbprint-algorithm>(str)

Thumbprint algorithm of certificate

<thumbprint>(str)

Thumbprint of certificate

<sound_index>(num)	
0...100	Index position of AMR file stored with AT^SBNW on the FFS. See also AT^SAFH for further details and examples.

<sound_size>(num)

Size of the AMR file stored on FFS (number of bytes).

20.4 AT^SBNW Binary Write

AT^SBNW allows for writing binary or hexadecimal data to the non-volatile memory or to the Flash File System (FFS). The handling of the AT^SBNW write command varies depending on the type of data.

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

Write Command

Cipher suites user file removal:

AT^SBNW="ciphersuites", 0

Response(s)

CIPHERSUITES: DELETE CIPHERSUITES FILE...
CIPHERSUITES: DONE
OK
+CME ERROR: <err>

Write Command

Save the xtra.bin file to local memory (if <agps_size> is used to specify file size):

AT^SBNW="agps", <agps_size>

Response(s)

CONNECT

AGPS READY: SEND FILE ...
(Indicates that UE has entered binary data mode. Data can be transferred.)

After data transfer the UE returns one of the following result codes:
AGPS: END OK
AGPS: TIME INFO ERROR
AGPS: SERVICE TIMEOUT ERROR
AGPS: I/O ERROR
AGPS: FILE WRITE ERROR

Write Command (Continued)

Save the xtra.bin file to local memory (if <agps_size> is used to specify file size):

AT^SBNW="agps", <agps_size>

Response(s)

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

Write Command

Delete existing xtra.bin file:

AT^SBNW="agps", -1

Response(s)

```
CONNECT

AGPS READY: RESET GPS ENGINE AND DELETE XTRA FILE...
```

(Indicates that UE tries to reset all current GPS data and to delete a saved xtra.bin file)
After that the UE returns one of the following result codes:

```
AGPS: END OK
AGPS: TEMPORARY NOT ALLOWED ERROR
AGPS: GENERAL FAILURE
AGPS: UNSUPPORTED
AGPS: INVALID PARAMETER
AGPS: ENGINE BUSY
AGPS: PHONE OFFLINE
AGPS: TIMEOUT
AGPS: CONFIG NOT SUPPORTED
AGPS: INSUFFICIENT MEMORY
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 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
```

Write Command

Load AMR file to FFS (intended for playback via AT^SAFH):

AT^SBNW="sound", <sound_index>, <sound_size>

Response(s)

```
CONNECT
```

Write Command (Continued)

Load AMR file to FFS (intended for playback via AT^SAFH):

AT^SBNW="sound", <sound_index>, <sound_size>

Response(s)

```
SOUND READY: SEND FILE ...
```

(Indicates that UE has entered binary data mode. Data can be transferred.)
When AMR file data are transferred and updated, or error occurs the UE returns one of following result codes:

```
SOUND: END OK
SOUND: NOT ENOUGH SPACE ON DEVICE
SOUND: FILE STRUCTURE ERROR
SOUND: FILE WRITE ERROR
SOUND: OPEN FILE ERROR
SOUND: UNDEFINED ERROR
SOUND: LENGTH ERROR
SOUND: ERROR
OK
ERROR
+CME ERROR: <err>
```

Write Command

Remove existing AMR file from FFS:

AT^SBNW="sound", <sound_index>, 0

Response(s)

```
SOUND READY: DELETE SOUND FILE ...

SOUND: END OK
SOUND: INDEX ERROR
SOUND: ERROR
OK
ERROR
+CME ERROR: <err>
```

PIN	✈	Last
-	+	-

Parameter Description

<type>(str)	
“agps“	Activates A-GPS binary data mode.
“ciphersuites“	Command for IPoverAT TLS Cipher Suite file management.
“is_cert“	Secure Command Mode (Manage Certificates). For embedded TCP IP services the certicates shall be created in DER format.
“sound“	Modification of AMR files intended for playback via AT^SAFH. To list stored AMR files use AT^SBNR ="sound".

<subtype>(num)	
1	Start Secure Command Block Transfer mode

<agps_size>(num)	
4097...61440	Size of xtra.bin file (number of bytes).
-1	Delete stored xtra.bin file. Also all currently used GPS data are deleted.

<ciphersuites_length>(num)

Number of characters of ciphersuite names.

<sound_index>(num)

0...100	Index position of AMR file to be stored on FFS. See AT^SAFH for further details and examples.

<sound_size>(num)

Size of the AMR file to be stored (number of bytes).
An existing file at the "<sound_index>" will be overwritten.
For details on size of AMR files please see AT^SAFH.

0	Remove stored AMR file from FFS.

Notes

- The AT^SBNW="AGPS" write command can be used to load binary data for A-GNSS (Assisted GNSS) from a local memory to the PLPS9-W Flash File System (FFS). The GNSS receiver integrated in PLPS9-W supports gpsOneXTRA™ assistance data.

  Before transferring A-GNSS data ensure that the following conditions are met:

  - Take care that the RTC of PLPS9-W is correctly set to Greenwich Mean Time (GMT):0 with AT+CCLK and is up to date.
  - Deactivate the GNSS receiver with AT^SGPSC="<EngineVal>",0.
  - Download a new GpsOneXTRA binary file via HTTP from one of the following gpsOneXtra assistance webservers, for example:
    - http://xtra1.gpsonextra.net/xtra2.bin
    - http://xtra2.gpsonextra.net/xtra2.bin
    - http://xtra3.gpsonextra.net/xtra2.bin
  - Save the received XTRA file to your local memory and check the exact file size. This is because the precise data length shall be given when storing the XTRA file to the PLPS9-W FFS. The data length shall be the second parameter <agps_size>.

  The UE verifies the XTRA file. If the validation check is successful the UE will send the responses "AGPS: END OK" and "OK" and return to command mode. The file will be saved in the FFS and injected into the GNSS engine. If the validation check is not successful the UE respond with "AGPS: TIME INFO ERROR". The data can be used to achieve faster TTFF (Time to First Fix). For this purpose, set AT^SGPSC="<EngineVal>",2 and activate the GNSS receiver. Assistance data is valid for up to 7 days.

20.5 AT^SFDL Enter Firmware Download Mode

AT^SFDL allows the application manufacturer to download PLPS9-W firmware into the module by starting the download process from the host application or a customer-designed download program.

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 PLPS9-W Firmware" [4]. An example for developing an appropriate download program is included.

The AT^SFDL execute command causes the module to enter the firmware download mode.

Syntax

Test Command

```
AT^SFDL=?
```

Response(s)

```
OK
```

Exec Command

```
AT^SFDL
```

Response(s)

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

PIN	✈	Last
-	+	+

Note

- The software update program sends first answer code OK and waits for data. If no data is received and after a 2 seconds timeout, the program ends with an error and the AT command interpreter outputs an error message.

21. Appendix

21.1 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 [27].

Table 21.1: Star-Hash (*#) Command Overview

Star-Hash Code	Functionality	Response, also refer to Table 21.3
Phone Security		
*#06#	Query IMEI	<IMEI> OK
**04[2]*oldPin[2]*newPin[2]*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 : 0,<m> OK (where <m> = active or not active)
*#77#	Check status of COLR (Connected Line Identification Restriction)	+COLR : 0,<m> OK (where <m> = active or not active)
Call forwarding		
(choice of *,#,*#,**,##)21*DN*BS#	Act/deact/int/reg/eras CFU	+CCFC : <status>, <class> [,...] (see: AT+CCFC)
(choice of *,#,*#,**,##)67*DN*BS#	Act/deact/int/reg/eras CF busy	see above
(choice of *,#,*#,**,##)61*DN*BS*T#	Act/deact/int/reg/eras CF no reply	see above
(choice of *,#,*#,**,##)62*DN*BS#	Act/deact/int/reg/eras CF no reach	see above
(choice of *,#,*#,**,##)002*DN*BS*T#	Act/deact/int/reg/eras CF all	see above
(choice of *,#,*#,**,##)004*DN*BS*T#	Act/deact/int/reg/eras CF all cond	see above
Call waiting		
(choice of *,#,*#)43*BS#	Activation/deactivation/int WAIT	+CCWA : <status>, <class> [,...]. (Refer to AT+CCWA)
Call hold / Multiparty		
C[C] in call	Call hold and multiparty	+CME ERROR: <err> / OK

Star-Hash Code	Functionality	Response, also refer to Table 21.3
USSD messages		
[C]...[C]#	Send USSD message	+CME ERROR: <err> / OK
C[C] (excluded 1[C])	Send USSD message	+CME ERROR: <err> / OK

Table 21.2: Abbreviations of Codes and Parameters used in Table 21.1

Abbreviation	Meaning	Value
ZZ	Type of supplementary services: Barring services All services	 330 Not specified
DN	Dialing number	String of digits 0-9
BS	Basic service equivalent to parameter class: Voice Fax (only for compatibility reasons) SMS SMS+Fax (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 25 24 27 26 21 22 20 --
T	Time in seconds	In contrast to AT+CCFC, parameter T has no default value. If T is not specified, an operator defined default or the last known value may be used, depending on the network operator.
PW	Password	--
C	Character of TE character set (e.g. asterisk, hash or digit in case of USSD, or digits in case of held calls or multiparty calls)	--

Table 21.3: Star-Hash Command Response Parameters

Parameter	Meaning
<m>	Mode: 0 = not active, 1 = active
<n>	Unsolicited result code: 0 = presentation disabled, 1 = presentation enabled
<status>	Status: 0 = not active, 1 = active
<class>	Represents BS = basic service, refer to AT+CCFC, AT+CLCK
<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 [26], and Annex C of of 3GPP TS 22.030 [27].

Table 21.4: Star-Hash Commands for Supplementary Services

Star-Hash Code	Abbreviations in Table 21.1	Functionality
*	act	Activate (except for CLIR, see list above)
**	reg	Register and activate
*#	int	Check status (interrogate)
#	deact	Deactivate (except for CLIR, see list above)
##	eras	Unregister and deactivate

21.2 Available AT Commands and Dependency on SIM PIN

ø ... Command not available
- ... Command does not require PIN1
+ ... Command requires PIN1
± ... Command sometimes requires PIN1

Table 21.5: Available AT Commands and Dependency on SIM PIN

AT Command	Exec	Test	Read	Write
Configuration Commands				
AT&F	-	ø	ø	ø
AT&V	-	ø	ø	ø
AT&W	-	ø	ø	ø
ATQ	-	ø	ø	ø
ATV	-	ø	ø	ø
ATX	+	ø	ø	ø
ATZ	+	ø	ø	ø
AT+CMEE	-	-	-	-
AT+CSCS	ø	-	-	-
AT+CFUN	ø	-	-	-
AT+GCAP	+	+	ø	ø
AT^SMSO	-	-	ø	ø
AT^SCFG	ø	-	-	-
AT^SFUN	ø	-	-	-
Status Control Commands				
AT+CEER	+	+	ø	+
AT^SIND	ø	-	-	-
AT+CPAS	-	-	ø	ø
AT+WS46	ø	-	-	-
AT^S171	-	-	ø	ø
Serial Interface Control Commands				
AT&C		ø	ø	ø
AT&D	+	ø	ø	ø
AT&S	-	ø	ø	ø
ATE	-	ø	ø	ø
ATO		ø	ø	ø
AT+CMUX	ø	-	-	-
AT+ICF	ø	-	-	-
AT+IPR	ø	-	-	-
AT^SQPORT	-	-	-	ø
AT\Q	-	ø	ø	ø

AT Command	Exec	Test	Read	Write
Security Commands				
AT+CPIN	ø	-	-	-
AT+CLCK	ø	+	ø	+
AT+CPWD	ø	+	ø	+
AT^SPIC	-	-	-	-
AT^SCSL	ø	±	ø	±
Identification Commands				
ATI	±	ø	ø	ø
AT+CGMI	-	-	ø	ø
AT+GMI	-	-	ø	ø
AT+CGMM	-	-	ø	ø
AT+GMM	-	-	ø	ø
AT+CGMR	-	-	ø	ø
AT+GMR	-	-	ø	ø
AT+CGSN	-	-	ø	ø
AT+GSN	-	-	ø	ø
AT+CIMI	+	+	ø	ø
AT^SINFO	ø	-	-	-
Call related Commands				
ATA	+	ø	ø	ø
ATD	±	ø	ø	ø
ATD><mem><index>	+	ø	ø	ø
ATD><index>	+	ø	ø	ø
ATD><str>	+	ø	ø	ø
AT+CHUP	-	-	ø	ø
AT^SHUP	ø	-	ø	-
ATS0	ø	ø	-	+
AT+CLCC	+	+	ø	ø
AT^SLCC	-	-	-	-
AT+CR	ø	+	+	+
AT+CRC	+	+	+	+
AT+CVMOD	ø	+	+	+
Network Service Commands				
AT+COPN	+	+	ø	ø
AT+COPS	ø	+	+	+
AT+CPOL	ø	+	+	+
AT+CPLS	ø	+	+	+
AT+CREG	ø	-	-	-

AT Command	Exec	Test	Read	Write
AT+CESQ	+	+	ø	ø
AT+CSQ	+	+	ø	ø
AT+CTZR	ø	-	-	-
AT+CTZU	ø	-	-	-
AT^SMONI	-	-	ø	ø
AT^SMONP	-	-	ø	ø
AT^SNMON	ø	-	ø	-
AT^SNCSGLS	+	+	ø	ø
AT^SNCSGSC	ø	-	-	-
AT^SNRSRP	ø	+	+	ø
AT^SNRSRQ	ø	+	+	ø
AT+CAVIMS	ø	-	-	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^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTGI	ø	ø	ø	-
AT^SSTR	ø	-	-	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-

AT Command	Exec	Test	Read	Write
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
AT^SSTR	ø	ø	ø	-
Short Message Service (SMS) Commands				
AT+CMGC	ø	+	ø	+
AT+CMGD	ø	+	ø	+
AT+CMGF	ø	+	+	+
AT+CMGL	+	+	ø	+
AT+CMGR	ø	+	ø	+
AT+CMGS	ø	+	ø	+
AT+CMGW	+	+	ø	+
AT+CMMS	ø			
AT+CMSS	ø	+	ø	+
AT+CNMA	+	+	ø	+
AT+CNMI	ø	+	+	+
AT+CPMS	ø	+	+	+
AT+CPNER	ø	-	-	-
AT+CSCA	ø	+	+	+
AT+CSCB	ø	+	+	+
AT+CSDH	ø	+	+	+
AT+CSMP	ø			
AT+CSMS	ø			
AT^SMGL	+	+	ø	+

AT Command	Exec	Test	Read	Write
AT^SMGR	Ø	+	Ø	+
AT^SSDA	Ø	-	-	-
AT^SCML	+	+	Ø	+
AT^SCMR	Ø	+	Ø	+
AT^SCMS	Ø	+	Ø	+
AT^SCMW	Ø	+	Ø	+
Supplementary Service Commands				
AT+CCFC	Ø	+	Ø	+
AT+CCWA	Ø	+	+	+
AT+CHLD	Ø	+	Ø	+
AT+CLIR	Ø	+	+	+
AT+CSSN	Ø	+	+	+
AT+CUSD	Ø	+	+	+
AT+CLIP	Ø	+	+	+
AT+COLP	Ø	+	+	+
Packet Domain Related Commands				
AT+CGDCONT	Ø	-	-	-
AT+CGDSCONT	Ø	-	-	-
AT+CGTFT	Ø	-	-	-
AT+CGATT	Ø	+	+	+
AT+CGACT	Ø	+	+	+
AT+CGDATA	Ø		Ø	
AT+CGPADDR	+	+	Ø	+
AT+CGPIAF	Ø	+	+	+
AT+CGEREP	Ø	+	+	+
AT+CGREG	Ø	+	+	+
AT+CEREG	+	+	+	+
AT+CGCONTRDP	+	+	Ø	+
AT+CGSCONTRDP	+	+	Ø	+
AT+CGTFTRDP			Ø	
AT+CGEQOS	Ø	-	-	-
AT+CGEQOSRDP	+	+	Ø	+
AT+CGSMS	Ø	+	+	+
AT+CNMPSD			Ø	Ø
ATD*99#		Ø	Ø	Ø
AT^SGAPN	Ø	-	-	-
AT^SGAUTH	Ø	-	-	-
USIM related Commands				
AT+CRSM	Ø	-	Ø	-
AT+CSIM	Ø	-	Ø	-

AT Command	Exec	Test	Read	Write
AT^SATR	Ø	-	Ø	-
AT^SCID	-	-	Ø	Ø
AT^SCKS	Ø	-	-	-
AT^SSET	Ø	-	-	-
Remote USIM Access (RSA) Commands				
AT^SRSA	Ø	-	-	-
Phonebook Commands				
AT+CPBS	+	+	+	+
AT+CPBR	Ø	±	Ø	±
AT+CPBW	Ø	+	Ø	+
AT+CSVM	Ø	+	+	+
AT+CPBF	Ø	+	Ø	+
AT+CNUM	+	+	Ø	Ø
GNSS Commands				
AT^SGPSC	Ø	-	-	-
AT^SGPSE	Ø	-	-	-
Audio Commands				
AT+CMUT	Ø	-	-	-
AT+VTS	Ø	-	Ø	-
AT+VTD	Ø	-	-	-
AT^SAFH	Ø	-	-	-
AT^SAIC	Ø	-	-	-
AT^SNFG	Ø	-	Ø	-
AT^SNFI	Ø	-	-	-
AT^SNFO	Ø	-	-	-
AT^SNFS	Ø	-	-	-
AT^SRTC	-	-	-	-
Hardware related Commands				
AT+CCLK	Ø	-	-	-
AT^SAD	Ø	-	Ø	-
AT^SBV	-	-	Ø	Ø
AT^SCTM	Ø	-	-	-
AT^SSPI	Ø	-	-	-
AT^SRADC	Ø	-	-	-
General Purpose I/O (GPIO) Pin related Commands				
AT^SPIO	Ø	-	Ø	-
AT^SCPIN	Ø	-	Ø	-

AT Command	Exec	Test	Read	Write
AT^SCPOL	Ø	-	Ø	-
AT^SGIO	Ø	-	Ø	-
AT^SSIO	Ø	-	Ø	-
AT^SGPINCA	Ø	-	Ø	-
Miscellaneous Commands				
A/	-	Ø	Ø	Ø
+++	-	Ø	Ø	Ø
AT^SBNR	Ø	-	-	-
AT^SBNW	Ø	-	Ø	-
AT^SFDL	-	-	Ø	Ø

21.3 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 21.6: Availability of AT Commands Depending on Operating Mode of ME

AT Command	Normal Mode	✈
Configuration Commands		
AT&F	+	
AT&V	+	
AT&W	+	
ATQ	+	
ATV	+	
ATX	+	
ATZ	+	
AT+CMEE	+	
AT+CSCS	+	
AT+CFUN	+	
AT+GCAP	+	
AT^SMSO	+	
AT^SCFG	+	+
AT^SFUN	+	
Status Control Commands		
AT+CEER	+	
AT^SIND	+	
AT+CPAS	+	
AT+WS46	+	
AT^S171	+	
Serial Interface Control Commands		
AT&C	+	
AT&D	+	
AT&S	+	
ATE	+	
ATO	+	-
AT+CMUX	+	+
AT+ICF	+	
AT+IPR	+	
AT^SQPORT	+	
AT\Q	+	

AT Command	Normal Mode	✈
Security Commands		
AT+CPIN	+	+
AT+CLCK	+	±
AT+CPWD	+	±
AT^SPIC	+	+
AT^SCSL	+	+
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	+	-
ATD><mem><index>	+	-
ATD><index>	+	-
ATD><str>	+	-
AT+CHUP	+	-
AT^SHUP	+	-
ATS0	+	-
AT+CLCC	+	-
AT^SLCC	+	-
AT+CR	+	
AT+CRC	+	
AT+CVMOD	+	-
Network Service Commands		
AT+COPN	+	
AT+COPS	+	-
AT+CPOL	+	
AT+CPLS	+	-
AT+CREG	+	+

AT Command	Normal Mode	✈
AT+CESQ	+	-
AT+CSQ	+	-
AT+CTZR	+	+
AT+CTZU	+	
AT^SMONI	+	-
AT^SMONP	+	-
AT^SNMON	+	-
AT^SNCSGLS	+	
AT^SNCSGSC	+	-
AT^SNRSRP	+	-
AT^SNRSRQ	+	-
AT+CAVIMS	+	+
USIM Application Toolkit (USAT) Commands		
AT^SSTA	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
AT^SSTGI	+	+
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 Command	Normal Mode	✈
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
Short Message Service (SMS) Commands		
AT+CMGC	+	-
AT+CMGD	+	+
AT+CMGF	+	+
AT+CMGL	+	+
AT+CMGR	+	+
AT+CMGS	+	-
AT+CMGW	+	+
AT+CMMS	+	
AT+CMSS	+	-
AT+CNMA	+	-
AT+CNMI	+	+
AT+CPMS	+	
AT+CPNER	+	+
AT+CSCA	+	
AT+CSCB	+	+
AT+CSDH	+	
AT+CSMP	+	
AT+CSMS	+	
AT^SMGL	+	

AT Command	Normal Mode	✈
AT^SMGR	+	
AT^SSDA	+	
AT^SCML	+	
AT^SCMR	+	
AT^SCMS	+	-
AT^SCMW	+	
Supplementary Service Commands		
AT+CCFC	+	-
AT+CCWA	+	-
AT+CHLD	+	-
AT+CLIR	+	-
AT+CSSN	+	-
AT+CUSD	+	-
AT+CLIP	+	-
AT+COLP	+	-
Packet Domain Related Commands		
AT+CGDCONT	+	+
AT+CGDSCONT	+	+
AT+CGTFT	+	
AT+CGATT	+	-
AT+CGACT	+	-
AT+CGDATA	+	-
AT+CGPADDR	+	+
AT+CGPIAF	+	
AT+CGEREP	+	+
AT+CGREG	+	+
AT+CEREG	+	+
AT+CGCONTRDP	+	-
AT+CGSCONTRDP	+	-
AT+CGTFTRDP	+	-
AT+CGEQOS	+	
AT+CGEQOSRDP	+	-
AT+CGSMS	+	
AT+CNMPSD	+	-
ATD*99#	+	-
AT^SGAPN	+	+
AT^SGAUTH	+	+
USIM related Commands		
AT+CRSM	+	

AT Command	Normal Mode	✈
AT+CSIM	+	
AT^SATR	+	
AT^SCID	+	
AT^SCKS	+	
AT^SSET	+	
Remote USIM Access (RSA) Commands		
AT^SRSA	+	-
Phonebook Commands		
AT+CPBS	+	+
AT+CPBR	+	+
AT+CPBW	+	+
AT+CSVM	+	+
AT+CPBF	+	+
AT+CNUM	+	+
GNSS Commands		
AT^SGPSC	+	+
AT^SGPSE	+	+
Audio Commands		
AT+CMUT	+	
AT+VTS	+	-
AT+VTD	+	-
AT^SAFH	+	
AT^SAIC	+	
AT^SNFG	+	
AT^SNFI	+	
AT^SNFO	+	
AT^SNFS	+	
AT^SRTC	+	
Hardware related Commands		
AT+CCLK	+	
AT^SAD	+	
AT^SBV	+	
AT^SCTM	+	
AT^SSPI	+	
AT^SRADC	+	
General Purpose I/O (GPIO) Pin related Commands		
AT^SPIO	+	

AT Command	Normal Mode	✈
AT^SCPIN	+	
AT^SCPOL	+	
AT^SGIO	+	
AT^SSIO	+	
AT^SGPINCA	+	
Miscellaneous Commands		
A/	+	
+++	+	-
AT^SBNR	+	
AT^SBNW	+	
AT^SFDL	+	+

21.4 AT Command Settings storable with AT&W

Table 21.7: Settings Stored to User Profile on ASC0

AT Command	Stored Parameters
Configuration Commands	
ATQ	<n>
ATV	<value>
ATX	<value>
AT+CMEE	<errMode>
Serial Interface Control Commands	
AT&C	<value>
AT&D	<value>
AT&S	<value>
ATE	<value>
AT\Q	<n>
Call related Commands	
ATS0	<n>
AT^SLCC	<n>
AT+CR	<mode>
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>
USIM related Commands	
AT^SCKS	<mode>
AT^SSET	<n>

21.5 Factory Default Settings Restorable with AT&F

Table 21.8: Factory Default Settings Restorable with AT&F

AT Command	Factory Defaults
Configuration Commands	
ATQ	<n>=0
ATV	<value>=1
ATX	<value>=0
AT+CMEE	<errMode>=2
AT+CSCS	<charSet>="GSM"
Serial Interface Control Commands	
AT&C	<value>=1
AT&D	<value>=2
AT&S	<value>=0
ATE	<value>=1
AT+ICF	<format>=3
AT\Q	<n>=3
Call related Commands	
ATS0	<n>=000
AT^SLCC	<n>=0
AT+CR	<mode>=0
AT+CRC	<mode>=0
Network Service Commands	
AT+COPS	<format>=0
AT+CREG	<urcMode>=0
AT+CTZR	<n>=0
AT+CTZU	<n>=0
Short Message Service (SMS) Commands	
AT+CMGF	<mode>=0
AT+CNMI	<mode>=0, <mt>=0, <bm>=0, <ds>=0, <bfr>=1
AT+CSCB	<operation>=0, <dcss>=" "
AT+CSDH	<show>=0
AT+CSMP	<fo>=17, <vp>=167, <pid>=0, <dcs>=0
AT+CSMS	<service>=0
AT^SSDA	<da>=1
Supplementary Service Commands	
AT+CLIR	<n>=0
AT+CSSN	<n>=0, <m>=0

AT Command	Factory Defaults
AT+CUSD	<ussdMode>=0
AT+CLIP	<clipUrcMode>=0
Packet Domain Related Commands	
AT+CGPIAF	<format>=0, <subnet>=0, <lzeros>=0, <czeros>=0
AT+CGREG	<n>=0
AT+CEREG	<n>=0
USIM related Commands	
AT^SCKS	<mode>=0
AT^SSET	<n>=0
Phonebook Commands	
AT+CPBS	<storage>="SM"
Audio Commands	
AT+VTD	<duration>=1
Hardware related Commands	
AT^SCTM	<UrcMode>=0

21.6 Summary of Unsolicited Result Codes (URC)

Table 21.9: Summary of Unsolicited Result Codes (URC)

AT Command	URC
Unsolicited Result Code Presentation	
	NO CARRIER
	NO CARRIER
	BUSY
	^SBC: Undervoltage
	^SBC: Overvoltage Warning
	^SBC: Overvoltage Shutdown
	^SHUTDOWN
Configuration Commands	
AT+CFUN	^SYSSTART
AT+CFUN	^SYSSTART AIRPLANE MODE
Status Control Commands	
AT^SIND	+CIEV: <indDescr>, <indValue>
AT^SIND	+CIEV: <indDescr>, <indValue>, <SmsMr>
AT^SIND	+CIEV: <indDescr>, <cmdType>, <commandDetails>[, <pathLen>, <fileNum>, <fileList>, <aidList>]
AT^SIND	+CIEV: <indDescr>, <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
AT^SIND	+CIEV: <indDescr>, <cmdType>, <commandDetails>, , , , , <status>, <statAddInfo>
AT^SIND	+CIEV: <indDescr>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>
AT^SIND	+CIEV: <indDescr>, <nitzUT>, <nitzTZ>[, <nitzDST>]
AT^SIND	+CIEV: <indDescr>
AT^SIND	+CIEV: <indDescr>, <indValue>, <lstaEdvs>, <lstaRssi>
AT^SIND	+CIEV: <indDescr>, <indValue>, <lstaNo>, <lstaMin>, <lstaMax>, <lstaMean>, <lstaVar>
AT^SIND	+CIEV: <indDescr>, <indValue>, <lstaFrRep>, <lstaBandScnd>, <lstaFrMin>, <lstaFrMax>, <lstaMin>, <lstaMax>, <lstaMean>, <lstaGrade>
AT^SIND	+CIEV: <indDescr>, <ceerRelCauseGroup>, <ceerReport>
AT^SIND	+CIEV: <indDescr>, <indValue>$_{slot\_1}$, <indValue>$_{slot\_2}$
AT^SIND	+CIEV: <indDescr>, <simreadEf>
AT^SIND	+CIEV: <indDescr>, <ltebotTimerstat>, <ltebotReason>, <APN>[, <ltebotReasonTxt>]
AT^SIND	+CIEV: <indDescr>, <indValue>[, <vp_play_state>, <vp_rec_state>]
AT^SIND	+CIEV: <indDescr>, <provMm>, <provCur>

AT Command	URC
Call related Commands	

AT^SLCC	if the list of current calls is empty:
	^SLCC:
	if one or more calls are currently in the list:
	^SLCC: <idx>, <dir>, <stat>, <mode>, <mpty>, <Reserved>[, <number>, <type>[, <alpha>]]
	[^SLCC: <idx>, <dir>, <stat>, <mode>, <mpty>, <Reserved>[, <number>, <type>[, <alpha>]]]
	[...]
	^SLCC:

AT+CRC	RING
AT+CRC	+CRING: <type>
Network Service Commands	
AT+CREG	+CREG: <regStatus>
AT+CREG	+CREG: <regStatus>[, <netLac>, <netCellId>[, <AcT>]]
AT+CTZR	+CTZV: <timezone>
AT+CTZR	+CTZE: <timezone>, <dst>[, <time>]
AT+CTZU	+CTZU:<nitzUT>, <nitzTZ>[, <nitzDST>]
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>[, <tooa>, <fo>, <pid>, <dcs>, <sca>, <tosca>, <length>]<CR><LF><data>
AT+CNMI	+CBM: <length><CR><LF><pdu>
AT+CNMI	+CBM: <sn>, <mid>, <dcs>, <page>, <pages><CR><LF><data>
AT+CNMI	+CDS: <length><CR><LF><pdu>
AT+CNMI	+CDS: <fo>, <mr>[, <ra>][, <tora>], <scts>, <dt>, <st>
AT+CPNER	+CPNERU: <MessageID>, <SerialNumberPrimary>, <WarningType>
AT+CPNER	^SSNERU: <ServiceID>, <SerialNumberSecondary>, <GeoScope>
Supplementary Service Commands	
AT+CCWA	+CCWA: <calling number>, <type of number>[, <class>][, , <CLI validity>]
AT+CSSN	+CSSI: <code 1>
AT+CSSN	+CSSU: <code 2>

AT Command	URC
AT+CUSD	+CUSD: <ussdStatus>[, <ussdRsp>[, <ussdDCS>]]
AT+CLIP	+CLIP: <clipNumber>, <clipNumType>, , [, <clipAlpha>][, <CLI validity>]
AT+COLP	+COLP: <number>, <type>[, <sub-number>][, <sub-type>][, <alpha>]
Packet Domain Related Commands	
AT+CGEREP	+CGEV: REJECT <PDP_type>, <PDP_addr>
AT+CGEREP	+CGEV: NW REACT <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: NW MODIFY <cid>,<change-reason>,<event-type>
AT+CGEREP	+CGEV: NW PDN DEACT <cid>
AT+CGEREP	+CGEV: ME PDN DEACT <cid>
AT+CGEREP	+CGEV: ME MODIFY <cid>, <change-reason>, <event-type>
AT+CGEREP	+CGEV: ME PDN ACT <cid>[, <reason>]
AT+CGREG	+CGREG: <stat>
AT+CGREG	+CGREG: <stat>[, <lac>][, <ci>][, <AcT>]
AT+CEREG	+CEREG: <stat>
AT+CEREG	+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>]]
USIM related Commands	
AT^SCKS	^SCKS: <SimStatus>
AT^SSET	^SSIM READY
Remote USIM Access (RSA) Commands	
AT^SRSA	^SRSA: <devId>, <sapRole>, <connState>, <linkChangeCause>
GNSS Commands	
AT^SGPSE	^SGPSE: <UrcType>, <BufferStatus>, <BufferCount>
AT^SGPSE	^SGPSE: <UrcType>, <PositionStatus>
AT^SGPSE	^SGPSE: <UrcType>, <InfoUrcMinutes>
AT^SGPSE	^SGPSE: <UrcType>, <NMEA_sentence> [^SGPSE: <UrcType>, <NMEA_sentence>] ...
Hardware related Commands	
AT^SCTM	^SCTM_B: <UrcCause>
AT^SRADC	^SRADC: <ch>, <count>, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>[, <value>]]]]]]]]
General Purpose I/O (GPIO) Pin related Commands	
AT^SCPOL	^SCPOL: <ioId>, <value>

21.7 Alphabetical List of AT Commands

Table 21.10: Alphabetical List of AT Commands

AT Command	Description	Section and Page
+++	Escape from Data Mode to AT Command Mode	Section 20.2, page 496
A/	Repeat Previous Command Line	Section 20.1, page 495
AT&C	Set Data Carrier Detect (DCD) line mode	Section 4.1, page 120
AT&D	Set Data Terminal Ready (DTR) line mode	Section 4.2, page 121
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 4.3, page 122
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+CAVIMS	Availability for voice calls with IMS	Section 8.17, page 216
AT+CCFC	Call forwarding number and conditions control	Section 11.1, page 333
AT+CCLK	Real Time Clock	Section 18.1, page 471
AT+CCWA	Call Waiting	Section 11.2, page 337
AT+CEER	Extended Error Report	Section 3.1, page 87
AT+CEREG	EPS Network Registration Status	Section 12.11, page 375
AT+CESQ	Extended Signal Quality	Section 8.6, page 191
AT+CFUN	PLPS9-W Functionality Level	Section 2.10, page 43
AT+CGACT	PDP Context Activate or Deactivate	Section 12.5, page 362
AT+CGATT	PS Attach or Detach	Section 12.4, page 361
AT+CGCONTRDP	PDP context read dynamic parameters	Section 12.12, page 377
AT+CGDATA	Enter Data State	Section 12.6, page 364
AT+CGDCONT	Define PDP Context	Section 12.1, page 351
AT+CGDSCONT	Define Secondary PDP Context	Section 12.2, page 356
AT+CGEQOS	Define EPS Quality of Service	Section 12.15, page 384
AT+CGEQOSRDP	EPS Quality of Service Read Dynamic Parameters	Section 12.16, page 386
AT+CGEREP	Packet Domain Event Reporting	Section 12.9, page 370
AT+CGMI	Request manufacturer identification	Section 6.2, page 153
AT+CGMM	Request model identification	Section 6.4, page 154
AT+CGMR	Request revision identification of software status	Section 6.6, page 155
AT+CGPADDR	Show PDP Address	Section 12.7, page 366
AT+CGPIAF	Select Printing IP address format	Section 12.8, page 368
AT+CGREG	Packet Domain Network Registration Status	Section 12.10, page 373
AT+CGSCONTRDP	Secondary PDP Context Read Dynamic Parameters	Section 12.13, page 379
AT+CGSMS	Select Service for MO Short Messages	Section 12.17, page 388
AT+CGSN	Request International Mobile Equipment Identity (IMEI)	Section 6.8, page 156
AT+CGTFT	Traffic Flow Template	Section 12.3, page 358
AT+CGTFTRDP	Traffic Flow Template Read Dynamic Parameters	Section 12.14, page 381
AT+CHLD	Call Hold and Multiparty	Section 11.3, page 340
AT+CHUP	Hang up call	Section 7.6, page 167
AT+CIMI	Request International Mobile Subscriber Identity (IMSI)	Section 6.10, page 157

AT Command	Description	Section and Page
AT+CLCC	List of current calls	Section 7.9, page 171
AT+CLCK	Facility Lock	Section 5.2, page 135
AT+CLIP	Calling Line Identification Presentation	Section 11.7, page 347
AT+CLIR	Calling Line Identification Restriction	Section 11.4, page 342
AT+CMEE	Error Message Format	Section 2.8, page 37
AT+CMGC	Send an SMS command	Section 10.2, page 300
AT+CMGD	Delete short message	Section 10.3, page 301
AT+CMGF	Select SMS message format	Section 10.4, page 302
AT+CMGL	List SMS messages from preferred store	Section 10.5, page 303
AT+CMGR	Read SMS messages	Section 10.6, page 305
AT+CMGS	Send Short Message	Section 10.7, page 306
AT+CMGW	Write Short Messages to Memory	Section 10.8, page 307
AT+CMMS	More Messages to Send	Section 10.9, page 308
AT+CMSS	Send short messages from storage	Section 10.10, page 309
AT+CMUT	Mute control	Section 17.1, page 453
AT+CMUX	Multiplex mode	Section 4.6, page 125
AT+CNMA	New Message Acknowledgement to UE/TE	Section 10.11, page 310
AT+CNMI	SMS Event Reporting Configuration	Section 10.12, page 311
AT+CNMPSD	No more PS data	Section 12.18, page 389
AT+CNUM	Read own numbers	Section 15.6, page 425
AT+COLP	Connected Line Identification Presentation	Section 11.8, page 349
AT+COPN	Read operator names	Section 8.1, page 180
AT+COPS	Operator Selection	Section 8.2, page 181
AT+CPAS	Activity Status	Section 3.3, page 117
AT+CPBF	Find phonebook entries	Section 15.5, page 423
AT+CPBR	Read from phonebook	Section 15.2, page 415
AT+CPBS	Select phonebook memory storage	Section 15.1, page 412
AT+CPBW	Write into phonebook	Section 15.3, page 418
AT+CPIN	PIN Authentication	Section 5.1, page 133
AT+CPLS	Select Preferred Operator List	Section 8.4, page 187
AT+CPMS	Preferred SMS message storage	Section 10.13, page 314
AT+CPNER	Notification event reporting	Section 10.14, page 316
AT+CPOL	Preferred Operator List	Section 8.3, page 185
AT+CPWD	Change Password	Section 5.3, page 141
AT+CR	Service reporting control	Section 7.11, page 176
AT+CRC	Set Cellular Result Codes for incoming call indication	Section 7.12, page 177
AT+CREG	Network Registration Status	Section 8.5, page 188
AT+CRSM	Restricted USIM Access	Section 13.1, page 395
AT+CSCA	SMS Service Center Address	Section 10.15, page 318
AT+CSCB	Select Cell Broadcast Message Indication	Section 10.16, page 319
AT+CSCS	Character Set	Section 2.9, page 42
AT+CSDH	Show SMS text mode parameters	Section 10.17, page 321

AT Command	Description	Section and Page
AT+CSIM	Generic USIM Access	Section 13.2, page 398
AT+CSMP	Set SMS Text Mode Parameters	Section 10.18, page 322
AT+CSMS	Select Message Service	Section 10.19, page 324
AT+CSQ	Signal Quality	Section 8.7, page 193
AT+CSSN	Supplementary service notifications	Section 11.5, page 343
AT+CSVM	Set voice mail number	Section 15.4, page 421
AT+CTZR	Time Zone Reporting	Section 8.8, page 194
AT+CTZU	Automatic Time Zone Update	Section 8.9, page 196
AT+CUSD	Unstructured Supplementary Service Data	Section 11.6, page 345
AT+CVMOD	Voice call mode	Section 7.13, page 179
AT+GCAP	Capabilities List	Section 2.11, page 45
AT+GMI	Request manufacturer identification	Section 6.3, page 153
AT+GMM	Request model identification	Section 6.5, page 154
AT+GMR	Request revision identification of software status	Section 6.7, page 155
AT+GSN	Request International Mobile Equipment Identity (IMEI)	Section 6.9, page 156
AT+ICF	Serial Interface Character Framing	Section 4.7, page 127
AT+IPR	Bit Rate	Section 4.8, page 129
AT+VTD	Tone duration	Section 17.3, page 455
AT+VTS	DTMF and tone generation	Section 17.2, page 454
AT+WS46	Select wireless network	Section 3.4, page 118
AT\Q	Flow Control	Section 4.10, page 132
AT^S171	Call Release Cause Information Query	Section 3.5, page 119
AT^SAD	Antenna Configuration	Section 18.2, page 473
AT^SAFH	Audio File Handling	Section 17.4, page 456
AT^SAIC	Audio Interface Configuration	Section 17.5, page 460
AT^SATR	Query SIM's Answer to Reset Data	Section 13.3, page 400
AT^SBNR	Binary Read	Section 20.3, page 497
AT^SBNW	Binary Write	Section 20.4, page 500
AT^SBV	Battery/Supply Voltage	Section 18.3, page 475
AT^SCFG	Extended Configuration Settings	Section 2.13, page 47
AT^SCID	USIM Identification Number	Section 13.4, page 401
AT^SCKS	Query USIM and Chip Card Holder Status	Section 13.5, page 402
AT^SCML	List Concatenated Short Messages from preferred store	Section 10.23, page 329
AT^SCMR	Read Concatenated Short Messages	Section 10.24, page 330
AT^SCMS	Send Concatenated Short Messages	Section 10.25, page 331
AT^SCMW	Write Concatenated Short Messages to Memory	Section 10.26, page 332
AT^SCPIN	Pin Configuration	Section 19.2, page 489
AT^SCPOL	GPIO Level Polling Configuration	Section 19.3, page 491
AT^SCSL	Customer SIM Lock	Section 5.5, page 148
AT^SCTM	Critical Operating Temperature Monitoring	Section 18.4, page 476
AT^SFDL	Enter Firmware Download Mode	Section 20.5, page 504
AT^SFUN	PLPS9-W Modem Software Functionality	Section 2.14, page 86

AT Command	Description	Section and Page
AT^SGAPN	Configure APN class settings	Section 12.20, page 391
AT^SGAUTH	Set Type of Authentication for PDP-IP Connections	Section 12.21, page 393
AT^SGIO	Get IO state of a specified pin	Section 19.4, page 492
AT^SGPINCA	Pin Configuration	Section 19.6, page 494
AT^SGPSC	GNSS Configuration	Section 16.3, page 430
AT^SGPSE	GNSS Event Notification	Section 16.4, page 447
AT^SHUP	Hang up call(s) indicating a specific 3GPP TS 24.008 release cause	Section 7.7, page 168
AT^SIND	Extended Indicator Control	Section 3.2, page 100
AT^SINFO	Information Output	Section 6.11, page 158
AT^SLCC	Extended list of current calls	Section 7.10, page 173
AT^SMGL	List Short Messages from preferred store without setting status to REC READ	Section 10.20, page 326
AT^SMGR	Read short message without setting status to REC READ	Section 10.21, page 327
AT^SMONI	Monitoring Serving Cell	Section 8.10, page 198
AT^SMONP	Monitoring Neighbour Cells	Section 8.11, page 204
AT^SMSO	Switch Off PLPS9-W	Section 2.12, page 46
AT^SNCSGLS	Operator CSG lists on USIM	Section 8.13, page 211
AT^SNCSGSC	Closed Subscriber Group Network Scan	Section 8.14, page 212
AT^SNFG	Generate Tone	Section 17.6, page 463
AT^SNFI	Set microphone path parameters	Section 17.7, page 465
AT^SNFO	Set audio output parameter (loudspeaker path)	Section 17.8, page 466
AT^SNFS	Select audio hardware set	Section 17.9, page 468
AT^SNMON	Network Monitoring	Section 8.12, page 209
AT^SNRSRP	Neighbour Reference Signal Received Power	Section 8.15, page 214
AT^SNRSRQ	Neighbour Reference Signal Received Quality	Section 8.16, page 215
AT^SPIC	Display PIN Counter	Section 5.4, page 144
AT^SPIO	GPIO Driver Open/Close	Section 19.1, page 488
AT^SQPORT	Query Port Id	Section 4.9, page 131
AT^SRADC	Configure and Read A/D Converter	Section 18.6, page 484
AT^SRSA	Remote USIM Access (RSA) Activation	Section 14.1, page 407
AT^SRTC	Ring tone configuration	Section 17.10, page 469
AT^SSDA	Set SMS Display Availability	Section 10.22, page 328
AT^SSET	USIM Data Ready Indication	Section 13.6, page 404
AT^SSIO	Set IO state of a specified pin	Section 19.5, page 493
AT^SSPI	Configure I2C	Section 18.5, page 479
AT^SSTA	Remote-SAT Interface Activation	Section 9.4, page 228
AT^SSTGI	SAT Get Information	Section 9.6, page 232
AT^SSTGI	SAT Get Information - Refresh (1)	Section 9.7, page 233
AT^SSTGI	SAT Get Information - Set Up Event List (5)	Section 9.8, page 235
AT^SSTGI	SAT Get Information - Set Up Call (16)	Section 9.9, page 236
AT^SSTGI	SAT Get Information - Send SS (17)	Section 9.10, page 238

AT Command	Description	Section and Page
AT^SSTGI	SAT Get Information - Send USSD (18)	Section 9.11, page 239
AT^SSTGI	SAT Get Information - Send Short Message (19)	Section 9.12, page 240
AT^SSTGI	SAT Get Information - Send DTMF (20)	Section 9.13, page 241
AT^SSTGI	SAT Get Information - Launch Browser (21)	Section 9.14, page 242
AT^SSTGI	SAT Get Information - Play Tone (32)	Section 9.15, page 244
AT^SSTGI	SAT Get Information - Display Text (33)	Section 9.16, page 246
AT^SSTGI	SAT Get Information - Get Inkey (34)	Section 9.17, page 248
AT^SSTGI	SAT Get Information - Get Input (35)	Section 9.18, page 250
AT^SSTGI	SAT Get Information - Select Item (36)	Section 9.19, page 252
AT^SSTGI	SAT Get Information - Set up Menu (37)	Section 9.20, page 254
AT^SSTGI	SAT Get Information - Set up Idle Mode Text (40)	Section 9.21, page 256
AT^SSTGI	SAT Get Information - Language Notification (53)	Section 9.22, page 257
AT^SSTGI	SAT Get Information - Open Channel (64)	Section 9.23, page 258
AT^SSTGI	SAT Get Information - Close Channel (65)	Section 9.24, page 259
AT^SSTGI	SAT Get Information - Receive Data (66)	Section 9.25, page 260
AT^SSTGI	SAT Get Information - Send Data (67)	Section 9.26, page 261
AT^SSTR	SAT Response	Section 9.27, page 262
AT^SSTR	SAT Response - Refresh (1)	Section 9.28, page 264
AT^SSTR	SAT Response - Set Up Event List (5)	Section 9.29, page 265
AT^SSTR	SAT Response - Set Up Call (16)	Section 9.30, page 266
AT^SSTR	SAT Response - Send SS (17)	Section 9.31, page 267
AT^SSTR	SAT Response - Send USSD (18)	Section 9.32, page 268
AT^SSTR	SAT Response - Send Short Message (19)	Section 9.33, page 269
AT^SSTR	SAT Response - Send DTMF (20)	Section 9.34, page 270
AT^SSTR	SAT Response - Launch Browser (21)	Section 9.35, page 271
AT^SSTR	SAT Response - Play Tone (32)	Section 9.36, page 272
AT^SSTR	SAT Response - Display Text (33)	Section 9.37, page 273
AT^SSTR	SAT Response - Get Inkey (34)	Section 9.38, page 274
AT^SSTR	SAT Response - Get Input (35)	Section 9.39, page 276
AT^SSTR	SAT Response - Select Item (36)	Section 9.40, page 278
AT^SSTR	SAT Response - Set Up Menu (37)	Section 9.41, page 279
AT^SSTR	SAT Response - Set Up Idle Mode Text (40)	Section 9.42, page 280
AT^SSTR	SAT Response - Language Notification (53)	Section 9.43, page 281
AT^SSTR	SAT Response - Open Channel (64)	Section 9.44, page 282
AT^SSTR	SAT Response - Close Channel (65)	Section 9.45, page 283
AT^SSTR	SAT Response - Receive Data (66)	Section 9.46, page 284
AT^SSTR	SAT Response - Send Data (67)	Section 9.47, page 285
AT^SSTR	SAT Event - Menu Selection (211)	Section 9.48, page 286
AT^SSTR	SAT Event - User Activity (232)	Section 9.49, page 287
AT^SSTR	SAT Event - Idle Screen Available (233)	Section 9.50, page 288
AT^SSTR	SAT Event - Language Selection (235)	Section 9.51, page 289
AT^SSTR	SAT Event - Browser Termination (236)	Section 9.52, page 290

AT Command	Description	Section and Page
AT^SSTR	SAT Event - Terminate Command (254)	Section 9.53, page 291
ATA	Connect to Incoming Call	Section 7.1, page 160
ATD	Mobile originated call to specified number	Section 7.2, page 161
ATD*99#	Request Packet Domain service	Section 12.19, page 390
ATD><index>	Mobile originated call from active memory using index number	Section 7.4, page 165
ATD><mem><index>	Mobile originated call using specific memory and index number	Section 7.3, page 163
ATD><str>	Mobile originated call from memory using corresponding string	Section 7.5, page 166
ATE	AT Command Echo	Section 4.4, page 123
ATI	Display product identification information	Section 6.1, page 150
ATO	Switch from command mode to data mode	Section 4.5, page 124
ATQ	Result Code Presentation Mode	Section 2.4, page 33
ATS0	Set number of rings before automatically answering a call	Section 7.8, page 170
ATV	Result code format mode	Section 2.5, page 34
ATX	Result Code Selection	Section 2.6, page 35
ATZ	Restore AT Command Settings from User Defined Profile	Section 2.7, page 36

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