

HSDPA Standard AT Commands Manual

VERSION 1.2

modmax[®]

3G Data Modem MM - 6280IND



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Introduction

1.1. General

The 3GPP TS 27.007 technical specification defines an AT command set for use in controlling devices that operate on WCDMA networks. This document identifies which of those AT commands are supported on the CHU628 USB modem module.

The specification document that lists the AT command set, 3GPP TS 27.007 V5.6.0(2005-03), is available on the 3GPP web site, www.3gpp.org.

The table below identifies whether each command is supported on the CHU628 USB module.

An “N/A in the support column of the table indicates that the command is related to a feature that is not available on the modems.

1.2. Terms

The following terms are used throughout this document. We have provided an explanation of these for your reference.

Table 1. Terms definition

Term	Description
[]	Field. Contents between '[' and ']' indicate the name of the field or the parameter required to complete the syntax.
{ }	Option field. Contents between '{' and '}' indicate the name of the field or the parameter which can be omitted.
<CR>	Carriage return character, which value is specified with command S3
	Delimiter/Space. Insert a space.
AT command set	Communications command set interface between data terminal equipment (DTE) and data circuit terminating equipment (DCE).
DCE	Same as MT2.
DTE	Same as TE2
IMEI	International Mobile station Equipment Identity
MO	Mobile-Originated where the SMS or the call is originated [sent] by the Mobile Station.
Mobile Station	A cellular device [e.g this modem or a mobile phone handset] in the carrier's domestic public cellular phone network intended to be used when stationary, while in motion or during halts at unspecified points. Mobile stations may include fixed, portable (e.g., hand-held personal units) or vehicular units.

Term	Description
MSC	Mobile Switching Centre
MT	Mobile-Terminated where the SMS or the call is terminated [received] at the Mobile Station.
MT2	Mobile Termination 2An MT2 provides a non-ISDN (Rm) user interface, e.g., CCITT V series or CCITT X series. Same at DCE. Refers to the MM-6280IND modem.
NVM	Non Volatile Memory. User changeable and is written at time of change or entry to a separate section of memory unaffected by power cycles. The setting value is available in all profiles.
PCCA	Portable Computer and Communications Association
Rm	Hardwire Interface between MT2 and TE2.
SMS	Short text Message Service.
TE2	Terminal Equipment 2. A TE2 is a data terminal device that has a non-ISDN user-network interface, e.g., CCITT V series or CCITT X series. Same as DTE. Products which can issue AT command set and handle the response through UART or RS-232 signalling ports of the MM-6280IND. The popular examples of MT2 are PC's, PDA and embedded systems i.e. Data Logger, PLC etc.
UART	Universal Asynchronous Receiver-Transmitter, the UART is a microchip component that handles asynchronous serial communication. Every computer contains a UART to manage the serial ports, and some internal modems such as MM-6280IND have their own UART. UART 1(RS232 port) UART 2 (On serial for diagnostics)
UE	User Equipment
UI	User Interface.
UICC	Universal Integrated Circuit Card
Um	Over-air interface between the MT2 and the BS.
USIM	Universal Subscriber Identity Module

1.3. References

The following standards are referenced in this text.

3GPP TS 22.002

3rd Generation Partnership Project; Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)

3GPP TS 22.003

3rd Generation Partnership Project; Teleservices supported by a GSM Public Land Mobile Network (PLMN).

3GPP TS 22.081

3rd Generation Partnership Project; Line identification supplementary services - Stage 1.

3GPP TS 22.082

3rd Generation Partnership Project; Call Forwarding (CF) supplementary services - Stage 1".

3GPP TS 22.083

3rd Generation Partnership Project; Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

3GPP TS 22.088

3rd Generation Partnership Project; Call Barring (CB) supplementary services - Stage 1.

3GPP TS 23.003

3rd Generation Partnership Project; Numbering, addressing and identification.

3GPP TS 24.008

3rd Generation Partnership Project; Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3.

GSM MoU SE.13

GSM MoU Permanent Reference Document SE.13

GSM Mobile Network Codes and Names.

ITU-T Recommendation E.212

Identification plan for land mobile stations.

ITU-T Recommendation T.31

Asynchronous facsimile DCE control, service class 1.

ITU-T Recommendation T.32

Asynchronous facsimile DCE control, service class 2.

ITU-T Recommendation T.50

International Reference Alphabet (IRA) (Formerly International Alphabet No. 5 or IA5) - Information technology - 7-bit coded character set for information exchange.

ITU-T Draft new Recommendation V.250

Serial asynchronous automatic dialling and control.

Telecommunications Industry Association TIA IS-99

Data Services Option Standard for Wideband Spread Spectrum Digital Cellular System.

Telecommunications Industry Association TIA IS-135

800 MHz Cellular Systems, TDMA Services, Async Data and Fax.

Portable Computer and Communications Association PCCA STD-101 Data Transmission Systems and Equipment

Serial Asynchronous Automatic Dialling and Control for Character Mode DCE on Wireless Data Services.

3GPP TS 27.060

3rd Generation Partnership Project; General requirements on Mobile Stations (MS) supporting General Packet Radio Bearer Service (GPRS).

CCITT Recommendation V.110

Support of data terminal equipments (DTEs) with V-Series interfaces by an integrated services digital network.

CCITT Recommendation V.120

Support by an ISDN of data terminal equipment with V-Series type interfaces with provision for statistical multiplexing.

ITU-T Recommendation X.31

Support of packet mode terminal equipment by an ISDN.

3GPP TS 31.101

UICC-Terminal Interface; Physical and Logical Characteristics

ETSI TS 102 310

Smart Cards; Extensible Authentication Protocol support in the UICC.

ETSI TS 102 221

Smart cards; UICC-Terminal interface; Physical and logical characteristics.

RFC 3748, June 2004

Extensible Authentication Protocol (EAP)

AT INTERFACE DESCRIPTION

1.4. Basic Integration

The MM-6280IND supports asynchronous serial communication known as RS-232 or USB.

This chapter describes the basic integration and communication of MT2 with TE2. MT2 hereby defines MM-6280IND and TE2 means host products which can issue AT commands and handle the response through UART or USB signalling. The popular examples of TE2 are PC's, PDA's and unmanned systems such as Data Loggers, RTU's or PLC's.

1.5. Serial Interface

TE2's command and MT2's response pair is the basic interface sequence. The pairs should keep a pre-defined format and ignore the case of letters unless otherwise specified. MM-6280IND supports 2 serial interfaces, USB and UART. USB and UART serve an AT command set with ASCII character sequence.

1.6. Command Format

The AT command set in USB and UART is based on ASCII text. The extended AT command set by Qualcomm start with "AT\$QC" and the extended AT command set by C-motech start with "AT\$\$". All commands should finish by <CR>, 0x0d.

Any spaces in the AT command field are ignored and the space in the parameter field should be removed if it is not necessary unless otherwise specified.

With few exceptions the following syntax provides the given response for each AT command. Where not applicable the response is ERROR:

Table 2. AT command Format

Command	Description
AT***?	reads current set value
AT***=?	reads supported range of values
AT***=<value>	changes current set value to new set value
ASCII commands/ACK	AT\$\$ command = argument
ASCII responses/notifications	\$\$command: result Error(In case of not applicable command, or wrong argument input)

NOTE: *** stands for the specific AT syntax.

1.7. Message Naming Convention

The following diagram shows the naming convention of messages between MT2 and TE2.

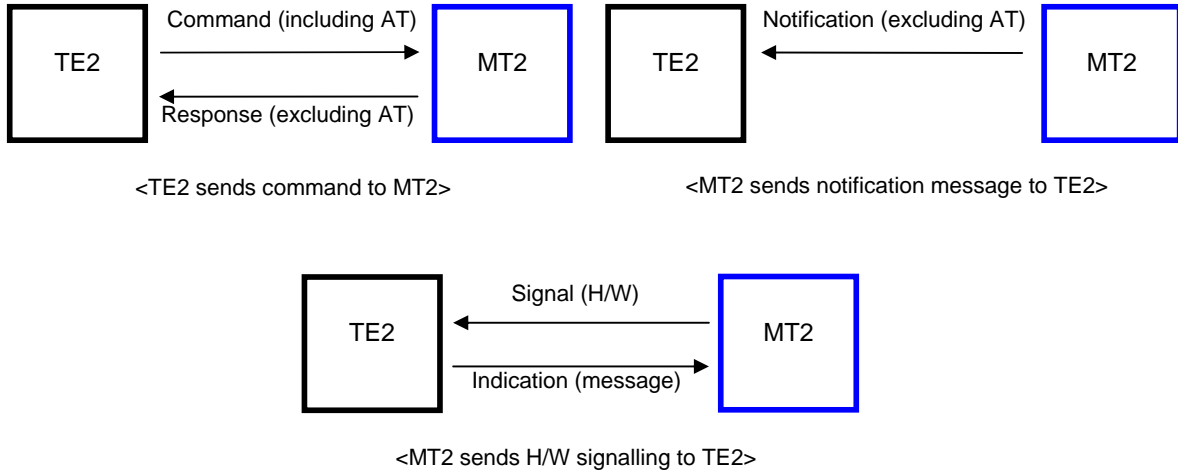


Figure 1. Naming convention diagram

1.8. DTE-TA/DCE interface commands

Table 3. ITU-T V.250 commands relating to TE-TA interface

Command	Req	Description	Support
E<value>	Mand.	Command echo	supported
Q<value>	Mand.	Result code suppression	supported
S3	Mand.	Command line termination character	supported
S4	Mand.	Response formatting character	supported
S5	Mand.	Command line editing character	supported
V<value>	Mand.	DCE response format	supported
X<value>	Mand.	Result code selection and call progress monitoring control	supported
&C<value>	Mand.	Circuit 109 DCE RLSD (DCD) behavior	supported
&D<value>	Mand.	Circuit 108 DTE DTR behavior	supported
+IPR=<rate>	Opt.	<p>Fixed Rm Rate. This numeric extended-format parameter specifies the data rate at which the MT2 will accept command set, in addition to 1200 bit/s or 9600 bit/s (as required in EIA/TIA-602). It may be used to select operation at rates at which the MT2 is not capable of automatically detecting the data rate being used by the TE2.</p> <p>115200bps. (Default)</p> <p>+IPR? Displays current set value.</p> <p>+IPR=? Displays range of (supported auto detectable rates), (list of supported fixed-only rates). e.g. +IPR: (1200, 2400,</p>	supported

		4800, 9600, 19200), (45, 50, 75, 110, 150, 300, 600, 38400, 57600, 115200, 230400) +IPR=<value> Set value	
+ICF	Opt.	<p>TE2-MT2 Character Framing. This extended-format compound parameter is used to determine the local serial port start-stop (asynchronous) character framing that the MT2 shall use while accepting TE2 command set and while transmitting information text and result codes to the TE2, if this is not automatically determined (see +IPR).</p> <p><format> valid numeric values</p> <p>0 auto detect [NOT SUPPORTED]</p> <p>1 8Data 2Stop</p> <p>2 8Data 1Parity 1Stop</p> <p>3 8Data 1Stop (Default)</p> <p>4 7Data 2Stop</p> <p>5 7Data 1Parity 1Stop</p> <p>6 7Data 1Stop</p> <hr/> <p><parity> defined numeric values</p> <p>0 odd</p> <p>1 even</p> <p>2 Mark [NOT SUPPORTED]</p> <p>3 space (Default)</p> <p>+ICF? Shows current settings +ICF=? Shows supported range +ICF=<format_value,parity_value> sets value</p>	supported
+IFC	Opt.	<p>TE2-MT2 Local Flow Control. This extended-format compound parameter is used to control the operation of local flow control between the TE2 and MT2 ^[1].</p> <p><c_by_t> Description</p> <p>0 None</p> <p>1 Xon/Xoff local DC1/DC3 on circuit 103; do not pass DC1/DC3 characters to the remote DCE.</p> <p>2 Circuit 133 (Ready for Receiving) (Default)</p>	supported

		<p>3 Xon/Xoff global DC1/DC3 on circuit 103 with DC1/DC3 characters being passed through to the remote DCE in addition to being acted upon for local flow control</p> <hr/> <p><t_by_c> Description</p> <p>0 None</p> <p>1 Xon/Xoff local DC1/DC3 on circuit 104</p> <p>2 Circuit 106 (Clear to Send/Ready for Sending) (Default)</p> <p><c_by_t>: specifies the method to be used by the DTE to control the flow of received data from the DCE; <t_by_c>: specifies the method to be used by the DCE to control the flow of transmitted data from the DTE.</p> <p>AT+IFC=<[[c_by_t]DCE_DTE]>,<[[t_by_c]DTE_DCE]></p> <p>+IFC? Shows current settings +IFC=? Shows supported range +IFC=<c_by_t,t_by_c> sets value</p>	
+ILRR	Opt.	determines whether the used local TE-TA data rate is informed using intermediate result code +ILRR	Not supported

Mobile Termination errors commands

Table 4. Mobile Termination control and status commands

Command	Req	Description	Support
+CMEE		Report Mobile Termination error	supported

1.9. Report Mobile Termination error(+CMEE)

Set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the 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.

Table 5. +CMEE parameter command syntax

Command	Possible response(s)
+CMEE=<n>	
+CMEE?	+CMEE: <n>
+CMEE=?	+CMEE: (list of supported <n>s)
value	<n>: 0 disable +CME ERROR: <err> result code and use ERROR instead 1 enable +CME ERROR: <err> result code and use numeric <err> values (refer next subclause) 2 enable +CME ERROR: <err> result code and use verbose <err> values (refer next subclause)

1.9.1. Mobile Termination error result code (CME ERROR)

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

<err> values (numeric format followed by verbose format):

- 0 phone failure
- 1 no connection to phone
- 2 phone-adaptor link reserved
- 3 operation not allowed
- 4 operation not supported
- 5 PH-SIM PIN required
- 6 PH-FSIM PIN required

- 7 PH-FSIM PUK required
- 10 SIM not inserted (Note)
- 11 SIM PIN required
- 12 SIM PUK required
- 13 SIM failure (Note)
- 14 SIM busy (Note)
- 15 SIM wrong (Note)
- 16 incorrect password
- 17 SIM PIN2 required
- 18 SIM PUK2 required
- 20 memory full
- 21 invalid index
- 22 not found
- 23 memory failure
- 24 text string too long
- 25 invalid characters in text string
- 26 dial string too long
- 27 invalid characters in dial string
- 30 no network service
- 31 network timeout
- 32 network not allowed - emergency calls only
- 40 network personalization PIN required
- 41 network personalization PUK required
- 42 network subset personalization PIN required
- 43 network subset personalization PUK required
- 44 service provider personalization PIN required
- 45 service provider personalization PUK required
- 46 corporate personalization PIN required
- 47 corporate personalization PUK required
- 48 hidden key required
- 49 EAP method not supported
- 50 Incorrect parameters

1.10. Informative examples

An example of TA responses with all three +CMEE values when MT manufacturer identification is requested but MT is not connected to the TA:

AT+CMEE=0 (+CME ERROR shall not be used)

OK

AT+CGMI

ERROR

AT+CMEE=1 (use numeric <err>)

OK

AT+CGMI

+CME ERROR: 1

AT+CMEE=2 (use verbose <err>)

OK

AT+CGMI

+CME ERROR: no connection to phone

General commands

ITU-T Recommendation V.250 [14] includes "Generic DCE Control" commands with the prefix +G. These commands are for the identification of the TA. Four of those commands are adapted here to be the identification commands of the MT. Syntax is otherwise similar but the prefix is +CG. TIA IS-99 [15] uses same commands for base station identification.

Table 6. General AT command

Command	Req	Description	Support
+CGMI	Opt.	Request manufacturer identification	supported
+CGMM	Opt.	Request model identification	supported
+CGMR	Opt.	Request revision identification	supported
+CGSN	Opt.	Request product serial number identification	supported
+CSCS	Mand.	Select TE character set	supported
+CIMI	Opt.	Request international mobile subscriber identity	supported
+CMUX		Multiplexing mode	Not supported

1.11. Request manufacturer identification(+CGMI)

Execution command causes the TA to return one or more lines of information text <manufacturer>, determined by the MT manufacturer, which is intended to permit the user of the TA to identify the manufacturer of the MT to which it is connected to. Typically, the text will consist of a single line containing the name of the manufacturer, but manufacturers may choose to provide more information if desired.

Table 7. +CGMI action command syntax

Command	Possible response(s)
+CGMI	<manufacturer> +CME ERROR: <err>
+CGMI=?	
value	<manufacturer>: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters

1.12. Request model identification(+CGMM)

Execution command causes the TA to return one or more lines of information text <model>, determined by the MT manufacturer, which is intended to permit the user of the TA to identify the specific model of the MT to which it is connected to. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide more information if desired.

Table 8. +CGMM action command syntax

Command	Possible response(s)
+CGMM	<model> +CME ERROR: <err>
+CGMM=?	
value	<model>: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

1.13. Request product serial number identification (+CGSN)

Execution command causes the TA to return one or more lines of information text <sn>, determined by the MT manufacturer, which is intended to permit the user of the TA to identify the individual MT to which it is connected to. Typically, the text will consist of a single line containing the IMEI (International Mobile station Equipment Identity; refer 3GPP TS 23.003 [7]) number of the MT, but manufacturers may choose to provide more information if desired.

Table 9. +CGSN action command syntax

Command	Possible response(s)
+CGSN	<sn> +CME ERROR: <err>
+CGSN=?	
value	<sn>: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters

1.14. Select TE character set (+CSCS)

Set command informs TA which character set <chset> is used by the TE. TA is then able to convert character strings correctly between TE and MT character sets.

Table 10. +CSCS parameter command syntax

Command	Possible response(s)
+CSCS=[<chset>]	
+CSCS?	+CSCS: <chset>
+CSCS=?	+CSCS: (list of supported <chset>s)
Value	<chset> (conversion schemes not listed here can be defined by manufacturers): "GSM" GSM 7 bit default alphabet (3GPP TS 23.038); this setting causes easily software flow control (XON/XOFF) problems "IRA" international reference alphabet (ITU-T T.50 [13]) "UCS2" 16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99

1.15. ITU-T V.250 generic TA control commands

Table 11. ITU-T V.250 generic TA control commands

Command	Req	Description	Support
Z[<value>]	Mand.	TA sets all parameters to their defaults as specified by a user memory profile or by the manufacturer, and resets TA	supported
&F[<value>]	Mand.	TA sets all parameters to their defaults as specified by the manufacturer	supported
I[<value>]	Opt.	request manufacturer specific information about the TA (software cannot use this command to determine the capabilities of a TA)	supported
+GMI	Mand.	This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the MT2 to identify the manufacturer. Typically, the text will consist of a single line containing the name of the manufacturer, but manufacturers may choose to provide more information if desired (e.g., address, telephone number for customer service, etc.). Maxon Electronics Australia Pty. Ltd.	supported
+GMM	Mand.	This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the MT2 to identify the specific model of the device. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide any information desired.	supported
+GMR	Mand.	This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the MT2 to identify the version, revision level or date, or other pertinent information of the device. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide any information desired.	supported
+GSN	Opt.	This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the MT2 to identify the individual device. Typically, the text will consist of a single line containing a manufacturer determined alphanumeric string, but manufacturers may choose to provide any information desired.	supported
+GOI	Opt.	request ISO system global object identification of the TA (general format defined in ITU T Recommendation X.208; encoding rules in ITU T Recommendation X.209)	Not supported
+GCAP	Mand.	This extended-format command causes the MT2 to transmit one or more lines of information text in a specific format. The content is a list of additional capabilities	supported

		command +<name>s, which is intended to permit the user of the MT2 to identify the minimum capabilities of the MT2. An MT2 conforming to this standard shall include the following items, as a minimum, in the result code for the +GCAP command: +CIS707, +MS, +ES, +DS, +FCLASS (Default)	
+GCI=<T.35>	Opt.	selects the country of installation for the TA using ITU T Recommendation T.35 Annex A country codes	Not supported

1.16. PCCA STD-101 [17] select wireless network +WS46

Table 12. PCCA STD-101 [17] select wireless network +WS46

Command	Req	Description	Support
+WS46		select wireless network	

1.17. Informative examples

1.17.1. Phone model

Command: AT+CGMM

Expected response: Model

1.17.2. Phone Manufacturer

Command: AT+CGMI

Expected response: Manufacturer

1.17.3. Checking mobile state

Command: AT+CPAS

Expected response: +CPAS: State

State possible values:

0: available

3: ringing

4: call in progress

1.17.4. Firmware version reading

Command: AT+CGMR

Expected response: +CGMR: Firmware

1.17.5. IMEI number reading

Command: AT+CGSN

Expected response: +CGSN: IMEI

1.17.6. Supported alphabets

Command: AT+CSCS=?

Expected response: +CSCS: ("alphabet1","alphabet2",...)

Command: AT+CSCS="Alphabet"

Expected response: OK if chosen alphabet is supported or ERROR

1.17.7. Supported alphabets

Command: AT+CSCS=?

Expected response: +CSCS: ("alphabet1","alphabet2",...)

Command: AT+CSCS="Alphabet"

Expected response: OK if chosen alphabet is supported or ERROR

Network service commands

UMTS network related commands, which are not covered in call control clause of the present document. Commands include UMTS MSISDN query, MT and network facility locking, and network registration information query

Table 13. Network service commands

Command	27.007 Req.	Description	Support
+CNUM	Opt.	Subscriber number	Supported
+CREG=[<n>]	Opt.	Presentation of unsolicited network registration status Values per spec Parameter values supported: <input type="checkbox"/> <n> – 0, 1 <input type="checkbox"/> <stat> – 0 to 5	Supported
+COPS	Opt.	PLMN selection	Supported
+CLCK=<fac>, mode>, <passwd>, <class>	Mand.	Lock, unlock, or interrogate an ME or a network facility Values per spec Command is abortable Parameter values supported: <fac>: <input type="checkbox"/> AB <input type="checkbox"/> AC <input type="checkbox"/> AG <input type="checkbox"/> AI <input type="checkbox"/> AO <input type="checkbox"/> IR <input type="checkbox"/> OI <input type="checkbox"/> OX <input type="checkbox"/> SC <input type="checkbox"/> PN <input type="checkbox"/> PU <input type="checkbox"/> PP <input type="checkbox"/> PC <input type="checkbox"/> PF <input type="checkbox"/> <mode> – 0 to 2 <input type="checkbox"/> <class> – 1 to 255	Supported
+CPWD=<fac>, <oldpwd>, <newpwd>	Opt.	Set new password for a facility lock function Values per spec Parameter values supported: <fac>: <input type="checkbox"/> AB <input type="checkbox"/> AC <input type="checkbox"/> AG <input type="checkbox"/> AI <input type="checkbox"/> AO <input type="checkbox"/> IR <input type="checkbox"/> OI <input type="checkbox"/> OX <input type="checkbox"/> P2 <input type="checkbox"/> SC	Supported
+CLIP	Opt.	<i>Calling line identification presentation</i>	<i>NA</i>
+CLIR	Opt.	<i>Calling line identification restriction</i>	<i>NA</i>
+COLP	Opt.	<i>Connected line identification presentation</i>	<i>NA</i>
+CDIP	Opt.	<i>Called line identification presentation</i>	<i>Not supported</i>
+CCUG	Opt.	<i>Closed user group</i>	<i>NA</i>

+CCFC	Mand.	Call forwarding number and conditions	NA
+CCWA	Opt.	Call waiting	NA
+CHLD	Opt.	Call related supplementary services	NA
+CTFR	Opt.	Call deflection	Not supported
+CUSD	Opt.	Unstructured supplementary service data	NA
+CAOC	Opt.	Advice of Charge	NA
+CSSN	Opt.	Supplementary service notifications	NA
+CLCC	Opt.	List current calls	NA
+CPOL=[<index>], format[,<oper>]]	Opt.	Preferred operator list Parameter values supported: □ <index> – 0 to 50 □ <format> – 0,2	Supported
+CPLS	Opt.	Selection of preferred PLMN list	Not supported
+COPN	Opt.	Read operator names	Supported
+CAEMLPP	Mand.	eMLPP Priority Registration and Interrogation	Not supported
+CPPS	Mand.	eMLPP subscriptions	Not supported
+CFCS	Mand.	Fast call setup conditions	Not supported
+CAAP	Mand.	Automatic answer for eMLPP Service	Not supported
+CUUS1	Opt.	User to User Signalling Service 1	Not supported

1.18. Subscriber number +CNUM

Action command returns the MSISDNs related to the subscriber (this information can be stored in the SIM/UICC or in the MT). When storing information in the SIM/UICC, if a SIM card is present or if a UICC with an active GSM application is present, the information is stored in the EF_{MSISDN} under DF_{Telecom}. If a UICC with an active USIM application is present, the information is stored in the EF_{MSISDN} under ADF_{USIM}. If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line.

Table 14. +CNUM action command syntax

Command	Possible response(s)
+CNUM	+CNUM: [<alpha1>], <number1>, <type1>[, <speed>, <service>[, <itc>]] [<CR><LF>+CNUM: [<alpha2>], <number2>, <type2>[, <speed>, <service>[, <itc>]] [...]] +CME ERROR: <err>
+CNUM=?	

1.19. Network registration +CREG

Action command returns the MSISDNs related to the subscriber (this information can be stored in the SIM/UICC or in the MT). When storing information in the SIM/UICC, if a SIM card is present or if a UICC with an active GSM application is present, the information is stored in the EF_{MSISDN} under DF_{Telecom}. If a UICC with an active USIM application is present, the information is stored in the EF_{MSISDN} under ADF_{USIM}. If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line.

Table 15. +CREG parameter command syntax

Command	Possible response(s)
+CREG=[<n>]	
+CREG?	+CREG: <n>,<stat>[,<lac>,<ci>] +CME ERROR: <err>
+CREG=?	+CREG: (list of supported <n>s)
value	<n>: 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>: 0 not registered, MT is not currently searching a new operator to register to 1 registered, home network 2 not registered, but MT 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" equals 195 in decimal) <ci>: string type; two byte cell ID in hexadecimal format

1.20. PLMN selection +COPS

Set command forces an attempt to select and register the GSM/UMTS network operator. <mode> is used to select whether the selection is done automatically by the MT or is forced by this command to operator <oper> (it shall be given in format <format>) to a certain access technology, indicated in <AcT>. If the selected operator is not available, no other operator shall be selected (except <mode>=4). If the selected access technology is not available, then the same operator shall be selected in other access technology. The selected operator name format shall apply to further read commands (+COPS?) also. <mode>=2 forces an attempt to deregister from the network. The selected mode affects to all further network registration (e.g. after <mode>=2, MT shall be unregistered until <mode>=0 or 1 is selected).

This command should be abortable when registration/deregistration attempt is made.

Read command returns the current mode, the currently selected operator and the current Access Technology. If no operator is selected, <format>, <oper> and <AcT> are omitted.

Test command returns a set of five parameters, each representing an operator present in the network. A set consists of an integer indicating the availability of the operator <stat>, long and short alphanumeric format of the name of the operator, numeric format representation of the operator and access technology. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in order: home network, networks referenced in SIM or active application in the UICC (GSM or USIM) in the following order: HPLMN selector, User controlled PLMN selector, Operator controlled PLMN selector and PLMN selector (in the SIM or GSM application), and other networks.

It is recommended (although optional) that after the operator list TA returns lists of supported <mode>s and <format>s. These lists shall be delimited from the operator list by two commas.

NOTE: The access technology selected parameters, <AcT>, should only be used in terminals capable to register to more than one access technology. Selection of <AcT> does not limit the capability to cell reselections, even though access technology is selected, the phone may still re-select a cell in other access technology.

Table 16. +CREG parameter command syntax

Command	Possible response(s)
+COPS=[<mode>[,<format> [,<oper>[,<AcT>]]]]	+CME ERROR: <err>
+COPS?	+COPS: <mode>[,<format> ,<oper>[,<AcT>]] +CME ERROR: <err>
+COPS=?	+COPS: [list of supported (<stat> ,long alphanumeric <oper> ,short alphanumeric <oper> ,numeric <oper>[,<AcT>])s] [, , (list of supported <mode>s) , (list of supported <format>s)] +CME ERROR: <err>
value	<mode>: 0 automatic (<oper> field is ignored) 1 manual (<oper> field shall be present, and <AcT> optionally) 2 deregister from network 3 set only <format> (for read command +COPS?), do not attempt registration/deregistration (<oper> and <AcT> fields are ignored); this value is not applicable in read command response 4 manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered <format>: 0 long format alphanumeric <oper> 1 short format alphanumeric <oper> 2 numeric <oper> <oper>: string type; <format> indicates if the format is alphanumeric or numeric; long alphanumeric format can be upto 16 characters long and short format up to 8 characters (refer GSM MoU SE.13 [9]); numeric format is the GSM Location Area Identification number (refer TS 24.008 [8] subclause 10.5.1.3) which consists of a three BCD digit country code coded as in ITU-T E.212 Annex A [10], plus a two BCD digit network code, which is administration specific; returned <oper> shall not be in BCD format, but in IRA characters converted from BCD; hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 3)(network code digit 2)(network code digit 1) <stat>: 0 unknown 1 available

	2 current 3 forbidden <AcT> access technology selected: 0 GSM 1 GSM Compact 2 UTRAN
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1.21. Facility lock +CLCK

Execute command is used to lock, unlock or interrogate a MT or a network facility <fac>. Password is normally needed to do such actions. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>.

. This command should be abortable when network facilities are set or interrogated.

Call barring facilities are based on GSM/UMTS supplementary services (refer 3GPP TS 22.088 [6]). The interaction of these with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standard.

Test command returns facility values supported as a compound value.

Table 17. +CREG parameter command syntax

Command	Possible response(s)
+CLCK=<fac>,<mode>[,<passwd>[,<class>]]	+CME ERROR: <err> when <mode>=2 and command successful: +CLCK: <status>[,<class1> [<CR><LF>+CLCK: <status>,<class2> [...]]
+CLCK=?	+CLCK: (list of supported <fac>s) +CME ERROR: <err>

value	<p><fac> values reserved by the present document:</p> <p>"CS" CNTRL (lock CoNTRoL surface (e.g. phone keyboard))</p> <p>"PS" PH-SIM (lock PHoNE to SIM/UICC card) (MT asks password when other than current SIM/UICC card inserted; MT may remember certain amount of previously used cards thus not requiring password when they are inserted)</p> <p>"PF" lock Phone to the very First inserted SIM/UICC card (also referred in the present document as PH-FSIM) (MT asks password when other than the first SIM/UICC card is inserted)</p> <p>"SC" SIM (lock SIM/UICC card) (SIM/UICC asks password in MT power-up and when this lock command issued)</p> <p>"AO" BAOC (Barr All Outgoing Calls) (refer 3GPP TS 22.088 [6] clause 1)</p> <p>"OI" BOIC (Barr Outgoing International Calls) (refer 3GPP TS 22.088 [6] clause 1)</p> <p>"OX" BOIC-exHC (Barr Outgoing International Calls except to Home Country) (refer 3GPP TS 22.088 [6] clause 1)</p> <p>"AI" BAIC (Barr All Incoming Calls) (refer 3GPP TS 22.088 [6] clause 2)</p> <p>"IR" BIC-Roam (Barr Incoming Calls when Roaming outside the home country) (refer 3GPP TS 22.088 [6] clause 2)</p> <p>"NT" barr incoming calls from numbers Not stored to TA memory</p> <p>"NM" barr incoming calls from numbers Not stored to MT memory</p> <p>"NS" barr incoming calls from numbers Not stored to SIM/UICC memory</p> <p>"NA" barr incoming calls from numbers Not stored in Any memory</p> <p>"AB" All Barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)</p> <p>"AG" All outGoing barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)</p> <p>"AC" All inComing barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)</p> <p>"FD" SIM card or active application in the UICC (GSM or USIM) fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as <passwd>)</p> <p>"PN" Network Personalization (refer 3GPP TS 22.022 [33])</p> <p>"PU" network sUbsEt Personalization (refer 3GPP TS 22.022 [33])</p> <p>"PP" service Provider Personalization (refer 3GPP TS 22.022 [33])</p> <p>"PC" Corporate Personalization (refer 3GPP TS 22.022 [33])</p> <p><mode>:</p> <p>0 unlock</p> <p>1 lock</p> <p>2 query status</p> <p><status>:</p> <p>0 not active</p> <p>1 active</p> <p><passwd>: string type; shall be the same as password specified for the facility from the MT user interface or with command Change Password +CPWD</p> <p><classx> is a sum of integers each representing a class of information (default 7):</p> <p>1 voice (telephony)</p> <p>2 data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)</p> <p>4 fax (facsimile services)</p> <p>8 short message service</p> <p>16 data circuit sync</p> <p>32 data circuit async</p> <p>64 dedicated packet access</p> <p>128 dedicated PAD access</p>
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1.22. Change password +CPWD

Action command sets a new password for the facility lock function defined by command Facility Lock +CLCK.

Table 18. +CPWD action command syntax

Command	Possible response(s)
+CPWD=<fac>,<oldpwd>,<newpwd>	+CME ERROR: <err>
+CPWD=?	+CPWD: list of supported (<fac>,<pwdlength>)s +CME ERROR: <err>
value	<fac>: "P2" SIM PIN2 refer Facility Lock +CLCK for other values <oldpwd>,<newpwd>: string type; <oldpwd> shall be the same as password specified for the facility from the MT user interface or with command Change Password +CPWD and <newpwd> is the new password; maximum length of password can be determined with <pwdlength> <pwdlength>: integer type maximum length of the password for the facility

1.23. Preferred PLMN list +CPOL

This command refers to the GSM/UMTS supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated call. The command enables or disables the presentation of the COL at the TE. It has no effect on the execution of the supplementary service COLR in the network.

When enabled (and called subscriber allows), +COLP:

<number>,<type>[,<subaddr>,<satype> [,<alpha>]] intermediate result code is returned from TA to TE before any +CR or V.25ter [14] responses. It is manufacturer specific if this response is used when normal voice call is established.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the COLP service according 3GPP TS 22.081 [3] (given in <m>).

Table 19. +COLP parameter command syntax

Command	Possible response(s)
+COLP=[<n>]	
+COLP?	+COLP: <n> ,<m>
+COLP=?	+COLP: (list of supported <n>s)
value	<n> (parameter sets/shows the result code presentation status to the TE): 0 disable 1 enable <m> (parameter shows the subscriber COLP service status in the network): 0 COLP not provisioned 1 COLP provisioned 2 unknown (e.g. no network, etc.) <number>, <type>, <subaddr>, <satype>, <alpha>: refer +CLIP

1.24. Read operator names +COPN

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

Table 20. +COPN action command syntax

Command	Possible response(s)
+COPN	+COPN: <numeric1>,<alpha1> [<CR><LF>+COPN: <numeric2>,<alpha2> [...]] +CME ERROR: <err>
+COPN=?	
value	<numericn>: string type; operator in numeric format (see +COPS) <alphan>: string type; operator in long alphanumeric format (see +COPS)

1.25. Informative examples

1.25.1. Operator information reading

Command: AT+COPS?

Expected response: +COPS: mode, format, name

mode possible values:

0: automatic registration

1: manual registration

3: use for set format, see below

4: manual/automatic. If manual choice fails then make an automatic registration

Format possible values:

0: short alphanumeric format

1: long alphanumeric format

2: numeric format

name is operator name corresponding to the format.

Command: AT+COPS=3, format command used to change the name format

Expected response: OK

Format possible values:

0: short alphanumeric format

1: long alphanumeric format

2: numeric format

1.25.2. IMSI number reading

Command: AT+CIMI

Expected response: IMSINumber

1.25.3. GPRS Attachment

Command: AT+CGATT=1

Expected response: OK or ERROR

Command: AT+CGATT?

Expected response: 1 or 0 depending on GPRS attachment

1.25.4. Network registration

UI waits for registered or Roaming status before going further.

Command: AT+CREG?

Expected response: +CREG: 0,Status

Status possible values:

0 : no network found

1 : registered

2 : not registered, looking for network

3 : registration denied

4 : unknown

5 : roaming

1.25.5. Own number reading

Command: AT+CNUM

Expected response: +CNUM: "String", "OwnNumber"

Mobile Termination control and status commands

1.26. Basic TE

Table 21. Basic TE

Command	Req	Description	Support
+CPAS	Mand .	Phone activity status	Not Supported
+CFUN	Opt.	Set phone functionality	Not Supported
+CMA`R	Opt.	Master Reset	Not supported
+CSCC	Opt.	Secure control command	Not supported
+CBC	Opt.	<i>Battery charge</i>	N/A
+CSQ	Opt.	Signal quality	Supported
+CMEC	Mand .	<i>Mobile Termination control mode</i>	N/A
+CKPD	Mand .	<i>Keypad control</i>	N/A
+CDIS	Opt.	Display control	Not supported
+CIND	Opt.	Indicator control	Not supported
+CMER	Mand .	Mobile Termination event reporting	Not supported
+CCLK	Opt.	Clock	Supported
+CALA	Opt.	Alarm	Not supported
+CALD	Opt.	Delete alarm	Not supported
+CAPD	Opt.	Postpone or dismiss an alarm	Not supported
+CTZU	Opt.	Automatic Time Zone Update	Not supported
+CTZR	Opt.	<i>Time Zone Reporting</i>	Not supported
+CPWC	Opt.	Power class	Not supported
+CPROT	Opt.	Enter protocol mode	Not supported
+CEAP	Opt.	EAP authentication	Not supported
+CERP	Opt.	EAP Retrieve Parameters	Not supported
+CLAN	Opt.	Set Language	Not supported
+CLAE	Opt.	Language Event	Not supported
+CSGT	Opt.	Set Greeting Text	Not supported
+CSVM	Opt.	Set Voice Mail Number	Not supported
+CALM	Opt.	Alert sound mode	Not supported
+CRSL	Opt.	Ringer sound level	Not supported
+CVIB	Opt.	Vibrator mode	Not supported
+CLVL	Opt.	Loudspeaker volume level	Not supported
+CMUT	Opt.	<i>Mute control</i>	N/A
+CRMC	Opt.	Ring Melody Control	Not supported
+CRMP	Opt.	Ring Melody Playback	Not supported
+CLAC	Opt.	List all available AT commands	Not supported
+CSIM	Opt.	Generic SIM access	Supported

+CRSM	Opt.	Restricted SIM access	Supported
+CPIN	Mand	Enter PIN	Supported
+CGLA		Generic UICC Logical Channel access	Not supported
+CRLA	Opt.	Restricted UICC Logical Channel access	Not supported
+CCHO	Opt.	Open Logical Channel	Not supported
+CCHC	Opt.	Close Logical Channel	Not supported
+CUAD	Opt.	UICC Application Discovery	Not supported
CACM	Opt.	Accumulated call meter	N/A
+CAMM	Opt.	Accumulated call meter maximum	N/A
+CPUC	Opt.	Price per unit and currency table	N/A
+CCWE	Opt.	Call Meter maximum event	Not supported

1.27. Signal quality +CSQ

Execution command returns received signal strength indication <rssi> and channel bit error rate <ber> from the MT..

Table 22. +CSQ action command syntax

Command	Possible response(s)
+CSQ	+CSQ: <rssi>, <ber> +CME ERROR: <err>
+CSQ=?	+CSQ: (list of supported <rssi>s) , (list of supported <ber>s)
Value	<rssi>: 0 -113 dBm or less 1 -111 dBm 2...30 -109... -53 dBm 31 -51 dBm or greater 99 not known or not detectable <ber> (in percent): 0...7 as RXQUAL values in the table in TS 45.008 [20] subclause 8.2.4 99 not known or not detectable

1.28. Clock +CCLK

Set command sets the real-time clock of the MT.

Table 23. +CCLK parameter command syntax

Command	Possible response(s)
+CCLK=<time>	+CME ERROR: <err>
+CCLK?	+CCLK: <time> +CME ERROR: <err>
+CCLK=?	
Value	<time>: string type value; format is "yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -96...+96). E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals to "94/05/06,22:10:00+08"

1.29. Band Selection (AT\$\$\$MBAND)

This command is used to read and write of the band selection.

Table 24. AT\$\$\$MBAND Read Command

Command	TE2	→	MT2	\$\$\$MBAND? <CR>
Response	TE2	←	MT2	\$\$\$MBAND: [result value] <CR> <result_code>(OK ERROR)
Result Value	0 : auto 1 : 850MHz 2 : 2.1GHz 3 : Not Setting			

Table 25. AT\$\$\$MBAND Write Command

Command	TE2	→	MT2	\$\$\$MBAND= <Setting value> <CR>
Response	TE2	←	MT2	\$\$\$MBAND: [result value] <CR> <result_code>(OK ERROR)
Setting Value	0 : auto 1 : 850MHz 2 : 2.1GMHz			
Result value	0 : Fail 1 : Success			

1.30. Enter PIN +CPIN

Set command sends to the MT a password which is necessary before it can be operated (SIM PIN, SIM PUK, PH-SIM, PIN, etc.). If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If no PIN request is pending, no action is taken towards MT and an error message, +CME ERROR, is returned to TE.

Table 26. +CPIN parameter command syntax

Command	Possible response(s)
+CPIN=<pin>[,<newpin>]	+CME ERROR: <err>
+CPIN?	+CPIN: <code> +CME ERROR: <err>
+CPIN=?	

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

1.31.1. Signal strength reading

Command: AT+CSQ

Expected response: +CSQ: signalstrength,BER

Signalstrength possible values:

0 -113 dBm or less

- 1 -111 dBm
- 2...30 -109... -53 dBm
- 31 -51 dBm or greater

1.31.2. Pin registration

The application just allows for an emergency call until PIN code is entered

Command: AT+CPIN?

Expected response: +CPIN: PinStatus

PinStatus possible values:

SIM PIN : waiting for PIN code

READY : PIN code OK

Command: AT+CPIN="PinCode","NewPinCode"

Expected response: OK or ERROR

Packet Domain Command(GPRS)

1.32. UMTS packet Domain commands

This clause defines commands that a TE may use to control a MT supporting packet switched services. Other aspects of a Packet Domain MT are described in 3GPP TS 27.060 [34].

It is anticipated that Packet Domain MTs will vary widely in functionality. At one extreme, a MT supporting CS/PS or class-A mode of operation might support multiple PDP types as well as circuit switched data, and use multiple external networks and QoS profiles. At the other extreme a MT supporting only PS or class-C mode of operation might support only a single PDP type using a single external network, and rely on the HLR to contain the PDP context definition.

A comprehensive set of Packet Domain-specific commands is defined in clause 10.1 to provide the flexibility needed by the more complex MT. The commands are designed to be expandable to accommodate new PDP types and interface protocols, merely by defining new values for many of the parameters. Multiple contexts may be activated if the interface link-layer protocol is able to support them. The commands use the extended information and error message capabilities described in this specification.

For MTs of intermediate complexity, most commands have simplified forms where certain parameters may be omitted.

For the simplest MTs, and for backwards compatibility with existing communications software, it is possible to control access to the Packet Domain using existing modem-compatible commands. A special dial-string syntax is defined for use with the D command. This "modem compatible" mode of operation is described in subclause 10.2.

A discussion on the interaction of the AT commands, Packet Domain Management and Packet Data Protocols, together with examples of command sequences for a number of applications may be found in 3GPP TS 27.060 [34].

Table 27. UMTS packet Domain commands

Command	Req	Description	Support
+CGDCONT	Mand.	Define PDP Context	Supported
+CGDSCONT	Opt.	Define Secondary PDP Context	Supported
+CGTFT	Opt.	Traffic Flow Template	Supported
+CGQREQ	Opt.	Quality of Service Profile (Requested)	Supported
+CGQMIN	Opt.	Quality of Service Profile (Minimum acceptable)	Supported
+CGEQREQ	Opt.	3G Quality of Service Profile (Requested)	Supported
+CGEQMIN	Opt.	3G Quality of Service Profile (Minimum acceptable)	Supported
+CGEQNEG	Opt.	3G Quality of Service Profile (Negotiated)	Not supported
+CGATT	Opt.	PS attach or detach	Supported
+CGACT	Opt.	PDP context activate or deactivate	Supported
+CGCMOD	Opt.	PDP Context Modify	Supported
+CGDATA	Opt.	Enter data state	Supported
+CGCLOSP	Opt.	Configure local Octet Stream PAD parameters	Not supported
+CGPADDR	Opt.	Show PDP address	Supported
+CGAUTO	Opt.	Automatic response to a network request for PDP context activation	Not supported

+CGANS	Opt.	Manual response to a network request for PDP context activation	Not supported
+CGCLASS	Opt.	GPRS mobile station class	Supported
+CGCLPAD (GPRS only)	Opt.	Configure local triple-X PAD parameters	Not supported
+CGEREP	Opt.	Packet Domain event reporting	Supported
+CGREG	Opt.	GPRS network registration status	Supported
+CGSMS	Opt.	Select service for MO SMS messages	Supported

1.32.1. Define PDP Context +CGDCONT

The set command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command.

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

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

The test command returns values supported as a compound value. If the MT supports several PDP types, <PDP_type>, the parameter value ranges for each <PDP_type> are returned on a separate line.

Table 28. +CGDCONT parameter command syntax

Command	Possible response(s)
+CGDCONT=[<cid> [,<PDP_type> [,<APN> [,<PDP_addr> ,<d_comp>[,<h_comp> [,<pd1> [,...[,<pdN>]]]]]]]]]	OK ERROR
+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>]]] [...]]
+CGDCONT=?	+CGDCONT: (range of supported <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 supported <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)]]] [...]]
Value	<cid>: (PDP Context Identifier) a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. The range of permitted values (minimum value = 1) is

	<p>returned by the test form of the command.</p> <p><PDP_type>: (Packet Data Protocol type) a string parameter which specifies the type of packet data protocol</p> <p>X.25 ITU-T/CCITT X.25 layer 3 (Obsolete) IP Internet Protocol (IETF STD 5) IPV6 Internet Protocol, version 6 (IETF RFC 2460) OSPIH Internet Hosted Octect Stream Protocol (Obsolete) PPP Point to Point Protocol (IETF STD 51)</p> <p><APN>: (Access Point Name) a string parameter which is a logical name that is used to select the GGSN or the external packet data network.</p> <p>If the value is null or omitted, then the subscription value will be requested.</p> <p><PDP_address>: a string parameter that identifies the MT in the address space applicable to the PDP.</p> <p>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.</p> <p>The read form of the command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the +CGPADDR command.</p> <p><d_comp>: a numeric parameter that controls PDP data compression (applicable for SNDCP only) (refer 3GPP TS 44.065 [61]) 0 - off (default if value is omitted) 1 - on (manufacturer preferred compression) 2 - V.42bis 3 - V.44 Other values are reserved.</p> <p><h_comp>: a numeric parameter that controls PDP header compression (refer 3GPP TS 44.065 [61] and 3GPP TS 25.323 [62]) 0 - off (default if value is omitted) 1 - on (manufacturer preferred compression) 2 - RFC1144 (applicable for SNDCP only) 3 - RFC2507 4 - RFC3095 (applicable for PDCP only) Other values are reserved.</p> <p><pd1>, ... <pdN>: zero to N string parameters whose meanings are specific to the <PDP_type></p>
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1.32.2. Define Secondary PDP Context +CGDSCONT

The set command specifies PDP context parameter values for a Secondary PDP context identified by the (local) context identification parameter, <cid>. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command.

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

Table 29. +CGDSCONT parameter command syntax

Command	Possible response(s)
+CGDSCONT=[<cid> , <p_cid> [,<d_comp> [,<h_comp>]]]	OK ERROR
+CGDSCONT?	+CGDSCONT: <cid>, <p_cid>, <d_comp>, <h_comp> [<CR><LF>+CGDSCONT: <cid>, <p_cid>, <d_comp>, <h_comp> [...]]
+CGDSCONT=?	+CGDSCONT: (range of supported <cid>s), (list of <cid>s for active primary contexts), (list of supported <d_comp>s), (list of supported <h_comp>s)
Value	<p><cid>: (PDP Context Identifier) a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. The range of permitted values (minimum value = 1) is returned by the test form of the command.</p> <p><p_cid>: (Primary PDP Context Identifier) a numeric parameter which specifies a particular PDP context definition which has been specified by use of the +CGDSCONT command. The parameter is local to the TE-MT interface. The list of permitted values is returned by the test form of the command.</p> <p><d_comp>: a numeric parameter that controls PDP data compression (applicable for SNDCPonly) (refer 3GPP TS 44.065 [61]) 0 - off (default if value is omitted) 1 - on (manufacturer preferred compression) 2 - V.42bis 3 - V.44 Other values are reserved.</p> <p><h_comp>: a numeric parameter that controls PDP header compression (refer 3GPP TS 44.065 [61] and 3GPP TS 25.323 [62]) 0 - off (default if value is omitted) 1 - on (manufacturer preferred compression) 2 - RFC1144 (applicable for SNDCP only) 3 - RFC2507 4 - RFC3095 (applicable for PDCP only) Other values are reserved.</p>

1.32.3. Traffic Flow Template +CGTFT

This command allows the TE to specify a Packet Filter - PF for a Traffic Flow Template - TFT that is used in the GGSN for routing of down-link packets onto different QoS flows towards the TE. The concept is further described in the 3GPP TS 23.060[47]. A TFT consists of from one and up to eight Packet Filters, each identified by a unique <packet filter identifier>. A Packet Filter also has an <evaluation precedence index> that is unique within all TFTs associated with all PDP contexts that are associated with the same PDP address.

The set command specifies a Packet Filters that is to be added to the TFT stored in the MT and used for the context identified by the (local) context identification parameter, <cid>. The specified TFT will be stored in the GGSN only at activation or MS-initiated modification of the

related context. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGTFT command is effectively an extension to these commands. The Packet Filters consist of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGTFT= <cid> causes all of the Packet Filters in the TFT for context number <cid> to become undefined. At any time there may exist only one PDP context with no associated TFT amongst all PDP contexts associated to one PDP address. At an attempt to delete a TFT, which would violate this rule, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

The read command returns the current settings for all Packet Filters for each defined context.

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line. TFTs shall be used for PDP-type IP and PPP only. For PDP-type PPP a TFT is applicable only when IP traffic is carried over PPP. If PPP carries header-compressed IP packets, then a TFT cannot be used.

Table 30. +CGTFT parameter command syntax

Command	Possible response(s)
<pre>+CGTFT=[<cid>, [<packet filter identifier>, <evaluation precedence index> [,<source address and subnet mask> [,<protocol number (ipv4) / next header (ipv6)> [,<destination port range> [,<source port range> [,<ipsec security parameter index (spi)> [,<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask> [,<flow label (ipv6)>]]]]]]]]]</pre>	<pre>OK ERROR</pre>

+CGTFT?	<p>+CGTFT: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label (ipv6)></p> <p>[<CR><LF>+CGTFT: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label (ipv6)></p> <p>[...]]</p>
+CGTFT=?	<p>+CGTFT: <PDP_type>, (list of supported <packet filter identifier>s), (list of supported <evaluation precedence index>s), (list of supported <source address and subnet mask>s), (list of supported <protocol number (ipv4) / next header (ipv6)>s), (list of supported <destination port range>s), (list of supported <source port range>s), (list of supported <ipsec security parameter index (spi)>s), (list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>s), (list of supported <flow label (ipv6)>s)</p> <p>[<CR><LF>+CGTFT: <PDP_type>, (list of supported <packet filter identifier>s), (list of supported <evaluation precedence index>s), (list of supported <source address and subnet mask>s), (list of supported <protocol number (ipv4) / next header (ipv6)>s), (list of supported <destination port range>s), (list of supported <source port range>s), (list of supported <ipsec security parameter index (spi)>s), (list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>s), (list of supported <flow label (ipv6)>s)</p> <p>[...]]</p>
Value	<p><cid>: a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).</p> <p>The following parameters are defined in 3GPP TS 23.060[47] -</p> <p><packet filter identifier>: Numeric parameter, value range from 1 to 8.</p> <p><source address and subnet mask>: Consists of dot-separated numeric (0-255) parameters on the form 'a1.a2.a3.a4.m1.m2.m3.m4', for IPv4 and 'a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16', for IPv6.</p> <p><protocol number (ipv4) / next header (ipv6)>: Numeric parameter, value range from 0 to 255.</p> <p><destination port range>: Consists of dot-separated numeric (0-65535)</p>

	<p>parameters on the form 'f.f'.</p> <p><source port range>: Consists of dot-separated numeric (0-65535) parameters on the form 'f.f'.</p> <p><ipsec security parameter index (spi)>: Hexadecimal parameter, value range from 00000000 to FFFFFFFF.</p> <p><type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>: Dot-separated numeric (0-255) parameters on the form 't.m'.</p> <p><flow label (ipv6)>: Hexadecimal parameter, value range from 00000 to FFFFF. Valid for IPv6 only.</p> <p><evaluation precedence index>: Numeric parameter, value range from 0 to 255.</p>
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Some of the above listed attributes may coexist in a Packet Filter while others mutually exclude each other, the possible combinations are shown in 3GPP TS 23.060[47].

1.32.4. Quality of Service Profile (Requested) +CGQREQ

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 (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGQREQ command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

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

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

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

Table 31. +CGQREQ parameter command syntax

Command	Possible response(s)
+CGQREQ=[<cid> [,<precedence> [,<delay> [,<reliability.> [,<peak> [,<mean>]]]]]]	OK ERROR
+CGQREQ?	+CGQREQ:<cid>, <precedence>, <delay>, <reliability>, <peak>, <mean> [<CR><LF>+CGQREQ:<cid>, <precedence>, <delay>, <reliability.>, <peak>, <mean>[...]]

+CGQREQ=?	+CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s) [<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)[...]]</cr>
Value	<p><cid>: a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).</p> <p>The following parameters are defined in 3GPP TS 23.107 [46]:</p> <p><precedence>: a numeric parameter which specifies the precedence class</p> <p><delay>: a numeric parameter which specifies the delay class</p> <p><reliability>: a numeric parameter which specifies the reliability class</p> <p><peak>: a numeric parameter which specifies the peak throughput class</p> <p><mean>: a numeric parameter which specifies the mean throughput class</p> <p>If a value is omitted for a particular class then the value is considered to be unspecified.</p>

1.32.5. Quality of Service Profile (Minimum acceptable) +CGQMIN

This command allows the TE to specify a minimum acceptable profile which is checked by the MT against the negotiated profile returned in the Activate PDP Context Accept message.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGQMIN command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGQMIN= <cid> causes the minimum acceptable profile for context number <cid> to become undefined. In this case no check is made against the negotiated profile.

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

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

Table 32. +CGQMIN parameter command syntax

Command	Possible response(s)
+CGQMIN=[<cid> [,<precedence> [,<delay> [,<reliability.> [,<peak> [,<mean>]]]]]]	OK ERROR
+CGQMIN?	+CGQMIN: <cid>, <precedence >, <delay>, <reliability>, <peak>,<mean>[<CR><LF>+CGQMIN: <cid>, <precedence >, <delay>, <reliability.>,<peak>,<mean>[...]]

+CGQMIN=?	+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s) [<CR><LF>+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s)[...]]
Value	<p><cid>: a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).</p> <p>The following parameters are defined in -3GPP TS 23.107 [46]:</p> <p><precedence>: a numeric parameter which specifies the precedence class</p> <p><delay>: a numeric parameter which specifies the delay class</p> <p><reliability>: a numeric parameter which specifies the reliability class</p> <p><peak>: a numeric parameter which specifies the peak throughput class</p> <p><mean>: a numeric parameter which specifies the mean throughput class</p> <p>If a value is omitted for a particular class then this class is not checked</p>

1.32.6. 3G Quality of Service Profile (Requested) +CGEQREQ

This command allows the TE to specify a UMTS Quality of Service Profile that is used when the MT sends an Activate PDP Context Request message to the network.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. The specified profile will be stored in the MT and sent to the network only at activation or MS-initiated modification of the related context. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGEQREQ command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

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

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

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line..

Table 33. +CGEQREQ parameter command syntax

Command	Possible response(s)
+CGEQREQ=[<cid> [,<Traffic class> [,<Maximum bitrate UL> [,<Maximum bitrate DL> [,<Guaranteed bitrate UL> [,<Guaranteed bitrate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay>	OK ERROR

[,<Traffic handling priority>]]]]]]]]]]]]]]]]]]]	
+CGEQREQ?	<p>+CGEQREQ: <cid>, <Traffic class> ,<Maximum bitrate UL> ,<Maximum bitrate DL> ,<Guaranteed bitrate UL> ,<Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority></p> <p>[<CR><LF>+CGEQREQ: <cid>, <Traffic class> ,<Maximum bitrate UL> ,<Maximum bitrate DL> ,<Guaranteed bitrate UL> ,<Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [...]]</p>
+CGEQREQ=?	<p>+CGEQREQ: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s), (list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s)</p> <p>[<CR><LF>+CGEQREQ: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s), (list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [...]]</p>
Value	<p><cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT and +CGDSCONT commands).</p> <p>The following parameters are defined in 3GPP TS 23.107 [46] -</p> <p><Traffic class>: a numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.</p> <ul style="list-style-type: none"> 0 - conversational 1 - streaming 2 - interactive

	<p>3 - background 4 - subscribed value</p> <p>If the Traffic class is specified as conversational or streaming, then the Guaranteed and Maximum bitrate parameters should also be provided. Other values are reserved.</p> <p><Maximum bitrate UL>: a numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). This parameter should be provided if the Traffic class is specified as conversational or streaming (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Maximum bitrate DL>: a numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Delivery order>: a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not. 0 - no 1 - yes 2 - subscribed value.</p> <p>Other values are reserved.</p> <p><Maximum SDU size>: a numeric parameter (1,2,3,...) that indicates the maximum allowed SDU size in octets. If the parameter is set to '0' the subscribed value will be requested (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQREQ=..., "5E3", ...). '0E0' means subscribed value (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered</p>
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	<p>SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQREQ=..., "5E3",...). '0E0' means subscribed value (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Delivery of erroneous SDUs>: a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not. 0 - no 1 - yes 2 - no detect 3 - subscribed value</p> <p>Other values are reserved.</p> <p><Transfer delay>: a numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds. If the parameter is set to '0' the subscribed value will be requested (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Traffic handling priority>: a numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers. If the parameter is set to '0' the subscribed value will be requested (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><PDP_type>: (see +CGDCONT and +CGDSCONT commands).</p> <p>If a value is omitted for a particular class then the value is considered to be unspecified</p>
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1.32.7. 3G Quality of Service Profile (Minimum acceptable) +CGEQMIN

This command allows the TE to specify a minimum acceptable profile, which is checked by the MT against the negotiated profile returned in the Activate/Modify PDP Context Accept message.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. The specified profile will be stored in the MT and checked against the negotiated profile only at activation or MS-initiated modification of the related context. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGEQMIN command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGEQMIN= <cid> causes the minimum acceptable profile for context number <cid> to become undefined. In this case no check is made against the negotiated profile.

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

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

	<p><Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s)</p> <p>[...]]</p>
Value	<p><cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT and +CGDSCONT commands).</p> <p>The following parameters are defined in 3GPP TS 23.107 [46] -</p> <p><Traffic class>: a numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.</p> <ul style="list-style-type: none"> 0 - conversational 1 - streaming 2 - interactive 3 - background <p>Other values are reserved.</p> <p><Maximum bitrate UL>: a numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Maximum bitrate DL>: a numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Delivery order>: a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.</p> <ul style="list-style-type: none"> 0 - no 1 - yes

	<p>Other values are reserved.</p> <p><Maximum SDU size>: a numeric parameter (1,2,3,...) that indicates the maximum allowed SDU size in octets (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQMIN=..., "5E3",...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQMIN=..., "5E3",...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Delivery of erroneous SDUs>: a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.</p> <p>0 - no 1 - yes 2 - no detect</p> <p>Other values are reserved.</p> <p><Transfer delay>: a numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Traffic handling priority>: a numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><PDP_type>: (see +CGDCONT and +CGDSCONT commands).</p> <p>If a value is omitted for a particular class then the value is considered to be unspecified.</p>
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1.32.8. 3G Quality of Service Profile (Negotiated) +CGEQNEG

This command allows the TE to retrieve the negotiated QoS profiles returned in the Activate PDP Context Accept message.

The execution command returns the negotiated QoS profile for the specified context identifiers, <cid>s. The QoS profile consists of a number of parameters, each of which may have a separate value.

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

Table 35. +CGEQNEG action command syntax

Command	Possible response(s)
+CGEQNEG =[<cid>[,<cid> [,...]]]	+CGEQNEG: <cid>, <Traffic class> ,<Maximum bitrate UL>, <Maximum bitrate DL> ,<Guaranteed bitrate UL>, <Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [<CR><LF>+CGEQNEG: <cid>, <Traffic class> ,<Maximum bitrate UL>, <Maximum bitrate DL> ,<Guaranteed bitrate UL>, <Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [...]]
+CGEQNEG=?	+CGEQNEG: (list of <cid>s associated with active contexts)
Value	<p><cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT and +CGDSCONT commands).</p> <p>The following parameters are defined in 3GPP TS 23.107 [46] -</p> <p><Traffic class>: a numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.</p> <ul style="list-style-type: none"> 0 - conversational 1 - streaming 2 - interactive 3 - background <p>Other values are reserved.</p> <p><Maximum bitrate UL>: a numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Maximum bitrate DL>: a numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Delivery order>: a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.</p> <ul style="list-style-type: none"> 0 - no 1 - yes

	<p>Other values are reserved.</p> <p><Maximum SDU size>: a numeric parameter that (1,2,3,...) indicates the maximum allowed SDU size in octets (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:..., "5E3",...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:..., "5E3",...) (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Delivery of erroneous SDUs>: a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.</p> <p>0 - no 1 - yes 2 - no detect</p> <p>Other values are reserved.</p> <p><Transfer delay>: a numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p><Traffic handling priority>: a numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers (refer TS 24.008 [8] subclause 10.5.6.5).</p> <p>If a value is omitted for a particular class then the value is considered to be unspecified.</p>
--	---

1.32.9. PS attach or detach +CGATT

The execution command is used to attach the MT to, or detach the MT from, the Packet Domain service. After the command has completed, the MT remains in V.25ter command state. If the MT is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

The read command returns the current Packet Domain service state.

The test command is used for requesting information on the supported Packet Domain service states.

NOTE: This command has the characteristics of both the V.25ter action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

Table 36. +CGATT parameter command syntax

Command	Possible response(s)
+CGATT=[<state>]	OK ERROR
+CGATT?	+CGATT: <state>
+CGATT=?	+CGATT: (list of supported <state>s)
Value	<state>: indicates the state of PS attachment 0 - detached 1 - attached Other values are reserved and will result in an ERROR response to the execution command.

1.32.10. PDP context activate or deactivate +CGACT

The execution command is used to activate or deactivate the specified PDP context (s). After the command has completed, the MT remains in V.25ter command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the requested state for any specified context cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. If the MT is not PS attached when the activation form of the command is executed, the MT first performs a PS attach and then attempts to activate the specified contexts. If the attach fails then the MT responds with ERROR or, if extended error responses are enabled, with the appropriate failure-to-attach error message.

If no <cid>s are specified the activation form of the command activates all defined contexts. If no <cid>s are specified the deactivation form of the command deactivates all active contexts.

The read command returns the current activation states for all the defined PDP contexts.

The test command is used for requesting information on the supported PDP context activation states.

NOTE. This command has the characteristics of both the V.25ter action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

Table 37. +CGACT parameter command syntax

Command	Possible response(s)
+CGACT=[<state> [,<cid>[,<cid>[,...]]]]	OK ERROR
+CGACT?	+CGACT:<cid>,<state>[<CR><LF>+CGACT:<cid>,<state>[...]]
+CGACT=?	+CGACT: (list of supported <state>s)
Value	<state>: indicates the state of PDP context activation 0 - deactivated 1 - activated Other values are reserved and will result in an ERROR response to the execution command. <cid>: a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).

1.32.11. PDP Context Modify +CGCMOD

The execution command is used to modify the specified PDP context (s) with respect to QoS profiles and TFTs. After the command has completed, the MT returns to V.25ter online data state. If the requested modification for any specified context cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

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

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

Table 38. +CGCMOD parameter command syntax

Command	Possible response(s)
+CGCMOD=[<cid> [,<cid>[,...]]]	OK ERROR
+CGCMOD=?	+CGCMOD: (list of <cid>s associated with active contexts)
Value	<cid>: a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).

1.32.12. Enter data state +CGDATA

The execution command causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more Packet Domain PDP types. This may include performing a PS attach and one or more PDP context activations. If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.25ter online data state.

Commands following +CGDATA command in the AT command line shall not be processed by the MT.

The detailed behaviour after the online data state has been entered is dependent on the PDP type. It is described briefly in 3GPP TS 27.060[34] and in more detail in 3GPP TS 29.061[39] and the specifications for the relevant PDPs. PS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

If context activation takes place during the PDP startup, one or more <cid>s may be specified in order to provide the information needed for the context activation request(s).

During each PDP startup procedure the MT may have access to some or all of the following information -

- The MT may have a priori knowledge, for example, it may implement only one PDP type.

- The command may have provided an <L2P> parameter value.

- The TE may provide a PDP type and/or PDP address to the MT during in the PDP startup procedure.

If any of this information is in conflict, the command will fail.

Any PDP type and/or PDP address present in the above information shall be compared with the PDP type and/or PDP address in any context definitions specified in the command in the order in which their <cid>s appear. For a context definition to match -

The PDP type must match exactly.

The PDP addresses are considered to match if they are identical or if either or both addresses are unspecified. For example, a PPP NCP request specifying PDP type = IP and no PDP address would cause the MT to search through the specified context definitions for one with PDP type = IP and any PDP address.

The context shall be activated using the matched value for PDP type and a static PDP address if available, together with the other information found in the PDP context definition. If a static PDP address is not available then a dynamic address is requested.

If no <cid> is given or if there is no matching context definition, the MT shall attempt to activate the context with whatever information is available to the MT. The other context parameters shall be set to their default values.

If the activation is successful, data transfer may proceed.

After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the V.25ter command state is re-entered and the MT returns the final result code OK.

In the event of an erroneous termination or a failure to start up, the V.25ter command state is re-entered and the MT returns the final result code NO CARRIER or, if enabled, +CME ERROR. Attach, activate and other errors may be reported.

Table 39. +CGDATA parameter command syntax

Command	Possible response(s)
+CGDATA=[<L2P> , [<cid> [, <cid> [, ...]]]]	CONNECT ERROR
+CGDATA=?	+CGDATA: (list of supported <L2P>s)
Value	<p><L2P>: a string parameter that indicates the layer 2 protocol to be used between the TE and MT</p> <p>NULL none, for PDP type OSP:IHOSS (Obsolete)</p> <p>PPP Point-to-point protocol for a PDP such as IP</p> <p>PAD character stream for X.25 character (triple X PAD) mode (Obsolete)</p> <p>X25 X.25 L2 (LAPB) for X.25 packet mode (Obsolete)</p> <p>M-xxxx manufacturer-specific protocol (xxxx is an alphanumeric string)</p> <p>If the value is omitted, the layer 2 protocol is unspecified. Other values are reserved and will result in an ERROR response.</p> <p><cid>: a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).</p>

1.32.13. Show PDP address +CGPADDR

The execution command returns a list of PDP addresses for the specified context identifiers.

The test command returns a list of defined <cid>s.

Table 40. +CGPADDR parameter command syntax

Command	Possible response(s)
+CGPADDR=[<cid> [,<cid> [,...]]]	+CGPADDR: <cid>,<PDP_addr> [<CR><LF>+CGPADDR: <cid>,<PDP_addr> [...]]
+CGPADDR=?	+CGPADDR: (list of defined <cid>s)
Value	<p><cid>: a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands). If no <cid> is specified, the addresses for all defined contexts are returned.</p> <p><PDP_address>: a string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the +CGDCONT and +CGDSCONT commands when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. <PDP_address> is omitted if none is available.</p>

1.33. Modem compatibility commands

Table 41. Modem compatibility commands

Command	Req	Description	Support
D		Dial(request packet domain service or packet domain IP service)	Supported

1.34. Informative examples

1.34.1. UMTS Connection

Command:

```
AT+CGDCONT=%CID%,"%PDPTYPE%","%APN%","%PDPADDRESS_NONE%","%DCOMP%,"%HCOMP%
```

Expected response: OK

Command:

```
AT+CGEQREQ=%CID%,"%REQ_TCLSS%,"%REQ_MBRUL%,"%REQ_MBRDL%,"%REQ_GBRUL%,"%REQ_GBRDL%,"%REQ_DORDR%,"%REQ_MSDU%,"%REQ_SDUER%","%REQ_RBBER%","%REQ_DESDU%,"%REQ_TRDELAY%,"%REQ_TRHP%
```

Expected response: OK

Command:

```
AT+CGEQMIN=%CID%,"%MIN_TCLSS%,"%MIN_MBRUL%,"%MIN_MBRDL%,"%MIN_GBRUL%,"%MIN_GBRDL%,"%MIN_DORDR%,"%MIN_MSDU%","%MIN_SDUER%","%MIN_RBBER%","%MIN_DESDU%,"%MIN_TRDELAY%,"%MIN_TRHP%
```

Expected response: OK

Synchronous data mode commands

Table 42. ITU-T V80ter Synchronous data mode command

Command	Req	Description	Support
+ES=<orig_rqst> <orig_fbk>,<ans_fbk>	Man	Enables the Synchronous Mode Values per spec <input type="checkbox"/> <orig_rqst> – 6 <input type="checkbox"/> <orig_fbk> –undefined <input type="checkbox"/> <ans_fbk> – 1	Supported
+ESA=<trans_idle>,<framed_idle>,<framed_un_ov>,<hd_auto>,<crc_type>,<nrzi_en>,<sync1>,<sync2>	Man	Preferred message storage Values per spec <input type="checkbox"/> <trans_idle> –0 <input type="checkbox"/> <framed_idle>– Undefined <input type="checkbox"/> <framed_un_ov> – Undefined <input type="checkbox"/> <hd_auto> –Undefined <input type="checkbox"/> <crc_type> –Undefined <input type="checkbox"/> <nrzi_en> – 0 <input type="checkbox"/> <sync1> – 0 <input type="checkbox"/> <sync2> – 0 to255	Supported

Qualcomm commands

Table 43. Qualcomm command

COMMAND	Description	Operation	Support
\$QCCLR	clear mobile error log	Clears the mobile error log	Supported
\$QCDMG	transition to diagnostics monitor operation	Returns OK and then transitions the mobile's serial port to DM mode; DM mode runs at rate set by \$QCDMR command and uses a proprietary halfduplex protocol; default DM rate fixed at 115200 bps	Supported
\$QCDMR= <rate>	set DM baud rate	Changes DM rate that will be used on mobile's serial port when mobile's serial port transitions to DM mode; DM mode is entered after \$QCDMG command is issued; default DM rate is fixed at 115200 bps; test command, i.e., \$QCDMR=?, returns rates supported and query command, i.e., \$QCDMR?, returns current Rate	Supported
&V	dump configuration parameters	Dumps the status of all AT parameters applicable to current operating mode, including the single-letter parameters not otherwise readable	Supported
&C2	Circuit 109 (carrier detect pin) behavior - wink	Setting "winks" (briefly transitions off, then back on) the Rm port Carrier Detect pin when Data calls end	Supported
\$QCTER= <rate>	Set TE-DCE baud rate Baud rates supported are identical to +IPR command.	Sets TE-DCE rate at which DCE will accept commands; this data rate also becomes the default and is stored in NV RAM, changing the +IPR command default rate; test command, i.e., \$QCTER=?, returns rates supported and query command, i.e., \$QCTER?, returns rate last issued by \$QCTER command or default rate	Supported
\$ \$QCDNSP= <address>	set primary DNS IP address	Sets the default primary IP address used for Domain Name Services; used only if no DNS server address is received over the air during PDP context activation; value is stored in NVRAM.	Supported
\$QCDNSS= <address>	Set secondary DNS IP address	Sets the default secondary IP address used for Domain Name Services; used only if no DNS server address is received over the air during PDP context activation; value is stored in NVRAM	Supported
\$QCPDPP= <cid>, <auth_type>,	PDP-IP packet data calls <cid> – 1 to 16 <auth_type>:	Defines authentication parameters on a per connection basis. Value of <auth_type> determines what	Supported

<password>, <username>	<input type="checkbox"/> 0 None <input type="checkbox"/> 1 PAP <input type="checkbox"/> 2 CHAP	additional parameters are required, as follows: <input type="checkbox"/> 0 – Neither username nor password accepted <input type="checkbox"/> 1 – Username and password accepted <input type="checkbox"/> 2 – Only password (secret) accepted Query command, i.e., \$QCPDPP?, does not display password values and only displays username for PAP authentication.	
\$QCPWRDN	used to power down the ME	Returns OK and then shuts down the phone	Supported
\$QCDGEN=<cid>, <data length>	Generates data over +CGACT activated PDP context <input type="checkbox"/> <cid> – 1 to 16 <input type="checkbox"/> <data length> – 21 to 2^32	Supported only during PDP context activation by +CGACT	Supported
\$QCSLOT=<slot>	set SIM card slot commands will operate on	Slot other than 1 only available if FEATURE_DUAL_SLOTS enabled	Supported
\$QCPDPLT=<enable>	Enable/disable tolerance to long delays in PDP call setup		Supported
\$QCPINSTAT?	sends the ME the status of all PINs for all cards	Statuses listed in order: SIM PIN, PH FSIM PIN, NET PIN, NETSUB PIN, SP PIN, CORP PIN, SIM PIN2	Supported