

u-blox TOBY-L1 and MPCI-L1

LTE Cellular Modules

AT Commands Manual

Abstract

Description of standard and proprietary AT Commands used with u-blox TOBY-L1 and MPCI-L1 LTE cellular modules.



TOBY-L1 series



MPCI-L1 series

Document Information	
Title	u-blox TOBY-L1 and MPC-I-L1
Subtitle	LTE Cellular Modules
Document type	AT Commands Manual
Document number	UBX-13002211
Revision and date	R09 01-Mar-2016
Document status	Early Production Information

Document status explanation	
Objective Specification	Document contains target values. Revised and supplementary data will be published later.
Advance Information	Document contains data based on early testing. Revised and supplementary data will be published later.
Early Production Information	Document contains data from product verification. Revised and supplementary data may be published later.
Production Information	Document contains the final product specification.

This document applies to the following products:

Product name	Type number	Firmware version	PCN / IN reference
TOBY-L100	TOBY-L100-00S-00	G0.V.00.00.15R	UBX-14002653
MPC-I-L100	MPC-I-L100-00S-00	G0.V.01.00.03	UBX-14043301
TOBY-L100	TOBY-L100-02S-00	G0.V.01.00.05R	UBX-16005625
MPC-I-L100	MPC-I-L100-02S-00	G0.V.01.00.05R	UBX-16005625

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1 Introduction

This AT Commands Manual provides the necessary information to successfully design in and configure the applicable u-blox cellular modules.

This manual has a modular structure. It is not necessary to read it from the beginning to the end.

The following symbols are used to highlight important information within the manual:



An index finger points out key information pertaining to module integration and performance.



A warning symbol indicates actions that could negatively impact or damage the module.

1.1 Purpose

This document describes the u-blox AT Commands used for the TOBY-L1 and MPC1-L1 product families including:

1. 3GPP 27.007 when applicable
2. 3GPP 27.005 when applicable
3. ITU-T v25 when applicable
4. U-blox proprietary AT commands for M2M features and enhancements
5. Carrier specific AT commands

1.2 Definitions

In this document the following naming conventions are used:

- DCE (Data Communications Equipment) or MT (Mobile Terminal): u-blox cellular module
- DTE (Data Terminal Equipment) or TE (Terminal Equipment): terminal that sends the command to the module

u-blox TOBY-L1 and MPC1-L1 modules implement one interface between DTE and DCE, USB. The interface works as specified by the followings definitions.

1.2.1 Command Description

The AT commands configure and enable the cellular module functionalities according to 3GPP normative and u-blox specifications. The AT commands are provided to the module via a hyper terminal through a command line and are described in the following sections. A general description of each command is provided including the functionalities, the correct syntax to be provided by the TE/DTE, the allowed responses and an example. The command description defines each named parameter with its type, its range (valid / acceptable values), the default value (when available) and the factory-programmed setting (when applicable).



In this document <CR><LF> are intentionally omitted.



If a parameter is omitted, no value will be inserted between the two commas indicating the interested parameter in the command line sent by the DTE.

The following rules are used when describing the command syntax:

- <...>: Name in angle brackets is a parameter. The brackets themselves do not appear in the command line
- [...]: the square brackets represent the optional parameters of a command or an optional part of the TA information response. Brackets themselves do not appear in the command line. When a parameter is not given, the value will be set to the default value provided in the command description.

1.2.2 Default values

If the command parameters are optional, they can be left out in the command line. If not otherwise specified, the default values are assumed as follows:

- For parameters of type Number, the default value is 0
- For parameters of type String, the default value is an empty string

1.2.3 Command line

The AT commands are typically provided to the cellular modules using a command line with the following generic syntax:

"AT"<command_name><string><S3_character>

Where:

- "AT": prefix to be set at the beginning of each command line
- <command_name>: command name string; it can have a "+" character as prefix
- <string>: string consisting of the value parameters following the syntax provided in this manual
- <S3_character>: command line termination character; it can be set with AT+M3 command; the factory programmed termination character is <CR>



When writing or sending an SMS, Ctrl-Z or ESC terminates the command; <CR> is used between the two parts of the SMS (address and text).

The serial interface driver does not allow a new command until the previous one has been terminated by "OK" or by an error message.

1.2.4 Information responses and result codes

The response format command AT+V is not supported. The response format is as follows:

Information responses: <S3_character><S4_character><text><S3_character><S4_character>

Result codes: <S3_character><S4_character><verbose code><S3_character><S4_character> where

- <S3_character> is the command line termination character; it can be set with S3 command
- <S4_character> is the linefeed character, with value specified by S4 command

If the command line is successfully processed and the commands correctly executed, in verbose response format the string "OK" is sent as final result code.

Intermediate output, as well as descriptive output of a command are formatted as information responses; if more than one string has to be printed out, additional command line termination and linefeed characters may be inserted for sake of readability.

If the command is not accepted by the MT, then an error message will be displayed. The format of the error message can be set with the AT+CMEE command. In this manual it is assumed that AT+CMEE=2, which results in error messages of the format (where <err> represents the verbose result code):

- +CMS ERROR: <err> for SMS-related AT commands
- +CME ERROR: <err> for any other AT command

The most typical errors are the following:

- If the command is not supported or unknown, either "+CME ERROR: unknown" or "+CME ERROR: operation not supported" is sent
- If the command syntax is wrong, "+CME ERROR: operation not supported" is sent (" +CMS ERROR: operation not supported" for SMS related commands)

For some commands only the message "ERROR" is displayed and is documented in the command description.

1.3 AT Commands mode



Please note that during the boot sequence the AT command interface will not be available immediately. As the device goes through its boot up sequence, some AT commands will begin returning valid responses while others may return ERROR. Once the device returns an "OK" to the simple "AT" command, u-blox recommends waiting 5 seconds before issuing any other AT commands listed here.



Note that the syntax and examples given for the AT commands listed here are for informational purposes only and may not represent the exact syntax with respect to white space characters. While changes in the white space are not anticipated, it is recommended that customer designs are not dependent upon a specific sequence of white space characters.

1.3.1 Action command

An Action command is used to force the DCE to transmit information or execute a specific action for the command. A typical usage of this command mode is to provide the manufacturer settings proper of the DCE like manufacturer name, firmware version, etc.

1.3.2 Set command

A Set command is performed to set the preferred settings for the specific command. The set command is the only way to set the preferred settings in the DCE.



Unless specifically stated, settings are not stored in Non-Volatile memory and will be lost when the modem is power-cycled.

1.3.3 Read command

A Read command provides the current values of the command parameters. It is used to know the last configuration of the parameters of the command.

1.3.4 Test command

A Test command provides the complete list of the values supported by each parameter of the command.

1.3.5 Unsolicited Result Code (URC)

An unsolicited result code is a string message (provided by the DCE) which is not a response to a previous AT command and can be output, when enabled, at any time to inform the DTE of a specific event or status change. The URC can have the same name of the command that enables it (e.g. +CREG) or can be enabled by another command (e.g. unsolicited result code: +CMTI, command that enables it: +CNMI).

1.3.6 Intermediate Result Code (IRC)

An intermediate result code is a string message (provided by the DCE) which informs the DTE of the processing status of the pending AT command.

2 General commands

2.1 Device Information AT1

2.1.1 Description

This command returns the device information like Manufacturer, Model, Revision, IMEI.

Type	Syntax	Response	Example
Action	ATI	<Info> OK	Manufacturer: u-blox Model: TOBY-L100 Revision: G0.V.00.00.12R OK

2.1.2 Defined Values

Parameter	Type	Description
<Info>	String	Device Information

2.2 Request Manufacturer Identification +CGMI

2.2.1 Description

Text string, determined by the manufacturer, identifying the manufacturer.

Type	Syntax	Response	Example
Action	AT+CGMI	<manufacturer> OK	u-blox OK

2.2.2 Defined Values

Parameter	Type	Description
<manufacturer>	String	Manufacturer name

2.3 Request TA Manufacturer Identification +GMI

2.3.1 Description

Text string, determined by the manufacturer, identifying the manufacturer.

Type	Syntax	Response	Example
Action	AT+GMI	<manufacturer> OK	u-blox OK

2.3.2 Defined Values

Parameter	Type	Description
<manufacturer>	String	Manufacturer name

2.4 Request model identification +GMM

2.4.1 Description

Text string, determined by the manufacturer, identifying the model identification.

Type	Syntax	Response	Example
Action	AT+GMM	<model> OK	TOBY-L100 OK

2.4.2 Defined Values

Parameter	Type	Description
<model>	Number	Model ID.

2.5 Request model identification +CGMM

2.5.1 Description

Text string identifying the model identification.

Type	Syntax	Response	Example
Action	AT+CGMM	<model> OK	TOBY-L100 OK

2.5.2 Defined values

Parameter	Type	Description
<model>	String	Name of model

2.6 Request revision identification +GMR

2.6.1 Description

Returns the firmware version of the module.

Type	Syntax	Response	Example
Action	AT+GMR	<version> OK	G0.V.00.00.12R OK

2.6.2 Defined Values

Parameter	Type	Description
<version>	String	Firmware version of the device.

2.7 Request revision identification +CGMR

2.7.1 Description

Returns the revision identification.

Type	Syntax	Response	Example
Action	AT+CGMR	<version> OK	G0.V.00.00.11R OK

2.7.2 Defined Values

Parameter	Type	Description
<version>	String	Firmware version of the device.

2.8 Request TA serial number identification +GSN

2.8.1 Description

Return the pseudo ESN or IMEI.

Type	Syntax	Response	Example
Action	AT+GSN	<decimal value of IMEI> OK	356075050012931 OK

2.9 Request Revision identification +CGSN

2.9.1 Description

Return the pseudo ESN or IMEI.

Type	Syntax	Response	Example
Action	AT+CGSN	<decimal value of IMEI> OK	356075050012931 OK

2.10 Set TE character set +CSCS

2.10.1 Description

Selects the TE character set.

Type	Syntax	Response	Example
Set	AT+CSCS=<chset>	OK	AT+CSCS="ASCII" OK
Read	AT+CSCS?	<chset> OK	ASCII OK
Test	AT+CSCS=?	+CSCS: (list of supported <chset>'s) OK	+CSCS: ("GSM", "UCS2", "ASCII", "8859-1", "IRA") OK

2.10.2 Defined values

Parameter	Type	Description
<chset>	String	<ul style="list-style-type: none"> "GSM" GSM 7 bit default alphabet (3GPP TS 23.038 [25]); this setting causes easily software flow contro (XON/XOFF) problems. "UCS2" 16-bit universal multiple-octet coded character set (see ISO/IEC 10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99. "ASCII" ASCII 7 bit default alphabet (default) "8859-1" ISO 8859 Latin 1 character set "IRA" International reference alphabet (see ITU-T Recommendation T.50 [13]).

2.11 Request complete capabilities list +GCAP

2.11.1 Description

This command requests the list of capabilities, containing the corresponding command names. The Complete Capabilities List command indicates the major capability areas of the MT. Each area is presented by the selection command name of the specific capability area or some other predefined response.

Type	Syntax	Response	Example
Action	AT+GCAP	+GCAP: <capability_area 1>[, <capability_area 2>[...]] OK	+GCAP: +CLTE0 OK

2.11.2 Defined values

Parameter	Type	Description
<capability_area>	String	Command name or predefined response of the specific capability area In the Example +CLTE0 response text shows that all EPS commands of the present document are supported by the MT

2.12 Request international mobile subscriber identification +CIMI

2.12.1 Description

Return 15-digit IMSI (International Mobile Subscriber Identity).

Type	Syntax	Response	Example
Action	AT+CIMI	<imsi> OK	311480061485363 OK

2.12.2 Defined Values

Parameter	Type	Description
<imsi>	Number	IMSI of the device, in this format <IMSI MCC><IMSI 11_12><IMSI_S> IMSI 11_12 will have values 00, 01, 02 etc

3 Network service commands

3.1 Subscriber number +CNUM

3.1.1 Description

Returns the MSISDNs related to this subscriber. If the subscriber has different MSISDN for different services, each MSISDN is returned in a separate line.



MSISDN is read from the SIM.

Type	Syntax	Response	Example
Action	AT+CNUM	+CNUM: [<alpha1>],<number1>,<type1> [+CNUM: [<alpha2>],<number2>,<type2> [...]] OK or OK	+CNUM: ",+18589452419",145 OK

3.1.2 Defined values

Parameter	Type	Description
<alphax>	String	Associated with <numberx>; used character set i.e: GSM, UCS2, ASCII or IRA
<numberx>	String	Phone number of format specified by <typex>
<typex>	Number	Type of address, octet in Number format (145 when <numberx> string includes '+', otherwise 129)

3.2 Network registration and roaming information +CREG

3.2.1 Description

This command displays the indication of the current network registration and roaming status.

Type	Syntax	Response	Example
Set	AT+CREG=<n>	OK Or +CME ERROR: <err>	AT+CREG=0 OK
Read	AT+CREG?	+CREG: <n>,<stat>[,<tac>,<ci>[,<Act>]] OK	+CREG: 2, 1, 3603, 00D6AF01, 7 OK
Test	AT+CREG=?	+CREG: (list of supported <n>s) OK	+CREG: (0,1,2) OK
URC		+CREG: <n>,<stat>[,<tac>,<ci>[,<Act>]]	

3.2.2 Defined Values

Parameter	Type	Description
<n>	Number	0 : To disable the network registration unsolicited result code. 1 : To enable the network registration unsolicited result code +CREG: <stat> 2 (default): enable network registration and location information unsolicited result code +CREG: <stat>[,<tac>,<ci>[,<AcT>]]
<stat>	Number	Registration status 0 : not registered, MT is not currently searching a new operator to register 1 : registered, home network 2 : not registered, but MT is currently searching a new operator to register 3 : registration denied 4 : unknown (e.g. E-UTRAN coverage) 5 : registered, roaming
<tac>	String	Two byte tracking area code is a code in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	String	Four byte E-UTRAN cell ID in hexadecimal format
<AcT>	Number	Access technology of the serving cell 7 : E-UTRAN

3.3 Operator selection +COPS

3.3.1 Description

This command forces an attempt to select and register the E-UTRAN network operator. Through <mode> parameter the network selection can be performed automatically or forced by this command: the access technology is indicated in <AcT> parameter (where supported).



<format> and <oper> parameters are optional only if the value of <mode> parameter is either 0, 2 or 3.

Type	Syntax	Response	Example
Set	AT+COPS=[<mode>[,<format>[,<oper>[,<AcT>]]]]	OK	AT+COPS=0 OK
Read	AT+COPS?	+COPS: <mode>[,<format>,<oper>[,<AcT>]] OK	+COPS: 0,2,"311480" OK
Test	AT+COPS=?	+COPS: [(<stat>, long <oper>, short <oper>, numeric <oper>[,<AcT>]),(<stat>, long <oper>, short <oper>, numeric <oper>[,<AcT>]),...],(list of supported <mode>s),(list of supported <format>s) OK	+COPS: (1,"Verizon Wireless","Verizon Wireless","311480"),,(0-4),(0-2) OK

3.3.2 Defined values

Parameter	Type	Description
<mode>	Number	Is used to select whether the selection is automatically done by the MT or is forced by this command to operator <oper> given in the format <format>: 0 (default): automatic (<oper> field is ignored) (default value) 1: manual 2: deregister from network 3: set only <format> (for read command +COPS?), do not attempt registration/deregistration (<oper> and <AcT> fields are ignored); this value is not applicable in read command response 4: manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered
<format>	Number	0 (default): long format alphanumeric <oper> 1: short format alphanumeric <oper> 2: numeric <oper>
<oper>	String	long alphanumeric format can be up to 16 characters long and short format up to 8 numeric format is the GSM Location Area Identification number which consists of a three BCD digit country code plus a two BCD digit network code, which is administration specific; returned <oper> shall not be in BCD format, but in IRA characters converted from BCD; hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 3)(network code digit 2)(network code digit 1)
<stat>	Number	0 unknown 1 available 2 current 3 forbidden
<AcT>	Number	Indicates the radio access technology 7: E-UTRAN



If the antenna is not connected, the response to the test command is: +COPS:



The application/user should not rely on the set command response "OK" as a confirmation that the network selection has been performed. To determine the network registration status, rely on the URC +CREG (refer to chapter 3.2).



The command is accessible also without an inserted SIM. In this case the command AT+COPS=0 returns always ERROR because the network registration cannot be performed without the SIM, while the configuration (i.e. automatic registration) is correctly set. The set value can be checked with the command AT+COPS?.



If <mode>=4 the module starts a manual network selection; if the operation is not successful the module will start an automatic network selection and will remain in automatic mode.

3.4 Preferred operator list +CPOL

3.4.1 Description

Edits the user preferred list of networks in the active application on the UICC (LTE). On TOBY-L1 and MPC1-L1 the Access Technology lists are also provided. Set command writes an entry in the list of preferred operators ($EF_{PLMNsel}$), when the UICC is present with an active LTE application.

If <index> is given but <oper> is left out, the entry is deleted. If only <format> is given, the <oper> format in the read command is changed. On TOBY-L1 and MPC1-L1, <GSM_Act>, <GSM_Compact_Act>, <UTRAN_Act> and <E-UTRAN_Act> are required when writing user controlled PLMN selector with Access Technology ($EF_{PLMNselwAcT}$).

The read command returns all used entries from the SIM list of preferred PLMNs.

Type	Syntax	Response	Example
Set	AT+CPOL=[<index>][,<format>[,<oper>[,<GSM_Act>,<GSM_Compact_Act>,<UTRAN_Act>]]]	OK	AT+CPOL=1,2,"23415",0,1,1,0 OK
Read	AT+CPOL?	+CPOL: <index1>, <format>, <oper1>[,<GSM_Act1>,<GSM_Compact_Act1>,<UTRAN_Act1>,<E-UTRAN_Act1>] [<CR><LF> +CPOL:<index2>,<format>,<oper2>[,<GSM_Act2>,<GSM_Compact_Act2>,<UTRAN_Act2>,<E-UTRAN_Act2>] [...]] OK	+CPOL: 1, 2, "23415",0,1,1,0 +CPOL: 2, 2, "22210",0,1,1,0 +CPOL: 3, 2, "26202",0,1,1,0 +CPOL: 4, 2, "20810",0,1,1,0 +CPOL: 5, 2, "21401",0,1,1,0 +CPOL: 6, 2, "27201",0,1,1,0 +CPOL: 7, 2, "50503",0,1,1,0 OK
Test	AT+CPOL=?	+CPOL: (list of supported<index>s), (list of supported <format>s) OK	+CPOL: (1-70), (0-2) OK

3.4.2 Defined values

Parameter	Type	Description
<index> / <indexn>	Number	Represents the order number of operator in the SIM preferred operator list
<format>	Number	See also +COPS (chapter 3.3) 0: long format alphanumeric <oper> 1: short format alphanumeric <oper> 2: numeric <oper>
<oper>	Number	Format indicated by <format>
<GSM_Act>	Number	GSM access technology 0: access technology not selected 1: access technology selected
<GSM_Compact_Act>	Number	GSM compact access technology 0: access technology not selected 1: access technology selected
<UTRAN_Act>	Number	UTRAN access technology 0: access technology not selected 1: access technology selected
<EUTRAN_Act>	Number	E-UTRAN access technology 0: access technology not selected 1: access technology selected



Only <format> = 2 (numeric) is currently supported. Using long format alphanumeric or short format alphanumeric will result in an error.

3.5 Signal quality +CSQ

3.5.1 Description

Returns signal strength indication <rss> and <qual> from the MT.

Type	Syntax	Response	Example
Action	AT+CSQ	+CSQ: <rss>,<qual> OK	+CSQ: 15,0 OK
Test	AT+CSQ=?	+CSQ: (list of supported <rss>s), (list of supported <qual>s) OK	+CSQ: (0-31,99),(0-7,99) OK

3.5.2 Defined values

Parameter	Type	Description
<rss>	Number	Received Signal Strength Indication - range for GSM: 0: -113dBm or less 1: -111 dBm 2..30: from -109 to -53 dBm with 2 dBm steps 31: -51 dBm or greater 99: not known or not detectable
<qual>	Number	In GSM RAT indicates the BER (Bit Error Rate): 0..7: as RXQUAL values as described in 3GPP TS 45.008 [20] subclause 8.2.4 99: not known or not detectable

3.6 Preferred network indication +CPNET

3.6.1 Description

This command indicates whether the terminal has preference <Pref_net> for GERAN/UTRAN/E-UTRAN or GAN, see 3GPP TS 44.318 [70].

Read command returns the current preference for GERAN/UTRAN/E-UTRAN or GAN.

Test command returns the parameter indicating preference <Pref_net> for GERAN/UTRAN/E-UTRAN or GAN.

Type	Syntax	Response	Example
Set	AT+CPNET=<Pref_net>	OK or ERROR	AT+CPNET=0 OK
Read	AT+CPNET?	+CPNET: (list of supported <Pref_net>s) OK	+CPNET: 0 OK
Test	AT+CPNET=?	+CPNET: (list of supported <Pref_net>s) OK	+CPNET: (0-3) OK

3.6.2 Defined values

Parameter	Type	Description
<Pref_net>	Number	Indicates the preference for GERAN/UTRAN/E-UTRAN or GAN 0 (default): GERAN/UTRAN/E-UTRAN shall be used. The terminal uses GERAN/UTRAN/E-UTRAN coverage only 1: GAN shall be used. The terminal used GAN coverage only 2: GERAN/UTRAN/E-UTRAN preferred. The terminal prefers to stay in GERAN/UTRAN/E-UTRAN rather than GAN 3: GAN preferred. The terminal prefers to stay in GAN rather than GERAN/UTRAN/E-UTRAN



Usage of value 0 or 1 will prevent the terminal from changing between GERAN/UTRAN/E-UTRAN and GAN. E.g. setting <Pref_net> to 1 indicates that only GAN will be used, and prevent the terminal from using available GERAN/UTRAN/E-UTRAN coverage.

3.7 Read operator names +COPN

3.7.1 Description

Execute command returns the list of operator names from the MT. Each operator code <numericn> that has an alphanumeric equivalent <alphan> in the MT memory shall be returned.

Type	Syntax	Response	Example
Read	AT+COPN	+COPN: <numeric1>,<alpha1> [<CR><LF>+COPN: <numeric2>,<alpha2> [...]] OK or +CME ERROR: <err>	AT+COPN +COPN: "311480", "Verizon Wireless" OK

3.7.2 Defined Values

Parameter	Type	Description
<numericn>	String	operator in numeric format (see +COPS)
<alphan>	String	operator in long alphanumeric format (see +COPS)

3.8 Preferred network status +CPNSTAT

3.8.1 Description

Set command controls the presentation of an unsolicited result code **+CPNSTAT: <stat>** when **<n>=1** and there is a change in the preferred network indication status.

Read command returns the status of result code presentation **<n>** and an integer **<stat>** which shows whether the terminal is in GERAN/UTRAN/E-UTRAN or GAN. See 3GPP TS 44.318 [70].



Further details about registration status are available using commands +CREG and +CEREG

Test command returns the list of supported unsolicited result codes.

Type	Syntax	Response	Example
Set	AT+CPNSTAT=[<n>]	OK Or ERROR	AT+CPNSTAT =0 OK
Read	AT+CPNSTAT?	+CPNSTAT: <n>,<stat> OK	AT+CPNSTAT? +CPNSTAT: 0,1 OK
Test	AT+CPNSTAT=?	+CPNSTAT: (list of supported <n>s) OK	+CPNSTAT (0-1) OK

3.8.2 Defined values

Parameter	Type	Description
<n>	Number	0 (default) : disable preferred network indication unsolicited result code 1 : enable preferred network indication unsolicited result code +CPNSTAT: <stat>
<stat>	Number	Preferred network indication status 0 : Requested network not available 1 : GERAN/UTRAN/E-UTRAN used 2 : GAN used

4 Call control

4.1 Extended error report +CEER

4.1.1 Description

Execution command causes the TA to return one or more lines of information text <report> which should offer the user of the TA an extended report of the reason for

- the failure in the last unsuccessful call setup (originating or answering) or in-call modification;
- the last call release;
- the last unsuccessful GPRS attach or unsuccessful PDP context activation;
- the last GPRS detach or PDP context deactivation.

Typically, the text will consist of a single line containing the cause information given by GSM/UMTS network in textual format.

Type	Syntax	Response	Example
Action	AT+CEER	+CEER: <report> OK	+CEER: normal, NO CARRIER OK
Test	AT+CEER=?	OK	

4.1.2 Defined values

Parameter	Type	Description
<report>	String	The total number of characters, including line terminators, in the information text does not exceed 2041.

5 Short Messages Services

5.1 Select message service +CSMS

5.1.1 Description

Selects message service <service>. It returns the types of messages supported by the MT.

Type	Syntax	Response	Example
Set	AT+CSMS=<service>	+CSMS: <mt>,<mo>,<bm> OK	AT+CSMS=1 +CSMS: 1,1,1 OK
Read	AT+CSMS?	+CSMS: <service>,<mt>,<mo>,<bm> OK	+CSMS: 0,1,1,1 OK
Test	AT+CSMS=?	+CSMS: (list of supported <service>s) OK	+CSMS: (0-1) OK

5.1.2 Defined values

Parameter	Type	Description
<service>	Number	0 (default): Refer to 3GPP TS 23.040 [99] and 3GPP TS 23.041[100]; syntax of AT commands is compatible with 3GPP TS 27.005 [24] phase 2; phase 2+ features may be supported if no new command syntax is required 1: Refer to 3GPP TS 23.040 [99] and 3GPP TS 23.04 [100]; syntax of AT commands is compatible with 3GPP TS 27.005 [24] phase 2+
<mt>	Number	Mobile terminated messages 0: not supported 1: supported
<mo>	Number	Mobile originated messages 0: not supported 1: supported
<bm>	Number	Broadcast messages 0: not supported 1: supported



Set <service> to 1 to acknowledge an incoming message (either SMS or Status Report) with +CNMA command.



If <service> is set from 1 to 0 and one or more parameters of +CNMI command are phase 2+, switch the +CNMI parameters to phase 2 specific values before entering phase 2.

5.2 Preferred message storage +CPMS

5.2.1 Description

Selects memory storages <mem1>, <mem2> and <mem3>. If the chosen storage is supported by the MT but not suitable, the final result code +CMS ERROR: <err> should be returned.



Only ME storage is supported at this time even though test command returns both ME and SM.

Type	Syntax	Response	Example
Set	AT+CPMS=<mem1>[,<mem2>[,<mem3>]]	AT+CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> OK	AT+CPMS="ME","ME","ME" +CPMS: 0,150,0,150,0,150 OK
Read	AT+CPMS?	+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> OK	+CPMS: "ME",0,150,"ME",0,150,"ME",0,150 OK
Test	AT+CPMS=?	+CPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s) OK	+CPMS: ("ME","SM"),("ME","SM"),("ME","SM") OK

5.2.2 Defined values

Parameter	Type	Description
<mem1>	String	Memory used to read and delete messages. The supported values may vary. "ME" (default) ME message storage "SM" (U)SIM message storage
<mem2>	String	Memory used to write and send SMS. The supported values may vary. "ME" (default) ME message storage "SM" (U)SIM message storage
<mem3>	String	Memory preferred to store the received SMS. The supported values may vary. "ME" (default) ME message storage "SM" (U)SIM message storage
<used1>	Number	Number of used message locations in <mem1>
<total1>	Number	Total number of message locations in <mem1>
<used2>	Number	Number of used message locations in <mem2>
<total2>	Number	Total number of message locations in <mem2>
<used3>	Number	Number of used message locations in <mem3>
<total3>	Number	Total number of message locations in <mem3>

5.3 Preferred message format +CMGF

5.3.1 Description

Indicates to MT which input and output format of messages shall be used.



It is strongly recommended that text mode be used. In the case where this is not possible due to incompatibility of MT messages from some non-3GPP2 carriers, see section 5.13 PDU Mode. One such known issue is with receiving SMS messages from AT&T network devices.

Type	Syntax	Response	Example
Set	AT+CMGF=[<mode>]	OK	AT+CMGF=1 OK
Read	AT+CMGF?	+CMGF: <mode> OK	+CMGF: 1 OK
Test	AT+CMGF=?	+CMGF: (list of supported <mode>s) OK	+CMGF: (0,1) OK

5.3.2 Defined values

Parameter	Type	Description
<mode>	Number	Indicates the format of messages used with send, list, read and write commands and URCs resulting from receiving SMS's messages: 0: PDU mode 1 (default): text mode

5.4 List message +CMGL

5.4.1 Description

Returns SMS messages with status value <stat> from message storage <mem1> to the DTE. If status of the received message is "received unread", status in the storage changes to "received read".

Type	Syntax	Response	Example
Set	Text mode (+CMGF=1): AT+CMGL[=<stat>]	<p>Command successful and SMS-DELIVERs:</p> <p>+CMGL: <index>,<stat>,<oa/da>,[<alpha>],[<scts>],[<tooa/toda>,<length>]<data>[</p> <p>+CMGL: <index>,<stat>,<da/oa>,[<alpha>],[<scts>],[<tooa/toda>,<length>]<CR><LF><data>[...]]</p> <p>OK</p> <p>Command successful and SMS-STATUS-REPORTs:</p> <p>+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[</p> <p>+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[...]]</p> <p>OK</p> <p>Command successful and SMS-COMMANDs:</p> <p>+CMGL: <index>,<stat>,<fo>,<ct>[</p> <p>+CMGL: <index>,<stat>,<fo>,<ct>[...]]</p> <p>OK</p> <p>Command successful and CBM storage:</p> <p>+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages> <data>[</p> <p>+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages> <data>[...]]</p> <p>OK</p>	<p>AT+CMGL</p> <p>+CMGL: 1,"REC READ","7605226262",,"13/11/18,15 :19:34"</p> <p>Test</p> <p>OK</p>
Test	AT+CMGL=?	<p>+CMGL: (list of supported <stat>s)</p> <p>OK</p>	<p>+CMGL: ("ALL","REC UNREAD","REC READ","STO UNSENT","STO SENT")</p> <p>OK</p>

5.4.2 Defined values

Parameter	Type	Description
<stat>	String	Indicates the status of message in memory "REC UNREAD" received unread SMS messages "REC READ" received read SMS messages "STO UNSENT" stored unsent SMS messages "STO SENT" stored sent SMS messages "ALL" all SMS messages (default)
<index>	Number	Storage position
<oa>	String	Originator address
<alpha>	String	Alphanumeric representation of <da> or <a> corresponding to the entry found in the phonebook <i>3GPP TS 24.008</i> [8]. The parameter is not managed.
<scts>	String	Service center time stamp in time-string format "yy/MM/dd,hh:mm:ss"; the time is expressed in local time
<tooa>	Number	Type of address of <oa> - octet
<length>	Number	Two meanings: in text mode: number of characters in PDU mode: PDU's length in octets without the Service Center's address. In example: 03912143 0100038166F6000004E374F80D : this is a PDU with Service Center's number +1234, that generates the address 03912143 (4 octets). Thus in this case <length> = 13.
<data>	String	This is the User-Data in text mode
<da>	String	Destination address
<toda>	Number	Type of address of <da> - octet
<fo>	Number	First octet of the SMS TPDU (see <i>3GPP TS 23.040</i> [99])
<mr>	Number	Message reference
<ra>	String	Recipient address field
<tora>	Number	Type of address of <ra> - octet
<dt>	String	Discharge time in format
<st>	Number	Status of an SMS STATUS-REPORT
<ct>	Number	TP-Command-Type (default 0)
<sn>	Number	CBM serial number
<mid>	Number	CBM message identifier
<page>	Number	<i>3GPP TS 23.041</i> [100] CBM Page Parameter bits 4-7 in integer format
<pages>	Number	<i>3GPP TS 23.041</i> [100] CBM Page Parameter bits 0-3 in integer format

5.5 Read message +CMGR

5.5.1 Description

Returns the message with location value <index> from message storage <mem1> to the DTE.



If the <index> value is out of range (it depends on AT+CPMS command setting) or it refers to an empty position, then the error "+CMS ERROR: invalid memory index" is returned.

Type	Syntax	Response	Example
Set	Text mode (+CMGF=1): AT+CMGR=<index>	(SMS-DELIVER) Command successful and SMS-DELIVER: +CMGR: <stat>,<oa>,<[alpha]>,<scts>,<tooa>,<fo>,<pid>,<dcsc>,<sca>,<tosca>,<length> <data> OK Command successful and SMS-SUBMIT: +CMGR: <stat>,<da>,<[alpha]>,<toda>,<fo>,<pid>,<dcsc>,<[vp]>,<sca>,<tosca>,<length> <data> OK Command successful and SMS-STATUS-REPORT: +CMGR: <stat>,<fo>,<mr>,<[ra]>,<[tora]>,<scts>,<dt>,<st> OK Command successful and SMS-COMMAND: +CMGR: <stat>,<fo>,<ct>,<[pid]>,<[mn]>,<[da]>,<[toda]>,<length> <[cdata]> OK Command successful and CBM storage: +CMGR: <stat>,<sn>,<mid>,<dcsc>,<page>,<pages> <data> OK	AT+CMGR=1 +CMGR: "REC READ", "7605226262", "13/11/21,11 :41:27" Test OK
Test	AT+CMGR=?	OK	

5.5.2 Defined values

Parameter	Type	Description										
<index>	Number	Storage position										
<stat>	Number	0: in PDU mode or "REC UNREAD" in text mode: received unread SMS 1: in PDU mode or "REC READ" in text mode: received read SMS 2: in PDU mode or "STO UNSENT" in text mode: stored unsent SMS 3: in PDU mode or "STO SENT" in text mode: stored sent SMS 4: in PDU mode or "ALL" in text mode: all SMS messages										
<oa>	String	Originator address										
<alpha>	String	Alphanumeric representation of <da> or <a> corresponding to the entry found in the phonebook 3GPP TS 24.008 [12]. The parameter is not managed.										
<scts>	String	Service center time stamp in time-string format, refer to <dt>										
<tooa>	Number	Type of address of <oa> - octet										
<fo>	Number	First octet of the SMS TPDU (see 3GPP TS 23.040 [99])										
<pid>	Number	TP-Protocol-Identifier (default 0); refer to 3GPP TS 23.040 [99]										
<dcs>	Number	Data Coding Scheme										
<sca>	String	Service center address field										
<tosca>	Number	Type of address of <sca> - octet in Number format (for more details refer to 3GPP TS 24.008 [12]); default 145 when string includes '+', otherwise default 129										
<length>	Number	Two meanings: in text mode: number of characters in PDU mode: PDU's length in octets without the Service Center's address. In example:03912143 0100038166F6000004E374F80D : this is a PDU with Service Center's number +1234, that generates the address 03912143 (4 octets). Thus in this case <length> = 13.										
<data>	String	This is the User-Data in text mode										
<da>	String	Destination address										
<toda>	Number	Type of address of <da> - octet										
<vp>	Number	Format depending of the <fo> setting: Relative format: validity period starting from when the SMS is received by the SMSC, in range 0-255 (default value 167); for more details refer to 3GPP TS 23.040 [99] <table><tr><td><vp></td><td>Validity period value</td></tr><tr><td>0 to 143</td><td>(TP-VP + 1) x 5 minutes (i.e. 5 minutes intervals up to 12 hours)</td></tr><tr><td>144 to 167</td><td>12 hours + ((TP-VP -143) x 30 minutes)</td></tr><tr><td>168 to 196</td><td>(TP-VP - 166) x 1 day</td></tr><tr><td>197 to 255</td><td>(TP-VP - 192) x 1 week</td></tr></table> Absolute format: absolute time of the validity period termination in string format ("yy/MM/dd,hh:mm:ss+zz") (refer to 3GPP TS 23.040 [99]); the time zone is expressed in steps of 15 minutes	<vp>	Validity period value	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
<vp>	Validity period value											
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											
<mr>	Number	Message reference										
<ra>	String	Recipient address field										
<tora>	Number	Type of address of <ra> - octet										
<dt>	String	Discharge time in format "yy/MM/dd,hh:mm:s"; the time is expressed in local time										
<st>	Number	Status of an SMS STATUS-REPORT										
<ct>	Number	TP-Command-Type (default 0)										

Parameter	Type	Description
<mn>	Number	Refer to <i>3GPP TS 23.040</i> [99] TP-Message-Number in integer format
<cdata>	String	TP-Command-Data in text mode responses
<sn>	Number	CBM serial number
<mid>	Number	CBM message identifier
<page>	Number	<i>3GPP TS 23.041</i> [100] CBM Page Parameter bits 4-7 in integer format
<pages>	Number	<i>3GPP TS 23.041</i> [100] CBM Page Parameter bits 0-3 in integer format
<pdu>	String	Protocol data unit: each 8-bit octet is presented as two IRA character long hexadecimal numbers, e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)

5.6 Send message +CMGS

5.6.1 Description

Sends message from a DTE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the DTE on successful message delivery.

Type	Syntax	Response	Example
Set	Text mode (+CMGF=1): AT+CMGS=<da>[,<toda>]<CR> <text><ctrl-Z>	> +CMGS: <mr> OK	AT+CMGS="7605226262"<CR> >"This is the text"<Ctrl-Z> +CMGS:2 OK
Test	AT+CMGS=?	OK	



In Text Mode (+CMGF=1) the entered text is preceded by a '>' (Greater-Than sign) character, and this shows that the interface is in "text enter" mode.

5.6.2 Defined values

Parameter	Type	Description
<da>	String	Destination address
<toda>	Number	Type of address of <da> - octet
<text>	String	SMS String
<mr>	Number	Message reference

5.7 Write message to memory +CMGW

5.7.1 Description

Stores message (SMS-DELIVER or SMS-SUBMIT) to memory storage. Memory location <index> of the stored message is returned.<CR> separates the parameter part from the text part of the edited SMS in text mode.

Type	Syntax	Response	Example
Set	Text mode (+CMGF=1): AT+CMGW=[<oa/da>[,<tooa/toda>] >[,<stat>]]<CR> <text><Ctrl-Z>	> +CMGW: <index> OK	AT+CMGW="7605226262"<CR> >"This is the text"<Ctrl-Z> +CMGW: 4 OK
Test	AT+CMGW=?	OK	



In Text Mode (+CMGF=1) the entered text is preceded by a '>' (Greater-Than sign) character, and this indicates that the interface is in "text enter" mode.

5.7.2 Defined values

Parameter	Type	Description
<da>	String	3GPP TS 23.040 [99] TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007 [101]); type of address given by <toda>
<oa>	String	3GPP TS 23.040 [99] TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007 [101]); type of address given by <tooa>
<tooa>	Number	3GPP TS 24.011 [102] TP-Originating-Address Type-of-Address octet in integer format (default value: refer to <toda>)
<toda>	Number	3GPP TS 24.011 [102] TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)
<stat>	Number or String	Number type in PDU mode (default value: 2), or string type in text mode (default value: "STO UNSENT"); indicates the status of message in memory 0: in PDU mode or "REC UNREAD" in text mode: received unread SMS messages 1: in PDU mode or "REC READ" in text mode: received read SMS messages 2: in PDU mode or "STO UNSENT" in text mode: stored unsent SMS messages 3: in PDU mode or "STO SENT" in text mode: stored sent SMS messages
<text>	String	SMS String
<index>	Number	Storage position
<length>	Number	Two meanings: in text mode: number of characters in PDU mode: PDU's length in octets without the Service Center's address. In example: 03912143 0100038166F6000004E374F80D : this is a PDU with Service Center's number +1234, that generates the address 03912143 (4 octets). Thus in this case <length>=13.
<PDU>	String	Protocol Data Unit: each 8-bit octet of the PDU must be written as two IRA character long hexadecimal numbers, e.g. octet with integer value 42 must be written as two characters 2A (IRA 50 and 65)

5.8 Send message from storage +CMSS

5.8.1 Description

Sends message with location value <index> from the preferred message storage to the network (SMS-SUBMIT or SMS-COMMAND). If a new recipient address <da> is given for SMS-SUBMIT, it will be used instead of the one stored with the message. Reference value <mr> is returned to the DTE on successful message delivery.

Type	Syntax	Response	Example
Set	Text mode (+CMGF=1):: AT+CMSS=<index>[,<da>[,<toda> >]]	+CMSS: <mr> OK	AT+CMSS=3 +CMSS: 3 OK
Test	AT+CMSS=?	OK	

5.8.2 Defined values

Parameter	Type	Description
<index>	Number	Storage position
<da>	String	Destination address
<toda>	Number	Type of address of <da> - octet
<mr>	Number	Message reference

5.9 Set text mode parameters +CSMP

5.9.1 Description

Selects values for additional parameters needed when SMS is sent to the network or placed in storage when text format message mode is selected. For more details refer to *3GPP TS 23.038* [25] and *3GPP TS 23.040* [99].

Type	Syntax	Response	Example
Set	AT+CSMP=<fo>,<vp>[,<pid>[,<dc s>]]	OK	AT+CSMP=1,169,0,0 OK
Read	AT+CSMP?	+CSMP: <fo>,<vp>,<pid>,<dc > OK	+CSMP: 1,169,0,0 OK
Test	AT+CSMP=?	+CSMP: (list of supported <fo>),(list of supported <vp>),(list of supported <pid>),(list of supported <dc>) OK	+CSMP: (1,17),(0-255),(0),(0) OK

5.9.2 Defined values

Parameter	Type	Description																									
<fo>	Number	First octet of the SMS TPDU (see 3GPP TS 23.040 [99])																									
<vp>	Number	<div>Format depending on the values of the bit3/bit4 of the <fo> (SMS-SUBMIT case):<table><tr><th>bit 3</th><th>bit 4</th><th>Format</th></tr><tr><td>0</td><td>0</td><td>Validity period not present</td></tr><tr><td>0</td><td>1</td><td>Validity period present, relative format</td></tr><tr><td>1</td><td>0</td><td>Reserved</td></tr><tr><td>1</td><td>1</td><td>Validity period present, absolute format</td></tr></table><div>Relative format: validity period, counted from when the SMS-SUBMIT is received by the SMSC, in range 0-255 (default value 169); for more details refer to 3GPP TS 23.040 [99]</div><table><tr><th><vp></th><th>Validity period value</th></tr><tr><td>0 to 143</td><td>(TP-VP + 1) x 5 minutes (i.e. 5 minutes intervals up to 12 hours)</td></tr><tr><td>144 to 167</td><td>12 hours + ((TP-VP -143) x 30 minutes)</td></tr><tr><td>168 to 196</td><td>(TP-VP - 166) x 1 day</td></tr><tr><td>197 to 255</td><td>(TP-VP - 192) x 1 week</td></tr></table></div>	bit 3	bit 4	Format	0	0	Validity period not present	0	1	Validity period present, relative format	1	0	Reserved	1	1	Validity period present, absolute format	<vp>	Validity period value	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
bit 3	bit 4	Format																									
0	0	Validity period not present																									
0	1	Validity period present, relative format																									
1	0	Reserved																									
1	1	Validity period present, absolute format																									
<vp>	Validity period value																										
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																										
<pid>	Number	TP-Protocol-Identifier (default 0); refer to 3GPP TS 23.040 [99]																									
<dcs>	Number	Data Coding Scheme. Default value is 0																									

5.10 Delete SMS +CMGD

5.10.1 Description

Deletes message from preferred message storage, if <flag> = 0 or not present, in location <index>. Otherwise the messages are deleted following the rules specified by <flag>.



When deleting a message from an empty location, the modem returns "OK".



If the <index> value is out of range (it depends on AT+CPMS command setting), then the error "+CMS ERROR: invalid memory index" is returned.

Type	Syntax	Response	Example
Set	AT+CMGD=<index>[,<flag>]	OK	AT+CMGD=3 OK
Test	AT+CMGD=?	+CMGD: (list of supported <index>s),(list of supported <flag>s) OK	+CMGD: (1 - 150),(0-4) OK

5.10.2 Defined values

Parameter	Type	Description
<index>	Number	Storage position
<flag>	Number	<p>Deletion flag. If present, and different from 0, <index> is ignored:</p> <p>0 (default value): Delete the message specified in <index></p> <p>1: Delete all read messages from preferred message storage, leaving unread messages and stored mobile originated messages (whether sent or not) untouched</p> <p>2: Delete all read messages from preferred message storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched</p> <p>3: Delete all read messages from preferred message storage, sent and unsent mobile originated messages leaving unread messages untouched.</p> <p>4: Delete all messages from preferred message storage including unread</p>

Parameter	Type	Description
		messages.

5.11 Service center address +CSCA

5.11.1 Description

Updates the SMSC address, through which mobile originated SMS's are transmitted. In text mode the setting is used by send and write commands. In PDU mode the setting is used by the same commands, but only when the length of SMSC address coded into <pdu> parameter equals zero.



This command sets the service center value both in the RAM (this value is actually the SMSC address used) and in the SIM card. Through the read command the value of current service center stored in the RAM is displayed. At the power on, the MT reads the SMSC address in the SIM card and the same value is set in RAM.

Type	Syntax	Response	Example
Set	AT+CSCA=<sca>[,<tosca>]	OK	AT+CSCA="+19037029920",145 OK
Read	AT+CSCA?	+CSCA: <sca>,<tosca> OK	+CSCA: "+19037029920" OK
Test	AT+CSCA=?	OK	

5.11.2 Defined values

Parameter	Type	Description
<sca>	String	Service center address
<tosca>	String	Type of address of <sca> (for more details refer to 3GPP TS 24.008 [12]); default 145 when string includes '+', otherwise default 129

5.12 New message indication +CNMI

5.12.1 Description

Selects the procedure to indicate the reception of a new SMS. All SMS classes are supported accordingly.



Currently, no buffering of URCs is supported. URCs will always be forwarded to the DTE.

Type	Syntax	Response	Example
Set	AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	OK	AT+CNMI=1,1 OK
Read	AT+CNMI?	+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr> OK	+CNMI: 1,1,1,2,1 OK
Test	AT+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	+CNMI: (1),(0-2),(0-2),(0-2),(0-1) OK

Type	Syntax	Response	Example
URC		+CMTI: <mem>,<index>	
URC		+CMT: <oa>,<[alpha]>,<scts>,<[tooa]>,<fo>,<pid>,<dcsc>,<[sca]>,<[tosca]>,<length>]<CR><LF><data>	
URC		+CBMI: <mem>,<index>	
URC		+CBM: <sn>,<mid>,<dcsc>,<page>,<pages><CR><LF><data>	
URC		+CDS: <fo>,<mr>,<[ra]>,<[tora]>,<scts>,<dt>,<st>	
URC		+CDSI: <mem>,<index>	

5.12.2 Defined values

Parameter	Type	Description
<mode>	Number	Controls the processing of URCs specified within this command: 0: buffer URCs in the MT; if the MT buffer is full, the oldest indication may be discarded and replaced with the new received indications (ring buffer) 1 (default value): discard indication and reject new received message URCs when MT-DTE link is reserved; otherwise forward them directly to the DTE 2: buffer URCs in the MT when the serial link is busy (e.g. data-transfer); otherwise forward them directly to the DTE
<mt>	Number	Specifies the rules for managing the received SMS according the message's DCS (Data Coding Scheme): 0: No SMS-DELIVER indications are routed to the TE 1 (default value): if SMS-DELIVER is stored in MT, indication of the memory location is routed to the DTE using the +CMTI URC 2: SMS-DELIVER (except class 2 SMS) are routed directly to the DTE (but not saved in the module file system or SIM memory) using the +CMT URC. If MT has its own display device then class 0 SMS and SMS in the message waiting indication group (discard message) may be copied to both MT display and to DTE. In this case MT 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 DTE using URCs defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1
<bm>	Number	Specifies the rules for managing the received Cell Broadcast messages: 0: No CBM indications to the DTE 1 (default value): if CBM is stored in RAM/NVRAM by MT, an indication of the used memory location is routed to DTE using the +CBMI URC 2: new CBMs are routed directly to the DTE using the +CBM URC 3: Class 3 CBMs are routed directly to DTE using URCs defined in <bm>=2. If CBM storage is supported, messages of other classes result in indication as defined in <bm>=1
<ds>	Number	Specifies the rules for managing the Status Report messages: 0: No SMS-STATUS-REPORTs are routed to the DTE 1: SMS-STATUS-REPORTs are routed to the DTE using the +CDS URC 2 (default value): if SMS-STATUS-REPORT is stored into MT, indication of the memory location is routed to the DTE using the +CDSI URC
<bfr>	Number	Controls the buffering of URCs: 0: MT buffer of URCs defined within this command is flushed to the DTE when <mode> 1...3 is entered (OK response shall be given before flushing the codes). 1 (default value): MT buffer of URCs defined within this command is cleared when

Parameter	Type	Description
		<mode> 1...3 is entered
<mem>	String	Same as defined in 5.2
<index>	Number	Storage position
<length>	Number	Two meanings: in text mode: number of characters in PDU mode: PDU's length in octets without the Service Center's address. In example: 039121430100038166F6000004E374F80D: this is a PDU with Service Center's number +1234, that generates the address 03912143 (4 octets). Thus in this case <length>=13.
<pdu>	String	Protocol data unit: each 8-bit octet is presented as two IRA character long hexadecimal numbers, e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)
<oa>	String	Originator address
<scts>	String	Service center time stamp in time-string format, refer to <dt>
<data>	String	User-Data in text mode
<sn>	Number	CBM serial number
<mid>	Number	CBM message identifier
<dcS>	Number	Data Coding Scheme
<page>	Number	CBM Page Parameter bits 4-7 in integer format as described in 3GPP TS 23.041 [100]
<pages>	Number	CBM Page Parameter bits 0-3 in integer format as described in 3GPP TS 23.041 [100]
<fo>	Number	First octet of the SMS TPDU (see 3GPP TS 23.040 [99])
<mr>	Number	Message reference
<ra>	String	Recipient address field
<tora>	Number	Type of address of <ra> - octet
<dt>	String	Discharge time in format "yy/MM/dd,hh:mm:ss+zz"; the time zone is expressed in steps of 15 minutes
<st>	Number	Status of a SMS STATUS-REPORT



The incoming SMS URC indications will be displayed only on the AT interface where the last +CNMI was set. As general rule, the +CNMI command should be issued by the DTE:



After start-up



After using the Z



Whenever the incoming SMS URCs indications are requested on a different AT interface

5.13 PDU Mode



SMS functionality is severely limited in PDU mode (+CMGF=0). Listed below are the only AT commands that work in PDU mode. All other SMS AT commands will return ERROR. It is not possible to store messages on the DCE in PDU mode. It is up to the host to manage storing MO and MT SMS messages in this mode.

5.13.1 Send message +CMGS

5.13.1.1 Description

Sends message from a DTE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the DTE on successful message delivery.

Type	Syntax	Response	Example
Set	PDU mode (+CMGF=0): AT+CMGS=<length><CR> <pdu><ctrl-Z>	> +CMGS: <mr> OK	AT+CMGS=29<CR> > 00000210020407029DA9489898800 80D00032000A00106102C8CBB366F <Ctrl-Z> +CMGS:2 OK
Test	AT+CMGS=?	OK	

5.13.1.2 Defined values

Parameter	Type	Description
<length>	Number	Number of octets in the PDU
<pdu>	Hexadecimal	Hexadecimal PDU

5.13.2 SMS Deliver +CMT

5.13.2.1 Description

When in PDU mode, MT SMS messages are routed directly to the Host via this URC. The message is not stored in memory nor on the USIM.

Type	Syntax	Response	Example
URC	PDU mode (+CMGF=0): +CMT: [<alpha>],<length><CR><LF> <pdu>		+CMT: ,40<CR><LF> 00000210020207029DA9489898800 8180003114A600106102C8CBB366F 0306141113140908080100

5.13.2.2 Defined values

Parameter	Type	Description
<alpha>	String	Alphanumeric representation of <da> or <oa> corresponding to the entry found in MT phonebook <not applicable>
<length>	Number	Number of octets in the PDU
<pdu>	Hexadecimal	Hexadecimal PDU

5.13.3 PDU Encoding and Decoding

Below is a brief description of the PDU encoding and decoding scheme. It is not an exhaustive list of all the data that can go into or come from a SMS PDU. For a complete description of the SMS PDU please see [\[105\]](#). Below we will show encoding and decoding using examples.

5.13.3.1 Encoding

Item	Length (bits)	Values	Value Definition
SMS_MSG_TYPE	8	00000000	SMS Point-to-Point
PARAMETER_ID	8	00000000	Teleservices ID

Item	Length (bits)	Values	Value Definition
PARAMETER_LEN	8	00000000	2 octets
Parameter Data	16	10000000 00000010	4098 – Wireless Messaging Teleservice (WMT)
PARAMETER_ID	8	00000100	4 – Destination address
PARAMETER_LEN	8	00000111	7 octets for 10 digit address
DIGIT_MODE	1	0	
NUMBER_MODE	1	0	
NUM_FIELDS	8	00001010	10 semi-octets
CHARi	40	0111	7
		0110	6
		1010	0
		0101	5
		0101	5
		0101	5
		0001	1
		0010	2
		0001	1
		0010	2
FILL BITS	6	000000	Needed to complete a full octet
PARAMETER_ID	8	00001000	8 – Bearer Data
PARAMETER_LEN	8	00001101	13 – octets need to send following bearer data
SUBPARAMETER_ID	8	00000000	Message Identifier
SUBPARAM_LEN	8	00000011	3 octet
MESSAGE_TYPE	4	0010	2 - Submit
MESSAGE_ID	16	00000000 00000000	All zeros
HEADER_IND	1	0	No Header in User Data
FILL BITS	3	000	Needed to complete a full octet
SUBPARAMETER_ID	8	00000001	User Data
SUBPARAM_LEN	8	00000110	6 octets to send 5 7-bit ASCII characters
MSG_ENCODING	5	00010	7 bit ACSII
NUM_FIELDS	8	000000101	5 7bit ASCII chars
CHARi	35	1001000	H
		1000101	E
		1001100	L
		1001100	L
		1001111	O
FILL BITS	0		Needed to complete a full octet

The above example will look like this:

AT+CMGS=29

> 00000210020407029DA955448480080D00032000000106102C88B3264F

5.13.3.2 Decoding

Item	Length (bits)	Values	Value Definition
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Item	Length (bits)	Values	Value Definition
SMS_MSG_TYPE	8	00000000	SMS Point-to-Point
PARAMETER_ID	8	00000000	Teleservices ID
PARAMETER_LEN	8	00000000	2 octets
Parameter Data	16	10000000 00000010	4098 – Wireless Messaging Teleservice (WMT)
PARAMETER_ID	8	00000010	2 – Originating address
PARAMETER_LEN	8	00000111	7 octets for 10 digit address
DIGIT_MODE	1	0	
NUMBER_MODE	1	0	
NUM_FIELDS	8	00001010	10 semi-octets
CHARi	40	0111	7
		0110	6
		1010	0
		0101	5
		0101	5
		0101	5
		0001	1
		0010	2
		0001	1
		0010	2
FILL BITS	6	000000	Needed to complete a full octet
PARAMETER_ID	8	00001000	8 – Bearer Data
PARAMETER_LEN	8	00011000	24 – octets need to send following bearer data
SUBPARAMETER_ID	8	00000000	Message Identifier
SUBPARAM_LEN	8	00000011	3 octet
MESSAGE_TYPE	4	0001	1 - Deliver
MESSAGE_ID	16	01111111 00011010	7F1A – set by Messaging Servicing Center
HEADER_IND	1	0	No Header in User Data
FILL BITS	3	000	Needed to complete a full octet
SUBPARAMETER_ID	8	00000001	User Data
SUBPARAM_LEN	8	00000110	6 octets to send 5 7-bit ASCII characters
MSG_ENCODING	5	00010	7 bit ASCII
NUM_FIELDS	8	000000101	5 7bit ASCII chars
CHARi	35	1001000	H
		1000101	E
		1001100	L
		1001100	L
		1001111	O
FILL BITS	0		Needed to complete a full octet
SUBPARAMETER_ID	8	00000011	3 – Message Center Timestamp
SUBPARAM_LEN	8	00000110	6 octets
YEAR	8	00010100	14
MONTH	8	00010001	11
DAY	8	00010011	13

Item	Length (bits)	Values	Value Definition
HOURS	8	00010011	13
MINUTES	8	01010100	54
SECONDS	8	00100100	24
SUBPARAMETER_ID	8	00001000	8 - Priority Indicator
SUBPARAM_LEN	8	00000001	1 octet
PRIORITY	8	00000000	0 - Normal

The above example will look like this:

+CMT: ,40

00000210020407029DA9554484800818000317F1A00106102C88B3264F0306141113135424080100

6 Security

6.1 Facility lock +CLCK

6.1.1 Description

Used to lock, unlock or interrogate an MT or a network facility <fac>. Password is normally needed to do such actions. When querying the status of a network service (<mode>=2) the response line for "not active" case (<status>=0) should be returned only if service is not active for any <class>. The command is abortable if network facilities are set or interrogated.



For <fac> "PN", "PU", "PP", "PC" and "PS" only <mode>=0 and <mode>=2 (unlock and query status) are always supported.



For <fac> "PN", "PU", "PP", "PC" and "PS" <mode>=1 (lock status) is supported only if proper re-activation characteristic is enabled during personalization.

Type	Syntax	Response	Example
Set	AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]]	OK or +CLCK: <status>[,<class1> [+CLCK: <status>[,<class1> [...]]	AT+CLCK="SC",1,"0933" OK
Test	AT+CLCK=?	+CLCK: (list of supported <fac>s) OK	+CLCK: ("SC","PN","PU","PP","PC","PS") OK

6.1.2 Defined values

Parameter	Type	Description
<fac>	String	Facility values "SC": SIM (lock SIM card) "PN": Network Personalisation (refer to 3GPP TS 22.022[33]) "PU": network sUbset Personalisation (refer to 3GPP TS 22.022[33]) "PP": service Provider Personalisation (refer to 3GPP TS 22.022[33]) "PC": Corporate Personalisation (refer to 3GPP TS 22.022[33]) "PS": SIM/USIM Personalisation (refer to 3GPP TS 22.022[33])
<mode>	Number	0: unlock 1: lock 2: query status
<status>	Number	0: not active 1: active
<passwd>	String	Shall be the same as password specified for the facility from the MT user interface or with command +CPWD (for more details refer to chapter 6.2)

Parameter	Type	Description
<class>	Number	Sum of numbers each representing a class of information. Default value is 7 (voice + data + fax) 1: voice 2: data 4: FAX 8: short message service 16: data circuit sync 32: data circuit async 64: dedicated packet access 128: dedicated PAD access

6.2 Change password +CPWD

6.2.1 Description

Sets a new password for the facility lock function defined by command +CLCK. The command is abortable if a character is sent to DCE during the command execution.

Type	Syntax	Response	Example
Set	AT+CPWD=<fac>,<oldpwd>,<newpwd>	OK	AT+CPWD="SC","0933","0934" OK
Test	AT+CPWD=?	+CPWD: list of available (<fac>,<pwdlength>s) OK	+CPWD: ("SC",8),("P2",8),("PN",16),("PU",16),("PP",16),("PC",16),("PS",16) OK

6.2.2 Defined values

Parameter	Type	Description
<fac>	String	"SC" SIM PIN; refer to Facility Lock +CLCK (chapter 6.1.2) for other values
<oldpwd>	String	Old password
<newpwd>	String	New password
<pwdlength>	Number	Maximum length of password (digits)



An error message will be provided during the changing of the PIN code if the PIN check is enabled through AT+CLCK.

6.3 Enter PIN +CPIN

6.3.1 Description

Enter PIN. If no PIN request is pending, the corresponding error code is returned. If a wrong PIN is given three times, the PUK must be entered in place of the PIN, followed by the <newpin> which replaces the old pin in the SIM.

Type	Syntax	Response	Example
Set	AT+CPIN=<pin>[,<newpin>]	OK	AT+CPIN="0933" OK

Type	Syntax	Response	Example
Read	AT+CPIN?	+CPIN: <code>	+CPIN: READY
		OK	OK

6.3.2 Defined values

Parameter	Type	Description
<pin>, <newpin>	String	4-to-8 characters long string of decimal digits. If only PIN is required, <newpin> is not to be entered. If PUK is required, <pin> must be the PUK and <newpin>, the new PIN code, must be entered as well.
<code>	String	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 SIM PIN2: MT is waiting SIM PIN2 to be given SIM PUK2: MT is waiting SIM PUK2 to be given PH-NET PIN: MT is waiting network personalization password to be given PH-NETSUB PIN: MT is waiting network subset personalization password to be given PH-SP PIN: MT is waiting service provider personalization password to be given PH-CORP PIN: MT is waiting corporate personalization password to be given PH-SIM PIN: MT is waiting phone to SIM/UICC card password to be given



If PIN is not inserted the following situation can occur:

AT+CMEE=2

OK

AT+COPS=0

+CME ERROR: SIM PIN required

AT+CMEE=0

OK

AT+COPS=0

ERROR



How to change the PIN: to change the PIN the user must use the AT+CPWD="SC",<old_pin>,<new_pin> command (see par.6.2 for details).

Example:

AT+CPWD="SC","1234","4321"

7 Mobile Termination control and status

7.1 Set phone functionality +CFUN

7.1.1 Description

Selects level of functionality <fun> in the MT.



If the syntax +CFUN=16 (reset) are used, the rest of the command line, placed after that, will be ignored.

Type	Syntax	Response	Example
Set	AT+CFUN=<fun>[,<rst>]	OK	AT+CFUN=1 OK
Read	AT+CFUN?	+CFUN: <power_mode>,<STK_mode> OK	+CFUN: 1,0 OK
Test	AT+CFUN=?	+CFUN: (list of supported <fun>'s),(list of supported <rst>'s) OK	+CFUN: (0,1,4,16),(0-1) OK

7.1.2 Defined values

Parameter	Type	Description
<fun>	Number	Selected functionality <ul style="list-style-type: none"> 0: sets the MT to minimum functionality (disable both transmit and receive RF circuits) 1 (default): sets the MT to full functionality, e.g. from airplane mode or minimum functionality (factory-programmed setting) 4: disables both transmit and receive RF circuits (i.e. "airplane mode") 16: MT silent reset (with detach from network and saving of NVM parameters), with reset of the SIM card
<rst>	Number	Reset mode. This parameter can be used only when <fun> is 1 or 4. <ul style="list-style-type: none"> 0 (default value): do not reset the MT before setting it to the selected <fun>, and save it in NVM for using also at every power on from now on 1: reset the MT before setting it to the selected <fun> (which is used only once)
<power_mode>	Number	<ul style="list-style-type: none"> 0: MT is switched on with minimum functionality 1: MT is switched on 4: MT is in "airplane mode"

7.2 Switch off MT +CPWROFF

7.2.1 Description

This command powers off the modem by means of the modem software. This command should always be used to power down the module.



Powering off the modem by simply removing the power supply is not recommended for the TOBY-L100 module and should be avoided. Removing power to the MPCI-L100 is acceptable and expected in normal use.



+CPWROFF does not switch off the MPCI-L100.



After ending the CPWROFF command an OK is returned before the power down process is started. So it's prudent to wait at least 5 seconds before commencing communication with the modem again.

Type	Syntax	Response	Example
Action	AT+CPWROFF	OK	Shut down the MT and return OK.
Test	AT+CPWROFF=?	OK	OK. But do not shut down the MT.

7.3 List all available AT commands +CLAC

7.3.1 Description

Causes the MT to return one or more lines of AT commands that are available for the DTE user. Each line contains one AT command.

Type	Syntax	Response	Example
Action	AT+CLAC	<AT command 1> [<AT command 2> [...]] OK	
Test	AT+CLAC=?	OK	

7.3.2 Defined values

Parameter	Type	Description
<AT command>	String	AT command name

7.4 Report mobile termination error +CMEE

7.4.1 Description

Enables or disables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the MT. When enabled, MT related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters or MT functionality.

Type	Syntax	Response	Example
Set	AT+CMEE=[<n>]	OK	AT+CMEE=2 OK
Read	AT+CMEE?	+CMEE: <n> OK	+CMEE: 0 OK
Test	AT+CMEE=?	+CMEE: (list of supported <n>s) OK	+CMEE: (0-2) OK

7.4.2 Defined values

Parameter	Type	Description
<n>	Number	0 (default): disable +CME ERROR: <err> result code and use ERROR instead 1: enable +CME ERROR: <err> result code and use numeric <err> values 2: enable +CME ERROR: <err> result code and use verbose <err> values



When +CMEE=2 selected, the following convention is valid:

- If the error code is related to a parameter not covered by the GSM/ETSI or u-blox specification, the value <error>="operation not supported" shall be used

- If the MT is in a state which does not allow performing the entered command, the value <error>="operation not allowed" shall be used

7.5 Restricted SIM access +CRSM

7.5.1 Description

Allows easy access to the SIM database. Set command transmits to the MT the SIM <command> and its required parameters. MT handles internally all SIM-MT interface locking and file selection routines. As response to the command, MT sends the actual SIM information parameters and response data. MT error result code +CME ERROR may be returned when the command cannot be passed to the SIM, but the failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters.

Type	Syntax	Response	Example
Set	AT+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]	+CRSM: <sw1>,<sw2>[,<response>] OK	AT+CRSM=176,28471,0,0,3 +CRSM: 144,0,"989301770020594178F2" OK
Test	AT+CRSM=?	OK	OK

7.5.2 Defined values

Parameter	Type	Description
<command>	Number	176: read binary 178: read record 192: get response 214: update binary 220: update record 242: status
<fileid>	Number	Identifies elementary datafile on SIM. Mandatory for every command except STATUS (e.g. 28423: meaning IMSI file (6F07))
<P1>, <P2>, <P3>	Number	Defines the request. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in <i>GSM TS 11.11</i> [18].
<data>	String	Information which shall be written to the SIM (hexadecimal character format; refer to +CSCS (refer to chapter 4.5) – string containing hexadecimal characters)
<pathid>	String	Contains the path of an elementary file on the SIM/UICC in hexadecimal format as defined in <i>ETSI TS 102 221</i> [103].e.g. "7F205F70" in SIM and UICC case). The <pathid> shall only be used in the mode "select by path from MF" as defined in <i>ETSI TS 102 221</i> [103]
<sw1>, <sw2>	Number	Contains SIM information about the execution of the actual command and can be (more details in <i>GSM TS 11.11</i> [104]): 0x90 0x00: normal ending of the command 0x9F 0xXX: length XX of the response data 0x92 0x0X: command 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 condition not fulfilled / unsucc. CHV verify / authent.failed 0x98 0x08: in contradiction with CHV status 0x98 0x10: in contradiction with invalidation status

Parameter	Type	Description
		0x98 0x40: unsucc. CHV-verif. or UNBLOCK CHV-verif. / CHV blocked /UNBL.blocked 0x98 0x50: increase cannot be performed. Max. value reached 0x67 0xXX: incorrect parameter P3 0x6B 0xXX: incorrect parameter P1 or P2 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>	String	The response of successful completion of the command previously issued (hexadecimal character format; refer to +CSCS - chapter 2.10). STATUS and GET RESPONSE return data, which gives information about the current elementary datafield. This information includes the type of file and its size (refer to <i>GSM TS 11.11</i> [104]). 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.

7.6 Phone activity status +CPAS

7.6.1 Description

Returns the activity status <pas> of the MT.

Type	Syntax	Response	Example
Action	AT+CPAS	+CPAS: <pas> OK	+CPAS: 0 OK
Test	AT+CPAS=?	+CPAS: (list of supported <pas>s) OK	+CPAS: (0-5) OK

7.6.2 Defined values

Parameter	Type	Description
<pas>	Number	0: ready (MT allows commands from DTE) 1: unavailable (MT does not allow commands from DTE) 2: unknown (MT is not guaranteed to respond to instructions) 3: ringing (MT is ready for commands from DTE, but the ringer is active) 4: call in progress (MT is ready for commands from DTE, but a call is in progress, e.g. call active, hold, disconnecting) 5: asleep (ME is unable to process commands from DTE because it is in a low functionality state)

7.7 Clock +CCLK

7.7.1 Description

Sets the real-time clock of the MT.

Type	Syntax	Response	Example
Set	AT+CCLK=<time>	OK	AT+CCLK=13/11/33,01:47:00-32 OK
Read	AT+CCLK?	+CCLK: <time> OK	+CCLK: 13/11/33,01:47:00-32 OK

7.7.2 Defined values

Parameter	Type	Description
-----------	------	-------------

Parameter	Type	Description
<time>	String	Format is yy/MM/dd,hh:mm:ss±TZ. Characters indicate year, month, day, hour, minutes, seconds, time zone.



"TZ:" The Time Zone information is represented by two digits; the display of TZ for query contains always this.



The Time Zone information is expressed in steps of 15 minutes.

7.8 Extended signal quality +CESQ

7.8.1 Description

Execution command returns received signal quality parameters. If the current serving cell is not a GERAN cell, <rxlev> and <ber> are set to value 99. If the current serving cell is not a UTRA FDD or UTRA TDD cell, <rscp> is set to 255. If the current serving cell is not a UTRA FDD cell, <ecno> is set to 255. If the current serving cell is not an E-UTRA cell, <rsrq> and <rsrp> are set to 255.

Refer subclause 14.2 for possible <err> values.

Test command returns values supported as compound values.

Type	Syntax	Response	Example
Set	AT+CESQ	+CESQ: <rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp> +CME ERROR: <err>	
Test	AT+CESQ=?	+CESQ: (list of supported <rxlev>s),(list of supported <ber>s),(list of supported <rscp>s),(list of supported <ecno>s),(list of supported <rsrq>s),(list of supported <rsrp>s)	

7.8.2 Defined Value

Parameter	Type	Description
<rxlev>	Number	Received signal strength level (see 3GPP TS 45.008 [20] subclause 8.1.4) 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>	Number	channel bit error rate (in percent) 0...7 : as RXQUAL values in the table in 3GPP TS 45.008 [20] subclause 8.2.4 99 : not known or not detectable
<rscp>	Number	Received signal code power (see 3GPP TS 25.133 [95] subclause 9.1.1.3 and 3GPP TS 25.123 [96] subclause 9.1.1.1.3). 0 : Ec/Io < -24 dB 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>	Number	Ratio of the received energy per PN chip to the total received power spectral density (see

Parameter	Type	Description
		3GPP TS 25.133 [95] subclause).
		0 : No zero compression
		1 : $-24 \text{ dB} \leq E_c/I_o < -23.5 \text{ dB}$
		2 : $-23.5 \text{ dB} \leq E_c/I_o < -23 \text{ dB}$
		:: ::
		47 : $-1 \text{ dB} \leq E_c/I_o < -0.5 \text{ dB}$
		48 : $-0.5 \text{ dB} \leq E_c/I_o < 0 \text{ dB}$
		49 : $0 \text{ dB} \leq E_c/I_o$
		255 : not known or not detectable
<rsrq>	Number	Reference signal received quality (see 3GPP TS 36.133 [96] subclause 9.1.7).
		0 : $\text{rsrq} < -19.5 \text{ dB}$
		1 : $-19.5 \text{ dB} \leq \text{rsrq} < -19 \text{ dB}$
		2 : $-19 \text{ dB} \leq \text{rsrq} < -18.5 \text{ dB}$
		:: ::
		32 : $-4 \text{ dB} \leq \text{rsrq} < -3.5 \text{ dB}$
		33 : $-3.5 \text{ dB} \leq \text{rsrq} < -3 \text{ dB}$
		34 : $-3 \text{ dB} \leq \text{rsrq}$
		255 : not known or not detectable
<rsrp>	Number	Received signal code power (see 3GPP TS 25.133 [95] subclause 9.1.1.3 and 3GPP TS 25.123 [96] subclause 9.1.1.1.3).
		0 : $\text{rsrp} < -140 \text{ dBm}$
		1 : $-140 \text{ dBm} \leq \text{rsrp} < -139 \text{ dBm}$
		2 : $-139 \text{ dBm} \leq \text{rsrp} < -138 \text{ dBm}$
		:: ::
		95 : $-46 \text{ dBm} \leq \text{rsrp} < -45 \text{ dBm}$
		96 : $-45 \text{ dBm} \leq \text{rsrp} < -44 \text{ dBm}$
		97 : $-44 \text{ dBm} \leq \text{rsrp}$
		255 : not known or not detectable

8 V24 control and V25ter

These commands, unless specifically stated, do not implement set syntax using "=", read ("?"), or test ("=?"). If such commands are used, an error message is displayed.

8.1 Reset to default configuration Z

8.1.1 Description

Resets the DCE and loads into the current profile the settings stored in the NVRAM profile.

When the command is issued, any CSD call in progress is released. In case of success, the response is issued using the default configuration of the result codes format (Q, V, S3, S4 commands). The other DCE settings are applied after the response has been sent.

Type	Syntax	Response	Example
Action	ATZ	OK	

8.2 Command line termination character S3

8.2.1 Description

Sets a value representing the decimal IRA5 value of the character recognized by the DCE from the DTE, to terminate the incoming command line. It is also generated by the DCE as part of the header, trailer and terminator for result codes and information text, along with the S4 setting.

Type	Syntax	Response	Example
Set	ATS3=<value>	OK	ATS3=13 OK
Read	ATS3?	<value> OK	013 OK

8.2.2 Defined values

Parameter	Type	Description
<value>	Number	Range 0 to 127. Answer to Read command is in "xxx" format. Default value: 013 (ASCII carriage return (CR, IRA5 0/13)).

8.3 Response formatting character S4

8.3.1 Description

Sets a value representing the decimal IRA5 value of the character generated by the DCE as part of the header, trailer and terminator for result codes and information text, along with the S3 setting.

Type	Syntax	Response	Example
Set	ATS4=<value>	OK	ATS4=10 OK
Read	ATS4?	<value> OK	010 OK

8.3.2 Defined values

Parameter	Type	Description
<value>	Number	Range 0 to 127. Answer to Read command is in "xxx" format. Default is 10 (line feed (LF, IRA5 0/10))

8.4 Command line editing character S5

8.4.1 Description

Sets a value representing the decimal IRA5 character recognized by the DCE as a request to delete from the command line the immediately preceding character.

Type	Syntax	Response	Example
Set	ATS5=<value>	OK	ATS5=8 OK
Read	ATS5?	<value> OK	008 OK

8.4.2 Defined values

Parameter	Type	Description
<value>	Number	Range 0 to 127. Answer to Read command is in "xxx" format. Default value: 8 (ASCII backspace (BS, IRA5 0/8))

8.5 Command echo E

8.5.1 Description

Controls whether or not the MT echoes characters received from the DTE during command state.

Type	Syntax	Response	Example
Set	ATE[<value>]	OK	ATE1 OK

8.5.2 Defined values

Parameter	Type	Description
<value>	Number	0: echo off 1 (default value): echo on

9 Commands for Packet Domain

9.1 EPS network registration status +CEREG

9.1.1 Description

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.

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 and technology elements **<tac>**, **<ci>** and **<Act>** are returned only when **<n>=2** and MT is registered in the network.



If the EPS MT also supports circuit mode services and/or GPRS services, the **+CEREG** 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

Type	Syntax	Response	Example
Set	AT+CEREG=<n>	OK +CME ERROR : <err>	AT+CEREG=2 OK
Read	AT+CEREG?	+CEREG: <n>,<stat>[,<tac>,<ci>[,<Act>]] OK	+CEREG: 2, 1, 3603, 00D6AF01, 7 OK
Test	AT+CEREG=?	+CEREG: (0,1,2) OK	

9.1.2 Defined Values

Parameter	Type	Description
<n>	Number	0 (default) : disable network registration unsolicited result code 1 : enable network registration unsolicited result code +CEREG: <stat> 2 : enable network registration and location information unsolicited result code +CEREG: <stat>[, <tac>, <ci>[, <Act>]]
<stat>	Number	numeric parameter that indicates the 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
<tac>	String	two byte tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	String	four byte GERAN/UTRAN/E-UTRAN cell ID in hexadecimal format
<Act>	Number	numeric parameter that indicates the access technology of the serving cell 0 : GSM 1 : GSM Compact 2 : UTRAN 3 : GSM w/EGPRS (see NOTE 1) 4 : UTRAN w/HSDPA (see NOTE 2) 5 : UTRAN w/HSUPA (see NOTE 2) 6 : UTRAN w/HSDPA and HSUPA (see NOTE 2) 7 :E-UTRAN



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

9.2 PDP Context Read Dynamic Parameters +CGCONTRDP

9.2.1 Description

The execution command returns the relevant information <bearer_id>, <apn>, <source_addr and subnet_mask>, <gw_addr>, <DNS_prim_addr>, <DNS_sec_addr>, <P-CSCF_prim_addr> and <PCSCF_sec_addr> for a non secondary PDP Context established by the network with the primary context identifier <cid>. If the context cannot be found an ERROR response is returned.

If the MT has dual stack capabilities, two lines of information are returned per <cid>. First one line with the IPv4 parameters followed by one line with the IPv6 parameters.



If the parameter <cid> is omitted, the relevant information for all established PDP contexts are returned.



The test command returns a list of <cid>s associated with active contexts.

Type	Syntax	Response	Example
Set	AT+CGCONTRDP=[<cid>]	+CGCONTRDP : <cid>,<bearer_id>,<apn>[,<source_addr and subnet_mask>,<gw_addr>,<DNS_prim_addr>[,<DNS_sec_addr>,<P-CSCF_prim_addr>,<P-CSCF_sec_addr>]]]]] [<CR><LF>+CGCONTRDP: <cid>,<bearer_id>,<apn>,<source_addr and subnet_mask>[,<gw_addr>,<DNS_prim_addr>,<DNS_sec_addr>,<P-CSCF_prim_addr>,<P-CSCF_sec_addr>]]]]] [...]]	
Read	AT+CGCONTRDP=?	+CGCONTRDP: (list of <cid>s associated with active contexts)	

9.2.2 Defined Values

Parameter	Type	Description
<cid>	Number	a numeric parameter which specifies a particular non secondary PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands
<bearer id>	Number	a numeric parameter which identifies the bearer, i.e. the EPS bearer in EPS and the NSAPI in UMTS/GPRS.
<APN>	String	a string parameter which is a logical name that was used to select the GGSN or the external packet data network.
<source_addr and subnet_mask>	String	string type. It shows the IP address and subnet mask of the MT. The string is given as dot-separated numeric (0-255) parameters on the form: "a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or "a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16", for IPv6.

Parameter	Type	Description
<gw_addr>	String	a string parameter which shows the gateway address of the MT. The string is given as dot-separated numeric (0-255) parameters.
<DNS_prim_addr>	String	a string parameter which shows the IP address of the primary DNS server.
<DNS_sec_addr>	String	a string parameter which shows the IP address of the secondary DNS server.
<P_CSCF_prim_addr>	String	a string parameter which shows the IP address of the primary P-CSCF server.
<P_CSCF_sec_addr>	String	a string parameter which shows the IP address of the secondary P-CSCF server.

9.3 Secondary PDP Context Read Dynamic Parameters +CGSCONTRDP

9.3.1 Description

The execution command returns <p_cid> and <bearer_id> for a given <cid>. If the context cannot be found an **ERROR** response is returned.

If the parameter <cid> is omitted, the <cid>, <p_cid> and <bearer_id> are returned for all established PDP contexts.



In EPS, the Traffic Flow parameters are returned.



The test command returns a list of <cid>s associated with active contexts.



Parameters for network initiated PDP contexts are returned as well. The dynamic part of the PDP context will only exist if established by the network

Type	Syntax	Response	Example
Set	AT+CGSCONTRDP=[<cid>]	+CGSCONTRDP : <cid>,<p_cid>,<bearer_id> [<CR><LF>+CGSCONTRDP: <cid>,<p_cid>,<bearer_id> [...]]	
Read	AT+CGSCONTRDP=?	+CGSCONTRDP: (list of <cid>s associated with active contexts)	

9.3.2 Defined Values

Parameter	Type	Description
<cid>	Number	a numeric parameter which specifies a particular non secondary PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands
<bearer id>	Number	a numeric parameter which identifies the bearer, i.e. the EPS bearer in EPS and the NSAPI in UMTS/GPRS.
<p_cid>	Number	a numeric parameter which specifies a particular PDP context definition or default EPS context Identifier which has been specified by use of the +CGDSCONT command. The parameter is local to the TE-MT interface (see the +CGDSCONT command).

9.4 Traffic Flow Template Read Dynamic Parameters +CGTFTRDP

9.4.1 Description

The execution command returns the relevant information about Traffic Flow Template of <cid> together with the additional network assigned values when established by the network. If the context cannot be found an **ERROR** response is returned. If the parameter <cid> is omitted, the Traffic Flow Templates for all established PDP contexts are returned. Parameters of both network and MT/TA initiated PDP contexts will be returned.



The test command returns a list of <cid>s associated with active contexts.

Type	Syntax	Response	Example
Set	AT+CGTFTRDP=[<cid>]	<p>+ CGTFTRDP : <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>,<NW packet filter Identifier></p> <p>[<CR><LF>+CGTFTRDP: <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>,<NW packet filter Identifier> [...]]</p>	
Read	AT+CGTFTRDP=?	+ CGTFTRDP: (list of <cid>s associated with active contexts)	

9.4.2 Defined Values

Parameter	Type	Description
<cid>	Number	a numeric parameter which specifies a particular PDP context definition or Traffic Flows definition (see +CGDCONT and +CGDSCONT commands).
<packet filter identifier>	Number	The value range is from 1 to 16.
<evaluation precedence index>	String	The value range is from 0 to 255.
<source_addr and subnet_mask>	String	string type. It shows the IP address and subnet mask of the MT. The string is given as dot-separated numeric (0-255) parameters on the form: "a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or "a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16", for IPv6.
<protocol number (ipv4) / next header (ipv6)>	Number	value range from 0 to 255.
<Destination port range>	String	The string is given as dot-separated numeric (0-65535) parameters on the form "f.t".
<source port range>	String	The string is given as dot-separated numeric (0-65535) parameters on the form "f.t".
<ipsec security parameter index (spi)>	Number	numeric value in hexadecimal format. The value range is from 00000000 to FFFFFFFF.
<type of service (tos) (ipv4) and mas / traffic class (ipv6) and mask >	String	The string is given as dot-separated numeric (0-255) parameters on the form "t.m".
<flow label (ipv6)>	Number	numeric value in hexadecimal format. The value range is from 00000 to FFFFF. Valid for IPv6 only.
<direction>	Number	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)

Parameter	Type	Description
		1 : Uplink 2 : Downlink 3 : Bidirectional (Used for Uplink and Downlink)
<NW packet filter Identifier>	Number	The value range is from 1 to 16. In EPS the value is assigned by the network when established.



Some of the above listed attributes can co-exist in a Packet Filter while others mutually exclude each other. The possible combinations are shown in 3GPP TS 23.060 [47]

9.5 Define EPS Quality of Service +CGEQOS

9.5.1 Description

The set command allows the TE to specify the EPS Quality of Service parameters <cid>, <QCI>, [<DL_GBR> and <UL_GBR>] and [<DL_MBR> and <UL_MBR>] for a PDP context or Traffic Flows. When in UMTS/GPRS the MT applies a mapping function to UMTS/GPRS Quality of Service. Refer subclause 9.2 for <err> values.

A special form of the set command, +CGEQOS=<cid> causes the values for context number <cid> to become undefined.

The read command returns the current settings for each defined QoS.



The test command returns the ranges of the supported parameters.

Type	Syntax	Response	Example
Set	AT+CGEQOS=[<cid>[,<QCI>[,<DL_GBR>,<UL_GBR>[,<DL_MBR>,<UL_MBR>]]]]	OK +CME ERROR: <err>	
Read	AT+CGEQOS?	+CGEQOS: <cid>,<QCI>[,<DL_GBR>,<UL_GBR>],<DL_MBR>,<UL_MBR>] [<CR>>LF]+CGEQOS: <cid>,<QCI>[,<DL_GBR>,<UL_GBR>],<DL_MBR>,<UL_MBR>] [...]	
Test	AT+CGEQOS=?	+CGEQOS: (range of supported <cid>s), (list of supported <QCI>s) <DL_GBR>s),(list of supported <UL_GBR>s),(list of supported <DL_MBR>s),(list of supported <UL_MBR>s)	

9.5.2 Defined Values

Parameter	Type	Description
<cid>	Number	a numeric parameter which specifies a particular EPS Traffic Flows definition in EPS and a PDP Context definition in UMTS/GPRS (see the +CGDCONT and +CGDSCONT commands).
<QCI>	Number	a numeric parameter that specifies a class of EPS QoS. (see 3GPP TS 23.203 [85]) 0 : QCI is selected by network [1 – 4] : value range for guaranteed bit rate Traffic Flows [5 – 9] : value range for non-guaranteed bit rate Traffic Flows
<DL_GBR>	Number	a numeric parameter which indicates DL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])
<UL_GBR>	Number	a numeric parameter which indicates UL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])

Parameter	Type	Description
<DL_MBR>	Number	a numeric parameter which indicates DL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])
<UL_MBR>	Number	a numeric parameter which indicates UL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])

9.6 EPS Quality of Service Read Dynamic Parameters +CGEQOSRDP

9.6.1 Description

The execution command returns the Quality of Service parameters <QCI>, [<DL_GBR> and <UL_GBR>] and [<DL_MBR> and <UL_MBR>] of the established PDP Context associated to the provided context identifier <cid>. If the context cannot be found an **ERROR** response is returned.

If the parameter <cid> is omitted, the Quality of Service parameters for all established PDP contexts are returned.

The test command returns a list of <cid>s associated with active contexts.



Parameters of both network and MT/TA initiated PDP contexts will be returned.

Type	Syntax	Response	Example
Read	AT+CGEQOSRDP=<cid>	+CGEQOSRDP: <cid>,<QCI>,<DL_GBR>,<UL_GBR>,<DL_MBR>,<UL_MBR> [<CR>>LF]+CGEQOSRDP: <cid>,<QCI>,<DL_GBR>,<UL_GBR>,<DL_MBR>,<UL_MBR> [...]]	
Test	AT+CGEQOSRDP=?	+CGEQOSRDP: (list of <cid>s associated with active contexts)	

9.6.2 Defined Values

Parameter	Type	Description
<cid>	Number	a numeric parameter which specifies a particular EPS Traffic Flows definition in EPS and a PDP Context definition in UMTS/GPRS (see the +CGDCONT and +CGDSCONT commands).
<QCI>	Number	a numeric parameter that specifies a class of EPS QoS. (see 3GPP TS 23.203 [85]) 0 : QCI is selected by network [1 – 4] : value range for guaranteed bit rate Traffic Flows [5 – 9] : value range for non-guaranteed bit rate Traffic Flows
<DL_GBR>	Number	a numeric parameter which indicates DL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])
<UL_GBR>	Number	a numeric parameter which indicates UL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])
<DL_MBR>	Number	a numeric parameter which indicates DL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])
<UL_MBR>	Number	a numeric parameter which indicates UL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])

9.7 UE modes of operation for EPS + CEMODE

9.7.1 Description

The set command is used to set the MT to operate according to the specified mode of operation for EPS, see 3GPP TS 24.301 [83]. If the requested mode of operation is not supported, an **ERROR** or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

The read command returns the mode of operation set by the TE, independent of the current serving cell capability and independent of the current serving cell Access Technology.



The test command is used for requesting information on the supported MT mode of operation.

Type	Syntax	Response	Example
Set	AT+CEMODE=[<mode>]	OK ERROR	
Read	AT+CEMODE?	+CEMODE : <mode>	
Test	AT+CEMODE=?	+CEMODE : <list of supported modes>	

9.7.2 Defined Values

Parameter	Type	Description
<mode>	Number	a numeric parameter which indicates the mode of operation 0 (default) :PS mode 2 of operation 1 :CS/PS mode 1 of operation 2 :CS/PS mode 2 of operation 3 :PS mode 1 of operation



The definition for UE modes of operation can be found in 3GPP TS 24.301 [83].



Other values are reserved and will result in an **ERROR** response to the set command.

9.8 PDP Context Modify +CGCMOD

9.8.1 Description

The execution command is used to modify the specified PDP context(s) with respect to QoS profiles and TFTs. After the command has completed, the MT returns to V.250 online data state. If the requested modification for any specified context cannot be achieved, an **ERROR** or **+CME ERROR** response is returned. Extended error responses are enabled by the **+CMEE** command.

For EPS, the modification request for an EPS bearer resource will be answered by the network by an EPS bearer modification request. The request must be accepted by the MT before the PDP context is effectively changed.



If no <cid>s are specified the activation form of the command modifies all active contexts.



The test command returns a list of <cid>s associated with active contexts.

Type	Syntax	Response	Example
Set	AT+CGCMOD=[<cid>[,<cid>[,...]]]	OK ERROR	
Read	AT+CGCMOD=?	+CGCMOD: (list of <cid>s associated with active contexts)	

9.8.2 Defined Values

Parameter	Type	Description
<cid>	Number	a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).

10 GPRS/PSD

10.1 Define PDP context +CGDCONT

10.1.1 Description

Define the connection parameters for a PDP context, identified by the local context identification parameter <cid>. If the command is used only with parameter <cid>, the corresponding PDP context becomes undefined. The maximum number of definable PDP contexts is 8.

 **The SET command is not supported. The embedded connection manager sets the PDP contexts with the values from the Verizon Wireless standard APN list in normal operating mode.**

 Use %VZWAPNE to change values for the PDP contexts.

 PAP and CHAP prefixes of the APN string are not displayed in the response of the read command.

 The three PDP types allowed are IP (for IPv4), IPv6 and IPv4V6 (for dual IPv4 and IPv6 support)

Type	Syntax	Response	Example
Set	AT+CGDCONT=[<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>]]]]	OK	AT+CGDCONT=1,"IP","APN_name", "1.2.3.4",0 OK
Read	AT+CGDCONT?	+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp> OK	+CGDCONT: 1,"IPV4V6","VZWIMS","0.0.0.0",,,,,4 , +CGDCONT: 2,"IPV4V6","VZWADMIN",,,,,, +CGDCONT: 3,"IPV4V6","VZWINTERNET",,,,,, OK
Test	AT+CGDCONT=?	+CGDCONT: (range of <cid>s),<PDP_type>,...(list of supported <d_comp>s) OK	+CGDCONT: (1-8),"IP",,...(0-3),(0-4),(0-2) OK

10.2 Define Secondary PDP context +CGDSCONT

10.2.1 Description

This command specifies particular PDP context parameter values for a secondary PDP context, identified by the local context identification parameter <cid>, associated to a primary PDP context identified by the local context identification parameter <p_cid>.

 Secondary PDP contexts are not supported on the Verizon network.

 If only the parameter <cid> is provided, the corresponding PDP context becomes undefined.

Type	Syntax	Response	Example
Set	AT+CGDSCONT=[<cid>,<p_cid>,<d_comp>,<h_comp>]]]]	OK	AT+CGDSCONT=2,1 OK

Type	Syntax	Response	Example
Read	AT+CGDSCONT?	+CGDSCONT: <cid>,<p_cid>,<d_comp>,<h_comp> [+CGDSCONT: <cid>,<p_cid>,<d_comp>,<h_comp> [...]] OK	+CGDSCONT: 2,1,0,0 OK
Test	AT+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) [+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), [...]] OK	+CGDSCONT: (1-3),(1), "IP" ..., (0-2), (0-4) OK

10.3 Traffic Flow Template +CGTFT

10.3.1 Description

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 (refer to *3GPP TS 23.060* [10] and *3GPP TS 24.008* [30]). A TFT is identified by a <packet filter identifier> and each packet filter also has an <evaluation precedence index>. The set command specifies a Packet Filters to be added to the TFT stored in the MT and used for the context identified by <cid>. This command is effectively an extension of the commands +CGDCONT and +CGDSCONT.

The syntax +CGTFT=<cid> causes all of the Packet Filters in the TFT for the specified <cid> to become undefined. TFT shall be used for PDP-type IP.

Not all the parameters combinations are allowed in a Packet Filter, some may coexist but others are mutually exclusive. The possible combinations are specified in *3GPP TS 23.060* [10].



A valid packet filter must contain a unique identifier and a unique evaluation precedence index within all TFTs for one PDP address. The network will reject the activation of a secondary context if the corresponding packet filter contains an identifier or an evaluation precedence index which is not unique within all TFTs for one PDP address.

Type	Syntax	Response	Example
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Type	Syntax	Response	Example
Set	AT+CGDCONT or AT+CGDSCONT are needed previously AT+CGTFT=[<cid>,<packet_filter_id entifier>,<evaluation_precedence_in dex>,<source_address_and_subnet _mask>,<protocol_number_(ipv4)- next_header_(ipv6)>,<destination_p ort_range>,<source_port_range>,< ipsec_security_parameter_index_(spi >,<type_of_service_(tos)_(ipv4)_and _mask- traffic_class_(ipv6)_and_mask>,<flo w_label (ipv6)>]]]]]]]]]	OK	AT+CGTFT=2,1,1,"109.115.1 83.216.255.255.0.0" OK
Read	AT+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)> OK	+CGTFT: 2,1,1,109.115.183.216[255.2 55.0.0],0,0,0,0,00000000,0 .0,00000 OK
Test	AT+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) [+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) [...] OK	+CGTFT: "IP",(1-16),(0- 255),(0-255),(0-255),(0- 65535),(0- 65535),(00000000- FFFFFFFF),(0-255),(00000- FFFFF),(1-3) OK

10.4 GPRS attach or detach +CGATT

10.4.1 Description

Register (attach) the MT to, or deregister (detach) the MT from the EPS service. After this command the MT remains in AT command mode. If the MT is already in the requested state (attached or detached), the command is ignored and OK is returned. If the requested state cannot be reached, an ERROR is returned. The command can be aborted if a character is sent to DCE during the command execution. Any active PDP context will be automatically deactivated when the EPS registration state changes to detached.



THIS COMMAND IS NO LONGER SUPPORTED. USE AT%CMATT INSTEAD.



If embedded connection manager auto-connect is enabled (eCM), this command will have no effect. The device will automatically attach to the EPS network and a detach command will only cause a temporary detach.

Type	Syntax	Response	Example
Set	AT+CGATT=[<state>]	ERROR	AT+CGATT=1 ERROR
Read	AT+CGATT?	+CGATT: <state> OK	+CGATT: 1 OK
Test	AT+CGATT=?	+CGATT: (list of supported <state>s) OK	+CGATT: (0-1) OK

10.5 PDP context activate or deactivate +CGACT

10.5.1 Description

Activates or deactivates the specified PDP context. After the command the MT remains in AT command mode. If any context is already in the requested state, the state for the context remains unchanged. If the required action cannot succeed, an error is returned. If the MT is not EPS attached when the activation of a PDP context is required, the MT first performs a EPS attach and then attempts to activate the specified context.

Type	Syntax	Response	Example
Set	AT+CGACT=[<status>,<cid>[,...]]	OK	AT+CGACT=1,1 OK
Read	AT+CGACT?	If no context is defined: OK For any defined context: +CGACT: <cid>,<status> OK	+CGACT: 1,1 OK
Test	AT+CGACT=?	+CGACT: (list of supported <status>s) OK	+CGACT: (0-1) OK



<status> is an optional parameter, default value: 0 (deactivated).



If <cid> not defined, the command activates or deactivates all defined PDP contexts.



Do not enter this command when using internal PDP contexts (see chapter 21).



The number of PDP contexts defined with AT+CGDCONT plus the number of contexts activated with +UPSDA cannot exceed three. Any further request to define a context with AT+CGDCONT or to activate a context with +UPSDA generates an error.

10.6 Show PDP address +CGPADDR

10.6.1 Description

Returns a list of PDP addresses for the specified context identifiers. Only defined PDP contexts are displayed.

Type	Syntax	Response	Example
Set	AT+CGPADDR=[<cid>[,<cid> [...]]]	+CGPADDR: <cid>,<PDP_addr> OK	AT+CGPADDR=1 +CGPADDR: 1,"1.2.3.4" OK
Test	AT+CGPADDR=?	+CGPADDR: [(list of defined <cid>s)] OK	+CGPADDR: 1,3 OK

11 Specific

11.1 Select wireless network +WS46

11.1.1 Description

PCCA STD-101 [17] includes a command to select the cellular network (Wireless Data Service; WDS) to operate with the MT. PCCA calls this WDS-Side Stack Selection. This command may be used when the MT is asked to indicate the networks in which it can operate.

Type	Syntax	Response	Example
Set	AT+WS46=[<n>]	<n> OK	AT+WS46=28 28 OK
Read	AT+WS46?	<n> OK	28 OK
Test	AT+WS46=?	(list of supported <n>s) OK	28 OK

11.1.2 Defined values

Parameter	Type	Description
<n>	Number	WDS-Side Stack Selection indication and may be: 12: GSM digital cellular (Single mode GSM) 22: UTRAN only (Single mode UMTS) 25: 3GPP Systems (GERAN, UTRAN and E-UTRAN) 28: E-UTRAN only 29: GERAN and UTRAN 30: GERAN and E-UTRAN 31: UTRAN and E-UTRAN



Any change in the WDS-Side stack selection must be done during detached state.

11.2 Generic SIM access +CSIM

11.2.1 Description

Allows direct control of the SIM by a distant application on the TE. This command transparently transmits the <command> to the SIM via the MT. The <response> is returned in the same manner to the TE.



It is recommended to wait some seconds after boot (or reset) before using AT+CSIM command.

Type	Syntax	Response	Example
Set	AT+CSIM=<length>,<command>	+CSIM: <length>,<response> OK	AT+CSIM=4,"4330" +CSIM: 4,"6F00" OK
Test	AT+CSIM=?	OK	OK

11.2.2 Defined values

Parameter	Type	Description
<length>	Number	Length of the characters that are sent to TE in <command> or <response>
<command>	String	Command passed on by MT to SIM in hex format; refer to 3GPP TS 51.011 [18]
<response>	String	Response to the command passed on by the SIM to the MT (3GPP TS 51.011 [18])

11.3 Selection of preferred PLMN list +CPLS

11.3.1 Description

Selects one PLMN selector with Access Technology list in the SIM card or active application in the UICC (GSM or USIM), that is used by +CPOL command.

The set command selects a list in the SIM/USIM. The read command returns the selected PLMN selector list from the SIM/USIM

The test command returns the whole index range supported lists by the SIM/USIM.

Type	Syntax	Response	Example
Set	AT+CPLS=[<list>]	OK	
Read	AT+CPLS?	+CPLS: <list> OK	+CPLS: 1 OK
Test	AT+CPLS=?	+CPLS: (list of supported <list>s) OK	+CPLS: (0-2) OK

11.3.2 Defined values

Parameter	Type	Description
<list>	Number	0 (default): User controlled PLMN selector with Access Technology EFPLMNwAcT, if not found in the SIM/UICC then PLMN preferred list EFPLMNsel (this file is only available in SIM card or USIM application selected in UICC) 1: Operator controlled PLMN selector with Access Technology EFOPLMNwAcT 2: HPLMN selector with Access Technology EFHPLMNwAcT

11.4 Edit APN Table +VZWAPNE

11.4.1 Description

Write command causes the APN table on the DUT to be overwritten. One write command must be issued for each APN edit.

If command fails, +CME ERROR: <err> is returned. Refer to 3GPP TS 27.007 subclause 9.2 for <err> values.

Read command queries the APN table that is currently on the DUT, starting from the first entry to the last. The numbers following each value (for example the numbers "1", "2", & "n" in the following cases: "<apncl>1", "<apncl>2", "<apncl>n") indicate from which of the available APNs the entry is from. The maximum number of APNs being 8.

See the APN's section of the Verizon Wireless document "Device Requirements – LTE 3GPP Band 13 Network Access" for more information on the APN table.

Type	Syntax	Response	Example
Set	AT+VZWAPNE=<wapn>,<apncl>,<apnni>,<apntype>,<apnb>,<apned>,<apntime>	OK +CME ERROR: <err>	
Read	AT+VZWAPNE?	+VZWAPNE: <apncl>1,<apnni>1,<apntype>1,<apnb>1,<apned>1,<apntime>1, <apncl>2,<apnni>2,<apntype>2,<apnb>2,<apned>2,<apntime>2,..., <apncl>n,<apnni>n,<apntype>n,<apnb>n,<apned>n,<apntime>n +CME ERROR: <err>	
Test	AT+VZWAPNE=?	+VZWAPNE: (list of supported <wapn>s), (list of supported <apncl>s), (list of supported <apnni>s), (list of supported <apntype>s), (list of supported <apnb>s), (list of supported <apned>s), (list of supported <apntime>s) +CME ERROR: <err>	

11.4.2 Defined Values

Parameter	Type	Description
<wapn>	Number	Integer type; Indicates which APN entry to edit. The maximum number of APNs is 8. 0 : Take no action 1 : Edit APN entry #1 2 : Edit APN entry #2 3 : Edit APN entry #3 4 : Edit APN entry #4 n : Edit APN entry #n
<apncl>	Number	Integer type; Indicates the APN Class. The maximum number of APNs is 8. 1: APN Class #1 2: APN Class #2 3: APN Class #3 4: APN Class #4 N: APN Class #n
<apnni>	String	String type; Indicates the Network Identifier. VZWIMS : Verizon Wireless IMS PDN VZWADMIN : Verizon Wireless Administrative PDN VZW INTERNET : Verizon Wireless Internet PDN VZWAPP : Verizon Wireless Application PDN
<apntypei>	String	APN type IPv6 : IPv6 Type IPv4v6 : IPv4 and IPv6 type
<apnb>	String	APN Bearer LTE : LTE bearer used
<apned>	String	Enable/Disable the APN Enabled : The APN is enabled Disabled : The APN is disabled

Parameter	Type	Description
<apntime>	Number	APN inactivity timer value 0 : Indicating that the timer is infinity X : Integer indicating the timer value in minutes



This AT command shall be enabled and disabled using a non-volatile memory setting. By default, this AT command shall be DISABLED. The vendor shall provide a lab application to modify this memory setting during device acceptance testing. The device vendor shall not allow the user to modify this memory setting through the device user interface or the remote access user interface for tethered devices.

11.5 Read RSRP Values +VZWRSP

11.5.1 Description

Execution command returns the RSRP values for all cells which the UE is measuring. The device shall be capable of returning the RSRP values of up to 8 cells. This device shall support this command in both RRC_IDLE and RRC_CONNECTED modes.

If command fails, +CME ERROR: <err> is returned. Refer to 3GPP TS 27.007 subclause 9.2 for <err> values.

Type	Syntax	Response	Example
Read	AT+VZWRSP?	+VZWRSP: <cellID>1,<EARFCN>1,<RSRP>1,<cellID>2, <EARFCN>2,<RSRP>2,...,<cellID>n,<EARFCN>n,<RSRP>n +CME ERROR: <err>	

11.5.2 Defined Values

Parameter	Type	Description
<cellID>	Number	Cell ID where the format is "XXX"
<EARFCN>	Number	EARFCN for given cell where EARFCN is per 3GPP TS 36.101
<RSRP>	String	RSRP value where the format is "-XXX.XX" dBm/15kHz

11.6 Read RSRQ Values +VZWRSRQ

11.6.1 Description

Execution command returns the RSRQ values for all cells which the UE is measuring. The device shall be capable of returning the RSRQ values of up to 8 cells. This device shall support this command in both RRC_IDLE and RRC_CONNECTED modes.

If command fails, +CME ERROR: <err> is returned. Refer to 3GPP TS 27.007 subclause 9.2 for <err> values.

Type	Syntax	Response	Example
Read	AT+VZWRSRQ?	+VZWRSRQ: <cellID>1,<EARFCN>1,<RSRQ>1,<cellID>2, <EARFCN>2,<RSRQ>2,...,<cellID>n,<EARFCN>n,<RSRQ>n +CME ERROR: <err>	

11.6.2 Defined Values

Parameter	Type	Description
<cellID>	Number	Cell ID where the format is "XXX"
<EARFCN>	Number	EARFCN for given cell where EARFCN is per 3GPP TS 36.101
<RSRQ>	String	RSRQ value where the format is "-XXX.XX" dBm/15kHz

11.7 Get NV Memory Configuration %GETCFG

11.7.1 Description

Get configuration from NV memory

Type	Syntax	Response	Example
Set	AT%GETCFG=<param1><param2>		

11.7.2 Defined Values

Parameter	Type	Response
<param1>	String	<p>List of supported Parameters :</p> <p>"OPER" : Reads device's operation mode from NV Returns "SERV", "NET"</p> <p>"IMG" : Reads device's image in focus from NV Returns "HOST", "1", "2"</p> <p>"LOG" : Reads device's log module severity from NV Returns "DEBUG", "FINE", "DEBUGW", "DEBUGE", "DEBUGF", "INFO", "NOTICE", "WARN", "ERROR", "CRIT", "ALERT", "EMRG"</p> <p>"LOG" : Reads device's global log severity from NV Returns "DEBUG", "FINE", "DEBUGW", "DEBUGE", "DEBUGF", "INFO", "NOTICE", "WARN", "ERROR", "CRIT", "ALERT", "EMRG"</p> <p>"BAND": Read bands defined in DOP file, these bands are the ones to be calibrated and scanned Returns Bands: "X", "Y", "Z"</p> <p>"USIM_SIMULATOR" : Read the Usim simulator status.</p> <p>"SC_STATE" : Read stored cell status Returns 0-disabled , 1-enabled</p> <p>"SC_INFO" : Read the device's stored cell information Returns MCC, MNC, EARFCN</p> <p>"CUSTOMER_ID" : Read the CustomerId from SysBp Returns "X"</p> <p>"HEATING_TC" : Reads heating traffic control parameter in NV Returns (TCXO) (enabled? "x") Reduced Tresh "x" Stop Thresh "x"</p> <p>"DISABLE_RESET" : Read the reset on assert status Returns 0-disabled , 1-enabled</p> <p>"RFIF_TO_GPIO_EN" : Reads if the device RFIF to GPIO feature is enabled Returns 0-disabled 1-enabled</p> <p>"W_DISABLED_PRESENT" : Reads if the device GPIO HW line for W_DISABLED is present (enabled) Returns 0-false</p>

Parameter	Type	Response
		1-true
		"SILENT_MODE_ACTIVE" : Reads if flight (silent) mode run-time is activated Returns 0-false 1-true
		"REPOSE_MIN" : Reads min pause interval between unsuccessful scanning Returns Time in seconds
		"REPOSE_MAX" : Reads max pause interval between unsuccessful scanning Returns Time in seconds
		"REPOSE_STEP" : Reads incremental step interval between unsuccessful scanning Returns Time in seconds for linear mode -1 for experiment mode
		"PW_MODE" : Reads power save mode for Idle/Connected RRC Returns 0-SW default, 1-PHY only, 2-Shallow sleep, 3- Deep Sleep, 4- Disabled (for idle , No service and connected states)
		"PW_ATTR" : Reads min interval to which shallow/deep sleep may be applied. Reads also estimated entry/exit time to shallow/deep sleep Returns Time in microseconds (For all: ShallowMinDuration , ShallowEntryGurdTime , ShallowExitGurdTime , DeepMinDuration , DeepEntryGurdTime , DeepExitGurdTime)
		"VZW_MODE_EN" : Get Verizon mode Enable flag Returns 0-disabled 1-enabled
		"IDEBUG_MEI" : Get IMEI from DOP (only if OTP is not locked) Returns "IMEI value"
		"HEATIG_PWR_EN" : Read heating power control enable flag Returns 0-disabled 1-enabled
		"HEATIG_PWR_PRM" : Read heating power control params
		"HEATIG_SD_EN" : Read heating shutdown enable flag Returns 0-disabled 1-enabled
		"HEATIG_SD_PRM" : Read heating shutdown control params
		"HD_BAND64_EN" : Reads if band64 half-duplex mode is enabled Returns 0-disabled 1-enabled
		"CEMODE_VAL" : Reads CEMODE stored value Returns 0 – PS only 1 – combined PS/CS. Non-EPS preferred 2- combined PS/CS, EPS-preferred
		"USB_BUFF_CONFIG" : Reads USB buffer configuration Returns Size in Bytes
		"ROHC_RTP_RECOG" : Reads ROHC RTP port recognition mode Returns 0 - SW default 1 – don't recognize RTP

Parameter	Type	Response
		2 – RTP auto recognition 3 – use port list for RTP recognition "SCAN_PLAN_EN" : Reads Scan Plan feature enabled flag "SCAN_LIST" : Reads Scan List row Returns band EARFCN start EARFCN end EARFCN step
<param2>	String	List of supported Parameters : "SYS", "L1A", "MAC", "RLC", "PDCP", "RRC", "VL1", "NAS", "L1AC", "USIM", "FRM", "ROHC", "PROF0", "PROF1", "PROF2", "PROF4", "PROF6", "OSAL", "SERV" : Reads device's log module severity from NV Returns "DEBUG", "FINE", "DEBUGW", "DEBUGE", "DEBUGF", "INFO", "NOTICE", "WARN", "ERROR", "CRIT", "ALERT", "EMRG" "ALL" : Reads device's global log severity from NV Returns "DEBUG", "FINE", "DEBUGW", "DEBUGE", "DEBUGF", "INFO", "NOTICE", "WARN", "ERROR", "CRIT", "ALERT", "EMRG" "USB_BUFF_CONFIG" : Reads USB buffer configuration Returns 0 – SW default (10640) 1 – Small (1520) 2 – Medium (5320) 3 – Large (10640) "SCAN_PLAN_EN" : Reads Scan Plan feature enabled flag Returns 0-disabled 1-enabled "SCAN_LIST" : Reads Scan List row Returns [row_index] (1-40) If omitted, whole list is reported

11.8 Set E-UTRAN DL frequency channel number %EARFCN

11.8.1 Description

This command is for setting the DL EARFCN (E-UTRAN DL frequency channel number).

Type	Syntax	Response	Example
Set	AT%EARFCN=[<EARFCN>[,<EARFCN >...]] (up to 8)	In case the earfcn not in range, return ERROR. Shall return "operation not allowed" in verbose mode (CMEE).	
Read	AT%EARFCN?	%EARFCN: <earfcn> Currently camped EARFCN.	
Test	AT%EARFCN=?	%EARFCN: (list of <earfcn>s found in scan)	

11.8.2 Defined Values

Parameter	Type	Description
<EARFCN>	Number	EARFCN for given cell where EARFCN is per 3GPP TS 36.101

11.9 Signal strength indication <rsqi> %CSQ

11.9.1 Description

Execution command returns received signal strength indication <rsqi>, channel bit error rate <ber> and <rsrq> signal quality

The TB (transport blocks) error rate will be used for the BER parameter.

Read command is not supported.

Test command returns the legend.

Type	Syntax	Response	Example
Set	AT%CSQ	%CSQ: <rsqi>,<ber>,<rsrq>-signal quality +CME ERROR: <err>	
Read	AT%CSQ?	ERROR (OPERATION_NOT_ALLOWED) Operation is not supported	
Test	AT%CSQ=?	%CSQ:(0-31,99),(0-7,99),(0-34,99) OK	

11.9.2 Defined Values

Parameter	Type	Description
<rsqi>	Number	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>	Number	<ber> (in percent): 0...7 as RXQUAL values in the table in TS 45.008 [20] subclause 8.2.4 99 not known or not detectable
<rsrq>-signal quality	Number	The reporting range of RSRQ is defined from -19.5 dB to -3 with 0.5 dB resolution. 0 less than -19.5 dB 1 -19.5 ... less than -19 dB 2 -19 ... less than -18.5 dB 32 -4 ... less than -3.5 dB 33 -3.5 ... less than -3 dB 34 -3 dB and greater

11.10 Protocol error notification %CEER

11.10.1 Description

This command is used for protocol error notification by enabling unsolicited reporting if needed.

Type	Syntax	Response	Example
Set	AT%CEER=[<mode>]	OK or ERROR	
Read	AT%CEER?	%CEER: <mode> [,<module>, <procedure>, <failure> [,<reject cause>, [<error info>]]] +CME ERROR: <err>	
Test	AT%CEER=?	%CEER: (list of supported <modes>)	

11.10.2 Defined Values

Parameter	Type	Description
<mode>	Number	Status of unsolicited result response presentation 0 - disabled (default) 1 – enabled
<clear_err>	Number	Clear last stored failure report 0 – keep last stored failure report (default) 1 – clear last stored failure report
<module>	String	protocol layer or protocol entity "NAS-EMM" "NAS-ESM" "RRC" "PDCP" "RLC" "MAC" "L1A"
<procedure>	String	protocol defined procedure For NAS-EMM: "ATTACH" "DETACH" "TAU" "SERREQ" - service request "AUTH" For NAS-ESM: "PDN_CONN" "PDP_ACT" "PDP_DEACT"
<failure>	String	"REJECT" "MAXRETRY" "UNEXPECTED"
<reject cause>	Number	as per protocol definition #X – numeric value of reject code prefixed with "#"
<error info>	String	It is an arbitrary error information text, determined by the UE manufacturer and containing additional information about failure. For reject it may contain textual definition of reject code.

11.10.3 Example

For read:

AT%CEER?
 %CEER 0, "NAS-EMM", "ATTACH", "REJECT", #3, INVALID SIM
 OK

For unsolicited report:
 %CEER "NAS-EMM", "ATTACH", "MAXRETRY"

11.11 Power Saving control +UPSV

11.11.1 Description

This command lets you set up the low power mode.

Type	Syntax	Response	Example
Set	AT+UPSV=<mode>,<timeout>	OK	AT+UPSV=1 OK
Read	AT+UPSV?	+UPSV: <mode> OK	+UPSV: 1 OK
Test	AT+UPSV=?	+UPSV: (list of supported <mode>'s) OK	+UPSV: (0,1,4) OK

11.11.2 Defined Values

Parameter	Type	Description
<upsv>	Number	<p>Selected functionality</p> <ul style="list-style-type: none"> 0: Normal operation. (Default) 1: Enabled (same as 4. Used for compatibility with 2G/3G u-blox modules) 4: Low Power. <p>Notes :</p> <p>After setting the module to the low power mode, we need to do reset the module. After the module is up and running, you should be able to read the UPSV mode: 4 which means that the module is in Low Power consumption mode.</p>

11.12 Query Hardware Version +UHWVER

11.12.1 Description

Returns the hardware version of the module.

Type	Syntax	Response	Example
Action	AT+UHWVER	<version> OK	1.0 OK

11.12.2 Defined Values

Parameter	Type	Description
<version>	String	Hardware version of the device.

11.13 Query Software Version +USWVER

11.13.1 Description

Returns the software version of the module.

Type	Syntax	Response	Example
Action	AT+USWVER	<version> OK	AT+USWVER Using APP processor - no SB or 3B versions MAC Revision: REL_04_05_06_REV_44015 MAC Package Version: ALT3100_04_05_06_00_43_TF MAC Build Time: May_23_2013_16_16_38 PHY Revision: 4.56.44017 DSP Revision: 23215 BB Product: 3100 BB HW Revision: 20 RFIC_6202 Revision: 0C HLRD Revision: LTEUSB_02_00_02_00_16 TOBY Version: G0.V.00.00.02 OK

11.13.2 Defined Values

Parameter	Type	Description
<version>	String	Toby Version specifies Firmware version of the device.

11.14 Transmit and Receive States +UTEST

11.14.1 Description

The +UTEST AT command gives the user a simple interface to set the cellular module to transmitting and receiving states ignoring cellular signaling protocol. When the +UTEST interface is activated the module is temporally set to test mode. If the module is reset or a power cycle is performed, the module is automatically set to normal mode with normal functionality.

11.14.2 Exit Test Mode +UTEST=0

This command is only available in non signaling mode. Send the AT+UTEST=0 command after terminating the testing procedure. This command allows the module to enter normal mode and closes the test interface. Nevertheless the module automatically returns to normal mode after switch-off or reset. Since no other AT command is available in non signaling mode, the AT+CPWROFF command cannot be used. After sending the command, wait until the normal switch-on boot sequence initializes the AT interface before entering any AT commands.

Type	Syntax	Response	Example
Set	AT+UTEST=[<Mode>]	OK	AT+UTEST= 0 OK
Read	AT+UTEST?	+UTEST: <Mode> OK	+UTEST: 0 OK
Test	AT+UTEST=?	+UTEST<list of supported <Mode>s> OK	+UTEST: (0-3) OK

11.14.3 Enter Test Mode +UTEST=1

This command allows the module to enter non signaling mode. All other +UTEST command modes are only available in non-signaling mode.

Type	Syntax	Response	Example
Set	AT+UTEST=[<Mode>]	OK	AT+UTEST= 1 OK
Read	AT+UTEST?	+UTEST: <Mode> OK	+UTEST: 1 OK
Test	AT+UTEST=?	+UTEST:(list of supported <Mode>s) OK	+UTEST: (0-3) OK

11.14.4 Receiver Test +UTEST=2

Measuring received power level can be done using this command syntax

Type	Syntax	Response	Example
Set	AT+UTEST=2, <par1>[,<par2>[,<par3>]]	+UTEST: <par1>,<par2>,<min>,<avg>,<max> OK	AT+UTEST=2,105230,5000 +UTEST: 2, 105230,5000,-70,-70,-70 OK
Read	AT+UTEST=?	+UTEST: 2 OK	+UTEST: 2 OK
Test	AT+UTEST=?	+UTEST:(list of supported <Mode>s) OK	+UTEST: (0-3) OK

11.14.4.1 Defined Values

Parameter	Description	Range	Default	Notes
<par1>	Channel	100001 to 199999	102286	RX channel 4G mode: the value corresponds to EUARFCN + 100000. For 4G Mode : <ul style="list-style-type: none"> [105180-105279]: Band 13 [101950-102399]: Band 4 Only the values indicated in the above ranges are valid, otherwise an error message will be provided (" +CME ERROR: operation not supported" if +CMEE is set to 2)
<par2>	Time	1 to 600000	1000	Time interval for RX test expressed in ms
<par3>	Rx_Antenna	0 or 1		0 (default): primary antenna 1: secondary antenna

11.14.4.2 RX Mode test command Examples

Command	Response	Description
AT+UTEST=2	+UTEST:102286,1000,-89,-88,-87 OK	<p>RX channel 4G mode: the value corresponds to EUARFCN + 100000.</p> <p>For 4G Mode :</p> <ul style="list-style-type: none"> [105180-105279]: Band 13 [101950-102399]: Band 4 <p>Only the values indicated in the above ranges are valid, otherwise an error message will be provided ("CME ERROR: operation not supported" if CME is set to 2)</p> <p> In the example -89,-88,-87 are the antenna RF level estimation: the numbers are just an example</p>
AT+UTEST=2,105230,5000	+UTEST:105230,5000,-66,-65,-65 OK	The module measures the primary antenna RX level at RX channel 5230 band 13 for 5 s interval. After this time the module provides the response.
AT+UTEST=2, 105230,2000,1	+UTEST: 105230,2000,-60,-60,-59 OK	The module measures the secondary antenna RX level at RX channel 5230 band 13 for 2 s interval. After this time the module provides the response.
AT+UTEST=2, 102286,3000,0	+UTEST: 102286,3000,-63,-62,-62 OK	The module measures the primary antenna RX level at RX channel 2286 band 4 for 3 s interval. After this time the module provides the response.
AT+UTEST=2, 105230,,1	+UTEST: 105230,1000,-51,-51,-51 OK	The module measures the secondary antenna RX level at RX channel 5230 band 13 for 1 s interval. After this time the module provides the response.

11.14.5 Transmitter Test +UTEST=3

RF signal transmission can be triggered with this command

Type	Syntax	Response	Example
Set	AT+UTEST=[<Mode>]	OK	AT+UTEST=3,<par1>,<par2>,<par3>,<par4>,<par5> OK
Read	AT+UTEST?	+UTEST: 3,384,5,5,5000 OK	+UTEST: 3,384,5,5,0,5000 OK
Test	AT+UTEST=?	+UTEST:(list of supported <Mode>s) OK	+UTEST: (0-3) OK

11.14.5.1 Defined Values

Parameter	Description	Range	Default	Notes
<par1>	Channel	100001 to 199999	120286	<p>RX channel 4G mode: the value corresponds to EUARFCN + 100000.</p> <p>For 4G Mode :</p> <ul style="list-style-type: none"> [123180-123279]: Band 13 [119950-120399]: Band 4 <p>Only the values indicated in the above ranges are valid, otherwise an error message will be provided (" +CME ERROR: operation not supported" if +CMEE is set to 2).</p> <p> +UTEST supports only 5 MHz bandwidth for the transmission of a LTE SC-FDMA OFDM signal.</p>
<par2>	power level	-56 to 24	23	For 4G mode: Absolute output power [dBm]
<par3>	BW/Offset	0 to 5	2	<p>For SC-FDMA modulation mode – BW (bandwidth):</p> <p>0: 1.4 MHz 1: 3 MHz 2: 5 MHz 3: 10 MHz 4: 15 MHz 5: 20 MHz</p> <p> Only 2 (5MHz) is supported. All other values will return ERROR.</p> <p>For CW mode – offset to center frequency in HZ</p>
<par4>	Modulation Mode	0 to 1	0	<p>Modulation mode</p> <ul style="list-style-type: none"> 0: SC-FDMA 1: CW (continuous waveform) <p> Only 0 (SC-FDMA) is supported. All other values will return ERROR.</p>
<par5>	Time	0 to 600000	1000	<p>Time interval for TX test expressed in ms</p> <p> With time parameter set to 0 the sequence is continuously transmitted and an OK response will be sent soon after the command execution. After the OK response another test command can be sent. The transmission is stopped sending the commands AT+UTEST=0, AT+UTEST=1 or AT+UTEST=2. The transmission is changed, updating the parameters with another AT+UTEST=3 command.</p>

11.14.5.2 TX mode test command examples

Command	Response	Description
AT+UTEST=3	+UTEST: 120286,23,2,0,1000 OK	The module will transmit for 1 s interval TX channel 20286 band 4 using 5MHz BW and normal SC-FDMA modulation
AT+UTEST=3,123230,0,2,0,5000	+UTEST: 123230,0,2,0,5000 OK	The module will transmit for 5 s 23230 band 13 using 5MHz BW and normal SC-FDMA modulation
AT+UTEST=3,123230,5,,,5000	+UTEST: 123230,5,2,0,5000 OK	The module will transmit for 5 s 23230 band 13 using 5MHz BW and normal SC-FDMA modulation
AT+UTEST=3,123230,23,,,0	+UTEST: 123230,23,2,0,0 OK	The module will transmit continuously 23230 band 13 using 5MHz BW and normal SC-FDMA modulation

11.15 Connect / Disconnect data PDN %DPDNACT

11.15.1 Description

This command is used by host to instruct eCM to connect/disconnect data PDN. The eCM implementation of this command is transparent to the user and it is operator dependent

When the active Connection Manager is the host, the command shall return ERROR. When the eCM is the active Connection Manager (i.e. the eCM is the responsible to send attach/connect commands to the modem), the command shall return OK upon success and ERROR upon failure.

Type	Syntax	Response	Example
Set	AT%DPDNACT=<act>	OK or Error	AT%DPDNACT=1 OK
Read	AT%DPDNACT?	%DPDNACT: <act> OK	%DPDNACT: 0 OK
Test	AT%DPDNACT=?	%DPDNACT: (list of supported <act>s)	%DPDNACT: (0-1) OK

11.15.2 Defined Values

Parameter	Type	Description
<act>	Number	Indicates the required action 0 : De-Activate 1 : Activate

11.16 Execute Script %EXE

11.16.1 Description

This command is used by host to instruct the module to execute a script resident on the device.

This command is to be used in conjunction with Lab and or Certification testing.

Type	Syntax	Response	Example
Set	AT%EXE=<script>,<argument>	OK or Error	AT%EXE=set_config. sh, DEFAULT OK

11.16.2 Defined Values

Parameter	Type	Description
<script>	string	Indicates the shell script to run set_config.sh is the only option here
<argument>	string	Indicates the argument to the shell script DEFAULT: normal operation. Also used for SMS, Supplementary Signaling, Data Retry, OMADM and IOT testing GCF_RF: TS 36.521-1, TS 36-521-3 and Supplementary RF testing. GCF_PROT: TS 36.523-1 and TS 31.121 testing. GCF_UICC: ETSI 102 230 Testing VZW_DTHPUT: Data Throughput testing VZW_FT: Field testing NOT_VZW: Non-Verizon Network Operation

11.16.3 Device Configuration for Defined Values

	FW Test Mode	FW VZW Mode	eCM Enabled	APN Table	eCM VZW Mode	eCM Lab Mode	IMS Test Mode
DEFAULT	0	1	true	VZW	true	true	false
GCF_RF	2	0	true	VZW	true	true	true
GCF_PROT	1	0	false	VZW	true	true	true
GCF_UICC	6	0	false	VZW	true	true	true
VZW_DTHPUT	3	0	true	VZW	true	true	true
VZW_FT	4	1	true	VZW	true	true	false
NOT_VZW	0	0	true	Single PDN	false	false	false

11.17 Embedded Connection Manager (eCM) Auto-Connect

11.17.1 Description

This command is used by host to instruct eCM to auto-connect to the EPS network. The eCM implementation of this command is transparent to the user and it is operator dependent

Type	Syntax	Response	Example
Set	AT%SETACFG=ecm.Mode.AutoConnect Mode,<act>	OK or Error	AT%SETACFG=ecm.Mode.AutoConnectMode,true OK
Read	AT%GETACFG=ecm.Mode.AutoConnectMode	<act> OK	true OK

11.17.2 Defined Values

Parameter	Type	Description
<act>	boolean	Indicates the required action true (Default): auto-connect activated false : auto-connect de-activated

11.18 Embedded Connection Manager (eCM) Attach %CMATT

11.18.1 Description

This command is used by host to instruct eCM to connect to the EPS network. This command is only used if the eCM Auto Connect feature is disabled.

Type	Syntax	Response	Example
Set	AT%CMATT=<act>	OK or Error	AT%CMATT=1 OK
Read	AT%CMATT?	%CMATT: <act> OK	%CMATT: 1 OK
Test	AT%CMATT=?	%CMATT: (list of supported <state>s) OK	%CMATT: (0-1) OK

11.18.2 Defined Values

Parameter	Type	Description
<act>	Number	Indicates the required action 1 : Attach to Network 0 : Detatch from Network

11.19 Network Indication configuration command +UGPIOC

11.19.1 Description

This command allows the user to configure a GPIO pin (GPIO1) as a pin to drive a LED for network indication. When connected and configured, the LED will blink according to the following table:

	LED Behavior
No Service/Searching	Continuous OFF
Registered Home	ON for 100ms, OFF for 2 seconds. Repeated
Registered Roaming	ON for 100ms, OFF for 100ms, ON for 100ms, OFF for 2 seconds. Repeated
Data TX/Rx	ON for the duration Data is sent or received.



This feature cannot be used in conjunction with power saving (+UPSV=4). If the network indicator is used with power save enabled, the LED will flash in an unknown pattern and cannot be relied upon to give the status of the module.

Type	Syntax	Response	Example
Set	AT+UGPIOC=<gpio_id>,<gpio_mode>	OK	AT+UGPIOC=21,2 OK
Read	AT+UGPIOC?	<gpio_id>,<gpio_mode> [<gpio_id>,<gpio_mode> [...]] OK	21,255 OK

Type	Syntax	Response	Example
Test	AT+UGPIOC=?	+UGPIOC: (list of supported GPIOs pins),(list of supported <gpio_mode>) OK	+UGPIOC: (21),(2,255) OK

11.19.2 Defined Values

Parameter	Type	Description
<gpio_id>	Number	GPIO pin identifier: pin number Only supports 21.
<gpio_mode>	Number	Mode identifier: configured function Possible values: <ul style="list-style-type: none"> 2: Enabled 255 (Default): Disabled.

11.20 Get logs from the device command +UGETLOGS

11.20.1 Description

This command allows the user to get all the logs that are stored on the device from the last power cycle or reset. The device will first collect all the logs and archive them in the NV memory. Then it will attempt to move the archive file to the host via either TFTP, socat, or NFS.



This feature is not available in normal operating mode. It requires the device to be put in engineering mode first before the logs can be transferred to the host.

Type	Syntax	Response	Example
Set	AT+UGETLOGS=<transfer_mode>[,<ip_address[:socket]>[,<local_path>]]	OK	AT+UGETLOGS=0,10.0.0.10 OK
Read	AT+UGETLOGS?	ERROR	ERROR
Test	AT+UGETLOGS=?	ERROR	ERROR

11.20.2 Defined Values

Parameter	Type	Description
<transfer_mode>	Number	Transfer mode to host Possible values: <ul style="list-style-type: none"> 0: TFTP 1: socat 2: NFS
<ip_address[:socket]>	String	IP address and socket (for socat) of host. Optional for transfer mode 0 (TFTP). Default is 10.0.0.10. IP address and socket are mandatory for transfer mode 1 (socat). IP address is mandatory for transfer mode 2 (NFS).
<local_path>	String	Host NFS share. Only applies to transfer mode 2.

11.20.3 Examples

Here are some examples and explanations of the different methods of transferring log files from the device and the host.

11.20.3.1 AT+UGETLOGS=0

When issued, this command will cause the TOBY module to establish a tftp session with the host at ip address 10.0.0.10. It will cause the logs to be collected from the device, and compressed into a tar.gz file. It will then attempt to push those logs to the host processor as the file upload_logs.tar.gz.

11.20.3.2 UGETLOGS=1,10.0.0.10:5599

Before issuing the AT command above, the host must have socat listening on the port specified. This can be done in linux using the following command: `socat -u TCP-LISTEN:5599,reuseaddr OPEN:temp.tar.gz,creat,trunk`.

The TOBY module will upload a file through the socat connection to the host, allowing the host to store the contents into temp.tar.gz. As one can see from above, the port and IP addresses are specified fully, so almost any port can be used. This gives the developer of the host platform many options for host configurations (for firewalls, for example).

11.20.3.3 AT+UGETLOGS=2,10.0.0.10,/export/fs/

The above command will cause the TOBY module to connect to the host at 10.0.0.10, to find the exported directory /export/fs, and upload the file to that folder. This requires that NFS is installed and configured properly on the host computer, and that the firewall is properly configured as well. For windows, it becomes absolutely necessary to configure the firewall.

11.21 Last scan results %SCAN

11.21.1 Description

This command returns the RSSI scan results of the last PLMN search. Only cells that the device successfully acquired SIB1 from are listed. Command returns OK if a PLMN scan was not performed (i.e. device is able to register on the last known Serving Cell saved in NV).

Type	Syntax	Response	Example
Set	AT%SCAN	ERROR	ERROR
Read	AT%SCAN?	Cell #1 DL BandWidth = <bw> Global Cell ID = <global_cell_id> DL EARFCN = <earfcn> Physical Cell ID = <physical_cell_id> PLMN ID = <plmn> RSRP = <rsrp> Cell #2 DL BandWidth = <bw> Global Cell ID = <global_cell_id> DL EARFCN = <earfcn> Physical Cell ID = <physical_cell_id> PLMN ID = <plmn> RSRP = <rsrp> . Cell #n DL BandWidth = <bw> Global Cell ID = <global_cell_id> DL EARFCN = <earfcn> Physical Cell ID = <physical_cell_id> PLMN ID = <plmn> RSRP = <rsrp> OK	Cell #1 DL BandWidth = 3 Global Cell ID = 00D6AF01 DL EARFCN = 5230 Physical Cell ID = 256 PLMN ID = 311480 RSRP = -77 Cell #2 DL BandWidth = 3 Global Cell ID = 01537E01 DL EARFCN = 2100 Physical Cell ID = 97 PLMN ID = 310260 RSRP = -78 Cell #3 DL BandWidth = 3 Global Cell ID = 01537E01 DL EARFCN = 2100 Physical Cell ID = 97 PLMN ID = 311660 RSRP = -78 Cell #4 DL BandWidth = 4 Global Cell ID = 056A8F0C DL EARFCN = 2325 Physical Cell ID = 256 PLMN ID = 311480 RSRP = -81 OK
Test	AT%SCAN=?	ERROR	ERROR

11.21.2 Defined Values

Parameter	Type	Description
<bw>	Integer	Indicates the cell DL bandwidth <ul style="list-style-type: none"> 0: 1.4 MHz 1: 3 MHz 2: 5 MHz 3: 10 MHz 4: 15 MHz 5: 20 MHz

<global_cell_id>	Hex	As per 3GPP encoding for cell ID.
<earfcn>	Integer	As per 3GPP encoding for EARFCN
<physical_cell_id>	Integer	PHY acquired cell ID
<plmn>	Integer	As per 3GPP encoding for PLMN ID
<rsrp>	Integer	RSRP measurements in dbm

11.22 Remaining PIN/PUK attempts: %CPININFO

11.22.1 Description

Returns the number of attempts left for PIN and PUK.

Type	Syntax	Response	Example
Set	AT%CPININFO	%CPININFO: <pin1>,<puk1>,<pin2>,<puk2>	%CPININFO=3,10,3,10
			OK
Read	AT%CPININFO?	ERROR	ERROR
Test	AT%CPININFO=?	ERROR	ERROR

11.22.2 Defined Values

Parameter	Type	Description
<pin1>	Number	Number of remaining tries to enter PIN1 before card is locked with the PUK1.
<puk1>	Number	Number of remaining tries to enter PUK1 before device is locked permanently.
<pin2>	Number	Number of remaining tries to enter PIN2 before card is locked with the PUK2.
<puk2>	Number	Number of remaining tries to enter PUK2 before device is locked permanently.

11.23 Measurements: %MEAS

11.23.1 Description

Returns the measurement value(s) for the specified measurement type.

Type	Syntax	Response	Example
Set	AT%MEAS=<meas_type>[,EARFCN[,cell ID]]	<p>For RSRP, RSRQ, SINR, RSSI:</p> <p><measurement type>: Reported=<measurement value>, Rx0Tx0=<measurement value>, Rx0Tx1=<measurement value>, Rx0Tx2=<measurement value>, Rx0Tx3=<measurement value>, Rx1Tx0=<measurement value>, Rx1Tx1=<measurement value>, Rx1Tx2=<measurement value>, Rx1Tx3=<measurement value></p> <p>For TX Power:</p> <p><measurement type>: PUSCH=<measurement value>, PUCCH=<measurement value>, PRACH=<measurement value>, SRS=<measurement value></p> <p>For Temperature:</p> <p><measurement type>: <measurement value></p>	<p>AT%MEAS="0"</p> <p>RSRP: Reported = -80, Rx0Tx0 = -82, Rx0Tx1 = -88, Rx0Tx2 = -140, Rx0Tx3 = -140, Rx1Tx0 = -85, Rx1Tx1 = -83, Rx1Tx2 = -140, Rx1Tx3 = -140</p> <p>OK</p> <p>AT%MEAS="4"</p> <p>TX power: PUSCH=7, PUCCH=-5, PRACH=-10, SRS=0</p> <p>OK</p> <p>AT%MEAS="5"</p> <p>Temperature: 20</p> <p>OK</p>
Read	AT%MEAS?	ERROR	ERROR
Test	AT%MEAS=?	<list of supported measurements> OK	0=RSRP, 1=RSRQ, 2=SINR 3=RSSI 4=TXPOWER 5=TEMPERATURE OK

11.23.2 Defined Values

Parameter	Type	Description
<meas_type>	String	Type of measurement to report <ul style="list-style-type: none"> "0" = RSRP "1" = RSRQ "2" = SINR "3" = RSSI "4" = TXPOWER "5" = TEMPERATURE
<measurement type>	String	Type of measurement reported <ul style="list-style-type: none"> RSRP RSRQ SINR RSSI TX power Temperature
<measurement value>	Integer	Value of the measurement

11.24 Physical connectivity and eNode B parameter info: %PCONI

11.24.1 Description

Returns the number of attempts left for PIN and PUK.

Type	Syntax	Response	Example
Set	AT%PCONI	duplexing mode: <dup_mode> Transmission mode: <tx_mode> Bandwidth: <bw> EARFCN: <earfcn> Global Cell ID: <global_cell_id> Physical Cell ID: <phy_cell_id> HNBN: <hnbn> OK	duplexing mode: FDD Transmission mode: Open loop MIMO Bandwidth: 4 EARFCN: 2325 Global Cell ID: 056A8F0C Physical Cell ID: 256 HNBN: N/A OK
Read	AT%PCONI?	ERROR	ERROR
Test	AT%PCONI=?	<not supported>	

11.24.2 Defined Values

Parameter	Type	Description
<dup_mode>	String	Duplexing mode. <ul style="list-style-type: none"> FDD TDD
<tx_mode>	String	eNode B transmission mode. <ul style="list-style-type: none"> SISO Tx diversity Open loop MIMO Close loop MIMO
<bw>	Integer	Indicates the cell DL bandwidth <ul style="list-style-type: none"> 0: 1.4 MHz 1: 3 MHz 2: 5 MHz 3: 10 MHz 4: 15 MHz 5: 20 MHz
<earfcn>	Integer	As per 3GPP encoding for EARFCN
<global_cell_id>	Hex	As per 3GPP encoding for cell ID.
<phy_cell_id>	Integer	PHY acquired cell ID
<hnbn>	String	Home eNode B name encoded in SIB9

11.25 Selecting Primary and Secondary RX Antenna

11.25.1 Description

Allows the user to select either Antenna 0 only, Antenna 1 only, or both antennas for receiver measurements per Verizon's requirements. This command supports other settings that are outside the scope of this document. Only the command sequence to set the RX antenna should be used.

Type	Syntax	Response	Example
Set	AT%TRSHCMD=<module>,<cmd> [,<param>]	OK or ERROR	%TRSHCMD= "RXANT", "USRSELM", "2" OK

Type	Syntax	Response	Example
Read	AT% TRSHCMD?	ERROR	ERROR
Test	AT% TRSHCMD=?	Module=<module1> <list of supported commands> Module=<module2> <list of supported commands> . . Module=<modulen> <list of supported commands>	

11.25.2 Defined Values

Parameter	Type	Description
<module>	String	"RXANT"
<cmd >	String	"USRSELM"
<param>	String	RX antenna configuration <ul style="list-style-type: none"> "0": RX0 only active "1": RX1 only active "2": both RX antenna active

12 Mobile Termination Errors

12.1 Report mobile termination error +CMEE

12.1.1 Description

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 MT. When enabled, MT related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters, or TA functionality.

Test command returns values supported as a compound value.

Type	Syntax	Response	Example
Set	AT+CMEE=[<n>]		
Read	AT+CMEE?	+CMEE: <n>	
Test	AT+CMEE= ?	+CMEE: (list of supported <n>s)	

12.1.2 Defined Values

Parameter	Type	Description
<n>	Number	0 (Default): disable +CME ERROR: <err> result code and use ERROR instead 1 : enable +CME ERROR: <err> result code and use numeric <err> values (refer subclause 14.2) 2 : enable +CME ERROR: <err> result code and use verbose <err> values (refer subclause 14.2)

12.2 Mobile termination error result code +CME ERROR

12.2.1 Description

The operation of +CME ERROR: <err> result code is similar to the regular ERROR result code: if +CME ERROR: <err> is the result code for any of the commands in a command line, none of the following commands in the same command line is executed (neither ERROR nor OK result code shall be returned as a result of a completed command line execution). The format of <err> can be either numeric or verbose. This is set with command +CMEE.



ITU-T Recommendation V.250 [14] command V does not affect the format of this code.

13 Acronyms

EFS	Embedded File System
EPC	Evolved Packet Core is the IP-based core network defined by 3GPP in release 8 for use by LTE and other access technologies.
NV	Non-volatile memory (refers to cellular module here)
SMS	Short Message Service
PDP	Packet Data Protocol
IMSI	International Mobile Subscriber Identity
IMEI	International Mobile Equipment Identifier
MDN	Mobile Dialing or Directory Number
TAC	Tracking Area Code
AcT	Access Technology
GSM	Global System for Mobile communications
GPRS	General Packet Radio System
UTRAN	Universal Terrestrial Radio Access Network
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
BCD	Binary Coded Decimal
EF	Element File
PLMN	Public Land Mobile Network
RSSI	Receive Signal Strength Indication
RSRP	Reference Signal Receive Power
RSRQ	Reference Signal Receive Quality
MT	Mobile Terminal or Terminated
MO	Mobile Originated
APN	Access Point Name
DNS	Domain Name Server
EARFCN	Evolved Absolute Radio Frequency Number
TDD	Time Domain Duplex
FDD	Frequency Domain Duplex
MIMO	Multiple Input Multiple Output

Related documents

- [1] 3GPP TS 22.002: "Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".
- [2] 3GPP TS 22.003: "Teleservices supported by a GSM Public Land Mobile Network (PLMN)".
- [3] 3GPP TS 22.081: "Line identification supplementary services - Stage 1".
- [4] 3GPP TS 22.082: "Call Forwarding (CF) supplementary services - Stage 1".
- [5] 3GPP TS 22.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".
- [6] 3GPP TS 22.088: "Call Barring (CB) supplementary services - Stage 1".
- [7] 3GPP TS 23.003: "Numbering, addressing and identification".
- [8] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".
- [9] GSM MoU SE.13, GSM MoU Permanent Reference Document SE.13: "GSM Mobile Network Codes and Names".
- [10] ITU-T Recommendation E.212: "Identification plan for land mobile stations".
- [11] ITU-T Recommendation T.31: "Asynchronous facsimile DCE control, service class 1".
- [12] ITU-T Recommendation T.32: "Asynchronous facsimile DCE control, service class 2".
- [13] ITU-T Recommendation T.50: "International Reference Alphabet (IRA) (Formerly International Alphabet No. 5 or IA5) - Information technology - 7-bit coded character set for information exchange".
- [14] ITU-T Recommendation V.250: "Serial asynchronous automatic dialling and control".
- [15] TIA IS-99: "Data Services Option Standard for Wideband Spread Spectrum Digital Cellular System".
- [16] TIA IS-135: "800 MHz Cellular Systems, TDMA Services, Async Data and Fax".
- [17] PCCA STD-101 Data Transmission Systems and Equipment: "Serial Asynchronous Automatic Dialling and Control for Character Mode DCE on Wireless Data Services".
- [18] 3GPP TS 24.022: "Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [19] 3GPP TS 22.030: "Man Machine Interface (MMI) of the Mobile Station (MS)".
- [20] 3GPP TS 45.008: "Radio subsystem link control".
- [21] 3GPP TS 22.085: "Closed User Group (CUG) supplementary services - Stage 1".
- [22] 3GPP TS 22.084: "MultiParty (MPty) supplementary services - Stage 1".
- [23] 3GPP TS 22.090: "Unstructured Supplementary Service Data (USSD) - Stage 1".
- [24] 3GPP TS 27.005: "Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".
- [25] 3GPP TS 23.038: "Alphabet and language specific information".
- [26] 3GPP TS 22.024: "Description of Charge Advice Information (CAI)".
- [27] 3GPP TS 22.086: "Advice of Charge (AoC) supplementary services - Stage 1".
- [28] 3GPP TS 51.011: "Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".
- [29] 3GPP TS 22.034: "High Speed Circuit Switched Data (HSCSD) - Stage 1".
- [30] 3GPP TS 22.091: "Explicit Call Transfer (ECT) supplementary service - Stage 1".
- [31] 3GPP TS 22.072: "Call Deflection (CD) supplementary service - Stage 1".
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Revision history

Revision	Date	Name	Status / Comments
0	20-May-2013	uray	Initial draft
R02	26-Nov-2013	jole	Advance Information document status (Engineering samples release version)
R03	08-Jun-2014	jole	Early Product Information document status. Added MPC-L1 module. Updated section 1.2 (added subsections). Added the following commands: %CMATT, +UGPIOC, +UGETLOGS, %CPININFO, %MEAS, %PCONI. Added instructions for enabling/disabling eCM. Added clarifications for the %EXE command. Added instructions for selecting RX antenna. Updated Acronyms chapter.
R04	30-Oct-2014	pafe	Added MPC-L100 FW version G0.V.01.00.02 (Engineering samples release version) Inclusion of MPC-L1 into document means status is changed from Early Production Information to Advance Information.
R05	10-Nov-2014	jole	Early Production Information document status Updated %GETCFG commands. Noted +CGDCONT set command is not supported and Verizon does not support secondary PDP contexts.
R06	17-Nov-2014	jole	Early Production Information document status Added sections to the SMS chapter to assist customers using PDU mode of the SMS format as opposed to text.
R07	14-Jul-2015	pafe	Added latest applicable type number and software version, TOBY-L100-01S-00.
R08	18-Jan-2016	pafe	Advance Information document status Added TOBY-L100-02S and MPC-L100-02S as applicable type number
R09	01-Mar-2016	Pafe	Early Production Information document status Added IN document reference

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