AT Commands Manual

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1 Introduction

1.1 Purpose of the document

This document describes the messages exchanged between an external application and the TM2 mobile station based on AT commands in order to control incoming / outgoing calls, SMS administration, mobile station behavior and GPRS connections.

1.2 Terms and Abbreviations

AT	AT Command Interpreter Software Subsystem, or attention.
CB	Cell Broadcast.
CM	Connection Management.
DA	Destination Address.
DCE	Data Communication Equipment.
DTE, TE	Data Terminal Equipment.
L3	Layer 3.
ME	Mobile Equipment.
MN	Mobile Network Software Subsystem.
MO	Mobile Originated.
MS	Mobile Station.
MT	Mobile Terminated.
PDU	Protocol Data Unit.
SC	Service Centre.
SI	SIM Application Part Software Subsystem.
SIM	Subscriber Identity Module.
SMS	Short Message Service.
TA	Terminal Adapter.

2 AT commands features

2.1 Serial interface settings

The serial driver works after start up with the following settings:
Data-rate:
- 115200 bps.
- 1 stop bit.
- Even parity.
- RTS/CTS flow control (HW flow control).

Please use the commands +IPR, +IFC, +ICF to change these settings.

2.2 Command line

The commands start normally with AT (means Attention) and finishes with a <CR> character. Only for writing or sending a SMS Ctrl + Z or ESC terminates the command; <CR> is used between the 2 parts of the SMS (address and text).

2.3 Default values

If the command parameters are optional, they can be also left out in the command line. In such cases normal default values are assumed as follows: in case of integer type parameters, the default value is 0, except the cases specified for each concerned command; in case of text parameters, the default value is an empty string, except the cases specified for each concerned command.

2.4 Information responses and result codes

Information responses start and end with <CR><LF> when V1 is enabled and with <CR> when V0 is enabled. If the command syntax is wrong CME ERROR: unknown is sent. If the parameters are wrong +CME ERROR: <error> or +CMS ERROR: <error> is sent. <error> gives hints to the kind of the error. If no SIM-card is present or the PIN was not correctly entered, +CME ERROR: <error> is sent for the most commands. If the command line could be performed successfully, the string OK is sent. In the following description <CR><LF> are intentionally omitted.

3 General behaviors

3.1 Start up and initialization

A complete start up can take place only with a SIM-card with disabled PIN-check. For a SIM-card with enabled PINM check the most commands are answered with +CME ERROR: SIM-PIN requested. After entering PIN via +CPIN command, which allows a start up completion, a lot of SIM-files will be read; it is possible that some commands are affected for a few seconds. The serial interface driver does not allow a new command, until the old one is terminated by OK or +CME ERROR: <error>. If at start up the MS detects inconsistencies related to the NVRAM the following message is displayed: "! NVR DOES NOT FIT TO SW-VERSION. NVR-update is needed!"

4 General commands

4.1 Manufacturer identification +CGMI	
Command syntax	**Description**
AT+CGMI	This command gives the manufacturer identification. <manufacturer> OK or CME ERROR: <error>
Test command AT+CGMI=?	OK

4.2 Request model identification +CGMM	
Command syntax	**Description**
AT+CGMM	This command gives the model identification. <model> OK or CME ERROR: <error>
Test command AT+CGMM=?	OK

4.3 Request revision identification +CGMR	
Command syntax	**Description**
AT+CGMR	This command gives the revised version of the mobile station.<revision> OK or CME ERROR: <error>
Test command AT+CGMR=?	OK

4.4 Request product serial number identification +CGSN	
Command syntax	**Description**
AT+CGSN	This command gets the product serial number, known as IMEI (International Mobile Equipment Identity) of the MS. <IMEI> OK or CME ERROR: <error>
Test command AT+CGSN=?	OK

4.5 Set TE character set +CSCS	
Command syntax	**Description**
AT+CSCS=<chset> AT+CSCS="IRA"	This command selects the TE character set. OK or CME ERROR: <error>
Read command AT+CSCS?	+CSCS="IRA" OK
Test command AT+CSCS=?	OK

<chset>:

- "GSM": GSM default alphabet (GSM03.38 6.2.1).

-"HEX" character strings consist only of hexadecimal numbers from 00 to FF; e.g. "032FE6" equals three 8-bit characters with decimal values 3, 47 and 230; no conversions to the original MT character set shall be done.
- "IRA": international reference alphabet (ITU-T T.50).
- "PCCP437": PC character set Code Page 437.
- "8859-1": ISO 8859 Latin 1 character set.
- "UCS2": 16-bit universal multiple-octet coded character set (USO/IEC10646); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF. Only the strings found in quotation marks are UCS2 coded, the rest of commands or responses remain inIRA alphabet.

4.6 Request international mobile subscriber identification +CIMI	
Command syntax	**Description**
AT+CIMI[1]	This command allows requesting the international mobile subscriber identity IMSI (International Mobile Subscriber Identity), which is intended to permit the TE user to identify the individual SIM which is attached to ME. <IMSI> OK or CME ERROR: <error>
Test command AT+CIMI=?	OK

4.7 Card identification +CCID	
Command syntax	**Description**
AT+CCID	This command returns the ICCID of the SIM-card. <ICCID> OK or CME ERROR: <error>
Read command AT+CCID?	same as above
Test command AT+CCID=?	OK

4.8 Request complete capabilities list +GCAP	
Command syntax	**Description**
AT+GCAP[2]	This command requests the list of capabilities, containing the corresponding command names. +GCAP: +FCLASS, +CGSM OK or CME ERROR: unknown

4.9 Repeat last command A/	
Command syntax	**Description**
A/	This syntax allows repeating the previously executed command again. Only the A/ command can not be repeated.

[1] Read the IMSI (15 digits starting with MCC / 3 digits and MNC / 2digits).
[2] Get the list of capabilities.

5 Mobile equipment control and status commands

5.1 Phone activity status +CPAS	
Command syntax	**Description**
AT+CPAS	This execution command returns the activity status <pas> of the MT. +CPAS: <pas> OK or CME ERROR: <error>
Test command AT+CPAS=?	OK

<pas> may be:

- 0: ready (MT allows commands from TA/TE)
- 1: unavailable (MT does not allow commands from TA/TE)
- 2: unknown (MT is not guaranteed to respond to instructions)
- 3: ringing (MT is ready for commands from TA/TE, but the ringer is active)
- 4: call in progress (MT is ready for commands from TA/TE, but a call is in progress)
- 5: asleep (MT is unable to process commands from TA/TE because it is in a low functionality state)

5.2 Switch off MS +CPWROFF	
Command syntax	**Description**
AT+CPWROFF	This command allows to switch off the MS. Note: Usage of this command implies that the part of command line placed thereafter will be ignored OK or CME ERROR: <error>
Test command AT+CPWROFF=?	OK

5.3 Set phone functionality +CFUN	
Command syntax	**Description**
AT+CFUN=<fun>	This command selects the level of functionality <fun> in the MS. Only some values of <fun> are allowed (see Defined values). Note: if the syntaxes +CFUN=0 or +CFUN=15 (resets) are used, the rest of the command line, placed after that, will be ignored.
AT+CFUN=0	OK or CME ERROR: <error>
AT+CFUN=1	Set full functionality mode OK
AT+CFUN=6	Allow SIM-TK commands and enables fetching of proactive commands by SIM-PPL from SIM OK
AT-CFUN=7	Disable SIM-TK commands and enables fetching of proactive commands by SIM-PPL from SIM OK
AT-CFUN=8	Disable fetching of proactive commands by SIM-APPL from SIM-card OK
AT-CFUN=15	Reset MS without resetting SIM
Read command AT+CFUN?	+CFUN: <power_mode>,<STK_mode>
Test command AT+CFUN=?	+CFUN: (list of supported <fun>'s) e.g. +CFUN: (0,1,6,7,8,15) OK

<fun> selected functionality which may be:
- 0 : minimum functionality meaning switch off of the MS
- 1: full functionality meaning start up MS (from offline mode)
- 6: enables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card
- 7: disables the SIM-toolkit interface and enables fetching of proactive commands by SIM-APPL from the SIM-card
- 8: disable fetching of proactive commands by SIM-APPL from the SIM-card
- 15: silent reset (reset MS without resetting the SIM).

<power_mode> may be:
- 0: MS is switched off
- 1: MS is switched on
- 2: invalid mode

<STK_mode> may be:
- 0: inactive state
- 6: enables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card.
- 7: disables the SIM-toolkit interface and enables fetching of proactive commands by SIM-APPL from the SIM-card.
- 8: disable fetching of proactive commands by SIM-APPL from the SIM-card.

5.4 Battery charge +CBC

Command syntax	Description
AT+CBC	This execution command returns battery status <bcs> and battery charge level <bcl> of the MT. The charge level <bcl> will be also used to build and display the indicator "battchg" i.e. battery charge level in the response code +CIND and in the unsolicited result code +CIEV. The following mapping of "battchg" to <bcl> exists: "battchg" <bcl> 0 < 17 %; 1 < 33 %; 2 < 50 %; 3 < 67 %; 4 < 83 %; 5 >= 83 % +CBC: <bcs>,<bcl> OK or CME ERROR: <error>
Test command AT+CBC=?	+CBC: (list of supported <bcs>'s), (list of supported <bcl>'s) OK

<bcs> may be:
- 0: MT is powered by the battery.
- 1: MT has a battery connected, but is not powered by it.
- 2: MT does not have a battery connected.
- 3: Recognized power fault, calls inhibited.

<bcl> may be:
- 0: battery is exhausted, or MT does not have a battery connected.
- 1...100: battery has 1-100 percent remaining.

5.5 Keypad control +CKPD	
Command syntax	**Description**
AT+CKPD=”*#21#”	This execution command emulates MT keypad by giving each keystroke as a character in a string <keys>. <time> x0.1 seconds is the time to stroke each key and <pause>x0.1 seconds is the length of pause between two strokes. OK or CME ERROR: <error>
Test command AT+CKPD=?	OK

5.6 Display control +CDIS	
Command syntax	**Description**
AT+CDIS=<text>,<text>,...	This set command is used to write the contents of MT text type display elements. An element can consist of one or several characters. The order of element parameters <text> should follow the rule: first is the element in upper left corner, second is the element to the right and so on.
Read command AT+CDIS?	+CDIS: <text> <text> ,… OK
Test command AT+CDIS=?	+CDIS: <length> [<length> ,... OK

<text> is a string type parameter using character set specified by command +CSCS.
<length> is a integer type parameter giving the maximum length of corresponding <text> parameter.

5.7 Display control +CDIS	
Command syntax	**Description**
AT+CIND[3] AT+CIND=<ind>,<ind>,...	This set command is used to set the values of MT indicators. <ind> value 0 means that the indicator is off, 1 means that the indicator is on, 2 is more substantial than 1, and so on. The read command returns the status of MT indicators. The test command returns pairs, where string value <descr> is a maximum 16 character description of the indicator and compound value is the allowed value for the indicator. OK or CME ERROR: <error>
Read command AT+CIND?	+CIND: <ind>,<ind>,... OK
Test command AT+CIND=?	+CIND:(“battchg”,(0-5)),(“signal”,(0-5)),(“service”,(0-1)), (“sounder”, (0-1)), (“message”,(0-1)),(“call”,(0-1)),(“roam”,(0-1)), (“smsfull”,(0-1 or 0,2-5 s.note below)),(“gprs”,(0-1)),(“callsetup”,(0-3)),(“callheld”,(0-1)) OK

<ind>: integer type value, which shall be in range of corresponding **<descr>**

<descr> values reserved by the norm and their <ind> ranges; it may have the values:

- “battchg” battery charge level (0-5); see also +CBC for details.
- “signal” signal quality (0-5); see also +CSQ for details.
- “service” service availability (0-1).
- “sounder” sounder activity (0-1).
- “message” message received (0-1).
- “call” call in progress (0-1); 0 means no call active, 1 means a call is active.
- “roam” roaming indicator (0-1); see also +CREG for details.
- “smsfull” at receiving of a SMS the used memory storage becomes full (1), or memory allocations are available (0); see also the note below.

[3] Because all possible supported parameters of the set syntax can not be overwritten, the setting will be ignored andthe TA sends the corresponding final result code OK to TE.

– "gprs" indicating the GPRS registration status: 2 means GPRS registered, 1 means GPRS available but not registered, 0 means not registered and GPRS network not available.
– "callsetup" call setup status indicator destinated for Bluetooth usage (not covered by TS27.007); possible values are: 0: "not currently in call setup"; 1: "incoming call process ongoing"; 2: "outgoing call setup is ongoing"; 3: "remote party being alerted in an ongoing call".
– "callheld" call held indicator destinated for Bluetooth usage (not covered by TS27.007).

Note: the handling related to "smsfull" is dependent from the presence of the compiler switch DR_TE_SM_EXTERNAL. The range 0-1 of this parameter exists, if the compiler switch DR_TE_SM_EXTERNAL does not exist; otherwise the values 0, 2, 3, 4, 5 are provided for and they have the meaning:
- 0: memory allocations are available.
- 2: the last free SMS entry on the SIM card is used.
- 3: a new MT SMS call-2 can not be stored on the SIM because the storage is full.
- 4: a new SMS not-class-2 can not be stored because the external storage is full, whereby the storage on the SIM card is still free.
- 5: a new SMS can not be stored because the external storage and the SMS storage on the SIM card are full.

5.8 Mobile termination event reporting +CMER

Command syntax	Description
AT+CMER=<mode>,<keyp>,<disp>,<ind>,<bfr> AT+CMER=1,1,0,2,1	This set command enables or disables sending of unsolicited result codes from TA to TE in the case of key pressings, display changes and indicator state changes. <mode> controls the processing of unsolicited result codes specified within this command. OK or CME ERROR: <error>
Read command AT+CMER?	+CMER: <mode>,<keyp>,<disp>,<ind>,<bfr> e.g. +CMER: 1,1,0,2,1 OK
Test command AT+CMER=?	+CMER: (list of supported <mode>'s),(list of supported <keyp>'s), (list of supported <disp>'s), (list of supported <ind>'s),(list of supported <bfr>'s) OK

<mode> may be:
– 0: buffer unsolicited result codes in the TA
– 1: discard unsolicited result codes when the V.24 interface is reserved for data; otherwise display them on TE directly
– 2: buffer unsolicited result codes in TA when the V.24 interface is reserved and flush them after reservation; otherwise display them on TE directly
– 3: forward unsolicited result codes directly to the DTE

<keyp> can have the values:
– 0: no keypad event reporting
– 1: keypad event reporting via +CKEV: <key>,<press> (s. +CKPD) for those keys which are not caused via +CKPD when the V.24 interface is not reserved
– 2: keypad event reporting via +CKEV: <key>,<press> for all keys when the V.24 interface is not reserved

<disp> can have the values
– 0: no display event reporting
– 1: display event reporting via +CDEV: <elem>,<text> when the V.24 interface is not reserved, for those elements which are not caused via +CDIS; <elem> indicates the element order number (as

specified for +CDIS) and <text> is the new value of text element; character set used in <text> is as specified by setting +CSCS;
− 2: display event reporting via +CDEV: <elem>,<text> for all elements when the V.24 interface is not reserved.

<ind> can have the values:
− 0: no indicator event reporting
− 1: indicator event reporting using result code +CIEV: <ind>,<value>. <ind> indicates the indicator order number (as specified for +CIND) and <value> is the new value indicator. Only the indicator events which are not caused by +CIND shall be indicated by the TA to the TE.
− 2: indicator event reporting using result code +CIEV: <ind>,<value>. All indicator events shall be directed from TA to TE.

<bfr> may have the following values:
− 0: TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1...3 is entered
− 1: TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes).

5.9 Clock +CCLK

Command syntax	Description
AT+CCLK=<time> AT+CCLK="02/07/01,14:54:00"	This set command sets the real-time clock of the ME. OK or CME ERROR: <error>
Read command AT+CCLK?	+CCLK: "02/07/01,14:55:00" OK
Test command AT+CCLK=?	OK

<time>: string type value; format is "yy/MM/dd,hh:mm:ss+TZ", wherein characters indicates year, month, day, hour, minutes, seconds. TZ: Time zone information represented by two digits. The time zone information is optional; if it was entered it is always accepted, but the display of TZ for query contains this information (in updated form) only if the network supports the time zone information.

5.10 Alarm +CALA

Command syntax	Description
AT+CALA=<time>,<n>,<type>,<text>, <recurr>,<silent> AT+CALA="02/07/ 01,14:56:00+04",1,1,"Alarm"	This set command sets an alarm time in the MT. At expiration a predefined text is displayed. There can be an array of different types of alarms, and each alarm may cause different text to be displayed in the MT display. If setting fails, a CME ERROR: <error> is returned. To set up a recurrent alarm for more days in the week, the <recurr> parameter is used. When an alarm is timed out and executed, first the alarm actions are executed as display of provided text and e.g sound alarm, and second, the unsolicited alarm code +CALV: <n> is displayed on DTE, even if the alarm was silent. OK or CME ERROR: <error>
Read command AT+CALA?	+CALA: <time>, <n1>, <type>, <text>, <recurr>,<silent> <CR><LF>+CALA: <time>, <n2>, <type>, <text>, <recurr>, <silent>[...] i.e. +CALA: "02/07/01,14:56:00+04",1,1,"Alarm",0 OK
Test command AT+CALA=?	+CALA: (list of supported <n>s),(list of supported <type>s),<tlength>,<rlength>,(list of supported <silent>'s) OK

<time>: string type value; format is "yy/MM/dd,hh:mm:ss+tz", wherein characters indicates year, month, day, hour, minutes, seconds and time zone.

Note: if the <recur> parameter is used, the <time> parameter must not contain a date. <n>, <n1>, <n2>: integer type value indicating the index of the alarm; the maximum number of alarms is 3; if not indicated by user, default value 1 is assumed

<type>: type of the alarm; this parameter is ignored

Note: if the MS does not have the possibility to generate an alarm tone, only the text is displayed at alarm time.

<text>: string type value indicating the text to be displayed when alarm time is reached; maximum length **<tlength>**.

<tlength>: integer type value indicating the maximum length of <text>, currently set to 255.

<recurr>: string type value (maximum string length is 13) indicating day of week for the alarm in one of the following formats:
"<1..7>[,<1..7>[…]]" – Sets a recurrent alarm for one or more days in the week. The digits 1 to 7 corresponds to the days in the week, Monday (1), …, Sunday (7).
Example: The string "1,2,3,4,5" may be used to set an alarm for some weekdays.

"0" – Sets a recurrent alarm for all days in the week and all following weeks.
<rlength>: integer type value indicating the maximum length of <recurr> which is currently limited to 15 characters .

<silent>: Integer type value indicating if the alarm is silent or not:
- 1: the alarm will be silent and the only result from the alarm is the unsolicited result code +CALV.
- 0: the alarm will not be silent.

5.11 Delete alarm +CALD

Command syntax	Description
AT+CALD=<n> AT+CALD=0	This action command deletes an alarm in the MT. OK or CME ERROR: <error>
Test command AT+CALD=?	+CALD: (0) i.e. list of <n>s OK

<n> integer type value indicating the index of the alarm; the maximum number of alarms is 3.

5.12 Restricted SIM access +CRSM	
Command syntax	**Description**
AT+CRSM=<command>,<fileid>, <P1>,<P2>,<P3>,<data>. AT+CRSM=176,28471,0,0,3 Note: read ACMmax AT+CRSM=176,28423,0,0,9 Note: read IMSI AT+CRSM=178,28473,0,4,3 Note: read ACM AT+CRSM=176,28481,0,0,5 Note: read PUKT	This command allows an easy access to the SIM database. By using this command instead of Generic SIM Access +CSIM DTE application has easier but more limited access to the SIM database. Set command transmits to the MS the SIM <command> and its required parameters. MS handles internally all SIM-MS interface locking and file selection routines. As response to the command, MS sends the actual SIM information parameters and response data. MS error result code +CME ERROR may be returned when the command cannot be passed to the SIM, but failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters. +CRSM: <sw1>,<sw2>[,<response>] OK or CME ERROR: <error>
Test command AT+CRSM=?	OK

<command> may be
- 176 read binary
- 178 read record
- 192 get response
- 214 update binary
- 220 update record
- 242 status

<fileid> integer type; this is the identifier of a elementary data file on SIM. Mandatory for every command except STATUS and may be e.g.:
- 28471 meaning ACMmax file (6F37).
- 28423 meaning IMSI file (6F07).
- 28473 meaning ACM file (6F39).
- 28481 meaning PUKT file (6F41).
- 28482 meaning SMS file (6F42).

<P1>, **<P2>**, **<P3>** integer type defining the request. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in GSM 51.011.

<data>: information which shall be written to the SIM (hexadecimal character format; refer +CSCS – string containing hexadecimal characters -).

<sw1>, **<sw2>** integer type containing the SIM information and can be:
- 0x90 0x00 normal entry of the command.
- 0x9F 0xXX length XX of the response data.
- 0x92 0x0X update successful but after using an internal retry routine X time.
- 0x92 0x40 memory problem.
- 0x94 0x00 no EF selected.
- 0x94 0x02 out of range (invalid address).
- 0x94 0x04 file ID not found; pattern not found.
- 0x94 0x08 file is inconsistent with the command.
- 0x98 0x02 no CHV initialized.
- 0x98 0x04 access cond. Not fulfilled / unsucc. CHV verify / authent.failed.

- 0x98 0x08 in contradiction with CHV status.
- 0x98 0x10 in contradiction with invalidation status.
- 0x98 0x40 unsucc. CHV-verif. or UNBLOCK CHF / CHV blocked /UNBL.blocked.
- 0x98 0x50 increase can not 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> response of successful completion of the command previously issued (hexadecimal character format refer +CSCS – string containing hexadecimal characters -). STATUS and GET RESPONSE return data, which gives information about the current elementary data field. This information includes the type of file and its size (refer GSM 51.011 [28]). 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.

5.13 Alert sound mode +CALM

Command syntax	Description
AT+CALM=<mode>	This command is used to select the general alert sound mode of the ME.
Read command AT+CALM?	+CALM: <mode> OK
Test command AT+CALM=?	+CALM: (0-1) OK

<mode> may be:

- 0 normal mode.
- 1 silent mode.

5.14 Ringer sound level +CRSL

Command syntax	Description
AT+CRSL=<level>	This command is used to select the incoming ringer sound level of the ME.
Read command AT+CRSL?	+CRSL: <mode> OK
Test command AT+CRSL=?	+CRSL: (0-1) OK

<level> may be a value in range 0-5 (0 means mute).

5.15 Loudspeaker volume level +CLVL

Command syntax	Description
AT+CLVL=<level>	This command is used to select the volume of the internal loudspeaker of the ME.
Read command AT+CLVL?	+CLVL: <level> OK
Test command AT+CLVL=?	+CLVL: (1-100) see also the note below. OK

<level> may be a value in range 1-100 (1 means minimum); the default value is 50.

Note: the <level> have the range 1-7 if the define AUD_MASTER_VOLUME_CONCEPT does not exist, in order to support also the old volume concept. The default value is 3.

5.16 Mute control +CMUT	
Command syntax	**Description**
AT+CMUT=<n>	This command is used to enable and disable the uplink voice muting during a voice call.
Read command AT+CMUT?	+CMUT=<n> OK
Test command AT+CMUT=?	+CMUT: (0-1) OK

<n> may be:
- 0 mute off.
- 1 mute on.

5.17 Call meter maximum event +CCWE	
Command syntax	**Description**
AT+CCWE=<mode>	This command allows the sending of an unsolicited result code CCWV to TE, when enabled. The warning is issued approximately when 30 seconds call time remains. It is also sent when starting a call if less than 30 s call time remains.
Read command AT+CCWE?	+CCWE: <mode> OK
Test command AT+CCWE=?	+CCWE: (0-1) OK

<mode> may be:
- 0 disable the call meter warning event.
- 1 enable the call meter warning event.

5.18 Set greeting text +CSGT	
Command syntax	**Description**
AT+CSGT=<mode>[,<text>] AT+CSGT=1,"Hello user"	This command sets and activates the greeting text in the ME. The greeting text is shown in the ME display when the ME is turned on. The command can also deactivate a text. OK or CME ERROR: <error>
Read command AT+CSGT?	+CSGT: <text>,<mode> OK
Test command AT+CSGT=?	+CSGT: (list of <mode>s),<ltext> OK

<text> string type containing the greeting text.
<mode> may be:
- 0 turn off greeting text.
- 1 turn on greeting text.

<ltext> maximum length of the <text>.

5.19 Automatic Time Zone Update +CTZU	
Command syntax	**Description**
AT+CTZU=<onoff> AT+CTZU=1	This set command enables and disables automatic time tone update via NITZ. OK or CME ERROR: <error>
Read command AT+CTZU?	+CTZU: <onoff> OK
Test command AT+CTZU=?	+C: (0-1) i.e. list of supported <onoff>s OK

<onoff> integer type value indicating:

- 0: disable automatic time zone via NITZ (default).
- 1: enable automatic time zone update via NITZ.

5.20 Time Zone Reporting +CTZR	
Command syntax	**Description**
AT+CTZR=<onoff>	This set command enables and disables the time zone change event reporting. If the reporting is enabled, the MT returns the unsolicited result code +CTZV: <tz> whenever the time zone is changed.
Read command AT+CTZR?	+CTZR: <onoff> OK
Test command AT+CTZR=?	+CTZR: (0-1) i.e. list of supported <onoff>s OK

<onoff> integer type value indicating:

- 0: disable time zone change event reporting (default)
- 1: enable time zone change event reporting.

<tz>: integer value indicating the time zone.

5.21 Report mobile termination error +CMEE	
Command syntax	**Description**
AT+CMEE=[<n>]	This set command 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 TA functionality.
Read command AT+CMEE?	+CMEE: <n> OK
Test command AT+CMEE=?	+CMEE: (0-2) i.e. list of supp.<n>s OK

<n> may be:

- 0 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.

Note: in case of selected value +CMEE=2, meaning formatting the error result code as +CME ERROR: <error> with <error> as verbose value, the following convention is valid: if the error result code is related to a parameter not covered by the GSM/ETSI or Teltonika specification the value <error>="operation not supported" shall be used if the TA is in a state which not allow to perform the entered command, the value <error>="operation not allowed" shall be used.

5.22 List all available AT commands +CLAC	
Command syntax	**Description**
AT+CLAC	This execution command causes the MS to return one or more lines of AT commands that are available for the DTE user. Each line contains one AT command. The presentation of commands respects the order in the AT-manual.
Test command AT+CLAC=?	OK

<AT command> defines the AT command including the prefix AT. The text does not contain the sequence 0<CR> or OK<CR>.

6 Call Control Commands

Note: Because the type of address is automatically detected on the dial string of the D command, the +CSTA command has really no effect.

6.1 Select type of address +CSTA	
Command syntax	**Description**
AT+CSTA=[<type>]	This set command selects the type of number for further dialing commands (D) according to GSM specifications.
Read command AT+CSTA?	+CSTA: <type> OK
Test command AT+CSTA=?	+CSTA: (129,145) OK

<type> may be:

- 145 when dialing string includes international access code character "+".
- 129 when the dial string begins with a digit.

6.2 Dial command D

6.2.1 Description

The V.24ter dial command D lists characters that may be used in a dialing string for making a call or controlling supplementary services in accordance with GSM02.30 and initiates the indicated kind of call. No further commands may follow in the command line. The command is abortable by hit a key before establishment.

6.2.2 V.25ter dialing digits

They are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, *,#, +, A, B, C. Character D is allowed but ignored.

6.2.3 V.25ter or GSM modifier characters

- ",", "T", "P", "!", "W" or "@" are ignored.
- ";" forces a voice call originated to the given address.
- ">" allows direct dialling from phonebook.
- "I" invocation restrict CLI presentation.
- "i" suppression i.e. allows CLI presentation.
- "G" or "g" control the CUG supplementary service information for this call (s.+CCUG).

6.2.4 Direct calling from phonebooks

D><str>[I][G][;] originate a call to phone number which corresponding alphanumeric field in the default phonebook is <str>.
D>mem<n>[I][G][;] originate a call to phone number in memory (one of the phonebooks) "mem" entry location <n>. "mem" may be for example "SM", "FD" or "LD".
D><n>[I][G][;] originate a call to phone number in entry location <n> of the default phonebook. The semicolon character shall be added when a voice call is originated. CLIR and CUG per call modifiers can also be present.

6.2.5 Responses

Verbose	Numeric	Description
OK	0	Acknowledges successful execution of cmd.
Connect	1	A connection has been established
No carrier	3	The connection has been terminated or the attempt to establish a connection failed
Busy	7	Engaged (busy) signal detected
No Answer	8	If no hang up is detected after a fixed network timeout
Connect <data rate>	9	Same as Connect but includes the data rate
Connect FAX	11	Same as CONNECT but includes the indication related to FAX call

6.3 Select tone dialing T

Command syntax	Description
ATT	This set command causes subsequent D command to assume that DTMF dialing is to be used. Because in GSM DTMF dialing is default, this command has no effect. OK

6.4 Select pulse dialing P

Command syntax	Description
ATP	This set command causes subsequent D command to assume that pulse dialing is to be used. Because in GSM DTMF dialing is default, this command has no effect. OK

6.5 Call answer A

Command syntax	Description
ATA	This command instructs the DCE to immediately connect to line and start the answer sequence as specified for the underlying DCE. Any additional command that appears after A on the same command line is ignored. The command is abortable. The user is informed that an incoming call is waiting, by the information result code RING or +CRING displayed on TE. OK

6.6 Hook control H

Command syntax	Description
ATH	This command is used to disconnect the remote user. In case of multiple calls, every call is released the waiting calls are not released. OK

6.7 Monitor speaker loudness L

Command syntax	Description
ATL<value>	This command controls the volume of the monitor speaker. It has no effect.

<value> range of <value> is 0-3.

6.8 Monitor speaker mode M

Command syntax	Description
ATM<value>	This command controls when the monitor speaker is on. The command has no effect.

<value> range of <value> is 0-2.

6.9 Call mode +CMOD	
Command syntax	**Description**
AT+CMOD=<mode>	This set command selects the call mode of further dialing commands (D) or for next answering command (A).
Read command AT+CMOD?	+CMOD: <mode> OK
Test command AT+CMOD=?	+CMOD: (0-1) i.e. list of supported <mode> OK

<mode> may be:

- 0 single mode
- 1 alternating voice/fax (teleservice 61)

Note: Bearer service 61 (<mode>=2) and Bearer service 81 (<mode>=3) are not supported.

6.10 Hang up call +CHUP	
Command syntax	**Description**
AT+CHUP	This execution command causes the TA to hang up the current GSM call of the ME. OK or CME ERROR: <error>
Test command AT+CHUP=?	OK

6.11 Extended error report +CEER	
Command syntax	**Description**
AT+CEER	This execution command causes the TA to return one or more lines of information text <report>, determined by the ME manufacturer, which offer an extended report of the reason for: − the failure in the last unsuccessful call setup 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 The displayed <report> text may contain only the numeric code if requested by the customer. +CEER: <report> OK
Test command AT+CEER=?	OK

<report>: the total number of characters, including line terminators, in the information text does not exceed 2041. The <report> text is the failure cause from GSM04.08 or a specific failure cause as specified in Appendices 18.3 and 18.4

6.12 Tone duration +VTD	
Command syntax	**Description**
AT+VTD=<n>	This command refers to an integer <n> that defines the length of tones emitted as a result of the +VTS command.
Read command AT+VTD?	+VTD: <n> OK
Test command AT+VTD=?	+VTD=(0-255) i.e. list of supported <n>s OK

<n> is an integer in range of 0 to 255. A value different than zero causes a tone of duration <n>/10 seconds. The value 1 is default. If the value 0 is selected, the tone duration is set to 1/10 seconds.

6.13 DTMF and tone generation +VTS	
Command syntax	**Description**
AT+VTS=<DTMF>[,<duration>]	This command allows the transmission of DTMF tones and arbitrary tones. These tones may be used e.g. when announcing the start of a recording period. In GSM this operates only in voice mode. If the optional parameter <duration> is left out, the tone duration is given by the setting +VTD (see +VTD description).
Test command AT+VTS=?	+VTS: (list of <DTMF>s), (list of supported <duration>s) OK

<DTMF> is a single ASCII character in the set 0-9, #, *, A-D.
<duration> integer in range 0-255, meaning 10ms multiples.

6.14 Redial last telephone number ATDL	
Command syntax	**Description**
ATDL	This command is used to redial the last number used in the ATD command. This command is abortable. OK or CME ERROR: <error>

6.15 Automatic answer S0	
Command syntax	**Description**
ATS0=<value> ATS0=2	This S-parameter command controls the automatic answering feature of the DCE. If set to 0, automatic answering is disabled, otherwise it causes the DCE to answer when the incoming call indication (ring) has occurred the number of times indicated by the value. OK (Automatic answer after 2 rings) or CME ERROR: <error>
Read command ATS0?	S0: <value> OK

<value> is a integer in range 0-255. Default setting: S0=0, meaning automatic answering is disabled.

7 Network Service Commands

7.1 Subscriber number +CNUM	
Command syntax	**Description**
AT+CNUM	This action command returns the MSISDNs related to this subscriber. If the subscriber has different MSISDN for different services, each MSISDN is returned in a separate line. +CNUM: “Mario Rossi”,”+39320821708”,145 +CNUM: “ABCD . AAA”,”123456789012”,129 +CNUM: “”,”” OK or CME ERROR: <error>

<alphax> optional alphanumeric string associated with <numberx>; used character set is selected by setting +CSCS.

<numberx> string type phone number of format specified by <typex>.

<typex> type of address octet in integer format (129 or 145).

<speed> corresponding to setting +CBST.

<service> service related to phone number as follows:
- 0: asynchronous modem.
- 1: synchronous modem.
- 2: PAD access (asynchronous).
- 3: Packet access (synchronous).
- 4: voice.
- 5: FAX

<itc> information transfer capability as follows:
- 0: 3.1 kHZ.
- 1: UDI.

7.2 Signal quality +CSQ	
Command syntax	**Description**
AT+CSQ	This execution command returns signal strength indication <rssi> and channel bit error rate <ber> from the ME. The radio signal strength <rssi> will be also used to build and display the indicator “signal” i.e. signal quality in the response code +CIND and in the unsolicited result code +CIEV. The following mapping of “signal” to <rssi> exists: “signal” <rssi> 0 < 4 or 99 (< -107 dBm or unknown) 1 < 10 (< -93 dBm) 2 < 16 (< -71 dBm) 3 < 22 (< -69 dBm) 4 < 28 (< -57 dBm) 5 >=28 (>= -57 dBm) +CSQ: 2,5 OK or CME ERROR: <error>
Test command AT+CSQ=?	+CSQ: (0-31,99),(0-7,99) i.e. list of supported <rssi>s and list of supported <ber>s OK

<rssi> may be:
- 0 i.e. -113dBm or less.
- 1 i.e. -111 dBm.
- 2 ... 30 i.e. -109 ... -53 dBm.
- 31 -51 dBm or greater.
- 99 i.e. not known or not detectable.

<ber> bit error rate:
- 0 ... 7 as RXQUAL values as described in GSM05.08 sub clause 8.2.4.
- 99 not known or not detectable.

7.3 Operator selection +COPS

Command syntax	Description
AT+COPS=<mode>,<format>,<oper>. AT+COPS=0,0	This command forces an attempt to select and register the GSM network operator. The command in the execution syntax is abortable hitting a key. OK or CME ERROR: <error>
Read command AT+COPS?	+COPS: <mode>[,<format>,<oper>] OK
Test command AT+COPS=?	+COPS: [list of supported (<stat>),long alphanumeric <oper>, short alphanumeric <oper>, numeric <oper>)s] [„(list of supported <mode>s),(list of supported <format>s)] OK

<mode> is used to select whether the selection is done automatically by the ME or is forced by this command tooperator <oper> given in the format <format> and may be:
- 0 automatic (<oper> field is ignored).
- 1 manual.
- 2 deregister from network.
- 3 set only <format>.
- 4 manual / automatic (if manual selection fails, automatic mode is entered).

<format> may be:
- 0 long alphanumeric <oper> (default value).
- 1 short format alphanumeric <oper>.
- 2 numeric <oper>.

<oper> string type given in format <format>; this field may be up to 16 character long for long alphanumeric format, up to 8 characters for short alphanumeric format and 5 characters long for numeric format MCC/MNC codes).

<stat> may be:
- 0 unknown.
- 1 available.
- 2 current.
- 3 forbidden.

7.4 Network registration +CREG	
Command syntax	**Description**
AT+CREG=<n>	This set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the ME network registration status, or code +CREG: <stat>,<lac>,<ci> when <n>=2 and there is a change of the network cell.
AT+CREG=1	OK or CME ERROR: <error>
Read command AT+CREG?	+CREG: <n>,<stat>,<lac>,<ci> OK
Test command AT+CREG=?	+CREG: (0-2) Note: i.e. list of the supported <n>s OK

<n> may by:
- 0 disable network registration unsolicited result code.
- 1 enable network registration unsolicited result code +CREG: <stat>.
- 2 enable network registration and location information unsolicited result code +CREG: <stat>,<lac>,<ci>.

<stat> may be:
- 0 not registered, ME is not currently searching a new operator to register to.
- 1 registered, home network.
- 2 not registered, but ME is currently searching a new operator to register to.
- 3 registration denied.
- 4 unknown.
- 5 registered, roaming.

<lac> string type; two byte location area code in hexadecimal format (e.g. "00C3")
<ci> string type; two byte cell ID in hexadecimal format (e.g. "A13F")

7.5 Preferred operator list +CPOL	
Command syntax	**Description**
AT+CPOL=<index>,<format>,<oper>	This command is used to edit the SIM preferred list of networks and writes an entry in the SIM list of preferred operators, previously selected by the command +CPLS. If no list has been selected (e.g. because +CPLS command is not implemented), the default SIM file EFPLMNwAcT is used.
AT+CPOL=2,0,"T-Mobil D"	OK or CME ERROR: <error>
Read command AT+CPOL?	+CPOL: 1,0,"F SFR" +CPOL: 2,0,"T-Mobil D" OK
Test command AT+CPOL=?	+CPOL: (1-30),(0-2) Note: i.e. (list of supported<index>s),(list of supported <format>s) OK

<index n> integer type; the order number of operator in the SIM preferred operator list.
<format> may be (see also +COPS):
- 0 long format alphanumeric <oper>.
- 1 short format alphanumeric <oper>.
- 2 numeric <oper>.

<oper n> string type in format indicated by <format>

7.6 Read operator names +COPN	
Command syntax	**Description**
AT+COPN	This execution command returns the list of operator names from the ME. Each operator code <numeric n> that has an alphanumeric equivalent <alpha n> in the ME memory shall be returned. +COPN: <numeric 1>,<alpha1>[<CR><LF>+COPN: <numeric2>,<alpha2> [...]] or CME ERROR: <error>
Test command AT+COPN=?	OK

<numeric n> string type; operator in numeric format (see +COPS).
<alpha n> string type; operator in long alphanumeric format (see +COPS).

8 Security Commands

Note: Commands which interact with ME that are accepted when ME is pending SIM PIN, SIM PUK, or PH-SIM are: +CGMI, +CGMM, +CGMR, +CGSN, D112;, +CPAS, +CFUN, +CPIN, +CDIS, +CIND, +CBC, +CREG, +CGREG, +CPWROFF, +CCID, +CHUP; +XL1SET, +XMER, +XCALLSTAT, +TRACE, +CMUX, +CRC, +CSSN, +CMER

8.1 Enter PIN +CPIN

Command syntax	Description
AT+CPIN=<pin>,<new pin> AT+COPS=0 AT+CPIN="0933"	This set command sends to the ME a password which is necessary before it can be operated. If no PIN request is pending, no action is taken towards ME and a corresponding error code is returned. If the PIN required is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the SIM. CME ERROR: SIM PIN OK or CME ERROR: <error>
Read command AT+CPIN?	+CPIN: <code> OK
Test command AT+CPIN=?	OK

<pin>, **<newpin>** are string type values.

<code> values may be:

- READY: ME is not pending for any password.
- SIM PIN: ME is waiting SIM PIN to be given.
- SIM PUK: ME is waiting SIM PUK to be given.
- SIM PIN2: ME is waiting SIM PIN2 to be given.
- SIM PUK2: ME is waiting SIM PUK2 to be given.

8.2 Facility lock +CLCK

Command syntax	Description
AT+CLCK=<fac>,<mode>,<passwd>,<class> AT+CLCK="SC",1,"0933"	This execution command is used to lock, unlock or interrogate a ME 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" only <mode> = 0 and <mode> = 2 (unlock and query status) is supported! OK Or +CLCK: <status>[,<class1> [<CR><LF>+CLCK: <status>[,<class1>[…]] CME ERROR: <error>
Test command AT+CLCK=?	+CLCK: "SC","FD","PS","PN","PU","PP","PC","AO","OI","OX","AI","IR","AB","AG","AC" OK

<fac> facility values:

- "SC" SIM (lock SIM card).
- "FD" SIM fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as <passwd>).
- "PN" Network Personalisation (refer GSM 02.22 [33]).
- "PU" network sUbset Personalisation (refer GSM 02.22 [33]).
- "PP" service Provider Personalisation (refer GSM 02.22 [33]).

- "PC" Corporate Personalisation (refer GSM 02.22 [33]).
- "AO"BAR (Bar All Outgoing Calls).
- "OI" BOIC (Bar Outgoing International Calls).
- "OX" BOIC-exHC (Bar Outgoing International Calls except to Home Country).
- "AI" BAIC (Bar All Incoming Calls).
- "IR" BIC-Roam (Bar Incoming Calls when Roaming outside the home country).
- "AB" All Barring services (applicable only for <mode>=0).
- "AG" All outGoing barring services (applicable only for <mode>=0).
- "AC" All inComing barring services (applicable only for <mode>=0).

<mode> may be:

- 0 unlock.
- 1 lock.
- 2 query status.

<status> may be:

- 0 not actine.
- 1 active.

<passwd> string type; shall be the same as password specified for the facility from the ME user interface or withcommand +CPWD.

<class x> is a sum of integers each representing a class of information (default 7) and may be:

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.

8.3 Change password +CPWD

Command syntax	Description
AT+CPWD=<fac>,<oldpwd>, <newpwd> AT+CPWD="SC","0933","0934"	This action command sets a new password for the facility lock function defined by command +CLCK. The command is abortable by hit a key. OK or CME ERROR: <error>
Test command AT+CPWD=?	+CPWD: ("SC",8"),("P2",8),(„PS",4),("PN",16),("PU",16),("PP",16),("PC",16),("AO",4),("OI",4),("OX",4),("AI",4),("IR",4),("AB",4),("AG",4),("AC",4) Note: list of supported (<fac>,<pwdlength>)s OK

<fac> "P2" and other values as defined for +CLCK except "PN", "PU", "PP, "PC".
<oldpwd> string type containing the old password.
<newpwd> string type containing the new password.
<pwdlength> length of password (digits).

9 Phonebook Commands

9.1 Select phonebook memory storage +CPBS

Command syntax	Description
AT+CPBS=<storage>[,<password>] AT+CPBS="SM"	This command selects phonebook memory storage for further usage in phonebook related commands. OK or CME ERROR: <error>
Read command AT+CPBS?	+CPBS: "SM",25,150 Note: used syntax +CPBS: <storage>[,<used>,<total>] OK
Test command AT+CPBS=?	+CPBS: "SM","FD","LD","BN","SN","EC" Note: (list of supported <storages>s) OK

<storage> string type using following values:

- "SM": SIM phonebook.
- "FD": SIM fix-dialing phonebook (only valid with PIN2).
- "LD": SIM last-dialing phonebook.
- "BN": SIM barred-dialing-number phonebook (only valid with PIN2).
- "SN": SIM service-dialing-number phonebook.
- "EC": SIM emergency-call-codes phonebook (read only).
- "ON": Own number phone-book (read/write); content is also shown by +CNUM.
- "IN": Information numbers phonebook (read only).
- "BL": Blacklist phonebook (delete only).
- "ME": MT phonebook (read only) (from EFS21.07.00 onwards).

<password>: string type value representing the PIN2-code required when selecting PIN2-code <storage>s above (e.g. "FD").

<used> integer type value indicating the number of used locations in selected memory.
<total> integer type value indicating the total number of locations in selected memory.

Note: Wildcard chracters (, ?) in the phone number of FDN (fixed number phonebook) are allowed.*

9.2 Read phonebook entries +CPBR

Command syntax	Description
AT+CPBR=<index1>[,<index2>] AT+CPBR=1,3	This execution command returns phonebook entries in location number range <index1> ... <index2> from the current phonebook memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned. +CPBR: 1,"091137880",129,"TM2" +CPBR: 2,"09113788223",129,"MMI" +CPBR: 3""09113788328",129,"Test-ro" OK or CME ERROR: <error>
Test command AT+CPBR=?	+CPBR: (1-100),20,18 i.e. +CPBR: (list of supported <index>s), [nlength],[tlength] OK

<index1>, **<index2>**, **<index>** integer type values in the range of location numbers of phonebook memory.
<number> string type phone number of format **<type>**.
<type> type of address octet in integer format.
<text> string type field of maximum length **<tlength>**.
<nlength> integer type value indicating the maximum length of field **<number>**.
<tlength> integer type value indicating the maximum length of field **<text>** (40).

9.3 Find phonebook entries +CPBF

Command syntax	Description
AT+CPBF=<findtext> AT+CPBF="TM2"	This command returns the phonebook entries from the current phonebook (previously selected by +CPBS), which alphanumeric field starts with string <findtext>.+CPBF:1,"091137880",129, "TM2" OK or CME ERROR: <error>
Test command AT+CPBF=?	+CPBF: [<nlength>],[<tlength>] OK

<index1>, <index2> integer type values in the range of location numbers of phonebook memory.
<number> string type phone number of format **<type>**.
<type> type of address octet in integer format.
<findtext>, **<text>** string type field of maximum length **<tlength>**.
<nlength> integer type value indicating the maximum length of field **<number>**.
<tlength> integer type value indicating the maximum length of field **<text>** (40).

Note: Wildcard characters (, ?) in the phone number of FDN (Fixed number phonebook) are allowed.*
Note: in case of previously selected BL blacklist phonebook, no parameters are needed; <index>=0 is also

9.4 Write phonebook entry +CPBW

Command syntax	Description
AT+CPBW=[<index>][,<number> [,<type>][,<text>]]] AT+CPBW=5,"091137880","TM2"	This execution command writes phonebook entry in location number <index> in the current phonebook memory storage selected with +CPBS. Entry fields written are phone number <number> in format <type> and <text> associated with the number. If all fields except <index> are omitted, the corresponding entry is deleted. If the <index> is left out, but <number> is given, entry is written to the first free location in the phonebook. OK or CME ERROR: <error>
Test command AT+CPBW=?	+CPBW: (list of supported <index>s),[<nlength>],(list of supported <type>s),[<tlength>] OK

<index> integer type values in range of location numbers of phonebook memory.
<number> string type phone number of format **<type>**.
<type> type of address octet in integer format.
<text> string type field of maximum length **<tlength>**.
<nlength> integer type value indicating the maximum length of field **<number>**.
<tlength> integer type value indicating the maximum length of field **<text>** (40).

10 Short Messages Commands

10.1 Parameter definition

<cdata>	TP-Command-Data in text mode responses
<ct>	TP-Command-Type in integer format (default 0)
<da>	Destination address
<dcs>	Data coding scheme
<dt>	Discharge time in string format “yy/MM/dd,hh:mm:ss+yy”
<fo>	First octet, default value 17 for SMS-SUBMIT
<index>	Place of storage in memory
<length>	number of characters in text mode length of TP data unit in PDU mode
<mem1>	Memory used to list, read and delete SMS
<mem2>	Memory used to write and send SMS
<mem3>	Memory to which received SMS are preferred stored (e.g. “BM”, “SM”)
<mid>	CBM message identifier
<mr>	Message reference
<oa>	Originator address
<pid>	Protocol identifier
<pdu>	Protocol data unit
<ra>	Recipient address
<sca>	Service center address
<scts>	Service center time stamp
<sn>	CBM serial number
<st>	Status of a SMS STATUS-REPORT
<stat>	Status of message in memory
<toda>	Type of address of <da>
<tooa>	Type of address of <oa>
<tora>	Type of address of <ra>
<tosca>	Type of address of <sca>
<total1>	Number of message locations in <mem1>
<total2>	Number of message locations in <mem2>
<total3>	Number of message locations in <mem3>
<used1>	Total number of messages in <mem1>
<used2>	Total number of messages in <mem2>
<used3>	Total number of messages in <mem3>
<vp>	Validity period of the SMS, default value 167

10.2 Select message service +CSMS	
Command syntax	**Description**
AT+CSMS=<service>	This command selects message service <service>. It returns the types of messages supported by the ME: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages.
Read command AT+CSMS?	+CSMS: <service>,<mt>,<mo>,<bm> OK
Test command AT+CSMS=?	+CSMS: (list of supported <service>s) OK

<service> may be:

− 0: GSM03.40 and GSM03.41; the syntax of SMS AT commands is compatible with GSM07.05 Phase 2; phase 2+ features may be supported.

− 1: GSM03.40 and GSM03.41; the syntax of SMS AT commands is compatible with GSM07.05 Phase 2+ **<mt>**, **<mo>**, **<bm>** may be:

- 0: type not supported.
- 1: type supported.

10.3 Preferred message storage +CPMS	
Command syntax	**Description**
AT+CPMS=<mem1>,<mem2>,<mem3> AT+CPMS="SM","SM","SM"	This set command selects memory storages <mem1>, <mem2> and <mem3> to be used for reading, writing, ... AT+CPMS: <used1>,total1>,<used2>,<total2>,<used3>,<tota l3> OK or CMS ERROR: <error>
Read command AT+CPMS?	+CPMS: <mem1>,<used1>,total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> OK or CMS ERROR: <error>
Test command AT+CPMS=?	+CPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s) OK

<mem1> may be:

- "BM" broadcast message storage
- "MT" any of the storages associated with ME;
- "ME" ME message storage;
- "SM" (U)SIM message storage

<mem2> may be:

- "MT" any of the storages associated with ME;
- "ME" ME message storage;
- "SM" (U)SIM message storage

<mem3> may be:

- "MT" any of the storages associated with ME;
- "ME" ME message storage;
- "SM" (U)SIM message storage

10.4 Preferred message format +CMGF	
Command syntax	**Description**
AT+CMGF=<mode> AT+CMGF=1	This set command indicates to TA which input and output format of messages shall be used. OK or CME ERROR: <error>
Read command AT+CMGF?	+CMGF: <mode> OK
Test command AT+CMGF=?	+CMGF: (list of supported <mode>s) OK

<mode> indicates the format of messages used with send, list, read and write commands and unsolicited result codes resulting from receiving SMS's. It can be:

- 0: PDU mode (default).
- 1: text mode.

10.5 Save settings +CSAS	
Command syntax	**Description**
AT+CSAS=<profile>	This execution command saves active message service settings to a non-volatile memory (NVRAM). In fact the settings related to +CSCA, +CSMP and +CSCB are stored in one profile.
Test command AT+CSAS=?	+CSAS: (list of supported <profile>s) OK

<profile> may be:

- 0: indicates the specific profile number where settings are to be stored.

10.6 Restore Settings +CRES	
Command syntax	**Description**
AT+CRES=<profile>	This command restores message service settings from a non-volatile memory (NVRAM) to active memory. The settings specified in the commands +CSCA, +CSMP and +CSCB are restored. Only one profile of stored settings is available.
Test command AT+CRES=?	+CRES: (list of supported <profile>s) OK

<profile> may be:

- 0: specific profile number from where settings are to be restored.

10.7 Show text mode parameters +CSDH	
Command syntax	**Description**
AT+CSDH=<show> AT+CSDH=1	This set command controls whether detailed header information is shown in text mode result codes. OK or CME ERROR: <error>
Read command AT+CSDH?	+CSDH: <show> OK
Test command AT+CSDH=?	+CSDH: (list of supported <show>s) OK

<show> may be:

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

Note (proprietary feature): the SMS's class 0 which are normally displayed via MMI, can be also indicated on DTE via unsolicited result code +CMTI: "SM",0 , wherein 0 represents a SMS without SIM-storage ("SM" indicates only that no other specific setting is needed in order to read the SMS via AT+CMGR=0).

10.8 New message indication +CNMI	
Command syntax	**Description**
AT+CNMI=<mode>,<mt>,<bm>,<ds>,<bfr> AT+CNMI=1,1	This set command selects the procedure, how receiving of new SMS from network is indicated to the TE when DTR-signal is ON. IF TE is inactive (DTR-signal OFF), message receiving should be done as specified in GSM03.38. All SMS classes are supported accordingly. OK or CMS ERROR: <error>
Read command AT+CNMI?	+CNMI=<mode>,<mt>,<bm>,<ds>,<bfr> OK
Test command 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

<mode> controls processing of unsolicited result codes specified with this command and may be:

− 0: buffer unsolicited result codes in the TA; if the TA buffer is full, the oldest indication may be discarded and replaced with the new received indications (ring buffer).

− 1: discard indication and reject new received message unsolicited result codes when TA-TE link is reserved; otherwise forward them directly to the TE.

− 2: buffer unsolicited result codes in the TA when the serial link is busy (e.g. data-transfer); otherwise forward them directly to the TE.

− 3: Forward unsolicited result codes directly to the TE. TA-TE link specific in band technique used to embed result codes and data when TA is in on-line data mode; this value is not supported.

<mt> contains the rules for storing received SMS dependent on its <dcs> and may be:

− 0: No SMS-DELIVER indications are routed to the TE

− 1: if SMS-DELIVER is stored in ME/TA, indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>, <index>.

− 2: SMS-DELIVER (except class2 SMS) is routed directly to the TE using the unsolicited result code: +CMT: [<alpha], <length><CR><LF><pdu> in PDU mode or +CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF>.

If ME has its own display device then class 0 SMS and SMS in the message waiting indication group (Discard message) may be copied to both ME display and to TE. In this case ME shall send the acknowledgement to the network.
Class 2 SMSs and messages in the message waiting indication group (storage message) result in indication as defined in <mt>=1

− 3: Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1.

<bm> contains the rules for storing CBMs and may be

− 0: No CBM indications to the TE

− 1: if CBM is stored in RAM/NVRAM by TA, an indication of memory location is routed to DTE unsolicited result code +CBMI: <mem>,<index>

− 2: new CBMs are routed directly to the TE using unsolicited result code:
+CBM: <length><CR><LF><pdu (when PDU-mode enabled> or
+CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>

− 3: Class 3 CBMs are routed directly to TE using unsolicited result codes defined in <bm>=2. If CBM storage is supported, messages of other classes result in indication as defined in <bm>=1.

<ds> may be:
- 0: No SMS-STATUS-REPORTs are routed to the TE
- 1: SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDS: <length><CR>LF><pdu> if PDU mode enabled or +CDS: <fo>,<mr>,[<ra>],[<tora>],>scts>,<dt>,<st> if text mode enabled.
- 2: if SMS-STATUS-REPORT is stored into ME/TA, indication of the memory location is routed to the DTE using the unsolicited result code +CDSI: <mem>,<index>

<bfr> may be:
- 0: TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes).
- 1: TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1...3 is entered.

Note: The parameters <tooa>, <fo>, <pid>, <dcs>, <sca>, <tosca>, <length> shall be displayed only when setting +CSHD=1 is.
Note: The syntax AT+CMGR=0 allows to display a SMS class 0 if it is signalized to TA, because no classic MMI is available in the MS (s. also the note from command +CNMI).

10.9 Read message +CMGR

Command syntax	Description

+CMGR=<index>	This execution command returns message with location value <index> from message storage <mem1> to the TE.
	for SMS-DELIVER in text mode:
	+CMGR:
	<stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data> for SMS-SUBMIT in text mode:
	+CMGR:
	<stat>,<da>,[<alpha>][<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]<CR><LF><data>
	for SMS-STATUS-REPORT in text mode:
	+CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>]<scts><dt>,<st> for SMS-COMMAND in text mode:
	+CMGR:
	<stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length>]for CBM storage in text mode:
	+CMGR:
	<stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data> in PDU mode:
	+CMGR: <stat>,[<alpha>],<length><CR><LF><pdu>

AT+CMGR=3	OK or CMS ERROR: <error>
Test command AT+CMGR=?	OK

<index>: may be in range 0-400; value 0 is possible only if a SMS class 0 is received and previously the setting +CNMI=1,… was set
<stat> may be:
- 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's

10.10 New Message Acknowledgement to ME/TA +CNMA	
Command syntax	**Description**
if text mode (+CMGF=1 enabled) +CNMA if PDU mode (+CMGF=0 enabled)+CNMA=<n>,<length><CR>PDU<ctrl-Z/ESC>	This execution command confirms correct reception of a new message (SMS-DELIVER or SMS-REPORT) which is routed directly to the TE. This acknowledgement command (causing ME to send RP-ACK to the network) shall be used when +CSMS parameter <service> equals 1. MS shall not send another +CMT or +CDS result code to TE before previous one is acknowledged. If the mobile does not get the acknowledgement within required time (network timeout), it must send RP-ERROR to the network. Both settings <mt> and <ds> of +CNMI command will be automatically set to zero. If the command +CNMA is received, but no acknowledgement is expected, or some other ME related errors occurs, a corresponding +CMS ERROR: <error> is returned.
AT+CNMA	OK or CMS ERROR: <error
Test command AT+CNMA=?	OK

10.11 List message +CMGL	
Command syntax	**Description**
AT+CMGL=<stat>	This execution command returns SMS messages with status value <stat> from message storage <mem1> to the TE. Parameter in italics are displayed only when setting +CSDH=1 is. If status of the received message is "received unread", status in the storage changes to "received read"
AT+CMGL	**if text mode (+CMGF=1), command successful and SMS-SUBMITs and/or SMS-DELIVERs:** +CMGL: <index>,<stat>,<oa/da>,[<alpha>],[<scts>][,<*tooa/toda*>, <*length*>]<CR><LF><data>[<CR><LF> +CMGL: <index>,<stat>,<da/oa>,[<alpha>],[<scts>][,<*tooa/toda*>, <*length*>]<CR><LF><data>[...]] **if text mode (+CMGF=1), command successful and SMS-STATUS REPORTs:** +CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st><CR><LF> +CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> [...]] **if text mode (+CMGF=1), command successful and SMSCOMMANDs:** +CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF> +CMGL: <index>,<stat>,<fo>,<ct>[...]] **if text mode (+CMGF=1), command successful and CBM storage:** +CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[<CR><LF> +CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages> <CR><LF><data>[...]] OK or **if PDU mode (+CMGF=0) and command successful:** +CMGL: <index>,<stat>,[<alpha>],<length><CR><LF><pdu><CR><LF>+CMGL:<index>,<stat>,[<alpha>],<length><CR><LF><pdu> [...]] or CMS ERROR: <error>
Test command AT+CMGL=?	+CMGL: (list of supported <stat>s) OK

Note: the optional response field <scts> is not returned when +CSMS=1 (t.b.d.)

<CR> separates the parameter part from the text part of the edited SMS in text mode. <ctrl-Z> indicates that the SMS shall be sent, while <ESC> indicates aborting of the edited SMS.

10.12 Send message +CMGS	
Command syntax	**Description**

Command syntax (text mode):
AT+CMGS=<da>[,<toda>]<CR>
<***text***><ctrl-Z/ESC>
Command syntax (PDU mode):
+CMGS=<length><CR>***PDU is given***<ctrl-Z/ESC>
 	
if text mode:
AT+CMGS="0171112233"<CR>
"This is the text"<ctrl-Z>
if PDU mode (+CMGF=0):
+CMGS=<length><CR>PDU is given<ctrl-Z/ESC>
	This execution command sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery.
	
	if text mode:
	+CMGS: <mr>[,<scts>]
	
	if PDU mode (+CMGF=0):
	+CMGS: <mr>[,<ackpdu>]
	OK
	or
	CMS ERROR: <error>

Test command AT+CMGS=?	OK

10.13 Write message to memory +CMGW	
Command syntax	**Description**
Command syntax in text mode: AT+CMGW=<oa/da>, <tooa/toda>,<stat><CR><text> <ctrl-Z/ESC> Command syntax in PDU mode: AT+CMGW=<length>,<stat> <CR><PDU><Ctrl-Z/ESC> In text mode: AT+CMGW="091137880"<CR> "This is the text"<Ctrl-Z> if PDU mode: AT+CMGW=52,<CR><PDU> <Ctrl-Z>	This execution command stores message (SMS-DELIVER or SMS-SUBMIT) to memory storage <mem2>. 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. <ctrl-Z> indicates that the SMS shall be sent, while <ESC> indicates aborting of the edited SMS. +CMGW: <index> OK or CMS ERROR: <error>
Test command AT+CMGW=?	OK

Note: the optional response field <scts> is not returned when +CSMS=1 (t.b.d.)

10.14 Send message from storage +CMSS	
Command syntax	**Description**
AT+CMSS=<index>,<da>,<toda> AT+CMSS=2	This execution command sends the message with location value <index> from the preferred message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). If a new recipient address <da> is given for SMS SUBMIT, it shall be used instead of the one stored with the message. Reference value <mr> is returned to the TE on successful message delivery. If text mode: +CMSS: <mr>[,<scts>] OK or CME ERROR: <error
Test command AT+CMSS=?	OK

10.15 Set text mode parameters +CSMP	
Command syntax	**Description**
AT+CSMP=<fo>,<vp>,<pid>,<dcs> AT+CSMP=17,167,0,0	This set command is used to select values for additional parameters needed when SMS is sent to the network or placed in storage when text format message mode is selected. It is possible to set the validity period starting from when the SM is received by the SMSC (<vp> is in range 0...255) or define the absolute time of the validity period termination (<vp> is a string). The format of <vp> is given by <fo>. OK or CME ERROR: <error>
Read command AT+CSMP?	+CSMP: <fo>,<vp>,<pid>,<dcs> OK
Test command AT+CSMP=?	OK

10.16 Delete SMS +CMGD	
Command syntax	**Description**
AT+CMGD=<index> AT+CMGD=3	This execution command deletes message from preferred message storage <mem1> location <index>. OK or CMS ERROR: <error>
Test command AT+CMGD=?	+CMGD: (list of supported <index>s) OK

10.17 Service center address +CSCA	
Command syntax	**Description**
AT+CSCA=<sca>,<tosca> AT+CSCA=”0170111000”,129	This set command updates the SMSC address, through which mobile originated SMS’s are transmitted. In text mode the setting is used by send and writes 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. OK or CME ERROR: <error>
Read command AT+CSCA?	+CSCA: <sca>,<tosca> OK
Test command AT+CSCA=?	OK

10.18 Select cell broadcast message types +CSCB	
Command syntax	**Description**
AT+CSCB=<mode>,<mids> ,<dcss> AT+CSCB=0,”1,5,10-11,40”,””	This set command selects which types of CBM’s are to be received by the ME OK or CME ERROR: <error>
Read command AT+CSCB?	+CSCB=<mode>,<mids>,<dcss> OK
Test command AT+CSCB=?	+CSCB: (list of supported <mode>s) OK

Note: if <mode>=0 and <mids> is an empty string, receiving of CB SMS is stopped.

<mode> may be:

- 0 message types specified in <mids> and <dcss> are accepted
- 1 message types specified in <mids> and <dcss> are not accepted

<mids> string type containing all possible combinations of CBM message identifiers (<mid>)

<dcss> string type containing all possible combinations of CBM data coding schemes (<dcs>)

11 Supplementary Services Command

11.1	Call forwarding +CCFC
Command syntax	**Description**
AT+CCFC=<reason>,<mode> ,<number>,<type>,<class> ,<subaddr>,<satype>,<time>	This command allows the control of the call forwarding supplementary service according to GSM02.82. Registration, erasure, activation, deactivation and status query are supported. In case of enabled ALS <class> = 1 will be treated as voice line 1 and <class> = 256 will be treated as voice line 2. (CPHS feature). This command is abortable (proprietary feature).
AT+CCFC=0,3,"01711234"	OK or when <mode>=2 +CCFC: <status>,<class1>,<number>,<type>,<subaddr>,<satype>,<time><CR><LF> +CCFC:<status>,<class1>,<number>,<type>,<subaddr>,<satype>,<time>[...]] CME ERROR: <error>
Test command AT+CCFC=?	+CCFC: (list of supported <reason>s) OK

<reason> may by:
- 0 unconditional.
- 1 mobile busy.
- 2 no reply.
- 3 not reachable.
- 4 all call forwarding.
- 5 all conditional call forwarding.

<mode> may be:
- 0 disable.
- 1 enable.
- 2 query status.
- 3 registration.
- 4 erasure.

<number> string type phone number of forwarding address in <type> format.
<type> type of address in integer format; default 145 when dialling string includes "+", otherwise 129.
<subaddr> string type subaddress; parameter currently ignored after syntax check.
<satype> type of subaddress; default 128 (TON/NPI unknown); parameter currently ignored after syntax check
<class> is a sum of integers each representing a class of information (default 7 or interpreted by network if not explicitly entered) and may be:
- 1 voice (voice line 1 if ALS enabled).
- 2 data.
- 4 FAX.
- 8 SMS.
- 16 data circuit sync.
- 32 data circuit async.
- 64 dedicated packet access.
- 128 dedicated PAD access.
- 256 voice line 2 (if ALS enabled).

<time> time in seconds to wait before call is forwarded (default 20), but only when <reason>=2 (no reply) is enabled.

<status> may be:
- 0 not active.
- 1 active.

11.1 Call waiting +CCWA	
Command syntax	**Description**
AT+CCWA= <n>,<mode>,<class>	This command allows control of the Call Waiting supplementary service according to GSM02.83. Activation, deactivation and status query are supported. 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>. In case of enabled ALS (de)activating Call waiting for one line always (de)activates Call waiting on the other line too (CPHS feature). Status query is abortable by hit a key. If enabled by <n> an unsolicited result code is presented on TE when a call is signaled in following format: +CCWA: <number>,<type>,<class>,<alpha>,<CLI validity>,<subaddr>,<satype> ,<priority>
Set command AT+CCWA=1,1,1	OK
Query command AT+CCWA=1,2	+CCWA: <status>,<class1> [<CR><LF>+CCWA: <status>,<class2> [...]] e.g. +CCWA: 1,1 OK or CME ERROR: <err
Read command AT+CCWA?	+CCWA: <n> OK
Test command AT+CCWA=?	+CCWA: (0-1) i.e. (list of supported <n>s) OK

<n> is used to enable/disable the presentation of an unsolicited result code +CCWA:
- 0: disable.
- 1: enable.

<mode> (if <mode> not given, network is not interrogated) may be:
- 0: disable.
- 1: enable.
- 2: query status.

<classx> is a sum of integers each representing a class of information (default 1)
- 1 voice (voice line 1 if ALS enabled).
- 2: data.
- 4: FAX. (Currently not supported)
- 8: SMS. (Currently not supported)
- 16: data circuit sync. (Currently not supported)
- 32: data circuit async. (Currently not supported)
- 64: dedicated packet access. (Currently not supported)
- 128 dedicated PAD access. (Currently not supported)
- 256 voice line 2 (if ALS enabled).

<status>
- 0: not active.
- 1: active.

<number> string type phone number of calling address in format specified by **<type>**.
<type> type of address in integer format.

<alpha> optional string type alphanumeric representation of <number> corresponding to the entry found in phonebook.
<CLI validity> may be:
- 0: CLI valid.
- 1: CLI has been withheld by the originator.
- 2: CLI is not available.

<subaddr>: string type subaddress of format specified by **<satype>**.
<satype>: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8).
<priority>: optional digit type parameter indicating that the eMLPP priority level of the incoming call. The priority level values are as defined in eMLPP specification 3GPP TS 22.067 [54].

11.2 Calling line identification restriction +CLIR

Command syntax	Description
AT+CLIR=<n> AT+CLIR=2	This command allows to control the calling line identification restriction supplementary service (GSM02.81). This command is abortable (proprietary feature). OK or CME ERROR: <error>
Read command AT+CLIR?	+CLIR: <n>,<m> OK
Test command AT+CLIR=?	+CLIR: (0-2) i.e. (list of supported <n>s) OK

<n> parameter sets the adjustment for outgoing calls and may be:
- 0: presentation indicator is used according to the subscription of the CLIR service.
- 1: CLIR invocation.
- 2: CLIR suppression.

<m> parameter shows the subscriber CLIR status in the network and may be:
- 0: CLIR nor provisioned.
- 1: CLIR provisioned in permanent mode.
- 2: unknown.
- 3: CLIR temporary mode presentation restricted.
- 4: CLIR temporary mode presentation allowed.

11.3 Calling line identification presentation +CLIP

Command syntax	Description
AT+CLIP=<n>	This command allows to control the calling line identification presentation supplementary service. When CLI is enabled, +CLI response is returned after every RING (or +CRING) result code. When the presentation of CLI at the TE is enabled, the following unsolicited result code is displayed after RING (or +CRING): +CLIP: <number>,<type>,[,<subaddr>, <satype>[,[<alpha>[,<CLI validity>]]] This command is abortable (proprietary feature).
Read command AT+CLIP?	+CLIP: <n>,<m> OK
Test command AT+CLIP=?	+CLIP: (0,1) i.e. (list of supported <n>s) OK

<n> parameter sets/shows the result code presentation in the TA:
- 0: disable.
- 1: enable.

<m> parameter shows the subscriber CLIP service status in the network and may be:
- 0: CLIP not provisioned.
- 1: CLIP provisioned.
- 2: unknown.

<number> string type phone number of calling address in format specified by **<type>**.
<type> type of address in integer format.
<subaddr> and **<satype>** are not used.
<alpha> optional string type alphanumeric representation of <number> corresponding to the entry found in Phonebook.

<CLI validity> may be:
- 0: CLI valid.
- 1: CLI has been withheld by the originator.
- 2: CLI is not available.

11.4 Connected line identification presentation +COLP	
Command syntax	**Description**
AT+COLP=<n>	This command allows the control of the connected line identification presentation supplementary service, useful in case of call forwarding of the connected line. When enabled and call allowed the following intermediate result code is sent to TE before any +CR or V.25ter responses: +COLP: <number>,<type>[,<subaddr>,<satype>[,<alpha>]] This command is abortable (proprietary feature).
AT+COLP=1	OK or CME ERROR: <error>
Read command AT+COLP?	+COLP: <n>,<m> OK
Test command AT+COLP=?	+COLP: (0,1) i.e. (list of supported <n>s) OK

<n> parameter sets/shows the result code presentation status in the TA and may be:
- 0: disable
- 1: enable

<m> parameter shows the subscriber COLP service status in the network and may be:
- 0: COLP not provisioned
- 1: COLP provisioned
- 2: unknown

<number>, **<type>**, **<subaddr>**, **<satype>**, **<alpha>** refer to +CLIP

11.5 Connected line identification restriction +COLR	
Command syntax	**Description**
AT+COLR?	The COLR supplementary service enables the connected party to prevent presentation of its line identity to the calling party. According to GSM02.81 the activation and deactivation of COLR is only a result of provision / withdrawal. The command +COLR allows only the interrogation of the current state of COLR service in the network. The set syntax is not allowed (CME ERROR: operation not supported).
Read command AT+COLR?	+COLR: <status> OK
Test command AT+COLR=?	OK

<status> parameter shows the subscriber COLR service status in the network and may be:
- 0: COLR not provisioned.
- 1: COLR provisioned.
- 2: unknown.

11.6 Advise of charge +CAOC	
Command syntax	**Description**
AT+CAOC=<mode> AT+CAOC=0	This command allows the subscriber to get the information about the call cost using the Advise of Charge supplementary service (GSM02.24 and GSM02.86). If enabled the following unsolicited result code is sent to TE periodically: +CAOC: “000A02” OK or CME ERROR: <error>
Read command AT+CAOC?	+CAOC: <mode> OK
Test command AT+CAOC=?	+CAOC: (0-2)i.e. (list of supported <mode>s) OK

<mode> may be:

- 0: query the CCM value.
- 1: deactivate the unsolicited reporting of CCM value.
- 2: activate the unsolicited reporting of CCM value.

<ccm> current call meter may is indicated as a string in hexadecimal format.

11.7 Accumulated call meter +CACM	
Command syntax	**Description**
AT+CACM=<passwd> AT+CACM=”0933”	This command resets the Advice of charge related accumulated call meter value in SIM file EF-ACM. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is required to reset the value. OK or CME ERROR: <error>
Read command AT+CACM?	+CACM: <acm> OK
Test command AT+CACM=?	OK

<passwd> SIM PIN2 as string type.
<acm> accumulated call meter value similarly coded as **<ccm>** under +CAOC as string type.

11.8 Accumulated call meter maximum +CAMM	
Command syntax	**Description**
AT+CAMM=<acmmax> ,<passwd> AT+CAMM=”00300”,”0933”	This command sets the Advise of Charge related accumulated call meter maximum value in the SIM file EFACMmax. ACMmax contains the maximum number of home units allowed to be consumed by the subscriber. When ACM reaches ACMmax, calls are prohibited. SIM PIN2 is required to set the value. OK or CME ERROR: <error>
Read command AT+CAMM?	+CAMM: <acmmax> OK
Test command AT+CAMM=?	OK

<acmmax> string type containing the accumulated call meter maximum value similarly coded as <ccm> under +CAOC; value zero disables ACMmax feature.
<passwd> SIM PIN2

11.9 Price per unit and currency table +CPUC	
Command syntax	**Description**
AT+CPUC=<currency>, <ppu>,<passwd> AT+CPUC="USD","0.20", "0933"	This set command sets the parameters of Advise of Charge related price per unit and currency table in SIM file EFPUCT. PUCT information can be used to convert the home units into currency units. SIM PIN2 is required to set the parameters. OK or CME ERROR: <error>
Read command AT+CPUC?	+CPUC: <currency>,<ppu> OK
Test command AT+CPUC=?	OK

<currency> string type containing the three-character currency code (e.g. "GBP","EUR").
<ppu> string type containing the price per unit; dot is used as a decimal separator.
<passwd> string type containing the SIM PIN2.

11.10 Call related supplementary services +CHLD	
Command syntax	**Description**
AT+CHLD=<n>	This command allows to manage call hold and multiparty conversation (conference call). Calls can be put on hold, recovered, released or added to conversation.
AT+CHLD=2	OK or CME ERROR: <error>
Test command AT+CHLD=?	+CHLD: (0,1,1x,2,2x,3,4,4*,6,7) i.e. (list of supported <n>s) OK

<n> may be:

- 0: release all held calls or set User Determined User Busy for a waiting call; if both exists then only the waiting call will be rejected.
- 1: release all active calls and accepts the other (held or waiting).
- 1x: release a specific call (x specific call number as indicated by +CCLC).
- 2: place all active calls (if exist) on hold and accepts the other call (held or waiting).
- 2x: place all active calls on hold except call x with which communication is supported.
- 3: adds a held call to the conversation.
- 4: connects the two calls and disconnects the subscriber from both calls (Explicit Call Transfer).
- 4*: call deflection (proprietary feature).
- 5: call completion of busy subscriber; this command syntax will be interpreted as an activation request, if the network has previously offered the possibility to activate this function, which will be indicated to the user by the unsolicited result code +XCCBS: 1 (CCBS is possible).
- 6: puts an active call on hold or an held call to active, while another call is waiting.
- 7: disconnect users in multiparty without accepting incoming call.

11.11 Call deflection +CTFR	
Command syntax	**Description**
AT+CTFR=<number> ,<type>,<subaddr> ,<satype>	This command allows the DTE user to respond to an incoming call offered by the network by requesting call deflection, i.e. redirection of this call to another number specified in the response. The call deflection is a supplementary service applicable only to voice calls (teleservice 11).
AT+CTFR="09113788"	OK or CME ERROR: <error>
Test command AT+CTFR=?	OK

<number> is the string type phone number of format specified by **<type>**.
<subaddr> is the string type subaddress of format specified by **<satype>**.

11.12 List current calls +CLCC	
Command syntax	**Description**
AT+CLCC	This command returns the list of current calls of ME. If command succeeds but no calls are available, no information response is sent to TE.
AT+CLCC	+CLCC: 1,0,0,0,0,"0913137880",129 OK or OK (if no calls) or CME ERROR: <error>
Test command AT+CLCC=?	OK

<idx> integer type indicating the call identification (s.+CHLD x).
<dir> direction and may be:
- 0: mobile originated (MO).
- 1: mobile terminated (MT).

<stat> state of the call and may be
- 0: actine.
- 1: held.
- 2: dialling (MO call).
- 3: alerting (MO cal).
- 4: incoming (MT call).
- 5: waiting (MT call).

<mode> teleservice and may be:
- 0: voice.
- 1: data.
- 2: FAX.
- 9: unknown.

<mpty> may be
- 0: cal is not one of multiparty (conference) call parties.
- 1: call is one of multiparty cal parties.

<number> string type indicating the phone number in format specified by **<type>**.
<type> type of address octet (phone number) in integer format.
<alpha> optional string alphanumeric representation of **<number>** corresponding to the entry found in phonebook.

11.13 Supplementary service notifications +CSSN	
Command syntax	**Description**
AT+CSSN=<n>,<m>	This command refers to supplementary service related network initiated notifications. When <n>=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code +CSSI: <code1> is sent before any other MO call setup result codes. When <m>=1 and a supplementary service notification is received during a call, unsolicited result code +CSSU: <code2> is sent. +CSSI: <code1>[,<index>] +CSSU: <code2>[<index>[,<number>,<type>[,<subaddr>,<satype>]]]
AT+CSSN=1,1	OK or CME ERROR: <error>
Read command AT+CSSN?	+CSSN: <n>,<m> OK
Test command AT+CSSN=?	+CSSN: (list of supported <n>s),(list of supported <m>s) OK

<n> this parameter sets/shows the +CSSI result code presentation status in the TA and may be:
- 0: disable.
- 1: enable.

<m> this parameter sets/shows the +CSSU result code presentation status in the TA and may be:
- 0: disable.
- 1: enable.

<code1> may be:
- 0: unconditional call forwarding is actine.
- 1: some of the conditional call forwardings are actine.
- 2: call has been forwarded.
- 3: call is waiting.
- 4: this is a CUG call (also <index> present).
- 5: outgoing calls are barred.
- 6: incoming calls are barred.
- 7: CLIR suppression rejected.
- 8: calls has been deflected.

<index> refer +CCUG.

<code2> may be:
- 0: this is a forwarded call (MT call setup).
- 1: this is a CUG call (<index> present) (MT call setup).
- 2: call has been put on hold (during a voice call).
- 3: call has been retrieved (during a voice call).
- 4: multiparty call entered (during a voice call).
- 5: cal on hold has been released – not a SS notification – (during a voice call).
- 6: forward check SS message received (can be received whenever).
- 7: call is being connected (alerting) with the remote party in alerting state in explicit call transfer operation (during a voice call).
- 8: call has been connected with the other remote party in explicit call transfer operation (during a voice call or MT call setup).
- 9: this is a deflected call (MT call setup).
- 10: additional incoming call forwarded.

<number> string type phone of format specified by **<type>**.

<type> type of address octet in integer format.

<subaddr>, **<satype>** not used.

11.14 Unstructured supplementary service data +CUSD

Command syntax	Description
AT+CUSD=<n>,<str>,<dcs>	This command allows control of the Unstructured Supplementary Service Data (USSD) according to GSM02.90. Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code +CUSD: <m>[,<str>,<dcs>] to the TE. Value <n>=2 is used to cancel an ongoing USSD session. This command is abortable (proprietary feature). When <str> is given, a mobile initiated USSD-string or a response USSD-string to a network initiated operation is sent to the network. The response USSD-string from the network is returned in the unsolicited +CUSD result code indicated above.
AT+CUSD=1,"*100#",15	+CUSD: 2,"Residual credit: 7,87 Euro",15 OK or CME ERROR: <error>
Read command AT+CUSD?	+CUSD: <n> OK
Test command AT+CUSD=?	+CUSD: (list of supported <n>s) OK

<n> may be:
- 0: disable the result code presentation in the TA.
- 1: enable the result code presentation in the TA.
- 2: cancel session (not applicable to read command response).

<str> sting type USSD-string converted in the selected character set.
<dcs> data coding scheme.
<m> may be:
- 0: no further user action required.
- 1: further user action required.
- 2: USSD termination by network.
- 4: operation not supported.
- 5: network time out.

11.15 Closed user group +CCUG

Command syntax	Description
AT+CCUG=<n>,<index>,<info> AT+CCUG=1,2,1	This command enables subscribers to form closed user groups to and from which access is restricted (GSM02.85). The command can be used to: activate/deactivate the control of the CUG information for all following calls select a CUG index suppress the outgoing access (OA). The OA allows a member of a CUG to place calls outside the CUG suppress the preferential CUG. OK or CME ERROR: <error>
Read command AT+CCUG?	+CCUG: <n>,<index>,<info> OK
Test command AT+CCUG=?	OK

<n> may be:
- 0: disable CUG temporary.
- 1: enable CUG temporary.

<index> may be:
- 0 ... 9 CUG index.
- 10 no index (preferred CUG taken from subscriber data).

<info> may be:
- 0: no information.
- 1: suppress OA.
- 2: suppress preferential CUG.
- 3:suppress OA and preferential CUG.

11.16 Calling name presentation +CNAP

Command syntax	Description
AT+CNAP=<n> AT+CNAP=1	This command allows to control the name identification supplementary service (s. GSM02.96). When the presentation of CNAP at the TE is enabled, the following unsolicited result code is displayed: +CNAP: <calling_name> [, <CNAP validity>] This command is abortable (proprietary feature). OK or CME ERROR: <error>
Read command AT+CNAP?	+CNAP: <n>, <m> OK
Test command AT+CNAP=?	+CNAP: (0,1) i.e. (list of supported <n>s) OK

<n> parameter sets the result code presentation in the TA:
- 0: disable.
- 1: enable.

<m> parameter shows the subscriber CNAP service status in the network and may be:
- 0: CNAP not provisioned.
- 1: CNAP provisioned.
- 2: unknown.

<calling_name> string type containing the calling party name.

<CNAP validity> may be:
- 0: name presentation allowed.
- 1: presentation restricted.
- 2: name unavailable.
- 3: name presentation restricted.

12 Data Commands

12.1 Select bearer service type +CBST	
Command syntax	**Description**
AT+CBST=<speed>, <name>,<ce> AT+CBST=5,0,1	This set command selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated. OK or CME ERROR: <error>
Read command AT+CBST?	+CBST: <speed>,<name>,<ce> OK
Test command AT+CBST=?	+CBST: (list of supported <speed>s), (list of supported <name>s),(list of supported <ce>s) OK

<speed> data rate may be:

- 0: autobauding
- 4: 2400 bps (V.22bis).
- 5: 2400 bps (V.26ter).
- 6: 4800 bps (V.32).
- 7: 9600 bps (V.34).
- 68: 2400 bps (V110 or X.31 flag stuffing).
- 70: 4800 bps (V110 or X.31 flag stuffing).
- 71: 9600 bps (V110 or X.31 flag stuffing).

<name> bearer service may be:

- 0: data circuit asynchronous (UDI or 3.1 kHz modem).

<ce> connection element may be:

- 0: transparent.
- 1: non-transparent.
- 2: both, transparent preferred.
- 3: both, non-transparent preferred.

12.2 Service class selection and identification +FCLASS	
Command syntax	**Description**
AT+FCLASS=<class> AT+FCLASS=2.0	This command puts the MS into a particular mode of operation (voice, data or FAX). OK or CME ERROR: <error>
Read command AT+FCLASS?	<n> OK
Test command AT+FCLASS=?	list of supported <class>s OK

<class> may be:

- 0: data
- 2.0: FAX (service class 2)
- 8: voice

12.3 Service reporting control +CR	
Command syntax	**Description**
AT+CR=<mode> AT+CR=1	This set command controls whether or not intermediate result code +CR: <serv> is returned from the TA to the TE. If enabled, the intermediate result code is transmitted at the point during connect negotiation at which the TA has determined which speed and quality of service will be used, before any error control or data compression reports are transmitted and before the intermediate result code CONNECT is transmitted. OK or CME ERROR: <error>
Read command AT+CR?	+CR: <mode> OK
Test command AT+CR=?	+CR: (list of supported <mode>s) OK

<mode> may be:

- 0: disables reporting.
- 1: enables reporting.

<serv> may be:

- ASYNC : asynchronous transparent.
- SYNC: synchronous transparent.
- REL ASYNC: asynchronous non-transparent.
- GPRS [<L2P]: GPRS.

12.4 Cellular result codes +CRC	
Command syntax	**Description**
AT+CRC=<mode> AT+CRC=1	This command enables a more detailed ring indication, in case of incoming call. Instead of RING an unsolicited result code +CRING: <type> is displayed on TE. OK or CME ERROR: <error>
Read command AT+CRC?	+CRC: <mode> OK
Test command AT+CRC=?	+CRC: (list of supported <mode>s) OK

<mode> may be:

- 0: disables extended format.
- 1: enables extended format.

<type> may be:

- ASYNC: asynchronous transparent.
- SYNC: synchronous transparent.
- REL ASYNC: asynchronous non-transparent.
- REL SYNC: synchronous non-transparent.
- FAX: facsimile (TS62).
- VOICE: normal voice (TS11).
- ALT VOICE / FAX: alternating voice/FAX, voice first (TS61).
- ALT FAX / VOICE alternating voice/FAX, FAX first (TS61).
- GPRS <PDP_type>, <PDP-addr>,<L2P>,<APN>: GPRS network request for PDP context activation.
- VOICE 2: normal voice on second ALS line.

12.5 Radio link protocol +CRLP

Command syntax	Description
AT+CRLP=<iws>,<mws>, <T1>,<N2> AT+CRLP=61,61,48,6	This command is used to change the radio link protocol (RLP) parameters used when non-transparent data-calls are originated. OK or CME ERROR: <error>
Read command AT+CRLP?	+CRLP: <iws>,<mws>,<T1>,<N2> OK
Test command AT+CRLP=?	+CRLP: (0-61),(0-61),(39-255)(1-255) i.e. lists of supported <iws>, <mws>, <T1>, <N2> OK

<iws> IWF to MS window size.
<mws> MS to IWF window size.
<T1> acknowledgement timer T1.
<N2> retransmission attempts.

13 Fax Class Commands

13.1 Transmit Data +FDT	
Command syntax	**Description**
AT+FDT	This action command prefixes data transmission. It requests the DCE to transmit a phase C page. It is issued at the beginning of each page in phase B or D.

13.2 Receive Data +FDR	
Command syntax	**Description**
AT+FDR	This action command initiates data reception.

13.3 Initialize facsimile parameters +FIP	
Command syntax	**Description**
AT+FIP=<value>	This action command causes the DCE to initialize all Service Class Facsimile Parameters to the manufacturer determined default settings. It does not change the setting +FCLASS.

<value> indicates the profile; only one profile is possible for **<value>**=0

13.4 Session termination +FKS, +FK	
Command syntax	**Description**
AT+FKS or AT+FK	This action command causes the DCE to terminate the session in an orderly manner. It will send a DCN message at the next opportunity and hang up.

13.5 Adaptive answer +FAA	
Command syntax	**Description**
AT+FAA=<value>	This command allows an adaptive answer of DCE depending on the parameter <value>.

<value>

- 0: the DCE shall answer only as a Class 2 facsimile device.
- 1: the DCE can answer and automatically determine whether to answer as a facsimile DCE or as a data modem. If a data modem is detected, the DCE shall operate as described in T.32 8.3.2.4.

13.6 Address & polling capabilities +FAP	
Command syntax	**Description**
AT+FAP=<sub>,<sep>,<pwd>	This command indicates the remote station the address and polling capabilities and also controls the reporting of those frames if received.

<sub> subaddressing; default value: 0.
<sep> selective polling; default value: 0.
<pwd> password; default value: 0.

13.7 Buffer size +FBS	
Command syntax	**Description**
AT+FBS?	This command allows the DCE to report the size of its data buffers. <tbs>,<rbs>

<tbs> transmit buffer size.
<rbs> receive buffer size.

13.8 Data bit order +FBO	
Command syntax	**Description**
AT+FBO=<value>	This set command controls the mapping between PSTN facsimile data and the DTE-DCE link. There are two choices: Direct: the first bit transferred of each octet on the DTE-DCE link is the first bit transferred on the GSTN data carrier Reversed: the last bit transferred of each octet on the DTE-DCE link is the first bit transferred on the GSTN data carrier.

<value> has the range: 0-3.

13.9 HDLC frame reporting +FBU	
Command syntax	**Description**
AT+FBU=<value>	This command enables/disables the DCE to report the contents of phase B and phase D HDLC frames to the DTE, as they are sent and received, in addition to other responses.

<value> has the range: 0-1.

13.10 DS capabilities parameters +FCC	
Command syntax	**Description**
AT+FCC=<vr>, ,<wd>,<ln>,<df>,<ec>,<bf>,<st>,<jp> (or AT+DCC=..)	This command allows the DTE to sense and constrain the capabilities of the facsimile DCE, from the choices defined in table 2/T.30. When +FCC is modified by the DTE, the DCE shall copy +FCC into +FIS.

<vr> resolution in range 0-1.
**
** bit rate in range 0-3.
<wd> page width in pixels; only 0 value.
<ln> page length in range 0-2.
<df> data compression format; only 0 value.
<ec> error correction; only 0 value.
<bf> file transfer; only 0 value.
<st> scan time/line in range 0-7.
<jp> JPEG for colour and B&W; only 0 value.

13.11 Copy quality checking +FCQ	
Command syntax	**Description**
AT+FCQ=<rq>,<tq>	This command allows to control copy quality checking and correction by a facsimile DCE.

<rq> controls copy quality checking and correction of data received from the remote station and delivered to DTE
<tq> controls copy quality checking and correction of image data received from the DTE and sent to the remote station.

13.12 Capability to receive data +FCR	
Command syntax	**Description**
AT+FCR=<value>	This command sets the capability to receive message data.

<value> only value 1 allowed; it means that the DCE can receive message data. Bit 10 in the DIS or DTC frame will be set.

13.13 Current session results +FCS	
Command syntax	**Description**
AT+FCS?	This command allows to display the current session results, either as response to the read syntax or spontaneously during execution of +FDR. (<vr>, ,<wd>,<ln>,<df>,<ec>,<bf>,<st>,<jp>)[4].

13.14 DTE phase C response timeout +FCT	
Command syntax	**Description**
AT+FCT=<value>	This command determines how long the DCE will wait for a command after having transmitted all available phase C data.

<value> is in range 0-FFH, meaning 1 second units. Default value: 1EH (30) sec.

13.15 Phase C received EOL alignment +FEA	
Command syntax	**Description**
AT+FEA=<value>	This command enables optional octet-alignment of EOL markers in received T.4 data stream. It does not apply to T.6 data, or to any form of data.

<value> may be:
0: determines that T.4 EOL patterns are bit aligned (as received).
1: determines that the last received bits of T.4 EOL patterns are octet aligned by the DCE, with necessary zero fill bits inserted.

13.16 Format conversion +FFC	
Command syntax	**Description**
AT+FFC=<vrc>,<dfv>, <lnc>,<wdc>	This command determines the DCE response to mismatches between the phase C data delivered after the +FDT command and the data format parameters negotiated for the facsimile session.

<vrc> vertical resolution format codes may be:
- 0: ignored.
- 1: enabled.
- 2: enabled for 1-D data.
- 3: enabled for 2-D data.

<dfc> data format codes may be:
- 0: ignored.
- 1: checking enabled.
- 2: conversion.

<lnc> page length format codes may be:
- 0: ignored.
- 1: checking enabled.
- 2: conversion for 1-D data.
- 3: conversion enabled for 2-D data.

<wdc> page with format codes may be:
- 0: ignored.
- 1: checking enabled.
- 2: conversion enabled.

[4] See +FCC.

13.17 Call termination status +FHS	
Command syntax	**Description**
AT+FHS? :<value>	This command indicates the cause of a hang-up +FHS is set by the DS at the conclusion of a FAX session. The DCE resets this value to 0 at the beginning of phase A.

<value> may be in range 0-FFH

13.18 Procedure interrupt enable +FIE	
Command syntax	**Description**
AT+FIE=<value>	This command allows either station to initiate interrupts; the other station may ignore or accept the requests.

<value> only value 0 is allowed, it means that the procedure interrupt requests from the remote station are ignored and not reported to DTE.

13.19 Current session parameters +FIS	
Command syntax	**Description**
AT+FIS=<vr>, ,<ln>,<df>,<ec>,<bf>,<st>,<jp> [4]	This command allows the DTE to sense and constrain the capabilities used for the current session.

13.20 Inactivity timeout +FIT	
Command syntax	**Description**
AT+FIT=<time>,<action>	This command allows to provide an inactivity timer which allows the DS to break away from an unsuccessful connection attempt at any stage of a facsimile transfer.

<time> valid time in range 0-255.
<action> only value 0 possible and means: upon timeout the DCE shall go on-hook, executing an implied ATH command, then reset to +FCLASS=0.

13.21 Local ID string +FLI	
Command syntax	**Description**
AT+FLI=<local ID string>	This command determines that DCE sends the ID frame if +FLI is not a zero-string.

<local ID string> 20 digit string; valid values are 0x20…0x7E.

13.22 Set flow control +FLO	
Command syntax	**Description**
AT+FLO=<value>	This command allows to set the flow control for communication via V.24 interface.

<value> indicates the kind of flow control:
- 0: DTE-DCE flow control is disabled.
- 1: DTE-DCE flow control is DC1/DC3 (SW).
- 2: DTE-DCE flow control is RTC/CTS (HW).

13.23 Indicate document to poll +FLP	
Command syntax	**Description**
AT+FLP=<value>	This command indicates document to poll. By default DTE has no document to poll.

<value> only value 0 is allowed.

13.24 Request manufacturer identification +FMI	
Command syntax	**Description**
AT+FMI	This command gives the manufacturer identification. (get manufacturer identification) OK or CME ERROR: <error>
Test command AT+FMI=?	OK

13.25 Request model identification +FMM	
Command syntax	**Description**
AT+FMM	This command gives the model identification. <model> OK or CME ERROR: <error>
Test command AT+FMM=?	OK

13.26 Request revision identification +FMR	
Command syntax	**Description**
AT+FMR	This command gives the revised version of the mobile station. <revision> OK or CME ERROR: <error>
Test command AT+FMR=?	OK

13.27 Minimum phase C speed +FMS	
Command syntax	**Description**
AT+FMS=<value>	This command limits the lowest negotiable speed for a session.

<value> may be in range 0-3 (2400, 4800, 9600 bps).

13.28 Negotiation reporting +FNR	
Command syntax	**Description**
AT+FNR=<rpr>,<tpr>, <idr>,<nsr>	This command controls the reporting of messages generated during T.30 phase B negotiations.

<rpr> receiver parameters reporting 0-1 (no-yes).
<tpr> transmitter parameters reporting 0-1 (no-yes).
<idr> ID strings reporting 0-1 (no-yes).
<nsr> non-standard frames reporting 0-1 (no-yes).

13.29 Non-standard frame FIF octet string +FNS	
Command syntax	**Description**
AT+FNS=<sring of hexadecimal coded octets>	This command allows to send the corresponding non-standard facilities frame.

Valid is only the null string.

13.30 NSF message data indication +FND	
Command syntax	**Description**
AT+FND=<value>	This command has no effect.

<value> may be in range 0-1.

13.31 Selective polling address +FPA	
Command syntax	**Description**
AT+FPA=<selective polling address string>	This command sets the selective polling address. The DCE sends the numeric string contained in the +FPA at the times specified in T.30, if the corresponding parameter is not zero string.

<selective polling address string> 20 digit string; valid values 0-9, *, #, space

13.32 Local polling ID string +FPI	
Command syntax	**Description**
AT+FLI=<local polling ID string>	This command allows the DCE to send the ID frame if +FPI is not a zero string. Polling is not supported.

<local polling ID string> only zero string; polling is not supported.

13.33 Packet protocol control +FPP	
Command syntax	**Description**
AT+FPP=<value>	This command allows to control the packet protocol. The packet protocol is not supported.

<value> only value 0 allowed.

13.34 Page status +FPS	
Command syntax	**Description**
AT+FPS=<value>	This parameter contains a value representing the post age response, including copy quality and related end-of-page status.

<value> may be:
- 1: MCF, page good.
- 2: RTN, page bad; retrain requested.
- 3: RTP, page good; retrain requested.
- 4: PIN, page bad; interrupt requested.
- 5: PIP, page good; interrupt requested.

13.35 Password parameter +FPW	
Command syntax	**Description**
AT+FPW=<password string>	This parameter sets the password. The DCE sends the numeric string contained in +FPW at the times specified in T.30, if the corresponding parameter is not zero string.

<password string> valid values: 0-9, *, #, space.

13.36 Receive quality thresholds +FRQ	
Command syntax	**Description**
AT+FRQ=<pgl>,<cbl>	This command allows to make the "Copy Quality OK" decision using the command parameter. The command has no effect.

<pgl> in range 0-64H.
<cbl> in range 0-FFH.

13.37 Error correction mode retry count +FRY	
Command syntax	**Description**
AT+FRY=<value>	This command has no effect.

<value> in range 0-FFH

13.38 SubAddress parameter +FSA	
Command syntax	**Description**
AT+FSA=<destination SubAddress string>	This command sets the Subaddress. The DCE sends the numeric string contained in +FSA at the times specified in T.30, if the corresponding parameter is not zero string.

<destination SubAddress string> 20 digit string; allowed values: 0-9, *, #, space.

13.39 Request to poll +FSP	
Command syntax	**Description**
AT+FSP=[<value>]	This command indicates whether or not the DTE wants to poll. The command has no effect.

<value> 0.

14 V24 control and V25ter commands

14.1 Reset to default configuration Z	
Command syntax	**Description**
ATZ<value>	This command resets the parameters of all AT-commands (also FAX-related). The values related to parameters contained in a user profile will be taken from the corresponding NVRAM-profile, indicated by the <value>. OK or CME ERROR: <error>

<value> indicates NVRAM profile; possible values 0-9.

14.2 Set to factory defined configuration &F	
Command syntax	**Description**
AT&F<value>	This command resets only the parameters of the not FAX-related AT-command to factory defined defaults. OK or CME ERROR: <error>

<value> only 0 allowed.

14.3 Circuit 109 behavior &C	
Command syntax	**Description**
AT&C<value>	This command determines how the state of circuit 109 relates to the detection of received line signal from the remote end. OK or CME ERROR: <error>

<value> indicates the behaviors of circuit 109 as follows:

- 0: the DCE always presents the ON condition on circuit 109.
- 1: circuit 109 changes in accordance with the underlying DCE, which may include functions other than the physical layer functions.

14.4 Circuit 108/2 behavior &D	
Command syntax	**Description**
AT&D<value> AT&D1	This command determines how the DCE responds when circuit 108/2 is changed from ON to OFF condition during on-line data state. OK or CME ERROR: <error>

<value> may be:

- 0: the DCE ignores circuit 108/2.
- 1: upon an ON-to-OFF transition of circuit 108/2, the DCE enters online command state and issues an OK result code.
- 2: upon an ON-to-OFF transition of circuit 108/2, the DCE instructs the underlying DCE to perform an orderly cleardown of the call. Automatic answer is disabled while circuit 108/2 remains OFF.

14.5 DSR override &S	
Command syntax	**Description**
AT&S<value> AT&S	This command selects how the modem will control DSR (V.24 control line 107). OK or CME ERROR: <error>

<value> indicates the behavior as follows:

- 0: sets the DSR line to ON.
- 1: sets the DSR line to OFF.

14.6 Flow control &K	
Command syntax	**Description**
AT&K<value> AT&K3	This command controls the flow control mechanism. OK or CME ERROR: <error>

<value> may be:

- 0: disable DTE-DCE flow control.
- 3: enable RTS/CTS DTE-DCE flow control (default for data modems).
- 4: enable XON/XOFF DTE-DCE flow control.
- 5: enable XON/XOFF FTE-DCE flow control.
- 6: enable XON/XOFF DTE-DCE flow control.

14.7 Store current configuration &W	
Command syntax	**Description**
AT&W<value> AT&W1	This command stores the current active configuration into one of the two user profiles in NVRAM as denoted by the parameter value. The profile is stored for the terminal where the storing is requested. OK or CME ERROR: <error>

<value> may be:

- 0: selects profile 0.
- 1: selects profile 1.

14.8 Display current configuration &V	
Command syntax	**Description**
AT&V	This command reports the current configuration and the stored user profiles.
AT&V	&C1, &D1, &K3, E1, Q0, V1, X0, S00:000, S02:000, S03:013, S04:010, S05:008, S07:060, +CBST:007, 0000, 001, +CRLP:061, 061, 048, 006, +CR:000, +CRC:000 STORED PROFILE 0: &C1, &D1, &K3, E1, Q0, V1, X0, S00:000, S02:000, S03:013, S04:010, S05:008, S07:060, +CBST:007, 0000, 001, +CRLP:061, 061, 048, 006, +CR:000, +CRC:000 STORED PROFILE 1: &C1, &D1, &K3, E1, Q0, V1, X0, S00:000, S02:000, S03:013, S04:010, S05:008, S07:060, +CBST:007, 0000, 001, +CRLP:061, 061, 048, 006, +CR:000,+CRC:000 OK or CME ERROR: <error>

14.9 Designate a default reset profile &Y	
Command syntax	**Description**
AT&Y<value>	This command selects which user profile will be used after a hardware reset. The settings which may be changed are described in the chapter related to the &V command. An error is returned if the parameter <value> is greater then 2 or NVRAM is not installed or is not operational.
AT&Y1	OK or CME ERROR: <error>

<value> may be:
- 0: selects profile 0.
- 1: selects profile 1.
- 2: selects the default factory settings.

14.10 Request identification information I	
Command syntax	**Description**
ATI<value>	This action command causes the DCE to transmit one or more lines of information text, determined by the manufacturer, followed by a final result code.
ATI3	Manufacturer 3 OK or CME ERROR: <error>

<value> may be in range 0-9; for each value an other text provided by the manufacturer will be displayed.

14.11 Request manufacturer Identification +GMI	
Command syntax	**Description**
AT+GMI	This action command causes the DCE to transmit one or more lines of information text, determined by the manufacturer, which allows to identify the manufacturer.
AT+GMI[5]	<manufacturer> OK or CME ERROR: <error>
Test command AT+GMI=?	OK

14.12 Request model identification +GMM	
Command syntax	**Description**
AT+GMM[6]	This command gives the model identification.
Test command AT+GMM=?	OK

14.13 Request revision identification +GMR	
Command syntax	**Description**
AT+GMR	This command gives the revised version of the mobile station. <revision> OK or CME ERROR: <error>

[5] get manufacturer identification.
[6] get model identification.

14.14 Request product serial number identification +GSN	
Command syntax	**Description**
AT+GSN	This command gets the product serial number, known as IMEI (International Mobile Equipment Identity) of the MS. <IMEI> OK or CME ERROR: <error>
Test command AT+GSN=?	OK

14.15 DTE-DCE character framing +ICF	
Command syntax	**Description**
AT+ICF=<format>,<parity>	This command sets the local serial port start-stop (asynchronous) character framing which is used in the informatikon interchange between DCE and DTE.
AT+ICF=3,1	OK or CME ERROR: <error>
Read command AT+ICF?	+ICF: <format>,<parity> OK
Test command AT+ICF=?	+ICF: (0-6),(0-3) i.e. lists of supported <format> and <parity> OK

<format> may be:

- 0: auto detect.
- 1: 8 data 2 stop.
- 2: 8 data 1 parity 1 stop.
- 3: 8 data 1 stop.
- 4: 7 data 2 stop.
- 5: 7 data 1 parity 1 stop.
- 6: 7 data 1 stop.

<parity> may be:

- 0: odd.
- 1: even.
- 2: mark.
- 3: space.

14.16 DTE-DCE local flow control +IFC	
Command syntax	**Description**
AT+IFC=<DCE_by_DTE>, <DTE_by_DCE> AT+IFC=2,2	This command controls the operation of local flow control between DTE and DCE used when data are sent or received. OK or CME ERROR: <error>
Read command AT+IFC?	+IFC: <DCE_by_DTE>,<DTE_by_DCE> OK
Test command AT+IFC=?	+IFC: (0-3),(0-2) i.e. lists of supported <DCE_by_DTE> and <DTE_by_DCE> OK

<DCE_by_DTE> may be:

- 0: none.
- 1: DC1/DC3 on circuit 103 (XON/XOFF).
- 2: circuit 133 (RTS).

<DTE_by_DCE> may be:

- 0: none.
- 1: DC1/DC3 on circuit 104 (XON/XOFF).
- 2: circuit 106 (CTS).

14.17 Set flow control \Q	
Command syntax	**Description**
AT\Q<value>	This command controls the operation of local flow control between DTE and DCE used when data are sent or received.
AT\Q3	OK or CME ERROR: <error>

<value> may be:

- 0: no flow control.
- 1: DC1/DC3 on circuit 103 and 104 (XON/XOFF).
- 2: DTE_by_DCE on circuit 106 (CTS).
- 3: DCE_by_DTE on circuit 133 (RTS and DTE_by_DCE on circuit 106 (CTS).

14.18 Fixed DTE rate +IPR	
Command syntax	**Description**
AT+IPR=<rate> AT+IPR=9600	This command specifies the data rate at which the DCE will accept commands. The full range of data rate values may be reduced dependent on HW or other criteria. OK or CME ERROR: <error>
Read command AT+IPR?	+IPR: 9600 OK
Test command AT+IPR=?	+IPR:(list of supported autodetectable <rate> values), (list of fixed only<rate> values) OK

<rate> may be 0 meaning autobauding or 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps.

14.19 Return to on-line data state O	
Command syntax	**Description**
ATO	This action command causes the DCE to return to online data state and issue a CONNECT or CONNECT <text> result code on TE.
MS is in state data transfer +++ (return to online command mode) MS is in online command mode ATO	 OK OK or CME ERROR: <error>

14.20 Escape character S2	
Command syntax	**Description**
ATS2=<value>	This command controls the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII '+'. A value over 127 disables the escape process, i.e. no escape character will be recognized. The escape sequence contains three escape characters e.g. "+++".
ATS2=43	OK or CME ERROR: <error>
Read command ATS2?	043 OK

14.21 Command line termination character S3	
Command syntax	**Description**
ATS3=<value>	This command sets a value which represents 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.
ATS3=13	OK or CME ERROR: <error>
Read command ATS3?	013 OK

<value> is in range 0 to 127; mandatory default is 13 carriage return character (CR, IRA5 0/13).

14.22 Response formatting character S4	
Command syntax	**Description**
ATS4=<value>	This command sets a value which represents 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.
Read command ATS4?	010 OK

<value> is in range 0 to 127; mandatory default is 10 line feed character (LF, IRA5 0/10).

14.23 Command line editing character S5	
Command syntax	**Description**
ATS5=<value>	This command 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.
ATS5=8	OK or CME ERROR: <error>
Read command ATS5?	008 OK

14.24 Pause before blind dialing S6	
Command syntax	**Description**
ATS6=<value>	This command specifies the amount of time in seconds, which the DCE waits between connecting to the line and dialing, when dial tone is not implemented or enabled. The command has no effect.
ATS6=2	OK or CME ERROR: <error>
Read command ATS6?	002 OK

<value> is in range 2-10.

14.25 Connection completion timeout S7	
Command syntax	**Description**
ATS7=<value>	This command specifies the amount of time in seconds, which the DCE shall allow between either answering a call or completion of dialling and establishment of a connection with a remote site.
ATS7=30	OK or CME ERROR: <error>
Read command ATS7?	030 OK

<value> is in range 1-255.

14.26 Command dial modifier time S8	
Command syntax	**Description**
ATS8=<value>	This command specifies the amount of time in seconds, which the DCE shall pause, during dialing, when a "," dial modifier is encountered in a dial string. The command has no effect.
ATS8=4	OK or CME ERROR: <error>
Read command ATS8?	004 OK

<value> is in range 0-255.

14.27 Automatic disconnect delay S10	
Command syntax	**Description**
ATS10=<value>	This command specifies the amount of time in tenth of a second, which the DCE will remain connected to the line after the DCE has indicated the absence of received line signal. The command has no effect.
ATS10=30	OK or CME ERROR: <error>
Read command ATS10?	030 OK

<value> is in range 1-254.

14.28 Escape prompt delay (EPD) S12	
Command syntax	**Description**
ATS12=<value>	This command defines the maximum period, in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent.
ATS12=80	OK or CME ERROR: <error>
Read command ATS12?	080 OK

<value> is in range 0-255 1/50 of a second; default: 50 (1 second).

14.29 Command echo E	
Command syntax	**Description**
ATE<value>	This command controls whether or not the TA echoes characters received from the DTE during command state.
ATE1	OK or CME ERROR: <error>

<value> may be:

- 0: echo off.
- 1: echo on.

14.30 Result code suppression Q	
Command syntax	**Description**
ATQ<value>	This command determines whether or not the DCE transmits result codes to the DTE. When result codes are being suppressed, no portion of any intermediate, final or unsolicited result code is transmitted. Information text transmitted in response to commands is not affected by this setting.
ATQ1	OK or CME ERROR: <error>

<value> may be:

- 0: DCE transmits result codes
- 1: Result codes are suppressed and not transmitted

14.31 DCE response format V	
Command syntax	**Description**
ATV<value>	This command allows to control the contents of the header and trailer transmitted with result codes and information responses. It also determines whether result codes are transmitted in a numeric form or a alphabetic (or verbose) form. The text portion of information responses is not affected by this setting. The effect of V setting on response formats is described below: in case of information responses the format is: – for V0: <text><CR><LF> – for V1: <CR><LF><text><CR><LF> in case of result codes the format is: – for V0: <numeric code><CR> – for V1: <CR><LF><verbose code><CR><LF>
ATV1	OK or CME ERROR: <error>

<value> may be:

- 0: DCE transmits limited headers and trailers and numeric text.
- 1: DCE transmits full headers and trailers and verbose response text (default).

14.32 Result code selection and call progress monitoring control X	
Command syntax	**Description**
ATX<value>	This command determines whether or not the DCE transmits particular result codes to the DTE. It also controls whether or not the DCE verifies the presence of dial tone when it first goes off-hook to begin dialing and whether or not engaged tone (busy signal) detection is enabled.
ATX1	OK or CME ERROR: <error>

<value> may be:

- 0: CONNECT result code is given upon entering online data state; dial tone and busy detection are disabled;
- 1: CONNECT <text> result code is given upon entering online data state; dial tone and busy detection are disabled;
- 2: CONNECT <text> result code is given upon entering online data state; dial tone detection is enabled and busy detection is disabled;
- 3: CONNECT <text> result code is given upon entering online data state; dial tone detection is disabled and busy detection is enabled;
- 4: CONNECT <text> result code is given upon entering online data state; dial tone and busy detection are both enabled.

15 Specific AT Commands

15.1 Production test command #	
Command syntax	**Description**
AT#<string>	This command allows to enter a test command string, which is transparently passed to the corresponding production test SW (proprietary command, only for production test).
AT#<string>	OK or CME ERROR: <error>

<string> string type containing the test command sequence, according to the production test specification.

15.2 GPRS cell environment description +CGED	
Command syntax	**Description**
AT+CGED=<mode>	This command returns a dump of the cell environment, either as a one shot dump or as a periodic refreshed dump (each 5 seconds), dependent on the command parameter <mode>.
AT+CGED=0	+CGED: **Service Cell:** MCC:222, MNC: 1, LAC:d5bd, CI:5251, BSIC:10. **Equivalent PLMNs:** **MCC:222, MNC:** 1 Arfcn:00061, RxLevServ:031, RfChannels:000, Arfcn_ded: INVALID_ARFCN, RxLevFull:255, RxLevSub:255, RxQualFull:255, RxQualSub:255, Ciphering:OFF, ms_txpwr:005, rx_acc_min:002, cbq:00, cba:00, c2_valid:True, cr_offset:000, tmp_offset:000, penalty_t:00, c1:00029, c2:00029, ch_type:ff, ch_mode:ff, txpwr:255, dtx_used:True, t3212:00240, acc:0000, t_adv:255, bs_pa_mfrms:004, dsc:000, rll:255. **Neighbour Cell 1:** MCC:222, MNC: 1, LAC:d5bd, CI:ffff, BSIC:10, Arfcn:00059, RxLev:035, C1_nc:00033, C2_nc:00033, **Neighbour Cell 2:** MCC:222, MNC: 1, LAC:d5bd, CI:ffff, BSIC:14, Arfcn:00049, RxLev:027, C1_nc:00025, C2_nc:00025, **Neighbour Cell 3:** MCC:222, MNC: 1, LAC:d5bd, CI:ffff, BSIC:17, Arfcn:00011, RxLev:020, C1_nc:00018, C2_nc:00018, **Neighbour Cell 4:** MCC:1665, MNC:165, LAC:0000, CI:ffff, BSIC:ff, Arfcn:00014, RxLev:019,C1_nc:00000, C2_nc:00000, **Neighbour Cell 5:** MCC:1665, MNC:165, LAC:0000, CI:ffff, BSIC:ff, Arfcn:00062, RxLev:019, C1_nc:00000, C2_nc:- **Neighbour Cell 6:** MCC:1665, MNC:165, LAC:0000, CI:ffff, BSIC:18, Arfcn:00027, RxLev:018, C1_nc:00000, C2_nc:- **GPRS-Parameters:** **GPRS_sup:** True, RAC:00, SplitPg:False, NCO:00000, NOM:002, T3192:01f4, Acc_Burst_type:00015, DRX_Timer_Max:07, PBCCH:False, Ext_Measure_Order:00000, PSI1_r_per:00, Count_LR:00, Count_HR:01, C_R_Hyst:06, C31:000-1, C32:00029, Prior_Acc_Thr:06 OK
Read command AT+CGED?	+CGED: <mode> OK
Test command AT+CGED=?	+CGED: (0-2) i.e. (list of supported <mode>s) OK

+CGED:
Service-Cell:
<MCC>,<MNC>,<LAC>,<CI>,<BSIC>.
Equivalent PLMNs :
<MCC>,<MNC>.

<MCC>,<MNC>.
<arfcn>,<RxLevServ>,<RfChannels>,<Arfcn_ded>, <RxLevFull>, <RxLevSub>, <RxQualFull>, <RxQualSub>, <ciphering>, <ms_txpwr>, <rx_acc_min>, <cbq>,<cba>,<cs_valid>,<cr_offset>, <tmp_offset>,<penalty_t>,<c1>,<c2>,<ch_type>,<ch_mode>, <txpwr>, <dtx_used>, <t3212>, <acc>, <t_adv>, <bs_pa_mfrms>, <dsc>,<rll>.

Neighbour Cell <n>:
<MCC>,<MNC>,<LAC>,<CI>,<BSIC>,<arfcn>,<RxLev>, <C1_nc>,<C2_nc>.

Note : the neighbor cell content may be repeated up to 6 times.

GPRS-Parameters:
<GPRS_sup>,<RAC>, <Split_Pg_Cycle>, <NCO>, <NOM>, <T3192>, <Acc_Burst_type>, <DRX_Timer_Max>, <PBCCH>, <Ext_Measure_Order> <PSI1_r_per>, <Count_LR>, <Count_HR>, <C_R_Hyst>, <C1>, <C2>, <C31>, <C32>, <Prior_Acc_Thr>.

<mode> may be:
- 0: one shot dump.
- 1: periodic refreshed dump.
- 2: stop periodic dump.

Service-Cell:
<MCC>: Mobile country code, range 0-999 (3 digits).
<MNC>: Mobile network code, range 0-99 (2 digits).
<LAC>: Location area code, range 0h-FFFFh (2 octets).
<CI>: Cell Identity, range 0h-FFFFh (2 octets).
<BSIC>: Base Station Identify Code, range 0h-3Fh (6bits).
<arfcn>: absolute radio frequency channel number, range 0-1023.
<RxLevFull>: Received signal strength on serving cell, measured on all slots; 0h-3Fh; 10.5.2.20 GSM04.08.
<RxLevSub>: Received signal strength on serving cell, measured on all slots; 0h-3Fh; 10.5.2.20 GSM04.08.
<RxQualFull>: Received signal quality on serving cell, measured on all slots; range 0-7; 10.5.2.20 GSM04.08.
<RxQualSub>:Received signal qual. observing cell, measured on a subset of slots, range 0-7;10.5.2.20 GSM04.08.
<ms_txpwr>: Maximum TX power level an MS may use when accessing the system until otherwise commanded, range 0-31; 10.5.2.4 GSM08.08.
<rx_acc_min>: RXLEV-ACCESS-MIN, range 0-63; 10.5.2.4 GSM04.08.
<cbq>: CELL_BAR_QUALIFY, range 0-1; 10.5.2.34 GSM04.08.
<cba>: CELL_BAR_ACCESS, range 0-1; 10.5.2.29 GSM04.08.
<cs_valid>: true if all parameters for calculation of c2 are available; Boolean.
<cr_offset>: CELL_RESELECT_OFFSET, range 0-63 (6 bit); 10.5.2.34 GSM04.08.
<tmp_offset>: TEMPORARY_OFFSET, range 0-7 mapped to 0-70; 10.5.2.34 GSM04.08.
<penalty_t>: Penalty time, range 0-31; 10.5.2.34 GSM04.08.
<c1>: Value of c1; 6.4 GSM04.08.
<c2>: Value of c2; 6.4 GSM04.08.
<ch_type>: Channel types of the current connection as follows (10.5.2.5 GSM04.08) see type (T_CHANNEL_MODE):
- 0: INVALID_CHN_TYPE.
- 1: TCH_F.
- 2: TCH_F.
- 3: SDCCH_4.
- 4: SDCCH_8.
- 5: TCH_H_H.
- 6: TCH_F_M.

<ch_mode>: Channel mode of current connection (10.5.2.6 GSM04.08), range 0-255 mapped to an internal value:

- 0: MODE_SIG_ONLY.
- 1: MODE_SPEECH_F.
- 2: MODE_SPEECH_H.
- 3: MODE_DATA_96_F.
- 4: MODE_DATA_48_F.
- 5: MODE_DATA_48_H.
- 6: MODE_DATA_24_F.
- 7: MODE_DATA_24_H.
- 8: MODE_SPEECH_F_V2.
- 9: MODE_SPEECH_F_V3.
- 10: MODE_SPEECH_H_V2.
- 11: MODE_SPEECH_H_V3.
- 12: MODE_DATA_144_F.

<txpwr>: Transmit power level of the current connection, range 0-31 (5 bits); 10.5.2.4 GSM04.08.
<dtx_used>: DTX used, range 0-1; 10.5.2.4 GSM04.08.
<t3212>: T3212. The T3212 timeout value field is coded as the binary representation of the timeout value for periodic updating in decihours; range 0-255 (8 bits); 10.5.2.11 GSM04.08.
<acc>: Access control class (RACH Control Parameters), range 0-65535 (2 octets); 10.5.2.29 GSM04.08
<t_adv>: Timing Advance, not used, always FFh.
<bs_pa_mfrms>: BS_PA_MFRMS (multiframes period for transmission of PAGING REQUEST), range 0-7 mapped to 2-9; 10.5.2.11 GSM04.08.

GPRS-Parameters:

<GPRS_sup>: GPRS supported (in serving cell); range 0-255 (8 bits); 10.5.2.37b GSM04.08.
<RAC>: Routing Area Code, range 0-1 (i bit);10.5.2.37b GSM04.08.
<Split_Pg_Cycle> SPGC_CCH_SUP split pg_cycle on ccch by network, range 0-1 (2 bits); 10.5.2.37b GSM04.08.
<NCO>: NETWORK_CONTROL_ORDER (GPRS_Cell_Options), range 0-3 (2 bits); 10.5.2.37b GSM04.08.
<NOM>NETWORK OPERATION MODE (GPRS_Cell_Options), range 0-3 (2 bits); 10.5.2.37b GSM04.08.
<T3192>T3192 (Wait for Release of the TBF after reception of the final block), range 0-7 mapped to 0-1500 msec (3 bits); 12.24 GSM04.60:

- 500 msec.
- 1000 msec.
- 1500 msec.
- 0 msec.
- 80 msec.
- 120 msec.
- 200 msec.

<Acc_Burst_type>: ACCESS_BURST_TYPE (Literal AB_8 and AB_11), range 0-1 mapped to 8,11 (1 bit); 12.24 GSM04.60.
<DRX_Timer_Max>DRX_TIMER_MAX, range 0-7 (3 bits); 12.24 GSM04.60.
<PBCCH>: PBCCH present, Boolean; 11.2.25 GSM04.60.
<Ext_Measure_Order>: EXT_MEASUREMENT_ORDER, range 0-3 (2 bits); 11.2.23 GSM04.60.
<PSI1_r_per>: PSI1_REPEAT_PERIOD, range 0-15 mapped to 1-16 (4 bits); 11.2.18 GSM04.60.
<Count_LR>: PSI_COUNT_LR, range 0-63 (4 bits); 11.2.18 GSM04.60.
<Count_HR>PSI_COUNT_HR, range 0-15 mapped to 1-16 (4 bits); 11.2.18 GSM04.60.
<C_R_Hyst>: CELL-RESELECT-HYSTERESIS, range 0-7 (3 bits); 10.5.2.4 GSM04.08.
<C1>: Value of c1, integer.
<C2> :Value of c2, integer.
<C31>: Value of c31, integer.
<C32>: Value of c32, integer.

<Prior_Acc_Thr>: Prioriry_ACCESS_THR, range 0-7 (3 bits); 10.5.2.37b GSM04.08.

15.3 Switch trace ON/OFF +TRACE
Description
This command controls the trace; it allows to select the trace mode, method and the trace data transfer rate (proprietary command, for debugging purpose only). This command is for internal test purpose only.

15.4 Select Band +XBANDSEL	
Command syntax	**Description**
AT+XBANDSEL=<band_1>, <band_2>,<band_3>,<band_4>	This command allows to switch from automatic band selection to selection of one or more (up to four) bands from the following: 850 MHz 900 MHz 1800 MHz 1900 MHz
AT+XBANDSEL=900	OK or CME ERROR: <error>
Read command AT+XBANDSEL?	+XBANDSEL: <band_1>,<band_2>,<band_3>,<band_4> OK
Test command AT+XBANDSEL=?	+XBANDSEL: (0,850,900,1800,1900) i.e. (list of supported bands) OK

<band_1> or <band_2> or <band_3> or <band_4> may be:

- 0: automatic band selection (entering every time possible, display improbable).
- 850: selection of 850 MHz band.
- 900: selection of 900 MHz band.
- 1800: selection of 1800 MHz band.
- 1900: selection of 1900 MHz band.

15.5 Set reporting call status +XCALLSTAT	
Command syntax	**Description**
AT+XCALLSTAT=<enable>	This command allows to enable/disable the reporting voice call status on DTE using an unsolicited result code +XCALLSTAT: <call_id><stat>. This code may be repeated so that for each call one line is displayed on DTE (e.g. one call is active and one call is waiting, or up to 6 calls are active in a multiparty session).
AT+XCALLSTAT=1	OK or CME ERROR: <error>
Read command AT+XCALLSTAT?	+XCALLSTAT: <enable> OK
Test command AT+XCALLSTAT=?	+XCALLSTAT: (list of supported <enable>'s) OK

<enable> may be:

- 0: reporting disabled.
- 1: reporting enabled.

<call_id> indicates the call identification (GSM02.30 4.5.5.1).

<stat> indicates the voice call status as follows:

- 0: active.
- 1: hold.
- 2: dialing (MO call).
- 3: alerting (MO call ringing for the remote party).

- 4: ringing (MT call).
- 5: waiting (MT call).
- 6: disconnected.

15.6 Display generation and SW version +XGENDATA	
Command syntax	**Description**
AT+XGENDATA	This command requests the SW version and generation data. +XGENDATA: "<reserved>" <CR><LF><SW-env>*<id>*<gfs>*<date>*<time> OK or CME ERROR: <error>

<reserved > proprietary information.
<SW-env> indicates the work environment and may be: gprs, gsm.
<id> identifier.
<gfs> GPRS full stack version.
<date> date of generation.
<time> time of generation.

15.7 Read counters of sent or received GPRS data +XGCNTRD	
Command syntax	**Description**
AT+CGCNTRD	The command AT+XGCNTRD allows to read the counters for total sent/received bytes for each defined context and indicates these to DTE using the result code(s) +XGCNTRD: <cid>,<sent_sess_bytes>,<received_sess_bytes>,<sent_total_bytes>,<received_total_bytes>. For each active <cid> one result code line +XGCNTRD: ... is displayed on DTE. +XGCNTRD: <cid>,<sent_sess_bytes>,<received_sess_bytes>,<sent_total_bytes>,<received_total_bytes><CR><LF>[… +XGCNTRD: <cid>,<sent_sess_bytes>,<received_sess_bytes>,<sent_total_bytes>,<received_total_bytes><CR><LF>] OK or CME ERROR: <error>
Test command AT+XGCNTRD=?	OK

<cid>: integer containing the local PDP context identifier in range of 0-255.
<sent_sess_bytes>: long integer containing the number of sent GPRS session bytes in range 0-2147483646.
<received_sess_bytes>: long integer containing the number of received GPRS session bytes in range 0-2147483646.
<sent_total_bytes>: long integer containing total number of sent bytes in range 0-2147483646.
<recived_total_bytes>: long integer containing the number of total received bytes in range 0-2147483646.

15.8 Set/reset counter of sent or received GPRS data +XGCNTSET	
Command syntax	**Description**
AT+XGCNTSET=<cid>, <total_bytes_sent_offset>, <total_bytes_received_offset>	The command AT+XGCNTSET allows to set the counter for total sent/received bytes for each defined context to zero or any other offset value. Whenever the total counter for a <cid> is set (to zero or a certain value), the session counter for this <cid> will be set to zero. If the <cid> equals zero than the total counter for every defined context is set to zero. Given offset parameters are ignored in this case.
AT+XGCNTSET=1,20,20	OK or CME ERROR: <error>
Test command AT+XGCNTSET=?	+XGCNTSET: (0-255),(0-2147483646),(0-2147483646) i.e. (range of <cid>s), (range of <total_bytes_sent_offset>), (range of <total_bytes_received_offset>) OK

<cid>: integer containing the local PDP context identifier in range of 0-255.
<total_bytes_sent_offset>: long integer containing the offset of total sent bytes used for counting in range 0-2147483646.
<total_bytes_received_offset>: long integer containing the offset of total received bytes used for counting in range 0-2147483646.

15.9 Set hands free mode +XHANDSFREE	
Command syntax	**Description**
AT+XHANDSFREE=<n>	This command allows to set and get the hands free mode, i.e. switch from loudspeaker to earphone.
AT+HANDSFREE=1	OK or CME ERROR: <error>
Read command AT+XHANDSFREE?	+XHANDSFREE: <n> OK
Test command AT+XHANDSFREE=?	+XHANDSFREE: (0-1) i.e. (list of supported <n>s) OK

In case of the read syntax, the response indicates also whether the user has switched from "not hands free mode" to a "hands free mode" using another AT command.

<n> may be:
− 0: hands free not active.
− 1: hands free active.

15.10 Call the L1-specific function +XL1SET	
Command syntax	**Description**
AT+XL1SET=<str>	This command allows to call L1-specific test and configuration functions. This command is for internal test purpose only.
AT+XL1SET="xxx"	OK or CME ERROR: <error>

<str> values are specified from L1 Group and available via Intranet.

15.11 Configuration trace and modem (AT) interfaces +XSIO	
Command syntax	**Description**
AT+XSIO=<requested>	This command allows the configuration of the modem-interface (AT), trace-interface, IrDA-interface, and MUXinterface by setting the variant number. The set variant number becomes active only after a reset. The read command allows to see which is the current variant and which is the requested variant; a star marks the active variant. An overview about the possible variants is delivered by the test syntax and customizable. *Note: After variant change via this command, the user has to wait some seconds since the NVRAM is only updated in the power saving period. Then reset the phone and the new device/protocol settings are active.*
AT+XSIO=1	OK or CME ERROR: <error>
Read command AT+XSIO?	+XSIO: <requested>,*<active> OK
Test command AT+XSIO=?	+XSIO: Variant=<requested>: AT=<AT-interface>; Trace=<Traceinterface>; MUX=<MUX-interface>; IrDA=<IrDA-interface> <CR><LF>+XSIO: Variant=<requested>: AT=<AT-interface>; Trace=<Trace-interface>; MUX=<MUX-interface>; IrDA=<IrDAinterface>..... (more display rows are possible) OK

<requested> requested variant, which may be in range 0-255.
<active> currently active variant, which may be in range 0-255.
<AT-interface>: NULL, UART0, …, UARTn.
<Trace>: NULL, UART0, …, UARTn.
<MUX>: 1-x.
<IrDA>: NULL, UART0, …, UARTn.

15.12 ADC read command + NADC	
Command syntax	**Description**
AT+NADC=<adc_id>	This command reads the current value of the specified ADC, given in milliVolts. The syntax and the parameters range is shown in the response to the test command.
Set command AT+NADC=0	+NADC:<adc_id>,<adc_val> OK or CME ERROR: <error>
Test command AT+NADC=?	+NADC: (0-adc_max_num)<CR><LF> OK

<adc_id> = ADC identifier, whose range (0-adc_max_num) depends on the specific platform (normally 2)
<adc_val> = Current ADC value (0-2000 for ADC1, 0-2500 for ADC2 due to different ranges)

15.13 GPIO select configuration command +NGPIOC	
Command syntax	**Description**
AT+NGPIOC=<gpio_id>,<gpio_mode>[,<gpio_def>]	This command allows the user to select the configuration of the available GPIOs, which can be set in either input or output mode. The user may also select the default value when the GPIO is configured in output. The syntax and the parameters range is shown in the response to the test command.
Set command AT+NGPIOC=3,0,1	OK or CME ERROR: <error>
Test command AT+NGPIOC=?	+NGPIOC: (0-gpio_max_num),(0-1)[,(0-1)]<CR><LF> OK

<gpio_id> = GPIO identifier, whose range (0-gpio_max_num) depends on the specific platform (normally either 6 or 12)
<gpio_mode> = GPIO mode, 0=output, 1=input

<gpio_def> = GPIO default value (0-1) for output configuration only

15.14 GPIO read command +NGPIOR	
Command syntax	**Description**
AT+NGPIOR=<gpio_id>	This command reads the current value of the specified GPIO, no matter whether it is configured as input or output. The syntax and the parameters range is shown in the response to the test command.
Set command AT+NGPIOR=4	+NGPIOR:<gpio_id>,<gpio_val> OK or CME ERROR: <error>
Test command AT+NGPIOR=?	+NGPIOR: (0-gpio_max_num)<CR><LF> OK

<gpio_id> = GPIO identifier, whose range (0-gpio_max_num) depends on the specific platform (normally either 6 or 12)
<gpio_val> = Current GPIO value (0-1)

15.15 GPIO set command +NGPIOW	
Command syntax	**Description**
AT+NGPIOW=<gpio_id>,<gpio_val>	This command sets ("writes") the output of the specified GPIO, but only if ti is configured in output mode. The syntax and the parameters range is shown in the response to the test command.
Set command AT+NGPIOW=2,1	OK or CME ERROR: <error>
Test command AT+NGPIOW=?	+NGPIOW: (0-gpio_max_num),(0-1)<CR><LF> OK

<gpio_id> = GPIO identifier, whose range (0-gpio_max_num) depends on the specific platform (normally either 6 or 12)
<gpio_val> = New GPIO value (0-1)

15.16 Ringer select command +NRNG	
Command syntax	**Description**
AT+NRNG=<rng_id>	This command allows the user to select one out of a set of available ringers.
Set command AT+NRNG=5	OK or CME ERROR: <error>
Read command AT+NRNG?	+NRNG: <CR><LF> 0 - <rng_name_1><CR><LF> 1 - <rng_name_2><CR><LF> ... rng_max_num - <rng_name_n><CR><LF> OK
Test command AT+NRNG=?	+NRNG: (0-rng_max_num),(0-1)<CR><LF> OK

<rng_id> = Ringer identifier, whose range (0-rng_max_num) depends on the specific SW release.

15.17 Tone generator +NTGN (Tone GeNerator)	
Command syntax	**Description**
AT+NTGN=<freq>, <duration>,<volume>	This command starts/stops a tone on the DSP tone generator.
Set command AT+ NTGN =1000,2000,100	OK or

	CME ERROR: <error>
Test command AT+ NTGN =?	+ NTGN: (300-3400; range of supported frequency in Hz), (0-8000; range of supported durations in msec), (1-100 range of supported volumes) OK

<freq> This is the frequency of the sinus wafeform in Hz for the tone generator
<duration> This is the duration of the tone in msec.
<volume> is the volume for the tone generator. Allowed values are 1-100; volume 1 means muted. Increasing step is 0.25dB.

15.18 Alert sound mode +NMSM (Message Sound Muting)

Command syntax	Description
AT+ NMSM =<mode>	This command is used to mute the signaling sound of SMS on the ME.
Set command AT+ NMSM=0	OK or CME ERROR: <error>
Read command AT+ NMSM?	+ NMSM: <mode> OK
Test command AT+ NMSM=?	+ NMSM: (0-1) OK

<mode> may be:
– 0 normal mode
– 1 silent mode

15.19 Power saving control +NPSV (Power SaVing)

Command syntax	Description
AT+ NPSV =<mode>	This command is used to enable and disable power saving: when enabled the module goes in sleep mode automatically whenether possible, when disabled this does never occur.
Set command AT+ NPSV=0	OK or CME ERROR: <error>
Read command AT+ NPSV?	+ NPSV: <mode> OK
Test command AT+ NPSV=?	+ NPSV: (0-1) OK

<mode> may be:
– 0 disabled
– 1 enabled

16 SIM Toolkit

The commands in this section are only working if they have been activated by the terminal equipment. This is required, since an unanswered SIM-toolkit command (without terminal response sent back to the SIM) would block the SIM-toolkit processing. This activation is done by sending AT+CFUN=6.

16.1 SIM-APPL-TK proactive commands +STKPRO	
Command syntax	**Description**
AT+STKPRO=?	This command displays the list of supported proactive commands. Only the test command syntax is allowed. In addition there is an unsolicited result code +STKPRO: <proactive_cmd>, … provided defined as: +STKPRO: 01,<type> +STKPRO: 05,<event list> +STKPRO: 16,<number>, <subaddr>, <type>, <alpha_1>, <icon_id1>, <alpha_2>, <icon_id2> +STKPRO: 17,<ss_data>, <alpha>, <icon_id>, <ref_number> +STKPRO: 18,<dcs>, <hex_string>, <alpha>, <icon_id>, <ref_number> +STKPRO: 19,<alpha>, <icon_id>, <ref_number> +STKPRO. 20,<alpha>, <icon_id> +STKPRO: 21,<URL>, <alpha>, <icon_id> +STKPRO: 32,<tone>,<unit>,<interval>,<alpha>,<icon_id> +STKPRO: 33,<type>,<dcs>,<hex string>,<icon_id>,<imm_resp> +STKPRO: 34,<type>,<dcs>,<hex string>,<icon_id> +STKPRO: 35,<type>,<dcs>,<hex string>,<max rsp len>,<min rsp len>,<default text>,<icon_id> +STKPRO: 36,<alpha>,<item_id>,<total items>, <item_text>, <next_action>, <default_item> +STKPRO: 37,<alpha>,<item id>,<total items>,<item_text>,<next_action> +STKPRO: 38,<type> +STKPRO: 40,<dcs>,<hex string>,<icon_id> +STKPRO: 53,<language>
Test command AT+STKPRO=?	+STKPRO=01,05,16,17,18,19,20,21,32,33,34,35,36,37,38,40,53 OK

<alpha>,<alpha_1>,<alpha_2>,<item_text>,<default text>: text string.
<dcs> data coding scheme.
<default_item> default item (s. item_id).
<event list> may be:
- 04: User activity event.
- 05: Idle screen available event.
- 07: Language selection.
- 08: Browser Termination event.

<hex_string> sting containing data in hexadecimal format.
<icon_id>,<icon_id1>,<icon_id2>
<interval> time duration in number of units.
<item_id> item identifier (Identifier of item chosen s. GSM11.14).
<language> 2 bytes string indicating the language.
<max rsp len> maximum response length.
<min rsp len> minimum response length.
<next_action> next action.
<number> called party number.
<proactive_cmd> may be:
- 01: refresh.
- 05: set up event list.
- 16: set up call.
- 17: send SS.
- 18: send USSD.

- 19: send SMS.
- 20: send DTMF.
- 21: launch browser.
- 32: play tone.
- 33: display text.
- 34: get inkey.
- 35: get input.
- 36: select item.
- 37: set up menu.
- 38: language setting.
- 40: set up idle mode text.
- 53: language notification.

<ref_number> reference number.
<subaddr> called party subaddr.
<ss_data> data string.
<type> integer as command qualifier; possible value 4 meaning "language".
<tone> tone may be:

- 01: dial tone.
- 02: call subscriber busy.
- 03: congestion.
- 04: radio path acknowledge.
- 05: radio path not available.
- 06: error / special information.
- 07: call waiting tone.
- 08: ringing tone.
- 10: general beep.
- 11: positive acknowledgement tone.
- 12: negative acknowledgement or error tone.

<total items> total items.
<unit> may be:

- 0: minutes.
- 1: seconds.
- 2: tenth of seconds.

<URL> URL that shall be loaded.

16.2 SIM-APPL-TK terminal response +STKTR	
Command syntax	**Description**
AT+STKTR= <proactive_cmd>, <type>, <result>, <add_result>, <reference_number>, <last_cmd>, <dcs>, <hex string> AT+STKTR=1,0	This action command allows entering the response to a SIM-APPL-TK proactive command which was displayed by the unsolicited result code +STKPRO. OK or CME ERROR: <error>
Test command AT+STKTR=?	+STKTR=01,05,16,17,18,19,20,21,32,33,34,35,36,37,38,40,53 OK

<add_result> additional result.
<dcs> data coding scheme.
<hex_string> string in hexadecimal format.
<last_cmd> last command.
<proactive_cmd> decimal code indicates the command (refer +STKPRO).
<reference_number> integer containing the indicated reference number; this parameter can be used only in case of <proactive_cmd> related to SMS, SS, USSD.

<result> may be (decimal code indicated):
- 0: command performed successfully.
- 1: command performed with partial comprehension.
- 2: command performed with missing information.
- 3: REFRESH performed with additional Efs read.
- 4: command performed successfully, but requested icon could not be displayed.
- 5: command performed but modified by call control by SIM.
- 6: command performed successfully, limited service.
- 7: command performed with modification.
- 16: proactive SIM session terminated by the user.
- 17: backward move in the proactive SIM session requested by the user.
- 18: no response from user.
- 19: help information required by the user.
- 20: USSD or SS transaction terminated by the user.
- 32: ME currently unable to process command.
- 33: network currently unable to process the command.
- 34: user did not accept call set-up request.
- 35: user cleared down call before connection or network release.
- 36: action in contradiction with the current timer state.
- 37: interaction with call control by SIM, temporary problem.
- 38: launch browser generic error code.
- 48: command beyond ME's capabilities.
- 49: command type not understood by ME.
- 50: command data not understood by ME.
- 51: command number not known by ME.
- 52: SS return error.
- 53: SMS RP-ERROR.
- 54: error, required values are missing.
- 55: USSD return error.
- 56: MultipleCard commands error, if class "a" is supported.
- 57: interaction with call control by SIM or MO short message control by SIM, permanent problem.
- 58: bearer independent protocol error (if class "e" is supported).

<type> command qualifier (usage in case of <proactive_cmd>=38).

16.3 SIM-APPL-TK envelope +STKENV

Command syntax	Description
AT+STKENV=<envelope_cmd>, <optional_ENV_data> AT+STKENV=214,7,<language> AT+STKENV=214,8,<cause > AT+STKENV=211,<item_id>, <help_requested>	This action command allows to send a SIM-APPL-TK envelope command to MS.
AT+STKENV=211,01	OK or CME ERROR: <error>
Test command AT+STKENV=?	+STKENV: OK

<cause> may be:
- 00: User Termination.
- 01: Error Termination.

<envelope_cmd> supported envelope commands:
Code 211 (hexa D3): menu selection (needs <item identifier>).
Code 214 (hexa D6): Event download (only one event can be included in the <event_list>).
<item_id> item identification.

<help_requested> indicates help requested and may be:
- 1: help is requested.
- 0: help is not requested.

<language> currently used language in the DTE (coding see 11.14).
<optional_ENV_data> indicates command code related parameters as follows:
- for code 211 (hexa D3): <item identifier>.
- for code 214 (hexa D6): <event list>.

16.4 SIM-APPL-TK terminal profile +STKPROF	
Command syntax	**Description**
AT+STKPROF=<length>, <data>	This command allows reading and changing the terminal profile data. The terminal profile sent by an external STK client state the facilities relevant to SIM Application Toolkit that are supported.
AT+STKPROF=4,"1F7F"	OK or CME ERROR: <error>
AT+STKPROF?	+STKPROF: <length>,<data> e.g. +STKPROF=4,"1F7F" OK
Test command AT+STKPROF=?	OK

<length>: integer type value; length of the characters that are sent to TE in **<data>**.

Note: <length> set to 0 forces a reset to the default terminal profile stored in the ME.

<data>: terminal profile data coded in hex format.

16.5 SIM-APPL-TK call control commands +STKCC
Description
The SIMAP call control status is displayed using the unsolicited result code +STKCC: <cc_comand>,… defined as: +STKCC: 1,<res_val>,<alpha>,<number> +STKCC: 2,<res_val>,<alpha>,<ss_code> +STKCC: 3,<res_val>,<alpha>,<ussd_code> +STKCC: 4,<res_val>,<alpha>,<ton_npi>,<sc_addr>,<ton_npi>,<dest_addr>

<cc_command> may be:
- 1: set up call.
- 2: send SS.
- 3: send USSD.
- 4: send SM.

<res_val> call control result value.
<alpha> text string.
<number> called party number.
<ton_npi> type of number and numbering plan.
<sc_addr> service centre address.
<dest_addr> destination address.

16.6 SIM-APPL-TK proactive session status +STKCNF
Description
The SIMAP proactive session status is displayed using the unsolicited result code STKCNF: <proactive_cmd>, <result>, <add_result>, <sw1>.

<proactive_cmd> decimal code indicates the command that was finished (refer +STKPRO).
<result> general result code.
<add_result> additional result code.

<sw1> status of the last response may be:
0: command to SIM was suppressed because of multiple terminal response or wrong client other responses see GSM 11.11.

17 GPRS commands

This paragraph describes the messages exchanged between an external application and the TM2 mobile station based on AT commands related to GPRS. The commands described here shall be understood as completion of the main AT commands described in the document "Main AT Commands".

17.1 Parameter Definition

<APN> Access Point Name is a string parameter, which is a logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested. An optional special code placed at the beginning of <APN> indicates the kind of the authentication handling MS/network and may be:

- CHAP: challenge handshake authentication protocol.
- PAP: personal authentication protocol.
- NONE: authentication protocol not used.
- code omitted: authentication protocol not used.

An example for the usage of <APN> is: +CGDCONT=1,"IP","CHAP: internet.t-d1.de",0,0.

<cid> PDP context identifier meaning a numeric parameter, which specifies a particular PDP context definition. This parameter is valid only locally on the interface TE-MT.

<d_comp> is a numeric parameter that controls PDP data compression and can have the values:

- 0: off.
- 1: on (manufacturer preferred compression).
- 2 : V.42bis data compression.

<delay> is a numeric parameter which specifies the delay class.

<h_comp> is a numeric parameter that controls PDP header compression. The range may be:

- 0: off (default value is omitted).
- 1: on (manufacturer preferred compression); this value leads to implicitly usage of RFC1144 t.b.d.
- 2: RFC1144 (applicable for SNDCP only).

<L2P> is a string parameter that indicates the layer 2 protocol to be used between the TE and MT; only the values "PPP", "M-HEX" and "M-RAW-IP" are supported.

<mean> is a numeric parameter which specifies the mean throughput class.

<peak> is a numeric parameter which specifies the peak throughput class.

<PDP_address> is a string parameter that identifies the MT in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. Readable with AT-command +CGPADDR.

<PDP_type> Packet Data Protocol type is a string parameter which specifines the type of packet data protocol:

- X25 (not allowed).
- IP Internet Protocol (IETF STD 5).
- OSPIH (not allowed).
- PPP (not allowed).

<pd1>,...**<pdN>** zero to N string parameters whose meanings are specific to the <PDP_type>. For PDP type OSP:IHOSS the following parameters are allowed:

- <pd1> = <host>.
- <pd2> = <port>.
- <pd3> = <protocol>.

<precedence> is a numeric parameter which specifies the precedence class as:

- 0: network subscribed.
- 1: high priority.
- 2: normal priority.
- 3: low priority.

<reliability> is a numeric parameter which specifies the reliability class.

<state> indicates the state of GPRS attachment:

- 0 detached.
- 1 attached.

<status> indicates the state of PDP context activation:

- 0 deactivated.
- 1 activated.

17.2 Define PDP context +CGDCONT	
Command syntax	**Description**
AT+CGDCONT=<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>,<pd1>,...,<pdn>	This command allows to specify specific PDP context parameter values for a PDP context, identified by the local context identification parameter <cid>. If the command is used only with the one parameter <cid>, it means that the corresponding PDP context becomes undefined.
AT+CGDCONT=1,"IP","name","1.2.3.4",0,0	OK or CME ERROR: <error>
Read command AT+CGDCONT?	+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp><pd1>,...,<pdN> <CR><LF>+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp><pd1>,...,<pdN>... OK
Test command AT+CGDCONT=?	+CGDCONT: (1-255),"IP",,,(0),(0) i.e. +CGDCONT: (range of <cid>s), <PDP_type>,,, (list of supported <d_comp>s) (list of supported <h_comp>s), (list of supported <pd1>s), (list of supported <pdN>s) <CR><LF>+CGDCONT: (range of <cid>s),<PDP_type>,,, (list of supported <d_comp>s) (list of supported <h_comp>s), (list of supported <pd1>s), (list of supported <pdN>s)... OK

17.3 GPRS event reporting +CGEREP	
Command syntax	**Description**
AT+CREREP=<mode>,<bfr>	This set command enables or disables sending of unsolicited result codes +CGEV: XXX from MT to the TE in case of certain events occurring in the GPRS MT or the network.
AT+CGEREP=1,1	OK or CME ERROR: <error>
Read command AT+CGEREP?	+CGEREP: <mode>,<bfr> OK
Test command AT+CGEREP=?	+CGEREP: (list of supported <mode>s), (list of supported <bfr>s) OK

<mode> controls the processing of unsolicited result codes specified within this command; it may be:

− 0: buffer unsolicited result codes in the MT; if buffer full the oldest ones will be discarded.

− 1: discard unsolicited result codes when V.24 link is reserved (online); otherwise forward them directly to the TE.

− 2: buffer unsolicited result codes in the MT when link reserved (online) and flush them to the TE when the link becomes available; otherwise forward them directly to the TE.

<bfr> controls the effect on buffered codes when <mode> 1 or 2 is entered; it may be:

− 0: MT buffer unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered.

− 1: MT buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1 or 2 is entered (OK is given before flushing the codes).

17.4 Quality of service profile (requested) +CGQREQ	
Command syntax	**Description**
AT+CGQREQ=<cid>,<precedence>,<delay>,reliability>,<peak>,<mean>	This command allows the TE to specify a quality of service profile that is used when the MT sends an activate PDP context request message to the network. The set command specifies a profile for the context identified by the <cid> (local context identification parameter). The syntax form used only with parameter <cid>, causes the requested profile for the indicated context number to become undefined.
AT+CGDCONT is needed previously AT+CGQREQ=1,1,1,1,1,1	OK or CME ERROR: <error>
Read command AT+CGQREQ?	+CGQREQ: 1,1,1,1,1,1 i.e. +CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean> <CR><LF>+CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>... OK
Test command AT+CGQREQ=?	+CGQREQ: "IP", (0-3), (0-4), (0-5), (0-9), (0-18,31) i.e. +CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s) <CR><LF>+CGQREQ: <PDP_type>,(list of supported<precedence>s), (list of supported <delay>s) , (list of supported<reliability>s), (list of supported <peak>s), (list of supported <mean>s)... OK

17.5 Quality of service profile (minimum acceptable) +CGQMIN	
Command syntax	**Description**
AT+CGQMIN=<cid>,<precedence>, <delay>,<reliability>,<peak>,<mean>	This command allows the TE to specify a QoS (Quality of Service) minimum acceptable profile which is checked by the MT against the negotiated profile returned in the activate PDP context accept message. The profile is identified by the <cid> parameter.
AT+CGDCONT is needed previously AT+CGQMIN=1,1,1,1,1,1	OK or CME ERROR: <error>
Read command AT+CGQMIN?	+CGQMIN: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean> OK
Test command AT+CGQMIN=?	+CGQMIN: "IP",(0-3),(0-4),(0-5),(0-9),(0-18,31) i.e. +CGQMIN: <PDP-type>, (list of supported <precedence>s), (list of supported <delays>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s) [+CGQMIN: <PDP-type>, (list of supported <precedence>s), (list of supported <delays>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)... OK

17.6 GPRS attach or detach +CGATT

Command syntax	Description
AT+CGATT=<state>	This execution command is used to attach the MT to, or detach the MT from the GPRS service. After this command the MT remains in command state. If the MT is already in the requested state, the command is ignored and OK is returned to TE. If the requested state can not be reached, an ERROR is returned. The command is abortable by hit a key; in this case a detach is performed (aborting is a proprietary feature). Any active PDP context will be automatically deactivated when the attachment state changes to detached.
AT+CGATT=1	OK or CME ERROR: <error>
Read command AT+CGATT?	+CGATT: <state> OK
Test command AT+CGATT=?	+CGATT: (0-1) e.g. +CGATT: (list of supported <state>s) OK

17.7 PDP context activate or deactivate +CGACT

Command syntax	Description
AT+CGACT=<status>,<cid>,<cid,...	This execution command is used to activate or deactivate the specified PDP context(s). After this command the MT remains in the command state. If any context is already in the requested state, the state for the context remains unchanged. If the requested state can not be achieved, an ERROR is returned. If the MT is not GPRS attached when the activation form of the command is executed, the MT first performs a GPRS attach and them attempts to activate the specified contexts. The command is abortable by hit a key; in this case a deactivation is performed (aborting is a proprietary feature).
AT+CGACT=1,1	OK or CME ERROR: <error>
Read command AT+CGACT?	+CGACT: <cid>,<status> <CR><LF>+CGACT: <cid>,<status>... OK
Test command AT+CGACT=?	+CGACT: (0-1) i.e. +CGACT: (list of supported <status>s) OK

17.8 Enter data state +CGDATA

Command syntax	Description
AT+CGDATA=<L2P>,<cid>,<cid>,...	This execution command causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more GPRS PDP types. This may include performing a GPRS attach and one or more PDP context activations. If the parameters are accepted, MT displays the intermediate result code CONNECT on TE and enters the online data state; thereafter data transfer may proceed. No other commands following +CGDATA in the command line will be processed. After data transfer is complete, the MT re-enters the command state and the final result code is displayed on TE. In error case the final result code NO CARRIER or CME ERROR: <error> is displayed.
AT+CGDATA="PPP",1	CONNECT It follows data transfer or CME ERROR: <error>
Test command AT+CGDATA=?	+CGDATA: "PPP" i.e. +CGDATA: (list of supported <L2P>s) OK

Note: Although a list of <cid>'s is possible (future usage), the MS does not support more then one <cid> and in this cases an error is returned.

Note: Possible are protocols: "PPP", "M HEX", "M RAW IP". After entering of the L2 hex protocol with

AT+CGDATA="M-HEX",1 the protocol can be used as follows:

Syntax: <int: counter> <int: length[1-1500]> <hex-sequence>[0-9-fA-F]

Examples:
- 1 200<CR> - send 1 packet with 200 0x2B (fill character)
- 5 1000<CR> - send 5 packets with 1000 0x2B (fill character)
- 1 5 31 32 33 34 35<CR> - send 1 packet with the given contents
- 1 10 31<q><CR> - send 1 packet with 10 0x31

Either a packet is sent
- if the length field is terminated with <CR>
- or the length value is equal to # chars of hex-sequence
- or the input is terminated with a character not equal to a hex digit or <CR>.

The session is terminated by default with +++, the context is deactivated. If ct108 (AT&D) is equal to 2 and the selected L2 protocol is "M-HEX", the channel is switched back to idle mode but the context remains activated. Leave the layer 2 packet protocol by typing of +++.

17.9 Automatic response to a network request for PDP context activation +CGAUTO

Command syntax	Description
AT+CGAUTO=<n>	This set command disables or enables an automatic positive response (auto-answer) to the receipt of a Request PDP context activation message from the network. The setting S0 is used as usual, but related to the GPRS incoming request. The A or H command handling may be used in order to accept or reject a network PDP request for PDP activation. The setting +CGAUTO does not affect the issuing of the unsolicited result code RING or +CRING. If the parameter <n> allows an positive answer to the network request for PDP context activation, the MT shall initiate an attach if it is not already attached.
AT+CGAUTO=1	OK or CME ERROR: <error>
Read command AT+CGAUTO?	+CGAUTO: <n> OK
Test command AT+CGAUTO=?	+CGAUTO: (list of the supported <n>s) OK

<n> may be:
- 0: turn off automatic response for GPRS only; in this case network requests are only manually accepted or rejected;
- 1: turn on automatic response for GPRS only; in this case network requests are automatically accepted.
- 2: modem compatibility mode, GPRS only; the automatic acceptance is controlled by the S0 setting; manual control using the A, +CGANS or H command is possible; incoming circuit switched calls can be neither manually nor automatically answered;
- 3: modem compatibility mode, GPRS and circuit switched calls (default); automatic acceptance of both GPRS network requests and incoming circuit switched calls is controlled by the S0 setting; A, +CGANS and H commands are also usable; not only GPRS but also circuit switched calls are also handled.

17.10 Show PDP address +CGPADDR	
Command syntax	**Description**
AT+CGPADDR=<cid>,<cid>,...	This execution command returns a list of PDP addresses for the specified context identifiers.
AT+CGPADDR=	+CGPADDR: 1,"1.2.3.4" i.e. +CGPADDR: <cid>,<PDP_addr> [<CR><LF>+CGPADDR: <cid>,<PDP_addr>... OK or CME ERROR: <error>
Test command AT+CGPADDR=?	+CGPADDR: (list of defined <cid>s) OK

17.11 GPRS mobile station class +CGCLASS	
Command syntax	**Description**
AT+CGCLASS=<class>	This set command allows to set the MT to operate according to the specified GPRS mobile class.
AT+CGCLASS="B"	OK or CME ERROR: <error>
Read command AT+CGCLASS?	+CGCLASS: <class> OK
Test command AT+CGCLASS=?	+CGCLASS: (list of supported <class>s) OK

<class> is a string parameter indicating the GPRS mobile class; it may be (in descending order of functionality):

- A: not supported.
- B: class B.
- CG: class C in GPRS mode.
- CC: class C in circuit switched mode.

17.12 GPRS network registration status +CGREG	
Command syntax	**Description**
AT+CGREG=<n>	This set command controls the presentation of an unsolicited result code +CGREG: <stat> when <n>=1 and there is a change in the MT's GPRS network registration status, or code +CGREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change in the network cell.
AT+CGREG=1 Test command	OK or CME ERROR: <error>
Read command AT+CGREG?	+CGREG: <n>,<stat>[,<lac>,<ci>] OK
AT+CGREG=?	+CGREG: (list of supported <n>s) OK

<n> may be:

- 0: disable network registration unsolicited result code.
- 1: enable network registration unsolicited result code.
- 2: enable network registration information unsolicited result code +CGREG: <stat>,<lac>,<ci>.

<stat> may be:

- 0: not registered, home network.
- 1: registered, home network.
- 2: not registered, but ME is currently searching a new operator to register to.
- 3: registration denied.
- 4: unknown.
- 5: registered, roaming.

<lac> string type containing two byte location area in hexadecimal format.

<ci> string type containing two byte cell ID in hexadecimal format.

17.13 Select service for MO SMS messages +CGSMS	
Command syntax	**Description**
AT+CGSMS=<service>	This set command is used to specify the service or service preference that the MT will use to send MO SMS messages.
Test command AT+AT+CGSMS=1	OK or CME ERROR: <error>
Read command AT+CGSMS?	+CGSMS: <service> OK
AT+CGSMS=?	+CGSMS: (list of currently available <service>s) OK

<service> numeric parameter indicating the service or service preference to be used and may be:

- 0: GPRS.
- 1: circuit switched.
- 2: GPRS preferred (use circuit switched if GPRS not available.
- 3: circuit switched preferred (use GPRS if circuit switched not available).

18 TCP/IP AT Commands

18.1 Introduction

Teltonika provides access to TCP/IP services by means of few but rich proprietary AT commands based on the philosophy of keeping a strict separation between the control plane (DCM) and the user plane (BSD). Thus the user must first define a connection profile (either GPRS or CSD) with all the related parameters and activate the connection and next start using sockets. Since there is no intrinsic association between bearers (CSD and GPRS) and data channels (TCP sockets) a great flexibility is ensured: several sockets can be managed independently and simultaneously over the same bearer and it's easy to associate services and connections. AT commands for both reading and writing data on sockets are provided and unsolicited indications notify the external application of incoming data and transmission result, thus avoiding the need for polling.

18.2 Packet Switched Data +NPSD

Command syntax	Description
AT+NPSD=<profile_id>[,<param_tag>[,<param_val>]]	This command is used to set the specified parameter for the specified GPRS profile, or to get the current value for the specified parameter, or to return the current value of all the parameters for the specified GPRS profile, one per line. The profile parameter values specified with this command are all volatile, but may be stored in NVM and later on retrieved from NVM by issuing the AT+NPSDA command with the action parameter equal to store.
Set command AT+CGSMS=1	OK or CME ERROR: <error>
Get command AT+NPSD=0,1	+NPSD: 0,1,"apn.provider.com" (Used syntax: +NPSD: <profile_id>,<param_tag>,<param_val>) OK or CME ERROR: <error>
Get All command AT+NPSD=0	+NPSD: 0,0,0 +NPSD: 0,1,"apn.provider.com" +NPSD: 0,2,"username" +NPSD: 0,4,"0.0.0.0" … +NPSD: 0,19,0 (Used syntax: +NPSD: <profile_id>,0,<param_val0> <CR><LF>+NPSD: <profile_id>,1,<param_val1> <CR><LF>+NPSD: <profile_id>,2,<param_val2> <CR><LF>+NPSD: <profile_id>,4,<param_val4> … <CR><LF>+NPSD: <profile_id>,19,<param_val19>) OK or CME ERROR: <error>

<profile_id> is the GPRS profile identifier, in range 0-6.
<param_tag> may be:

- 0: Protocol type.
  The only allowed value for <param_val> is:
  - 0: (IPv4);
  - 1: (IPv6) is just reserved for future use.

- 1: APN.
  <param_val> is defined by a text string, such as “apn.provider.com”.
- 2: Username.
  <param_val> is the user name text string for the authentication phase.
- 3: Password.
  <param_val> is the password text string for the authentication phase.
  Note: the AT+NPSD Get command with <param_tag> = 3 is not allowed.
- 4: DNS1.
  <param_val> is the text string of the primary DNS address.
- 5: DNS2.
  <param_val> is the text string of the secondary DNS address.
- 6: Authentication.
  <param_val> selects the authentication type:
  - 0: none;
  - 1: PAP;
  - 2: CHAP (that is currently RFU).
- 7: IP address.
  <param_val> is the text string of the static IP address given by the ISP (“0.0.0.0” means dynamic IP address assigned during context activation).
- 8: Data compression.
  <param_val> enables/disables (1/0) data compression.
- 9: Header compression.
  <param_val> enables/disables (1/0) header compression.
- 10: QoS precedence.
  <param_val> selects the quality of service:
  - 0: subscribe;
  - 1: high;
  - 2: normal;
  - 3: low.
- 11: QoS delay.
  <param_val> selects the delay class:
  - 0: subscribe;
  - 1: class 1;
  - 2: class 2;
  - 3: class 3;
  - 4: best effort.
- 12: QoS reliability
  <param_val> selects the reliability class:
  - 0: subscribe;
  - 1: class 1 (GTP Ack, LLC Ack and Protected, RLC Ack);
  - 2: class 2 (GTP Unack, LLC Ack and Protected, RLC Ack);
  - 3: class 3 (GTP Unack, LLC Unack and Protected, RLC Ack);
  - 4: class 4 (GTP Unack, LLC Unack and Protected, RLC Unack);
  - 5: class 5 (GTP Unack, LLC Unack and Unprotected, RLC Unack).
- 13: QoS peak rate.
  <param_val> selects the peak throughput in range 0-9.
- 14: QoS mean rate.
  <param_val> selects the mean throughput in range 0-18, 31.
- 15: Minimum QoS precedence.
  <param_val> selects the acceptable value for the quality of service:
  - 0: subscribe;

- 1: high;
- 2: normal;
- 3: low.

– 16: Minimum QoS delay.
<param_val> selects the acceptable value for the delay class:
- 0: subscribe;
- 1: class 1;
- 2: class 2;
- 3: class 3;
- 4: best effort.

– 17: Minimum QoS reliability.
<param_val> selects the minimum acceptable value for the reliability class:
- 0: subscribe;
- 1: class 1 (GTP Ack, LLC Ack and Protected, RLC Ack);
- 2: class 2 (GTP Unack, LLC Ack and Protected, RLC Ack);
- 3: class 3 (GTP Unack, LLC Unack and Protected, RLC Ack);
- 4: class 4 (GTP Unack, LLC Unack and Protected, RLC Unack);
- 5: class 5 (GTP Unack, LLC Unack and Unprotected, RLC Unack).

– 18: Minimum QoS peak rate.
<param_val> selects the acceptable value for the peak throughput in range 0-9

– 19: Minimum QoS mean rate.
<param_val> selects the acceptable value for the mean throughput in range 0-18, 31.

18.3 Packet Switched Data Action +NPSDA

Command syntax	Description
AT+ NPSDA=<profile_id>,<action>	This command performs the requested action for the specified GPRS profile.
Set command AT+NPSDA=2,1	OK or CME ERROR: <error>

<profile_id> is the GPRS profile identifier, in range 0-6.

<action> is the requested action. May be:

– 0: Reset: clears the specified profile resetting all parameter to their default values;

– 1: Store: saves all the parameters of the specified profile in NVM for future retrieval;

– 2: Load: reads all the parameters of the specified profile from NVM;

– 3: Activate: activates the specified profile, using the pre-defined parameters.
Note 1: Only one profile at a time can be activated.
Note 2: In case of remote deactivation of GPRS profile the unsolicited indication
+NUPSDD: <profile_id>
is sent to the TE to notify the user.

– 4: Deactivate: deactivates the specified profile.

18.4 Packet Switched Network Assigned Data +NPSND

Command syntax	Description
AT+NPSND=<profile_id>,<param_tag>	This command returns the current Network-assigned (dynamic) value of the specified parameter for the specified GPRS profile.
Set command AT+NPSND=2,0	+NPSND: 2,0,"151.9.78.170" (Used syntax: +NPSND: <profile_id>,<param_tag>,<dynamic_param_val>) OK or

	CME ERROR: <error>

<profile_id> is the GPRS profile identifier, in range 0-6.

<param_tag> may be:

- 0: IP address: dynamic IP address assigned during context activation;
- 1: DNS1: dynamic primary DNS address (only for future implementation);
- 2: DNS2: dynamic secondary DNS address (only for future implementation);
- 3: QoS precedence: network assigned precedence value of the QoS;
- 4: QoS delay: network assigned delay value of the QoS;
- 5: QoS reliability: network assigned reliability value of the QoS;
- 6: QoS peak rate: network assigned peak rate value of the QoS;

7: QoS mean rate: network assigned mean rate value of the QoS.

18.5 Circuit Switched Data +NCSD

Command syntax	Description
AT+NCSD=<profile_id>[,<param_tag>[,<param_val>]]	This command is used to set the specified parameter for the specified GSM profile, or to get the current value for the specified parameter, or to return the current value of all the parameters for the specified GSM profile, one per line. The profile parameter values specified with this command are all volatile, but may be stored in NVM and later on retrieved from NVM by issueing the AT+NCSDA command with the action parameter equal to store.
Set command AT+NCSD=2,1,0	OK or CME ERROR: <error>
Get command AT+NCSD=2,1	+NCSD: 2,1,0 (Used syntax: +NCSD: <profile_id>,<param_tag>,<param_val>) OK or CME ERROR: <error>
Get All command AT+NCSD=2	+NCSD: 2,0,"3290208668" +NCSD: 2,1,0 +NCSD: 2,2,"username" +NCSD: 2,4,"0.0.0.0" … +NCSD: 0,6,0 (Used syntax: +NCSD: <profile_id>,0,<param_val0> <CR><LF>+NCSD: <profile_id>,1,<param_val1> <CR><LF>+NCSD: <profile_id>,2,<param_val2> <CR><LF>+NCSD: <profile_id>,4,<param_val4> … <CR><LF>+NCSD: <profile_id>,6,<param_val6>) OK or CME ERROR: <error>

<profile_id> is the GSM profile identifier, in range 0-6.

<param_tag> may be:

- 0: Phone number.
  <param_val> is defined by a text string, such as "+39123456".

- 1: Call type.
  <param_val> may be:
  - 0: Analog;
  - 1: ISDN.
- 2: Username.
  <param_val> is the user name text string for the authentication phase.
- 3: Password.
  <param_val> is the password text string for the authentication phase.
  Note: the AT+NCSD Get command with <param_tag> = 3 is not allowed.
- 4: DNS1.
  <param_val> is the text string of the primary DNS address.
- 5: DNS2.
  <param_val> is the text string of the secondary DNS address.
- 6: Timeout.
  <param_val> represents the linger time: if there is no data transfer for the given time-out, the call is hang-up).
  Note: currently it is not implemented (RFU).

18.6 Circuit Switched Data Action +NCSDA

Command syntax	Description
AT+ NCSDA=<profile_id>,<action>	This command performs the requested action for the specified CSD profile.
Set command AT+NCSDA=3,0	+NPSND: 2,0,"151.9.78.170" (Used syntax: +NPSND: <profile_id>,<param_tag>,<dynamic_param_val>) OK or CME ERROR: <error>

<profile_id> is the GSM profile identifier, in range 0-6.

<action> is the requested action. May be:

- 0: Reset: clears the specified profile resetting all parameter to their default values;
- 1: Store: saves all the parameters of the specified profile in NVM for future retrieval;
- 2: Load: reads all the parameters of the specified profile from NVM;
- 3: Activate: activates the specified profile, using the pre-defined parameters.
  Note 1: Only one profile at a time can be activated.
  Note 2: In case of remote disconnection of CSD profile the unsolicited indication
  +NUCSDD: <profile_id>
  is sent to the TE to notify the user.
- 4: Deactivate: deactivates the specified profile.

18.7 Circuit Switched Network Assigned Data +NCSND

Command syntax	Description
AT+NCSND=<profile_id>,<param_tag>	This command returns the current Network-assigned (dynamic) value of the specified parameter for the specified GSM profile.
Set command AT+NCSND=2,0	+NCSND: 2,0,"151.9.78.170" (Used syntax: +NCSND: <profile_id>,<param_tag>,<dynamic_param_val>) OK or CME ERROR: <error>

<profile_id> is the CSD profile identifier, in range 0-6.

<param_tag> may be:

- 0: IP address: dynamic IP address assigned during context activation;
- 1: DNS1: dynamic primary DNS address;
- 2: DNS2: dynamic secondary DNS address.

18.8 Create Socket +NSOCR	
Command syntax	**Description**
AT+NSOCR=<protocol>	This command creates a socket and associates it to the specified protocol (TCP), returning an integer that represents the socket handle to be used for any future operation on that socket. Such command corresponds to the BSD socket routine.
Set command AT+NSOCR=6	+NSOCR: 2 (Used syntax: +NSOCR: <socket>) OK or CME ERROR: <error>

<protocol> may be:

- 6: TCP;
- 17: UDP.

18.9 Set Socket Option +NSOSO	
Command syntax	**Description**
AT+NSOSO=<socket>,<level>,<opt_name>,<opt_val>[,<opt_val2>]	This command sets the specified standard option (type of service, local address re-use, linger time, time-to-live, etc) for the specified socket, like the BSD setsockopt routine.
Set command AT+NSOSO=2,6,1,1	OK or CME ERROR: <error>

<socket> is the socket identifier, in range 0-15.

<level> may be:

- 0: IP Protocol.
  <opt_name> for IP Protocol level may be:
  - 1: Type of service.
    <opt_val>: integer type value for the type of service.
  - 2: Time-to-live.
    <opt_val>: integer type value for the time-to-live option.
- 6: TCP Protocol.
  <opt_name> for TCP protocol level may be:
  - 1: No delay option: don't delay send to coalesce packets.
    <opt_val>: integer type value to enable/disable "no delay" option.
  - 2: Keepalive option: send keepalive probes when idle for <opt_val> milliseconds.
    <opt_val>: integer type value representing the milliseconds for "keepalive" option.
- 65535: Socket.
  <opt_name> for Socket level options may be:
  - 4: Local address re-use.
    <opt_val>: integer type value to enable/disable "local address re-use" option.
  - 8: Keep connections alive.
    <opt_val>: integer type value to enable/disable "keep connections alive" option.

- 32: Sending of broadcast messages.
  <opt_val>: integer type value to enable/disable "sending of broadcast messages" option.
- 128: Linger on close if data present.
  <opt_val>: integer type to set on/off "linger" option.
  <opt_val2>: integer type value for linger time.
- 512: Local address and port re-use.
  <opt_val>: integer type value to enable/disable "local address and port re-use" option.

18.10 Get Socket Option +NSOGO	
Command syntax	**Description**
AT+NSOGO=<socket>,<level>,<opt_name>	This command retrieves the specified standard option (type of service, local address re-use, linger time, time-to-live, etc) for the specified socket, like the BSD getsockopt routine.
Set command AT+NSOGO=2,6,1	+NSOGO: 1 (Used syntax: +NSOGO: <opt_val>[,<opt_val2>]) OK or CME ERROR: <error>

<socket> is the socket identifier, in range 0-15.

<level> may be:

- 0: IP Protocol.
  <opt_name> for IP Protocol level may be:
  - 1: Type of service.
  - 2: Time-to-live.
- 6: TCP Protocol.
  <opt_name> for TCP protocol level may be:
  - 1: No delay option: don't delay send to coalesce packets.
  - 2: Keepalive option: send keepalive probes when idle for <opt_val> milliseconds.
- 65535: Socket.
  <opt_name> for Socket level options may be:
  - 4: Local address re-use.
  - 8: Keep connections alive.
  - 32: Sending of broadcast messages.
  - 128: Linger on close if data present.
  - 512: Local address and port re-use.

18.11 Close Socket +NSOCL	
Command syntax	**Description**
AT+NSOCL=<socket>	This command closes the specified socket, like the BSD close routine. Remote socket closure is notified via the +NUSOCL: <socket> unsolicited indication, carrying the closed socket identifier.
Set command AT+NSOCL=2	OK or CME ERROR: <error>

<socket> is the socket identifier, in range 0-15.

18.12 Get Socket Error +NSOER	
Command syntax	**Description**
AT+NSOER	This command retrieves the last error occurred in a socket operation, stored in the BSD standard variable errno.
Set command AT+NSOER	+NSOER: 104 OK

18.13 Set Listening Socket +NSOLI	
Command syntax	**Description**
AT+NSOLI=<socket>,<port>	This command sets the specified socket in listening mode on the specified port of service, waiting for incoming connections that are automatically accepted and notified via the +NUSOLI: <socket>,<ip_address>,<port> unsolicited indication, carrying the connected socket identifier, the remote IP address and port. This command corresponds to the bind, listen and accept BSD routines and it can be applied to TCP sockets only.
Set command AT+NSOLI=2,1200	OK or CME ERROR: <error> +NUSOLI: 3,"151.63.16.7",1203

<socket> is the socket identifier, in range 0-15.
<port> integer type value of port of service.

18.14 Connect Socket +NSOCO	
Command syntax	**Description**
AT+NSOCO=<socket>,<remote_addr>,<remote_port>	This command establishes a peer-to-peer connection to the specified remote end, like the BSD connect routine. The 3-way handshake is managed for a TCP socket. For an UDP socket this function declares the remote host address and port in order to deploy an active UDP session. A Write Socket operation will follow, in [1] is described the logical usage of the Connect procedure and UDP active sockets.
Set command AT+NSOCO=3,"151.63.16.9",1200	OK or CME ERROR: <error>

<socket> is the socket identifier, in range 0-15.
<remote_addr> is the text string of remote end IP address.
<remote_port> integer type value of remote end port.

18.15 Write Socket Data +NSOWR	
Command syntax	**Description**
Base syntax AT+NSOWR=<socket>,<length>,<data> Binary syntax AT+NSOWR=<socket>,<length>	This command writes the specified amount of data to the specified socket, like the BSD write routine, and returns the number of bytes of data actually written. It can be applied to UDP sockets too, after a Connect Socket command There are two kinds of syntax: - **base syntax**: useful for writing simple strings to the socket with the limitation that a set of chars are forbidden; - **binary extended**: mandatory for writing any char in the ASCII range [0x00, 0xFF], it can be useful for sending protocol data bytes.
Set base command AT+NSOWR=3,16,"16 bytes of data"	+NSOWR: 3,16 (Used syntax: +NSOWR: <socket>,<length>) OK or CME ERROR: <error>
Set binary command AT+NSOWR=3,16	@ (When this prompt appears, data are provided by the user, all the bytes in the range [0x00,0xFF] can be accepted. After the specified <length> has been reached the response can be:) +NSOWR: 3,16 (Used syntax: +NSOWR: <socket>,<length>) OK or CME ERROR: <error>

For base syntax

<socket> is the socket identifier, in range 0-15.
<length> integer type value to specify amount of data to write, in range 0-512.
<data> string type of the data bytes to be written. Please note that not all of the ASCII charset can be used. Allowed ASCII chars are:
0x20 (space), 0x21and from 0x23 to 0xFF. Substantially all of the alphanumeric set, symbols and extended ASCII charset from 0x80 to 0xFF.
The control chars from 0x00 to 0x1F (included) are forbidden.
The 0x22 char, quotation marks ("), is forbiddent too.
Note: the value of <length> and the actual length of <data> should match.

For binary syntax

<socket> is the socket identifier, in range 0-15.
<length> integer type value to specify amount of data to write, in range 0-1024 (an extension, for the base syntax it was 512).

After the command is provided, user waits for the @ prompt. When it appears the stream of bytes can be provided. After the specified amount of bytes has been provided, system returns with OK (or ERROR). The feed process cannot be interrupted i.e. the return in the command mode can be effective when the number of bytes provided is the declared one. Please note: that specific feature of byte delivery is the only way for the system to accept control chars as data; for the AT command specifications [2,3], chars like <CR>, <CTRL-Z>, quotation marks, etc. have a specific meaning and they cannot be used like data in the command itself. The command is so extended with a specific acceptance state identified by the @ prompt.
Note: this powerful feature can be successfully used when there is need to send a byte stream which belongs to a protocol that has any kind of chars in the ASCII range [0x00,0xFF].

18.16 Read Socket Data +NSORD	
Command syntax	**Description**
AT+NSORD=<socket>,<length>	This command reads the specified amount of data from the specified socket, like the BSD read routine. The unsolicited indication +NUSORD: <socket>,<length> notifies that new data is available for reading, either when new data arrives or after a partial read by the user for the TCP socket type. This command can be applied to UDP active sockets too with the follow exceptions. Please note that the UDP is a connectionless protocol i.e. in an UDP active connection, data can be received after (and only after) an UDP packet is sent to a remote server: in this case the remote server replies to the local port and the local stack gets the response. This means that a Read Socket operation will always follow a Write Socket operation. If Write Socket operation (after a Connect operation) is not performed, data cannot be received by the stack (and the remote peer will receive an ICMP error type 3 code 3, destination port unreachable). Furthermore data reading from an UDP socket should be done in 'one shot' only: if a read attempt specifies less bytes than the value reported in the unsolicited indication, the number of the bytes specified are returned but there is not possible to read the remained part of the UDP datagram incame.
Set command AT+NSORD=3,16	+NUSORD: 3,16 +NSORD: 3,16,"16 bytes of data"<CR><LF> (Used syntax: +NSORD: <socket>,<length>,<data in the ASCII [0x00,0xFF] range>) OK or CME ERROR: <error>

<socket> is the socket identifier, in range 0-15.
<length> integer type value to specify amount of data to read, in range 0-1024.
<data> data read

The returned data may have any kind of ASCII char in the range [0x00,0xFF] i.e. control chars too. The starting quotation marks shall not be taken into account like data, the first byte of data starts after the first quotation marks. Then the other chars are provided for a <length> amount. At the end of the length byte stream, another quotation marks followed by <CR><LF> are provided for user convenience and visualization purposes. Note: a smart remote application which deals with TM2 AT commands should rely on the <length> info to count the received number of chars (after the starting quotation marks) especially if any protocol control chars are expected.
If an application deals with letter and number chars only i.e all of the expected chars are outside the [0x00, 0x1F] range and are not quotation marks, the AT+NSORD response quotation marks can be assumed to identify the start and the end of the received data packet, anyway the <length> field usage to identify the valid data stream is recommended.

19 Appendices

19.1 Mobile Termination error result code +CME ERROR

<err>	Meaning	Resulting from the following commands
0	phone failure	undeterminated
1	no connection to phone	
2	phone-adaptor link reserved	
3	operation not allowed	all +C.. commands described in GSM07.07
4	operation not supported	all +C.. commands described in GSM07.07
5	PH-SIM PIN required	all +C.. commands described in GSM07.07
10	SIM not inserted	all +C.. commands described in GSM07.07
11	SIM PIN required	all +C.. commands described in GSM07.07
12	SIM PUK required	all +C.. commands described in GSM07.07
13	SIM failure	all +C.. commands described in GSM07.07
14	SIM busy	all +C.. commands described in GSM07.07
15	SIM wrong	all +C.. commands described in GSM07.07
16	incorrect password	+CLCK, +CPWD, +CPIN, ATD*...#...
20	memory full	+CPBW, +CPOL
21	invalid index	+CPBR, +CPBW
22	not found	+COPS, +CHLD, +CGATT, ATD*...#...
23	memory failure	+CSAS, +CRES, +CSGT
24	text string too long	+CPBW
25	invalid characters in text string	ATD*...#...
26	dial string too long	ATD, +CPBW
27	invalid characters in dial string	ATD, +CPBW, ...
30	no network service	ATD, +COPS, +CLIR, ...
31	network timeout	ATD
100	unknown	commands with wrong syntax
103	illegal MS	+CGATT
106	illegal ME	+CGATT
107	GPRS services not allowed	+CGATT
111	PLMN not allowed	+CGATT
112	Location area not allowed	+CGATT
113	roaming not allowed in this location area	+CGATT
132	service option not supported	+CGACT, or other non-GPRS cmds.
133	requested service option not subscribed	+CGACT, or other non-GPRS cmds.
134	service option temporarily out of order	+CGACT, or other non-GPRS cmds.
149	PDP authentication failure	+CGACT
148	unspecified GPRS error	all GPRS related commands
150	invalid mobile class	all GPRS related commands
701	incorrect security code	+ XPIN, +XSECSTATE
702	max attempts reached	+ XPIN, +XSECSTATE

19.2 Message service failure result codes +CMS ERROR

<err>	Meaning	Resulting from the following commands
1 to 127	Error cause values from the GSM recommendation 04.11 Annex E-2	+CMGS, +CMMS
128 to 301	Error cause related to GSM 3.40	(SMS commands)
301	SMS service of ME reserved	+CSMS
302	operation not allowed	all SMS commands
303	operation not supported	all SMS commands
310	SIM not inserted	all SMS commands

311	SIM PIN required	all SMS commands
312	PH-SIM PIN required	all SMS commands
313	SIM failure	all SMS commands
314	SIM busy	all SMS commands
315	SIM wrong	all SMS commands
316	SIM PUK required	all SMS commands
320	memory failure	+CMGR
321	invalid memory index	+CMGR, +CMGL
322	memory full	
330	SMSC address unknown	+CMGR
332	network timeout	
500	unknown error	commands with wrong syntax
512	MN_SMS_RP_ACK	This and the following codes are manufacturer specific
513	MN_SMS_TIMER_EXPIRED	
514	MN_SMS_FORW_AVAIL_FAILED	
515	MN_SMS_FORW_AVAIL_ABORTED	
516	MS invalid TP-Message-Type-Indicator	
517	MS no TP-Status-Report in Phase 1	
518	MS no TP-Reject-Duplicate in phase 1	
519	MS no TP-Replay-Path in Phase 1	
520	MS no TP-User-Data-Header in Phase 1	
521	MS missing TP-Validity-Period	
522	MS invalid TP-Service-Centre-Time-Stamp	
523	MS missing TP-Destination- Address	
524	MS invalid TP-Destination-Address	
525	MS missing Service-Centre-Address	
526	MS invalid Service-Centre-Address	
527	MS invalid alphabet	
528	MS invalid TP-User-Data-length	
529	MS missing TP-User-Data	
530	MS TP-User-Data to long	
531	MS no Command-Request in Phase 1	
532	MS Cmd-Req invalid TP-Destination-Address	
533	MS Cmd-Req invalid TP-User-Data-Length	
534	MS Cmd-Req invalid TP-User-Data	
535	MS Cmd-Req invalid TP-Command-Type	
536	MN MNR creation failed	
537	MS CMM creation failed	
538	MS network connection lost	
539	MS pending MO SM transfer	
540	MS MO SM rejected by SIM MO SMS control	
541	RP-Error OK	
542	RP-Error OK no icon display	
543	Unspecified SMS PP error	

19.3 Failure cause from GSM04.08 (+CEER)

Cause value	Diagnostic
1	unassigned (unallocated) number
3	no route destination
6	channel unacceptable
8	operator determined barring

16	normal call clearing
17	user busy
18	no user responding
19	user alerting, no answer
21	call rejected
22	number changed
26	non selected user clearing
27	destination out of order
28	invalid number format (incomplete number)
29	facility rejected
30	response to STATUS ENQUIIRY
31	normal, unspecified
34	no circuit / channel available
38	network out of order
41	temporary failure
42	switching equipment congestion
43	access information discarded
44	requested circuit / channel not available
47	resources unavailable, unspecified
49	quality of service unavailable
50	requested facility not subscribed
55	incoming calls barred with in the CUG
57	bearer capability not authorized
58	bearer capability not presently available
63	service or option not available, unspecified
65	bearer service not implemented
68	ACM equal to or greater than ACMmax
69	requested facility not implemented
70	only restricted digital information bearer capability is available
79	service or option not implemented, unspecified
81	invalid transaction identifier value
87	user not member of CUG
88	incompatible destination
91	invalid transit network selection
95	semantically incorrect message
96	invalid mandatory information
97	message type non-existent or not implemented
98	message type not compatible with protocol state
99	information element non-existent or not implemented
100	conditional IE error
101	message not compatible with protocol state
102	recovery on timer expiry
111	protocol error, unspecified
127	interworking, unspecified

19.4 Specific failure cause for +CEER

Cause value	**Diagnostic**
244	normal
245	alternate call unsuccessful modify
246	mobile originated unsuccessful call setup
247	mobile terminated unsuccessful call setup
248	unsuccessful in-call-modification
249	normal user request
250	last call release
251	last data call release

252	unsuccessful GPRS attach
253	GPRS detach
254	unsuccessful PDP context activation
255	PDP context deactivation

20 TCP / IP Stack Example

20.1 Activation of a GPRS connection

This example refers to the activation of a GPRS connection on BITE network (a BITE SIM is inserted in the M2M data module) and shows the use of commands +NPSD, +NPSDA, +NPSND to define a GPRS profile with the related parameters, store the profile in NVM for later use, activate the connection, retrieve the dynamic parameters of GPRS connection, deactivate the profile.

at+cmee=2	(Use verbose <err> values)
OK	
at+cops=0	(Ask for automatic operator selection and registration)
+CME ERROR: SIM PIN required	(SIM requests PIN)
at+cpin="0011"	
OK	(Correct PIN)
at+cops=0	(Ask for automatic operator selection and registration)
OK	
at+cops?	(Get the operator name)
+COPS: 0,0," Bite LT"	
OK	
	(Define a GPRS profile with ID=0)
at+npsd=0,1,"apn"	(Specify APN parameter for the GPRS profile 0)
OK	
at+npsd=0,1	(Get APN of profile 0)
+NPSD: 0,1,"apn"	
OK	
at+npsd=0,2,"UserName"	(Set Username parameter for GPRS profile 0)
OK	
at+npsd=0,2	(Get Username string)
+NPSD: 0,2,"UserName"	
OK	
at+npsd=0,3,"PWD123"	(Set Password of profile 0)
OK	(Get of Password is not allowed!)
at+npsd=0,7,"0.0.0.0"	(Set IP address parameter - 0.0.0.0 means dynamic IP address assigned during context activation)
OK	
at+npsd=0,7	(Get IP address of profile 0)
+NPSD: 0,7,"0.0.0.0"	
OK	
at+npsd=0	(Get all the parameters related to GPRS profile 0)
+NPSD: 0,0,0	(Protocol type: IPv4)
+NPSD: 0,1,"apn"	(APN)
+NPSD: 0,2,"UserName"	(Username)
+NPSD: 0,4,"0.0.0.0"	(Primary DNS address)
+NPSD: 0,5,"0.0.0.0"	(Secondary DNS address)
+NPSD: 0,6,0	(Authentication type: none)
+NPSD: 0,7,"0.0.0.0"	(IP address: dynamic assignment)
+NPSD: 0,8,0	(Data compression: disabled)
+NPSD: 0,9,0	(Header compression: disabled)
+NPSD: 0,10,0	(QoS precedence)
+NPSD: 0,11,0	(Qos delay)
+NPSD: 0,12,0	(QoS reliability)
+NPSD: 0,13,0	(QoS peak rate)
+NPSD: 0,14,0	(QoS mean rate)
+NPSD: 0,15,0	(Minimum QoS precedence)
+NPSD: 0,16,0	(Minimum Qos delay)
+NPSD: 0,17,0	(Minimum QoS reliability)
+NPSD: 0,18,0	(Minimum QoS peak rate)
+NPSD: 0,19,0	(Minimum QoS mean rate)
OK	(These parameters are all volatile)
at+npsda=0,1	(Store all the parameters of profile 0 in NVM for future
OK	

at+npsda=0,3 OK at+npsnd=0,0 +NPSND: 0,0,"217.201.146.112" OK at+npsda=0,4 OK	retrieval) (Activate GPRS profile 0) (Get dynamically assigned IP address) (Deactivate GPRS profile 0)

20.2 Activation of a CSD connection

This example refers to the activation of a CSD connection and shows the use of commands +NCSD, +NCSDA, +NCSND to define a CSD profile with the related parameters, store the profile in NVM for later use, activate the connection, retrieve the dynamic parameters of CSD connection, disconnect the profile.

at+cmee=2 OK at+cops=0 OK at+ncsda=1,0 OK at+ncsd=1,0,"telephone number " OK at+ncsd=1,0 +NCSD: 1,0,"telephone number" OK at+ncsd=1,2," " OK at+ncsd=1,2 +NCSD: 1,2," " OK at+ncsd=1,3,"userPWD" OK at+ncsd=1,3 +CME ERROR: operation not allowed at+ncsd=1 +NCSD: 1,0," " +NCSD: 1,1,0 +NCSD: 1,2," " +NCSD: 1,4,"0.0.0.0" +NCSD: 1,5,"0.0.0.0" +NCSD: 1,6,0 OK at+ncsda=1,1 OK at+ncsda=1,3 OK at+ncsnd=1,0 +NCSND: 1,0,"151.25.99.187" OK at+ncsnd=1,1 +NCSND: 1,1,"193.70.192.25" OK at+ncsnd=1,2 +NCSND: 1,2,"193.70.152.25" OK at+ncsda=1,4 OK	(Use verbose <err> values) (Ask for automatic operator selection and registration) (Reset CSD profile with ID=1 and all the related parameters) (Define the CSD profile 1) (Set Phone number parameter for the CSD profile 1) (Get Phone number of profile 1) (Set Username parameter for CSD profile 1) (Get Username string) (Set Password for profile 1) (Get of Password is not allowed!) (Get all the parameters related to CSD profile 1) (Phone number) (Call type: analog) (Username) (Primary DNS address) (Secondary DNS address) (BITEout: RFU) (These parameters are all volatile) (Store all the parameters of profile 1 in NVM for future retrieval) (Activate CSD profile 1) (Get dynamically assigned IP address) (Get dynamically assigned primary DNS address) (Get dynamically assigned secondary DNS address) (Deactivate CSD profile 1)

NOTE: 7 GPRS profiles and 7 CSD profiles can be defined, but only one profile at a BITE can be activated!

Once a connection is established, either on GPRS or GSM bearer, sockets can be brought into play. Up to 16 sockets can be managed independently and simultaneously over the same bearer and it's easy to associate services and connections. The serial port of the M2M data module is always in command mode and never switched to data mode. AT commands for both reading and writing data on sockets are available to the application hosted on the external microcontroller and unsolicited indications notify of incoming data and transmission result, thus avoiding the need for polling.

20.3 Client Socket

In the following example the creation of a TCP socket and its connection to a remote end is illustrated, as well as the transmission and reception of data. The use of commands +NSOCR, +NSOCO, +NSORD, +NSOWR, +NSOCL is exemplified.
We suppose that a server with IP address 151.9.34.66 is available, where a socket is running in listening mode on port 1500: this listener accepts an incoming socket connection and echoes the received data.

at+cmee=2	(Use verbose <err> values)
OK	
at+cops=0	(Ask for automatic operator selection and registration)
OK	
at+cops?	(Get the operator name)
+COPS: 0,0,"Bite LT"	
OK	
	(Load from NVM a GPRS profile with parameters
at+npsda=0,2	configuration suited for BITE provider; e.g. profile with ID=0
OK	stored in NVM during the informative example concerning
at+npsd=0	the "Activation of a GPRS connection")
+NPSD: 0,0,0	(Get all the parameters related to GPRS profile 0)
+NPSD: 0,1,"apn"	(Protocol type: IPv4)
+NPSD: 0,2,"UserName"	(APN)
+NPSD: 0,4,"0.0.0.0"	(Username)
+NPSD: 0,5,"0.0.0.0"	(Primary DNS address)
+NPSD: 0,6,0	(Secondary DNS address)
+NPSD: 0,7,"0.0.0.0"	(Authentication type: none)
+NPSD: 0,8,0	(IP address: dynamic assignment)
+NPSD: 0,9,0	(Data compression: disabled)
+NPSD: 0,10,0	(Header compression: disabled)
+NPSD: 0,11,0	(QoS precedence)
+NPSD: 0,12,0	(Qos delay)
+NPSD: 0,13,0	(QoS reliability)
+NPSD: 0,14,0	(QoS peak rate)
+NPSD: 0,15,0	(QoS mean rate)
+NPSD: 0,16,0	(Minimum QoS precedence)
+NPSD: 0,17,0	(Minimum Qos delay)
+NPSD: 0,18,0	(Minimum QoS reliability)
+NPSD: 0,19,0	(Minimum QoS peak rate)
OK	(Minimum QoS mean rate)
at+npsda=0,3	
OK	
at+nsocr=6	(Activate GPRS profile 0)
+NSOCR: 0	
OK	(Create a socket and associate it to TCP protocol)
at+nsoco=0,"151.9.34.66",1500	(Handle of the created socket)
OK	
at+nsowr=0,18,"data to be written"	(Connect the socket 0 peer-to-peer to the remote end)
+NSOWR: 0,18	
OK	(Write data to connected socket, *base syntax*)
	(18 bytes actually written)

+NUSORD: 0,18 at+nsord=0,8 +NSORD: 0,8,"data to " OK +NUSORD: 0,10 at+nsord=0,12 +NSORD: 0,10,"be written" at+nsowr=0,21 @data<CR> to be <CR>written<BELL> +NSOWR: 0,21 OK +NUSORD: 0,21 at+nsord=0,21 +NSORD: 0,21,"data<CR> to be <CR>written<BELL>" OK at+nsocl=0 OK at+npsda=0,4 OK	(Listener echoes back received data) (Unsolicited indication of 18 bytes of data to be read from socket 0) (Partial read of data from socket) (Received data) (Unsolicited indication of data available for reading) (Read data from socket) (Write data to connected socket, *extended syntax*) (@ prompt appears and 21 bytes are provided without startup quotation marks; control chars like the <CR> or <BELL> can be used too). (after the 21st char has been provided, system writes to the socket. 21 bytes are written. System returns to the command prompt state) (Unsolicited indication of 21 bytes of data to be read from socket 0) (Read of data from socket) (Received data, control chars are included too; first and last quotation marks are not significant) (Close socket 0) (Deactivate GPRS profile 0)

Note: <CR> is the ASCII char 0x0D, <BELL> is the ASCII char 0x07.

20.4 Listening Socket

This example concerns the creation of a TCP socket set in listening mode. The listening socket is waiting for incoming connections that are automatically accepted and notified via the +NUSOLI indication. The use of commands +NSOCR, +NSOLI, +NSORD, +NSOWR, +NSOCL is demonstrated. We suppose that, once the socket is in listening mode, there is an attempt of connection from a telnet client.

at+cmee=2 OK at+cops=0 OK at+cops? +COPS: 0,0,"Bite LT" OK at+npsda=0,2 OK at+npsd=0 +NPSD: 0,0,0 +NPSD: 0,1,"apn" +NPSD: 0,2,"UserName" +NPSD: 0,4,"0.0.0.0" +NPSD: 0,5,"0.0.0.0" +NPSD: 0,6,0 +NPSD: 0,7,"0.0.0.0" +NPSD: 0,8,0 +NPSD: 0,9,0 +NPSD: 0,10,0 +NPSD: 0,11,0 +NPSD: 0,12,0	(Use verbose <err> values) (Ask for automatic operator selection and registration) (Get the operator name) (Load from NVM a GPRS profile with parameters configuration suited for BITE provider; e.g. profile with ID=0 stored in NVM during the informative example concerning the "*Activation of a GPRS connection*") (Get all the parameters related to GPRS profile 0) (Protocol type: IPv4) (APN) (Username) (Primary DNS address) (Secondary DNS address) (Authentication type: none) (IP address: dynamic assignment) (Data compression: disabled) (Header compression: disabled) (QoS precedence)

+NPSD: 0,13,0	(Qos delay)
+NPSD: 0,14,0	(QoS reliability)
+NPSD: 0,15,0	(QoS peak rate)
+NPSD: 0,16,0	(QoS mean rate)
+NPSD: 0,17,0	(Minimum QoS precedence)
+NPSD: 0,18,0	(Minimum Qos delay)
+NPSD: 0,19,0	(Minimum QoS reliability)
OK	(Minimum QoS peak rate)
at+npsda=0,3	(Minimum QoS mean rate)
OK	
at+npsnd=0,0	(Activate GPRS profile 0)
+NPSND: 0,0,"217.201.129.34"	
OK	(Get dynamically assigned IP address)
at+nsocr=6	
+NSOCR: 0	
OK	(Create a socket and associate it to TCP protocol)
at+nsoli=0,80	(Handle of the created socket)
OK	
	(Set the socket 0 in listening mode on port 80)
+NUSOLI: 1,"151.9.34.66",9882	(Attempt of connection from remote client using > telnet 217.201.129.34 80)
	(Unsolicited indication notifying establishment of a connection with socket ID=1, carrying the remote IP address and port)
+NUSORD: 1,28	
at+nsord=1,28	(Unsolicited indication of data available for reading)
+NSORD: 1,28,"data sent from telnet client"	(Read data from socket)
OK	
at+nsowr=1,29,"sending data to telnet client"	(Write data to connected socket)
+NSOWR: 1,29	(29 bytes actually written)
OK	
at+nsocl=1	(Close socket 1)
OK	
at+nsocl=0	(Close listening socket 0)
OK	
at+npsda=0,4	(Deactivate GPRS profile 0)
OK	