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L8-Family AT Commands User Manual

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Versions

Version	Date	Remarks
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V1.0.2	2014-08-30	Update CSMP CPBR
V1.0.3	2014-09-10	Update CPBW Add CLK32K
V1.0.4	2014-11-07	Update XCESQ
V1.0.5	2014-11-26	Update CPBS
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		Update CPMS
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V1.1.1	2015-04-26	Update the description of copyright and attention.
V1.1.2	2015-08-25	Update the logo.
V1.1.3	2015-09-28	Add the TCP/IP.

Applicability Type

No.	Type	Note
1	L810-GL	
2	L830-GL	

Contents

1 Preface

1.1 Manual Scope

This manual introduces the L8 family AT command set, and describes how software developers can use these commands to communicate with the device, and to create software applications that communicate with the device using these commands.

Note: The integrator should read the corresponding SW release notes corresponding to the product version in using to get information about differences from this manual.

1.2 Target Audience

This manual is intended for software developers who communicate with the L8 family device using the AT commands, and create applications to communicate with the device using the AT commands.

2 Introduction to AT Commands

2.1 AT Commands Overview

AT commands are sets of commands used for communication with the cellular modem. AT commands are comprised of assemblies of ASCII characters which start with the "AT" prefix (except the commands A/ and +++). The AT prefix is derived from the word Attention, which asks The modem to pay attention to the current request (command).

AT commands are used to request services from the cellular modem, such as:

- Call services: dial, answer and hang up
- Cellular utilities: send/receive SMS
- Modem profiles: Auto Answer
- Cellular Network queries: GSM signal quality

2.2 General System Abbreviations

The basic system configuration contains a modem and a terminal.

The L8 family is The modem unit and may be referred to as the DCE or TA, such as the phone, the mobile or the radio.

The terminal (PC or MCU) may be referred to as the DTE or the TE.

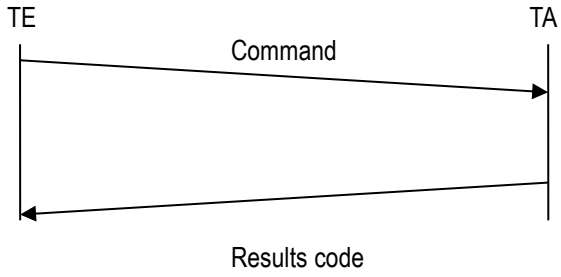
2.3 AT Commands Protocol

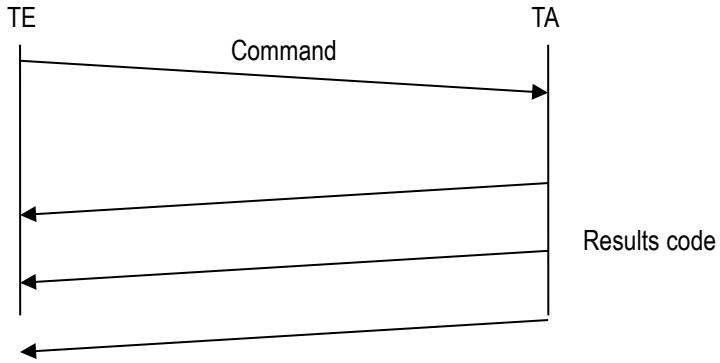
The AT commands interface is basically a Modem Services upon Request.

Communication (almost) always begins from the TE side. This means that any service should be requested from the TE. Thus a request is called a "Command".

Each command must be answered by a "Results code" from the TA. The results code reports the command status to the TE. Some commands may include several "Results code" to send data back to the TE. Some commands may initiate a mode in which, when specified events are generated in the modem, "Indicator" messages are sent data asynchronously. The “indicators” can be called “Unsolicited results code”.

The Modem can echo characters received from the TE (commands) back to the TE.





2.4 AT Commands Structure

2.4.1 General Symbols Used in AT Commands Description

The following syntax definitions apply in this chapter :

Syntax	Definition
<CR>	Carriage returns character, specified by the value of the S3-register.
<LF>	Line-feed character, specified by the value of the S4-register.

<…>	Name enclosed in angle brackets is a syntax element. The brackets themselves do not appear in the command line.
[...]	Optional sub-parameter of a command or an optional part of terminal information response, enclosed in square brackets. The brackets themselves do not appear in the command line. When the sub-parameter is not provided in the parameter type commands, the new value equals its previous value. In action type commands, the action should be performed on the basis of the recommended default setting of the sub-parameter.
//	Denotes a comment, and should not be included in the command.

2.4.2 Command Structure

Each AT command has the "AT" or “at” prefix string (except the commands A/ and +++).

Each AT command has the suffix <CR> (except the commands A/ and +++).

Example:

AT+CSQ<CR>
ATS24?<CR>

An AT command line may contain one or more commands. Delimiters are used to separate the commands from each other. The delimiter is either a semicolon ";" or none, meaning space (basic commands).

Example:

ATS0=1V1Q0E0<CR>
AT+IFC=0,0;+ICF=3,4;+CNMI=2,1,0,0,0<CR>

2.4.3 Results Code Structure

By default, the Modem responds with verbose response codes. The results code prefix is <CR><LF>. The results code suffix is <CR><LF>.

Example:

<CR><LF>+CSQ: 99,99<CR><LF>
<CR><LF>OK<CR><LF>

The unsolicited results code is same as the Results code.

2.5 Command Syntax

Execute command syntax	AT+xxx ATxxx ATxxx;
Parameter set command syntax	AT+xxx=<Value> ATxxx=<Value>
Parameter read Command syntax	AT+xxx? ATxxx?
Parameter test Command syntax	AT+xxx=? ATxxx=?

<Value> consists of either a numeric constant or a string constant. <compound_value> consist of several <value> parameters separated by commas.

Example of compound_value: <value1>, <value2>,…,<valueN>

- Numeric Constants

  Numeric constants are expressed in decimal, hexadecimal, or binary form. In the Modem, the definition of each command specifies which form is used for values associated with that command.

- String Constants

  String constants consist of a sequence of characters, bounded at the beginning and end by the double-quote character (").

3 Modem ID

These commands allow the user to query the type of device that is attached, the technology used in the device, as well as basic operating information about the modem unit.

3.1 +CGMI, +GMI, Request Manufacturer ID

These commands display manufacturer identification. The modem unit outputs a string containing manufacturer identification information.

Command	Response/Action
AT+CGMI AT+CGMI?	+CGMI: <manufacturer_ID> OK
AT+GMI AT+GMI?	+GMI: <manufacturer_ID> OK

Example:

AT+CGMI
+CGMI: "Fibocom"
OK

3.2 +CGMM, +GMM, +FMM, Request Model ID

These commands request the model identification. The modem outputs a string containing information about the specific model, including a list of the supported technology used, and the particular model number.

Command	Response/Action
AT+CGMM AT+CGMM?	+CGMM: <list of supported technologies>,<model> OK
AT+GMM AT+GMM?	+GMM: <list of supported technologies>,<model> OK
AT+FMM AT+FMM?	+FMM: <list of supported technologies>,<model> OK

Example:

AT+CGMM?
+CGMM: "L810 LTE Module","L810"
OK

3.3+CGMR, +GMR, +FMR, Request Revision

These commands request the revision identification. The modem outputs a string containing the revision identification information of the software version contained within the device.

Command	Response/Action
AT+CGMR AT+CGMR?	+CGMR: <revision> OK
AT+GMR AT+GMR?	+GMR: <revision> OK
AT+FMR AT+FMR?	+FMR: <revision> OK

Example:

AT+CGMR
+CGMR: "L810_V0L.00.01"
OK

3.4+CGSN, +GSN, Request Product Serial Number Identification

This command displays the product serial number identification IMEI (International Mobile Equipment Identification). It can be used even when the SIM card is not inserted.

Command	Response/Action
AT+CGSN	<imei> OK
AT+CGSN?	+CGSN: <imei> OK
AT+GSN	+GSN: <imei>

AT+GSN?	OK

The following table shows the +CGSN, +GSN parameters.

<Parameter>	Description
<imei>	The IMEI (International Mobile Station Equipment Identity) number is composed of 15 digits, as specified by 3GPP TS 23.003. IMEI numbers are composed of the following elements, all in decimal digits: Type Approval Code (TAC) - 8 digits Serial Number (SNR) - 6 digits Spare digit - 1 digit The TAC and SNR are protected against unauthorized changes.

Example:

AT+CGSN

865204020007540

OK

AT+CGSN?

+CGSN: "865204020007540"

OK

3.5+CSCS, Select Terminal Character Set

This command selects the Modem character set. The modem supports the following character sets: "IRA","GSM","UCS2","HEX". The default value is “IRA”.

Command	Syntax	Response/Action
Set	+CSCS=[<chset>]	OK or: +CMS ERROR: <err>
Read	+CSCS?	+CSCS: <selected character set> OK
Test	+CSCS=?	+CSCS: (<supported character sets>) OK

The following table shows the +CSCS parameter optional values.

<chset>	Character Set

“IRA”	International Reference Alphabet (ITU-T T.50)
“GSM”	GSM default alphabet (GSM 03.38 subclause 6.2.1)
"UCS2"	2-byte Universal Character Set, Unicode (ISO/IEC 10646 [32])
“HEX”	Character strings consist only of hexadecimal numbers from 00 to FF

Example:

AT+CSCS=?
+CSCS: ("UCS2", "IRA", "HEX", "GSM")
OK
AT+CSCS?
+CSCS: "IRA"
OK
AT+CPBS="SM"
OK
AT+CPBW=1,"8475763000",129,"Lin Zhao"
OK
AT+CSCS="UCS2"
OK
AT+CPBR=1
+CPBR: 1,"8475763000",129,”004C0069006E0020005A00680061006F”
OK

3.6+CIMI, Request IMSI

This command displays the International Mobile Subscriber Identity number.

Command	Response/Action
AT+CIMI	<imsi> OK or: +CME ERROR: <err>
AT+CIMI?	+CIMI: <imsi> OK or:

	+CME ERROR: <err>

Example:

AT+CIMI
314566320021400
OK

AT+CIMI?
+CIMI: 314566320021400
OK

3.7+CFSN, Read Factory Serial Number

This command is used to query the factory serial number.

Command	Response/Action
AT+CFSN AT+CFSN?	+CFSN: <fsn> OK

Example:

AT+CFSN
+CFSN: “1234567890”
OK

3.8I, Request Identification Information

This command displays various modem information items.

Command	Response/Action
ATIn	<information item n> or: +CME ERROR: <err>

The following table shows the information items that are supported by the Modem.

ATIn	Description	Output (Just Demo)	Remark
ATI	Same as ATI0	".Built@Jul 24 2014:10:15:45"	
ATI0	Build time	".Built@Jul 24 2014:10:15:45"	
ATI1	Reserve	"Reserve"	
ATI2	Reserve	"Reserve"	
ATI3	Product description	"Fibocom LTE Module"	
ATI4	Reserve	"Reserve"	Note: For L810, L830 are not supported now.
ATI5	Platform	"XMM7262"	
ATI6	Reserve	"Reserve"	
ATI7	Product description	"L810 LTE Module"	
ATI8	Software version	"L810_V0L.00.01"	
ATI9	Reserve	"L810-GL-00 V1.0.0"	

3.9+CNUM, Request MSISDN(s)

This command displays up to 2 strings of text information that identify the modem. The output string contains double quotes.

On SIM cards that have EFmsisdn file, the string(s) returned are the MSISDN numbers and their associated data.

On SIM cards that don't have EFmsisdn file, the strings returned are the MSISDN numbers and their associated data stored in Modem NVM.

Note: For L810-GL, L830-GL,+CNUM? are not supported.

Command	Response/Action

+CNUM +CNUM? (MSISDN supported)	+CNUM: [<MSISDN1_string>],<MSISDN1>,<MSISDN1_type><CR><LF> [+CNUM: [<MSISDN2_string>],<MSISDN2>,<MSISDN2_type>]<CR><LF> > [...] OK
+CNUM +CNUM? (MSISDN not supported)	+CNUM: <phone_number> OK

The following table shows the +CNUM parameters.

<Parameter>	Description
<MSISDN type>	Phone number type 129 Use for local call 145 Use “+” for international access code 128 Unknown

Example:

AT+CNUM
+CNUM: "VoiceMail","13812345678",129
OK

3.10 +CLAC, List of All Available AT Commands

This command prints out all AT Commands supported by the Modem.

Command	Syntax	Response/Action	Remarks

Execute	+CLAC	List of available AT commands	The Execute command displays a list of all the AT commands supported by the Modem.

4 Modem Control and Status

4.1 Modem Register Commands

The modem holds certain data items in selected memory space, named Software Registers (S-registers) and Modem Registers. Some of these registers are used as bitmaps, where one register holds more than one data item.All S-registers can be accessed using the S command, described in “S, Bit Map Registers”. Some registers can also be accessed using dedicated commands, detailed below.

4.1.1 V, Modem Response Format

This command determines the response format of the data adapter and the contents of the header and trailer transmitted with the result codes and information responses. This command also determines whether the result codes are transmitted in a numeric or an alphabetic ("verbose") form. The text portion of information responses is not affected by this setting.

The following table shows the effect that setting this parameter has on the format of information text and result codes.

V0	V1	Information Responses
<ATV0><cr><lf>	<ATV1><cr><lf>	0 - "OK" 1 - "CONNECT" 2 - "RING" 3 - "NO CARRIER" 4 - "ERROR" 5 - "NO DIALTONE" 6 - "BUSY" 7 - "NO ANSWER"
<numeric code><cr>	<verbose code><cr><lf>	

Command	Syntax	Response/Action	Remarks
Set	ATV<value>	OK or: +CME ERROR: <err>	The Set command sets the format of information responses and result codes.

The following table shows the V parameters.

<Parameter>	Description
<value>	0 Transmits limited headers and trailers, and numeric text. 1 Transmits full headers and trailers, and verbose response text. The default value is 1.

Example:

ATV0
0
ATV1
OK

4.1.2 Q, Result Code Suppression

This command determines whether to output the result codes. Information text transmitted in response to commands is not affected by the setting of this parameter.

Note : For L810, L830, Read command are not supported.

Command	Syntax	Response/Action	Remarks
Set	ATQ<value>	OK or: +CME ERROR: <err>	The set commands sets whether or not to output result codes.
Read	ATQ?	Q: <value> OK	

The following table shows the Qn parameters.

<Parameter>	Description
<value>	0 Transmit result codes. 1 Suppress result codes. The default value is 0.

Example:

ATQ0
OK
ATQ4
ERROR
ATQ1 // No response because result codes are suppressed.
ATQ4 // No response because result codes are suppressed.

4.1.3 E, Command Echo

This command defines whether input characters are echoed to output. If so, these characters are echoed at the same rate, parity and format at which they were received.

Note: For L810, L830, ATE? are not supported.

Command	Syntax	Response/Action	Remarks
Set	ATE<value>	OK or: +CME ERROR: <err>	The Set command sets whether or not to echo characters.
Read	ATE?	<value> OK	The Test command for E is not defined by ITU, and therefore is not supported by the Modem. The Modem returns an error.

The following table shows the E parameters.

<Parameter>	Description
<value>	000 Does not echo characters 001 Echoes characters The default value is 001.

4.1.4 X, Result Code Selection and Call Progress Monitoring Control

This command defines the CONNECT result code format. It determines whether or not the Modem transmits particular result codes to the user. It also controls whether the Modem verifies the presence of

dial tone when it first goes off-hook to begin dialing, and whether the engaged tone (busy signal) detection is enabled.

Note: For L810, L830, ATX? are not supported.

Command	Syntax	Response/Action	Remarks
Set	ATX<value>	OK or: +CME ERROR: <err>	The Set command sets the result code and call progress monitoring control.
Read	ATX?	<value> OK	

The following table shows the X parameters.

<Parameter>	Description
<value>	0 CONNECT result code given upon entering online data state: Dial tone detection - Disabled Busy detection - Disabled 1 CONNECT <text> result code given upon entering online data state: Dial tone detection - Disabled Busy detection - Disabled 2 CONNECT <text> result code given upon entering online data state: Dial tone detection - Enabled Busy detection - Disabled 3 CONNECT <text> result code given upon entering online data state: Dial tone detection - Disabled Busy detection - Enabled 4 CONNECT <text> result code given upon entering online data state: Dial tone detection - Enabled Busy detection – Enabled

	The default value is 4.

4.1.5 S, Bit Map Registers

This command reads/writes values of the S-registers. The Modem supports this command for various S values, according to official specifications (ITU-I, ETSI, or manufacturer specific).

Command	Syntax	Response/Action	Remarks
Set	ATSn=<value>	OK or: +CME ERROR: <err>	The Set command is allowed for read/write S-registers, and not allowed for read-only S-registers.
Read	ATSn?	<current value of S-register n> OK or: +CME ERROR: <err>	
Test			The Test command for Sn is not defined by ITU, and therefore is not supported by the Modem. The Modem returns an error.

The following table shows the different S-registers and their associated values.

Sn	Description	Min Value	Max Value	Default Value
S0	Sets/gets number of rings before auto answer.	0	255	0
S2	Sets/gets escape code character.	1	255	43
S3	Sets/gets carriage return code character.	0	127	13
S4	Sets/gets line feed code character.	0	127	10
S5	Sets/gets command line editing character (backspace).	0	127	8

S6	Sets/gets the amount of time in seconds, that the DCE waits between connecting to the line and dialing, when dial tone is not implemented or enabled.	2	10	2
S7	Sets the number of seconds in which connection must be established before the call is disconnected.	1	255	60
S8	Sets/get the amount of time in seconds, that the DCE shall pause, during dialing, when a "," dial modifier is encountered in a dial string.	0	255	2
S12	Sets/get guard time (in units of 50 msec) for the escape character during CSD connections	0	255	20

Note: S0 (Auto Answer) should work regardless of the DTR HW line state. This is a deviation from the ITU V. 25-ter standard. For L810, L830, only S0, S4 and S7 are supported.

Example:

ATS0?
000
OK
ATS0=3
OK
ATS0?
003
OK

4.1.6 S2

This command handles the selection of the escape characters, which are stored in S-Register 2, and specifies the escape character used in CSD connections.

Command	Syntax	Response/Action	Remarks
Set	S2=<escape_character>	OK +CME ERROR: <err>	The Set command sets the CSD escape character value if all parameters are valid.

Read	S2?	<escape_character> OK	The Read command displays the currently defined escape character for CSD connections.

The following table shows the S2 parameters.

<Parameter>	Description
<escape_character>	CSD escape character. Range is 1 to 255. The default value is 43 ("+").

4.1.7 S12

This command handles the selection of the guard time, which is stored in S-Register 12, and specifies the behavior of escape characters during CSD connection.

Note: For a guard time specified by S-Register 12, no character should be entered before or after "+++". The duration between escape codes must be smaller than the guard time.

Command	Syntax	Response/Action	Remarks
Set	S12=<guard_time>	OK +CME ERROR: <err>	The Set command sets the CSD escape character guard time value if all parameters are valid.
Read	S12?	<guard_time> OK	The Read command displays the current CSD escape character guard time.

The following table shows the S12 parameters.

<Parameter>	Description
<guard_time>	CSD escape character guard time (units of 50 msec). Range is 0 to 255. The default value is 20.

4.1.8 &F, Set to Factory Defined Configuration

This command restores the factory default configuration profile. The Modem only supports one factory

default profile, 0.

Note: For L810, L830, Read command are not supported.

Command	Syntax	Response/Action	Remarks
Set	AT&F<value>	OK or: +CMS ERROR: <err>	
Read	AT&F?	<current profile number>	
Test			The Test command for &F is not defined by ITU, and therefore is not supported by the Modem. The Modem returns an error.

The following table shows the &F parameters.

<Parameter>	Description
<value>	0 Factory default configuration profile. This is the only value supported.

4.1.9 Z, Reset to Default Configuration

This command drops the current call, and resets the values to default configuration.

Command	Syntax	Response/Action	Remarks
Set	ATZ<value>	OK or: +CMS ERROR: <err>	
Read		ERROR	The Read command for Z is not defined, and therefore is not supported by the Modem. The Modem returns an error.

Test		ERROR	The Test command for Z is not defined, and therefore is not supported by the Modem. The Modem returns an error.

The following table shows the Z parameters.

<Parameter>	Description
<value>	0 Set to user profile 0 1 Set to user profile 1 The default value is 0.

Example:

ATZ0
OK

4.1.10 +CRSM, Restricted SIM Access

This command provides limited access to the Elementary Files on the SIM. Access to the SIM database is restricted to the commands which are listed at <command>. All parameters of AT+CRSM are used as specified by 3GPP TS 51.011(2G) and TS 31.101(3G). As response to the command, the Modem sends the actual SIM information parameters and response data. Error result code "+CME ERROR" may be returned if the command cannot be transferred to the SIM, e.g. if the SIM is not inserted, or defected, or PIN1/PUK authentication required, or required input parameters not present. However, failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters.

Some of the AT+CRSM commands require PIN/PIN2 authentication.

Note: For L810, L830, Test command only returns OK .

Command	Syntax	Response/Action	Remarks
Set	AT+CRSM=<command>[,<file_id>[,<P1>,<P2>,<P3>[,<data>[,	+CRSM: <sw1>,<sw2>[,<response>]	Set command transmits the SIM <command> and its required parameters to the ME.

	<pathid>]]]]	OK or: +CME ERROR: <err>	ME sends the actual SIM information parameters and response data.
Test	AT+CRSM=?	+CRSM: (list of supported<command>s), (possible <file_id>s range value),(possible <P1> range value), (possible <P2> range value),(possible <P3>range value), OK or: +CME ERROR: <err>	The test command returns the possible ranges of CRSM Parameters.

The following table shows the +CRSM parameters.

<Parameter>	**Description**
<command>	Integer type. Command passed on by the ME to the SIM. 176 Read BINARY 178 Read RECORD 192 Get RESPONSE 214 Update BINARY 220 Update RECORD 242 STATUS
<file_id>	Integer type. This is the identifier of a elementary data file on SIM. Mandatory for every <command> except of STATUS.

<P1>,<P2>,<P3>	Integer type. Parameters passed on by the ME to the SIM. These parameters are man- datory for every command, except GET RESPONSE and STATUS. READ BINARY <P1> Offset high (0...255) <P2> Offset low (0...255) <P3> Length (0...255) READ RECORD <P1> Rec. No. (0...255) <P2> Mode "02" = next record "03" = previous record "04" = absolute mode/current mode, the record number is given in P1 with P1='00' denoting the current record. <P3> Length (0...255) GET RESPONSE <P1> "00" <P2> "00" <P3> Length (0...255) UPDATE BINARY <P1> Offset high (0...255) <P2> Offset low (0...255) <P3> Length (0...255) UPDATE RECORD <P1> Rec. No. (0...255) <P2> Mode "02" = next record "03" = previous record "04" = absolute mode/current mode, the record number is given in P1

	with P1='00' denoting the current record. <P3> Length (0...255) STATUS <P1> "00" <P2> "00" <P3> Length (0...255)
<data>	Information which shall be written to the SIM (hexadecimal character format). Man- datory for UPDATE BINARY and UPDATE RECORD.
<pathid>	String type; contains the path of an elementary file on the SIM/USIM in hexadecimal format as defined in ETSI TS 102 221 [60] (e.g. “7F205F70” in SIM and USIM case).
<sw1> <sw2>	Integer character format. Information, from the SIM, about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command. <sw1>, <sw2> integer type containing the SIM information and can be: 0x90 0x00 normal entry of the command 0x9F 0xXX length XX of the response data 0x92 0x0X update successful but after using an internal retry routine X times 0x92 0x40 memory problem 0x94 0x00 no EF selected 0x94 0x02 out of range (invalid address) 0x94 0x04 file ID not found; pattern not found 0x94 0x08 file is inconsistent with the command 0x98 0x02 no CHV initialized 0x98 0x04 access cond. Not fullfiled / unsucc. CHV verify

	authent.failed 0x98 0x08 in contradiction with CHV status 0x98 0x10 in contradiction with invalidation status 0x98 0x40 unsucc. CHV-verif. Or UNBLOCK CHF / CHV blocked /UNBL.blocked 0x98 0x50 increases can not be performed. Max. value reached 0x61 0xXX SW2 indicates the number of response bytes still available. Use GET RESPONSE to access this data. 0x62 0xXX Warning - state unchanged 0x62 0x00 Warning - no information provided 0x62 0x81 Warning - part of returned data may be corrupt 0x62 0x82 Warning - end of file/record reached (bad cmd) 0x62 0x83 Warning - selected file invalidated 0x62 0x84 Warning - bad file control information format 0x63 0xXX Warning - state unchanged 0x63 0x00 Warning - no information provided 0x63 0x81 Warning - file filled up with last write 0x63 0xCx Warning - counter value is x 0x64 0xXX Error - state unchanged 0x65 0xXX Error - state changed 0x65 0x00 Error - no information provided 0x65 0x81 Error - memory failure 66 xx Security Error 0x66 0xXX Security Error 0x67 0xXX incorrect parameter P3 0x68 0xXX Check Error - CLA function not supported 0x68 0x00 Check Error - no information provided 0x68 0x81 Check Error - logical channel not supported

	0x68 0x82 Check Error - secure messaging not supported 0x69 0xXX Check Error - command not allowed 0x69 0x00 Check Error - no information provided 0x69 0x81 Check Error - command incompatible with file structure 0x69 0x82 Check Error - security status not satisfied 0x69 0x83 Check Error - authentication method blocked 0x69 0x84 Check Error - referenced data invalidated 0x69 0x85 Check Error - conditions of use not satisfied 0x69 0x86 Check Error - command not allowed (no current EF) 0x69 0x87 Check Error - expected SM data objects missing 0x69 0x88 Check Error - SM data objects incorrect 0x6A 0xXX Check Error - wrong parameters 0x6A 0x00 Check Error - no information provided 0x6A 0x80 Check Error - incorrect parameters in data field 0x6A 0x81 Check Error - function not supported 0x6A 0x82 Check Error - file not found 0x6A 0x83 Check Error - record not found 0x6A 0x84 Check Error - not enough memory space in the file 0x6A 0x85 Check Error - Lc inconsistent with TLV structure 0x6A 0x86 Check Error - inconsistent parameters P1-P2 0x6A 0x87 Check Error - Lc inconsistent with P1-P2 0x6A 0x88 Check Error - referenced data not found 0x6B 0xXX incorrect parameter P1 or P2 0x6C 0xXX Check Error - wrong length - xx is the correct length 0x6D 0xXX unknown instruction code given in the command 0x6E 0xXX wrong instruction class given in the command 0x6F 0xXX technical problem with no diagnostic given

<response>	Response of a successful completion of the command previously issued (hexadecimal character uppercase format). STATUS and GET RESPONSE return data, which gives information about the current elementary data file_id. This information includes the type of file and its size (refer to GSM 11.11). After READ BINARY or READ RECORD command the requested data will be returned. <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command.

Example:

```
AT+CRSM=176,28478,0,0,20
+CRSM: 145,165,"FF"

OK
AT+CRSM=192,12258
+CRSM: 144,0,"62168202412183022FE28A01058B032F06038002000A8800"

OK
AT+CRSM=?
OK
```

4.1.11 +CCID

This command returns the card identification number in SIM (SIM file EFICCID, see GSM 11.11 Chap.10.1.1) as string type.

Command	Syntax	Response/Action
Set	AT+CCID	+CCID: <ID> OK or: +CME ERROR: <err>
Read	AT+CCID?	Same as above

Test	AT+CCID=?	OK

Example:

AT+CCID
+CCID: 89860018190839008096
OK
AT+CCID=?
OK
AT+CCID?
+CCID: 89860018190839008096
OK

4.2 Port Change Commands

The following are the port change AT commands:

- GTUSBMODE: Set USB Mode.

The L810, L830, receives a request to change USB mode.

4.2.1 GTUSBMODE, Set USB Mode

This command change the USB mode. The terminal sends +GTUSBMODE=0 or1 or 2,then send +CFUN=15 to activate the configuration.

Command	Syntax	Response/Action	Remarks
Set	AT+GTUSBMODE=<mode>	OK or CME ERROR: <error>	
Read	AT+GTUSBMODE?	+GTUSBMODE : <mode> OK	.Note:user must apply set command first after download program,or the read command return error
Test	AT+GTUSBMODE=?	+GTUSBMODE: (0-2)	

		OK	

Defined values

<mode> indicates the radio access technology and may be

0 3ACM (2 AT+ 1 Trace) and 3NCM

1 MBIM only , end user configuration for Win8+ OS

2 3ACM (2 AT + 1 Trace) and MBIM , for debugging under windows 8+ OS

4.3 GTSET Command

4.3.1 GTSET, Set the proprietary parameters of Fibocom

This command set/read/test the proprietary parameters of Fibocom.

*Supported commands list is vary on different product model.

Command	Syntax	Response/Action
Set	+GTSET=<Name>,<P1>,<P2>	OK or: ERROR
Read	+GTSET?	+GTSET: "SIMREPO",1 +GTSET: "SIMPHASE",1 +GTSET: "LPMMODE",1,0 +GTSET:"SWCOREDUMP"1 +GTSET: "DIGITPLAY",0 OK
Test	+GTSET=?	+GTSET: "Name",P1<,P2> OK

The following table shows the +GTSET parameters.

<Parameter>	Description

< Name>	"Name": parameters name, string.
<P1>	Integer: value according to the “name” parameter
<P2>	Integer: value according to the “name” parameter

Example:

AT+gtset?
+GTSET: "SIMREPO",1
+GTSET: "SIMPHASE",1
+GTSET: "LPMMODE",1,0
+GTSET: "SWCOREDUMP",1
+GTSET: "DIGITPLAY",0
OK

4.4 Error Handling Commands

4.4.1 +CMEE, Report Mobile Equipment Error

The Set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the MODEM. When enabled, Modem -related errors cause a +CME ERROR: <err> final result code instead of the regular ERROR final result code. Usually, ERROR is returned when the error is related to syntax, invalid parameters or terminal functionality.

For all Accessory AT commands besides SMS commands, the +CMEE set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the Modem. When enabled, Modem related errors cause a +CME ERROR: <err> final result code instead of the regular ERROR result code.

For all SMS AT commands that are derived from GSM 07.05, the +CMEE Set command disables or enables the use of result code +CMS ERROR: <err> as an indication of an error relating to the functionality of the modem. When enabled, modem -related errors cause a +CMS ERROR: <err> final result code instead of the regular ERROR final result.

Command	Syntax	Response/Action	Remarks
Set	AT+CMEE=[<n>]	OK	The Set command enables or disables the use of result code +CME ERROR:

		or: +CME ERROR: <err>	<err> as an indication of an error relating to the functionality of the Modem.
Read	AT+CMEE?	+CMEE: <n> OK	The Read command returns the current setting format of the result code.
Test	AT+CMEE=?	+CMEE: (list of supported <n>s) OK	The Test command returns values supported by the terminal as a compound value.

The following table shows the +CMEE parameters.

<Parameter>	Description
<n>	0 Disable the +CME ERROR: <err> result code and use ERROR. 1 Enable the +CME ERROR: <err> or +CMS ERROR: <err> result codes and use numeric <err> values or +STK ERROR: <err> result codes and use numeric <err> values. 2 Enable the +CME ERROR: <err> or +CMS ERROR: <err> result codes and use verbose <err> values or +STK ERROR: <err> result codes and use numeric <err> values. The default value is 0.

Example:

```
AT+CMEE=0     //+CME ERROR is not used
OK
AT+VTD
ERROR
AT+CMEE=1     //Use numeric <err>
OK
AT+VTD
+CME ERROR: 1
AT+CMEE=2     //Use verbose <err>
OK
```

+CME ERROR: operation not supported

4.4.2 +CEER, Extended Error Report

This execution command returns an extended error report containing one or more lines of information text <report>, determined by the manufacturer, providing reasons for the following errors:

- Failure in the last unsuccessful call setup (originating or answering) or the in-call modification.
- Last call release.

Typically, the text consists of a single line containing the reason for the error according to information given by GSM network, in textual format.

Command	Syntax	Response/Action
Execute	AT+CEER	+CEER: <category>[,<cause>,<description>] OK
Test	AT+CEER=?	OK

The following table shows the +CEER parameters.

<Parameter>	Description
<category>	“No report available” “CC setup error” “CC modification error” “CC release” “SM attach error” “SM detach” “SM activation error” “SM deactivation” “SS – network error cause” “SS – network reject cause” “SS – network GSM cause”
<cause>	contains a digit representing the error cause sent by network or internally

<description>	Is a verbose string containing the textual representation of the Cause

5 Call Control

5.1 Managing a CSD (Data) Call

The Modem working modes can be divided into two modes of operation.

- Data Mode: In this mode, once the MODEM has established a link with the remote modem, it does not respond to any data passing through it (except for the Escape Sequence search). The Modem becomes a transparent link, connecting the terminal with the remote side.
- Command Mode: In this mode, the Modem responds to the AT commands issued by the terminal. This is the default working mode.

Note: It is possible to switch between the operating modes.The operating modes can operate simultaneously using the MUX and using multi-channels operation.

5.1.1 Simple Dialing

In order to instruct The modem to dial a remote modem from an ordinary tone-dialing telephone line, enter the Dial command followed by the phone number. For example, type the following command:

ATD 876-5555 <Enter>

Note: If you receive characters which were sent, you can disable this with using the Echo command (ATE0 <Enter>).

After issuing the Dial command, and if the remote modem answers the call, the two modems send high-pitched carrier tones to one another which establish the transmission speed and other parameters for the data connection. This process is called negotiation.

After the negotiation process, the message, "CONNECT" followed by the connection speed, is received. If the other phone line is busy, the message “BUSY” is received.

If the other modem does not answer, the message "NO CARRIER" is received.

Once a connection has been established, The modem is ready to immediately begin transmitting and receiving data. This may vary from sending messages to each other, sending or receiving files, logging on to an information service, or any other data communication task you wish to perform.

5.1.2 Switching From Data Mode to Command Mode

To switch the connection from Data mode to Command mode, send the Escape Sequence command (+++).

If The modem responds with "OK" to the Escape command, The modem is in Command mode and the dial connection is still active, and you can use the AT command set.

Note:

- The character '+' in the Escape Sequence pattern can be changed using the S2 S-register.
- Escape is detected only by the Modem and not by the remote side. The remote side stays in the Data mode.
- The behavior of Escape Sequence command (+++) is affected by AT&D setting. Please refer to the description of AT&D.

5.1.3 Hanging Up

If you are using a communications program, use the "Hang up" or "Disconnect" AT command in the program to disconnect the call.

When using computers in the "Dumb Terminal mode", return to the Command mode by typing the Escape Sequence (+++) and then hang up by typing the Hang up command as follows:

```
ATH <Enter>
OK
NO CARRIER
```

If the Modem responds with "OK" and "NO CARRIER", the dial connection is closed.

5.2 Receiving a Data Call

```
ATA <Enter>
```

This command instructs The modem to be the "answering modem". Either party may be the answering or the originating modem, but both parties cannot be the same modem at the same time.

You hear The modem handshake and see the result code "CONNECT" "OK".

Note:

- Outgoing Voice Call during CSD Call, when switching to Command mode.

- If using Dial Command to make Outgoing Voice Call, currently active CSD Call is dropped and the new Voice Call is generated.

5.3 Call Control AT Commands

5.3.1 D, Dial Command

This command places a DATA/VOICE call on the current network.

The default call type is a data call (CSD).

There must be an explicit request in order to make a VOICE call.

If a DATA call was originated and answered by the remote side, a "OK" notification is sent to the terminal from the Modem, and it moves to the online Data state.

For more information about call failure, should use the AT+CEER command.

Note: If there is an active voice call and the terminal sends another ATD voice call command to the Modem, the active call is put on hold and the new number is called.

Command	Response/Action
ATD<number>[;]	VOICE CALL: 1st response - Voice call place begins OK 2nd response - Voice call connected: OK DATA: 1st response only - Data call connected CONNECT When MO call fails: 1. Connection Failure - NO CARRIER or BUSY or NO ANSWER 2. General Failure - ERROR 3. Security reason (such as SIM not present) - OPERATION NOT ALLOWED 4. Unknown reason - UNKNOWN CALLING ERROR

The following table shows the D parameters.

<Parameter>	Description
<number>	Valid phone digits are: 0 1 2 3 4 5 6 7 8 9 * # + The following characters are ignored: A B C D - () / and <space>.
semicolon (;)	When given after <number string>, a voice call is originated to the given address, otherwise a data call is originated.

The control of supplementary services through the Dial command is not supported as these are controlled through the specific supplementary service commands (CCFC, CLCK, and so on.)

Initiating a GPRS connection is done through ATD*99#, as described in “D*99”.

Example:

```
atd44345678;     //VOICE call (with semicolon)
OK
OK
atd44345678      //DATA call (without semicolon)
CONNECT          //Move to online Data state
```

5.3.2 D>, Direct Dialing from Phone Books

This command places a DATA/VOICE call on the current network by dialing directly from the Modem phone book.

Note:

- “+CME ERROR: not found" is returned when no match is found in an existing phone book.
- FD phone book supports the (?) wild card character. Telephone numbers containing this character cannot be dialed directly from the phone book.
- "+CME ERROR: Invalid index" is returned when entry <n> is out of the requested Phonebook range.

The following table shows a detailed description for the D> commands.

Command	Detailed Description
D><alpha>[;]	Originates a call to a phone number with the corresponding alphanumeric field <alpha>. The Current Phone Book (Set by +CPBS) is searched for the entry that begins with the alphanumeric pattern

	<alpha>.
D>mem<n>[;]	Originates a call to a phone number in memory (phone book) mem and stored in entry location <n>.
D><n>[;]	Originates a call to a phone number from entry location <n> in the Current Phone Book (Set by +CPBS).

Note: Current used memory (phone book) set/read is done through the memory command +CPBS=/+CPBS? respectively.

The following table shows the D> parameters.

<Parameter>	Description
<"alpha">	String type value, which should be equal to an alphanumeric field in a phone book entry. The used character set should be the one selected with Select Terminal Character Set +CSCS. <alpha> is case-sensitive, and should be placed in quotes ("alpha").
<n>	This parameter is also called "speed dial location". It is an integer type memory location. <n> should be in the range of locations available in the memory used.
<mem>	This parameter is not case-sensitive.

Example:

```
AT+CPBS="SM"
OK
AT+CSCS="IRA"
OK
AT+CPBW=1,"035659090",129,"VoiceMail"
OK
AT+CPBR=1
+CPBR: 001,"035659090",129,"VoiceMail"
OK
atd>”VoiceMail”;       //Phonebook by name
```

OK

OK

ath

OK

NO CARRIER

5.3.3 DL, Dial Last Number

The DL command places a voice call to the last number dialed. The call progress information (success/failure) is reported in the same way as for the Dial command.

Command	Detailed Description
ATDL[;]	Initial Response - Last Number retrieved: ATDL: <DIAL DIGITS> 1st response - Voice call placement begins OK 2nd response - Voice call connected OK

The following table shows the DL parameters.

<Parameter>	Description
semicolon (;)	If the semicolon (;) is given, a voice call is originated to the last dialed number. If the semicolon (;) is not given, a Data call is originated. Note: The last dialed call type is irrelevant to the DL command.

Note:

When ATDL is issued after a dialed number with comma digit:

- ATDL; (Voice) dials the exact number that was last dialed, including the DTMF tones sent.
- If ATDL is sent before any Dial command was issued (mainly after Power On, when the last number is an empty field), the Modem will return NO CARRIER, as mentioned in the ITU V.25-ter standard.
- CCFC（*#21#）,CCWA（*#43#）,CLIP（*#30#）,CLIR(*#31#),COLP(*#76#) will be treat as call number and dail it again.

  Example:

```
atdl;
ATDL: 035658278
OK
OK      //VOICE call
```

5.3.4 H, Hang-up Call

This command hangs up a call. The Modem terminates the call whether it is a data or voice call, and whether it is an incoming, originating, waiting, or connected call.

A NO CARRIER message is returned to the terminal after the regular OK approval.

Note:

- To terminate (hang-up) a MO data call while call is placed: Any character sent from the terminal to the Modem causes the Data call termination, and NO CARRIER is sent from the Modem to the terminal.
- To terminate a held Voice call or to terminate a call out of a MTPY call, refer to “+CHLD, Call Related Supplementary Services Command”.

The following table shows the call states of the H command.

Call State	Response/Action
IDLE	Error ("operation not allowed")
Single Active	Call released
MTPY Active	Call released (all calls)
Incoming call (RING)	Call released
Single Active and Waiting Call	Single Active released (waiting not affected)
MTPY Active and Waiting Call	MTPY Active released (waiting not affected)
Single (or MTPY) Active and Single (or MTPY) Held	Single (or MTPY) Active released
Held (Single or MTPY) and Waiting Call	Waiting call released
Single (or MTPY) Active and Single (or MTPY) Held	Single (or MTPY) Active released

& Waiting call	

Example:

```
RING       //Incoming call
RING      //Incoming call
ath         //Hang-up incoming call
OK
NO CARRIER    //Incoming call has been terminated - user determined user busy
RING
ata
OK       //Voice call connected
ath         //Hang-up connected call
OK
NO CARRIER //Active call has been hung-up - terminated
(... Active multi party call, with 3 numbers …)
ath
OK
NO CARRIER
NO CARRIER
NO CARRIER
atd035659260;
OK
ath         //Terminate MO voice call while placed
OK
NO CARRIER
```

Example - Hanging up a data call:

```
atd035659260
CONNECT//Data call connected - Online Data mode
…
+++       //ESC Sequence is sent from the terminal to the Modem
OK         //The Modem is in Command mode
ath         //Terminate Data call
OK
NO CARRIER
```

5.3.5 A, Answer Incoming Call

This command answers an incoming VOICE/DATA call after a RING/+CRING indication is sent to the terminal.

If the incoming call is answered (CSD connected), the Modem sends a CONNECT notification to the terminal.

If the MT call fails, the possible notifications are:

- NO CARRIER - Connection Failure
- ERROR - General Failure

Note: A waiting call (an incoming call while a call is in progress) is announced by +CCWA rather than RING. A waiting call can be answered only if it is a voice call. The waiting voice call should be answered using the ATA command, which will put the active call on hold and will connect the waiting call, making it the active call. This ATA action is the same action as AT+CHLD=2.

Example:

Example - Answering a voice call:

```
AT+CRC=1
+CRING: VOICE
+CRING: VOICE
ata
OK      //VOICE call connected - Modem is in Command mode
ath
OK
NO CARRIER
```

Example - Answering a data call:

```
+CRING: REL ASYNC
+CRING: REL ASYNC
ata
...         //Connecting (dots are not displayed)
OK          //DATA call connected - Modem is in Online Data mode
```

Note: In a CSD call, call release is not valid during the phase of call negotiation (from OK until connect call).

5.3.6 +CRC, Cellular Result Codes and RING, +CRING - Incoming Call Indication

This command controls whether or not to present the extended format of an incoming call indication. The RING/+CRING indication is sent from the Modem to the terminal when the Modem is alerted by an incoming call from the network. Once this indication is sent, information is available on the calling line via +CLIP. When +CRC is disabled, the indication is RING, and when +CRC is enabled, the indication is +CRING.

Command	Syntax	Response/Action	Remarks
Set	+CRC=<n>	OK	The Set command enables/disables the extended format of an incoming call indication. When enabled, an incoming call is indicated to the terminal with an unsolicited result code +CRING: <type> instead of the normal RING.
Read	+CRC?	+CRC: <n> OK	The Read command queries the current settings for the cellular result code.
Test	+CRC=?	+CRC: (list of supported <n>s)	The Test command returns the possible <n> values.

RING/+CRING Indication

+CRING: <type>
or:
RING

The following table shows the +CRC parameters.

<Parameter>	Description
<n>	0 Extended format disabled 1 Extended format enabled

	The default value is 0.
<type> ASYNC [,<priority>[,<subaddr>,<satype>]] SYNC [,<priority>[,<subaddr>,<satype>]] REL ASYNC [,<priority>[,<subaddr>,<satype>]] REL SYNC [,<priority>[,<subaddr>,<satype>]] VOICE [,<priority>[,<subaddr>,<satype>]] VOICE/XXX [,<priority>[,<subaddr>,<satype>]] ALT VOICE/XXX [,<priority>[,<subaddr>,<satype>]] GPRS <PDP_type>,<PDP_addr>[,[<L2P>][,<APN>]] VGC <GCA>, <Gid>, <ackflag> [,<priority>] VBC <GCA>, <Gid>, <ackflag> [,<priority>]	Type of incoming call: asynchronous transparent synchronous transparent asynchronous non-transparent synchronous non-transparent normal voice (TS 11) voice followed by data (BS 81) (XXX is ASYNC, SYNC,REL SYNC,REL ASYNC) alternating voice/data, voice first (BS 61) alternating voice/data, data first (BS 61)

	GPRS network request for PDP context activation voice group call (TS 91) voice broadcast call (TS 92)
The optional <priority> indicates the EMLPP priority level of the incoming call by paging, notification or setup message. <subaddr>: string type subaddress of format specified by <satype> <satype>: type of subaddress octet in integer format <PDP_type> ,<PDP_addr> and <APN> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.250 online data state) the MT shall reject the request. No corresponding unsolicited result code shall be issued when the MT returns to a command state. <GCA> is a part of the group call reference and indicates group call area. <Gid> is a part of the group call reference and indicates group call identification.The <ackflag>=1 proposes that a predefined confirmation procedure is to be used after the call is ended. For <ackflag>=0 no confirmation procedure is required	

Example:

AT+CRC?
+CRC: 0
OK
AT+CRC=?
+CRC: (0-1)
OK

Example - RING/+CRING indication

(..Incoming Data Call..)
RING
RING
RING
AT+CRC=1 //Enable extended ring format
OK
+CRING: REL ASYNC
+CRING: REL ASYNC
ath
OK
AT+CRC=1
OK
+CRING: ALT Voice/Data
NO CARRIER

5.3.7 +CLIP, Calling Line Identification

This command controls the Calling Line Identity (CLI) presentation indication to the terminal when an incoming call is detected by the Modem.

This command allows the user to query the provisioning status of the CLI by the network and by the Modem. The command also allows the user to enable/disable the CLI presentation by the Modem to the terminal.

The +CLIP indication information varies depending on what is provided by the network and what information is stored in the Modem phone book.

Command	Syntax	Response/Action	Remarks
Set	AT+CLIP=[<n>]	OK or: +CME ERROR: <err>	The Set command enables or disables the presentation of the CLI indication from the Modem to the terminal. Note: The Set command does not address the network.
Read	AT+CLIP?	+CLIP: <n>, <m> OK	The Read command returns the +CLIP enable/disable state in the Modem as well as in the network provisioning state of the CLI presentation.

Test	AT+CLIP=?	+CLIP: (0,1) OK	The Test command returns the Set command options (0,1).

5.3.8 +CLIP Indication

When the CLI presentation indication is enabled by the Modem (<n>=1), this unsolicited indication is sent to the terminal after the RING indication.

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

The following table shows the +CLIP parameters.

<Parameter>	Description
<n>	Enables/disables the CLI presentation indication after the ring indication: 0 Disable CLI presentation 1 Enable CLI presentation The default value is 0.
<m>	Shows the subscriber CLIP service status in the network: 0 CLIP not provisioned 1 CLIP provisioned 2 Unknown (for example, no network and so on)
<"number">	Calling line number. The number format is specified by <type>.
<type>	Type of address octet in integer format: 145 Default when the dialing string includes the international access code character "+". 129 Default when making a local call. 128 Type of number is unknown (usually the output when the number itself is unknown).
<subaddr>	NULL, field not used (String type subaddress of format specified by <satype>)
<satype>	Field not used. Value is always 128 (unknown) - type of sub address

	octet in integer format.
<"alpha">	Name of the calling party (if provided by the network).
<CLI validity>	The Validity of the Calling Line Identity presentation: 0 CLI valid. 1 CLI has been withheld by the originator. 2 CLI is not available due to networking problems or limitations of the originating network.

Example:

AT+CLIP=?
+CLIP: (0,1)//CLI presentation is disabled by the Modem (0) and is enabled by the network (1)
OK
AT+CLIP=1
OK

Example +CLIP indication:

(…incoming call…)
RING
+CLIP: "13510503472",129,,,"",0

Example +CLIP indication with restricted CLI:
AT+CRC=1
OK

(…incoming call…, caller restricted the CLI presentation (used AT+CLIR)…)
+CRING: VOICE
+CLIP: "",128,,128,"",1

5.3.9 +CCWA, Call Waiting Command

This command controls the Call Waiting supplementary service, including the settings and the queries of the Modem and the network.

When the Call Waiting indication is enabled by the Modem and there is a waiting call, a +CCWA: indication is sent from the Modem to the terminal. The indication will appear one time

Note: The Modem supports only one of the services at a time: Voice or Data. Multiparty is a voice-only functionality.

A CCWA indication is sent to the terminal only during a voice call-waiting event. A CCWA indication is not sent for a data call during in a voice session.

Command	Syntax	Response	Remarks
Set	+CCWA=[<n>[,<mode>[,<class>]]]	OK If <mode>=2 and the command succeeds: +CCWA: <status>,<class>[<CR><LF>+CCWA: <status>,<class>[...]] OK	The Set command enables/disables the Call-Waiting indication in the Modem and in the network. Activation, deactivation and status query are supported. Note: When the <mode> parameter is set to 2 (network query), the <n> parameter is ignored. This means that no enable/disable action is performed while querying the network.
Read	+CCWA?	+CCWA: <n> OK	The Read command returns the enable/disable status of the call waiting indication in the Modem (<n>).
Test	+CCWA=?	+CCWA: (list of supported <n>s) OK	The Test command returns <n> values supported by the Modem as a compound value.

The following table shows the <class> parameters.

<Class>	Description
1	Voice (telephony)
2	data (refers to all bearer services; with <mode>=2 this may refer only to some

	bearer service if TA does not support values 16, 32, 64 and 128)
4	Fax (facsimile services)
8	short message service
16	data circuit sync
32	data circuit async
64	dedicated packet access
128	dedicated PAD access

5.3.10 +CCWA Indication

When a call-waiting indication is enabled by the Modem (<n>=1), the following unsolicited indication is sent to the terminal from the Modem:

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

The following table shows the +CCWA parameters.

<Parameter>	Description
<n>	Enables/disables the call waiting indication to the terminal by the Modem. 0 - Disable 1 - Enable The default value is 0.
<mode>	Call waiting service request to the network. When the <mode> parameter is not given, the network is not interrogated. 0 - Disable 1 - Enable 2 - Query status
<class>	Sum of integers each representing a class of information. Please see class table in +CCWA command. The default value is 7.

<number>	Calling line number. The number format is specified by <type>.
<type>	Type of address octet in integer format: 145 - Default when the dialing string includes the international access code character "+". 129 - Default when making a local call. 128 - Type of number is unknown (usually the output when the number itself is unknown)
<status>	Call waiting support by the network (output for <mode>=2). 0 - Not active 1 - Active
<alpha>	Name of the calling party (if provided by the network).
<CLI validity>	The Validity of the Calling Line Identity presentation: 0 - CLI valid. 1 - CLI has been withheld by the originator. 2 - CLI is not available due to networking problems or limitations of the originating network.

Note: When the parameter <mode> is 2 (Query status), the first parameter is ignored and the third parameter is always treated as class = 1 unless it was set in Set Mode.

Example:

```
AT+CCWA=1
OK
AT+CCWA=?
+CCWA: (0,1)
OK
AT+CCWA?
+CCWA: 1
```

```
OK
Examples of +CCWA set command - network interrogation
AT+CCWA=1,2          //Class parameter is considered as 7
+CCWA: 1,1        //Call waiting is active for class 1, voice
OK
AT+CCWA=1,2,2 //Class parameter is 2
+CCWA: 0,2        //Call waiting is not active for class 2, data
OK
AT+CCWA=1,1
OK                //Enable the call waiting feature in the network,
Example +CCWA indication
atd9311234567;          //Originate a voice call
OK
OK                //Voice call connected
(...conversation...)
+CCWA: "+358317654321",145,1,"Bob"
AT+CHLD=0             //Release the waiting call
OK
NO CARRIER
AT+CRC=1          //RING indication is not relevant to CCWA indication
OK
(…waiting call…, caller restricted to its CLI presentation (used AT+CLIR)…)
+CCWA: "",128,1,"",1        //CLI is restricted, but call type recognized as voice
```

5.3.11 +CHLD, Call Related Supplementary Services Command

This command controls the Call Hold and Multiparty Conversation services. This command manipulates voice calls only. The Set command allows the control of the following call related services:

- Call HOLD: A call can be temporarily disconnected from the Modem, but the connection is retained by the network.
- MTPY (Multi party) Conversation: Conference calls.

The network does not reserve more than one traffic channel for a mobile station, therefore the Modem can have only one call on hold at a time.

Note: Only voice calls can be put on HOLD.

A precondition for the multi-party service is that the Modem is in control of one active call and one call on hold. In this situation, the Modem can request the network to begin the MTPY (Multi Party) service. Once

a MTPY call is active, remote parties may be added, disconnected or separated (removed from the MTPY call, but remain connected to the served mobile subscriber).The maximum number of remote parties is 5.

In this command, the term CALL refers to a single or MTPY call.

A single Active call is considered a MTPY call with one call index numbered as 1.

Command	Response/Action
+CHLD=<n>	If the call is terminated: OK (approve request was submitted) NO CARRIER If the call state is changed (link, split, from active to hold, and so on): OK (approve request was done) If the call is terminated and another call is answered OK (call answered and is now connected) NO CARRIER

Command	Syntax	Response/Action	Remarks
Test	+CHLD=?	+CHLD: (list of supported <n>s) OK	The Test command returns <n> values supported by the Modem to the terminal

The following table shows the +CHLD parameters.

Parameter n	Description
0	Release all held calls or set User Determined User Busy for a waiting\incoming call: if both exists then only the waiting call will be rejected
1	Releases all active calls and accepts the held or waiting call **Note:** In the scenario: An active call, a waiting call and held call, when the active call is terminated, we will make the Waiting call as active
1x	Release a specific call (x specific call number as indicated by +CCLC)

2	Place all active calls (if exist) on hold and accepts the other call (held or waiting\incoming). If only one call exists which is active, place it on hold and
2x	Place all active calls on hold except call x with which communication is
3	Adds a held call to the conversation
4	Connects the two calls and disconnects the subscriber from both calls
6	Puts an active call on hold or an held call to active, while another call is
7	Disconnect users in multiparty without accepting incoming call
8	release all calls

Example:

```
AT+CHLD=?
+CHLD: (0,1,1x,2,2x,3,4,6,7,8)
OK
AT+CCWA=1    //Enable call waiting
OK
atd9311234567;     //Originate a voice call
OK
OK (...conversation...)
+CCWA: "+358317654321 ",145,1,"Bob"     //Awaiting call alerts
AT+CHLD=2     //Put first call on hold and answer the second call
OK (...conversation...)
AT+CHLD=3     //Add the held call to the conversation
OK
(...MTPY conversation...)
AT+CHLD=22       //Split: Place the MO active call on hold, MT call remains active
OK
AT+CHLD=0       //Release the held call
OK
NO CARRIER
ath       //Release the active call
OK
NO CARRIER
atd9311234567;       //Originate a voice call
```

OK

OK

+CCWA: "055728386",129,1," ",0 //Waiting call alerts

AT+CHLD=1 //Release the active call, accept the waiting call

OK

NO CARRIER //Active 9311234567 was released

OK //Waiting 055728386 was answered

5.3.12 +CCFC, Call Forwarding Number and Conditions

This command enables control of the call-forwarding supplementary service. Registration, erasure, activation, deactivation, and status query are supported.

Command	Syntax	Response/Action	Remarks
Set	+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<subaddr>[,<satype>[,<time>]]]]]]	If the command succeeds: +CCFC: <status>,<class>[,<number>,<type>[,<subaddr>,<satype>[,<time>]]] [<CR><LF> +CCFC: <status>,<class>[,<number>,<type>[,<subaddr>,<satype>[,<time>]]][...]] +CCFC: (list of supported <reason>s)	The Set command instructs the Modem which call forwarding settings to request from network. The Set command, in query mode, interrogates the network about the subscriber current call forwarding status.
Test	+CCFC=?	+CCFC: <reason> OK	The Test command returns <reason> values supported by the Modem to the terminal.

The following table shows the +CCFC parameters.

<Parameter>	Description
<reason>	0 - Unconditional

	1 - Mobile busy 2 - No reply 3 - Not reachable 4 - All call forwarding 5 - All conditional call forwarding
<mode>	0 - Disable 1 - Enable 2 - Query status 3 - Registration 4 - Erasure
<number>	Calling line number. The number format is specified by <type>.
<type>	Type of address octet in integer format-. 145 Default when dialing string includes international access code character "+". 129 Default when making a local call.
<subaddr>	NULL, field not used (String type subaddress of format specified by <satype>).
<satype>	Field not used. Value is always 128 (unknown) - type of sub address octet in integer format.
<class>	The sum of integers, each representing a class of information. Please see class table in +CCWA command. The default value is 7.
<time>	1-30 - The number of seconds to wait before calls are forwarded, when "no reply" is enabled or queried. The default value is 20. **Note**: The parameter must be a multiple of 5, for example, 5, 10, 15 and so on.
<status>	0 - Not active

	1 - Active

Note: A forward-to phone <number> (and the optional fields <type>, <subaddr> and <satype>) are tied to a <reason> and a <class>. This means that there can be a different <number> for the same <reason> because of a different <class>. When registering without mentioning a <class>, <class>=7 is selected.

A <number> field is mandatory when registering (<mode>=3) and it is irrelevant (ignored) in all other <mode>s.

Example:

```
AT+CCFC=?
+CCFC: (0,1,2,3,4,5)
OK
AT+CCFC=0,3,"01256316830",129,1
OK
AT+CCFC=1,3,"0545658278",129,1     //Register UC forward-to of all classes.
OK
AT+CCFC=1,1       //Activate UC forward-to of all classes.
OK
AT+CCFC=1 ,2       //Interrogate reason not-reachable of all classes.
+CCFC: 1,1,"+97254151200",145
+CCFC: 0,2,"",0
+CCFC: 0,4,"",0
OK          //For <reason>=3, forward only voice calls is activated.
AT+CCFC=4,2        //Interrogate reason all-call-forwarding for all classes.
+CME ERROR: no network service//Interrogation of <reason>=30 is not supported by network.
AT+CCFC=2,3,"+972545658278"
OK
AT+CCFC=2,0       //Disable call-forwarding for reason no-reply of all classes.
OK
AT+CCFC=2,2
+CCFC: 0,1,"+972545658278",145,,25
+CCFC: 0,2,"+972545658278",145,,25
+CCFC: 0,4,"+972545658278",145,,25
OK
```

5.3.13 +CLIR, Calling Line Identification Restriction

This command instructs the Modem to query, enable or disable the presentation of the CLI (calling line ID) of a MO call to the called party. The restriction of the CLI (disable presentation) is dependent both on

the Modem and on the network.

The network enables three possible provisions of CLIR:

- Not provisioned (CLIR Off - presentation allowed)
- Provisioned permanently
- Provisioned with Temporary mode

The provision is fixed and cannot be changed by an AT command. Temporary Mode:

Temporary mode can be in one of two states:

- A - Presentation restricted (CLIR On) as default.
- B - Presentation allowed (CLIR Off) as default. A subscriber to Temporary mode always has a default subscription to state A or B. Temporary-mode provisioning means that the terminal can request the Modem to switch the default mode from A to B, and vice versa.

Note: When a service is in state A, and the terminal wants to enable the CLI presentation (turn CLIR off) for a single call, it can do so using the ATD command. This does not change the Temporary mode state. This can also be done when the service is in state B and the terminal wants to disable the CLI presentation (turn CLIR on) for a single call.

Command	Syntax	Response/Action	Remarks
Set	+CLIR=<n>	OK or: +CME ERROR: <err>	The Set command instructs the Modem to enable/disable CLI restriction for all MO calls.
Read	+CLIR?	+CLIR: <n>,<m> OK	The Read command returns the current setting of CLIR on the network <m> and on the Modem <n>.
Test	+CLIR=?	+CLIR: (list of supported<n>s)	The Test command returns <n> values supported by the Modem.

The following table shows the +CLIR parameters.

<Parameter>	Description
<n>	Adjustment for outgoing calls 0 - Presentation indicator is used according to the subscription of the

	CLIR service 1 - CLIR invocation 2 - CLIR suppression The default value is 2.
<m>	Subscriber CLIR service status in the network 0 - CLIR not provisioned 1 - CLIR provisioned in permanent mode 2 - Unknown (for example, no network and so on) 3 - CLIR Temporary mode presentation restricted (can be the default) 4 - CLIR Temporary mode presentation allowed (can be the default)

Example:

```
AT+CLIR=?
+CLIR: (0-2)
OK
AT+CLIR?
+CLIR: 0,0
AT+CLIR=2
OK
atd054565195;    //MO voice call
OK
(… calling …)
(… a Modem that has 054565195 SIM and is CLIP enabled will receive the following on the
      terminal:
RING
+CLIP: "",128,,128,"",1
RING
+CLIP: "",128,,128,"",1)
ath
NO CARRIER
OK
AT+CLIR=0
```

OK

atd054565195; //MO voice call

OK

(… calling …)

(… a Modem that has 054565195 SIM and is CLIP enabled will receive the following on the terminal:

RING

+CLIP: "054565006",129,,128," ",0

RING

+CLIP: "054565006",129,,128," ",0 …)

ath

OK

NO CARRIER

5.3.14 +CBST, Select Bearer Service Type

This command sets the bearer service (data circuit duplex asynchronous and synchronous). It chooses one of the bearer services, the data rate of the service (actually the modulation when modem IWFs are used), and enables or disables the Radio Link Protocol.

Command	Syntax	Response/Action	Remarks
Set	AT+CBST=[<speed>[,<name>[,<ce>]]]	OK +CME ERROR: <err>	The Set command selects the bearer service <name> with data rate <speed> and the connection element <ce> to be used when data calls are originated (refer to GSM 02.02). Values may also be used during mobile terminated data call setup, especially in the case of single numbering scheme calls. Note: For incoming calls, the bearer service will be taken automatically from incoming parameters and not according to the CBST Set command. The Modem does not change the output, but for incoming calls, the phone works in automatic mode.
Read	AT+CBST?	+CBST: <speed>,<name>,	

		<ce> OK	
Test	AT+CBST=?	+CBST: (list of supported <speed>s), (list of supported <name>s), (list of supported <ce>s) OK	The Test command returns values supported by the MA as compound values.

The following table shows the +CBST parameters.

<Parameter>	Description
<speed>	0 - Auto-baud (automatic selection of the speed; this setting is possible in case of 3.1 kHz modem and non-transparent service) 4 -2400 bps (V.22bis) 5 -2400 bps (V.26ter) 6 - 4800 bps (V.32) 7 - 9600 bps (V.32) 12 -9600 bps (V.34) 14 -14400 bps (V.34) 15 -19200 bps (V.34) 16 -28800 bps (V.34) 17 -33600 bps (V.34) 39 -9600 bps (V.120) 43 -14400 bps (V.120) 47 -19200 bps (V.120) 48 -28800 bps (V.120) 49 -38400 bps (V.120) 50 -48000 bps (V.120) 51 -56000 bps (V.120) 68 -2400 bps (V.110 or X.31 flag stuffing) 70 - 4800 bps (V.110 or X.31 flag stuffing) 71 - 9600 bps (V.110 or X.31 flag stuffing) 75 -14400 bps (V.110 or X.31 flag stuffing) 79 -19200 bps (V.110 or X.31 flag stuffing) 80 -28800 bps (V.110 or X.31 flag stuffing) 81 -38400 bps (V.110 or X.31 flag stuffing)

	82 -48000 bps (V.110 or X.31 flag stuffing) 83 -56000 bps (V.110 or X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI or RDI service in order to get FTM) 84 -64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM) 115 -56000 bps (bit transparent) 116 -64000 bps (bit transparent) 120 -32000 bps (PIAFS32k) 121 -64000 bps (PIAFS64k) 130 -28800 bps (multimedia) 131 -32000 bps (multimedia) 132 -33600 bps (multimedia) 133 -56000 bps (multimedia) 134 -64000 bps (multimedia) The default value is 7.
<name>	0 - Data circuit asynchronous (UDI or 3.1 kHz modem) The default value is 0. 1 - data circuit synchronous (UDI or 3.1 kHz modem) 4 - data circuit asynchronous (RDI) 5 - data circuit synchronous (RDI)
<ce>	0 - Transparent 1 - Non-transparent (default) 2 - both, transparent preferred 3 - both, non-transparent preferred

Example:

```
AT+CBST=?
+CBST: (0,4-7,12,14-17,68,70-71,75,79-84,115-116,120-121,130-134),(0-1,4-5),(0-3)
OK
AT+CBST?
+CBST: 7,0,1
OK
AT+CBST=6
OK
AT+CBST?
```

+CBST: 6,0,1

OK

5.3.15 O, Return to Online Data State

This command returns the Modem from the Command mode to the Online Data mode and issues a CONNECT or CONNECT <text> result code.

After dialing or answering (atd/ata commands and connect), the phone enters the Online Data mode where it is able to transfer data, but not to enter AT commands.

The ESC command +++, transfers the phone to the Command mode (able to input AT commands, while preserving the Data call). The O command returns the phone to the fully Online Data mode (as it was before using the ESC command).

Note: The escape character '+' can be changed using the S2-register. The time delay between consecutive escape characters is configured using the S 12-register.

Command	Syntax	Response/Action
Execute	ATO	CONNECT +CME ERROR: <err> If phone is not in Data Call NO CARRIER: If connection is not successfully resumed.

Example:

ATD035684072 //Calling a remote modem - data call
CONNECT //Modem is in Data mode
//Escaping back to Command mode using the +++ sequence
OK
AT //Modem is in Command mode
OK
ATO //Returning to Data mode
CONNECT

5.3.16 +CHUP, Hang Up Call

This command causes the Modem to hang up the current call.

Command	Syntax	Response/Action	Remarks

Set	+CHUP	OK or: +CME ERROR <err>	The Set command hangs up the current GSM call.

Example:

atd15986784172;

OK
OK
At+CHUP
OK
NO CARRIER

5.4 Call Status Messages

5.4.1 +CPAS, Phone Activity Status

This command displays the current activity status of the Modem; like call in progress, or ringing.

Command	Syntax	Response/Action	Remarks
Execute/Read	AT+CPAS	+CPAS: <pas> OK or: +CME ERROR: <err>	The Execute and Read commands return the activity status <pas> of the Modem. They can be used to interrogate the Modem.
Test	AT+CPAS=?	+CPAS: (list of supported <pas>s) OK	

The following table shows the +CPAS parameters.

<Parameter>	Description
<pas>	0 - Ready - The Modem allows commands from the terminal 1 - unavailable(MT does not allow commands from TA/TE) 2 - Unknown - The Modem is not guaranteed to respond to instructions 3 - Ringing (MT calls) - The Modem is ready for commands from the terminal, but the ringer is active 4 - Call in progress - The Modem is ready for commands from the terminal, but a call is in progress

	5 - asleep(MT is unable to process commands from TA/TE because it is in a low functionality state)

Example:

AT+CPAS
+CPAS: 0
OK
AT+CPAS=?
+CPAS: (0-5)
OK
//AT+CPAS?
//+CPAS: 4
//OK
AT+CPAS//Voice call active state
+CPAS: 4
OK

5.4.2 +CLCC, List Current Calls

This command displays a list of all current Modem calls and their statuses, and also enables/disables the unsolicited indication of the call list. (If no calls are received, no information response is sent to the terminal.)

If the command succeeds but no calls are available, no information response is sent to the terminal.

The maximum number of simultaneous multiparty calls is 5+1 (5 in active group and 1 on hold).

Note: For L810, L830, at+clcc? are not supported now.

Command	Syntax	Response/Action	Remarks
Set	AT+CLCC=<state>	OK or: +CME ERROR: <err>	The Set command enables/disables unsolicited indications.
Execute	AT+CLCC	+CLCC: <idx>,<dir>,<call state>,<mode>,<mpty>,<number>,<type> [<CR><LF> + CLCC: <idx>,<dir>,<call state>,<mode>,<mpty>,<number>,<type> […]]	The Execute command enables the receiving of data about current calls.

		OK	
Read	AT+CLCC?	+CLCC: <state> OK or: +CME ERROR <err>	The Read command returns the call status.
Test	AT+CLCC=?	+CLCC: (List of supported <state>s) OK or: +CME ERROR <err>	

The following table shows the +CLCC parameters.

<Parameter>	Description
<state>	0 Disable CLCC unsolicited indication 1 Enable CLCC unsolicited indication The default value is 0.
<idx>	Integer type, call identification number
<dir>	0 Mobile originated call (MO) 1 Mobile terminated call (MT)
<call state>	The state of the call 0 Active 1 Held 2 Dialing (MO call) 3 Alerting (MO call) 4 Incoming (MT call) 5 Waiting (MT call) 6 Released
<mode>	Bearer/Teleservice 0 Voice Call 1 Data

	3 Voice followed by data, voice mode 9 Unknown
<mpty>	Multiparty status 0 Call is not part of a multiparty call 1 Call is one of multiparty call parties
<number>	Phone number in the format specified by <type>. Contains a string of up to 32 characters.
<type>	Phone number display format. Type of address octet in integer format (refer to GSM 04.08 subclause 10.5.4.7) 129 Local number 145 International number with access character +

Note: When a mobile-originated call is routed to PSTN (PABX), no ALERT indication is prompted.

Example:

```
AT+CLCC=?
+CLCC: (0,1)
OK
AT+CLCC
+CLCC: 1,0,0,0,0,"01256316830",129
OK
```

5.5 Call Advice of Charge Commands

This set of commands enables GSM operators to offer Advice of Charge (AoC) services that calculate call charges. These charges are expressed in terms of home units.

5.5.1 +CAOC, Advice of Charge

This command displays information about the cost of calls. If supported, this command also activates/deactivates unsolicited event reporting of the CCM (Current Call Meter) information.

The unsolicited report +CCCM: <ccm> is sent when the CCM value changes, but not more than once every 10 seconds.

Note: The CCM value depends on the network properties (charge for MO or/and MT calls).

- There are two states in which the command can be activated:
- In IDLE state - returns the last call cost.
- A voice/data state - returns the accumulated cost, including the current call.

Command	Syntax	Response/Action	Remarks
Set	+CAOC[=<mode>]	[+CAOC: <ccm>] OK or: +CME ERROR: <err>	The Set command returns the CCM value from the Modem, or activates/deactivates unsolicited reports.
Read	+CAOC? +CAOC	+CAOC: <mode> OK or: [+CAOC: <ccm>] or: +CME ERROR: <err>	The Read command returns the current CAOC mode.
Test	+CAOC=?	+CAOC: (list of supported <mode>s) OK	The Test command returns the supported mode values.

The following table shows the +CAOC parameters.

<Parameter>	Description
<mode>	0 Queries the CCM value 1 Deactivates unsolicited reporting of the CCM value 2 Activates unsolicited reporting of the CCM value

Note: <CCM>: String type value representing three bytes of the current call meter value in hexadecimal format (for example, "00001E" indicates decimal value 30).

Example:

Example with prepaid SIM card with 56700.00L prepaid before the test.

AT

OK

AT+CAOC=2

OK

atd+97254565190;

OK

OK

+CCCM: "000000"

+CCCM: "000006"

AT+CAOC

+CAOC: "000009"

OK

+CCCM: "00000e"

+CCCM: "000016"

AT+CAOC

+CAOC: "00001d"

OK

+CCCM: "00001e"

+CCCM: "000027"

AT+CAOC=0

+CAOC: "00002d"

OK

AT+CAOC=2

OK

+CCCM: "00003d"

AT+CAOC

+CAOC: "00003f"

OK

+CCCM: "000046"

AT

+CCCM: "00004e"

+CAOC

+CAOC: "00004f"

OK

```
+CCCM: "000056"
AT+CAOC
+CAOC: "00005d"
OK
+CCCM: "00005e"
NO CARRIER
AT+CAOC
+CAOC: "000066"
OK
//567 (prepaid SIM value) - 102 (price per call unit by provider) x 66 (call units) = 465 left in prepaid
    SIM
OK
```

There is now 46500.00L prepaid remaining on the SIM card.

Note: The above example shows first time activation of the AOC feature using the Modem. Therefore, the accumulated cost is equal to the current call cost.

5.5.2 +CACM, Accumulated Call Meter

This command resets the Advice of Charge accumulated call meter value in the SIM file, EFACM. ACM contains the total number of home units for both the current call and preceding calls.

Command	Syntax	Response/Action	Remarks
Set	+CACM =<passwd>	OK +CME ERROR: <err>	The Set command resets the accumulated call meter value. SIM PIN2 is required.
Read	+CACM ?	+CACM: <acm> +CME ERROR: <err>	The Read command displays the current value of ACM.
Test	+CACM =?	OK	The Test command indicates whether the +CACM command is functioning.

The following table shows the +CACM parameters.

<Parameter>	Description
<passwd>	SIM PIN2 password

	Maximum string length is 8 characters. If this value is exceeded, the command terminates in an error. If PIN2 is incorrect, "+CME ERROR: incorrect password" is displayed.
<acm>	Accumulated call meter maximum value (similar to CCM; Refer to “+CAOC, Advice of Charge”). The default value is 0. <ccm> String type; three bytes of the current call meter value in hexadecimal format (for example, 00001E indicates a decimal value of 30). Value is given in home units; bytes are similarly coded as the ACMmax value in the SIM.

Example:

```
AT+CACM=?
OK
AT+CACM?
+CACM: "000000"
OK
AT+CACM="2222"
OK
```

5.5.3 +CAMM, Accumulated Call Meter Maximum

This command sets the Advice of Charge accumulated call meter maximum value in the SIM file, EFACM max. ACM max contains the maximum number of home units the subscriber is able to consume. When the ACM (Refer to “+CACM, Accumulated Call Meter”) reaches ACM max, additional calls (mobile-originated and mobile-terminated calls that incur charges) are prohibited, except for emergency calls. Refer to GSM 02.24.

Command	Syntax	Response/Action	Remarks
Set	+CAMM=[<acm_max>,<passwd>]	OK +CME ERROR: <err>	The Set command sets the accumulated call meter maximum value. SIM PIN2 is required. The value that is set remains after a power cycle. Note: This command is activated if Advice of Charge is supported by the

			network.
Read	+CAMM ?	+CAMM: <acmmax> OK	The Read command displays the current value of ACMmax.
Test	+CAMM =?	OK	The Test command indicates whether the +CAMM command is functioning.

The following table shows the +CAMM parameters.

<Parameter>	**Description**
<acmmax>	Accumulated call meter maximum value (similar to CCM; Refer to “+CAOC, Advice of Charge”) <ccm> String type; three bytes of the current call meter value in hexadecimal format (for example, 00001E indicates a decimal value of 30). Value is given in home units; bytes are similarly coded as the ACMmax value in the SIM. Range is from 00001 to FFFFFF. 0 Disables ACMmax (default)
<passwd>	SIM PIN2 password Maximum string length is 8 characters. If this value is exceeded, the command terminates in an error. If PIN2 is incorrect, "+CME ERROR: incorrect password" is displayed.

Example:

```
AT+CAMM=?
OK
AT+CAMM="FFFFFF","2222"
OK
AT+CAMM?
+CAMM: "FFFFFF"
OK
```

5.5.4 +CPUC, Price per Unit and Currency Table

This command sets the parameters of the Advice of Charge-related price per unit and currency table found in the SIM file, EFPUCT. PUCT information is used to convert the home units (used in +CAOC, +CACM and +CAMM) into currency units.

Command	Syntax	Response/Action	Remarks
Set	+CPUC=<currency>,<ppu>,<passwd>	OK +CME ERROR: <err>	The Set command sets the price per unit and the currency table. SIM PIN2 is required. The new value is retained after a power cycle.
Read	+CPUC?	+CPUC: <currency>,<ppu> OK	The Read command displays the current price per unit and currency table.
Test	+CPUC=?	OK	The Test command indicates whether the +CPUC command is functioning.

The following table shows the +CPUC parameters.

<Parameter>	Description
<currency>	Currency code character set (3 characters) defined by +CSCS command. (Refer to “+CSCS, Select Terminal Character Set”) If the string begins with an alphanumeric character, it may be entered with or without quotation marks, for example, "GBP", "DEM".
<ppu>	Price per unit A dot is used as a decimal separator (precision of 1/1000; 15 digit maximum), for example,"2.667". [See notes below]
<passwd>	SIM PIN2 password Maximum string length is 8 characters. If this value is exceeded, the command terminates in an error. If PIN2 is incorrect, "+CME ERROR: incorrect password" is displayed.

Example:

AT+CPUC=?
OK

```
AT+CPUC="GBP","0.125","2222"
OK
AT+CPUC?
+CPUC: "GBP","0.125"
OK
```

Note:

- If <ppu> contains a dot, a maximum of three digits may appear after the dot, otherwise an error is generated. For example, if <ppu>=0.61, the Read command displays 0.610. <ppu>=1 .2345 terminates in an error.
- If <ppu> does not contain a dot, the number is divided by 1000. For example, if <ppu>=1, the Read command displays 0.001.
- Due to storage constraints, the <ppu> value is limited to a range of 0 to 4095. Values beyond this range may result in rounding errors. For example, if <ppu>=4095, the Read command displays 4.095. However, if <ppu>=4096, the Read command displays 4.090 (the last digit is replaced by 0). If <ppu>=456789, the Read command displays 456.000.

5.5.5 +CR, Service Reporting Control

This command controls whether or not the extended format of an outgoing call is displayed or not. The +CR indication is sent from the Modem to the terminal whenever a data call is initiated by the Modem.

Command	Syntax	Response/Action	Remarks
Set	+CR=[<mode>]	OK	The Set command enables/disables the extended format of an outgoing data call. When enabled, the outgoing data call is indicated to the terminal through the unsolicited result code +CR: <serv>. When the command is disabled, no +CR is sent to the terminal.
Read	+CR?	+CR: <mode> OK	The Read command displays the current service reporting control setting.
Test	+CR=?	+CR: <mode> OK	The Test command displays the list of supported CR modes.

The following table shows the +CR parameters.

<Parameter>	Description
<mode>	0 Extended format disabled (default) 1 Extended format enabled
<serv>	Type of outgoing data calls: ASYNC - Asynchronous transparent SYNC - Synchronous transparent REL ASYNC - Asynchronous non-transparent REL SYNC - Synchronous non-transparent

Example:

AT+CR=1 //Enable reporting OK
ATD1234567890
+CR: REL ASYNC

5.6 Supplementary Services

This set of commands enables control over supplementary service notifications, including Structured and Unstructured Supplementary Service Data (USSD) data.

5.6.1 +CSSN, Supplementary Service Notifications

This command handles the enabling and disabling of supplementary service-related, network-initiated, notifications.

Command	Syntax	Response/Action	Remarks
Set	+CSSN =[<n>[, <m>]]	OK or: +CME ERROR: <err>	The Set command enables/disables the display of notification result codes to the TE. When <n>=1 and a supplementary service notification is received after a mobile-originated call setup, the +CSSI: notification is sent to the TE before any

			other mobile-originated call setup result codes. When several different notifications are received from the network, each of them receives its own +CSSI result code. When <m>=1 and a supplementary service notification is received during a mobile-terminated call setup or during a call, or when a forward check supplementary service notification is received, the unsolicited result code +CSSU: is sent to the TE. In case of a mobile-terminated call setup, a CSSU is sent after every +CLIP result code (“+CLIP, Calling Line Identification”). When several different events are received from the network, each of them receives its own +CSSU result code. Note: The values for <n> and <m> are not saved after power cycle.
Read	+CSSN ?	+CSSN: <n>,<m> OK	The Read command displays the current supplementary service notification setting.
Test	+CSSN =?	+CSSN: (0-1), (0-1) OK	The Test command displays the list of supported CSSN values.

The following table shows the +CSSN parameters.

<Parameter>	**Description**
<n>	Sets/displays the +CSSI result code presentation status. This value must be specified.

	0 Disable (default) 1 Enable
<m>	Sets/displays the +CSSU result code presentation status. This value is optional, but cannot be specified without <n>. 0 Disable (default) 1 Enable

Value	Description	Modem Support
0	Unconditional call forwarding is active	Yes
1	Some conditional call forwarding is active	Yes
2	Call has been forwarded	Yes
3	Call is waiting	Yes (GSM only)
4	CUG call (<index> is present)	Yes
5	Outgoing calls are barred	Yes
6	Incoming calls are barred	Yes
7	CLIR suppression rejected	Yes
8	Call has been deflected	No

Value	Description	Modem Support
0	This is a forwarded call (mobile-terminated call setup)	Yes
1	CUG call (<index> is present; mobile-terminated call setup).	Yes
2	Call has been put on hold (during a voice call)	Yes

3	Call has been retrieved (during a voice call)	Yes
4	Multiparty call has been entered(during a voice call)	Yes
5	Call on hold has been released(during a voice call; not a supplementary service notification)	Yes
6	Forward check supplementary service message received (can be received at any time)	Yes
7	Call is being connected with the remote party in an alerted state using an explicit call transfer operation (during a voice call).	Yes
8	Call has been connected with the other remote party using an explicit call transfer operation (during a voice call or during mobile-terminated call setup).Number and subaddress parameters may be present: <number>String type phone number of format defined by <type> <type>Type of address octet in integer format (refer to GSM04.08, subclause 10.5.4.7) <subaddr>String type subaddress of format defined by <satype> <satype>Type of subaddress octet in integer format (refer to GSM 04.08, subclause10.5.4.8)	Yes
9	Deflected call (mobile-terminated call setup)	YES
10	additional incoming call forwarded	YES

Example:

AT+CSSN=? // test command
+CSSN: (0-1),(0-1)

OK

AT+CSSN=0,0 // disable both options

OK

AT+CSSN=1,0 // set n value as enabled, m disabled

OK

AT+CSSN?

+CSSN: 1,0 // display the current n & m values

OK

+CSSI: 1 // displayed after mobile originated call setup of call forward and n enable

+CSSU: 2 //displayed when a call has been placed on hold (during the call) using the +CHLD AT command and m enable

5.6.2 +CUSD, Unstructured Supplementary Service Data

This command allows control of Unstructured Supplementary Service Data (US SD), according to GSM 02.90.

Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD: <m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session. When <str> is given, a mobile initiated USSD-string or a response USSD-string to a network initiated operation is sent to the network. The response USSD-string from the network is returned in a subsequent unsolicited +CUSD result code.

Command	Syntax	Response/Action	Remarks
Set	AT+CUSD =[<n>[,<str>[,<dcs>]]]	OK or: +CME ERROR: <err>	The Set command enables/disables the display of the unsolicited result code.
Unsolicited Report		+CUSD: <m>[,<str>[,<dsc>]]]	The USSD response from the network.
Read	+CUSD?	+CUSD: <n> OK	The Read command displays the current value of <n>.
Test	+CUSD=?	+CUSD: (list of supported <n>s)	The Test command displays the supported values of <n>.

		OK	

The following table shows the +CUSD parameters.

<Parameter>	Description
<n>	0 Disable the result code presentation in the TA. 1 Enable the result code presentation in the TA. 2 Cancel session (not applicable to read command response).
<str>	String type USSD-string (when <str> parameter is not given, network is not interrogated): If <dcs> indicates that GSM 03.38 default alphabet is used: • If TE character set other than "HEX" (refer command Select TE Character Set +CSCS): ME/TA converts GSM alphabet into current TE character set according to rules of GSM 07.05 Annex A. • If TE character set is "HEX": ME/TA converts each 7-bit character of GSM alphabet into two IRA character long hexadecimal number (e.g. character ? (GSM 23) is presented as 17 (IRA 49 and 55)). If <dcs> indicates that 8-bit data coding scheme is used: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).
<dcs>	GSM 03.38 - Cell Broadcast Data Coding Scheme in integer format. The supported value are: 17 - USC2 Language Indicator. (The first character in a USC2 Lang IND has the language ID in it. This situation is not defined by the GSM 7.07 or the 3GPP 27.007 so the assuming that the first character should have the correctly formatted and packed language ID already in it). 72 - USC2 (16 bit). 68 - 8 bit. Each other value except of 96, 80, and 240 are 7 bit.

	Not supported values are: 96, 80, 240 The default value is 15 (7 bit).
<m>	0 No further user action required (network initiated US SD-Notify, or no further information needed after mobile Initiated operation). 1 Further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation). 2 USSD terminated by network. the reason for the termination is indicated by the index, as described in CUSD Termination Cause Table Index. 3 Other local client has responded. 4 Operation not supported 5 Network time out

CUSD Termination Cause Table Index:

Termination Cause	Index
NO_CAUSE	0
CC_BUSY	1
PARAMETER_ERROR	2
INVALID_NUMBER	3
OUTGOING_CALL_BARRED	4
TOO_MANY_CALLS_ON_HOLD	5
NORMAL	6
DROPPED	10
NETWORK	12
INVALID_CALL_ID	13
NORMAL_CLEARING	14

TOO_MANY_ACTIVE_CALLS	16
UNASSIGNED_NUMBER	17
NO_ROUTE_TO_DEST	18
RESOURCE_UNAVAILABLE	19
CALL_BARRED	20
USER_BUSY	21
NO_ANSWER	22
CALL_REJECTED	23
NUMBER_CHANGED	24
DEST_OUT_OF_ORDER	25
SIGNALING_ERROR	26
NETWORK_ERROR	27
NETWORK_BUSY	28
NOT_SUBSCRIBED	29
SERVICE_UNAVAILABLE	31
SERVICE_NOT_SUPPORTED	32
PREPAY_LIMIT_REACHED	33
INCOMPATIBLE_DEST	35
ACCESS_DENIED	43
FEATURE_NOT_AVAILABLE	45
WRONG_CALL_STATE	46

SIGNALING_TIMEOUT	47
MAX_MPTY_PARTICIPANTS_EXCEEDED	48
SYSTEM_FAILURE	49
DATA_MISSING	50
BASIC_SERVICE_NOT_PROVISIONED	51
ILLEGAL_SS_OPERATION	52
SS_INCOMPATIBILITY	53
SS_NOT_AVAILABLE	54
SS_SUBSCRIPTION_VIOLATION	55
INCORRECT_PASSWORD	56
TOO_MANY_PASSWORD_ATTEMPTS	57
PASSWORD_REGISTRATION_FAILURE	58
ILLEGAL_EQUIPMENT	59
UNKNOWN_SUBSCRIBER	60
ILLEGAL_SUBSCRIBER	61
ABSENT_SUBSCRIBER	62
USSD_BUSY	63
CANNOT_TRANSFER_MPTY_CALL	65
BUSY_WITH_UNANSWERED_CALL	66
UNANSWERED_CALL_PENDING	68
USSD_CANCELED	69

PRE_EMPTION	70
OPERATION_NOT_ALLOWED	71
NO_FREE_BEARER_AVAILABLE	72
NBR_SN_EXCEEDED	73
NBR_USER_EXCEEDED	74
Call Control by SIM Causes	
NOT_ALLOWED_BY_CC	75
MODIFIED_TO_SS_BY_CC	76
MODIFIED_TO_CALL_BY_CC	77
CALL_MODIFIED_BY_CC	78
App. Cause	
FDN_FAILURE	90

Example:

```
AT+CUSD=1,"*00*0549598743#"
+CUSD: 0,"Connecting...",15
+CUSD: 0,"Connected",15
+CLCC: 1,1,4,0,0,"0545550099",129     > Call from USSD server
RING
ATA > answer to the server (when answered, the server call to 0549598743)
OK
+CLCC: 1,1,0,0,0,"0545550099",129
NO CARRIER
+CLCC: 1,1,6,0,0,"0545550099",129
```

5.6.3 +COLP, Connected Line Identification Presentation

This command relates to the GSM supplementary service called COLP (Connected Line Identification

Presentation), which enables a calling subscriber to obtain the connected line identity (COL) of the called party after setting up a mobile-originated call with the Modem. For example, after setting up a mobile-originated call to one number that is forwarded to another number, the calling party will see the number of that third party.

When this command is enabled (and the called subscriber permits it), the following intermediate result code is returned:

+COLP: <number>,<type>[,<subaddr>,<satype>].

Note: This command is activated when COLP is supported by the network.

Command	Syntax	Response/Action	Remarks
Set	+COLP=[<n>]	OK +CME ERROR: <err>	The Set command enables/disables the display of the COL at the TE on the Modem. It has no effect on the execution of the COLR supplementary service on the network. The value set by this command is not retained after a power cycle.
Read	+COLP?	+COLP: <n>,<m> OK	The Read command displays the status of <n>. It also initiates a query of the COLP service provision status and displays <m>.
Test	+COLP=?	+COLP: (list of supported <n>s) OK	The Test command displays the supported values of <n>.

The following table shows the +COLP parameters.

<Parameter>	Description
<n>	Sets/displays the result code presentation status of the Modem. 0 Disable (default) 1 Enable

<m>	Displays the subscriber’s COLP service status in the network. 0 COLP not provisioned 1 COLP provisioned 2 Unknown (for example, no network, and so on)
<number>	Sets the phone number, using the format specified by <type>.
<type>	Sets the address octet type in integer format (refer to GSM 04.08 subclause10.5.4.7). 129 Unknown 145 International (used when dialing string includes "+" international access code character)
<subaddr>	Sets the subaddress, using the format specified by <satype>.
<satype>	Sets the address octet type in integer format (refer to GSM 04.08 subclause 10.5.4.8).

Example:

AT+COLP=0
OK
AT+COLP=2
+CME ERROR: operation not supported

6 Phone Book and Clock

6.1 Directory Access Commands - Phone Book

This set of commands enables read/write access to the phone book contained within the Modem, including both the numeric and the alpha information contained in the location. The presentation is according to GSM 07.07.

In some cases, it may be possible to use these commands to access the dialed and received call stacks. However, as these phone books cannot be edited, the +CPBW command does not work on them.

6.1.1 +CPBS, Select Phone Book Memory

This command handles the selection of the memory to be used for reading and writing entries in the Modem's phone books' memory.

Command	Syntax	Response/Action	Remarks
Set	AT+CPBS=<storage>[,<pin2>] <pin2>is optional while <storage> = "FD" only	OK or: +CME ERROR: <err>	The Set command selects the phone book memory storage which is to be used by other phone book commands. The Read command returns the currently selected phone book memory, number of used entries and total number of entries in the phone book memory.
Read	+CPBS?	+CPBS: <storage>[,<used>,<total>] OK	The Read command returns the currently selected phone book memory, number of used entries and total number of entries in the phone book memory.
Test	+CPBS=?	+CPBS: (list of supported<storage	Test command returns the supported storages as a

		>s) OK	compound value.

The following table shows the +CPBS parameters.

<Parameter>	Description
<storage>	List of supported phone books and their storage IDs FD: SIM Fixed dialing phone book.
	ON: Own numbers (MSISDNs) list (reading this storage is also available through +CNUM). SM: SIM phone book. LD: SIM last-dialing phonebook BL: Blacklist phonebook (delete only) EN: SIM emergency-call-codes phonebook (read only) AP: Selected application phonebook. BN: SIM barred-dialling-number phonebook (only valid with PIN2) SN: SIM service-dialling-number phonebook The default phone book is SM.
<used>	Integer type value indicating the number of used locations in the selected memory.
<total>	Integer type value indicating the total number of entries in the selected phone book memory.
<pin2>	String type. PIN2 password 4 - 8 digits.

Example:

```
AT+CPBS="SM"
OK
AT+CPBR=?
```

```
+CPBS: ("SM","FD","SN","LD","ON","EC","BL")
OK
AT+CPBR=1
OK
AT+CPBR=1,3 //There is nothing written in entry 1,2,3
OK
AT+CPBS="FD","<correct pin2>"
OK // +CPBW pin2 unlocked
AT+CPBW=1,"034546565",129,"xyz"// Write into FD storage
OK
AT+CPBS="FD","<wrong pin2>"
+CME ERROR: incorrect password
AT+CPBS="FD","<pin2 longer then 8 chars>"
+CME ERROR: text string too long
```

6.1.2 +CPBR, Read Phone Book Entries

This command recalls phone book entries from a specific entry number or from a range of entries. If only one entry is specified, and that entry is empty, OK is returned. If a range of entries is requested, all entries that contain data within that range are returned. If a listing fails in a Modem error, +CME ERROR: <err> is returned.

This command can also be used to obtain information about the number of entries and the maximum size of a phone number and alpha tag fields in the phone book.

This command acts on the currently active phone book, as selected with the +CPBS command.

Command	Syntax	Response/Action	Remarks
Set	+CPBR =<index1>[,<index2>]	[+CPBR: <index1>,<number>,<type>,<text>[,<hidden>][,<group>][,<adnumber>][,<adtype>][,<secondtext>][,<email>] [<CR><LF> +CPBR: <index2>,<number>,<type>,<text>[,<hidden>][,<group>][,<adnumber>][,<adtype>][,<secondtext>][,<email>]]]	Execution command returns phonebook entries in location number range <index1>... <index2> from the current phonebook memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned.

		OK or: +CME ERROR: <err>	
Test	+CPBR =?	+CPBR: (list of supported<index>s)[,<nlength>], [<tlength>],[<glength>], [<alength>],[<slength>],[<elength>] OK	The Test command returns the entry range supported by the current storage as a compound value and the maximum lengths of the <number> and <text> fields.

The following table shows the +CPBR parameters.

<Parameter>	Description
<index1> <index2>	Index for a given phone book entry
<number>	Phone number of a given entry
<type>	The address type of a phone number 129 Use for local call 145 Use “+” for international access code 128 Unknown "128" is used to represent an email address or a mailing list. In this case, <ph_type> can be used to further differentiate between the two.
<text>	Text identifier for a phone book entry, according to the character set as specified by command +CSCS.

<nlength>	The maximum number of digits in the <number>.
<tlength>	The maximum number of characters in the <text> entry
<hidden>	indicates if the entry is hidden or not – only available, if a UICC with an active USIM application is present 0 phonebook entry not hidden 1 phonebook entry hidden
<group>	string type field of maximum length <glength>.character set as specified by command Select TE Character Set +CSCS
<adnumbe>	string type phone number of format <adtype>
<adtype>	type of address octet in integer format (refer TS 24.008 subclause 10.5.4.7)
<secondtex>	string type field of maximum length <slength>.character set as specified by command Select TE Character Set +CSCS
<email>	string type field of maximum length <elength>.character set as specified by command Select TE Character Set +CSCS
<glength>	integer type value indicating the maximum length of field <number>
<alength>	integer type value indicating the maximum length of field <adnumber>
<slength>	integer type value indicating the maximum length of field <secondtext>
<elength>	integer type value indicating the maximum length of field <email>

Example:

```
AT+CPBS="SM"
OK
AT+CPBR=?
+CPBR: (1-250),20,14
```

OK

At+CPBR=1

OK

AT+CPBR=1,3 //There is nothing written in entry 1,2,3

OK

AT+CPBR=4

+CPBR: 4,"18888888",129,"Tom"

OK

6.1.3 +CPBF, Find Phone Book Entries

This execution command enables the user to search for a particular entry, by name, in the currently active phone book. If no matching entry is found, the command returns OK. If multiple matches are found, all are returned.

Command	Syntax	Response/Action
Set	+CPBF=<findtext>	[+CPBR: <index1>,<number>,<type>,<text>[,<hidden>][,<group>][,<adnumber>][,<adtype>][,<secondtext>][,<email>] [<CR><LF> +CPBR: <index2>,<number>,<type>,<text>[,<hidden>][,<group>][,<adnumber>][,<adtype>][,<secondtext>][,<email>]]] OK or: +CME ERROR: <err>
Test	AT+CPBF=?	+CPBF: [<nlength>][,<tlength>],[<glength>],[<slength>],[<elength>] OK

The following table shows the +CPBF parameters.

<Parameter>	Description

<findtext>	Case-sensitive text substring to search for, according to the character set specified by the +CSCS command.
<index1> <index2>	Index for a given phone book entry
<number>	Phone number of a given entry
<type>	The address type of a phone number 129 Use for local call 145 Use “+” for international access code 128 Unknown Note: "128" is used to represent an email address or a mailing list. In this case, <ph_type> can be used to further differentiate between the two.
<text>	Text identifier for a phone book entry that starts with the substring <findtext>, according to the character set as specified by command +CSCS.
<hidden>	indicates if the entry is hidden or not – only available, if a UICC with an active USIM application is present 0 phonebook entry not hidden 1 phonebook entry hidden
<group>	string type field of maximum length <glength>.character set as specified by command Select TE Character Set +CSCS
<adnumbe>	string type phone number of format <adtype>
<adtype>	type of address octet in integer format (refer TS 24.008 subclause 10.5.4.7)
<secondtext>	string type field of maximum length <slength>.character set as

	specified by command Select TE Character Set +CSCS
<email>	string type field of maximum length <elength>.character set as specified by command Select TE Character Set +CSCS
<glength>	integer type value indicating the maximum length of field <number>
<alength>	integer type value indicating the maximum length of field <adnumber>
<slength>	integer type value indicating the maximum length of field <secondtext>
<elength>	integer type value indicating the maximum length of field <email>

Example:

```
AT+CPBS="SM"    //Selecting phone book
OK
AT+CPBF="Lin"
+CPBF: 1,"18888888",129,"Linzhao"
OK
AT+CPBF="Voice"    //Searching for string "Voice" and finding Voice Mail
+CPBF: 2,"+8613800138000",145,"Voicemail"
OK
AT+CPBF=""    //Searching for everything in phone book, and finding all entries
+CPBF: 1,"18888888",129,"Linzhao"
+CPBF: 2,"+8613800138000",145,"Voicemail"
+CPBF: 3,"18888888",129,"abc"
OK
```

6.1.4 +CPBW, Write Phone Book Entry

Set command writes phonebook entry in location number<index> in the current phonebook memory storage selected with +CPBS. Entry fields written are phone number<number> in format<type> and <text> associated with the number. If all fields except <index> are omitted, the corresponding entry is deleted. If the <index> is left out, but <number> is given, entry is written to the first free location in the phonebook.

Read command returns the last <written_index> value, or -1 if information about previous value is not available.

Test command returns location range supported by the current storage as a compound value, the maximum length of <number> field, supported number formats of the storage, the maximum length of <text> field, the maximum length of <group>, the maximum length of <secondtext>, the maximum length of <email>, the maximum length of <sip_uri> and the maximum length of <tel_uri>.

In case of SIM storage, the lengths may not be available. Note: Wildcard chracters(*,?) in the phone Number of FDN(fixed number phonebook) are allowed.

Command	Syntax	Response/Action	Remarks
Set	AT+CPBW=[<index>][,<number>[,<type>[,<text>[,<group>[,<adnumber>[,<adtype>[,<secondtext>[,<email>[,<hidden>]]]]]]]]	+CPBW:<written_index> OK or: +CME ERROR: <err>	
Read	AT+CPBW?	+CPBW:<written_index> OK or +CPBW:-1 OK	
Test	AT+CPBW=?	+CPBW: (list of supported<index>s)[,<nlength>],(list of supported<type>s)[,<tlength>],[<glength>],[<alength>],[<slength>] ,[<elength>] OK	This command queries the allowable command field and sizes.

The following table shows the +CPBW parameters.

<Parameter>	Description
<index>	Integer type values in range of location numbers of phonebook memory
<number>	String type phone number of format <type>

<type>	Type of address octet in integer format. Default 145 when vailable string includes international access code character"+", otherwise 129
<text>	String type field of maximum length <tlength>
<nlength>	Integer type value indicating the maximum length of field <number>
<tlength>	Integer type value indicating the maximum length of field <text> (40)
<hidden>	indicates if the entry is hidden or not – only available, if a UICC with an active USIM application is present 0 phonebook entry not hidden 1 phonebook entry hidden
<group>	string type field of maximum length <glength>.
<adnumbe>	string type phone number of format <adtype>
<adtype>	type of address octet in integer format (refer TS 24.008 subclause 10.5.4.7)
<secondtext>	string type field of maximum length <slength>.character set as specified by command Select TE Character Set +CSCS
<email>	string type field of maximum length <elength>.character set as specified by command Select TE Character Set +CSCS
<glength>	integer type value indicating the maximum length of field <group>
<alength>	integer type value indicating the maximum length of field <adnumber>
<slength>	integer type value indicating the maximum length of field <secondtext>
<elength>	integer type value indicating the maximum length of field <email>
<written_index>	Integer type value indicating the last location number <index> of the written phonebook entry Remark: Read command returns the last <written_index> value, or -1 if information about previous value is not. Changing the current phonebook memory storage with the +CPBS to another storage invalidates the last <written_index> value.

Example:

```
at+cpbw=1,"15986784172",129,
OK
at+cpbr=1
+CPBR: 1,"15986784172",129,"",0
OK
```

6.1.5 +CSVM, Set Voice Mail Server

This command handles the selection of the number to the voice mail server. The new value should also remain after power cycle.

Command	Syntax	Response/Action	Remarks
Set	+CSVM=<mode>[,<number>[,<type>]]	OK +CME ERROR: <err>	The Set command sets the number to the voice mail server.
Read	+CSVM?	+CSVM: <mode>,<number>, <type> OK	The Read command displays the currently selected voice mail number and status (enabled or disabled).
Test	+CSVM=?	+CSVM: (list of supported <mode>s), (list of supported <type>s) OK	The Test command displays the list of supported <mode>s and <type>s.

The following table shows the +CSVM parameters.

<Parameter>	Description
<mode>	0 Disables the voice mail number (default) 1 Enables the voice mail number
<number>	Voice mail number in string. String can be of up to 32 characters long, starting with a digit, “r”"+". Other allowed characters are digits (0..9), * and #.
<type>	Address octet type. 129 ISDN/telephony marketing plan; national/international number unknown 145 ISDN/telephony numbering plan; international number When the dialing string includes the international access code character (+), the default is 145. Otherwise, the default <type> is 129.

Note: If <mode> is set to 0, <number> and <type> are ignored. If <mode> is set to 1, <number> is mandatory.

Example:

AT+CSVM=?

+CSVM: (0,1),(129,145)

OK

AT+CSVM=1,"+97255512356",145

OK

AT+CSVM?

+CSVM: 1,"97255512356",145

OK

6.2 System Date and Time Access Commands

6.2.1 +CCLK, Read/Set System Date and Time

This command reads and sets the Modem current date, time and time zone.

Command	Syntax	Response/Action	Remarks
Set	+CCLK=<time>	OK or: +CME ERROR: <err>	The Set command sets the date, time and time zone of the system clock. Note: Set Command sets user defined system clock values and saves them in the NVM memory. These saved values are kept after power-cycle as well.
Read	+CCLK?	+CCLK: <time> OK or: +CME ERROR: <err>	The Read command returns the current date, time and time zone setting. By default, <time> will represent the network updated time. If the user has used the Set command once, then <time> will represent the Set command setting. Note: If network operator does not support System Clock Update Message, the initial date, time and time zone,

			displayed by CCLK Read Command could be invalid (user's responsibility to set date, time and time zone by CCLK Set Command). Note: See Execute Command for how-to enable back network update time.
Test	+CCLK=?	+CCLK (list of supported <time>s) OK	The Test command returns valid parameters for the +CCLK Set command.

The following table shows the +CCLK parameters.

<Parameter>	**Description**
<time>	ASCII string of format: yy/MM/dd,hh: mm: ss±zz or yy/MM/dd,hh: mm: ss or yy/MM/dd,hh: mm yy - 2-digit year [2000-2069] MM - 2-digit month [01-12] dd - 2-digit day of month [00-31] hh - 2-digit hour [00-23] mm - 2-digit minute [00-59] ss - 2-digit seconds [00-59] zz - (optional) time zone offset from GMT, in quarter-hours [-47...+48]. If this value is not specified, the time zone offset will be 0.

Example:

AT+CCLK=?

+CCLK: "88/12/31, 23: 59: 59, (-47-+48)"

OK

AT+CCLK="01/01/01, 01: 01: 01-08"

OK

AT+CCLK?

+CCLK: "01/01/01, 01 : 01 : 01-08"

OK

AT+CCLK="02/02/02, 02: 02: 02"

OK

Power cycling…

AT+CCLK?

+CCLK: "02/02/02, 02: 02: 02+00"

OK

7 SMS

7.1 SMS Commands

Modem supports SMS PDU and SMS TEXT mode according to ETSI specifications 3GPP TS 27.005 & 3GPP TS 03.40/23.0400.

7.1.1 +CSMS, Select Message Service.

This command handles the selection of the messaging service. It returns the types of messages that are supported by the Modem.

Command	Syntax	Response/Action	Remarks
Set	+CSMS =<service>	+CSMS: <mt>,<mo>,<bm> OK or: +CMS ERROR: <err>	The Set command sets the type of service and returns the types of messages supported by the Modem.
Read	+CSMS ?	+CSMS: <service>,<mt>,<mo>,<bm> OK	The Read command returns the supported message types along with the current service setting.
Test	+CSMS =?	+CSMS: <service> OK	The Test command returns a list of all the services supported by the terminal.

The following table shows the +CSMS parameters.

<Parameter>	Description
<service>	Integer that defines the type of service 0:SMS AT command grammar is compatible with GSM Phase 2 1:SMS AT command grammar is compatible with GSM Phase 2+
<mt>	Mobile terminated messages

	0 Not supported by the Modem 1 Supported by the Modem
<mo>	Mobile originated messages 0 Not supported by the Modem 1 Supported by the Modem
<bm>	Broadcast type messages 0 Not supported by the Modem 1 Supported by the Modem

Example:

AT+CSMS?
+CSMS: 1,1,1,1
OK

7.1.2 +CPMS, Preferred Message Storage

This command handles the selection of the preferred message storage area. The message storage area is divided into three parts, mem1, mem2 and mem3.

Command	Syntax	Response/Action	Remarks
Set	+CPMS=<mem1>[,<mem2>[,<mem3>]]	+CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> OK or: +CMS ERROR: <err>	The Set command sets the memory storage.
Read	+CPMS?	+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3>	The Read command displays the selected memory storage type for the three memory

		OK or: +CMS ERROR: <err>	areas.
Test	+CPMS=?	+CPMS: (list of supported<mem1>s),(list of supported <mem2>s),(list of supported <mem3>s) OK or: +CMS ERROR: <err>	The Test command lists the supported memory storage for <mem1>, <mem2> and <mem3>.

The following table shows the +CPMS parameters.

<Parameter>	Description
<mem1>	Memory from which messages are read and deleted. Supported values are: "SM","BM",”ME”,”SR”. The default value at power-up is "SM".
<mem2>	Memory to which writing operation is made. Supported value is: "SM". The default value at power-up is "SM".
<mem3>	Memory to which received SMS are stored (unless forwarded directly to TE). Supported value is: "SM","BM",”SR” The default value at power-up is "SM".
"BM"	Broadcast message storage
"SM"	(U)SIM message storage
"ME"	ME message storage
"SR"	status report storage

Example:

AT+CPMS="SM"
+CPMS: 5,50,5,50,5,50
OK
AT+CPMS?
+CPMS: "SM",5,50,"SM",5,50,"SM",5,50
OK

7.1.3 +CMGF, Message Format

This command is a basic command.

The Set command handles the selection of the message format used with send, list, read and write commands, as well as the format of unsolicited result codes resulting from message receipts.

The Modem supports both PDU mode (where entire TP data units are used) and text mode (where the body of the message and its headers are given as separate parameters).

Command	Syntax	Response/Action	Remarks
Set	+CMGF=<mode>	OK or: +CMS ERROR: <err>	The Set command sets the message format to use.
Read	+CMGF?	+CMGF: <mode> OK	The Read command displays the current message format.
Test	+CMGF=?	+CMGF: (list of supported mode>s) OK	The Test command lists all the supported message formats.

The following table shows the +CMGF parameters.

<Parameter>	Description
<mode>	Message format:

	0 PDU mode (default) 1 Text mode

Example:

```
AT+CMGF=1
OK
AT+CMGF?
+CMGF: 1
OK
AT+CMGF=?
+CMGF: (0,1)
OK
```

7.1.4 +CSCA, Service Center Address

This command enables to write/read SCA to/from SIM. In SMS text mode, SCA stored in SIM is added to any stored and sent SMS.In SMS pdu mode, SCA stored in SIM is added to stored SMS and send SMS only when SCA address length coded in PDU equals zero.

Command	Syntax	Response/Action	Remarks
Set	+CSCA=<sca>[,<tosca>]	OK or: +CMS ERROR: <err>	Sets service center address stored in SIM (EF-SMSp -Short message service parameters). <tosca> is optional parameter, When <sca> is prefixed with '+' it indicates that <tosca> is set to 145(International number), otherwise is 129(local number).
Read	+CSCA?	+CSCA: <sca>,<tosca> OK	Read command displays <sca> and <tosca> stored in SIM*EF-SMSp).
Test			The Test command for +CSCA is not defined by ETSI.

The following table shows the +CSCA parameters.

<Parameter>	Description
<sca>	Service Center Address "+" character prefix of <sca> indicates <tosca> of 145. Minimum 1 and up to 20 characters, where each character is represented by semi octets (excluding '+' character). If <sca> contains an odd number of digits, bits 4 to 7 of the last octet shall be filled with an end mark coded "1111".
<tosca>	Type of service center address. <tosca> of 129 is mostly use for local number and 145 for International. <tosca> of 129 is default value. <tosca> values are in range of 0-255. Valid values are defined according to: GSM03.40 v7.4.0 section 9.1.2.5 as follow: Bit 7 is 1 Bits 6,5–4 - Present Type of number as follow: Bits 6 5 4 0 0 0 Unknown 0 0 1 International number 0 1 0 National number 0 1 1 Network specific number 1 0 0 Subscriber number 1 0 1 Alphanumeric, (coded according to GSM TS 03.38 7-bit default alphabet) 1 1 0 Abbreviated number 1 1 1 Reserved for extension

	Numbering-plan-identification (applies for Type-of-number = 000,001,010) Bits 3 2 1 0 0 0 0 0 Unknown 0 0 0 1 ISDN/telephone numbering plan (E.164/E.163) 0 0 1 1 Data numbering plan (X.121) 0 1 0 0 Telex numbering plan 1 0 0 0 National numbering plan 1 0 0 1 Private numbering plan 1 0 1 0 ERMES numbering plan (ETSI DE/PS 3 01-3) 1 1 1 1 Reserved for extension. All other values are reserved.

+CSCA <SCA> parameters.

Following table describes +CSCA <SCA> valid parameters including the conversion when using stored <SCA> in SMS PDU mode (editing SMS via +CMGW or +CMGS without SCA). This is according to 24.008V031000P Table 10.5.118/GSM 24.008V031000P: Called party BCD number:

<SCA> Character in SMS (Text mode)	**Mapped character for SMS PDU mode**
Digits: 0-9	Digits: 0-9
'+'	0x91
'*'	'A'
'#'	'B'
'A'	'C'
'B'	'D'
'C'	'E'

Example:

AT+CSCA?

```
+CSCA: "+97212356",145        // Read SCA address and TOSCA stored in SIM (EF-smsp)
OK

AT+CSCA="97212356"
OK
AT+CSCA?
+CSCA: "97212356",129
OK

AT+CSCA?
+CSCA: "*AC#",129
OK

AT+CMGW=13
> 0481ABCD1211640A8150224902450000A700     // '*'->'A',   'A'->B', 'B'->C', '#'->'D'

+CMGW: 15
OK
AT+CMGR=15
+CMGR: 2,,13
0481ABCD1211640A8150224902450000A700        // SCA read as stored for current SMS
OK
AT+CSCA?
+CSCA: "*AC#",129   // Read command remained       // SCA settings didn't change
OK
AT+CSCA?
+CSCA: "*AC#",129
OK
AT+CMGW=
> 0011640A8150224902450000A700
+CMGW: 16
OK
AT+CMGR=16
+CMGR: 2,,13
0481CAEDFB11640A8150224902450000A700     // SCA is: ACDEB in pdu,   mapped to *ABC#
OK
AT+CMGW=13
> 0381AB1211640A8150224902450000A700          // Set SCA to BA21
```

```
+CMGW: 17
OK
AT+CMGR=17
+CMGR: 2,,13
0381AB1211640A8150224902450000A700        // SCA is set correctly only for current SMS but
      +CSCA setting didn't changed
OK
AT+CSCA?
+CSCA: "*AC#",129    /SCA didn't    change in storage
OK
```

7.1.5 +CSMP, Set Text Mode Parameters

This command is a basic command and is used to select values for additional parameters needed when SMS is sent to the network or placed in storage when TEXT mode is selected.

Command	Syntax	Response/Action	Remarks
Set	+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]]	OK or: +CMS ERROR: <err>	The set command selects values for additional parameters needed when SMS is sent to the network or placed in storage when text format message mode is selected.
Read	AT+CSMP?	+CSMP: <fo>,<vp>,<pid>,<dcs> OK	The read command returns the current parameters value.
Test	AT+ CSMP =?	OK	The test command just returns OK.

The following table shows the +CSMP parameters.

<Parameter>	Description
<fo>	Depending on the command or result code: first octet of 3GPP TS 23.040 [3] SMS-DELIVER, SMS-SUBMIT(default 17), SMS-STATUS-REPORT, or SMS-COMMAND(default 2) in integer format.

<vp>	Validity Period, depending on SMS-SUBMIT <fo>, TP-Validity-Period-Format bits setting. If there is no correlation between the VPF and the VP value. an error message will be returned. Either in integer format (see Table) or in time-string format ("yy/MM/dd, hh:mm:ss±zz"). If in integer format the vp will write to SIM EF and read form SIM EF when use it.
<pid>	Protocol-Identifier. The one octet information element by which the SM-TL either refers to the higher layer protocol being used, or indicates interworking with a certain type of telematic device. "0 - no interworking, SME-to-SME protocol (default) "Any value between 0-255 will be accepted. The SC may reject messages with a TP-Protocol-Identifier containing a reserved value or one, which is not supported.
<dcs>	One octet of Data Coding Scheme, indicates the data coding scheme of the DATA, and may indicate a message class. Note: For DCS expanded information, see section “DCS handling”. default alphabet: 00xx00xx, 111 100xx, 1 101xxxx 8 bit data: 00xx01xx, 111101xx UCS2: 00xx10xx, 1110xxxx reserved: 00xx11xx, 0100xxxx-1011xxxx The default value at power-up is 0 - Default alphabet.

The following table shows the VP format.

<Parameter>	**Description**
0 to 143	(TP-VP + 1) x 5 minutes (i.e. 5 minutes intervals up to 12 hours)
144 to 167	12 hours + ((TP-VP - 143) x 30 minutes)

168 to 196	(TP-VP - 166) x 1 day
197 to 255	(TP-VP - 192) x 1 week

Example:

AT+CSMP?
+CSMP: 17,167,0,0 (default values for SMS-SUBMIT)
OK
AT+CSMP= 1,256,0,0
+CMS ERROR: numeric parameter out of bounds
AT+CSMP=?
OK
AT+CSDH=1
OK
AT+CMGF=1
OK
AT+CMGW="15820447141"
> ABC(^Z)
+CMGW: 6
OK
AT+CMGR=6
+CMGR: "STO UNSENT","15820447141","",129,17,0,0,167,"+8613800755500",145,3
ABC
OK

7.1.6 +CSDH, Show Text Mode Parameters

This command controls whether detailed header information is shown in text mode result codes.

Command	Syntax	Response/Action	Remarks
Set	+CSDH=[<show>]	OK or: +CMS ERROR: <err>	The set command controls whether detailed header information is shown in text mode result codes.
Read	AT+CSDH?	+CSDH: (<show>)	The read command returns the current

		OK	<show> parameter value.
Test	AT+CSDH=?	+CSDH: (list of supported <show>s) OK	

The following table shows the +CSDH parameters.

<Parameter>	Description
<show>	0 - Means do not show header values defined in commands +CSCA and +CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <tooa> in +CMT, +CMGL, +CMGR result codes for SMS-DELIVERs and SMS-SUBMITs in text mode; for SMS-COMMANDs in +CMGR result code, do not show <pid>,<mn>, <da>, <toda>, <length> or <cdata> (default). 1 - Means show the values in result codes.

Example:

```
AT+CSDH=?
+CSDH: (0-1)
OK
AT+CSDH?
+CSDH: 0
OK
AT+CMGR=160// SMS-SUBMIT
+CMGR: "STO UNSENT","0544565034",
ABC
OK
AT+CSDH=1
OK
AT+CMGR=160
+CMGR: "STO UNSENT","0544565034",,81,29,0,0,"04/11/04,09: 48:
      36+08","+97254120032",145,3
ABC
OK
```

7.1.7 +CNMI, New Message Indications to Terminal

This command handles enabling of unsolicited notifications to the terminal when an SMS is received by the Modem.

After sending an unsolicited response to the TE, the Modem will expect a +CNMA (new message acknowledgement) from the TE within a predefined timeout of 15 seconds. Within the timeout the Modem will not send another unsolicited response to the TE before the previous one is acknowledgement. If the Modem does not receive acknowledgment within the required time, CNMI parameters will NOT be reset automatically and the unsolicited response will send to the TE again.

Command	Syntax	Response/Action
Set	+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	OK or: +CMS ERROR: <err>
Read	+CNMI?	+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr> OK
Test	+CNMI=?	+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

The following table shows the +CNMI parameters.

<Parameter>	Description	
<mode>	0	Buffer unsolicited result codes in the TA; if the TA buffer is full, the oldest indication may be discarded and replaced with the new received indications (ring buffer).
	1	Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved; otherwise forward them directly to the terminal.
	2	Buffer unsolicited result codes in the TA when the serial link is busy (e.g. data-transfer); otherwise forward them directly to the terminal.
<mt>	0	No SMS-DELIVER indications are routed to the terminal (default)
	1	If SMS-DELIVER is stored in the Modem, the memory location

		indication is routed to the terminal using the unsolicited result code: +CMTI: <mem>,<index>
	2	SMS-DELIVER (except class2 SMS) are routed directly to the TE using the unsolicited result code: +CMT: [<alpha],<length><CR><LF><pdu> (in PDU mode) or +CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF> If ME has its own display device then class 0 SMS and SMS in the message waiting indication group (discard message) may be copied to both ME display and to terminal. In this case ME shall send the acknowledgement to the network. Class 2 SMSs and messages in the message waiting indication group (storage message) result in indication as defined in <mt>=1
	3	Class 3 SMS-DELIVERs are routed directly to terminal using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1.
<bm>	0	No CBM indications are routed to the terminal (default)
	1	if CBM is stored in RAM/NVRAM by ATC/DR, an indication of memory location is routed to DTE unsolicited result code +CBMI: <mem>,<index>
	2	new CBMs are routed directly to the terminal using unsolicited result code: +CBM: <length><CR><LF><pdu (when PDU-mode enabled> or +CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>
	3	Class 3 CBMs are routed directly to TE using unsolicited result codes defined in <bm>=2. If CBM storage is supported, messages of other classes result in indication as defined in <bm>=1.
<ds>	0	No SMS-STATUS-REPORT indications are routed to the terminal (default)
	1	SMS-STATUS-REPORT is routed directly to the terminal
	2	If SMS-STATUS-REPORT is stored in the Modem, the memory locationindication is routed to the terminal using the unsolicited result code: +CDSI: <mem>,<index>
<bfr>	0	TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes).

	1	TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1. ..3 is entered.

Example:

```
AT+CNMI=?
+CNMI: (0-2),(0-3),(0-3),(0-2),(0-1)
OK
AT+CNMI?
+CNMI: 0,0,0,0
OK
AT+CNMI=2,1
OK
AT+CMSS=142,"0544565034"    // send to myself
+CMSS: 72
OK
+CMTI: "SM",15
AT+CNMI=1,2
OK
AT+CSDH=1
OK
AT+CMSS=142,"054565034"     // send to myself
+CMSS: 73
OK
+CMT: "+972544565034",,"04/11/04,09: 48: 36+08",145,4,0,0,"+97254120032",145,3
ABC
AT+CSMP=49,167       //Set first octet to status report.
// See status report parameters in CMGW.
OK
AT+CSMP?
+CSMP: 49,167,0,0
OK
AT+CNMI=1,,,1
OK
AT+CNMI?
+CNMI: 1,0,0,1,0
OK
AT+CNMI=1,0,0,1,0
```

```
OK
AT+CMGS="0524680592"
> HELLO
+CMGS: 168
OK
+CDS: 6,168,"+972524680592",145,"05/08/02,15: 20: 12+08","05/08/02,15: 20: 14+08",0
AT+CNMI=1,0,0,2
OK
AT+CMSS=296
+CMSS: 185
OK
+CDSI: "SM",6
```

7.1.8 +CNMA, New Message Acknowledgment

This command acknowledge the receipt of a +CMT and +CDS response from the terminal to the Modem. A +CMT response receipt confirms the correct reception of a new SMS-DELIVER message, which was routed directly to the terminal. A +CDS response receipt confirms the correct reception of a new SMS-STATUS-REPORT message, which was routed directly to the terminal.

When the Modem sends a +CDS response to the terminal, it waits a predefined timeout of 15 seconds for the +CNMA acknowledgment. The Modem will not send another +CDS result code to the terminal before the previous one is acknowledged, or the timeout expires.

When the Modem sends a +CMT response to the terminal, it waits a predefined timeout of 15 seconds for the +CNMA acknowledgment. The Modem will not send another +CMT result code to the terminal before the previous one is acknowledged, or the timeout expires. Upon receipt of the +CNMA command, the Modem sends RP-ACK to the network. The acknowledged SMS will not be saved in message storage. If the command is executed but no acknowledgment is expected, or some other Modem related error occurs, the final result code +CMS ERROR: <err> is returned.

Note: AT+CNMA send acknowledgment to network , Two conditions must be met AT+CSMS=1 command set <service> to 1, AT+CNMI=,2 command set <mt> to 2 or AT+CNMI=,,1 command set <ds> to 1. After the two conditions are met, If the Modem does not receive acknowledgment after receiver a SMS within the required time, CNMI parameters will NOT be reset automatically and the +CMT or +CDS unsolicited response will send to the TE again.

Command	Syntax	Response/Action	Remarks
Set	AT+CNMA	OK	For text mode (+CMGF=1).

		or: +CMS ERROR: <err>	
Set	AT+CNMA[=<n>[,<length>[<CR> PDU<ctrl-Z/ESC>]]]	OK or: +CMS ERROR: <err>	For PDU mode (+CMGF=0). **Note:** All parameters (<n>, <length> and PDU) are optional.
Read			The Read command for +CNMA is not defined by ETSI, and therefore is not supported by the Modem. The Modem returns an error.
Test	AT+CNMA=?	OK	+CNMA: (list of supported <n>s) in PDU mode

The following table shows the +CNMA parameters.

<Parameter>	Description
<n>	0 command operates similarly as defined for the text mode 1 send RP-ACK 2 send RP-ERROR
<length>	Length of the PDU in PDU mode

Example:

```
AT+CNMI=2,2
OK
AT+CMSS=142,"054565132"        // send to myself
+CMSS: 74
OK
+CMT: "+97254565132",,"03/04/09,17: 14: 33+08"
new message text
AT+CNMA
OK
```

```
AT+CNMI?
+CNMI: 2,2,0,0
OK
AT+CNMI=1,0,0,1
OK
AT+CSMP=49,167
OK
AT+CSMP?
+CSMP: 49,167,0,0
OK
AT+CNMI?
+CNMI: 1,0,0,1,0
OK
AT+CMSS=295
+CMSS: 184
OK
+CDS: 6,184,"+972524680592",145,"05/08/02,17: 19: 23+08","05/08/02,17: 19: 24+08",0
AT+CNMA
OK
AT+CNMI?
+CNMI: 1,0,0,1,0
OK
```

7.1.9 +CMTI, Unsolicited Response (New SMS-DELIVER Receipt Indication)

The +CMTI unsolicited response is sent to the TE upon receipt of a new SMS-DELIVER SMS, if the +CNMI parameter <mt> is set to 1. Refer to “+CNMI, New Message Indications to Terminal”.

This unsolicited message indicates that a new SMS-DELIVER message was received, and is stored in location <index>:

```
+CMTI: <mem>,<index>
```

The following table shows the +CMTI parameters.

<Parameter>	Description
<mem>	Message memory space. "SM" - SIM memory storage.
<index>	Location of the new message.

Example:

AT+CNMI=2,1
OK
AT+CMGS=18 //send to my self
> 07917952120100951100 0c91795242865029 0004AA0441424344
+CMGS: 69
OK
+CMTI: "SM",4

7.1.10 +CMT, Unsolicited Response (New SMS-DELIVER Receipt)

The +CMT unsolicited response is sent to the TE upon receipt of a new SMS-DELIVER SMS if the +CNMI parameter <mt> is set to 2. Refer to “+CNMI, New Message Indications to Terminal”.

This unsolicited message displays the received SMS-DELIVER message:

In text mode: (+CMGF=1):

+CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>] <CR><LF><data>

(about parameters in italics, refer command Show Text Mode Parameters +CSDH).

In PDU mode: (+CMGF=0):

+CMT: [<alpha>], <length><CR><LF><pdu>

The following table shows the +CMT parameters.

<Parameter>	Description
<oa>	Message origination address.
<scts>	Service center time stamp.
<tooa>	Type of origination address
<fo>	First octet of the SMS
<pid>	Protocol Identifier
<dcs>	Data Coding Scheme

<sca>	Service Center Address
<tosca>	Type of Service Center Address
<data>	Message contents.
<alpha>	Alpha ID of message.
<length>	In PDU mode: Size of message, in octets, excluding SMSC data. In TEXT mode: number of characters included in the <data>
<pdu>	Message header and contents in PDU mode format. See description in "+CMGR, Read Message".

After sending a +CMT unsolicited response to the TE, the Modem will expect a +CNMA (new message acknowledgement) from the TE within a predefined timeout of 15 seconds. Within the timeout the Modem will not send another +CMT unsolicited response to the TE before the previous one is acknowledged. If the +CMT is acknowledged within the timeout, the new SMS is not saved in the message storage. If the Modem does not receive acknowledgment after receiver a SMS within the required time, CNMI parameters will NOT be reset automatically and the +CMT unsolicited response will send to the TE again.

Example:

```
AT+CNMI=1,2
OK
AT+CSDH=1
OK
AT+CMSS=142,"054565034" // send to myself
+CMSS: 74
OK
+CMT: "+972544565034",,"04/11/04,09: 48: 36+08",145,4,0,0,"+97254120032",145,3
ABC
AT+CNMA
OK
AT+CMGF=0
OK
```

AT+CMGS=18 // send to myself

> 07917952120100951100 0c91795244650543000 4AA0441424344

+CMGS: 70

OK

+CMT: ,23

07917952120100950 40C91795244650543000450203211543080044142 4344

7.1.11 +CBM, Unsolicited Response (New CB Message Receipt)

The +CBM unsolicited response is sent to the TE upon receipt of a new cell broadcast message if +CNMI parameter <bm> is set to 2. Refer to “+CNMI, New Message Indications to Terminal”.

This unsolicited message displays the received CB message. The displayed CBM is not saved in message storage.

Unsolicited Response

In text mode: (+CMGF=1):

+CBM: <sn>,<mid>,<dcs>,<page>,<page><CR><LF><data>

In PDU mode: (+CMGF=0):

+CBM: <length><CR><LF><pdu>

The following table shows the +CBM parameters.

<Parameter>	Description
<sn>	Message serial number.
<mid>	Message ID.
<page>	Current page number.
<pages>	Total number of pages.
<data>	Message contents in text mode.
<length>	Size of message in PDU mode format, in octets.
<pdu>	Message header and contents in PDU mode format. See description in “+CMGR,, Read Message”.

7.1.12 +CDSI, Unsolicited Response (New SMS-STATUS-REPORT Indication)

The +CDSI unsolicited response is sent to the TE upon receipt of a new SMS-STATUS-REPORT SMS, if the +CNMI parameter <ds> is set to ’2’.

This unsolicited message indicates that a new SMS-STATUS-REPORT message was received, and is stored in location <index>.

Unsolicited Response

+CDSI: <mem>,<index>

The following table shows the +CDSI parameters.

<Parameter>	Description
<mem>	Message memory space. "SR" - status report storage.
<index>	Location of the new message.

Example:

```
AT+CMGF=1
OK
AT+CSMP=49,165    /*Set Message type to Status Report, see +CMGW*/
OK
AT+CSMP?
+CSMP: 49,167,0,0
OK
AT+CNMI=1,0,0,2
OK
AT+CMGS="052468000"
> Hello
+CMGS: 188
OK
+CDSI: "SR",1
```

7.1.13 +CDS, Unsolicited Response (New SMS-STATUS-REPORT Receipt)

The +CDS unsolicited response is sent to the TE upon receipt of a new mobile-terminated SMS if the +CNMI parameter <ds> is set to '1'.

This unsolicited message displays the received SMS-DELIVER message.

Unsolicited Response

In text mode: (+CMGF=1):

+CDS: <fo>,<mr>[,<ra>][,<tora>],<scts>,<dt>,<st><CR><LF>

In PDU mode: (+CMGF=0):

+CDS: <length><CR><LF><pdu>

The following table shows the +CDS parameters.

<Parameter>	Description
<fo>	First octet of the SMS
<mr>	Message Reference
<ra>	Message Recipient address
<tora>	Type of Recipient address
<scts>	Service center time stamp
<dt>	Discharge-Time
<st>	Status

After sending a +CDS unsolicited response to the TE, the Modem will expect a +CNMA (new message acknowledgement) from the TE within a predefined timeout of 15 seconds. Within the timeout the Modem will not send another +CDS unsolicited response to the TE before the previous one is acknowledged. If the +CDS is acknowledged within the timeout, the new SMS is not saved in the message storage. If the Modem does not receive acknowledgment within the required time, CNMI parameters will NOT be reset automatically and the +CDS unsolicited response will send to the TE again.

Example:

```
AT+CMGF=1
OK
AT+CSMP=49,167
OK
AT+CSMP?
+CSMP: 49,167,0,0
OK
AT+CNMI=1,0,0,1
OK
AT+CMGS="052468000"
> Hello
+CMGS: 187
OK
+CDS: 6,187,"+97252468000",145,"05/08/03,08: 56: 34+08","05/08/03,08: 56: 34+08",70
AT+CNMA
OK
```

7.1.14 +CMGL, List Messages

These commands display a list of all SMS with the status value <stat>, from the Modem message storage <mem1> (selected using the +CPMS command). The command returns a series of responses, one per message, each item containing the message index, status, and data. If the status of a message is "RECEIVED UNREAD", execution of the +CMGL command changes the status of the message to "RECEIVED READ".

Command	Syntax	Response/Action	Remarks
Set	+CMGL[=<stat>]	If text mode (+CMGF=1) command execution is successful and SMS-SUBMITs and/or SMS-DELIVERs: +CMGL: <index>,<stat>,<oa/da>[,<scts>][,<tooa/toda>,<length>]<CR><LF><data>[<CR><LF> +CMGL:	

		<index>,<stat>,<da/oa>[,,<scts>][,<tooa/toda>,<length>]<CR><LF><data>[...]] The parameters <tooa/toda>,<length> refer command shows the Text Mode Parameters +CSDH and will be shown according to +CSDH settings. If text mode (+CMGF=1) command execution is successful and SMS-COMMANDs: +CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF> +CMGL: <index>,<stat>,<fo>,<ct>[...]] If text mode (+CMGF=1), command execution is successful and CBM storage: +CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[<CR><LF> +CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[...]] If text mode (+CMGF=1) command execution is successful and SMS-STATUS_REPORTs: +CMGL: <index>,<stat>,<fo>,<mr>[,<ra>][,<tora>],<scts>,<dt>,<st>[<CR><LF> +CMGL: <index>,<stat>,<fo>,<mr>[,<ra>][,<tora>],<scts>,<dt>,<st>[...]] In PDU mode (+CMGF=0): +CMGL:	

		<index>,<stat>[,<alpha>],<length><CR><LF><pdu>[<CR><LF> +CMGL: <index>,<stat>[,<alpha>],<length><CR><LF><pdu>[…]] Or +CMS ERROR: <err>	
Test	+CMGL=?	+CMGL: (list of supported <stat>s)	The Test command lists all the supported <stats>

The following table shows the +CGML parameters.

<Parameter>	Description
<index>	1-352 Index of message in storage.
<stat>	Status of message in memory: PDU mode / Text mode / Description 0 / "REC UNREAD" / Received unread messages 1 / "REC READ" / Received read messages 2 / "STO UNSENT" / Stored unsent messages 3 / "STO SENT" / Stored sent message 4 / "ALL" / All messages For fault tolerance,Two mode can be trade off
<oa/da>	Original/destination address.
<data>	Message contents in text mode
<length>	In PDU mode: Size of message, in octets, excluding SMSC data. InTEXT mode: Number of characters included in <data>.
<pdu>	Message header and contents in PDU mode format. See description in "+CMGR, Read Message".
<toda/toda>	Type of origination address / destination address
<fo>	First octet of the SMS
<mr>	Message Reference

<ra>	Recipient-Address
<tora>	Type of Recipient address
<scts>	Service center time stamp
<ct>	Command type
<sn>	Message serial number
<mid>	Message ID
<page>	Current page number
<pages>	Total number of pages
<dt>	Discharge-Time
<st>	Status

Example:

```
AT+CMGL=?
+CMGL: ("REC UNREAD","REC READ","STO UNSENT","STO SENT","ALL")
OK
AT+CPMS="SM"    // read messages from SIM.
+CPMS: 2,20,11,61,2,20
OK
AT+CMGL       // read "rec-unread" messages with changing message stat
+CMGL: 1,"REC UNREAD","+972544565034",,"05/01/01,09: 21 : 22+08"
message text
OK
AT+CMGL
OK     // the message stat was changed. No "rec-unread" messages.
AT+CPMS="ME"
+CPMS: 11,61,11,61,2,20
OK
AT+CMGL="sto sent"
+CMGL: 142,"STO SENT","054565034",,
message text
OK
AT+CSDH=1
OK
AT+CMGL="STO SENT"
+CMGL: 142,"STO SENT","054565034",,,81,<message length>
message text
OK
```

AT+CMGS=18 //send to myself

> 07917952120100951100 0c91795244650543000 4AA0441424344

+CMGS: 68

OK

AT+CPMS="sm" // change to SIM to read the incoming messages

+CPMS: 2,20,11,61,2,20

OK

7.1.15 +CMGR, Read Message

These commands handle the reading of SMS. The command displays the message in location <index> of the preferred message storage <mem1> (selected using the +CPMS command). If the status of the message is "RECEIVED UNREAD", the +CMGR command changes the status to "RECEIVED READ".

Command	Syntax	Response/Action	Remarks
Set	+CMGR=<index>	If text mode (+CMGF=1) command execution is successful and SMS-DELIVER: +CMGR: <stat>,<oa>[,<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data> If text mode (+CMGF=1) command execution is successful and SMS-SUBMIT: +CMGR: <stat>,<da>[,<alpha>][,<toda>,<fo>,<pid>,<dcs>[,<vp>],<sca>,<tosca>,<length>]<CR><LF><data> If text mode (+CMGF=1) command execution is successful and SMS-COMMAND: +CMGR: <stat>,<fo>,<ct>[,<pid>[,<mn>][,<da>][,<toda>],<length><CR><LF><cdata>] If text mode (+CMGF=1) command execution is successful and CBM storage: +CMGR: <stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data> If text mode (+CMGF=1) command execution is successful and SMS-STATUS-REPORT:	The Set command reads the SMS located at <index> in the Modem message storage and displays it

		+CMGR: <stat>,<fo>,<mr>[,<ra>][,<tora>],<scts>,<dt>, <st> If PDU mode (+CMGF=0) and command execution is successful: +CMGR: <stat>[,<alpha>],<length><CR><LF><pdu> otherwise: +CMS ERROR: <err>	

The following table shows the +CMGR parameters.

<Parameter>	Description
<index>	Index in storage of the message to be retrieved.
<stat>	Status of message in memory: PDU mode / Text mode / Description 0 / "REC UNREAD" / Received unread messages 1 / "REC READ" / Received read messages 2 / "STO UNSENT" / Stored unsent messages 3 / "STO SENT" / Stored sent message 4 / "ALL" / All messages
<alpha>	Alpha ID of message (not present).
<length>	In PDU mode: Size of message, in octets, excluding SMSC data. In TEXT mode: Number of characters included in <data>.
<pdu>	Message header and contents in PDU mode format. See description in the table below.
<oa/da>	Original/destination address.
<data>	Message contents in text mode
<toda/toda>	Type of origination address / destination address
<fo>	First octet of the SMS

<pid>	Protocol Identifer
<dcs>	Data Coding Scheme
<sca>	Service Center Address
<tosca>	Type of Service Center Address
<vp>	Validity Period. Either in integer format or in time-string format (“yy/MM/dd,hh: mm: ss±zz”)
<mr>	Message reference
<scts>	Service center time stamp
<ct>	Command type
<sn>	Message serial number
<mn>	Message Number
<cdata>	Command-Data
<mid>	Message ID
<page>	Current page number
<pages>	Total number of pages
<mr>	Message reference
<ra>	Message Recipient address
<tora>	Type of Recipient address
<scts>	Service center time stamp
<dt>	Discharge-Time
<st>	Status

Example:

```
AT+CPMS?
+CPMS: "SM",13,50,"SM",13,50,"SM",13,50
OK
AT+CMGR=1
+CMS ERROR: invalid index
AT+CMGR=142
+CMGR: "STO SENT","054565034",
message text
OK
AT+CSDH=1
OK
AT+CMGR=142
+CMGR: "STO SENT","054565034",,129,25,0,0,"05/04/03,21 : 22: 23+08","+
      97254120032",145,<message length>
message text
OK
AT+CMGW=18
> 07917952120100951100 0c917952428650290004AA0441424344
+CMGW: 143
OK
AT+CMGR=143
+CMGR: 2,,23
07917952120100950 40C917952428650290004502032110201800441424344
OK
AT+CPMS="SM"     // change to SM to read SMS-DELIVER messages.
+CPMS: 2,20,11,61,2,20
OK
AT+CMGR=1
+CMGR: "REC READ","+972544565034",,"05/02/23,11 : 20:
      10+08",145,4,0,4,"+97254120032",145,4 41424344
OK
AT+CMGF=0
OK
AT+CMGR=1
+CMGR: 0,,23
0791 07917952140230F2040C917952446505430004502032110201800441424344
OK
AT+CMGR=14
```

```
+CMGR: 0,,25
07917952120100950 6BC0B917952428600F0508030807512805080308075128046
// SMS-STATUS-REPORT message in PDU mode
OK
AT+CMGF=1
OK
AT+CMGR=14     // SMS-STATUS-REPORT message in Text mode
+CMGR: "REC READ",6,188,"+97252468000",145,"05/08/03,08: 57: 21+08","05/08/03,08: 57:
      21+08",70
OK
```

7.1.16 +CMSS, Send Message from Storage

This command sends a pre-stored message, written previously using the +CMGW command. The <da>, <toda> parameters are optional. If a DA is given, the message is sent to that address. Otherwise the message is sent to the DA it was stored with (if any was entered). If no DA is found, an error occurs.

When the given index is an incoming message index the header settings will be as follows:

- <first-octet> will be SMS-SUBMIT and VPF - relative.
- The TP-RP and TP-UDHI settings will be taken from the incoming message's first octet.
- <vp> - will be set to the default value -167 - as defined in 03.40.
- <sca>,<tosca>, <pid> and <dcs> will be set according the incoming message parameters.
- If <da> and/or <toda> are not given by the command, the <oa> and <tooa> will be set instead.

Command	Syntax	Response/Action	Remarks
Set	+CMSS=<index>[,<da>[,<toda>]]	+CMSS: <mr> or: +CMS ERROR: <err>	The Set command sends a message from storage to the network.

The following table shows the +CMSS parameters.

<Parameter>	Description
<index>	1-352 Index in storage of the message to be sent.

<da>	Destination address in quoted string. This field contains a single phone number.
<toda>	Type of DA. Value between 128-255 (according to GSM 03.40, 9.1.2.5). If this field is not given and first character of <da> is '+' , <toda> will be 145, otherwise 129.
<mr>	Sent message reference number.

Example:

AT+CMSS=7
+CMSS: 12
OK
AT+CMSS=7,"054565132",129
+CMSS: 13
OK

Note: Any character sent by TE to Modem before Modem has reported a result of AT+CMSS operation, will abort AT+CMSS command execution. However, if SMS was already sent to network and sending operation was successful, the result of operation "+CMSS <mr>" will be reported by Modem. If after aborting AT+CMSS command execution and before result of operation was reported by Modem, a second AT+CMSS command is executed, then the result of the second AT+CMSS operation only will be reported by Modem.

7.1.17 +CMGW, Write Message to Memory

This command is used to write and save a message to <mem2>. The message is saved in memory, and the message index is displayed to the user.

By default, messages are saved with the status of "STO UNSENT", but status "STO SENT" can be applied using the <stat> parameter.

In TEXT mode, the header parameters will be set according to CSMP settings.

Command	Syntax	Response/Action	Remarks
Set	If text mode (+CMGF=1): +CMGW[=<da>[,<toda>[,<stat>]]]<	+CMGW: <index>	The Set command writes a message

	CR>text is entered<ctrl-Z/ESC> if PDU mode (+CMGF=0): +CMGW=<length>[,<stat>]<CR> PDU is given<ctrl-Z/ESC>	or: +CMS ERROR: <err>	and stores it.

Example:

```
AT+CMGF=1
OK
AT+CMGW="5124335432"
>This is the message body <CTRL+Z>    //<CTRL+Z> ends the prompt text mode and returns to
      regular AT command mode
+CMGW: 126
OK
AT+CMGW
> TEST <CTRL+Z>
+CMGW: 195
OK
AT+CMGF=0
OK
AT+CMGW=24
>07917952120100951 1FF0B917962543940F20008001400410042004300440045 <CTRL+Z>
+CMGW: 128
OK
AT+CMGR=128
+CMGR: 2,,24
07917952120100951 1FF0B917962543940F20008001400410042004300440045
OK
AT+CMGF=1
OK
AT+CSDH=1
OK
AT+CMGR=128
+CMGR: "STO UNSENT", "+97264593042",,145,17,0,8,0,"+972521100059",145,5
00410042004300440045
OK
AT+CSMP=25,"05/03/15,21 : 22: 23+08",0,0
```

```
OK
AT+CMGW="0544565034"
A<CTRL+Z>
+CMGW: 129
OK
AT+CMGR=129
+CMGR: "STO UNSENT", "0544565034",,129,25,0,0,"05/03/15,21 : 22:
    23+08","+972521100059",145,1
OK
AT+CMGF=0
OK
AT+CMGR=129
+CMGR: 2,,20
07917952120100951 9FF0A8150446505430000503051122232800141
AT+CMGW=18
> 0011000c917952428650290004AA0441424344 // SCA is not given
+CMGW: 130
OK
AT+CMGR=130
+CMGR: 2,,18
07917952120100951 1000C917952428650290004AA0441424344
OK
AT+CMGW=19
> 07917952120100951 1000c917952428650290004AA0441424344 //Invalid length (19)
+CMS ERROR: invalid PDU mode parameter
AT+CMGW=19
> 07917952120100951 1000c917952428650290004AA044142434477 //UDL is not equal to UD
    length
+CMS ERROR: invalid PDU mode parameter
AT+CMGW=17
> 07917952120100950 1000c9179524286502900040441424344 //No VP in PDU message
+CMGW: 131
OK
AT+CMGR=131
+CMGR: 2,,17
07917952120100950 1000C9179524286502900040441424344
OK
AT+CMGW=14
> 07917952140230F212000000000c9179524286502900 //SMS Command
```

```
+CMGW: 132
OK
AT+CMGR=132
+CMGR: 2,,14
07917952140230F212000000000C9179524286502900
OK
AT+CMGF=1
OK
AT+CMGR=132
+CMGR: "STO UNSENT",18,0,0,0,"+972524680592",145,0
OK
```

7.1.18 +CMGD, Delete Message

This command handles deletion of a single message from memory location <index>, or multiple messages according to <delflag>. If the optional parameter <delflag> is entered, and is greater than 0, the <index> parameter is practically ignored. If deletion fails, result code +CMS ERROR: <err> is returned.

Note: The deletion of multiple commands is a time-consuming process that may require more than 60 seconds to complete.

Command	Syntax	Response/Action	Remarks
Set	+CMGD=<index>[,<delflag>]	OK or: +CMS ERROR: <err>	
Read			The Read command for +CMGD is not defined by ETSI, and therefore is not supported by the Modem. The Modem returns an error.
Test	+CMGD=?	+CMGD: (list of valid<index>s), (list of valid<deflag>s)	The Test command displays the supported values of <index>, it list the index where have stored the SMS.

The following table shows the +CMGD parameters.

<Parameter>	Description
<index>	1-352 Index in the SMS memory of the message to be deleted.
<delflag>	0 Deletes the message specified in <index> 1 Deletes all read messages 2 Deletes all read messages and sent MO messages 3 Deletes all read messages, sent and unsent MO messages 4 Deletes all messages

Example:

AT+CMGD=4
OK
AT+CMGD=1,3
OK

7.1.19 +CGSMS, Select Service for MO SMS Messages

This command handles the selection of the service or service preference used by the Modem to send mobile-originated SMS messages.

Note: The Set command selects the service or service preference used to send SMS messages. The value that is set is not retained after a power cycle.

Command	Syntax	Response/Action	Remarks
Set	+CGSMS=[<service>]	OK +CME ERROR: <err>	The Set command selects the service or service preference used to send SMS messages. The value that is set is not retained after a power cycle.
Read	+CGSMS?	+CGSMS: <service> OK	The Read command displays the current SMS service preference setting.
Test	+CGSMS=?	+CGSMS: (list of currently available <service>s) OK	The Test command displays a list of currently available <service>s on the network.

The following table shows the +CGSMS parameters.

<Parameter>	Description
<service>	Indicates the service or service preference to be used. 0 GPRS 1 Circuit switched (default) 2 GPRS preferred (use circuit switched if GPRS is not available) 3 Circuit switched preferred (use GPRS if circuit switched is not available) Other values are reserved and will result in an ERROR response to the Set command.

Example:

AT+CGSMS=?
CGSMS: (0-3)
OK
AT+CGSMS?
CGSMS: 1
OK

7.1.20 +CMGS, Send SMS to Network

This command sends an SMS from the Modem to the network. The message reference value <mr> is returned to the Modem upon successful delivery of the message.

Valid <toda> will be any value between 128-255.

The header parameters in TEXT mode will be set according to CSMP settings.

Command	Syntax	Response/Action	Remarks
Set	If text mode (+CMGF=1): +CMGS=<da>[,<toda>]<CR>text is	+CMGS: <mr> OK or: +CMGS ERROR:	The Set command validates the input parameters, sends the SMS to network and

	entered<ctrl-Z/ESC> If PDU mode (+CMGF=0): +CMGS=<length><CR> PDU is entered<ctrl-Z/ESC>	<err>	reports the result of the operation to the Modem.

The following table shows the +CMGS parameters.

<Parameter>	Description
<da>	Destination address in quoted string. This field contains a single MIN number.
<toda>	Type of DA. Value between 128-255 (according to GSM 03.40, 9.1.2.5). If this field is not given and first character of <da> is '+' , <toda> will be 145, otherwise 129.
<length>	Size of message in PDU mode format, in octets, excluding SMSC data.
<mr>	Sent message reference number.
PDU	Message header and contents in PDU mode format. See description in “+CMGW, Write Message to Memory”.

Example:

```
AT+CMGS="064593042",129
>This is the message body <CTRL+Z> //<CTRL+Z> ends the prompt text mode and returns to
    regular AT command mode
OK
AT+CMGF=0
OK
AT+CMGS=24
>07917952120100951 1FF0B917962543940F20008001400410042004300440045 <CTRL+Z>
+CMGS: 128
```

OK

Note: Any character sent by TE to Modem before Modem has reported a result of AT+CMGS operation, will abort AT+CMGS command execution. However, if SMS was already sent to network and sending operation was successful, the result of operation "+CMGS <mr>" will be reported by Modem.

If after aborting AT+CMGS command execution and before result of operation was reported by Modem, a second AT+CMGS command is executed, then the result of the second AT+CMGS operation only will be reported by Modem.

If AT+CSCS=”HEX” , the SMS cannot be sent (CMGS).

7.1.21 +CSCB, Cell Broadcast Messages

This command handles the selection of cell broadcast message types and data coding schemes received by the Modem.

Command	Syntax	Response/Action	Remarks
Set	+CSCB=[<mode>[,<mids>[,<dcss>]]]	If mode=0 and <mids>is not specified, then no channels are accepted, and the Modem channel/mid list is cleared. OK or: +CME ERROE: <err>	The Set command sets the cell broadcast message type and data coding scheme.
Read	+CSCB?	+CSCB: <mode>,<mids>,<dcss> OK	The Read command displays the current MID and DCS settings.
Test	+CSCB=?	+CSCB: (list of supported <mode>s) OK	The Test command displays the supported values of <mode>.

Note: The Channel and DCS list is saved to the SIM card.

The maximum number of active channels is SIM dependent.

The AT+CSCB set command is not available when the phone is either in "Emergency Only" or "No Service" status.

The following table shows the AT+CSCB parameters.

<Parameter>	Description
<mode>	The current broadcast message mode: 0 MIDs and DCSs accepted 1 MIDs and DCSs not accepted
<mids>	Cell broadcast message identifiers 0-65534
<dcss>	Cell broadcast message data coding schemes 0-255

Note:

- A combination of discrete values or intervals can be entered for <mids> and <dcss>, for example, "0,1,5,320-324,922".
- The default value for missing <mode> is 1.
- The string type lists <mids> and <dcss> may include only numbers (0-9), comma and minus (-) characters.
- <mids> = 1-5 is equivalent to five channels.
- The dcss specified refers to all incoming messages, and not only to mids specified in the same AT command.

  Example:
  Testing the modes supported:
  AT+CSCB=?
  +CSCB: (0,1)
  OK
  Reading the current mid and dcs lists: AT+CSCB?
  +CSCB: 0,"",""
  OK
  Adding channels 3, 4,5,6,22 to mid list and languages 1,8 to dcs list:
  AT+CSCB=0,"3-6,22","1,8"
  OK

AT+CSCB?

+CSCB: 0,"3-6,22","1,8"

OK

AT+CSCB=1,"4,6","1"

OK

AT+CSCB?

+CSCB: 1,"4,6","1"

OK

8 Access and security

8.1 A/, Repeat Last Command

This command repeats the last command. It is not necessary to press <Enter> after this command.

Note: Only “AT” will not be repeated.

Command	Syntax	Response/Action
Execute	A/	Repeats last command Command “AT” will ignore

Example:

AT&D?
&D: 2
OK
A/
&D: 2
OK

8.2 AT, Check AT Communication

This command only returns OK.

Command	Syntax	Response/Action
Execute	AT	OK

Example:

AT
OK

8.3+CPIN, Enter PIN for Unlocking SIM or Enter PUK for Unblocking SIM

This command unlocks the SIM card when the proper SIM PIN is provided and unblocks the SIM card when the proper SIM PUK is provided.

The SIM card is unlocked only once the provided pin is verified as the SIM PIN. If the required PIN (determined by the error code returned from the requested operation or the Read command) is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the SIM card. When entering the pin, a <new pin> is not required.

A SIM card related error is returned if an AT command operation is unsuccessful due to a SIM card problem. The following table shows the SIM card errors.

Error	Description
10 SIM not inserted	SIM Card is not inserted
11 SIM PIN required	SIM Card waiting for SIM PIN to be entered
12 SIM PUK required	SIM PIN is blocked
13 SIM failure	SIM Card is permanently blocked
17 SIM PIN2 required	SIM Card is waiting for SIM PIN2 to be entered
18 SIM PUK2 required	SIM PIN2 is blocked

Command	Syntax	Response/Action	Remarks
Set	AT+CPIN=[<puk> or <pin>][,<newpin>]	OK or: +CME ERROR: <err>	The Set command sends the password to the Modem that is necessary before it can be operated (SIM PIN or SIM PUK). If there is no PIN request pending, no action is taken towards the Modem, and an error message, +CME ERROR, is returned to the terminal. The Set command issued gives the code (SIM PIN or SIM PUK)

			corresponding to the error code required or returned as the result of the Read command. For example, if the SIM PIN is blocked, the error code 11 or "SIM PIN required" is returned. The user must then issue the Set command with the SIM PIN.
Read	AT+CPIN?	+CPIN: <code> OK or: +CME ERROR: <err>	The Read command returns an alphanumeric string indicating the status of the SIM card, and whether a password is required or not. This is an independent SIM card lock status check only, and does not check the phone lock status.
Test	AT+CPIN=?	OK	

The following table shows the +CPIN parameters.

<Parameter>	**Description**	
<puk>	PUK code for unblocking a blocked phone	
<pin>	Current PIN for unlocking a locked phone	
<newpin>	New PIN (after changing or after entering PUK) 4 - 8 digits	
<code>	READY	MT is not pending for any password
	SIM PIN	MT is waiting SIM PIN to be given
	SIM PUK	MT is waiting SIM PUK to be given
	PH-SIM PIN	MT is waiting phone-to-SIM card password to be given
	PH-FSIM PIN	MT is waiting phone-to-very first SIM card

		password to be given
	PH-FSIM PUK	MT is waiting phone-to-very first SIM card unblocking password to be given
	SIM PIN2	MT is waiting SIM PIN2 to be given (this <code> is recommended to be returned only when th e last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered right after the failure, it is recommended that MT does not block its operation)
	SIM PUK2	MT is waiting SIM PUK2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR: 18); if PUK2 and new PIN2 are not entered right after the failure, it is recommended that MT does not block its operation)
	PH-NET PIN	MT is waiting network personalization password to be given
	PH-NET PUK	MT is waiting network personalization unblocking password to be given
	PH-NETSUB PIN	MT is waiting network subset personalization password to be given
	PH-NETSUB PUK	MT is waiting network subset personalization unblocking password to be given
	PH-SP PIN	MT is waiting service provider personalization password to be given
	PH-SP PUK	MT is waiting service provider personalization unblocking password to be given

	PH-CORP PIN	MT is waiting corporate personalization password to be given
	PH-CORP PUK	MT is waiting corporate personalization unblocking password to be given
SIM PIN	AT+CPIN=<pin>	
SIM PUK	AT+CPIN=<puk>,<newpin>	
SIM PUK2	AT+CPIN=<puk2>,<newpin2>	
SIM PIN 2	AT+CPIN=<pin2>	

Example:

AT+CPIN=?
OK
AT+CLCK="SC",1,"<correct PIN>" //Not case-sensitive
OK
The facility is enabled by the +CLCK command (Refer to “+CLCK, Facility Lock”)
AT+CPIN?
+CPIN: SIM PIN
OK
AT+CPIN="<correct PIN>"
OK
AT+CPIN?
+CPIN: READY
OK
The status of the SIM is still enabled, but the PIN is READY for this session.
The SIM is enabled per session. After power-up SIM must be unlocked again by using the +CLCK command.
The following case shows an example of three unsuccessful attempts at entering the PIN:
AT+CPIN?
+CPIN: SIM PIN
OK
AT+CPIN="<wrong pin>"
+CME ERROR: incorrect password
AT+CPIN="<wrong pin>"

```
+CME ERROR: incorrect password
AT+CPIN="<wrong pin>"
+CME ERROR: SIM PUK required
AT+CPIN?
+CPIN: SIM PUK          //PIN is blocked. The PUK is needed for unblocking.
OK
AT+CPIN="<PUK>","<NEW PIN>"        //Enter PUK and new PIN
OK
AT+CLCK="FD",1,"<wrong PIN2>"
+CME ERROR: incorrect password
AT+CLCK="FD",1,"<wrong PIN2>"
+CME ERROR: incorrect password
AT+CLCK="FD",1,"<wrong PIN2>"
+CME ERROR: SIM PUK2 required
AT+CPIN?
+CPIN: SIM PUK2          //PIN2 is blocked. The PUK2 is needed for unlocking.
OK
AT+CPIN="<PUK2>","<NEW PIN2>"       //Enter PUK2 and new PIN2
OK
```

8.4+CPWD, Change Password

This command sets a new password for the facility lock. The password can only be changed once the required facility is enabled by the +CLCK command.

A password can be changed only if the provided password <oldpwd> has been verified. The entered password <newpwd> must also comply to the password rules. The facility value <fac> is not case-sensitive. In the password value, letters are not allowed.

Command	Syntax	Response/Action	Remarks
Set	AT+CPWD=<fac>,<oldpwd>,<newpwd>	OK or: +CME ERROR: <err>	Set a new password for the facility lock.
Read	AT+CPWD?	+CME ERROR:	

		<err>	
Test	AT+CPWD=?	+CPWD: list of Supported (<fac>,<pwdlength>)s OK or: +CME ERROR: <err>	The Test command returns a list of pairs which represent the available facilities, and the maximum length of their passwords.

The following table shows the <fac> parameters.

<fac>	Description
SC	SIM (lock SIM/UICC card) (SIM/UICC asks password in MT power-up and when this lock command issued)
FD	SIM card or active application in the UICC (GSM or USIM) fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as <passwd>)
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)

P2	SIM PIN2

The following table shows the +CPWD parameters.

<Parameter>	Description
<fac>	List of supported facilities. All the facility messages, except for SC and P2, are sent to the network. (The facilities are not case-sensitive.) Please see <fac> Table.
<oldpwd>	String type, 4-8 character old password specified for the facility from the Modem user interface.
<newpwd>	String type, 4-8 character new password specified by the user.
<pwd length>	Maximum length of the facmility password. Integer type.

Example:

```
AT+CPWD =?
+CPWD: ("SC",8),("AO",8),("OI",8),("OX",8),("AI",8),("IR",8),("AB",8),("AG",8), ("AC",8),("P2",8)
OK
AT+CPWD?
+CME ERROR: operation not supported
AT+CLCK="sc",1,"current pin password"
OK
AT+CPWD="sc","incorrect old password","new password"
+CME ERROR: incorrect password
AT+CLCK="sc",2
+CLCK: 0
OK
AT+CPWD="sc","old password","new password"
+CME ERROR: operation not allowed
AT+CLCK="fd",1,"current pin2 password"
AT+CPWD="p2","old password","new password"
```

OK

AT+CLCK="ai",2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

AT+CLCK="ai",1,"correct password"

OK

AT+CLCK="ai",2

+CLCK: 1,1

+CLCK: 1,2

+CLCK: 1,4

OK

AT+CPWD="ai","old password","new password"

OK

8.5+CLCK, Facility Lock

This command locks, unlocks or interrogates a Modem or a network facility <fac> (any kind of call barring program).

A password is mandatory for performing locking and unlocking actions, but not for querying. The features of the Modem that are affected by this are fixed dialing list.

When querying the status of a single call barring program <mode>=2, the <status> for each call type will be returned.

For <fac>="SC", SIM Card PIN setting and for <fac>="FD", SIM Fixed Dialing memory setting, the <class> is irrelevant (For more information about <class>, refer to the following table shows the +CLCK parameters.). For “SC”, the <passwd> is SIM PIN. For “FD”, the <passwd> is SIM PIN2.

Command	Syntax	Response/Action	Remarks

Set	+CLCK=<fac>,<mode>[,<passwd>[,<classx>]]	For <fac> where <class> is irrelevant(SC, FD): +CLCK=<fac>,2 +CLCK: <status> For <fac> with several supported <class>es: +CLCK=<fac>,2 +CLCK: <status>,<class1> [<CR><LF> +CLCK: <status>,<class2> […]] OK	The Set command performs the specified <mode> action on the specified <fac>.
Read	+CLCK?	ERROR	
Test	+CLCK=?	+CLCK: (list of supported <fac>s)	The Test command returns the list of supported facilities.

The following table shows the +CLCK parameters.

<Parameter>	**Description**
<fac>	Please see <fac> Table in +CPWD command.
<passwd>	String type, 4-8 character password. Shall be the same as password specified for the facility with command Change Password +CPWD
<mode>	0 Unlock 1 Lock 2 Query status (<passwd> does not apply) Note: Query mode return only the active <fac>. In case no <fac> is active the query will return the default (7).
<class>	Sum of integers, each representing a class of information.

	Please see class table in +CCWA command. The default value is 7.
<status>	0 Inactive 1 Active

Example:

```
AT+CLCK=?
+CLCK: ("SC","AO","OI","OX","AI","IR","AB","AG","AC","FD")
OK
AT+CLCK="SC",2
+CLCK: 0
OK
AT+CLCK="SC",1
+CME ERROR: operation not allowed
AT+CLCK="SC",1,"incorrect password"
+CME ERROR: incorrect password
AT+CLCK="SC",1,"correct password"
OK
(From now SIM Card is locked and PIN is requested on power up)
AT+CLCK="AB",0,"incorrect password"
+CME ERROR: incorrect password

AT+CLCK="IR",2
+CLCK: 0,1
+CLCK: 0,2
+CLCK: 0,4
+CLCK: 0,8
OK
AT+CLCK="IR",1,"correct password" //<classx> is defaulted to 7 when not specified
OK
AT+CLCK="IR",2
+CLCK: 1,1
+CLCK: 1,2
+CLCK: 1,4
+CLCK: 0,8
OK
```

AT+CLCK="OI",1,"correct password",3

OK

(Voice and data international calls barred, fax and SMS not barred.)

AT+CLCK="OI",2

+CLCK: 1,1

+CLCK: 1,2

+CLCK: 0,4

+CLCK: 0,8

OK

9 Network

9.1 Network Commands

9.1.1 +CSQ, Signal Strength

This command displays the received signal strength indication <rssi> and channel bit error rate <ber> from the Modem.

Command	Syntax	Response/Action
Execute/Read	AT+CSQ AT+CSQ?	+CSQ: <rssi>,<ber> OK
Test	AT+CSQ=?	+CSQ: (list of supported <rssi>s),(list of supported <ber>s) OK

The following table shows the +CSQ parameters.

<Parameter>	Description
<rssi>	0 through 31 - covers the range of -113 dbm (or less) to -51 dbm (or greater) 0 - 113 dBm or less 1 - 111 dBm 2…30 -109… -53 dBm 31 - 51 dBm or greater 99 not known or not detectable
<ber>	Channel bit error rate (in percent) 0-7 RXQUAL values in the TS 45.008 table 99 Unknown or not detectable

Example:

AT+CSQ
+CSQ: 23,99
OK
AT+CSQ=?
+CSQ: (0-31,99),(0-7,99)
OK

9.1.2 +XCESQ, Extended signal quality with URC support

Set command is used to enable/disable the Extended Signal Quality (XCESQI) unso-licited result code.

Read command returns the XCESQ command setting, received signal quality parameters.

Test command returns values supported as compound values.

Note : 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> and <ecno> are set to 255. If the current serving cell is not an E-UTRA cell, <rsrq>, <rsrp> and <rssnr> are set to 255.

Command	Syntax	Response/Action
Set	AT+XCESQ =[<n>]	OK or CME ERROR:<error>
Read	AT+XCESQ?	+XCESQ: <n>,<rxlev>,<ber>,<rscp>,<ecno>, <rsrq>,<rsrp>,<rssnr> OK
Test	AT+ XCESQ =?	+XCESQ: (list of supported <n>s),(list of supported <rxlev>s),(list of supported <ber>s),(list of supported <rscp>s),(list of supported <ecno>s),(list of sup- ported <rsrq>s),(list of supported <rsrp>s),(list of supported <rssnr>s) OK

The following table shows the + XCESQ parameters.

<Parameter>	Description
<n>	Integer type 0 disable the XCESQI unsolicited result code, default value 1 enable the XCESQI unsolicited result code
<rxlev>	Integer type. Received signal strength level 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>	Channel bit error rate (in percent) 0-7 RXQUAL values in the TS 45.008 table 99 Unknown or not detectable
<rscp>	Received signal code power 0 rscp < -120dbm 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>	Ratio of the received energy per PN chip to the total received power spectral density 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>	Reference signal received quality 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>	Reference signal received power 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
<rssnr>	Radio Signal Strength Noise Ratio value. -100 RSSNR <= -50dB -99 -50dB < RSSNR <= -49.5dB -98 -49.5dB < RSSNR <= -49dB : : : : -1 -1 dB < RSSNR <= -0.5 dB 0 -0.5 dB < RSSNR <= 0 dB 1 0 dB < RSSNR <= 0.5 dB : : : : 98 49 dB <= RSSNR < 49.5 dB 99 49.5dB <= RSSNR < 50dB 100 50dB <= RSSNR 255 not known or not detectable

Note: Starting from Release-10 platforms, the signal strength reporting will be change based for all the supported RATs.

9.1.3 +CRLP, Radio Link Protocol

This command is used to change the Radio Link Protocol(RLP) parameters used when non-transparent data calls are originated.

Command	Syntax	Response/Action	Remarks
Set	+CRLP=[<iws>[,<mws>[,<T1>[,<N2>]]]]	OK or: +CME ERROR: <err>	The Set command is used to change the radio link protocol parameters.

Read	+CRLP?	+CRLP= <iws>,<mws>,<T1>,<N2> OK	Returns the current CRLP settings
Test	+CRLP=?	+CRLP= (list of supported <iws>s),(list of supported <mws>s), (list of supported <T1>s), (list of supported<N2>s) OK	

The following table shows the +CRLP parameters.

<Parameter>	Description
<iws>	IWF to MS window size. 10-61. The default value is 61.
<mws>	MS to IWF window size. 10-61. The default value is 61.
<T1>	Acknowledgement timer T1. 39-255. The default value is 48.
<N2>	Retransmission attempts N2 in integer format (refer to GSM 04.22 subclause5.4.3) The default value is 6.

Example:

```
AT+CRLP=?
+CRLP: (10-61),(10-61),(39-255),(1-255)
OK
AT+CRLP?
```

+CRLP: 61,61,48,6

OK

9.1.4 +CREG, Network Registration Status

This command controls the presentation of an unsolicited result code +CREG and provides the information of network registration status.

Set command is used to control the unsolicited result code +CREG. The syntax of unsolicited result +CREG as mentioned below:

1. +CREG:<stat> when <n>=1 and there is a change in the MT's circuit mode network registration status in GERAN/UTRAN/E-UTRAN.
2. +CREG:<stat> [,<lac>,<ci>[<,<AcT>]] when <n>=2 and there is a change of the network cell cell in GERAN/UTRAN/E-UTRAN in this case <AcT>,<lac> and <ci> are sent only is available
3. +CREG: <stat> [, <lac>,<ci>[,<AcT>[,<reject type>[,<reject cause>]]]] when <n>=3.

Read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. Location information elements<AcT>,<lac> and <ci> are returned only, if available,when <n>=2 and MT is registered in the network.

Test command returns the range of supported modes(i.e.<n>s)

Command	Syntax	Response/Action	Remarks
Set	AT+CREG =[<n>]	OK or: +CME ERROR: <err	The Set command controls the presentation of an unsolicited result code and the result of the Read operation.
Read	AT+CREG ?	+CREG: <n>,<stat> [, <lac>,<ci>[,<AcT>[,<reject type>[,<reject cause>]]]] OK	The Read command returns the status of the result code presentation whether the network has indicated the registration of Modem.
Test	AT+CREG =?	+CREG: (0-3) Note: i.e. (list of supported <n>s)	

		OK	

The following table shows the +CREG parameters.

<Parameter>	Description
<n>	0 Disables the network registration unsolicited result code. 1 Enables the network registration unsolicited result code +CREG: <stat>. 2 Enables the network registration and location information in unsolicited reports and Read command +CREG: <stat>[,<lac>,<ci>[,<AcT>]]. 3 Enables the network registration and location information in unsolicited reports and Read command +CREG: <stat> [, <lac>,<ci>[,<AcT>[,<reject type>[,<reject cause>]]]] The default value is 0.
<stat>	0 Not registered, and the ME is not currently searching for a new operator to register. 1 Registered, home network. 2 Not registered, but the ME is currently searching for a new operator to register. 3 Registration denied. 4 Unknown. 5 Registered, roaming. 6 Registered for “SMS only”, home network (applicable only when <AcT> indicates E-UTRAN) 7 registered for "SMS only", roaming (applicable only when <AcT> indicates E-UTRAN) 8 attached for emergency bearer services only (see NOTE) (not applicable) NOTE : 3GPP TS 24.008 [8] and 3GPP TS 24.301 [83] specify the condition when the MS is considered as attached for emergency bearer services
<lac>	string type; two byte location area code (when <AcT> indicates value 0 to 6), or tracking area code (when <AcT> indicates value 7). In hexadecimal format (e.g. "00C3").

<ci>	string type; ; four byte GERAN/UTRAN/E-UTRAN cell ID in hexadecimal format (e.g. "0000A13F")
<AcT>	0 GSM 2 UTRAN 3 GSM w/EGPRS 4 UTRAN w/HSDPA 5 UTRAN w/HSUPA 6 UTRAN w/HSDPA and HSUPA 7 E-UTRAN Note: <Act> is supporting from R7 and above Protocol Stack. 3GPP TS 44.060 [71] specifies the System Information messages which give the information about whether the serving cell supports EGPRS. 3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.
<reject type>	integer type; indicates the type of <reject_cause>. 0 Indicates that <reject_cause> contains an MM cause value, see 3GPP TS 24.008 [8] Annex G. 1 Indicates that <reject_cause> contains a manufacturer specific cause.
<reject cause>	integer type; contains the cause of the failed registration. The value is of type as defined by <cause_type>.

Example:

```
AT+CREG=?
+CREG: (0-3)
OK
AT+CREG?
+CREG: 0,1
OK
AT+CREG=2
OK
AT+CREG?
+CREG: 2,1,"A52F","01603413",6
OK
AT+CREG=1
```

OK

AT+CREG?

+CREG: 1,1

OK

AT+CREG=0

OK

9.1.5 +CGREG, GPRS Network Registration

This command gives the information of state of GPRS network registration. This set command controls the presentation of an unsolicited result code +CGREG: <stat> when <n>=1 and there is a change in the MT's GPRS network registration status GERAN/UTRAN, or code +CGREG: <stat> [,<lac>,<ci>] [,<AcT>,<rac>]when <n>=2 and there is a change in the network cell in GERAN/UTRAN; in this case <AcT>, <lac>, <rac> and <ci> are sent only if available. code +CGREG: <stat>[,<lac>[,<ci>[,<AcT>[,<rac>[,<reject type>[,<reject cause>]]]]]] when <n>=3.

The read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT.Location information elements <lac>, <ci>, <AcT> and <rac>, if available, are returned only when <n>=2 and MT is registered in the network

Test command returns the range of supported network registration mode (i.e. <n>).

Command	Syntax	Response/Action	Remarks
Set	AT+CGREG=<n>	OK or: +CME ERROR: <err>	The Set command controls the presentation of an unsolicited result code "+CGREG: " and the result of the Read operation.
Read	AT+CGREG?	+CGREG: <n>, <stat>[,<lac>[,<ci>[,<AcT>[,<rac>[,<reject type>[,<reject cause>]]]]]] OK	
Test	AT+CGREG=?	+CGREG: (list of supported <n>s)	The Test command displays the supported values of <n>.

		OK	

The following table shows the +CGREG parameters.

<Parameter>	Description
<n>	0 Disables the network registration unsolicited result code. 1 Enables the network registration unsolicited result code +CGREG: <stat>. 2 Enables the network registration and location information in unsolicited result code and Read command +CGREG: <stat>[,<lac>,<ci>]. 3 Enables the network registration and location information in unsolicited result code and Read command +CGREG:<stat>[,<lac>[,<ci>[,<AcT>[,<rac>[,<reject type>[,<reject cause>]]]]]] The default value is 0.
<stat>	0 Not registered, and the ME is not currently searching for a new operator to register. 1 Registered, home network. 2 Not registered, but the ME is currently searching for a new operator to register. 3 Registration denied. 4 Unknown. 5 Registered, roaming. 6 registered for "SMS only",home network (not applicable) 7 registered for "SMS only", roaming (not applicable) 8 attached for emergency bearer services only (see NOTE 2) (applicable only when <AcT> indicates 2,4,5,6). Note: 3GPP TS 24.008 [8] and 3GPP TS 24.301 [83] specify the condition when the MS is considered as attached for emergency bearer

	services.
<lac>	string type; two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	string type ; four byte GERAN/UTRAN cell ID in hexadecimal format
<AcT>	It is a Release 7 feature and describes access technology of the registered network. Possible values of <AcT> are: 0 GSM 1 GSM Compact 2 UTRAN 4 UTRAN w/HSDPA 5 UTRAN w/HSUPA 6 UTRAN w/HSDPA and HSUPA 7 E-UTRAN Note: 3GPP TS 44.060 [71] specifies the System Information messages which give the information about whether the serving cell supports EGPRS. 3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.
<rac>	is Release 7 feature, string type; one byte routing area code in hexadecimal format
<reject type>	integer type; indicates the type of <reject_cause>. 0 Indicates that <reject_cause> contains an MM cause value, see 3GPP TS 24.008 [8] Annex G. 1 Indicates that <reject_cause> contains a manufacturer specific cause.
<reject cause>	integer type; contains the cause of the failed registration. The value is of type as defined by <cause_type>.

Example:

```
at+cgreg=?
+CGREG: (0-3)
OK
```

AT+CGREG=2

OK

AT+CGREG?

+CGREG: 2,1,"A52F","0160358F",6,"02"

OK

AT+CGREG=1

OK

AT+CGREG?

+CGREG: 1,1

OK

AT+CGREG=0

OK

9.1.6 +CEREG, EPS Network Registration status

The set command controls the presentation of an unsolicited result code +CEREG:<stat> when <n>=1 and there is a change in the MT's EPS network registration status,or code +CEREG: <stat>[,<tac>,<ci>[,<AcT>]] when <n>=2 and there is a change of the network cell, code +CEREG: <stat>[,<tac>[,<ci>[,<AcT>[,<reject type>[,<reject cause>]]]]] when <n>=3. NOTE 1: If the EPS MT also supports circuit mode services and/or GPRS services, the +CREG command and +CREG: result codes and/or the +CGREG command and +CGREG: result codes apply to the registration status and location information for those services.

NOTE 1: If the EPS MT also supports circuit mode services and/or GPRS services, the +CREG command and +CREG: result codes and/or the +CGREG command and +CGREG: result codes apply to the registration status and location information for those services.

The read command returns the status of result code presentation and an integer <stat> whitch shows whether the network has currently indicated the registration of the MT. Location information elements <tac>, <ci> and <AcT>, if available,are returned only when <n>=2 and MT is registered in the network.

Test command returns the range of supported network registration mode (i.e. <n>).

Note: This command is supported only in R8 protocol with LTE.

Command	Syntax	Response/Action	Remarks
Set	AT+CEREG=[<n>]	OK Or +CME ERROR: <err>	The Set command controls the presentation of an unsolicited result

			code "+CEREG: " and the result of the Read operation.
Read	AT+CEREG?	+CEREG: <n>,<stat>[,<tac>[,<ci>[,<AcT>[,<reject type>[,<reject cause>]]]]]	
Test	AT+CEREG=?	+CEREG: (list of supported <n>s)	The Test command displays the supported values of <n>.

The following table shows the +CEREG parameters.

<Parameter>	Description
<n>	0 disable network registration unsolicited result code (default) 1 enable network registration unsolicited result code +CEREG: <stat> 2 enable network registration and location information unsolicited result code +CEREG: <stat>[,<tac>,<ci>[,<AcT>]] 3 enable network registration and location information unsolicited result code +CEREG: <stat>[,<tac>[,<ci>[,<AcT>[,<reject type>[,<reject cause>]]]]]
<stat>	EPS registration status 0 not registered, MT is not currently searching an operator to register to 1 registered, home network 2 not registered, but MT is currently trying to attach or searching an operator to register to 3 registration denied 4 unknown 5 registered, roaming 6 registered for "SMS only", home network (not applicable) 7 registered for "SMS only", roaming (not applicable) 8 attached for emergency bearer services only (see NOTE 2) (applicable

	only when <AcT> indicates 2,4,5,6). NOTE 2: 3GPP TS 24.008 [8] and 3GPP TS 24.301 [83] specify the condition when the MS is considered as attached for emergency bearer services.
<tac>	string type; two byte tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	string type; four byte E-UTRAN cell ID in hexadecimal format
<AcT>	access technology of the serving cell 0 GSM (not applicable) 1 GSM Compact (not applicable) 2 UTRAN (not applicable) 3 GSM w/EGPRS (see NOTE 3) (not applicable) 4 UTRAN w/HSDPA (see NOTE 4) (not applicable) 5 UTRAN w/HSUPA (see NOTE 4) (not applicable) 6 UTRAN w/HSDPA and HSUPA (see NOTE 4) (not applicable) 7 E-UTRAN NOTE 3: 3GPP TS 44.060 [71] specifies the System Information messages which give the information about whether the serving cell supports EGPRS. NOTE 4: 3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.
<reject type>	integer type; indicates the type of <reject_cause>. 0 Indicates that <reject_cause> contains an MM cause value, see 3GPP TS 24.008 [8] Annex G. 1 Indicates that <reject_cause> contains a manufacturer specific cause.
<reject cause>	integer type; contains the cause of the failed registration. The value is of type as defined by <cause_type>.

Example:

```
at+cereg=?
+CEREG: (0-3)
OK
AT+CEREG=2
OK
AT+CEREG?
+CEREG: 2,1,"247B","0A7D7B01",7
OK
AT+CEREG=0
OK
```

9.1.7 +COPS, Operator Selection

This command enables accessories to access the network registration information, and the selection and registration of the GSM/UMTS network operator.

The Modem is registered in the Home network.

The Enhanced Operator Name String (EONS) feature enables the Modem to return the operator name displayed on the handset.

This feature allows the SIM card to store a mapping of MCC/MNC code pairs to the displayed operator name. As a result, several operators can share a single network while having their handsets display their own name as the network operator.

Testing the enhanced ONS feature requires a "SIM ONS" SIM card.

Command	Syntax	Response/Action	Remarks
Set	AT+COPS =[<mo de>[,<form at> [,<oper>[,< AcT>]]]]	OK or: +CME ERROR: <err>	The Set command can force an attempt to select and register a specific GSM network operator. The <mode> selects whether this is done automatically by the Modem or whether the selection is forced to an operator <oper> (given in format <format>). If the selected operator is not available, no other operator is selected (except when the <mode> is set to 4). <mode>=2 forces an attempt to deregister

			from the network. \<mode>=3 sets the operator format to all further Read commands (+COPS?) as well. The selected mode applies to future network registrations, for example, once you deregister from the network, the Modem remains unregistered until you select \<mode>=0, \<mode>=1, or \<mode>=4
Read	AT+COPS? 	+COPS: \<mode>[,\<format>,\<oper>[,\<AcT>]] OK Or +CME ERROR: \<err>	The Read command returns the current mode and the currently selected operator.
Test	AT+COPS=? 	+COPS: [list of supported (\<stat>, long alpha numeric \<oper>,short alphanumeric\<oper>, numeric\<oper>)][,list of supported \<mode>s,(list of supported\<format>s)] OK	The Test command returns a list of quadruplets, each representing an operator present in the network. A quadruplet consists of an integer indicating the availability of the operator \<stat>, long and short alphanumeric format of the name of the operator, and numeric format representation of the operator. If any of the formats are unavailable, there is an empty field. The list of operators is in the following order: home network, networks referenced in SIM or active application in the UICC (GSM or USIM) in the following order: HPLMN selector, User controlled PLMN selector, Operator controlled PLMN selector and PLMN selector (in the SIM

			or GSM application), and other networks. After the operator list, the Modem returns lists of the supported <mode>s and <format>s. These lists are separated from the operator list by two commas.

The following table shows the +COPS parameters.

<Parameter>	Description
<mode>	Determines whether what is displayed is defined by <oper>, or is done automatically by the Modem. 0 Automatic (<oper> field is ignored) 1 Manual (<oper> field is present) 2 De-register from network 3 Set only <format> (<oper> field is ignored); used for Read command only, do not attempt registration/deregistration 4 Manual/automatic (<oper> field is present; if manual selection fails, use automatic mode) The default value is 0.
<format>	The operator format type: 0 Long alphanumeric 1 Short alphanumeric 2 Numeric The default value is 0.
<stat>	0 Unknown 1 Available 2 Current

	3 Forbidden
<oper>	Operator name displayed. The long alphanumeric format can be up to 16 characters long. The short alphanumeric format can be up to 8 characters long. The numeric format is the GSM Location Area Identification number (refer to GSM 04.08 subclause 10.5.1.3), consisting of a three BCD digit country code (as per ITU-T E.212 Annex A), plus a two BCD digit network code, which is administration specific. The returned <oper> is not in BCD format, but in IRA characters converted from BCD, and therefore the number has the following structure: (country code digit 3) (country code digit 2) (country code digit 1) (network code digit2) (network code digit 1)
<AcT>	Indicates the radio access technology and values can be: 0 GSM 2 UMTS/TD-SCDMA 7 LTE
<plmn_list>	Indicates whether the PLMN is present on the EHPLMN list, the User Controlled PLMN List or the Operator Controlled PLMN List. 0 PLMN is present on the EHPLMN list 1 PLMN is present on the User Controlled PLMN List 2 PLMN is present on the Operator Controlled PLMN List

Example:

```
AT+COPS=?
+COPS:
    (2,"CHN-UNICOM","UNICOM","46001",2,),(2,"CHN-UNICOM","UNICOM","46001",0,),(3,"CHIN
    A  MOBILE","CMCC","46000",0,)
OK
```

AT+COPS?

+COPS: 1,0,"CHN-UNICOM",2

OK

AT+COPS=2

OK

AT+CREG=2

OK

+CREG: 3

AT+COPS=4,2,"46001"

+CREG: 3

+CREG: 2

+CREG: 1,"27A0","0DEB"

OK

AT+COPS?

+COPS: 1,2,"46001",2

OK

9.1.8 +CPOL, Preferred Operators

This command is used to edit the PLMN selector lists in the SIM card or active application in the UICC (GSM or USIM).

If no list has been previously selected, the EFPLMNwAcT - user controlled PLMN selector with Access Technology list, is the one accessed by default.

Command	Syntax	Response/Action	Remarks
Set	AT+CPOL=<index>[,<format>[,<oper>[,<GSM_AcT>,<GSM_Compact_AcT>,<UTRAN_AcT> ,<EUTRAN_AcT>]]]	OK or: +CME ERROR: <err>	Note: In case the index already exists in the list, the new entry will erase the old one and replace it in the list. The Modem may also update this list automatically when new networks are selected.
Read	AT+CPOL?	+CPOL: <index1>,<format>,<oper1> [,<GSM_AcT1>,<GSM_	

		Compact_AcT1>,<UTRAN_AcT1> ,<UTRAN_AcT1>][<CR><LF>+CPOL: <index2>,<format>,<oper2> [,<GSM_AcT2>,<GSM_Compact_AcT2>,<UTRAN_AcT2> ,<UTRAN_AcT1>] […]] OK or +CME ERROR: <err>	
Test	AT+CPOL=?	+CPOL: (list of supported<index>s),(list of supported<format>s) OK or: +CME ERROR: <err> * Index range is SIM dependent	The Test command displays the entire index range supported by the SIM.

The following table shows the +CPOL parameters.

<Parameter>	**Description**
<indexn>	Order number of network operator in the SIM preferred operator list
<format>	Defines the <oper> format: 0 Long alphanumeric format (up to 16 characters) (default) 1 Short alphanumeric format (up to 8 characters) 2 Numeric
<oper>	Name of the network operator string type; <format> indicates if the format is alphanumeric or numeric

	(see +COPS)
<GSM_AcTn>	GSM access technology 0 access technology not selected 1 access technology selected
<GSM_Compact_AcTn>	GSM compact access technology 0 access technology not selected 1 access technology selected
<UTRA_AcTn>	UTRA access technology 0 access technology not selected 1 access technology selected
<EUTRAN_AcT>	EUTRAN access technology 0 access technology not selected 1 access technology selected

Note1:

- If <index> is given but <oper> is left out, entry is deleted.
- If <oper> is given but <index> is left out, <oper> is put in the next free location.
- If only <format> is given, the format of the <oper> in the read command is changed.

Note2:

- User is prevented from editing index No. 0. This index is reserved for the HPLMN record and can not be modified.
- When entering a new item with an <index> to a full list, the Modem deletes the last item, stores the new item in the requested entry, and shifts the rest of the list down.
- When entering a new item without an <index> to a full list, the Modem replaces the last entry with the new item.

Note3: MT may also update the User controlled PLMN selector with Access Technology list - EFPLMNwAcT, automatically when new networks are selected.

Note4: The Operator controlled PLMN selector with Access Technology EFOPLMNwAcT and HPLMN selector with Access Technology - EFHPLMNwAcT can not be written since the access conditions is Administrative.

Note5: The command is implemented according to 3GPP TS 27.007 without acceptance in attention the <GSM_AcT2>, <GSM_Compact_AcT2>, <UTRAN_AcT2>] bits since the Modem device not using this bits to get the best PLMN.

Example:

```
AT+CPOL=?
+CPOL: (001-032),(000-002)
OK
AT+CPOL?
+CPOL: 000,002,"42501"
OK
AT+CPOL=,0
OK
AT+CPOL?
+CPOL: 000,000,"IL ORANGE"
OK
AT+CPOL=?
+CPOL: (001-032),(000-002)
OK
AT+CPOL=1,2,"42502"
OK
AT+CPOL?
+CPOL: 000,000,"IL ORANGE"
+CPOL: 001,000,"IL Cellcom"
OK
AT+CPOL=1
OK
AT+CPOL?
+CPOL: 000,000,"IL ORANGE"
OK
```

9.1.9 +XREG, Current Network Registration Status

This command reports where the device is attached to with respect to PS registration status only.

. Set command enables/disables network registration status unsolicited result code +XREG.

. Read command gives the status of registration for mode 2.

+XREG: <mode>,<State>[,<AcT>[,<Band>[,<lac>[,<ci>]]]]

. Read command will give following info for mode 3 (this is to maintain backward compatibility)

+XREG: <mode>,<State>[,<AcT>[,<Band>[,<lac>[,<ci>[,<rac>[,<reject type>[,<reject cause>]]]]]]]

. Test command returns list of supported <n>.

. URC is triggered when even there is a change in parameter. For <n> as 1, change in <AcT> & <Band> are not reported.

Command	Syntax	Response/Action	Remarks
Set	AT+XREG=<n>	OK or CME ERROR: <error>	Set command enables/disables network registration status unsolicited result code +XREG. URC same as read syntax.
Read	AT+XREG?	+XREG: <mode>,<State>[,<AcT>[,<Band>[,<lac>[,<ci>[,<rac>[,<reject type>[,<reject cause>]]]]]]] OK	Read command gives the status of registration.
Test	AT+XREG=?	+XREG: (list of supported <n>s) OK	Test command returns list of supported <n>.

The following table shows the +XREG parameters.

<Parameter>	Description
<n>	0 disable network registration attach status unsolicited result code 1 enable network registration attach status unsolicited result code +XREG: <State>[,<AcT>[,<Band>]] (<State> 2 is not reported) 2 enable network registration attach status unsolicited result code with lac, ci +XREG: <State>[,<AcT>[,<Band>[,<lac>[,<ci>]]]] 3 enable network registration attach status unsolicited result code with lac, ci, rac, reject type, reject cause +XREG: <State>[,<AcT>[,<Band>[,<lac>[,<ci>[,<rac>[,<reject type>[,<reject cause>]]]]]]]
<State>	0 Not registered, MT is not currently searching a new operator to register to 1 Registered, home network 2 Not registered, but ME is currently searching a new operator to register to 3 Registration denied 4 Unknown 5 Registered, roaming 6 Registered, SMS only 7 Registered for SMS only in roaming 8 PS emergency only Note: if <state> = 0,3,4 ... then <AcT>, <Band>, <lac>, <ci>, <rac> are omitted. 20 "FAST" OOS indication for STACK whose sim_id will be based on terminal. 21 For STACK back to In service. sim_id will be based on terminal. Note:

	<state> 20, 21 is available only in DSDS configuration. <state> 20 followed with <state> 0, then <state> 0 refer to "SLOW" OOS. <State> 20, 21 will be reported for both CS and PS registered network. Both <state> 20 and 21 will never be returned on response to XREG?. When in <state> 20. XCOPS returns network names as before. Any change in <Act>/<Band>/<lac>/<ci> will be reported when stack is back to In_Service.
<AcT>	0 GSM (might not be sent, reserved for compatibility) 1 GSM Compact (i.e., GPRS) 2 UTRAN 3 GSM w/EGPRS 4 UTRAN w/HSDPA 5 UTRAN w/HSUPA 6 UTRAN w/HSDPA and HSUPA (i.e., HSPA) 7 E-UTRAN (reserved for LTE) 8 UTRAN w/HSPA+ 9 UTRAN w/HSPA+ and DC-HSDPA I.e. if no PS available then URC will be +XREG: <state>,0,<band>,...
<Band>	900: selection of 900 MHz band 1800: selection of 1800 MHz band 1900: selection of 1900 MHz band 850: selection of 850 MHz band 450: selection of 450 MHz band 480: selection of 480 MHz band 750: selection of 750 MHz band 380: selection of 380 MHz band

	410: selection of 410 MHz band 710: selection of 710 MHz band 810: selection of 810 MHz band BAND_UMTS_I: BAND_UMTS_I BAND_UMTS_II: BAND_UMTS_II BAND_UMTS_III: BAND_UMTS_III BAND_UMTS_IV: BAND_UMTS_IV BAND_UMTS_V: BAND_UMTS_V BAND_UMTS_VI: BAND_UMTS_VI BAND_UMTS_VII: BAND_UMTS_VII BAND_UMTS_VIII: BAND_UMTS_VIII BAND_UMTS_IX: BAND_UMTS_IX BAND_UMTS_X: BAND_UMTS_X BAND_UMTS_XI: BAND_UMTS_XI BAND_UMTS_XII: BAND_UMTS_XII BAND_UMTS_XIII: BAND_UMTS_XIII BAND_UMTS_XIV: BAND_UMTS_XIV BAND_UMTS_XV: BAND_UMTS_XV BAND_UMTS_XVI: BAND_UMTS_XVI BAND_UMTS_XVII: BAND_UMTS_XVII BAND_UMTS_XVIII: BAND_UMTS_XVIII BAND_UMTS_XIX: BAND_UMTS_XIX BAND_UMTS_XX: BAND_UMTS_XX BAND_UMTS_XXI: BAND_UMTS_XXI BAND_UMTS_XXII: BAND_UMTS_XXII BAND_LTE_1 BAND_LTE_2

	BAND_LTE_3 BAND_LTE_4 BAND_LTE_5 BAND_LTE_6 BAND_LTE_7 BAND_LTE_8 BAND_LTE_9 BAND_LTE_10 BAND_LTE_11 BAND_LTE_12 BAND_LTE_13 BAND_LTE_14 BAND_LTE_15 BAND_LTE_16 BAND_LTE_17 BAND_LTE_18 BAND_LTE_19 BAND_LTE_20 BAND_LTE_21 BAND_LTE_22 BAND_LTE_23 BAND_LTE_24 BAND_LTE_25 BAND_LTE_33 BAND_LTE_34 BAND_LTE_35 BAND_LTE_36

	BAND_LTE_37 BAND_LTE_38 BAND_LTE_39 BAND_LTE_40 BAND_LTE_41 BAND_LTE_42 BAND_LTE_43
<lac>	string type; two byte location area code in hexadecimal format (e.g. "00C3")
<ci>	string type; four byte cell ID in hexadecimal format (e.g. "0000A13F")
<rac>	integer type; indicating routing area code
<reject type>	integer type; indicates the type of <reject_cause>. 0 Indicates that <reject_cause> contains an MM cause value, see 3GPP TS 24.008 [8] Annex G. 1 Indicates that <reject_cause> contains a manufacturer specific cause
<reject cause>	integer type; contains the cause of the failed registration. The value is of type as defined by <cause_type>

Note:

1. <state> 20, 21 is available only in DSDS configuration. <state> 20 followed with<state> 0, then <state> 0 refer to "SLOW" OOS.

2. <State> 20, 21 will be reported for both CS and PS registered network.

3. Both <state> 20 and 21 will never be returned on response to XREG?.

4. When in <state> 20. XCOPS returns network names as before.

5. Any change in <State/act>/<Band> will be reported when stack is back to In_Service.

9.1.10 +GTUMODE, URAT mode switch

This command forces the selection of the URAT in the protocol stack. On a later network registration (+COPS, +CGATT) this URAT is used.

This command is available for phones supporting TDS and UMTS Mode.

In case of TDS / UMTS Dual-Mode is selected additionally a preferred URAT can be configured, which is stored in NVRAM selecting which URAT shall be attached first.

Set command is used to set URAT and preferred URAT value used for further network registration.

Read command returns the previously set of <Act> and <mode> values.

Test command returns the range of supported <Act> values.

Command	Syntax	Response/Action	Remarks
Set	AT+GTUMODE=<AcT>[,<mode>]	OK or CME ERROR: <error>	Note: 1.the<AcT> value can not set the previous value. 2. Set as need to restart to take effect.
Read	AT+GTUMODE?	+GTUMODE : <Act>[,<mode>] OK	
Test	AT+GTUMODE=?	+GTUMODE: (0,1,2) OK	

Define values

<Act>indicates the URAT and may be

0 UTMS(WCDMA) mode

1 TD-SCDMA mode

2 Automatic mode

<mode> indicates the preferred URAT mode when <Act> is ‘Automatic mode’.

0 UMTS(WCDMA)mode

9.1.11 +XACT, Set Rat and Band

This command allows to switch between all the allowed RATs and BANDs for air interface access.

Set command is used to set up RAT and BAND

Read command returns the present RAT and BAND used.

Test command returns list of supported RAT and BAND used.

Command	Syntax	Response/Action	Remarks
Set	AT+XACT=[<rat>[,[PreferredAct1>],[<PreferredAct2>][,<band_1>[,<band_2>[,…….[,<band_n>]]]]]	OK or CME ERROR: <error>	
Read	AT+XACT?	+XACT : [<rat>[,[PreferredAct1>],[<PreferredAct2>][,<band_1>[,<band_2>[,…….[,<band_n>]]]]] OK	.
Test	AT+XACT=?	+XACT: (0-6),(0-2),0,900,1800,1,8,201,206,101,103,105,107,108,120,138,139,140,141 OK	

<Rat>

0: GSM (default - only when band parameter is not specified otherwise set to No change in <Rat>)

1: UMTS

2: LTE

3: (GSM, UMTS) (DUAL), GSM and UMTS are supported and preference is given to PreferredAct1

4: (UMTS, LTE) (DUAL), UMTS and LTE are supported and preference is given to PreferredAct1

5: (LTE, GSM) (DUAL), LTE and GSM are supported and preference is given to Preferred Act1

6: (GSM, UMTS, LTE) (TRIPLE), GSM, UMTS and LTE will be selected and first preference and second preference is given to PreferredAct1 and PreferredAct2 respectively

< PreferredAct1 >,< PreferredAct2>

Only valid for DUAL or TRIPLE Mode

0: GSM

1: UMTS

2: LTE

<Band_1>,<Band_2>....<Band_n>

0:Automatic band selection for the <rat> as mentioned in the command. If no value is mentioned for <rat> then automatic band selection is sent for all the RAT's.

<gsm_band>:

900: selection of 900 MHz band

1800: selection of 1800 MHz band

1900: selection of 1900 MHz band

850: selection of 850 MHz band

450: selection of 450 MHz band

480: selection of 480 MHz band

750: selection of 750 MHz band

380: selection of 380 MHz band

410: selection of 410 MHz band

710: selection of 710 MHz band

810: selection of 810 MHz band

<umts_band>:

1: BAND_UMTS_I

2: BAND_UMTS_II

3: BAND_UMTS_III

4: BAND_UMTS_IV

5: BAND_UMTS_V

6: BAND_UMTS_VI

7: BAND_UMTS_VII

8: BAND_UMTS_VIII

9: BAND_UMTS_IX

10: BAND_UMTS_X

11: BAND_UMTS_XI

12: BAND_UMTS_XII

13: BAND_UMTS_XIII

14: BAND_UMTS_XIV

15: BAND_UMTS_XV

16: BAND_UMTS_XVI

17: BAND_UMTS_XVII

18: BAND_UMTS_XVIII

19: BAND_UMTS_XIX

20: BAND_UMTS_XX

21: BAND_UMTS_XXI

22: BAND_UMTS_XXII

25: BAND_UMTS_XXV

<umts_tdd_band>:

201: BAND_UMTS_TDD_A

202: BAND_UMTS_TDD_B

203: BAND_UMTS_TDD_C

204: BAND_UMTS_TDD_D

205: BAND_UMTS_TDD_E

206: BAND_UMTS_TDD_F

<lte_band>:

101: BAND_LTE_1

102: BAND_LTE_2

103: BAND_LTE_3

104: BAND_LTE_4

105: BAND_LTE_5

106: BAND_LTE_6

107: BAND_LTE_7

108: BAND_LTE_8

109: BAND_LTE_9

110: BAND_LTE_10

111: BAND_LTE_11

112: BAND_LTE_12

113: BAND_LTE_13

114: BAND_LTE_14

115: BAND_LTE_15

116: BAND_LTE_16

117: BAND_LTE_17

118: BAND_LTE_18

119: BAND_LTE_19

120: BAND_LTE_20

121: BAND_LTE_21

122: BAND_LTE_22

123: BAND_LTE_23

124: BAND_LTE_24

125: BAND_LTE_25

126: BAND_LTE_26

127: BAND_LTE_27

128: BAND_LTE_28

129: BAND_LTE_29

130: BAND_LTE_30

131: BAND_LTE_31

132: BAND_LTE_32

133: BAND_LTE_33

134: BAND_LTE_34

135: BAND_LTE_35

136: BAND_LTE_36

137: BAND_LTE_37

138: BAND_LTE_38

139: BAND_LTE_39

140: BAND_LTE_40

141: BAND_LTE_41

142: BAND_LTE_42

143: BAND_LTE_43

144: BAND_LTE_44

145: BAND_LTE_45

146: BAND_LTE_46

147: BAND_LTE_47

148: BAND_LTE_48

149: BAND_LTE_49

150: BAND_LTE_50

151: BAND_LTE_51

152: BAND_LTE_52

153: BAND_LTE_53

154: BAND_LTE_54

155: BAND_LTE_55

156: BAND_LTE_56

157: BAND_LTE_57

158: BAND_LTE_58

159: BAND_LTE_59

160: BAND_LTE_60

161: BAND_LTE_61

162: BAND_LTE_62

163: BAND_LTE_63

164: BAND_LTE_64

9.1.12 +GTRAT, Selection of Radio Access Technology

This command forces the selection of the Radio Access Technology (RAT) in the protocol stack. On a later network registration (+COPS, +CGATT) this RAT is used.

This command is available for phones supporting Dual Mode/Triple Mode.

In case of GSM / UMTS, GSM/LTE or UMTS/LTE Dual-Mode is selected additionally a preferred RAT can be configured, which is stored in NVRAM selecting which RAT shall be attached first.

In case of GSM/UMTS/LTE Triple Mode is selected, additionally a first preferred RAT and a second preferred RAT can be configured to set the searching order of available RATs.

- Set command is used to set RAT and preferred RAT value used for further network registration (at+cops=0).
- Read command returns the previously set of <Act> and <PreferredAct> values.
- Test command returns the range of supported <Act> and <PreferredAct> values.

Command	Syntax	Response/Action	Remarks

Set	AT+GTRAT=<AcT> [, <PreferredAct1>[, <PreferredAct2>]]	OK or CME ERROR: <error>	
Read	AT+GTRAT?	+GTRAT : <Act>[,<PreferredAct1>[,<PreferredAct2>]] OK	.
Test	AT+GTRAT=?	+GTRAT: (0-6)[,(0,2,3)[,(0,2,3)]] OK	Note: i.e. list of supported <Act>s and list supported <PreferredAct>s

Defined values

<AcT> indicates the radio access technology and may be

0 GSM single mode

1 GSM / UMTS Dual mode

2 UTRAN (UMTS)

3 LTE single mode

4 LTE / UMTS Dual Mode

5 LTE / GSM Dual Mode

6 LTE / UMTS/ GSM Triple Mode

< PreferredAct1 > This parameter is used for network registration in case of <AcT>=1,4,5

0 RAT GSM

2 RAT UMTS

3 RAT LTE

< PreferredAct2 > This parameter is used for network registration in case of <AcT>=6

0 RAT GSM

2 RAT UMTS

3 RAT LTE

Examples:

To set Triple mode with LTE as the first preferred RAT and UMTS as the second preferred RAT

AT+GTRAT=6,3,2

OK

To set Dual mode with LTE as the first preferred RAT and UMTS as the second preferred RAT

AT+GTRAT=5,3

OK

To query the current setting of RAT

AT+GTRAT?

+GTRAT: 5,3

OK

9.2 Other Parameter Commands

9.2.1 +CBC, Battery Charger Connection

This command is used for user to query the battery voltage level.

Command	Syntax	Response/Action
set	+CBC	+CBC: <bcs>,<bcl> OK

The following table shows the +CBC parameters.

<Parameter>	Description
<bcs>	0 MT is powered by the battery (default) 1 MT has a battery connected, but is not powered by it (NA on L810-GL, L830-GL) 2 MT does not have a battery connected (NA on L810-GL, L830-GL) 3 Recognized power fault, calls inhibited (NA on L810-GL, L830-GL)
<bcl>	voltage in mV

Example:

AT+CBC
+CBC: 0,3904

OK

9.2.2 +CFUN, Shut Down Phone Functionality

This command shuts down the phone functionality of smart phones and PDAs with phone capabilities in order to prevent interference from a nearby environment. This enables other functionality to be used continuosly in environments where phone use is either impractical or not permitted. For example, on

airplanes the use of cellular phones is forbidden during the entire flight, but the use of computers is allowed during much of the flight. This command enables other functionality to continue while preventing use of phone functionality.

Command	Syntax	Response/Action	Remarks
Set	+CFUN=<fun>	OK +CME ERROR: <err>	The Set command selects the level of functionality <fun> in the smart phone or PDA incorporating Modem.
Read	+CFUN?	+CFUN: <power mode>, <STK_mode> OK	The Read command displays the current level of functionality.
Test	+CFUN=?	+CFUN: (list of supported <fun>s) OK	The Test command displays the list of supported functionality settings.

The following table shows the AT+CFUN parameters.

<Parameter>	Description
<fun>	Functionality levels: 0 Turn off (With logging out network). 1 Full functionality meaning start up MS(from offline mode) 4 Disables phone transmit & receive RF circuits – Flight mode. 6 Enables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card. 7 Disables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card.

	8 Disable fetching of proactive commands by SIM-APPL from the SIM-card. 15 Hardware reset. (Need power cycle the module) 16 MT and SIM RESET
<power mode>	1 MS is switched on 2 Invalid mode 4 Flight mode
<STK_mode>	0 Inactive state 6 Enables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card. 7 Disables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card. 8 Disable fetching of proactive commands by SIM-APPL from the SIM-card.

Example:

```
AT+CFUN=?
+CFUN: (0,1,4,6,7,8,15,16)
OK
AT+CFUN?
+CFUN: 1,0
OK
AT+CFUN=4          //Disable phone transmit and receive RF circuits
OK
AT+CFUN?
+CFUN: 4
Power cycling…
AT+CFUN?
+CFUN: 4,0
AT+COPS?
+COPS: 2
OK
```

```
AT+CFUN=1        // Enable phone transmit and receive RF circuits through '1' OK
OK
AT+CFUN?
+CFUN: 1,0
OK
AT+COPS?
+COPS: 0,0,"CHINA MOBILE"
OK
```

9.2.3 +CPWROFF Switch off MS

This command allows to switches off the Modem (shutdown the system).

Command	Syntax	Response/Action	Remarks
Set	AT+CPWROFF	OK or +CME ERROR: <error>	Shutdown the system
Test	AT+CPWROFF=?	OK	

9.2.4 +MMAD, Query and Monitor ADC Value

This command intends to query and monitor ADC value. Modem supports 1-2 ADC channel converter. This command returns the current ADC values for the requested channel. The values received from the first converter represent the DC voltage levels of the input pin.

The returned value is a multiplication of the input level by 1000 (e.g. input level of 0.56V will return 560).

Note: L810-GL, L830-GL, supports only 1 ADC channel

Command	Syntax	Response/Action	Remarks
Execute	AT+MMAD	+MMAD: <Converter_number>,<Converted_Value> OK	

		Or: +CME ERROR: <err>	
Read	AT+MMAD?		Same as AT+MMAD

The following table shows the +MMAD parameters.

<Parameter>	Description
<Converter Number>	1-2 Select the A2D converter.
<Converted Value>	A decimal value represents the returned digital value. The input level multiplied by 1000.

Example:

```
AT+MMAD
+MMAD: 1,500    // 500mV, must less than 1000
OK
```

9.2.5 +MTSM, Temperature Sensor Measurement

This command measures the current temperature sensor value in Celsius degrees.

This temperature is taken from a Thermistor internally.

All the parameters restore to default values when Modem restart.

All the parameter default value is 0.

Note: In case that AT parameters are set and executed, and a reset or a power-cycle occurs, the Modem continues with the execution of the AT command using the saved parameters, until the user changes the settings.

Command	Syntax	Response/Action	Remarks
Set	+MTSM=<Report>[,<Rate>][,<Low>,<High>]	For <Report>=0 OK For <Report>=1	Read the temperature.

		+MTSM: <Temp> OK For <Report>=2 or 3 OK +MTSM: <Temp> … +MTSM: <Temp> or: ERROR	
Read	+MTSM?	+MTSM=<Report>,<Rate>,<Low>,<High> OK	Read the setting parameters.
Test	+MTSM=?	+MTSM: (range of <Report>),(range of <Rate>),(range of <Low>/<High>) OK	

The following table shows the +MTSM parameters.

<Parameter>	**Description**
<Temp>	-40 - 125; Temperature measurements in Celsius degrees.
<Report>	0: Deactivate unsolicited report. 1: Report once the current temperature. 2: Activate unsolicited report. 3: Activate unsolicited report only for out-off boundaries events. 6: Report the temperature of BBIC

	7: Report the temperature of RF 8: Report the temperature of PCB(Not support yet) 9: Report the temperature of BAT
<Rate>	1-255; Select the time interval in seconds between the unsolicited reports. (Default value = 1 Second).
<Low>	(-)–0 - 125; The lowest boundary level of the temperature value for unsolicited report. (Default value = 0 Celsius). Setting corresponding <Low> and <High> temperature boundaries for <Report>=3 only.
<High>	(-)–0 - 125; The Highest boundary level of the temperature value for unsolicited report. (Default value = 0 Celsius). Setting corresponding <Low> and <High> temperature boundaries for <Report>=3 only.

Example:

```
AT+MTSM=?       // Test the range of the parameters.
+MTSM: (0-3,6-9),(1-255),(-40-125)
OK

AT+MTSM=1       // Set to read for once the current temperature measurement.
+MTSM: 35       // Current temperature is +35 Celsius degree.
OK

AT+MTSM=2,5     // Set to unsolicited temperature reports to TE for every 5 seconds.
OK
+MTSM: -10      // Current temperature measure report -10 Celsius.
+MTSM: -5       // Unsolicited temperature report -5 Celsius after 5 seconds.
+MTSM: 7    // Unsolicited temperature measure report +7 Celsius after 10 seconds.
+MTSM: 20   // Unsolicited temperature measure report +20 Celsius after 15 seconds.
```

…

+MTSM: 50 // Unsolicited temperature measure report +50 Celsius after Nx5 seconds.

AT+MTSM=0 // Set to stop the unsolicited report.

OK

AT+MTSM=3,30,-10,40 // Set to out-off boundary (-10 to +40 Celsius) unsolicited reports for every 30 seconds.

OK

+MTSM: -20 // Unsolicited current report out-off the Low boundary.

+MTSM: -12 // Unsolicited report out-off the Low boundary after 30 seconds.

+MTSM: 47 // Unsolicited report out-off the High boundary after Nx30 seconds

AT+MTSM? // Read the current setting.

+MTSM: 3,30,-10,40

OK

AT+MTSM=0 // Set to stop the unsolicited report.

OK

AT+MTSM? // Read the current setting.

+MTSM: 0

OK

9.2.6 +MSMPD, Enable/Disable SIM card hot plug

This command can Enable/Disable SIM card hot plug feature. The default status is disable this feature. The parameter will be saved in NVM and can restore at power cycle.

Command	Syntax	Response/Action	Remarks
Set	AT+MSMPD=< status>	OK Or: +CME ERROR: <err>	Enable/Dis-enable SIM card hot plug
Read	AT+MSMPD?	+MSMPD: <status>	Read the current status

		OK	

The following table shows the +MSMPD parameters.

<Parameter>	Description
<status>	0: Disable the SIM card hot plug feature 1: Enable the SIM card hot plug feature The default value is 1

9.2.7 +GPIO, Set and Read GPIO

This command intends to configure supported GPIO pins and gets value from input pin. Modem support 11 GPIO pins. All these pins can be set to output and input mode. The default configuration is input, but it's better to set direction before use. The high voltage level is 1.8V.

Please read product hardware user manual for detail PIN definition.

Command	Syntax	Response/Action	Remarks
Set	AT+GPIO=<pin>,<direct>,<value>	OK Or: +CME ERROR: <err>	Used to set direction and output value.
Read	AT+GPIO?	+GPIO: <pin>,<direct>,<value> OK Or ERROR	Return all the pin state here.
Test	AT+GPIO=?	+GPIO: <pin>,<direct>,<value> OK or ERROR	Return supported values

The following table shows the +GPIO parameters.

<Parameter>	Description
<pin>	(0,1,4-6,9,10,12-22,29-33,36,40,42-44,52,55-59,70-73,118-120,123,150-152) The value is pin number on module.
<direct>	0: Input 1: Output 2: Query output value of the single pin
<value>	0: Low level 1: High level

Example:

```
AT+GPIO=23,1,1
OK
AT+GPIO?
+GPIO:
23,0,1
52,0,1
……      //Leave out some value here
107,0,0
108,0,0
OK
AT+GPIO=23,2
+GPIO: 1
OK
AT+GPIO=?
+GPIO:(0,1,4-6,9,10,12-22,29-33,36,40,42-44,52,55-59,70-73,118-120,123,150-152) ,(0-2),(0,1)
OK
```

9.2.8 +GTWAKE,Open or close wake host

This command is used to set wake up host function to on or off.

PIN23(PIN# A7 on HW manual) is used to wake up host, The default is High voltage (1.8V). When the wake up host function is enabled, if voice call, SMS, or data packet is coming, PIN23(PIN# A7 on HW manual) will output 1s low voltage.

Command	Syntax	Response/Action	Remarks
Set	AT+GTWAKE=<mode>	OK or ERROR	Parameters are saved after power down.
Read	AT+GTWAKE?	+GTWAKE: <mode> E.g. +GTWAKE: 0 OK or +GTWAKE: 1 OK	
Test	AT+GTWAKE=?	+GTWAKE: (0-1) OK	

The following table shows +GTWAKE parameter description:

<Parameter>	Description
<mode>	0 :wake host is disable. 1 :wake host is enable.

Example:

```
AT+GTWAKE=1
OK
AT+GTWAKE?
+GTWAKE: 1
OK
AT+GTWAKE=?
+GTWAKE: (0-1)

OK
```

9.3 Multiplexer Feature

The MUX provides multiple logical communication channels between the DTE and Modem over one physical RS232 or USB connection. This service enables the DTE device to run multiple applications (such as GPRS, CSD, SMS and voice calls) while communicating simultaneously with the Modem.

The Modem can support the multiplexing protocol control channel as defined in GSM07.10 and only basic mode.

9.3.1 +CMUX, MUX Start up Command

This command is used to start the GSM MUX multiplexing protocol stack. When the Modem received a valid +CMUX command, it returns OK and changes its state to MUX-Init. If the parameters are left out, the default value is used.

Command	Syntax	Response/Action	Remarks
Set	+CMUX=<mode>[,<subset>[,<port_speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]]	+CME ERROR: <err>	The Set command requests the Modem to open the MUX stack with various parameters. This command works only in PREMUX state.
Read	+CMUX?	+CMUX: <mode>, [<subset>], <port_speed>,<N1>, <T1>, <N2>, <T2>, <T3>,<K>+CME ERROR: <err>	The Read command displays the current mode and settings. This command works only in MUX state.
Test	+CMUX=?	+CMUX: (list of supported <mode>s),(list of supported<subset>s), (list of supported	The Test Command displays a list of supported modes and parameters. This command works in

		<port_speed>s),(list of supported <N1>s),(list of supported <T1>s),(list of supported <N2>s),(list of supported <T2>s),(list of supported <T3>s),(list of supported <k>s)	both PREMUX and MUX states.

The following table shows the +CMUX parameters.

<Parameter>	**Description**
<mode>	MUX mode:
	0 Basic
<subset>	Defines how the MUX control channel is set up. The virtual channel is set up according to this setting. 0 UIH frames used only
<port_speed>	1 9600 bit/sec 2 19200 bit/sec 3 38400 bit/sec 4 57600 bit/sec 5 115200 bit/sec(default) 6 230400 bit/sec 7 1 M bit/s
<N1>	Maximum frame size: 1—1509; The default value is 31 in Basic mode.

<T1>	Acknowledgement timer (in units of 10 ms). 1-255 The default value is 10 (100 ms)
<N2>	Maximum number of re-transmissions. 0-5 The default value is 3.
<T2>	Response timer for the DLC0 (in unit of 10 ms). <T2> must be longer than <T1>. 2-255 The default value is 30 (300 ms).
<T3>	Wake up response timer (in seconds). 1-255 The default value is 10.
<k>	Reserve for Advanced operation with Error Recovery options.

10 Hardware Information

10.1 UART Parameter Commands

10.1.1 Fixed DTE Rate +IPR

This command specifies the data rate at which the DCE will accept commands. The full range of data rate values may be reduced dependent on HW or other criteria.

Execution command sets baud rate of i/o port

Read command returns the current settings of the i/o baud rate

Test command returns list of supported baud rates.

Command	Syntax	Response/Action
Set	AT+IPR=<baud_rate>	OK or: +CME ERROR: <err>
Read	AT+IPR?	+IPR: <baud_rate> OK
Test	AT+IPR=?	+IPR: (list of supported auto detectable<baud_rate> values)[,(list of fixed only <baud_rate> values)] OK

The following table shows the parameters of command +IPR:

<Parameter>	Description
<baud_rate>	may be 0 meaning auto bauding or 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600,115200 (default),230400, 460800, 500000, 750000, 921600, 1843200, 3250000, 6000000 bps.

	Maybe not all listed rates are available because they depend on the target.

Example:

AT+IPR?

+IPR: 115200

OK

AT+IPR=?

+IPR: (300, 1200, 2400, 4800, 9600, 19200, 38400, 57600,115200,230400, 460800, 500000, 750000, 921600, 1843200, 3250000, 6000000),()

OK

10.1.2 +CBAUD, Baud Rate Regulation

This command sets the uniquely UART baud rate. The baud rate of L810/L830 will be change/set to the request value <rate> which is get from the command.

Specifying a value of 0 ,1 or 9 allows operation only at rates automatically detectable by L810/L830. The specified rate takes effect following the issuing of any result code(s) associated with the current command line.

In auto baud, must sent an AT command to L810/L830 firstly. After sent any AT command, the module will lock on single baud rate (this AT command will be lost and can not get response from L810/L830). Read command can feedback the currently baud rate.

The module can not be changed to auto baud without send AT+CBAUD=0 ,1 or 9 command or after power cycle. L810/L830 auto baud rate detect supports the next baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400.

The parameter can’t be saved after power up.

Command	Syntax	Response/Action
Set	+CBAUD=<n> +CBAUD=<rate>	OK or: +CME ERROR: <err>
Read	+CBAUD?	+CBAUD: <rate> OK
Test	+CBAUD=?	+CBAUD: (list of supported <n>s, list of supported <rate>s)

		OK

The following table shows the +CBAUD parameters.

<Parameter>	Description	
<n> <rate>	0	Auto baud rate
	1	Auto baud rate
	2	300
	3	1200
	4	2400
	5	4800
	6	9600
	7	19200
	8	38400
	9	Auto baud rate
	10	57600
	11	115200
	12	230400
	13	460800
	14	921600
	The default value is 115200.	

10.1.3 &D, Circuit 108 Behavior

This command determines how the Module responds when the DTR (Data Terminal Ready) status is changed from ON to OFF during the online data state. The DTR is an input line that indicates that the

terminal is ready.

The DTR line must be active (low) in order for the Module to recognize the terminal. This signal is raised by the terminal when a process activates the serial port. If the DTR is not used by the application, it should connect this line to ground (DTR active). The default value is active (low).

In case of local link during initial PPP retries, DTR change will be ignored.

Command	Syntax	Response/Action
Set	AT&D<param>	OK
Read	AT&D?	&D: <param>
Test	AT&D=?	&D: (list of supported <param>s)

The following table shows the &D parameters.

<Parameter>	Description
<param>	The Module's reaction when the DTR status is changed from ON to OFF. In ODM: 0,4 Ignores DTR changes 1 Switches the ODM to asynchronous command mode (the ODM remains connected) 2,3 Disconnects the ODM and returns to the command mode In GPRS calls: 0,4 Ignores DTR changes 1 Switches the GPRS session to asynchronous command mode (the session remains connected) 2,3 Deactivates the GPRS and returns to command mode In MUX and MUX_INIT state: 0-3 Ignores DTE changes 4 Drops the MUX application and returns to PRE_MUX state The default value is 1.

11 Audio

11.1Scope

This section describes the Audio features, which includes the following configuration items:

Path: Selection of microphone and speaker to be used.

Gain: Control of volume levels for rings, voice, etc.

Algorithm: Activation of audio algorithms (echo cancellation, noise suppression and sidetone).

Audio Control of Path, Gain and Algorithms is available by these two different modes sets of commands. It is advised to select the audio mode according to the application needs.

11.2General Audio Commands

The following audio commands can be used in audio modes: +VTD, +VTS, +CALM,+MMICG

11.2.1 +CMUT, Mute/Unmute Microphone and Speaker Path

This command is used to mute/unmute the currently active Microphone and Speaker path by overriding the current mute state. The CMUT setting should take effect only for the current call or for the next call once the command setting was typed in idle mode.

Command	Syntax	Response/Action	Remarks
Set	+CMUT=<state>	OK or: +CME ERROR: <err>	The Set command enables/disables uplink and downlink voice muting during a voice call.
Read	+CMUT?	+CMUT: <state> OK	The Read command returns the current uplink and downlink voice mute/unmute state.
Test	+CMUT=?	+CMUT: (list of supported <state>s) OK	The Test command returns the possible <state> values.

The following table shows the +CMUT parameters.

<Parameter>	Description
<state>	0 Unmute microphone and speaker path (default) 1 Mute microphone path, Unmute speaker path 2 Unmute microphone, mute speaker path 3 Mute microphone path, mute speaker path

Example:

```
AT+CMUT=?
+CMUT:(0-3)
OK
AT+CMUT?
+CMUT: 0          //uplink voice is unmuted
OK
AT+CMUT=1              //uplink voice is muted
OK
AT+CMUT?
+CMUT: 1
OK
AT+CMUT=4
+CME ERROR: <err>
```

11.2.2 +VTD, Tone Duration

This command handles the selection of tone duration. An integer <n> defines the length of tones emitted as a result of the +VTS command. This command does not affect the D (dial) command. In this command, the new value is saved after power down.

Note: In GSM, the tone duration value can be modified depending on the specific network.

Command	Syntax	Response/Action	Remarks
Set	+VTD=<n>	OK or: +CME ERROR: <err>	The Set command sets the tone duration.
Read	+VTD?	+VTD: <n> OK	The Read command displays the current tone duration.

Test	+VTD=?	+VTD: (list of supported <n>s) OK	The Test command displays the list of supported tone duration.

The following table shows the +VTD parameters.

<Parameter>	Description
<n>	Defines the length of tones emitted by the +VTS command. 1-10 100mS to 1S adjustable.

11.2.3 +VTS, Command-Specific Tone Duration

This command transmits a string of DTMF tones when a voice call is active. DTMF tones may be used, for example, when announcing the start of a recording period.

The duration does not erase the VTD duration

Note: In GSM, the tone duration value can be modified depending on the specific network.

If the active call is dropped in the middle of playing a DTMF tone, the following unsolicited message transfers to TE: +VTS: "Call termination stopped DTMF tones transmission".

Command	Syntax	Response/Action	Remarks
Set	+VTS=<DTMF>[,<duration>]	OK or: +CME ERROR: <err>	The Set command sets the tone and duration (if entered).
Test	+VTS=?	+VTS: (list of supported <DTMF>,(list of supported <durations>s) OK	The Test command displays the list of supported DTMF tones and tone lengths.

The following table shows the +VTS parameters.

<Parameter>	Description
<DTMF>	String of ASCII characters (0-9, #, *)

	String length is up to 32 characters long.
<duration>	A DTMF tone of different duration from that set by the +VTD command. 1-10 100mS to 1S adjustable..

Note: The duration defined by +VTS is specific to the DTMF string in this command only. It does not erase the duration defined by the +VTD command, and is erased when the Modem is powered down.If <duration> is not defined, the +VTD value is used.

11.3Clock Configuration

11.3.1 +CLK32k, 32KHz Clock Output From CLK32K

This command is used for controlling the 32KHz clock output from CLK32K, and by default, the clock is switched off.

Command	Syntax	Response/Action	Remarks
Set	AT+CLK32K=<n>	OK or: +CME ERROR: <err>	Switch on/off 32KHz clock output from PIN CLK32K
Read	AT+CLK32K?	+ CLK32K: <n> OK	Query the current status of PIN CLK32K
Test	AT+CLK32K=?	+CLK32K: (list of supported <n>s) OK	Query the range of the parameters

The following table shows the +CLK32K parameters:

<Parameter>	Description
<n>	0: switch off the clock, default value. 1: switch on the clock

12 GPRS

12.1 GPRS Functionality

GSM 07.07 defines commands that a TE may use to control a GPRS ME via a non-multiplexed character-stream interface. This places certain limitations on the functionality of the interface. For example, it is not possible for the ME to send control information to the TE or for the TE to send commands to the ME whilst the interface is in the online data state, unless the layer 2 protocol itself supports this feature (GSM 07.60-12). However, Modem-specific escape mechanism (DTR) is provided to enable the TE to switch the Modem into limited online command state.

The use of a multiplexed interface, (GSM 07.10), is not considered here (See “Multiplexer Feature”). The Modem-specific escape mechanism use DTR as an escape signal (following &D parameters) and designed for limited non network related commands. This specific mechanism purpose is to give the user a way to retrieve the signal strength. The time limit of consecutive DTR toggles is a minimum of 90 seconds. The Modem-specific is not designed to support online command and data states both at the same time, therefore any wrong or extreme usage can cause unexpected behaviors. The basic GPRS concept is be “always connected” and there is no charge for being connected (only per real data transferred).

12.2 GPRS Commands

This section defines commands that a terminal may use to control a GPRS ME. GPRS MTs vary widely in functionality. A class A ME might support multiple PDP-types as well as circuit-switched data, and use multiple external networks QoS profiles. At the other extreme, a class C ME might support only a single PDP-type using a single external network, and rely on the HLR to contain the PDP context definition. A comprehensive set of GPRS-specific commands is defined below to provide the flexibility needed by the more complex ME. The commands are designed to be expandable to accommodate new PDP types and interface protocols, merely by defining new values for many of the parameters. Multiple contexts may be activated if the interface link-layer protocol is able to support them. The commands use the extended information and error message capabilities described in this specification. For MTs of intermediate complexity, most commands have simplified forms where certain parameters may be omitted. For the simplest MTs, and for backwards compatibility with existing communications software, it is possible to control access to the GPRS using existing modem-compatible commands. This "modem compatible" mode of operation is described below.

12.2.1 +CGCLASS, GPRS Mobile Station Class

This command is used to set the Modem to operate according to the specified GPRS mobile class.

If the requested class is not supported, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

Command	Syntax	Response/Action	Remarks
Set	AT +CGCLASS=<class>	OK or: +CME ERROR: <err>	Set command is used to set the MT to operate according the specified mode of operation
Read	AT +CGCLASS?	+CGCLASS: <class> OK	The Read command returns the current GPRS mobile class.
Test	AT +CGCLASS=?	+CGCLASS: (list of supported <class>s) OK	The Test command is used for requesting information on the supported GPRS mobile classes.

Note: Issuing GPRS actions over a poor-quality connection may cause protocol errors and harm data validity. To prevent these problems, Modem is equipped with a protection mechanism that confirms GPRS signal strength before issuing GPRS network-related commands.

The following table shows the +CGCLASS parameters.

<Parameter>	Description
<class>	String parameter that indicates the GPRS mobile class: A class A // only supported if UMTS_SUPPORT is enabled B meaning mobile class B CC class C in GPRS mode CG class C in circuit switched mode

Example:

AT+CGCLASS=?

+CGCLASS: (“A”,“B”,”CC”,”CG”)

OK

Note: If a SIM card without GPRS allowance is used:

AT+CGCLASS=?

+CGCLASS: (CC) //Note that CC is a not supported value.

12.2.2 +CGDCONT, Define PDP Context

This command specifies the PDP (Packet Data Protocol) context.

This command allows specifying specific PDP context parameter values for a PDP context, identified by the local context identification parameter <cid>.

If the command is used only with the one parameter <cid>, it means that the corresponding PDP context becomes undefined.

Command	Syntax	Response/Action	Remarks
Set	AT+CGDCONT=[<cid> [,<PDP_type> [,<APN> [,<PDP_addr>[,<d_comp> [,<h_comp>>[,<IPv4AddrAlloc>[,<emergency_indication>[,<PCSCF_discovery>[,<IM_CN_Signaling_Flag_Ind>]]]]]]]]] OK Or ERROR	OK or: +CME ERROR: <err>	The Set command specifies the context identification parameter values for a PDP context. A special form of the Set command, +CGDCONT=<cid> causes the values for context number <cid> to become undefined.
Read	AT+CGDCONT?	+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,	The read command returns the current settings for each defined context.

		<d_comp>, <h_comp>[,<IPv4AddrAlloc>[,<emergency_indication>[,<PCSCF_discovery>[,<IM_CN_Signaling_Flag_Ind>]]]] OK	It will be read only “OK” without any set command.
Test	AT+CGDCONT=?	+CGDCONT: (range of supported <cid>s),<PDP_type>,,,(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 <PCSCF_discovery>s),(list of supported <IM_CN_Signaling_Flag_Ind>s)[<CR><LF>+CGDCONT: (range of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s)),(list of supported<IPv4AddrAlloc>s),(list of	The Test command returns the values supported as a compound value. If the ME supports several PDP types, <PDP_type>, the parameter value ranges for each <PDP_type> are returned on a separate line.

		supported<emergency _indication>s),(list of supported <PCSCF_discovery>s) ,(list of supported <IM_CN_Signaling_Flag_Ind>s)[...]] OK	

The following table shows the +CGDCONT parameters.

<Parameter>	Description
<cid>	Numeric parameter specifying a particular PDP context definition (PDP Context Identifier). The parameter is local to the Terminal-Mobile Terminal interface and is used in other PDP context-related commands. The value is from 1 to 20
<"PDP_type"> (Packet data protocol type)	String parameter (in quotation marks) specifying the type of packet data protocol: IP IP Internet Protocol (IETF STD 5) IPV6 Internet Protocol, version 6 (IETF RFC 2460) IPV4V6 Virtual<PDP_type>introduced to handle dual IP stack capability Note: The<PDP_type>is IPV6 and IPV4V6 are supported only is the feature FEAT_IPV6 support is enabled
<"APN"> (Access Point Name)	String parameter (in quotation marks), which is a logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, the subscription value is requested.
<"PDP_address">	String parameter (in quotation marks), which identifies the ME in the address space applicable to the PDP.

	If the value is null or omitted, a value may be provided by the terminal during the PDP start up procedure or, failing that, a dynamic address is requested. The Read form of the command continues to return the null string even if an address has been allocated during the PDP start up procedure. The allocated address may be read using the +CGPADDR command. The default value is 0.
<d_comp>	Numeric parameter that controls PDP data compression. 0 off (default if value is omitted) 1 on (manufacturer preferred compression) 2 V.42 bis Other values are reserved. The default value is 0.
<h_comp>	a numeric parameter that controls PDP header compression 0 off (default if value is omitted) 1 on (manufacturer preferred compression) 2 RFC1144 (applicable for SNDCP only) 3 RFC2507 4 RFC3095 (applicable for PDCP only) Other values are reserved.
<IPv4AddrAlloc>	a numeric parameter that controls how the MT/TA requests to get the IPv4 address information 0 IPv4 Address Allocation through NAS Signaling 1 IPv4 Address Allocated through DHCP
<emergency_indication>	a 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>	a 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 Signaling
<IM_CN_Signaling_Flag_Ind>	a numeric parameter used to indicate to the network whether the PDP context is for IM CN subsystem-related signaling 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 Note: The parameters <IPv4AddrAlloc>, <P-CSCF_discovery> and <IM_CN_Signaling_Flag_Ind> , can be over-ridden by AT+XPCO command (meaning AT+CGDCONT values for these parameters can be over-ridden by issuing AT+XPCO later).

Example:

```
AT+CGDCONT?
OK              // Only without any set command.
AT+CGDCONT=1, “IP”,”CMNET”
OK
AT+CGDCONT=2, “IP”,”CMWAP”
OK
AT+CGDCONT?
+CGDCONT: 1,"IP","CMWAP","0.0.0.0",0,0
+CGDCONT: 2,"IP","CMNET","0.0.0.0",0,0
OK

AT+CGACT=1
```

```
OK
AT+CGDCONT?
+CGDCONT: 1,"IP","CMWAP","10.230.50.116",0,0
+CGDCONT: 2,"IP","CMNET","10.3.97.156",0,0
OK

AT+CGDCONT=?
+CGDCONT: (1-20),("IP"),,,(0),(0,1)
OK
```

12.2.3 +CGQMIN, Quality of Service Profile (Min Acceptable)

This command enables the terminal to specify the minimum acceptable profile which is checked by the ME against the negotiated profile returned in the Activate PDP Context Accept message.

Command	Syntax	Response/Action	Remarks
Set	AT+CGQMIN=<cid>[,<precedence>[,<delay>[,<reliability.>[,<peak>[,<mean>]]]]]	OK or: +CME ERROR: <err>	The Set command specifies a profile for the context identified by the (local) context identification parameter,<cid>. As this is the same parameter that is used in the +CGDCONT command, the +CGQMIN command is effectively an extension of the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.
Read	AT+CGQMIN?	+CGQMIN: <cid>,<precedence>,<delay>,<	The Read command returns the current

		reliability>,<peak>,<mean>[<CR><LF> +CGQMIN: <cid>,<precedence>,<delay>,<reliability.>,<peak>,<mean>[...]] OK or: +CME ERROR: <err>	settings for each defined context.
Test	AT+CGQMIN=?	+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s) OK or: +CME ERROR: <err>	The Test command returns the parameter value ranges for each <PDP_type>

The following table shows the +CGQMIN parameters.

<Parameter>	**Description**
<cid>	A numeric parameter that specifies a particular PDP context definition. The value is from 1 to 10 For <cid> refer to defined values under +CGDCONT command.
<precedence>	A numeric parameter that specifies the precedence class.
<delay>	A numeric parameter that specifies the delay class.

<reliability>	A numeric parameter that specifies the reliability class.
<peak>	A numeric parameter that specifies the peak throughput class.
<mean>	A numeric parameter that specifies the mean throughput class.

Example:

```
AT+CGQMIN=?
+CGQMIN: "IP",(0-3),(0-4),(0-5),(0-9),(0-18)
OK
AT+CGQMIN?
+CGQMIN: 1,2,4,3,9,10
+CGQMIN: 2,2,4,3,9,10
OK
```

12.2.4 +CGQREQ, Quality of Service Profile (Requested)

This command enables the terminal to specify a Quality of Service Profile that is used when the ME sends an Activate PDP Context Request message to the network.

Command	Syntax	Response/Action	Remarks
Set	AT+CGQREQ=<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]	OK or: +CME ERROR: <err>	The Set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. As this is the same parameter that is used in the +CGDCONT command, the +CGQREQ command is effectively an extension of the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value. A special form of the Set command, +CGQREQ= <cid>, causes the requested profile for context number <cid> to become undefined.
Read	AT+CGQREQ?	+CGQREQ:	The Read command returns the current

		<cid>,<precedence>,<delay>,<reliability>,<peak>, <mean> OK	settings for each defined context.
Test	AT+CGQREQ=?	+CGQREQ: <PDP_type>,(list of supported<precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s) OK	The Test command returns values supported as a compound value. If the ME supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

The following table shows the +CGQREQ parameters.

<Parameter>	**Description**
<cid>	A numeric parameter that specifies a particular PDP context definition. The value is from 1 to 10
<precedence>	A numeric parameter that specifies the precedence class.
<delay>	A numeric parameter that specifies the delay class.
<reliability>	A numeric parameter that specifies the reliability class.
<peak>	A numeric parameter that specifies the peak throughput class.
<mean>	A numeric parameter that specifies the mean throughput class.

Example:

```
AT+CGQREQ=?
+CGQREQ: ("IP"),(0-3),(0-4),(0-5),(0-9),(1-18,31)
OK
AT+CGQREQ?
+CGQREQ: 1,2,4,3,9,10
+CGQREQ: 2,2,4,3,9,10
OK
AT+CGQREQ=1,0,,0,0,10
OK
AT+CGQREQ?
+CGQREQ: 1,0,4,0,0,10
+CGQREQ: 2,2,4,3,9,10
OK
```

12.2.5 +CGATT, GPRS Attach or Detach

This command attaches/detaches the ME to/from the GPRS service. When the command has completed, the ME remains in V.25ter command state. If the ME 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. Extended error responses are enabled by the +CMEE command. Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

Command	Syntax	Response/Action	Remarks
Set	AT+CGATT= <state>	OK or: +CME ERROR: <err>	The Set command attaches/detaches the ME to/from the GPRS service.
Read	AT+CGATT?	+CGATT: <state> OK	The Read command returns the current GPRS service state.
Test	AT+CGATT=?	+CGATT: (list of supported <state>s) OK	The Test command requests information on the supported GPRS service states.

Note: This command has the characteristics of both the V.25ter action and parameter commands. Therefore, it has the Read form in addition to the Execution/Set and Test forms.

The following table shows the +CGATT parameters.

<Parameter>	Description
<state>	Indicates the state of the GPRS attachment: 0 Detached. 1 Attached.

Example:

```
AT+CGATT=?
+CGATT: (0,1)
OK
AT+CGATT?
+CGATT: 0
OK
AT+CGATT=0
OK
```

12.2.6 D*99, Request GPRS Service "D"

This command enables the ME to perform the actions necessary for establishing communication between the terminal and the external Packet Data Network (PDN).

The ITU V.25ter 'D' (Dial) command causes the ME to enter the ITU V.25ter Online Data state and together with the terminal, to start the specified layer 2 protocol. The ME returns CONNECT to confirm acceptance of the command prior to entering the ITU V.25ter Online Data state. No further commands may follow on the AT command line.

The detailed behavior after the Online Data state has been entered is dependent on the PDP type, and is described briefly. GPRS attachment and PDP context activation procedures may take place prior to, or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

When the layer 2 protocols have terminated, either as a result of an orderly shut down of the PDP or an

error, the ME enters the ITU V.25ter command state and returns the NO CARRIER final result code.

If <called address> is supported and provided, the ME automatically sets up a virtual call to the specified address after the PDP context has been activated.

If <L2P> and <cid> are supported, the +CGDCONT, +CGQREQ and other such commands may then be used in The modem initialization AT command string to set values for PDP type, APN, QoS and so on.

If <L2P> is not supported, or is supported but omitted, the ME uses a layer 2 protocol appropriate to the PDP type.

If <cid> is not supported, or is supported but omitted, the ME attempts to activate the context using one of the following:

- Any information provided by the terminal during the PDP start up procedure. For example, the terminal may provide a PDP type and/or PDP address to the ME.
- A prior knowledge, for example, the ME may implement only one PDP type.

Using the "Empty PDP type" No PDP address or APN is sent in this case and only one PDP context subscription record is present in the HLR for this subscriber.

This command may be used in both normal and modem compatibility modes.

Command	Syntax	Response/Action
Set	ATD*<GPRS_SC> [* [<called_address>] [*[<L2P>] [*[<cid>]]]]#	CONNECT or: ERROR

The following table shows the D*99 parameters.

<Parameter>	Description
<GPRS_SC> (GPRS Service Code)	Digit string (value 99) which identifies a request to use GPRS.
called_address>	String that identifies the called party in the address space applicable to the PDP. For communications software that does not support arbitrary characters in the dial string, a numeric equivalent may be used. Also, the comma character ","

	may be used as a substitute for the period character ".". For PDP type OSP: IHOSS, the following syntax may be used for <called_address>: [<host>] [@[<port>] [@ [<protocol>]]] where <host>, <port> and <protocol> are defined in "+CGDCONT,Define PDP Context". For communications software that does not support arbitrary characters in the dial string, a numeric value equivalent to the host name may be used. However, this should be avoided if at all possible.
<L2P>	String variable which indicates the layer 2 protocol to be used. For communications software that does not support arbitrary characters in the dial string, the following numeric equivalents are used: 0 NULL 1 PPP 2 PAD 3 X25 9 yyyy M-xxxx Other values are reserved and result in an ERROR response to the Set command. Note: V.250 (and certain communications software) do not permit arbitrary characters in the dial string. The <L2P> and <called_address> strings are therefore specified as containing digits (0-9) only.
<cid>:	Digit string which specifies a particular PDP context definition (See "+CGDCONT, Define PDP Context").

Example:

ATD*99# //Try connecting to GPRS according to the first <cid>, defined in +CGDCONT

12.2.7 +CGACT, PDP Context Activate or Deactivate

This command activates/deactivates the specified PDP context(s).

Command	Syntax	Response/Action	Remarks
Set	AT+CGACT=[<state>[,<cid>[,<cid>[,]]]]	OK or: NO CARRIER or: +CME ERROR: <err>	The Set command activates/deactivates the specified PDP context(s). When the command is completed, the ME remains in V.25 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the requested state for any specified context cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. If the ME is not GPRS-attached when the activation form of the command is executed, the ME first performs a GPRS attach and them attempts to activate the specified contexts. If the attach fails, the ME responds with an ERROR or, if extended error responses are enabled, with the appropriate failure-to-attach error message.
Read	AT+CGACT?	+CGACT: <cid>,<state><CR><LF> +CGACT: <cid>,<state><CR><LF> +CGACT: <cid>,<state> OK	The Read command returns the current activation states for all the defined PDP contexts.

Test	AT+CGACT =?	+CGACT: (list of supported <state>s) OK	The Test command requests information on the supported PDP context activation states.

The following table shows the +CGACT parameters.

<Parameter>	Description
<state>	Indicates the activation state of the context: 0 Non-active 1 Active
<cid>	1-10 A numeric parameter that specifies a particular PDP context definition

Example:

```
AT+CGACT=?
+CGACT: (0,1)
OK
AT+CGACT?
OK
AT+CGACT=1
ERROR       //GPRS network not present.
```

Note:

In some GPRS networks, +CGACT is not supported. the ATD*99 # command can be used to establish a connection.

Activating a context can take up to 150 seconds.

Deactivating a context can take up to 40 seconds.

When aborting a +CGACT Set command, the context is closed. This can take up to 40 seconds

12.2.8 +CGPADDR, GPRS Addresses

This command reads the allocated PDP addresses for the specified context identifiers.

Command	Syntax	Response/Action	Remarks

Set	AT+CGPADDR=[<cid>[,<cid>[,]]]	+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]] [<CR><LF> +CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]][...]] OK	The Set command returns a list of PDP addresses for the specified context identifiers.
Test	AT+CGPADDR=?	+CGPADDR: (list of defined <cid>s) OK	The Test command returns the list of defined <cid>s.

The following table shows the +CGPADDR parameters.

<Parameter>	**Description**
<cid>	A numeric parameter that specifies a particular PDP context definition. If no <cid> is specified, the addresses for all defined context are returned.
<PDP_address>	each is a string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the+CGDCONT and +CGDSCONT commands when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. Both <PDP_addr_1> and <PDP_addr_2> are omitted if none is available. Both <PDP_addr_1> and <PDP_addr_2> are included when both Ipv4 and Ipv6 addresses are assigned, with <PDP_addr_1>containing the Ipv4 address and <PDP_addr_2> containing the Ipv6 address. The string is given as 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.

	Note: IPv6 address obtained on LTE will be prefixed with a constant 8 byte address "FE.80.00.00.00.00.00.00" if network has not provided.

Example:

AT+CGPADDR=?
+CGPADDR: (1,2)
OK
AT+CGPADDR=1
+CGPADDR: 1,”0.0.0.0”
OK

12.2.9 +CGANS, Manual response to a network request for PDP context activation

This command requests the MT to respond to a network request for Packet Domain PDP context activation which has been signaled to the TE by the RING or +CRING unsolicited result code.

Command	Syntax	Response/Action	Remarks
Set	AT+CGANS=[<response>,[<L2P> ,[<cid>]]]	OK Or CME ERROR : <error>	The set command requests the MT to respond to a network request for Packet Domain PDP context activation which has been signalled to the TE by the RING or +CRING unsolicited result code.
Test	AT+CGANS=?	+CGANS: (list of supported <response>s), (list of supported <L2P>s)	The test command returns the values of <response> and <L2P> supported by the MT as compound values.

The following table shows the +CGANS parameters.

<Parameter>	Description

<response>	A numeric parameter which specifies how the request should be responded to. 0 reject the request 1 accept and request that the PDP context be activated If <response> is omitted it is assumed to be 0. Other values are reserved and will result in the ERROR response.
<L2P>	A string parameter which indicates the layer 2 protocol to be used (see +CGDATA command).
<cid>	A numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).

The <response> parameter allows the TE to accept or reject the request. If <response> is 0, the request is rejected and the MT returns OK to the TE. If <response> is 1, the following procedure is followed by the MT.

Commands following the +CGANS command in the AT command line shall not be processed by the MT.

If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.250 online data state.

If no <cid> is given or if there is no matching context definition, the MT will attempt to activate the context using the values for PDP type and PDP address provided by the network, together with any other relevant information known to the MT. The other context parameters will be set to their default values.

If the activation is successful, data transfer may proceed

Example：

AT+CGANS=?

+CGANS: (0,1), (PPP,M-OPT-PPP,M-HEX,M-RAW_IP)

OK

Note: This is not the same as if the MT issues a +CGDATA (or +CGACT) command after receiving a +CRING unsolicited result code. A +CGDATA (or +CGACT) does not command the MT to acknowledge the network request but rather to make a new request for context activation. The network request would

be ignored.

12.2.10 +CGAUTO, Automatic Response to a Network Request for PDP Context Activation

The set command disables or enables an automatic positive or negative response (auto-answer) to the receipt of a NW initiated Request PDP Context Activation message from the network in UMTS/GPRS and a NW-initiated Request EPS Bearer Activation/ Modification Request messages in EPS. It also provides control over the use of the V.250 basic commands 'S0', 'A' and 'H' for handling network requests for PDP context activation. The setting does not affect the issuing of the unsolicited result code RING or +CRING.

Command	Syntax	Response/Action	Remarks
Set	AT+CGAUTO = [<n>]	OK Or CME ERROR : <error>	The set command disables or enables an automatic positive or negative response (auto-answer) to the receipt of a NW initiated Request PDP Context Activation message from the network.
Read	AT+CGAUTO?	+CGAUTO: <n> OK	The read command returns the current setting for the auto-answer whether it's enabled or disabled.
Test	AT+CGAUTO=?	+CGAUTO: (list of supported <n>s) OK	The test command returns the values of <n> supported by MT as a compound value.

The following table shows the +CGAUTO parameters.

<Parameter>	Description
<n>	Is a numeric parameter which indicates the setting for the auto-answer to be used 0 Turn off automatic response for Packet Domain only Packet Domains network requests are manually accepted or rejected by the +CGANS command. 1 Turn on automatic response for Packet Domain only

	Packet Domain network requests are automatically accepted according to the description above. 2 Modem compatibility mode, Packet Domain only Automatic acceptance of Packet Domain network requests is controlled by the 'S0' command. Manual control uses the 'A' and 'H' commands, respectively, to accept and reject Packet Domain requests. (+CGANS may also be used.) Incoming circuit switched calls can be neither manually nor automatically answered. 3 Modem compatibility mode, Packet Domain and circuit switched calls (default) Automatic acceptance of both Packet Domain network requests and incoming circuit switched calls is controlled by the 'S0' command. Manual control uses the 'A' and 'H' commands, respectively, to accept and reject Packet Domain requests. (+CGANS may also be used.) Circuit switched calls are handled as described elsewhere in this specification. 4 Turn on automatic negative response for Packet Domain only Packet Domain network requests are automatically rejected.

Example：

```
AT+CGAUTO=0
OK
AT+CGAUTO=1
OK
AT+CGAUTO=4
OK
AT+CGAUTO=5
ERROR
AT+CGAUTO=?
+CGAUTO: (0-4)
OK
```

Note: When the +CGAUTO=1 command is received, the MT shall attempt to perform a PS attach if it is not already attached. Failure will result in ERROR or, if enabled, +CME ERROR being returned to the TE. Subsequently, when the MT announces a network request for PDP context activation by issuing the

unsolicited result code RING or +CRING to the TE, this is followed by the intermediate result code CONNECT. The MT then enters V.250 online data state and follows the same procedure as it would after having received a +CGANS=1 with no <L2P> or <cid> values specified.

12.2.11 +CGEQMIN，3G Quality of Service Profile (Minimum acceptable)

This command allows the TE to specify a minimum acceptable profile, which is checked by the MT against the negotiated profile returned in the Activate/Modify PDP Context Accept message.

Command	Syntax	Response/Action	Remarks
Set	AT+CGEQMIN=[<cid> [,<Traffic class> [,<Maximum Bit rate UL> [,<Maximum bit rate DL> [,<Guaranteed Bit rate UL> [,<Guaranteed bit rate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority>	OK Or CME ERROR : <error>	Set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. The specified profile will be stored in the MT and checked against the negotiated profile only at activation or MS-initiated modification of the related context.

	[,<Source statistics descriptor> [,<Signaling indication>]]]]]]]]]]]		
Read	AT+CGEQMIN?	+CGEQMIN: <cid>, <Traffic class> ,<Maximum bit rate UL>, <Maximum bit rate DL> ,<Guaranteed bit rate UL> ,<Guaranteed bit rate DL>, <Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [,<Source statistics descriptor> ,<Signaling indication>] [<CR><LF>+CGEQMIN: <cid>, <Traffic class> ,<Maximum bit rate UL> ,<Maximum bit rate DL> ,<Guaranteed bit rate UL> ,<Guaranteed bit rate DL>, <Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [,<Source statistics descriptor> ,<Signaling indication>] […]]	The read command returns the current settings for each defined context.
Test	AT+CGEQMIN =?	+CGEQMIN: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bit rate UL>s) ,(list of supported <Maximum bit rate DL>s), (list of supported <Guaranteed bit rate UL>s), (list of supported <Guaranteed bit rate DL>s) ,(list of	Test command returns values supported as a compound value. If the MT supports several PDP types, the

		supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [,(list of supported <Source statistics descriptor>s) ,(list of supported <Signaling indication>s)] [<CR><LF>+CGEQMIN: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bit rate UL>s), (list of supported <Maximum bit rate DL>s) ,(list of supported <Guaranteed bit rate UL >s), (list of supported<Guaranteed bit rate DL >s) ,(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [,(list of supported <Source statistics descriptor>s) ,(list of supported <Signaling indication>s)] […]]	parameter value ranges for each PDP type are returned on a separate line.

The following table shows the +CGEQMIN parameters.

<Parameter>	Description
<cid>	A numeric parameter which specifies a particular PDP context definition

	(see +CGDCONT and +CGDSCONT commands).
<Traffic class>	<Traffic class> a numeric parameter that indicates the type of application for which the UMTS bearer service is on format. 0 conversational 1 streaming 2 interactive 3 background Other values are reserved.
<Maximum bit rate UL>	A numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bit rate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=…,32, …) (refer 3GPP TS 24.008 sub clause 10.5.6.5).
<Maximum bit rate DL>	A numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bit rate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=…,32, …) (refer 3GPP TS 24.008 sub clause 10.5.6.5).
<Guaranteed bit rate UL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=…,32, …) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Guaranteed bit rate DL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=…,32, …) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Delivery order>	A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not. 0 no

	1 yes Other values are reserved.
<Maximum SDU size>	A numeric parameter (1,2,3,…) that indicates the maximum allowed SDU size in octets(refer 3GPP TS 24.008 subclause 10.5.6.5).
<SDU error ratio>	A string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of 5•10-3 would be specified as '5E3' (e.g. AT+CGEQMIN=…,"5E3",…) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Residual bit error ratio>	A string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of 5•10-3 would be specified as '5E3' (e.g. AT+CGEQMIN=…,"5E3",…) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Delivery of erroneous SDUs>	A numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not. 0 no 1 yes 2 no detect Other values are reserved.
<Transfer delay>	A numeric parameter (0,1,2,…) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds (refer 3GPP TS 24.008 subclause10.5.6.5).
<Traffic handling priority>	A numeric parameter (1,2,3,…) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Source Statistics Descriptor>	Supported in R7 P S a numeric parameter that specifies characteristics of the source of the submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5). 0 Characteristics of SDUs is unknown (default value) 1 Characteristics of SDUs corresponds to a speech source Other values are reserved.
<Signaling Indication>	Supported in R7 PS a numeric parameter used to indicate confirmat content of submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as interactive (refer 3GPP TS 24.008 subclause 10.5.6.5). 0 PDP context is not optimized for confirmat (default value) 1 PDP context is optimized for confirmat
<PDP_type>	(See +CGDCONT and +CGDSCONT commands). If a value is omitted for a particular class then the value is considered to be unspecified.

Example：

```
AT+CGEQMIN?
+CGEQMIN: 1,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
+CGEQMIN: 6,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
+CGEQMIN: 4,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
+CGEQMIN: 3,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
+CGEQMIN: 2,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
OK
AT+CGEQMIN=?
+CGEQMIN: "IP",(0-3),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps
    steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps, 8700-16000 in
    100 kbps steps), (1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps),(1-63
    in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps, 8700-16000 in 100 kbps
    steps),
    (0-1),(10-1500,1502,1510,1520),("1E6","1E5","1E4","1E3","7E3","1E2","1E1"),("6E8","1E6","1E
    5","1E4","5E3","4E3","1E3","5E2","1E2"),(0-2),(10-150 in 10 ms steps, 200-950 in 50 ms steps,
```

1000-4000 in 50 ms steps),(0-3),(0-1),(0-1)

OK

12.2.12 +CGEQREQ，3G Quality of Service Profile (Requested)

This command allows the TE to specify a UMTS Quality of Service Profile that is used when the MT sends an Activate PDP Context Request message to the network.

Command	Syntax	Response/Action	Remarks
Set	AT+CGEQREQ=[<cid> [,<Traffic class> [,<Maximum bit rate UL> [,<Maximum bit rate DL> [,<Guaranteed bit rate UL> [,<Guaranteed bit rate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority> [,<Source statistics descriptor> [,<Signaling indication>]]]]]]]]]]]]]]	OK ERROR	Set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. The specified profile will be stored in the MT and sent to the network only at activation or MS-initiated modification of the related context. Parameter value ranges for each PDP type are returned on a separate line.
Read	AT+CGEQREQ?	+CGEQREQ: <cid>, <Traffic class> ,<Maximum bit rate UL> ,<Maximum bit rate	Read command returns the current settings for each

		DL> ,<Guaranteed bit rate UL> ,<Guaranteed bit rate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [,<Source statistics descriptor> ,<Signaling indication>] [<CR><LF>+CGEQREQ: <cid>, <Traffic class> ,<Maximum bit rate UL> ,<Maximum bit rate DL> ,<Guaranteed bit rate UL> ,<Guaranteed bit rate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [,<Source Statistics Descriptor> ,<Signaling Indication>] […]]	defined context.
Test	AT+CGEQREQ=?	+CGEQREQ: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bit rate UL>s), (list of supported <Maximum bit rate DL>s), (list of supported <Guaranteed bit rate UL>s), (list of supported <Guaranteed bit rate DL>s),(list of supported <Delivery order>s) ,(list	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

		of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [,(list of supported <Source statistics descriptor>s) ,(list of supported <Signaling indication>s)] [<CR><LF>+CGEQREQ: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bit rate UL>s), (list of supported <Maximum bit rate DL>s), (list of supported <Guaranteed bit rate UL>s), (list of supported <Guaranteed bit rate DL>s),(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s)] [,(list of supported <Source statistics descriptor>s) ,(list of supported <Signaling indication>s)]	separate line.

The following table shows the +CGEQREQ parameters.

<Parameter>	Description
<cid>	A numeric parameter which specifies a particular PDP context definition (see +CGDCONT and +CGDSCONT commands).
<Traffic class>	A numeric parameter that indicates the type of application for which the UMTS bearer service is on format. 0 conversational 1 streaming 2 interactive 3 background subscribed value If the Traffic class is specified as conversational or streaming, then the Guaranteed and Maximum bit rate parameters should also be provided. Other values are reserved.
<Maximum bit rate UL>	A numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. AT+CGEQREQ=…,32, …). This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Maximum bit rate DL>	A numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. AT+CGEQREQ=…,32, …). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Guaranteed bit rate UL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=…,32, …). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Guaranteed bit rate DL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=…,32, …). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Delivery order>	A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not. 0 no 1 yes 2 subscribed value. Other values are reserved.
<SDU error ratio>	a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of 5•10-3 would be specified as '5E3' (e.g. AT+CGEQREQ=…,"5E3",…). '0E0' means subscribed value (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Residual bit error ratio>	a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target

	residual bit error ratio of 5•10-3 would be specified as ‘5E3’ (e.g. AT+CGEQREQ=…,”5E3”,…). ‘0E0’ means subscribed value (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Delivery of erroneous SDUs>	a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not. 0 no 1 yes 2 no-detect 3 subscribed value Other values are reserved.
<Transfer delay>	a numeric parameter (0,1,2,…) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds. If the parameter is set to ‘0’ the subscribed value will be requested (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Traffic handling priority>	a numeric parameter (1,2,3,…) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers. If the parameter is set to ‘0’ the subscribed value will be requested (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Source Statistics Descriptor>	Supported in R7 P S a numeric parameter that specifies characteristics of the source of the submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5). 0 Characteristics of SDUs is unknown (default value) 1 Characteristics of SDUs corresponds to a speech source Other values are reserved.
<Signaling Indication>	Supported in R7 P S a numeric parameter used to indicate confirmat content of submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as

	interactive (refer 3GPP TS 24.008 subclause 10.5.6.5). 0 PDP context is not optimized for confirmat (default value) 1 PDP context is optimized for confirmat<PDP_type>: (see +CGDCONT and +CGDSCONT commands

Example：

AT+CGEQREQ=?

+CGEQREQ: "IP",(0-4),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps, 8700-16000 in 100 kbps steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps, 8700-16000 in 100 kbps steps),(0-1),(10-1500,1502,1510,1520),("1E6","1E5","1E4","1E3","7E3","1E2","1E1"),("6E8","1E6","1E5","1E4","5E3","4E3","1E3","5E2","1E2"),(0-2),(10-150 in 10 ms steps, 200-950 in 50 ms steps, 1000-4000 in 50 ms steps),(0-3),(0-1),(0-1)

OK

12.2.13 +CGEQNEG，G Quality of Service Profile (Negotiated)

This command allows the TE to retrieve the negotiated QoS profiles returned in the Activate PDP Context Accept message.

Command	Syntax	Response/Action	Remarks
Set	AT+CGEQNEG=[<cid>[,<cid>[,…]]]	+CGEQNEG: <cid>, <Traffic class> ,<Maximum bit rate UL>, <Maximum bit rate DL> ,<Guaranteed bit rate UL>, <Guaranteed bit rate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [<CR><LF>+CGEQNEG: <cid>, <Traffic class> ,<Maximum bit rate UL>, <Maximum bit rate DL> ,<Guaranteed bit rate UL>, <Guaranteed bit rate DL> ,<Delivery order> ,<Maximum SDU	Set command allows the TE to retrieve the negotiated QoS profiles returned in the Activate PDP Context Accept message.

		size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> […]]	
Test	AT+CGEQNEG =?	+CGEQNEG: (list of <cid>s associated with active contexts)	Test command returns a list of <cid>s associated with active contexts.

The following table shows the +CGEQNEG parameters.

<Parameter>	**Description**
<cid>	A numeric parameter which specifies a particular PDP context definition (see +CGDCONT and +CGDSCONT commands).
<Traffic class>	A numeric parameter that indicates the type of application for which the UMTS bearer service is optimised. 0 conversational 1 streaming 2 interactive 3 background Other values are reserved.
<Maximum bit rate UL>	A numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. +CGEQNEG:…,32, …) (refer TS 24.008 subclause 10.5.6.5).
<Maximum bit rate DL>	A numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. +CGEQNEG:…,32, …) (refer TS 24.008 subclause 10.5.6.5)

<Guaranteed bit rate UL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:…,32, …) (refer TS 24.008 subclause 10.5.6.5).
<Guaranteed bit rate DL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. +CGEQNEG:…,32, …) (refer TS 24.008 subclause 10.5.6.5).
<Delivery order>	A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not. 0 no 1 yes Other values are reserved.
<Maximum SDU size>	A numeric parameter that (1,2,3,…) indicates the maximum allowed SDU size in octets (refer TS 24.008 subclause 10.5.6.5).
	<SDU error ratio> a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of 5•10-3 would be specified as '5E3' (e.g. +CGEQNEG:…,"5E3",…) (refer TS 24.008 subclause 10.5.6.5).
<Residual bit error ratio>	A string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of 5•10-3 would be specified as '5E3' (e.g. +CGEQNEG:…,"5E3",…) (refer TS 24.008 subclause 10.5.6.5).

<Delivery of erroneous SDUs>	A numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not. 0 no 1 yes 2 no detect Other values are reserved.
<Transfer delay>	A numeric parameter (0,1,2,…) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds (refer TS 24.008 subclause 10.5.6.5).
<Traffic handling priority>	A numeric parameter (1,2,3,…) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers (refer TS 24.008 subclause 10.5.6.5

Example:

AT+CGEQNEG=?
+CGEQNEG: ()

OK

12.2.14 +CGCMOD，PDP Context Modify

The execution command is used to modify the specified PDP context (s) with respect to QOS profiles and TFTs.

Command	Syntax	Response/Action	Remarks
Set	+CGCMOD=[<cid>[,<cid>[,…]]]	OK Or CME ERROR : <error>	The set command is used to modify the specified PDP context (s) with respect to QoS profiles and TFTs.
Test	+CGCMOD=?	+CGCMOD: (list of <cid>s associated with active contexts)	The test command returns a list of <cid>s associated

		OK	with active contexts.

The following table shows the +CGCMOD parameters.

<Parameter>	Description
<cid>	A numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands)

Example：

```
AT+CGDCONT?
+CGDCONT: 1,"IP","CMNET","172.29.107.202",0,0
+CGDCONT: 2,"IP","","0.0.0.0",1,1
+CGDCONT: 3,"IP","CMNET","0.0.0.0",0,0
+CGDCONT: 4,"IP","CMNET","0.0.0.0",0,0
+CGDCONT: 6,"IPV6","CDOE","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0
OK
AT+CGCMOD=1,1,
OK
AT+CGCMOD=1,1,6
OK
AT+CGDCONT?
+CGDCONT: 1,"IP","CMNET","172.29.107.202",0,0
+CGDCONT: 2,"IP","","0.0.0.0",1,1
+CGDCONT: 3,"IP","CMNET","0.0.0.0",0,0
+CGDCONT: 4,"IP","CMNET","0.0.0.0",0,0
+CGDCONT: 6,"IPV6","CDOE","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0
OK
AT+CGCMOD=?
+CGCMOD: (1,2,3,4,6)
OK
```

12.2.15 +CGDATA ， Enter Data State

This execution command causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more GPRS PDP types. This may include performing a GPRS attach and one or more PDP context activation. If the parameters are accepted, MT displays the intermediate result code CONNECT on TE and enters the online data state; thereafter data transfer may proceed. No other commands following +CGDATA in the command line will be processed.

Command	Syntax	Response/Action	Remarks
Set	+CGDATA = [<L2P> ,[<cid> [,<cid> [,…]]]]	CONNECT It follows data transfer or CME ERROR: <error>	Set command specifies the <L2P> and <cid> to establish data call (csd connection state)
Test	+CGDATA=?	+CGDATA: (list of supported <L2P>s) OK	Test command returns values supported as a compound value.

The following table shows the +CGDATA parameters.

<Parameter>	Description
<L2P>	a string parameter that indicates the layer 2 protocol to be used between the TE and MT NULL none, for PDP type OSP: IHOSS (Obsolete) PPP Point-to-point protocol for a PDP such as IP PAD character stream for X.25 character (triple X PAD) mode (Obsolete) X25 X.25 L2 (LAPB) for X.25 packet mode (Obsolete). M-OPT-PPP MS supports manufacturing specific protocol M-HEX MS supports manufacturing specific protocol M-RAW_IP MS supports manufacturing specific protocol.
<cid>	A numeric parameter which specifies a particular PDP context definition (see the

	+CGDCONT and +CGDSCONT commands).

Note: After data transfer is complete, the MT re-enters the command state and the final result code is displayed on TE. In error case the final result code NO CARRIER or CME ERROR :<error> is displayed. 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 +CGATT and +CGACT commands.

If no <cid> is given or if there is no matching context definition, the MT shall attempt to activate the context with whatever information is available to the MT. The other context parameters shall be set to their default values.

If the activation is successful, data transfer may proceed. After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the V.250 command state is re-entered and the MT returns the final result code OK.

Example：

AT+CGDATA=ppp

CONNECT

…….

……..

AT+CGDATA=?

+CGDATA: (PPP,M-OPT-PPP,M-HEX,M-RAW_IP,PAD,X25)

OK

12.2.16 +CGDSCONT，Define Secondary PDP Context

This command is used to define a secondary PDP context by specifying the PDP context parameter values for a <cid> (local context identification parameter). If the command is used only with the one parameter <cid>, it means that the corresponding PDP context becomes undefined.

Command	Syntax	Response/Action	Remarks
Set	+CGDSCONT =[<cid>, <p_cid> [,<d_comp>[, <h_comp> [,<IM_CN_Signaling_Flag_Ind>]]]]	OK Or ERROR	Set command specifies PDP context parameter values for a Secondary PDP context identified by the (local) context identification parameter, <cid>.

Read	+CGDSCONT ?	+CGDSCONT: <cid>, <p_cid>, <d_comp>, <h_comp> [,<IM_CN_Signaling_Flag_Ind>] OK	Read command returns the current settings for each defined context.
Test	+CGDSCONT =?	+CGDSCONT: (range of <cid>s),(list of <cid>s for defined primary contexts),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s) ,(list of supported <IM_CN_Signaling_Flag_Ind>s) [<CR><LF>+CGDSCONT: (range of <cid>s),(list of<cid>s for defined primary contexts),<PDP_type>,,, (list of supported <d_comp>s),(list of supported <h_comp>s) ,(list of supported <IM_CN_Signaling_Flag_Ind>s) [...]] <d_comp>s),(list of supported <h_comp>s) […]] OK	Test command returns values supported as a compound value.

The following table shows the + CGDSCONT parameters.

<Parameter>	**Description**
<cid>	(PDP Context identifier) It is a numeric parameter, which specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. The range of the permitted values is 1-10.
<p_cid>	(Primary PDP context identifier) It is a numeric parameter which specifies a particular PDP context definition which has been specified by use of the +CGDCONT command. The parameter is local to the TE-MT interface. The list of permitted values is returned by the test form of the command.
<d_comp>	(A numeric parameter that controls PDP data compression (applicable for SNDCP only)) 0 off (default if value is omitted)

	1 on (manufacturer preferred compression) 2 V.42 bis Other values are reserved.
<h_comp>	(A numeric parameter that controls PDP header compression) 0 off (default if value is omitted) 1 on (manufacturer preferred compression) 2 RFC1144 (applicable for SNDCP only) 3 RFC2507 4 RFC3095 (applicable for PDCP only) Other values are reserved.
<IM_CN_Signaling_Flag_Ind>	a numeric parameter used to indicate to the network whether the PDP context is for IM CN subsystem-related signaling 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 Note: The parameter <IM_CN_Signaling_Flag_Ind> , can be over-ridden by AT+XPCO command (meaning AT+CGDSCONT values for these parameters can be over-ridden by issuing AT+XPCO later).

12.2.17 +CGEREP，Packet Domain Event Reporting

This command is used to enable or disable sending of unsolicited result codes, +CGEV: XXX from MT to TE in the case of events occurring in the Packet Domain

Command	Syntax	Response/Action	Remarks
Set	+CGEREP=[<mode>[,<bfr>]]	OK	The Set command enables or disables sending of unsolicited result codes, +CGEV: XXX from MT to TE in the case of certain events occurring in the Packet Domain MT or the network.
Read	+CGEREP?	+CGEREP: <mode>, <bfr> OK	The read command returns the current value of <mode> and <bfr> parameters.

Test	+CGEREP=?	+CGEREP: (list of supported <mode>s),(list of supported <bfr>s) OK	The test command lists the supported values for <mode> and for <bfr>.

The following table shows the +CGEREP parameters.

<Parameter>	Description
<mode>	0 buffer unsolicited result codes in the MT; if MT result code buffer is full, the oldest ones can be discarded. No codes are forwarded to the TE. 1 discard unsolicited result codes when MT-TE link is reserved (e.g. in on-line data mode); otherwise forward them directly to the TE 2 buffer unsolicited result codes in the MT when MT-TE link is reserved (e.g. in on-line data mode) and flush them to the TE when MT-TE link becomes available; otherwise forward them directly to the TE
<bfr>	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 shall be given before flushing the codes) 2 circuit switched preferred (use Packet Domain if circuit switched not available)

Example：

AT+CGEREP=1,0

OK

AT+CGEREP=2,2

ERROR

AT+CGEREP=?

+CGEREP: (0-2),(0-1)

OK

AT+CGEREP=2,0

AT+CGEREP?

+CGEREP: 2,0

OK

12.2.18 +CGTFT Traffic Flow Template

This 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.

Command	Syntax	Response/Action	Remarks
Set	+CGTFT=[<cid>, [<packet filter identifier>, <evaluation precedence index> [,<source address and subnet mask> [,<protocol number (ipv4) / next header (ipv6)> [,<destination port range> [,<source port range> [,<ipsec security parameter index (spi)> [,<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask> [,<flow label (ipv6)> [,<direction>]]]]]]]]]	OK ERROR	The set command specifies a Packet Filters that is to be added to the TFT stored in the MT and used for the context identified by the (local) context identification parameter, <cid>.
Read	+CGTFT?	+CGTFT: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label (ipv6)> , <direction> [<CR><LF>+CGTFT:	The read command returns the current settings for all Packet Filters for each defined context.

		<cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label (ipv6)> , <direction> […]]	
Test	+CGTFT=?	+CGTFT: <PDP_type>, (list of supported <packet filter identifier>s), (list of supported <evaluation precedence index>s), (list of supported <source address and subnet mask>s), (list of supported <protocol number (ipv4) / next header (ipv6)>s), (list of supported <destination port range>s), (list of supported <source port range>s), (list of supported <ipsec security parameter index (spi)>s), (list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>s), (list of supported <flow label (ipv6)>s) , (list of supported <direction>s) [<CR><LF>+CGTFT: <PDP_type>, (list of supported <packet filter identifier>s), (list of supported <evaluation precedence index>s), (list of supported <source address and	The test command returns values supported as a compound value.

		subnet mask>s), (list of supported <protocol number (ipv4) / next header (ipv6)>s), (list of supported <destination port range>s), (list of supported <source port range>s), (list of supported <ipsec security parameter index (spi)>s), (list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>s), (list of supported <flow label (ipv6)>s), (list of supported <direction>s) […]]	

The following table shows the +CGTFT parameters.

<Parameter>	**Description**
<cid>	a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).
<packet filter identifier>	Numeric parameter, value range from 1 to 16.
<source address and subnet mask>	Consists of dot-separated numeric (0-255) parameters on the form 'a1.a2.a3.a4.m1.m2.m3.m4', for Ipv4 and '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.
<protocol number (ipv4) / next header (ipv6)>	Numeric parameter, value range from 0 to 255.
<destination port range>	Consists of dot-separated numeric (0-65535) parameters on the form 'f.t'.

<source port range>	Consists of dot-separated numeric (0-65535) parameters on the form ‘f.t’.
<ipsec security parameter index (spi)>	Hexadecimal parameter, value range from 00000000 to FFFFFFFF
<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>	Dot-separated numeric (0-255) parameters on the form ‘t.m
<flow label (ipv6)>	Hexadecimal parameter, value range from 00000 to FFFFF. Valid for Ipv6 only.
<evaluation precedence index>	Numeric parameter, value range from 0 to 255
<direction>:	a numeric parameter which specifies the transmission direction in which the packet filter shall be applied. 0 Pre-Release 7 TFT filter (see 3GPP TS 24.008 [8], table 10.5.162) 1 Uplink 2 Downlink 3 Birectional (Up & Downlink) (default if omitted) 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 [47].

12.2.19 +CGEV, Unsolicited Packet Domain Event Reporting

This unsolicited event is sent by the Modem to the terminal for packet domain event reporting.

The following table shows the format and parameters of +CGEV.

<Parameter>	Description
+CGEV: NW DEACT <PDP_type>, <PDP_addr>, [<cid>]	The network has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT
+CGEV: ME DEACT <PDP_type>, <PDP_addr>, [<cid>]	The mobile termination has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT.
+CGEV: NW DETACH	The network has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately. ETSI 3GPP TS 27.007 version 7.6.0 Release 7 147 ETSI TS 127 007 V7.6.0 (2010-04)
+CGEV: ME DETACH	The mobile termination has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.
+CGEV: NW CLASS <class>	The network has forced a change of MT class. The highest available <class> is reported (see +CGCLASS).
+CGEV: ME CLASS <class>	The mobile termination has forced a change of MT class. The highest available <class> is reported (see +CGCLASS).
+CGEV: ME PDN ACT <cid>[,<reason>[,<cid_other>]]	The mobile termination has activated a context. The context represents a PDN connection in LTE or a Primary PDP context in GSM/UMTS. The <cid> for this context is provided to the TE. This event is sent either in result of explicit context activation request (+CGACT), or in result of implicit context activation request associated to attach request (+CGATT=1). The format of the parameters <cid>, <cid_other> are found in command +CGDCONT. <reason> integer type parameter 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.

13 TCP/IP

13.1 Basic Mode

13.1.1 +MSDNS, Set DNS IP Address

This command set/read DNS (Domain Name Server) IP address (primary/secondary) for each socket. If the user doesn't specify DNS servers by AT+MSDNS, Module will use default DNS from NW. The defined value(s) will be saved during disconnect PDP context (can be used in next PDP context), but will reset after power cycle.

Command	Syntax	Response/Action
Set	AT+MSDNS=[<Socket_ID>[,<Primary_DNS_server_IP>[,<Secondary_DNS_server_IP>]]]	OK or: +CME ERROR: <err>
Read	AT+MSDNS?	+MSDNS: 1,<Primary_DNS_server_IP>,<Secondary_DNS_server_IP><CR><LF> +MSDNS: 2,<Primary_DNS_server_IP>,<Secondary_DNS_server_I

		P><CR><LF> +MSDNS: 3,<Primary_DNS_server_IP>,<Secondary_DNS_server_IP><CR><LF> +MSDNS: 4,<Primary_DNS_server_IP>,<Secondary_DNS_server_IP><CR><LF> <CR><LF> OK
Test	AT+MSDNS=?	+MSDNS: (List of supported <Socket_id>s),(<IP>),(<IP>) OK

The following table shows the +MSDNS parameters.

<Parameter>	**Description**
<Socket_ID>	A unique number that identifies a connection (provided by the terminal application). 0 - Invalid socket number 1,2,3,4 - Valid socket number 5 - Valid socket number dedicated to +MPING.
<Primary_DNS_server_IP>,<Secondary_DNS_server_IP>	IP of the destination site in the format "AAA.BBB.CCC.DDD". The range of each octant is 0-255. The value can be written in 1, 2, or 3 digits.

Example:

```
AT+MSDNS=?
+MSDNS: (1-7),(<IP>),(<IP>)
OK
AT+MSDNS?                // read when MIPCALL is disconnected
+MSDNS: 1,"0.0.0.0","0.0.0.0"
+MSDNS: 2,"0.0.0.0","0.0.0.0"
```

```
+MSDNS: 3,"0.0.0.0","0.0.0.0"
+MSDNS: 4,"0.0.0.0","0.0.0.0"
+MSDNS: 5,"0.0.0.0","0.0.0.0"
+MSDNS: 6,"0.0.0.0","0.0.0.0"
+MSDNS: 7,"0.0.0.0","0.0.0.0"
OK
AT+MSDNS=2,"212.150.49.10","206.49.94.234"      //set socket 2 prim & sec DNS
OK
AT+MSDNS=4,"62.120.55.10"                       //set socket 4 prim DNS only
OK
AT+MSDNS=5,"212.150.49.10","206.49.94.234"      //set socket 5 prim & sec DNS
OK
AT+MSDNS?          // read when MIPCALL is disconnected
+MSDNS: 1,"0.0.0.0","0.0.0.0"
+MSDNS: 2,"212.150.49.10","206.49.94.234"
+MSDNS: 3,"0.0.0.0","0.0.0.0"
+MSDNS: 4,"62.120.55.10","0.0.0.0"
+MSDNS: 5,"212.150.49.10","206.49.94.234"
+MSDNS: 6,"0.0.0.0","0.0.0.0"
+MSDNS: 7,"0.0.0.0","0.0.0.0"
OK
```

14 Error Code

The list below is a draft List and is still TBD.

14.1 CME Error

Parameter	Description
<Err>	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" 19, "incorrect PUK1" 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 personalisation PIN required"

	41, "network personalisation PUK required" 42, "network subset personalisation PIN required" 43, "network subset personalisation PUK required" 44, "service provider personalisation PIN required" 45, "service provider personalisation PUK required" 46, "corporate personalisation PIN required" 47, "corporate personalisation PUK required" 48, "hidden key required" (NOTE: This key is required when accessing hidden phonebook entries.) 49, "EAP method not supported" 50, "Incorrect parameters" 100, "unknown" 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" 114, "GPRS services not allowed in this PLMN" 116, "MSC temporarily not reachable" 117, "Network failure" 132, "Service not supported" 133, "Service not subscribed" 134, "service option temporarily out of order" 135, "NS-api already used" 148, "Unspecified GPRS error" 149, "PDP authentication error" 150, "invalid mobile class" 244, "Attach failure" 257, "Invalid error mapping" 258, "APN not listed in APN Control List (ACL)" 701, "incorrect security code" 702, "max attempts reached" 1001, "Unassigned (unallocated) number" 1003, "No route to destination" 1006, "Channel unacceptable" 1008, "Operator determined barring" 1016, "Normal call clearing"

	1017, "User busy" 1018, "No user responding" 1019, "User alerting, no answer" 1021, "Call rejected" 1022, "Number changed" 1026, "Non selected user clearing" 1027, "Destination out of order" 1028, "Invalid number format (incomplete number)" 1029, "Facility rejected" 1030, "Response to STATUS ENQUIRY" 1031, "Normal, unspecified" 1034, "No circuit/channel available" 1038, "Network out of order" 1041, "Temporary failure" 1042, "Switching equipment congestion" 1043, "Access information discarded" 1044, "requested circuit/channel not available" 1047, "Resources unavailable, unspecified" 1049, "Quality of service unavailable" 1050, "Requested facility not subscribed" 1055, "Incoming calls barred within the CUG" 1057, "Bearer capability not authorized" 1058, "Bearer capability not presently available" 1063, "Service or option not available, unspecified" 1065, "Bearer service not implemented" 1068, "ACM equal to or greater than ACMmax" 1069, "Requested facility not implemented" 1070, "Only restr. digital information bearer capability" 1079, "Service or option not implemented, unspecified" 1081, "Invalid transaction identifier value" 1087, "User not member of CUG" 1088, "Incompatible destination" 1091, "Invalid transit network selection" 1095, "Semantically incorrect message" 1096, "Invalid mandatory information" 1097, "Message type non-existent or not implemented" 1098, "Message type not compatible with protocol state" 1099, "Information element non-existent or not implemented"

	1100, "Conditional IE error" 1101, "Message not compatible with protocol state" 1102, "Recovery on timer expiry" 1111, "Protocol error, unspecified" 1127, "Inter working, unspecified" 1279, "Number not allowed" 1283, "CCBS possible"

14.2 CMS Error

Parameter	Description
<Err>	1, "Unassigned (unallocated) number" 8, "Operator determined barring" 10, "Call barred" 17, "Network failure" 21, "Short message transfer rejected" 22, "Memory capacity exceeded" 27, "Destination out of service" 28, "Unidentified subscriber" 29, "Facility rejected" 30, "Unknown Subscriber" 38, "Network out of order" 41, "Temporary failure" 42, "Congestion" 47, "Resources unavailable, unspecified" 50, "Requested facility not subscribed" 69, "Requested facility not implemented" 81, "Invalid short message reference value" 95, "Invalid message, unspecified" 96, "Invalid mandatory information" 97, "Message type non-existent or not implemented" 98, "Message not compatible with short message protocol state" 99, "Information element non-existent or not implemented" 111, "Protocol error, unspecified" 127, "Inter working unspecified" 128, "Telematic inter working not supported" 129, "Short message type 0 not supported"

	130, "Cannot replace short message" 143, "Unspecified TP-PID error" 144, "Data coding scheme (alphabet) not supported" 145, "Message class not supported" 159, "Unspecified TP-DCS error" 160, "Command cannot be action" 161, "Command unsupported" 175, "Unspecified TP-Command error" 176, "TPDU not supported" 192, "SC busy" 193, "No SC subscription" 194, "SC system failure" 195, "Invalid SME address" 196, "Destination SME barred" 197, "SM Rejected-Duplicate SM" 198, "TP-VPF not supported" 199, "TP-VP not supported" 208, "SIM SMS storage full" 209, "No SMS storage capability in SIM" 210, "Error in MS" 211, "Memory Capacity Exceeded" 212, "SIM Application Toolkit Busy" 213, "SIM data download error" 224, "TP_FCS_APPL_ERR_START" 254, "TP_FCS_APPL_ERR_STOP" 255, "TP_FCS_UNSPECIFIED" 300, "ME failure" 301, "SMS service of ME reserved" 302, "operation not allowed" 303, "operation not supported" 304, "Invalid PDU mode param" 305, "invalid text mode parameter" 310, "SIM not inserted" 311, "SIM PIN required" 312, "PH-SIM PIN necessary" 313, "SIM failure" 314, "SIM busy" 315, "SIM wrong"

	317, "SIM PIN2 required" 318, "SIM PUK2 required" 319, "incorrect PUK1" 320, "memory failure" 321, "invalid memory index" 322, "memory full" 330, "SMSC address unknown" 331, "no network service" 332, "network timeout" 340, "no +CNMA acknowledgement expected" 512, "MN_SMS_RP_ACK" 513, "MN_SMS_TIMER_EXPIRED" 514, "MN_SMS_FORW_AVAIL_FAILED" 515, "MN_SMS_FORW_AVAIL_ABORTED" 516, "MS invalid TP-Message-Type-Indicator" 517, "MS no TP-Status-Report in Phase 1" 518, "MS no TP-Reject-Duplicate in Phase 1" 519, "MS no TP-Reply-Path in Phase 1" 520, "MS no TP-User-Data-Header in Phase 1" 521, "MS missing TP-Validity-Period" 522, "MS invalid TP-Service-Centre-Time-Stamp" 523, "MS missing TP-Destination-Address" 524, "MS invalid TP-Destination-Address" 525, "MS missing Service-Centre-Address" 526, "MS invalid Service-Centre-Address" 527, "MS invalid alphabet" 528, "MS invalid TP-User-Data-Length" 529, "MS missing TP-User-Data" 530, "MS TP-User-Data too long" 531, "MS no Command-Request in Phase 1" 532, "MS Cmd-Req invalid TP-Destination-Address" 533, "MS Cmd-Req invalid TP-User-Data-Length" 534, "MS Cmd-Req invalid TP-User-Data" 535, "MS Cmd-Req invalid TP-Command-Type" 536, "MN MNR creation failed" 537, "MS CMM creation failed" 538, "MS network connection lost" 539, "MS pending MO SM transfer"

	540, "RP-Error OK" 541, "RP-Error OK no icon display" 542, "SMS-PP Unspecified" 543, "SMS rejected By SMS CONTROL"

14.3 TCP/IP Error

Parameter	Description
<Err>	2000, "TCPIP Param wrong " 2001, "TCPIP not supported in ppp mode" 2002, "TCPIP dns convert to ip fail" 2003, "TCPIP socket number limited" 2004, "TCPIP invalid operation" 2005, "TCPIP protocol error" 2006, "TCPIP send data too long" 2007, "TCPIP send data memory failed" 2008, "TCPIP service not in correct state " 2009, "TCPIP pdp not defined " 2010, "TCPIP new socket failed" 2011, "TCPIP socket bind fail" 2012, "TCPIP socket connect fail" 2013, "TCPIP socket send fail " 2014, "TCPIP socket close fail" 2015, "TCPIP get socket receive buffer failed" 2016, "TCPIP receive data failed" 2017, "TCPIP socket used" 2018, "TCPIP get send buffer size failed" 2019, "TCPIP socket send data failed" 2020, "TCPIP socket send data size limited" 2021, "TCPIP socket set listening mode failed" 2022, "TCPIP socket listen fail" 2023, "TCPIP socket error" 2024, "TCPIP socket not opened " 2025, "TCPIP tcp stack config failed" 2026, "TCPIP socket no data to send " 2027, "TCPIP socket send invalid data state" 2028, "TCPIP socket close client"

	2029, "TCPIP ping error " 2030, "TCPIP ppp not connected " 2031, "TCPIP mipcall not active" 2032, "TCPIP etcpip not active" 2033, "TCPIP not def4 "