



AT Commands Guide

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1.1	WNC	Updated +CFUN Commands Updated % SOCKETEV session	2018/10/18
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Contents

Contact Information.....	2
Revision History	2
Contents	5
1. Introduction	10
1.1. Purpose and Scope.....	10
1.2. Definitions and Abbreviations.....	10
1.3. AT Command Availability.....	11
2. Configuration Commands	12
2.1. AT&F Reset AT Command Settings to Factory Default Values.....	12
2.2. TV Result Code Format Mode	13
2.3. ATZ Restore AT Command Settings from a User Defined Profile	14
2.4. AT+CMEE Error Message Format	14
2.5. AT+CSCS Character Set	16
2.6. AT+CFUN Functionality Level	18
2.7. AT+GCAP Capabilities List.....	19
2.8. AT+CLAC List all available AT commands.....	20
3. Status Control Commands	22
3.1. AT+CEER Extended Error Report	22
3.2. AT+CPAS Activity Status.....	錯誤! 尚未定義書籤。
3.3. AT+WS46 Select Wireless Network.....	23
3.4. AT%STATUS Query Module Status.....	24
3.5. AT+CPSMS Power Saving Mode Setting	29

3.6.	AT+CEDRXS e-DRX Setting	31
4.	Serial Interface Control Commands.....	33
4.1.	ATE AT Command Echo.....	33
4.2.	AT+IPR Bit Rate	34
4.3.	AT&K Flow Control	35
5.	Security Commands.....	37
5.1.	AT+CPIN PIN Authentication	37
5.2.	AT+CLCK Facility Lock	39
5.3.	AT+CPWD Change Password	41
5.4.	AT+CPINR Display PIN Counter	43
6.	Identification Commands	45
6.1.	ATI Display Product Identification Information	45
6.2.	AT+CGMI Request Manufacturer Identification	45
6.3.	AT+GMI Request Manufacturer Identification	46
6.4.	AT+CGMM Request Model Identification	47
6.5.	AT+GMM Request Model Identification	48
6.6.	AT+CGMR Request Revision Identification of Software Status	49
6.7.	AT+GMR Request Revision Identification of Software Status	50
6.8.	AT+CGSN Request International Mobile Equipment Identity (IMEI).....	51
6.9.	AT+GSN Request International Mobile Equipment Identity (IMEI).....	52
6.10.	AT+CIMI Request International Mobile Subscriber Identity (IMSI).....	53
7.	Network Service Commands.....	55
7.1.	AT+COPN Read Operator Names.....	55
7.2.	AT+COPS Operator Selection.....	56

7.3.	AT+CPOL Preferred Operator List	60
7.4.	AT+CPLS Select Preferred Operator List	63
7.5.	AT+CREG Network Registration Status	65
7.6.	AT+CSQ Signal Quality	67
7.7.	AT+CNUM Subscriber number	68
7.8.	AT%MEAS Get Signal Parameter	69
8.	Packet Domain Related Commands	76
8.1.	AT+CGACT PDP Context Activate Or Deactivate.....	76
8.2.	AT+CGATT GPRS Attach Or Detach	77
8.3.	AT+CGDCONT Define PDP Context	78
8.4.	AT+CGEREP Packet Domain Event Reporting	82
8.5.	AT+CEREG EPS Network Registration Status	84
8.6.	AT+CGCONTRDP PDP Context Read Dynamic Parameters.....	87
8.7.	AT+CGEQOS Define EPS Quality of Service	91
8.8.	AT+CGPADDR Show PDP Address.....	95
8.9.	AT+CEMODE UE modes of operation for EPS.....	97
8.10.	AT%PDNSET Define PDP Context And Authentication	98
8.11.	AT%PDNACT PDP Context Activate Or Deactivate	101
8.12.	AT%CMATT LTE network Attach Or Detach	103
9.	USIM related Commands.....	105
9.1.	AT+CRSM Restricted SIM Access	105
9.2.	AT%CCID Reads the ICCID from SIM EFICCID	106
10.	Internet Service Commands.....	108
10.1.	AT@DNSSEVR DNS Server Setting.....	108

10.2.	AT% DNSRSLV Resolve Domain Name	109
10.3.	AT% SOCKETCMD Socket Service	110
10.4.	AT% SOCKETDATA Socket Data Delivery	115
10.5.	AT% SOCKETEV Socket Event.....	116
10.6.	AT%PINGCMD Ping Request.....	120
11.	Hardware Related Commands	122
11.1.	AT@GPIOCFG Configure The Specific GPIO	122
11.2.	AT@GPIOGET Get The Logical State of The Specific GPIO	123
11.3.	AT@GPIOSET Set The Logical State of The Specific GPIO	124
11.4.	AT@THERMO Thermal Detection	126
12.	Miscellaneous Commands	128
12.1.	AT@HOSTINFO Send the Host's Information to the Module.....	128
13.	Short Message Service Commands	130
13.1.	AT+CMGF Select SMS Message Format	130
13.2.	AT+CMGL List SMS Messages from Preferred Store	131
13.3.	AT+CMGD Delete Short Message.....	134
13.4.	AT+CMGR Read SMS Messages.....	135
13.5.	AT+CMGS Send Short Message	138
13.6.	AT+CMGW Write Short Messages to Memory.....	142
13.7.	AT+CMSS Send Short Messages from Storage	144
13.8.	AT+CNMA New Message Acknowledgement to UE/TE	145
13.9.	AT+CNMI SMS Event Reporting Configuration.....	148
13.10.	AT+CPMS Preferred SMS Message Storage.....	152
13.11.	AT+CSCA SMS Service Center Address	154

13.12.	AT+CSDH Show SMS Text Mode Parameters.....	156
13.13.	AT+CSMP Set SMS Text Mode Parameters.....	158
13.14.	AT+CSMS Select Message Service	159
14.	PPP Configuration Commands	162
14.1.	ATD*99*** PPP Data Session Command	162
14.2.	AT%PPLOC Local PPP Session Command	162
15.	FOTA Commands	164
15.1.	AT@FOTACHECK Checking the Server for New Release.....	164
15.2.	AT@FOTAUPGRADE Start to Upgrade	166
15.3.	AT@FOTADONE Upgrade Status.....	166
15.4.	@ FOTAIND FOTA Indication.....	167
A	Supported Error Codes	169
B	Proprietary Error Codes	173
C	References	174

1. Introduction

1.1. Purpose and Scope

This document provides information about the AT command set supported by the IMA2A. The various AT commands are listed and associated with the IMA2A Software Release.

The AT commands in this document are divided into the following sections:

1. Configuration Commands
2. Status Control Commands
3. Serial Interface Control Commands
4. Security Commands
5. Identification Commands
6. Network Service Commands
7. Packet Domain Related Commands
8. USIM related Commands
9. Short Message Service (SMS) Commands
10. PPP related Commands

The error codes supported for the CMEE commands are provided for the software developer's reference.

Note:

For a detailed description of standard 3GPP AT commands, refer to specification (3GPP TS 27.007).

For a detailed description of standard 3GPP AT commands for Short Message Service (SMS) and Cell Broadcast Service, refer to specification (3GPP TS 27.005).

1.2. Definitions and Abbreviations

GSM	Global System for Mobile Communications
UMTS	Universal Mobile Telecommunications System
LTE	Long Term Evolution
PLMN	Public Land Mobile Network
IMEI	International Mobile Station Equipment Identity

USIM	Universal Subscriber Identity Module
IMSI	International Mobile Subscriber Identity

1.3. AT Command Availability

Some AT command or command parameters are not shared between all module products. The AT command availability will be indicated in each table in section 2 below. Regarding AT command parameters which are supported by certain special modules only, a note will be added to that parameter in the descriptions in this document.

2. Configuration Commands

2.1. AT&F Reset AT Command Settings to Factory Default Values

AT&F parameter command syntax

Command	Possible response(s)
&F[<value>]	<i>Normally respond:</i>
	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	3GPP TS 27.007

Description:

Terminal Adapter (TA) sets AT command parameters to their defaults as specified by a user memory profile or by the manufacturer.

IMA2A will resets Terminal Adapter (TA) after command is executed successfully and field <value> is mandatory and need to be filled as 0.

Defined values:

<value>: integer

0 – Reset parameters; only a “0” value is available.

Example: Reset to default AT command settings

```
AT&F0
OK
```

2.2. TV Result Code Format Mode

ATV parameter command syntax

Command	Possible response(s)
V[<value>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

DCE response format.

Defined values:

<value>: integer

0 – Displays result codes in numeric form

1 – Displays result codes in verbose form

Example:

Case 1: Enables returning of the result code “OK” to the host

```
ATV1
```

```
OK
```

```
ATE1
```

```
OK
```

Case 2: Enables returning of the result code “0” to the host

```
ATV0
```

```
OK
```

```
0TE1
```

2.3. ATZ Restore AT Command Settings from a User

Defined Profile

ATZ parameter command syntax

Command	Possible response(s)
Z	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

TA sets all parameters to their defaults as specified by a user memory profile or by the manufacturer.

Example:

```
ATZ
OK
```

2.4. AT+CMEE Error Message Format

AT+CMEE parameter command syntax

Command	Possible response(s)
+CMEE=[<n>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+CMEE?	<i>Normally respond:</i> +CMEE:<n>

	OK
	<i>If something is wrong, then respond:</i>
	ERROR
+CMEE=?	<i>Normally respond:</i>
	+CMEE:(list of supported <n>)
	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	3GPP TS 27.007

Description:

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

Defined values:

<n>: integer

0 – Disable +CME ERROR: <err> result code and use ERROR

1 – Enable +CME ERROR: <err> result code and use numeric <err> values

2 – Enable +CME ERROR: <err> result code and use verbose <err> values

Example:

Case 1: Enable +CME Error and use numeric form.

```
AT+CMEE=1
OK

AT+CPIN?
+CME ERROR: 10
```

Case 2: Enable +CME Error and use verbose form.

```
AT+CME=2
OK

AT+CPIN?
+CME ERROR: SIM not inserted
```

2.5. AT+CSCS Character Set

AT+CSCS parameter command syntax

Command	Possible response(s)
+CSCS=[<chset>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+CSCS?	<i>Normally respond:</i> +CSCS:<chset> OK <i>If something is wrong, then respond:</i> ERROR
+CSCS=?	<i>Normally respond:</i> +CSCS:(list of supported <chset>s) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The 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. When TA-TE interface is set to 8-bit operation and the TE alphabet to 7-bit operation, the highest bit shall be set to zero.

Defined values:

<chset>: character set as a string type (Conversion schemes not listed here can be defined by manufacturers.)

- "IRA" – International reference alphabet
- "UCS2" – 16-bit universal multiple-octet coded character set (Refer to 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.
- "HEX" – Character strings consist only of hexadecimal numbers from 00 to FF; e.g. "032FE6" equals three 8-bit characters with decimal values 3, 47 and 230; no conversions to the original MT character set shall be done.
- "8859-1" – ISO 8859 Latin 1 character set
- "PCCP437" – PC character set Code Page 437

Example:

Case 1: Set coding scheme to 8859-1 and query the settings.

```
AT+CSCS="8859-1"
OK

AT+CSCS?
+CSCS: "8859-1"

OK
```

Case 2: Query-supported coding schemes, setting an invalid value will return "ERROR".

```
AT+CSCS=?
+CSCS: ("UCS2","8859-1","IRA","HEX","PCCP437")

OK

AT+CSCS="UTF8"
ERROR
```

2.6. AT+CFUN Functionality Level

AT+CFUN parameter command syntax

Command	Possible response(s)
+CFUN=[<fun>[,<rst>]]	<p><i>Normally respond:</i> OK</p> <p><i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err></p>
+CFUN?	<p><i>Normally respond:</i> +CFUN:<fun> OK</p> <p><i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err></p>
+CFUN=?	<p><i>Normally respond:</i> +CFUN:(list of supported <fun>),(list of supported <rst> OK</p> <p><i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err></p>
Reference:	3GPP TS 27.007

Description:

The set command selects the level of functionality <fun> in the MT. The highest level of power drawn is at "full functionality". The minimum power is drawn at "minimum functionality". The level of functionality between these may also be specified by manufacturers. When supported by manufacturers, MT resetting with the <rst> parameter may be utilized. Refer to [Table A-1 Error codes supported for CME commands for possible](#)

[<err> values.](#)

Defined values:

<fun>: integer

- 0 – Minimum functionality
- 1 – Full functionality
- 4 – Disable phone both transmit and receive RF circuits

<rst>: integer

- 0 – Do not reset the MT before setting it to <fun> power level

Notes: rst=1 is not supported.

Example:

Case 1: Query the supported +CFUN values.

```
AT+CFUN=?  
+CFUN: (0-1,4),(0-1)  
OK
```

Case 2: Go to the airplane mode and then go back to normal mode.

```
AT+CFUN=0  
OK  
  
AT+CFUN=1  
OK
```

2.7. AT+GCAP Capabilities List

AT+GCAP parameter command syntax

Command	Possible response(s)
+GCAP	<i>Normally respond:</i> +GCAP: <capability>s OK

	<i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The AT command will request overall capabilities of TA. The response code will be CLTE-M1 (based on configured LTE category)

Example: Request overall capabilities of TA

```
AT+GCAP
+GCAP: +CLTE-M1
OK
```

2.8. AT+CLAC List all available AT commands

AT+CLAC parameter command syntax

Command	Possible response(s)
+CLAC	<p><i>Normally respond:</i></p> <p><AT Command1> [<CR><LF><AT Command2> [...]] OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
Reference:	3GPP TS 27.007

Notes: The AT commands which is not listed in the document are not allowed to be used by users.

Description:

Execution command causes the MT to return one or more lines of AT Commands.

Defined values:

<AT Command>: Defines the AT command including the prefix AT. Text shall not contain the sequence 0<CR> or OK<CR>

Example:

```
AT+CLAC
ATS
AT+CGMI
AT+CGMM
AT+CGMR
AT+CGSN
AT+CIMI
ATZ
AT+GMI
AT+GMM
AT+GMR
AT+GCAP
ATI
...
OK
```

3. Status Control Commands

3.1. AT+CEER Extended Error Report

AT+CEER parameter command syntax

Command	Possible response(s)
+CEER	<i>Normally respond:</i> +CEER:<report> OK <i>If something is wrong, then respond:</i> ERROR
+CEER=?	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The execution command causes the TA to return one or more lines of information text <report>, determined by the MT manufacturer. This should offer the user of the TA an extended report of the reason for:

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

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

Defined values:

<report>: string, the total number of characters, including line terminators, in the

information text shall not exceed 2,041 characters.

Example: Display CEER status

```
at+cgdcont?
+CGDCONT: 1,"IPV4V6","broadband",,0,0,,0,,0
OK

/* Set an ATTACH_REJECT message with ESM cause-code #27 "missing
or unknown APN" */

at%cmatt=1
OK
AT+CEER
+CEER: ESM_FAILURE
OK
```

3.2. AT+WS46 Select Wireless Network

AT+WS46 parameter command syntax

Command	Possible response(s)
+WS46=<n>	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+WS46?	<i>Normally respond:</i> <n> OK <i>If something is wrong, then respond:</i> ERROR
+WS46=?	<i>Normally respond:</i> (list of supported <n>s) OK

If something is wrong, then respond:

ERROR

Reference: 3GPP TS 27.007

Description:

The AT command is intended for reading the current status of the network selection.

The IMA2A support only E-UTRAN. The modem returns 28 for the read and test command. The set command accepts only 28.

Defined values:

<n>: integer

28 – E-UTRAN only

Example: Select wireless network

```
AT+WS46=?
+WS46: (28)
OK

/* Incorrect setting */
AT+WS46=25
ERROR

AT+WS46=28
OK
AT+WS46?
+WS46: 28
OK
```

3.3. AT%STATUS Query Module Status

AT%STATUS parameter command syntax

Command	Possible response(s)
---------	----------------------

%STATUS=<subsystem>	<p><i>Normally respond:</i></p> <p><subsystem>: <status>[,<status_info>]</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
%STATUS=?	<p><i>Normally respond:</i></p> <p>%STATUS: (list of supported <subsystem>s)</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	Altair_SW_501_AT_Commands Guide_Rev3.pdf

Description:

The AT command is intended for retrieves current status of specified UE subsystem.

Defined values:

<subsystem>: string

- “INIT” – Module initial status
- “USIM” – USIM type status
- “RRC” – RRC status
- “ROAM” – ROAM status
- “UICC” – UICC status
- “IPS” – IP stack status
- “AMBR” – each bearer with APN AMBR status
- “PSM” – PSM status
- “SEC” – SEC status
- “CSPS” – CS/PS status
- “WDIS” – signal detected status
- “TEMPM” – temperature monitor status
- “EMM” – EMM status
- “ATT” – ATT status
- “BOOT” – boot type

<status>: integer or string

For "INIT": integer

- 0 – UE init process ongoing (calibration in progress)
- 1 – UE init process has finished (calibration complete)
- 2 – UE init process has finished (calibration complete) but with critical errors.
(SYS_CRITICAL)

For "USIM": string

- "USIM: REAL USIM, LTE"
- "USIM: REAL USIM, non-LTE"
- "USIM: USIM SIMULATOR"
- "USIM: NO USIM"
- "USIM: REAL USIM DEACTIVATED"
- "USIM: INVALID USIM"
- "USIM: PERSONALIZATION ERROR"
- "USIM: REMOTE USIM"

For "RRC": string

- "RRC: IDLE"
- "RRC: CONNECTED"
- "RRC: UNKNOWN" – Used for all other states (init, standby, flight mode, etc.)

For "ROAM": integer

- 0 – UE is not roaming (UE isn't camped at all or UE is camped on HPLMN/EHPLMN)
- 1 – UE is roaming and camped on VPLMN

For "UICC": integer

- 0 – SIM is not inserted
- 1 – SIM inserted, init is in progress
- 2 – SIM init passed, wait for PIN unlock
- 3 – Personalization failed, wait for run-time depersonalization
- 4 – Activation completed. Reported when "Ready" state is reported by "AT+CPIN?"
- 5 – Activation completed. RAM cache also ready

For "IPS": integer

- 0 – UE IP stack works correctly
- 1 – UE IP stack failure

For "AMBR": string

- EPS bearer ID,
- APN-AMBR downlink in kbps

– APN-AMBR uplink in kbps

For “PSM”: integer

0 – PSM is not active

1 – PSM is active

For “SEC”: integer

– SEC: AUTH: x NAS IALG: y1 NAS CALG: z1 AS IALG: y2 AS CALG: z2

Where the parameter range can be as following:

AUTH: <0-6>

0 - No authentication request sent yet

1 - Authentication success - stored context

2 - Authentication success – new context

3 - Authentication failure - MAC failure

4 - Authentication failure - Synch failure

5 - Authentication failure - non-EPS authentication unacceptable

6 - Authentication failure – error unspecified

7 - Authentication Reject

IALG: <0-3, 99>

0 - EIA0 (null integrity algorithm)

1 - EIA1 (SNOW 3G integrity algorithm)

2 - EIA2 (128-bit AES integrity algorithm)

3 – EIA3 (128-bit ZUC integrity algorithm)

99 - Invalid

CALG: <0-3, 99>

0 - EEA0 (null ciphering algorithm)

1 - EEA1 (SNOW 3G ciphering algorithm)

2 - EEA2 (128-bit AES ciphering algorithm)

3 – EEA3 (128-bit ZUC ciphering algorithm)

99 - Invalid

For “CSPS”: integer

0 – not registered or EPS_ONLY (PS) mode

1 – EPS_COMBINED (CS/PS) mode

For “WDIS”: integer

0 – enable signal detected

1 – disable signal detected

For “TEMPM”: integer

0 – normal UE operation

1 – heating protection applied

For “EMM”: string

1 – EMM_NULL

2 – EMM_DEREGISTERED_NORMAL_SERVICE

3 – EMM_DEREGISTERED_ATTEMPTING_TO_ATTACH

4 – EMM_DEREGISTERED_PLMN_SEARCH

5 – EMM_DEREGISTERED_NO_IMSI

6 – EMM_DEREGISTERED_ATTACH_NEEDED

7 – EMM_DEREGISTERED_NO_CELL_AVAILABLE

8 – EMM_DEREGISTERED_ATTACH_ACCEPT_RECEIVED

9 – EMM_DEREGISTERED_REGISTRATION_INITIATED

10 – EMM_DEREGISTERED_LIMITED_SERVICE

11 – EMM_REGISTERED_LIMITED_SERVICE

12 – EMM_REGISTERED_NORMAL_SERVICE

13 – EMM_REGISTERED_ATTEMPTING_TO_UPDATE

14 – EMM_REGISTERED_PLMN_SEARCH

15 – EMM_REGISTERED_UPDATE_NEEDED

16 – EMM_REGISTERED_NO_CELL_AVAILABLE

17 – EMM_REGISTERED_ATTEMPTING_TO_UPDATE_MM

18 – EMM_REGISTERED_IMSI_DETACH_INITIATED

19 – EMM_REGISTERED_NO_CELL_AVAILABLE_PSM_ACTIVE

20 – EMM_REGISTERED_DEREGISTRATION_INITIATED

21 – EMM_REGISTERED_TRACKING_AREA_UPDATING_INITIATED

22 – EMM_REGISTERED_SERVICE_REQUEST_INITIATED

For “ATT”: integer

0 – detached

1 – normal attach

2 – attach without PDN

3 – emergency attach

For “BOOT”: integer

0 – cold boot

1 – warm boot

Example: Query USIM/RRC/INIT status.

```
AT%STATUS="INIT"
```

```
INIT: 1
```

```

OK
AT%STATUS="RRC"
RRC: IDLE
OK
AT%STATUS="USIM"
USIM: REAL USIM, LTE, Activated 1 times, Verified 1 times
OK
AT%STATUS="UICC"
UICC: 5
OK

```

3.4. AT+CPSMS Power Saving Mode Setting

AT+CPSMS parameter and command syntax

Command	Possible response(s)
+CPSMS=[<mode>],[<Requested_Periodic-RAU>],[<Requested_GPRSREADYtimer>],[<Requested_Periodic-TAU>],[<Requested_Active-Time>]]]]]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> +CME ERROR: <err>
+CPSMS?	+CPSMS: <mode>,[<Requested_Periodic-RAU>],[<Requested_GPRS-READYtimer>],[<Requested_Periodic-TAU>],[<Requested_Active-Time>]
+CPSMS=?	+CPSMS: (list of supported <mode>s),(list of supported <Requested_Periodic-RAU>s),(list of supported <Requested_GPRS-READY-timer>s),(list of supported <Requested_Periodic-TAU>s),(list of supported <Requested_Active-Time>s)

Description:

The set command controls the setting of the UEs power saving mode (PSM) parameters. The command controls whether the UE wants to apply PSM or not, as well as the requested

extended periodic RAU value and the requested GPRS READY timer value in GERAN/UTRAN, the requested extended periodic TAU value in E-UTRAN and the requested Active Time value. See the unsolicited result codes provided by commands +CGREG for the Active Time value, the extended periodic RAU value and the GPRS READY timer value that are allocated to the UE by the network in GERAN/UTRAN and +CEREG for the Active Time value and the extended periodic TAU value that are allocated to the UE by the network in E-UTRAN.

Defined values:

<mode>: integer type. Indication to disable or enable the use of PSM in the UE.

0 - Disable the use of PSM

1 - Enable the use of PSM

<Requested_Periodic-RAU>: string type; one byte in an 8 bit format. Requested extended periodic RAU value (T3312) to be allocated to the UE in GERAN/UTRAN. The requested extended periodic RAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours).

<Requested_GPRS-READY-timer>: string type; one byte in an 8 bit format. Requested GPRS READY timer value (T3314) to be allocated to the UE in GERAN/UTRAN. The requested GPRS READY timer value is coded as one byte (octet 2) of the GPRS Timer information element coded as bit format (e.g. "01000011" equals 3 decihours or 18 minutes).

<Requested_Periodic-TAU>: string type; one byte in an 8 bit format. Requested extended periodic TAU value (T3412) to be allocated to the UE in E-UTRAN. The requested extended periodic TAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours).

<Requested_Active-Time>: string type; one byte in an 8 bit format. Requested Active Time value (T3324) to be allocated to the UE. The requested Active Time value is coded as one byte (octet 3) of the GPRS Timer 2 information element coded as bit format (e.g. "00100100" equals 4 minutes).

Example: Query PSM status.

```
AT+CPSMS?  
+CPSMS: 0,"11100000","11100000","44","10"  
OK  
/* Enable PSM */  
AT+CPSMS=1
```

OK

3.5. AT+CEDRXS e-DRX Setting

AT+CEDRXS parameter and command syntax

Command	Possible response(s)
+CEDRXS=[<mode>],[<AcT-type>],[<Requested_eDRX_value>]]]	<p><i>Normally respond:</i> OK</p> <p><i>If something is wrong, then respond:</i> +CME ERROR:<err></p>
+CEDRXS?	<p><i>Normally respond:</i> [+CEDRXS: <AcT-type>,<Requested_eDRX_value> [<CR><LF>+CEDRXS:<AcT-type>,<Requested_eDRX_value>[...]]] OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
+CEDRXS=?	<p>+CEDRXS: (list of supported <mode>s),(list of supported <AcT-type>s),(list of supported <Requested_eDRX_value>s) OK</p>

Description:

The set command controls the setting of the UEs eDRX parameters. The command controls whether the UE wants to apply eDRX or not, as well as the requested eDRX value for each specified type of access technology.

The set command also controls the presentation of an unsolicited result code +CEDRXP:<AcT-type>,<Requested_eDRX_value>,<NW-provided_eDRX_value>,<Paging_time_window>]] when <n>=2 and there is a change in the eDRX parameters provided by the network.

A special form of the command can be given as +CEDRXS=3. In this form, eDRX will be disabled and data for all parameters in the command +CEDRXS will be removed or, if available, set to the manufacturer specific default values.

Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

The read command returns the current settings for each defined value of <AcT-type>.

The test command returns the supported s and the value ranges for the access technology and the requested eDRX value as compound values.

Defined values:

<mode>: integer type, indicates to disable or enable the use of eDRX in the UE. This parameter is applicable to all specified types of access technology, i.e. the most recent setting of <mode> will take effect for all specified values of <AcT>.

0 – Disable the use of eDRX

1 – Enable the use of eDRX

2 – Enable the use of eDRX and enable the unsolicited result code

+CEDRXP:<AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]]

3 – Disable the use of eDRX and discard all parameters for eDRX or, if available, reset to the manufacturer specific default values.

<AcT-type>: integer type, indicates the type of access technology. This AT-command is used to specify the relationship between the type of access technology and the requested eDRX value.

4– E-UTRAN (WB-S1 mode)

<Requested_eDRX_value>: string type; half a byte in a 4 bit format. The eDRX value refers to bit 4 to 1 of octet 3 of the Extended DRX parameters information element (see subclause 10.5.5.32 of 3GPP TS 24.008 [8]). For the coding and the value range, see Extended DRX parameters information element in 3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008. The default value, if available, is manufacturer specific.

<NW-provided_eDRX_value>: string type; half a byte in a 4 bit format. The eDRX value refers to bit 4 to 1 of octet 3 of the Extended DRX parameters information element (see subclause 10.5.5.32 of 3GPP TS 24.008 [8]). For the coding and the value range, see Extended DRX parameters information element in 3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008.

<Paging_time_window>: string type; half a byte in a 4 bit format. The paging time window refers to bit 8 to 5 of octet 3 of the Extended DRX parameters information element (see subclause 10.5.5.32 of 3GPP TS 24.008 [8]). For the coding and the value range, see the Extended DRX parameters information element in 3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008.

4. Serial Interface Control Commands

4.1. ATE AT Command Echo

ATE parameter command syntax

Command	Possible response(s)
E<value>	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The set command enables/disables the command echo.

Defined values:

<value>: integer

0 – Disables command echo

1 – Enables command echo (factory default); hence the commands sent to the device are echoed back to the DTE before the response is given.

Note: If this parameter is omitted, the command has the same behavior as ATE1. But IMA2A not support, the <value> has to be inputed as mandatory parameter.

Example: Turn on/turn off echo.

```
ATE0
OK
(AT) – not display
OK
(ATE1) – not display
OK
AT
OK
```

4.2. AT+IPR Bit Rate

AT+IPR parameter command syntax

Command	Possible response(s)
+IPR=<rate>	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+IPR?	<i>Normally respond:</i> +IPR:<rate> OK <i>If something is wrong, then respond:</i> ERROR
+IPR=?	<i>Normally respond:</i> +IPR: (list of supported <rate>s) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

Fixed DTE rate; this numeric extended-format parameter specifies the data rate at which the DCE will accept commands; auto baud rate detection is not supported. Default rate is 115200.

Defined values:

<rate >: integer, transmission rate, ex:115200

Example: Set rate by IPR

```
AT+IPR=?
+IPR:(200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400,
57600, 115200, 230400, 460800, 921600)
OK
```

```
AT+IPR?
+IPR: 115200
OK
at+IPR=9600
OK

/* Change setting with the desired baud rate */

AT+IPR?
+IPR: 9600
OK
```

4.3. AT&K Flow Control

AT&K parameter command syntax

Command	Possible response(s)
&K[<value>]	<i>Normally respond:</i>
	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	3GPP TS 27.007

Description:

Set the flow control behaviour.

Defined values:

<value >: integer

0 – Flow control disabled (default)

3 – RTS/CTS (hardware) flow control is enabled

Notes: Support only &K0 and &K3

Example: Disable flow control

```
AT&K0
```

```
OK
```

```
/* Check setting status*/
```

```
AT&K?
```

```
&K: 0
```

```
OK
```

5. Security Commands

5.1. AT+CPIN PIN Authentication

AT+CPIN parameter command syntax

Command	Possible response(s)
+CPIN=<pin>[,<newpin>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
+CPIN?	<i>Normally respond:</i> +CPIN:<code> OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
Reference:	3GPP TS 27.007

Description:

The set command sends a password to the MT which is necessary before its operation (such as SIM PIN, SIM PUK, or PH-SIM PIN). If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If there is no pending PIN, no action will be performed towards MT, and an error message “+CME ERROR” is returned to TE. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<pin>, <newpin>: string

<code> string, values reserved by the present document:

READY	– MT is not pending for any password.
SIM PIN	– MT is waiting for the SIM PIN to be given.
SIM PUK	– MT is waiting for the SIM PUK to be given.
PH-SIM PIN	– MT is waiting for the phone-to-SIM card password to be given.
PH-FSIM PIN	– MT is waiting for the phone-to-initial SIM-card password to be given.
PH-FSIM PUK	– MT is waiting for the phone-to-initial-SIM-card unblocking password to be given.
SIM PIN2	– MT is waiting for the SIM PIN2 to be given. This <code> is recommended to be returned only when the last executed command results in a PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered immediately after the failure, it is recommended that MT does not block its operation.
SIM PUK2	– The MT is waiting for the SIM PUK2 to be given. This <code> is recommended to be returned only when the last executed command results in a PUK2 authentication failure (i.e. +CME ERROR: 18); if PUK2 and new PIN2 are not entered immediately after the failure, it is recommended that MT does not block its operation.
PH-NET PIN	– MT is waiting for the network personalization password to be given.
PH-NET PUK	– MT is waiting for the network personalization unblocking password to be given.
PH-NETSUB PIN	– MT is waiting for the network subset personalization password to be given.
PH-NETSUB PUK	– MT is waiting for the network subset personalization unblocking password to be given.
PH-SP PIN	– MT is waiting for the service provider personalization password to be given.
PH-SP PUK	– MT is waiting for the service provider personalization unblocking password to be given.
PH-CORP PIN	– MT is waiting for the corporate personalization password to be given.
PH-CORP PUK	– MT is waiting for the corporate personalization unblocking password to be given.

Example: Query PIN status and enter PIN code

```

AT+CPIN?
+CPIN: SIM PIN
OK
AT+CPIN="1234"
OK
AT+CPIN?
+CPIN: READY
OK

```

5.2. AT+CLCK Facility Lock

AT+CLCK parameter command syntax

Command	Possible response(s)
+CLCK=<fac>,<mode>[,<passwd>[,<class>]]	<p><i>Normally respond:</i></p> <p>OK</p> <p>when <mode>=2 and command successful:</p> <p>+CLCK:<status>[,<class1></p> <p>[<CR><LF>+CLCK:<status>,<class2></p> <p>[...]]</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p> <p>or</p> <p>+CME ERROR:<err></p>
+CLCK=?	<p><i>Normally respond:</i></p> <p>+CLCK:(list of supported <fac>s)</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	3GPP TS 27.007

Description:

The execute command is used to lock, unlock, or interrogate an MT or a network facility <fac>. A password is normally required to perform such actions. When querying the status of a network service (<mode>=2), the response line for a “not active” case (<status>=0) should be returned only if service is not active for any <class>. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#). This command should be abortable when network facilities are set or interrogated.

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

The test command returns facility values supported as a compound value.

Notes: Support “PS”, “SC”, “PN”, “PU” only

Defined values:

<fac>: string, values reserved by the present document:

- "PS" – PH-SIM (lock PHone to SIM/UICC card) (MT requests a password when other-than-current SIM/UICC cards have been inserted; MT may have stored information regarding a certain number of previously used cards thus not requiring passwords when they are inserted.)
- "SC" – SIM (lock SIM/UICC card) (The SIM/UICC requests the password when the MT powers up and when this lock command has been issued.)
- "PN" – Network Personalization (Refer to 3GPP TS 22.022.)
- "PU" – network subset personalization (Refer to 3GPP TS 22.022.)

<mode>: integer

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

<status>: integer

- 0 – not active
- 1 – active

<passwd>: string, shall be the same as the password specified for the facility from the MT user interface or with the command Change Password +CPWD

<classx>: integer, this is a sum of integers each representing a class of information (default 7 - voice, data and fax):

- 1 – voice (telephony)
- 2 – data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64, and 128.)
- 4 – fax (facsimile services)
- 8 – short message service
- 16 – data circuit sync
- 32 – data circuit async
- 64 – dedicated packet access
- 128 – dedicated PAD access

Example: Query and set PIN enable/disable status

```
AT+CLCK=?
+CLCK: ("SC", "PN", "PU", "PS")
OK
AT+CLCK="SC", 2
+CLCK: 0
OK
AT+CLCK="SC", 1, "1234"
OK
AT+CLCK="SC", 2
+CLCK: 1
OK
```

5.3. AT+CPWD Change Password

AT+CPWD parameter command syntax

Command	Possible response(s)
+CPWD=<fac>,<oldpwd>,<newpwd>	<p><i>Normally respond:</i></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p> <p>or</p> <p>+CME ERROR:<err></p>
+CPWD=?	<i>Normally respond:</i>

	+CPWD: list of supported (<fac>,<pwdlength>)s OK
	<i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

Action command sets a new password for the facility lock function defined by the command Facility Lock +CLCK. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

The test command returns a list of pairs which present the available facilities and the maximum length of their password.

Notes: Support "SC", "P2", "PN", "PU", "PS" only

Defined values:

<fac>: string, values reserved by the present document:

- "P2" – SIM PIN2
- "PS" – PH-SIM (lock PHone to SIM/UICC card) (MT requests a password when other-than-current SIM/UICC cards have been inserted; MT may have stored information regarding a certain number of previously used cards thus not requiring passwords when they are inserted.)
- "SC" – SIM (lock SIM/UICC card) (The SIM/UICC requests the password when the MT powers up and when this lock command has been issued.)
- "PN" – Network Personalization (Refer to 3GPP TS 22.022.)
- "PU" – network subset personalization (Refer to 3GPP TS 22.022.)

<oldpwd>, <newpwd>: string type, <oldpwd> shall be identical to the password specified for the facility from the MT user interface or with command Change Password +CPWD; <newpwd> is the new password. The maximum length of the password can be determined with <pwdlength>.

Example: Enable PIN and change PIN code

```
AT+CPWD=?
+CPWD: ("SC",8),("P2",8),("PN",16),("PU",16),("PS",16)
```

```

OK

AT+CPIN?
+CPIN: SIM PIN
OK
AT+CPIN="0000"
OK
AT+CPIN?
+CPIN: READY
OK
AT+CPWD="SC", "0000", "1234"
OK

```

5.4. AT+CPINR Display PIN Counter

AT+CPINR parameter command syntax

Command	Possible response(s)
+CPINR[=<sel_code>]	<p><i>Normally respond:</i></p> <p>+CPINR:<code>,<retries>[,<default_retries>] [<CR><LF>+CPINR:<code>,<retries>[,<default_retries>] [...]] OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
+CPINR=?	<p><i>Normally respond:</i></p> <p>OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
Reference:	3GPP TS 27.007

Description:

Execution command cause the MT to return the number of remaining PIN retries for the MT

passwords with intermediate result code +CPINR: <code>,<retries>[,<default_retries>] for standard PINs.

Defined values:

<retries>: integer, number of remaining retries per PIN.

<default_retries>: integer, number of default/initial retries per PIN.

<sel_code><code>: string

"SIM PIN" – SIM PIN code

"SIM PUK" – SIM PUK code

"SIM PIN2" – SIM PIN2 code

"SIM PUK2" – SIM PUK2 code

Example: Query remain retries for all PINs

```
AT+CPINR
+CPINR: SIM PIN, 3, 3
+CPINR: SIM PUK, 10, 10
+CPINR: SIM PIN2, 3, 3
+CPINR: SIM PUK2, 10, 10
OK
```

6. Identification Commands

6.1. ATI Display Product Identification Information

ATI parameter command syntax

Command	Possible response(s)
ATI	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	

Description:

Display Product Identification Information

Defined values:

Example:

```
ATI
Manufacturer: WNC
Model: IMA2A
Revision: MPSS: IMA2A_v20.13.183561 APSS: IMA2A_v20.13.183561
SVN: 01
OK
```

6.2. AT+CGMI Request Manufacturer Identification

AT+CGMI parameter command syntax

Command	Possible response(s)
+CGMI	<i>Normally respond:</i>

	<manufacturer> OK
	<i>If something is wrong, then respond:</i> ERROR
+CGMI=?	<i>Normally respond:</i> OK
	<i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The 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. 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. Refer to [Table A-1 Error codes supported for CME commands for possible <err> values](#).

Defined values:

<manufacturer>: string, the total number of characters, including line terminators, in the information text shall not exceed 2,048 characters. Text shall not contain the sequence 0<CR> or OK<CR>.

Example:

```
AT+CGMI
WNC

OK
```

6.3. AT+GMI Request Manufacturer Identification

AT+GMI parameter command syntax

Command	Possible response(s)
+GMI	<i>Normally respond:</i> <manufacturer> OK <i>If something is wrong, then respond:</i> ERROR
+GMI=?	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	ITU-T V.25ter

Description:

The 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. 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. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<manufacturer>: string, the total number of characters, including line terminators, in the information text shall not exceed 2,048 characters. Text shall not contain the sequence 0<CR> or OK<CR>.

6.4. AT+CGMM Request Model Identification

AT+CGMM parameter command syntax

Command	Possible response(s)
+CGMM	<i>Normally respond:</i> <model> OK

	<i>If something is wrong, then respond:</i> ERROR
+CGMM=?	<i>Normally respond:</i> OK
	<i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The 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. 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. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<model>: string, the total number of characters, including line terminators, in the information text shall not exceed 2,048 characters.

Example:

```
AT+CGMM
IMA2A

OK
```

6.5. AT+GMM Request Model Identification

AT+GMM parameter command syntax

Command	Possible response(s)
+GMM	<i>Normally respond:</i> <model>

	OK
	<i>If something is wrong, then respond:</i>
	ERROR
+GMM=?	<i>Normally respond:</i>
	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	ITU-T V.25ter

Description:

The 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. 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. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<model>: string, the total number of characters, including line terminators, in the information text shall not exceed 2,048 characters.

6.6. AT+CGMR Request Revision Identification of Software Status

AT+CGMR parameter command syntax

Command	Possible response(s)
+CGMR	<i>Normally respond:</i>
	<revision>
	OK
	<i>If something is wrong, then respond:</i>

	ERROR
+CGMR=?	<i>Normally respond:</i> OK
	<i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The execution command causes the TA to return one or more lines of information text <revision>, determined by the MT manufacturer, which is intended to permit the user of the TA to identify the version, revision level or date, or other pertinent information of the MT to which it is connected. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide more information if desired. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<revision>: string, the total number of characters, including line terminators, in the information text shall not exceed 2,048 characters.

Example:

```
AT+CGMR
Revision: MPSS: IMA2A_v20.13.183561 APSS: IMA2A_v20.13.183561

OK
```

6.7. AT+GMR Request Revision Identification of Software

Status

AT+GMR parameter command syntax

Command	Possible response(s)
+GMR	<i>Normally respond:</i> <revision>

	OK
	<i>If something is wrong, then respond:</i>
	ERROR
+GMR=?	<i>Normally respond:</i>
	<revision>
	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	ITU-T V.25ter

Description:

The execution command causes the TA to return one or more lines of information text <revision>, determined by the MT manufacturer, which is intended to permit the user of the TA to identify the version, revision level or date, or other pertinent information of the MT to which it is connected. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide more information if desired. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<revision>: string, the total number of characters, including line terminators, in the information text shall not exceed 2,048 characters.

6.8. AT+CGSN Request International Mobile Equipment

Identity (IMEI)

AT+CGSN parameter command syntax

Command	Possible response(s)
+CGSN	<i>Normally respond:</i>
	<sn>
	OK

	<i>If something is wrong, then respond:</i> ERRORor +CME ERROR: <err>
+CGSN=?	<i>Normally respond:</i> OK
	<i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The 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. Typically, the text will consist of a single line containing the IMEI (International Mobile station Equipment Identity; refer to 3GPP TS 23.003.) number of the MT, but manufacturers may choose to provide more information if desired. Refer to [Table A-1 Error codes supported for CME commands for possible <err> values](#).

Defined values:

<sn>: string, the total number of characters, including line terminators, in the information text shall not exceed 2,048 characters.

Example:

```
AT+CGSN
004402330002308

OK
```

6.9. AT+GSN Request International Mobile Equipment Identity (IMEI)

AT+GSN parameter command syntax

Command	Possible response(s)
AT+GSN	<i>Normally respond:</i> <sn> OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR: <err>
AT+GSN=?	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	ITU-T V.25ter

Description:

AT+GSN delivers the International Mobile Equipment Identity (IMEI). The command is identical to AT+CGSN.

Defined values:

<SN>: string, International Mobile Equipment Identity (IMEI) used to identify a GSM mobile equipment to the GSM network.

6.10. AT+CIMI Request International Mobile Subscriber Identity (IMSI)

AT+CIMI parameter command syntax

Command	Possible response(s)
+CIMI	<i>Normally respond:</i> <IMSI> OK

	<i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
+CIMI=?	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The execution command causes the TA to return <IMSI>, which is intended to permit the TE to identify the individual SIM card or active application in the UICC (GSM or USIM) which is attached to MT. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<IMSI>: string, International Mobile Subscriber Identity (string without double quotes)

Example:

```
AT+CIMI
001010123456789
OK
```

7. Network Service Commands

7.1. AT+COPN Read Operator Names

AT+COPN parameter command syntax

Command	Possible response(s)
+COPN	<i>Normally respond:</i> +COPN:<numeric1>,<alpha1> [<CR><LF>+COPN:<numeric2>,<alpha2> [...]] OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
+COPN=?	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The execute command returns the list of operator names from the MT. Each operator code <numeric> that has an alphanumeric equivalent <alphan> in the MT memory shall be returned. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<numeric>: string, operator in numeric format (Refer to +COPS.)

<alphan>: string, operator in long alphanumeric format (Refer to +COPS.)

Example: Read operator names

```
AT+COPN
.....
+COPN: "90126", "TIMi sea"
+COPN: "90145", "AISatSea"
+COPN: "99899", "UZMOBILE"
OK
AT+COPN=?
OK
```

7.2. AT+COPS Operator Selection

AT+COPS parameter command syntax

Command	Possible response(s)
+COPS=[<mode>[,<format> [,<oper>[,<AcT>]]]]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
+COPS?	<i>Normally respond:</i> +COPS:<mode>[,<format>,<oper>[,<AcT>]] OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>

+COPS=?	<p><i>Normally respond:</i></p> <p>+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)]</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p> <p>or</p> <p>+CME ERROR: <err></p>
Reference:	3GPP TS 27.007

Description:

The set command forces an attempt to select and register the GSM/UMTS network operator. <mode> is used to select whether the selection is performed automatically by the MT or is forced by this command to operator <oper> (It shall be provided 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 also apply to further read commands (+COPS?). <mode>=2 forces an attempt to deregister from the network. The selected mode affects all further network registration. (E.g. after <mode>=2, MT shall not be registered until <mode>=0 or <mode>=1 is selected.) Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#). This command should be abortable when registration/deregistration attempts are made.

The 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.

The 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>, a long and short alphanumeric format of the name of the operator, a 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 the following order: home

network and networks referenced in the SIM or active application in the UICC (GSM or USIM) which will be subsequently 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> and <format>, these lists shall be delimited from the operator list by two commas.

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

Defined values:

<mode>: integer

- 0 – automatic (The <oper> field is ignored.)
- 1 – manual (The <oper> field shall be present; <AcT> is optional.)
- 2 – deregister from the 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 cases of a read-command response.

<format>: integer

- 0 – long format alphanumeric <oper>
- 1 – short format alphanumeric <oper>
- 2 – numeric <oper>

<oper>: string, <format> indicates if the format is alphanumeric or numeric; long alphanumeric format can be up to 16 characters long and short format up to 8 characters (Refer to GSM MoU SE.13.); numeric format is the GSM Location Area Identification number (Refer to 3GPP TS 24.008 subclause 10.5.1.3.) which consists of a three-BCD-digit country code coded as in ITU-T Recommendation E.212 Annex A, plus a two BCD digit network code, which is administration-specific; the returned <oper> shall not be in BCD format, but in IRA characters converted from BCD. The number is composed with the following 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>: integer

0 – unknown

1 – available

2 – current

3 – forbidden

<AcT>: integer, access technology selected

7 – E-UTRAN

Example:

Case 1: Network scan, UE need to disconnect the data call first.

```
at%CMATT=0
OK
at+cops=?
+COPS: (1,"Test Usim","Test","00101",7),,(0-4),(0-2)
OK
at%CMATT=1
OK
```

Case 2: Set network name display format

```
/* Set long format */
at+cops=3,0
OK
at+cops?
+COPS: 0,0,"Test Usim",7
OK

/* Set short format */
at+cops=3,1
OK
at+cops?
+COPS: 0,1,"Test",7
OK

/* Set numeric format */
at+cops=3,2
```

```
OK
at+cops?
+COPS: 0,2,"00101",7
OK
```

7.3. AT+CPOL Preferred Operator List

AT+CPOL parameter command syntax

Command	Possible response(s)
+CPOL=[<index>][,<format>[,<oper>[,<GSM_Act>,<GSM_Compact_Act>,<UTRAN_Act>,<E-UTRAN_Act>]]]	<p><i>Normally respond:</i></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p> <p>or</p> <p>+CME ERROR:<err></p>
+CPOL?	<p><i>Normally respond:</i></p> <p>+CPOL:<index1>,<format>,<oper1>[,<GSM_Act1>,<GSM_Compact_Act1>,<UTRAN_Act1>,<E-UTRAN_Act1>]</p> <p>[<CR><LF>+CPOL:<index2>,<format>,<oper2>[,<GSM_Act2>,<GSM_Compact_Act2>,<UTRAN_Act2>,<E-UTRAN_Act2>]</p> <p>[...]</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p> <p>or</p> <p>+CME ERROR:<err></p>

+CPOL=?*Normally respond:*

+CPOL: (list of supported <index>s),(list of supported <format>s)

OK

If something is wrong, then respond:

ERROR

or

+CME ERROR:<err>

Reference:

3GPP TS 27.007

Description:

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

The execute command writes an entry in the SIM/USIM list of preferred PLMNs, previously selected by the command +CPLS. If no list has been previously selected, the User controlled PLMN selector with Access Technology, EFPLMNwAcT, is the one accessed by default. If <index> is given but <oper> is omitted, entry is deleted. If <oper> is given but <index> is omitted, <oper> is put in the next free location. If only <format> is given, the format of the <oper> in the read command is changed. The Access Technology selection parameters, <GSM_Act>, <GSM_Compact_Act>, and <UTRAN_Act> and <E-UTRAN_Act> are required when writing user-controlled PLMN selectors with Access Technology, EFPLMNwAcT, operator-controlled PLMN selectors with Access Technology EFOPLMNwAcT, and HPLMN selectors with Access Technology EFHPLMNwAcT. (Refer to 3GPP TS 31.102.) Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Note 1: MT can also update the User controlled PLMN selector with Access Technology EFPLMNwAcT automatically when new networks are selected.

Note 2: The Operator controlled PLMN selector with Access Technology EFOPLMNwAcT can only be written if the write access condition in the SIM/USIM has been previously verified.

The read command returns all used entries from the SIM/USIM list of preferred PLMNs previously selected by the command +CPLS with the Access Technologies for each PLMN in the list.

The test command returns the whole index range supported by the SIM. The command accepts <oper> in numeric format only.

Defined values:

<indexn>: integer, the order number of operators in the SIM/USIM preferred operator list

<format>: integer

2 – numeric <oper>

<opern>: string, <format> indicates if the format is numeric (Refer to +COPS.)

<GSM_AcTn>: integer, GSM access technology:

0 – access technology not selected

1 – access technology selected

<GSM_Compact_AcTn>: integer, GSM compact access technology

0 – access technology not selected

1 – access technology selected

<UTRAN_AcTn>: integer type; UTRAN access technology

0 – access technology not selected

1 – access technology selected

<E-UTRAN_AcTn>: integer, E-UTRAN access technology

0 – access technology not selected

1 – access technology selected

Example: Read preferred operator list

```
at+CPOL?
+CPOL: 1, 2, "00101",0,0,0,1
+CPOL: 2, 2, "00101",0,0,1,0
+CPOL: 3, 2, "00101",0,1,0,0
OK
AT+CPOL=?
+CPOL: (1-16), (0-2)
OK
```

Example: Delete 1st entry

```
AT+CPOL=1
OK
AT+CPOL?
+CPOL: 2, 2, "00101",0,0,1,0
+CPOL: 3, 2, "00101",0,1,0,0
OK
```

7.4. AT+CPLS Select Preferred Operator List

AT+CPLS parameter command syntax

Command	Possible response(s)
+CPLS=<list>	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
+CPLS?	<i>Normally respond:</i> +CPLS:<list> OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
+CPLS=?	<i>Normally respond:</i> +CPLS:(list of supported <list>s) OK <i>If something is wrong, then respond:</i> ERROR or

	+CME ERROR:<err>
Reference:	3GPP TS 27.007

Description:

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

The execute command selects a list in the SIM/USIM. Refer to [Table A-1 Error codes supported for CME commands for possible <err> values](#).

The read command returns the selected PLMN selector list from the SIM/USIM.

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

Defined values:

<list>: integer

- 0 – User controlled PLMN selector with Access Technology EFPLMNwAcT, if not found in the SIM/UICC, then the PLMN preferred list EFPLMNsel (This file is only available in the SIM card or GSM application selected in UICC.)
- 1 – Operator controlled PLMN selector with Access Technology EFOPLMNwAcT
- 2 – HPLMN selector with Access Technology EFHPLMNwAcT

Example: Select prefer network list for AT+CPOL operation

```
AT+CPLS?
+CPLS: 0
OK
AT+CPLS=?
+CPLS: (0-2)
OK
AT+CPLS=1
OK
AT+CPLS?
+CPLS: 1
OK
```


7.5. AT+CREG Network Registration Status

AT+CREG parameter command syntax

Command	Possible response(s)
+CREG=[<n>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+CREG?	<i>Normally respond:</i> +CREG:<n>,<stat>[,<lac>,<ci>[,<AcT>]] OK <i>If something is wrong, then respond:</i> ERROR
+CREG=?	<i>Normally respond:</i> +CREG:(list of supported <n>) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the MT's circuit-mode network registration status or code +CREG: <stat>[,<lac>,<ci>[,<AcT>]] when <n>=2 and there is a change of the network cell.

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

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

registered in the network. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Defined values:

<n>: integer

- 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>[,<AcT>]]
- 3 – enable network registration, location information and cause value information unsolicited result code +CREG: <stat>[,<lac>],<ci>[,<AcT>],<cause_type>,<reject_cause>]]

<stat>: integer, circuit mode registration status

- 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, two byte location area code or tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal format)

<ci>: string, four byte GERAN/UTRAN/E-UTRAN cell ID in hexadecimal format

<AcT>: integer, access technology of the serving cell

- 7 – E-UTRAN

Example: Query current registration status and enable registration status unsolicited notify.

```
AT+CREG=2
OK
AT+CREG?
+CREG: 2,1,0001,00000000,7
OK
AT+CREG=?
+CREG: (0-3)
OK
```

```
AT+CREG=1
OK
AT+CREG?
+CREG: 1,1
OK
at+cfun=0
+CREG: 0
OK
at+cfun=1
+CREG: 0
OK
...
+CREG: 1
```

7.6. AT+CSQ Signal Quality

AT+CSQ parameter command syntax

Command	Possible response(s)
+CSQ	<i>Normally respond:</i> +CSQ:<rssi>,<ber> OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
+CSQ=?	<i>Normally respond:</i> +CSQ:(list of supported <rssi>s),(list of supported <ber>s) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The execution command returns the received signal strength indication <rsqi> and channel bit error rate <ber> from the MT. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

The test command returns values supported as compound values

Defined values:

<rsqi>: integer

- 0 – -113 dBm or less
- 1 – -111 dBm
- 2...30 – -109 dBm to -53 dBm
- 31 – -51 dBm or greater
- 99 – not known or not detectable

<ber>: integer, channel bit error rate (in percent)

- 0...7 – as RXQUAL values in the table in 3GPP TS 45.008 subclause 8.2.4
- 99 – not known or not detectable

Example: Query signal quality

```
AT+CSQ
+csq: 26,99
OK
AT+CSQ=?
+CSQ: (0-31,99),(0-7,99)
OK
```

7.7. AT+CNUM Subscriber number

AT+CNUM parameter command syntax

Command	Possible response(s)
+CNUM	<i>Normally respond:</i> +CNUM: [<alpha1>,<number1>,<type1>,<speed>,<service>,<itc>]] [<CR><LF>+CNUM:[<alpha2>,<number2>,<type2>,<speed> ,<service>,<itc>]] [...]]

	OK
	<i>If something is wrong, then respond:</i> +CME ERROR:<err>
+CNUM=?	<i>Normally respond:</i> OK
	<i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

Action command returns the MSISDNs related to the subscriber.

Defined values:

<alphax>: optional alphanumeric string associated with <numberx>; used character set should be the one selected with command Select TE Character Set +CSCS

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

<typex>: type of address octet in integer format

<speed>: integer type as defined in subclause 6.7

<service>: integer type (service related to the phone number)

- 0 – asynchronous modem
- 1 – synchronous modem
- 2 – PAD Access (asynchronous)
- 3 – Packet Access (synchronous)
- 4 – voice
- 5 – fax

all other values below 128 are reserved by the present document

<itc>: integer type (information transfer capability)

- 0 – 3,1 kHz
- 1 – UDI

7.8. AT%MEAS Get Signal Parameter

AT%MEAS parameter command syntax

Command	Possible response(s)
%MEAS=<measurement type>	<p><i>Normally respond(RSRP, RSRQ, SINR, RSSI):</i></p> <p>%MEAS: <measurement type>:Reported=<measurement value>,Rx0Tx0=<measurement value>,Rx0Tx1=<measurement value>,Rx1Tx0=<measurement value>,Rx1Tx1=<measurement value> OK</p> <p><i>Normally respond(Temperature, Path loss):</i></p> <p>%MEAS: <measurement type>:<measurement value> OK</p> <p><i>Normally respond(TX Power):</i></p> <p>%MEAS: <measurement type>:PUSCH=<measurement value>,PUCCH=<measurement value>,PRACH=<measurement value>,SRS=<measurement value> OK</p> <p><i>Normally respond(Signal Quality):</i></p> <p>%MEAS: Signal Quality:RSRP=<measurement value>,RSRQ=<measurement value>,SINR=<measurement value>,RSSI=<measurement value> OK</p> <p><i>Normally respond(Antenna relative phase):</i></p> <p>%MEAS: <measurement type>:TX0=<measurement value>,TX1=<measurement value>, TX2=<measurement value>,TX3=<measurement value>,Rx0RSSI=<measurement value>, Rx1RSSI=<measurement value> OK</p> <p><i>Normally respond(RS_SNR):</i></p> <p>%MEAS: RS_SNR: Reported=<measurement value> OK</p>

Normally respond(RS_SINR):

%MEAS: RS_SINR: Reported=<measurement value>
OK

Normally respond(per-antenna RSRP, RSRQ, SINR, RSSI):

%MEAS: <measurement type>:
Reported=<value>,Ant0=<value>,Ant1=<value>
OK

Normally respond(Network Time correspond to SFN of serving cell):

%MEAS: NWTIME:<networkTTI>,<networkUtcTime>

Normally respond(E-CID):

%MEAS: ECID:<gcid>,<TimeDifIndex>,<ta>,
<MCC>,<MNC>,<TAC>, <EARFCN>,<cell
ID>,<SFN>,<RSRP>,<RSRQ>{,<EARFCN>,<cell
ID>,<SFN>,<RSRP>,<RSRQ> [...]}]

Normally respond(all NBS RSRP and RSRQ):

%MEAS: EARFCN=<EARFCN>,CellID=<cell
ID>,<measurement type>=<measurement
value>[<CR><LF>%MEAS: EARFCN=<EARFCN>,CellID=<cell
ID>,<measurement type>=<measurement value>][...]
OK

Normally respond(All neighboring NBS simultaneous RSRP and RSRQ reporting):

%MEAS: EARFCN=<EARFCN>,CellID=<cell
ID>,RSRP=<measurement value>, RSRQ=<measurement
value>[<CR><LF>%MEAS:EARFCN=<EARFCN>,CellID=<cell
ID>,<RSRP>=<measurement value>, RSRQ=<measurement
value>][...]
OK

If something is wrong, then respond:

	ERROR or +CME ERROR:<err>
%MEAS=?	<i>Normally respond:</i> %MEAS: <list of supported measurement types> OK <i>If something is wrong, then respond:</i> ERROR or +CME ERROR:<err>
Reference:	Altair_SW_501_AT_Commands Guide_Rev3.pdf
Note:	Only the execute/test command is supported.

Description:

This command returns measurement for specified measurement type.

For RSRP and RSRQ “Reported” measurement value is the averaged narrow-band measurement executed for serving eNB as defined in the spec.

Note: The SINR is not reported over the air, its “reported” value contains combined value of all antennas’ measurements.

Signal Quality measurement type (8) returns together last serving cell measurements of RSRP, RSRQ, SINR and RSSI. The AT command response contains only “reported” values.

For RSRP only the per antenna measurement value RXyTXz (y,z=0/1) is the result of last non-averaged wide-band measurement used for debugging purposes.

Only single “reported” value is supported for neighbor eNB measurements.

Antenna relative phase measurement type (9) returns for each eNB TX antenna, the relative phase between UE RX antennas. Command returns also related RSSI measurement as per UE RX antennas.

Read command is not supported.

Defined values:

<measurement type>: string

- "0" – RSRP
- "1" – RSRQ
- "2" – SINR
- "3" – RSSI
- "4" – TX Power
- "5" – Temperature
- "6" – Path loss
- "7" – CQI
- "8" – Signal Quality (RSRP & RSRQ & SINR & RSSI)
- "9" – Antenna relative phase
- "10" – RSRP reported value only
- "11" – RSRQ reported value only
- "12" – SINR reported value only
- "13" – RS_SNR (reference signal signal-to-noise ratio)
- "14" – RS_SINR (reference signal signal-to-interference-plus-noise ratio)
- "20" – per-antenna RSRP
- "21" – per-antenna RSRQ
- "22" – per-antenna SINR
- "23" – per-antenna RSSI
- "93" – Network Time alignment with SFN
- "95" – Measurements for E – CID
- "96" – RSRP for all detected NBS
- "97" – RSRP & RSRQ for all detected NBS
- "98" – RSRP for all detected NBS
- "99" – RSRQ for all detected NBS

<EARFCN>: integer, Decimal EARFCN value

<cell ID>: integer, Decimal Physical Cell ID value

<gcid>: integer, Hexadecimal Global cell ID value

<TimeDifIndex>: integer, RxTxTimeDiff decimal index (as defined in 9.1.9.2 of 3GPP 36.133) of the measured cell. The value shall be reported by MAC based on RxTxTimeDiff reported by PHY. Be aware that RxTxTimeDiff used by the PHY is different from the value received by MAC CE and has better Ts granularity and accuracy.

<ta>: integer, Currently used Timing Advance value (NTA) of the measured cell. The NTA value is represented by index values of TA = 0, 1, 2, ..., 1282, where an amount of the time alignment is given by NTA = TA 16 per [3GPP 36.213].

<mcc>: integer, A three-digit value indicating mobile country code as defined in ITU-T

Recommendation E.212 Annex A.

<mnc>: integer, A three-digit or two-digit value indicating the mobile network code as defined in ITU-T Recommendation E.212 Annex A.

<TAC>: string, Two byte tracking area code in hexadecimal format

<SFN>: string, the decimal system frame number (SFN) of the measured cell during which the measurement have been performed. Since there is averaging over multiple SFN, it is advised to supply the latest SFN. If value is not available at the time of the query, command returns N/A (without quotes)

<RSRP>: integer, $-140 \leq \text{RSRP} \leq 0$

<RSRQ>: integer, $-60 \leq \text{RSRQ} \leq 0$

<SINR>: integer, $-128 \leq \text{SINR} \leq 40$

<TX Power>: integer, 10dBm for TX Power, $-26 \leq \text{TX Power} \leq 40$

<Temperature>: integer, Degrees (°C) for Temperature, $-128 \leq \text{Temperature} \leq 128$

<networkTTI>: integer, The subframe counter of the serving cell corresponds to the network UTC time. The subframe counter is a decimal running from 0 to 10239 (i.e. rollover at 10240) also known as TTI (Transmission Time Interval) counter.

<networkUtcTime>: integer, This field specifies the network UTC time which correspond to the specified TTI counter. The UTC time is a decimal counter of 1msec units counted since 00:00:00 on 1 January, 1900

Example:

```
AT%MEAS=?
%MEAS: 0-RSRP, 1-RSRQ, 2-SINR, 3-RSSI, 4-TXPOWER, 5-TEMPERATURE,
6-Pathloss, 7-CQI, 8-Signal Quality, 9-Antenna relative phase,10-
RSRP reported value only, 11-RSRQ reported value only, 12-SINR
reported value only, 13-RS_SNR, 14-RS_SINR, 20-per-antenna RSRP,
21-per-antenna RSRQ, 22-per-antenna SINR, 23-per-antenna RSSI, 93-
Network Time alignment with SFN, 95 - Measurements for E - CID, 96
- RSRP for all detected NBS, 97 - RSRP & RSRQ for all detected
NBS, 98 - RSRP for all detected NBS, 99 - RSRQ for all detected
NBS
OK

/* measurement RSRP */
at%meas="0"
RSRP: Reported = -92, Rx0Tx0 = -88, Rx0Tx1 = -140, Rx0Tx2 = -140,
```

```
Rx0Tx3 = -140, Rx1Tx0 = -140, Rx1Tx1 = -140, Rx1Tx2 = -140, Rx1Tx3  
= -140  
OK  
  
/* measurement Tx Power */  
at%meas="4"  
%MEAS: TX power: PUSCH=63, PUCCH=0, PRACH=-10, SRS=0  
OK  
  
/* measurement Signal Quality */  
at%meas="8"  
Signal Quality: RSRP = -91, RSRQ = -14, SINR = 25, RSSI = -70  
OK  
  
/* measurement RSRP for all detected NBS */  
AT%MEAS="98"  
%MEAS: EARFCN=0, CellID=45, RSRP =76  
%MEAS: EARFCN=0, CellID=75, RSRP =82  
%MEAS: EARFCN=2620, CellID=40 RSRP =73  
OK
```

8. Packet Domain Related Commands

8.1. AT+CGACT PDP Context Activate Or Deactivate

AT+CGACT parameter command syntax

Command	Possible response(s)
+CGACT=[<state>[,<cid>[,<cid>[,...]]]]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+CGACT?	<i>Normally respond:</i> +CGACT:<cid>,<state> [<CR><LF>+CGACT:<cid>,<state> [...]] OK <i>If something is wrong, then respond:</i> ERROR
+CGACT=?	<i>Normally respond:</i> +CGACT:(list of supported <state>s) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.007

Description:

The execution command is used to activate or deactivate the specified PDP context(s).

Note: Altair modem which includes internal stack may automatically activate/deactivate PDN context. Command shall be used with caution.

Defined values:

<state>: integer, a numeric parameter that indicates the state of PDP context activation

0 – deactivated

1 – activated

<cid>: integer, a numeric parameter which specifies a particular PDP context definition.

(Refer to the +CGDCONT and +CGDSCONT commands.)

Example: PDP Context activation/deactivation

```
AT+CGACT?
+CGACT: 1,1
+CGACT: 2,0
...
OK
AT+CGACT=?
+CGACT: (0,1)
OK
```

8.2. AT+CGATT GPRS Attach Or Detach

AT+CGATT parameter command syntax

Command	Possible response(s)
+CGATT=[<state>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+CGATT?	<i>Normally respond:</i> +CGATT:<state> OK <i>If something is wrong, then respond:</i> ERROR
+CGATT=?	<i>Normally respond:</i> +CGATT:(list of supported <state>s)

	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	3GPP TS 27.007

Description:

The execution command is used to attach the MT to, or detach the MT from, the Packet Domain service.

Defined values:

< state >: integer, a numeric parameter that indicates the state of PS attachment

0 – Detached

1 – Attached

Example: Detach/Attach network

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

8.3. AT+CGDCONT Define PDP Context

AT+CGDCONT parameter command syntax

Command	Possible response(s)
+CGDCONT=[<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<PCSCF_discovery>[,<NSLPI>]]]]]]]]]	Normally respond: OK
]]	<i>If something is wrong, then respond:</i> ERROR
+CGDCONT?	Normally respond: +CGDCONT:<cid>,<PDP_type>,<APN>,<PDP_addr>,<

```
d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<emergency_
indication_present>[,<PCSCF_discovery>[,<IM_CN_Si
gnalling_Flag_Ind>[,<NSLPI>]]]]]
```

```
[<CR><LF>+CGDCONT:<cid>,<PDP_type>,<APN>,<PD
P_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<e
mergency_indication_present>[,<PCSCF_discovery>[,
<IM_CN_Signalling_Flag_Ind>[,<NSLPI>]]]]]]
[...]]
```

OK

If something is wrong, then respond:

ERROR

+CGDCONT=?

Normally respond:

```
+CGDCONT:(range of supported
<cid>s),<PDP_type>,<APN>,<PDP_addr>,(list of
supported <d_comp>s),(list of supported
<h_comp>s),(list of supported
<IPv4AddrAlloc>s),( (list of supported
<PCSCF_discovery>s), (list of supported <NSLPI>s)
[<CR><LF>+CGDCONT:(range of supported
<cid>s),<PDP_type>,<APN>,<PDP_addr>,(list of
supported <d_comp>s),(list of supported
<h_comp>s),(list of supported <IPv4AddrAlloc>s),
( (list of supported <PCSCF_discovery>s), (list of
supported <NSLPI>s)
```

```
[...]]
```

OK

If something is wrong, then respond:

ERROR

Reference:

3GPP TS 27.007 V12.7.0

Limitations: In Alaitr's platform, please use AT%PDNSET to modify APN profile.

Description:

The set command specifies the 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 provided by the range returned by the test command.

For EPS, the PDN connection and its associated EPS default bearer is identified herewith. For EPS, the <PDP_addr> parameter value shall be omitted.

A special form of the set command +CGDCONT=<cid> causes the values for the 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 using the parameter <PDP_type>, the parameter value ranges for each <PDP_type> are returned on a separate line.

Defined values:

<cid>: integer, 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.

<PDP_type>: string, a string parameter which specifies the type of packet data protocol

- IP – Internet Protocol (IETF STD 5)
- IPV6 – Internet Protocol, version 6 (IETF RFC 2460)
- IPV4V6 – Virtual <PDP_type> introduced to handle dual IP stack UE capability.
(Refer to 3GPP TS 24.301.)

<APN>: string, a string parameter which is a logical name that is used to select the GGSN or the external packet data network.
If the value is null or omitted, then the subscription value will be requested.

<PDP_addr>: string, a string parameter that identifies the MT in the address space applicable to the PDP.
If the parameter value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested.

The read 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(es) may be read

using the +CGPADDR command.

<d_comp>: integer, a numeric parameter that controls PDP data compression (applicable for SNDCP only) (Refer to 3GPP TS 44.065.)

- 0 – off
- 1 – on (manufacturer-preferred compression)
- 2 – V.42bis
- 3 – V.44

Other values are reserved.

<h_comp>: integer, a numeric parameter that controls PDP header compression (Refer to 3GPP TS 44.065 and 3GPP TS 25.323.)

- 0 – off
- 1 – on (manufacturer-preferred compression)
- 2 – RFC1144 (applicable for SNDCP only)
- 3 – RFC2507
- 4 – RFC3095 (applicable for PDCP only)

Other values are reserved.

<IPv4AddrAlloc>: integer, a numeric parameter that controls how the MT/TA requests to get the IPv4 address information

- 0 – IPv4 Address Allocation through NAS Signaling
- 1 – IPv4 Address Allocated through DHCP

<emergency_indication_present>: integer, a numeric parameter used to indicate whether the PDP context is for emergency bearer services or not.

- 0 – PDP context is not for emergency bearer services
- 1 – PDP context is for emergency bearer services

<P-CSCF_discovery>: integer type; influences how the MT/TA requests to get the P-CSCF address.

- 0 –Preference of P-CSCF address discovery not influenced by +CGDCONT
- 1 –Preference of P-CSCF address discovery through NAS signalling
- 2 –Preference of P-CSCF address discovery through DHCP

<IM_CN_Signalling_Flag_Ind>: integer, a numeric parameter used to indicate to the network whether the PDP context is for IM CN subsystem-related signalling only or not.

- 0 –UE indicates that the PDP context is not for IM CN subsystem-related

signalling only

1 –UE indicates that the PDP context is for IM CN subsystem-related signalling only

<NSLPI>: integer type; indicates the NAS signalling priority requested for this PDP context

0 –indicates that this PDP context is to be activated with the value for the low priority indicator configured in the MT.

1 – indicates that this PDP context is is to be activated with the value for the low priority indicator set to "MS is not configured for NAS signalling low priority".

Example: Check APN profile

```
AT+CGDCONT?
+CGDCONT: 1,"IPV4V6","broadband",,,0,0,0,0,0,,0,,,,,
OK

AT+CGDCONT=?
+CGDCONT: (1-15),"IP",,,(0),(0),(0-1),(0-1),(0-2),(0-1),(0-1),(0-1),(0-1),(0-1)
+CGDCONT: (1-15),"IPV6",,,(0),(0),(0-1),(0-1),(0-2),(0-1),(0-1),(0-1),(0-1)
+CGDCONT: (1-15),"IPV4V6",,,(0),(0),(0-1),(0-1),(0-2),(0-1),(0-1),(0-1),(0-1)
+CGDCONT: (1-15),"Non-IP",,,(0-3),(0-4),(0-1),(0-1),(0-2),(0-1),(0-1),(0-1),(0-1)
OK
```

8.4. AT+CGEREP Packet Domain Event Reporting

AT+CGEREP parameter command syntax

Command	Possible response(s)
+CGEREP=[<mode>[,<bfr>]]	<p><i>Normally respond:</i></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p>

	ERROR
+CGEREP?	<p><i>Normally respond:</i></p> <p>+CGEREP:<mode>,<bfr></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
+CGEREP=?	<p><i>Normally respond:</i></p> <p>+CGEREP:(list of supported <mode>s),(list of supported <bfr>s)</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	3GPP TS 27.007

Description:

The set command enables or disables sending of unsolicited result codes, +CGEV: XXX from MT to TE in the case of certain events occurring in the Packet Domain MT or the network. The <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1 or <mode> 2 is entered. If a setting is not supported by the MT, ERROR or +CME ERROR: is returned.

The read command returns the current mode and buffer settings.

The test command returns the modes and buffer settings supported by the MT as compound values.

Defined values:

<mode>: integer, a numeric parameter

- 0 – buffer unsolicited result codes in the MT; if the MT result code buffer is full, the oldest values can be discarded. No codes are forwarded to the TE.
- 1 – discard unsolicited result codes when the MT–TE link is reserved (e.g. in on-line data mode); otherwise forward them directly to the TE.
- 2 – buffer unsolicited result codes in the MT when the MT-TE link is reserved (e.g. in on-line data mode) and flush them to the TE when the MT-TE link becomes available; otherwise forward them directly to the TE.

<bfr>: integer, a numeric parameter

- 0 – The MT buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or <mode> 2 is entered.
- 1 – MT buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1 or <mode> 2 is entered. (An OK response shall be issued before flushing the codes.)

Example: Modify event report

```
AT+CGEREP?  
+CGEREP: 0,0  
OK  
AT+CGEREP=?  
+CGEREP: (0-2),(0-1)  
OK  
AT+CGEREP=1,1  
OK  
AT+CGEREP?  
+CGEREP: 1,1  
OK  
at+cgatt=0  
+CGEV: ME DETACH  
OK
```

8.5. AT+CEREG EPS Network Registration Status

AT+CEREG parameter command syntax

Command	Possible response(s)
+CEREG=[<n>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+CEREG?	<i>Normally respond:</i> +CEREG:<n>,<stat>[,<tac>],[<ci>],[<AcT>[, <cause_type>,<reject_cause>]]]

	OK
	<i>If something is wrong, then respond:</i>
	ERROR
+CEREG=?	<i>Normally respond:</i>
	+CEREG:(list of supported <n>s)
	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	3GPP TS 27.007

Description:

The set command controls the presentation of an unsolicited result code +CEREG: <stat> when <n>=1 and there is a change in the MT's EPS network registration status in E-UTRAN or unsolicited result code.

+CEREG: <stat>[, [<tac>], [<ci>], [<AcT>]] when <n>=2 and there is a change of the network cell in EUTRAN. The parameters <AcT>, <tac> and <ci> are sent only if available. The value <n>=3 further extends the unsolicited result code with [, <cause_type>, <reject_cause>] when available and when the value of <stat> is changed. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

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

The read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. Location information elements <tac>, <ci> and <AcT>, if available, are returned only when <n>=2 and MT is registered in the network. The parameters [, <cause_type>, <reject_cause>], if available, are returned when <n>=3.

Test command returns values supported as a compound value.

Defined values:

<n>: integer

- 0 – Disable network registration unsolicited result code
- 1 – Enable network registration unsolicited result code +CEREG: <stat>
- 2 – Enable network registration and location information unsolicited result code +CEREG: <stat>[,<tac>],[<ci>],[<AcT>]]
- 3 – Enable network registration, location information, and EMM cause value information unsolicited result code +CEREG: <stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]]
- 4 – For a UE that wants to apply PSM, enable network registration and location information unsolicited result code +CEREG: <stat>[,<tac>],[<ci>],[<AcT>][,],[<Active-Time>],[<Periodic-TAU>]]]
- 5 – For a UE that wants to apply PSM, enable network registration, location information and EMM cause value information unsolicited result code +CEREG: <stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>],[<reject_cause>][,],[<Active-Time>],[<Periodic-TAU>]]]

<stat>: integer, indicates the EPS registration status

- 0 – Not registered, MT is not currently searching an operator to register to
- 1 – Registered, home network
- 2 – Not registered, but MT is currently trying to attach or searching an operator to register to
- 3 – Registration denied
- 4 – Unknown (e.g. out of E-UTRAN coverage)
- 5 – Registered, roaming
- 6 – Registered for "SMS only", home network (not applicable)
- 7 – Registered for "SMS only", roaming (not applicable)
- 8 – Attached for emergency bearer services only (Refer to NOTE 2)
- 9 – Registered for "CSFB not preferred", home network (not applicable)
- 10 – Registered for "CSFB not preferred", roaming (not applicable)

NOTE: 3GPP TS 24.008 and 3GPP TS 24.301 specify the condition when the MS is considered as attached for emergency bearer services.

<tac>: string, two byte tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)

<ci>: string, four byte E-UTRAN cell ID in hexadecimal format

<AcT>: integer, indicates the access technology of the serving cell

- 0 – GSM (not applicable)
- 1 – GSM Compact (not applicable)
- 2 – UTRAN (not applicable)
- 3 – GSM w/EGPRS (Refer to NOTE 3) (not applicable)
- 4 – UTRAN w/HSDPA (Refer to NOTE 4) (not applicable)
- 5 – UTRAN w/HSUPA (Refer to NOTE 4) (not applicable)
- 6 – UTRAN w/HSDPA and HSUPA (Refer to NOTE 4) (not applicable)
- 7 – E-UTRAN

NOTE: 3GPP TS 44.060 specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

3GPP TS 25.331 specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

<cause_type>: integer, indicates the type of <reject_cause>.

- 0 – Indicates that <reject_cause> contains an EMM cause value, Refer to 3GPP TS 24.301 Annex A.
- 1 – Indicates that <reject_cause> contains a manufacturer-specific cause.

<reject_cause>: integer, contains the cause of the failed registration. The value is of a type defined by <cause_type>.

Example: Check LTE network registration status

```
AT+CEREG=2
OK
AT+CEREG?
+CEREG: 2,0,0001,00000000,7
OK
AT+CEREG=?
+CEREG: (0,1,2,3,4,5)
OK
```

8.6. AT+CGCONTRDP PDP Context Read Dynamic

Parameters

AT+CGCONTRDP parameter command syntax

Command	Possible response(s)
+CGCONTRDP[=<cid>]	<p><i>Normally respond:</i></p> <pre>[+CGCONTRDP: <cid>,<bearer_id>,<apn>,<local_addr and subnet_mask>,<gw_addr>,<DNS_prim_addr>,<DNS_sec_addr>,<PCSCF_prim_addr>,<PCSCF_sec_addr>,<IM_CN_Signalling_Flag>,<LIPA_indication>,<IPv4_MTU>,<WLAN_Offload>,<Local_Addr_Ind>,<Non-IP_MTU>,<Serving_PLMN_rate_control_value>]]]]]]]]]]]]] [<CR><LF>+CGCONTRDP: <cid>,<bearer_id>,<apn>,<local_addr and subnet_mask>,<gw_addr>,<DNS_prim_addr>,<DNS_sec_addr>,<P-CSCF_prim_addr>,<PCSCF_sec_addr>,<IM_CN_Signalling_Flag>,<LIPA_indication>,<IPv4_MTU>,<WLAN_Offload>,<Local_Addr_Ind>,<Non-IP_MTU>,<Serving_PLMN_rate_control_value>]]]]]]]]]]]]] [...]] OK</pre> <p><i>If something is wrong, then respond:</i></p> <pre>ERROR or +CME ERROR: <err></pre>
+CGCONTRDP=?	<p><i>Normally respond:</i></p> <pre>+CGCONTRDP: (list of <cid>s associated with active contexts) OK</pre> <p><i>If something is wrong, then respond:</i></p> <pre>ERROR or +CME ERROR: <err></pre>
Reference:	3GPP TS 27.007

Description:

The execution command returns the relevant information <bearer_id>, <apn>, <local_addr and subnet_mask>, <gw_addr>, <DNS_prim_addr>, <DNS_sec_addr>, <P-

CSCF_prim_addr>, <PCSCF_sec_addr>, <IM_CN_Signalling_Flag> and <LIPA_indication> for an active non-secondary PDP context with the context identifier <cid>.

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

If the parameter <cid> is omitted, the relevant information for all active non-secondary PDP contexts is returned.

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

Defined values:

<cid>: integer, specifies a particular non-secondary PDP context definition. The parameter is local to the TE/MT interface and is used in other PDP context-related commands. (Refer to the +CGDCONT and +CGDSCONT commands.)

<bearer_id>: integer, identifies the bearer, i.e. the EPS bearer in EPS and the NSAPI in UMTS/GPRS.

<apn>: string, a logical name that was used to select the GGSN or the external packet data network.

<local_addr and subnet_mask>: string, shows the IP address and subnet mask of the MT. The string is given as dot-separated numeric (0–255) parameters on the form: "a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or "a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16" for IPv6. When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<gw_addr>: string, shows the Gateway Address of the MT. The string is given as dot-separated numeric (0–255) parameters. When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<DNS_prim_addr>: string, shows the IP address of the primary DNS server. When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<DNS_sec_addr>: string, shows the IP address of the secondary DNS server. When +CGPIAF is supported, its settings can influence the format of this parameter

returned with the execute form of +CGCONTRDP.

<P_CSCF_prim_addr>: string, shows the IP address of the primary P-CSCF server.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<P_CSCF_sec_addr>: string, shows the IP address of the secondary P-CSCF server.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<IM_CN_Signalling_Flag>: integer, shows whether the PDP context is for IM CN subsystem-related signalling only or not.

0 – PDP context is not for IM CN subsystem-related signalling only

1 – PDP context is for IM CN subsystem-related signalling only

<LIPA_indication>: integer, indicates that the PDP context provides connectivity using a LIPA PDN connection. This parameter cannot be set by the TE.

0 – indication not received that the PDP context provides connectivity using a LIPA PDN connection

1 – indication received that the PDP context provides connectivity using a LIPA PDN connection

<IPv4_MTU>: integer type; shows the IPv4 MTU size in octets.

<WLAN_Offload>: integer type; indicates whether traffic can be offloaded using the specified PDN connection via a WLAN or not. This refers to bits 1 and 2 of the WLAN offload acceptability IE as specified in 3GPP TS 24.008 [8] subclause 10.5.6.20.

0 – offloading the traffic of the PDN connection via a WLAN when in S1 mode or when in lu mode is not acceptable.

1 – offloading the traffic of the PDN connection via a WLAN when in S1 mode is acceptable, but not acceptable in lu mode.

2 – offloading the traffic of the PDN connection via a WLAN when in lu mode is acceptable, but not acceptable in S1 mode.

3 – offloading the traffic of the PDN connection via a WLAN when in S1 mode or when in lu mode is acceptable.

<Local_Addr_Ind>: integer type; indicates whether or not the MS and the network support local IP address in TFTs (see 3GPP TS 24.301 [83] and 3GPP TS 24.008 [8] subclause 10.5.6.3).

0 – indicates that the MS or the network or both do not support local IP address in TFTs

1 – indicates that the MS and the network support local IP address in TFTs

<Non-IP_MTU>: integer type; shows the Non-IP MTU size in octets.

<Serving_PLMN_rate_control_value>: integer type; indicates the maximum number of uplink messages the UE is allowed to send in a 6 minute interval. This refers to octet 3 to 4 of the Serving PLMN rate control IE as specified in 3GPP TS 24.301 [8] subclause 9.9.4.28.

Example: Check current active PDP context status

```
AT+CGCONTRDP=?
+CGCONTRDP: ( 1 )
OK
AT+CGCONTRDP=1
+CGCONTRDP:
1,5,"wnc.mnc001.mcc001.gprs",192.168.2.2.255.255.255.252,192.168.2
.1,8.8.8.8,,,,,,,,,
OK
```

8.7. AT+CGEQOS Define EPS Quality of Service

AT+CGEQOS parameter command syntax

Command	Possible response(s)
AT+CGEQOS=[<cid>[,<QCI>[,<DL_GBR>,<UL_GBR>[,<DL_MBR>,<UL_MBR>]]]]	<p><i>Normally respond:</i></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>

+CGEQOS?*Normally respond:*

[+CGEQOS:

<cid>,<QCI>,[<DL_GBR>,<UL_GBR>], [<DL_MBR>,<UL_MBR>]]

[<CR>>LF>+CGEQOS:

<cid>,<QCI>,[<DL_GBR>,<UL_GBR>], [<DL_MBR>,<UL_MBR>] [...]]

OK

If something is wrong, then respond:

ERROR

+CGEQOS=?*Normally respond:*

+CGEQOS: (range of supported <cid>s),(list of supported <QCI>s),(list of supported <DL_GBR>s),(list of supported <UL_GBR>s),(list of supported <DL_MBR>s),(list of supported <UL_MBR>s)

OK

If something is wrong, then respond:

ERROR

Reference:

3GPP TS 27.007

Description:

The set command allows the TE to specify the EPS Quality of Service parameters <cid>, <QCI>, [<DL_GBR> and <UL_GBR>], and [<DL_MBR> and <UL_MBR>] for a PDP context or Traffic Flows. (Refer to 3GPP TS 24.301 and 3GPP TS 23.203.) When in UMTS/GPRS the MT applies a mapping function to UTMGS/GPRS Quality of Service. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

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

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

The test command returns the ranges of the supported parameters.

Defined values:

<cid>: integer, specifies a particular EPS Traffic Flows definition in EPS and a PDP Context definition in UMTS/GPRS. (Refer to the +CGDCONT and +CGDSCONT commands.)

<QCI>: integer, specifies a class of EPS QoS. (Refer to 3GPP TS 24.301.)

0 QCI is selected by the network.

[1 – 4] value range for guaranteed bit rate Traffic Flows

[5 – 9] value range for non-guaranteed bit rate Traffic Flows

[128 – 254] value range for Operator-specific QCIs

<DL_GBR>: integer, indicates DL GBR in case of GBR QCI; the value is in kbit/s. This parameter is omitted for a non-GBR QCI. (Refer to 3GPP TS 24.301.)

<UL_GBR>: integer, indicates UL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (Refer to 3GPP TS 24.301.)

<DL_MBR>: integer, indicates DL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (Refer to 3GPP TS 24.301.)

<UL_MBR>: integer, indicates UL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (Refer to 3GPP TS 24.301.)

<cid>: integer, specifies a particular non-secondary PDP context definition. The parameter is local to the TE/MT interface and is used in other PDP context-related commands. (Refer to the +CGDCONT and +CGDSCONT commands.)

<bearer_id>: integer, identifies the bearer, i.e. the EPS bearer in EPS and the NSAPI in UMTS/GPRS.

<apn>: string, a logical name that was used to select the GGSN or the external packet data network.

<local_addr and subnet_mask>: string, shows the IP address and subnet mask of the MT.

The string is given as dot-separated numeric (0–255) parameters on the form:

"a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or

"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16" for IPv6. When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute

form of +CGCONTRDP.

<gw_addr>: string, shows the Gateway Address of the MT. The string is given as dot-separated numeric (0–255) parameters.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<DNS_prim_addr>: string, shows the IP address of the primary DNS server.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<DNS_sec_addr>: string, shows the IP address of the secondary DNS server.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<P_CSCF_prim_addr>: string, shows the IP address of the primary P-CSCF server.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<P_CSCF_sec_addr>: string, shows the IP address of the secondary P-CSCF server.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<IM_CN_Signalling_Flag>: integer, shows whether the PDP context is for IM CN subsystem-related signalling only or not.

0 – PDP context is not for IM CN subsystem-related signalling only.

1 – PDP context is for IM CN subsystem-related signalling only.

<LIPA_indication>: integer, indicates that the PDP context provides connectivity using a LIPA PDN connection. This parameter cannot be set by the TE.

0 – indication not received that the PDP context provides connectivity using a LIPA PDN connection

1 – indication received that the PDP context provides connectivity using a LIPA PDN connection

Example: Query current EPS QOS parameter

```
at+cgeqos=?  
+CGEQOS: (1-15), (0-9,128-254), (0-10000000), (0-10000000), (0-  
10000000), (0-10000000)
```

```
OK

at+cgeqos=1,0
OK
at+cgeqos?
+CGEQOS: 1,0
+CGEQOS: 2,2,105,100,125,120
+CGEQOS: 3,2,105,100,125,120
...
OK
at+cgeqos=2,1
OK
at+cgeqos?
+CGEQOS: 1,0
+CGEQOS: 2,1
+CGEQOS: 3,2,105,100,125,120
...
OK
```

8.8. AT+CGPADDR Show PDP Address

AT+CGPADDR parameter command syntax

Command	Possible response(s)
+CGPADDR=[<cid>[,<cid>[,...]]]	<i>Normally respond:</i> +CGPADDR:<cid>[,<PDP_addr_1>[,<PDP_addr_2>]] [<CR><LF>+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]] [...]] OK <i>If something is wrong, then respond:</i> ERROR
+CGPADDR=?	<i>Normally respond:</i> +CGPADDR:(list of defined <cid>s) OK

If something is wrong, then respond:

ERROR

Reference: 3GPP TS 27.007

Description:

The execution command returns a list of PDP addresses for the specified context identifiers. The test command returns a list of defined <cid>.

Defined values:

<cid>: integer, a numeric parameter which specifies a particular PDP context definition (Refer to the +CGDCONT and +CGDSCONT commands.); if no <cid> is specified, the addresses for all defined contexts are returned.

<PDP_addr_1> and <PDP_addr_2>: each is a string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the address set by the +CGDCONT and +CGDSCONT commands when the context was defined. For a dynamic address, it will be the address assigned during the last PDP context activation that used the context definition referred to by <cid>. Both <PDP_addr_1> and <PDP_addr_2> are omitted if none are available. Both <PDP_addr_1> and <PDP_addr_2> are included when both IPv4 and IPv6 addresses are assigned, with <PDP_addr_1> containing the IPv4 address and <PDP_addr_2> containing the IPv6 address.

The string is provided as a dot-separated numeric (0–255) parameter of the form:

a1.a2.a3.a4 for IPv4 and

a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16 for IPv6.

Example: Query current IP addresses

```
AT+CGPADDR=?
+CGPADDR: (1)
OK
at+cgdcont?
+CGDCONT: 1,"IP","internet",,0,0,0,0,0,,0
OK
at+cgpaddr=1
+CGPADDR: 1,"192.168.20.11"
```


OK

8.9. AT+CEMODE UE modes of operation for EPS

AT+CEMODE parameter command syntax

Command	Possible response(s)
+CEMODE=<mode>	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> +CME ERROR: <err>
+CEMODE?	<i>Normally respond:</i> +CEMODE: <mode> OK <i>If something is wrong, then respond:</i> ERROR
+CEMODE=?	<i>Normally respond:</i> +CEMODE: (list of supported <mode>s) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	Altair_SW_501_AT_Commands Guide_Rev3.pdf

Description:

The set command is used to set the MT to operate according to the specified mode of operation for EPS, see 3GPP TS 24.301. If the requested mode of operation is not supported, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

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

The test command is used for requesting information on the supported MT modes of operation as a compound value.

Defined values:

<mode>: integer type; indicates the mode of operation. The default value is manufacturer specific.

- 0 – PS mode 2 of operation
- 1 – CS/PS mode 1 of operation
- 2 – CS/PS mode 2 of operation
- 3 – PS mode 1 of operation

Example: Query current UE mode

```
AT+CEMODE=?  
+CEMODE:(0-3)  
OK  
  
AT+CEMODE?  
+CEMODE: 2  
OK
```

8.10. AT%PDNSET Define PDP Context And Authentication

AT%PDNSET parameter command syntax

Command	Possible response(s)
%PDNSET=<ext_sessionID>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<host_name>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI>	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR

%PDNSET?	<p><i>Normally respond:</i></p> <pre>%PDNSET: <ext_session_id> sessionID>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<host_name>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI></pre> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
%PDNSET=?	<p><i>Normally respond:</i></p> <pre>%PDNSET: <ext_session_id>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<auth_host>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI></pre> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	Altair_SW_501_AT_Commands Guide_Rev5.pdf

Description:

The command is used to set the run-time PDN parameters for data PDNs exposed to the host.

The APN name and IP type provided in the command will override the default PDN settings from the embedded APN table stored into the UE NV. The PPP security parameters are run-time only and are not stored into non-volatile memory.

This command is effective immediately. This means that if parameters are different from those already in use, the PDN will be deactivated, updated locally and on the server (via LTE messages), and then reactivated.

Missed PPP security parameters will completely remove the previous PPP security setting.

This command is intended to substitute the previous %PPPAUTH command which is not synced with other PDN parameter definitions.

Notes:

1. In both command and response, a parameter which is not specified will be written as ","
2. Last parameters of the command which are not specified may not include the "," notation.
e.g. AT%PDNSET=<ext_sessionID>,<apnname>,<ip_type>

Defined values:

<ext_session_id>: integer, numeric value of the session identifier which is configured and used by external application or host and defined in NP config file.

<apnname>: string, indicates the APN name configured for the PDN.

<ip_type>: string

- "IP"
- "IPv6"
- "IPv4v6"

<ppp_auth>: string , PPP authentication type

- "NONE"
- "PAP"
- "CHAP"

<user>: string, username used for authentication

<passw>: string, password used for authentication

<host_name>: string, optional, the name of the Authentication server.

<pcscf_discovery>: decimal

- 0 – disable
- 1 – Enable

<IPv4AddrAlloc>: integer type; controls how the host requests to get the IPv4 address information (same as defined in AT+CGDCONT)

- 0 - IPv4 address allocation through NAS signalling
- 1 - IPv4 address allocated through DHCP

<NSLPI>: integer type; indicates the NAS signalling priority requested for this PDP context as defined in AT+CGDCONT in 3GPP 27.007

Example: Query and set APN profile

```
AT%PDNSET?
%PDNSET: 1,broadband,IPV4V6,,,,,0,0,0
OK
AT%PDNSET=?
%PDNSET:
<ext_session_id>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<auth_host>,<IPv4A
ddrAlloc>,<pcscf_discovery>,<NSLPI>
OK

/*Disconnect LTE link and then set PDN*/
at%cmatt=0
OK
AT%PDNSET=1,"internet","IPV4V6"
OK
at%cmatt=1
OK
AT%PDNSET?
%PDNSET: 1,internet,IPV4V6,,,,,0
OK
```

8.11. AT%PDNACT PDP Context Activate Or Deactivate

AT%PDNACT parameter command syntax

Command	Possible response(s)
%PDNACT=<act>,[<sessionID>],[<apnname >]	Normally respond:
	OK
	If something is wrong, then respond: ERROR

%PDNACT?	<p><i>Normally respond:</i></p> <pre>%PDNACT:<sessionID>,<stat>,<APN>,<cid>][<CR><LF>%PDNACT:<sessionID>,<stat>,<APN>,<cid>][...]] OK</pre> <p><i>If something is wrong, then respond:</i></p> <pre>ERROR</pre>
%PDNACT=?	<p><i>Normally respond:</i></p> <pre>%PDNACT: (list of defined <act>s),<ext_session_id> [,<APN>] OK</pre> <p><i>If something is wrong, then respond:</i></p> <pre>ERROR</pre>
Reference:	Altair_SW_501_AT_Commands Guide_Rev3.pdf

Description:

This command is used by external Host to instruct eCM to expose and connect (disconnect) specific PDN to the Host. There may be more than one PDN exposed to Host.

There may be more than one PDN exposed to Host.

Session ID is Altair proprietary session identifier, which is defined for each session established over-the-air in NP config file named '/etc/config/ecm'.

User can use <apnname> or <sessionID> or both to identify PDN. If both are defined, PDN is identified by <apnname>.

The PDNs terminated in modem cannot be exposed to Host and any attempt to activate them from host will return ERROR. PDN sharing between Host and modem is not supported yet.

Defined values:

<act>: integer, numeric value, indicates the required action.

0 – Deactivate

1 – Activate

<sessionID>: integer, numeric value of session identifier defined in NP config file.

<apnname>: string, indicates the APN name configured for the PDN.

<stat>: integer, numeric value, indicates the actual PDN state.

0 – Deactivate

1 – Activate

<cid>: integer, a numeric parameter which specifies a particular PDP context definition.

Example: Activate/Deactivate PDP context

```
AT%PDNACT?
%PDNACT: 1,1,internet,1
OK
AT%PDNACT=?
%PDNACT: (0-1), <ext_session_id> [,<APN>]
OK
AT%PDNACT=0,1
OK
AT%PDNACT?
%PDNACT: 1,0,internet,1
OK
AT%PDNACT=1,1
OK
AT%PDNACT?
%PDNACT: 1,1,internet,1
OK
```

8.12. AT%CMATT LTE network Attach Or Detach

AT%CMATT parameter command syntax

Command	Possible response(s)
%CMATT=<act>	<i>Normally respond:</i>
	OK
	<i>If something is wrong, then respond:</i>
	ERROR

%CMATT?	Normally respond: %CMATT: <state> OK
	If something is wrong, then respond: ERROR
%CMATT=?	Normally respond: %CMATT: (list of defined <act>s) OK
	If something is wrong, then respond: ERROR
Reference:	Altair_SW_501_AT_Commands Guide_Rev3.pdf

Description:

AT command sent from external Host, which instructs LTE module (eCM application) to attach or detach the LTE network.

Defined values:

<act>: integer, numeric value, instruct the device to attach or detach the LTE network.

0 – Detach

1 – Attach

Example: Detach/Attach LTE network

```
at%CMATT=0
OK
AT%CMATT?
%CMATT: 0
OK
at%CMATT=1
OK
AT%CMATT?
%CMATT: 1
OK
```


9. USIM related Commands

9.1. AT+CRSM Restricted SIM Access

AT+CRSM parameter command syntax

Command	Possible response(s)
+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]	<p><i>Normally respond:</i></p> <p>+CRSM:<sw1>,<sw2>[,<response>] OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERRORor +CME ERROR: <err></p>
+CRSM=?	<p><i>Normally respond:</i></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	3GPP TS 27.007

Description:

By using this command instead of Generic SIM Access +CSIM TE application has easier but more limited access to the SIM database. Set command transmits to the MT the SIM <command> and its required parameters. If a SIM installed in the currently selected card slot, the MT handles internally all SIM-MT interface locking and file selection routines.

As response to the command, MT sends the actual SIM information parameters and response data. MT error result code +CME ERROR may be returned when the command cannot be passed to the SIM, but failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters. Refer to [Table A-1 Error codes supported for CMEE commands for possible <err> values](#).

Coordination of command requests to SIM and the ones issued by GSM/UMTS application inside the MT is implementation dependent. However the TE should be aware of the

precedence of the GSM/UMTS application commands to the TE commands.

Defined values:

<command>: integer, command passed on by the MT to the SIM(refer to 3GPP TS 51.011).

176 – READ BINARY

178 – READ RECORD

192 – GET RESPONSE

214 – UPDATE BINARY

220 – UPDATE RECORD

242 – STATUS

203 – RETRIEVE DATA

219 – SET DATA

All other values are reserved.

<fileid>: integer

<P1>, <P2>, <P3>: integer

<data>: string, information which shall be written to the SIM

<pathid>: string

Example: Read binary EFIMSI(28423)

```
AT+CRSM=176,28423,0,0,9
+CRSM: 144,0,"080910101032547698"
OK
```

9.2. AT%CCID Reads the ICCID from SIM EFICCID

AT%CCID Parameter parameter command syntax

Command	Possible response(s)
%CCID	<i>Normally respond:</i>
	<iccid>
	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	Altair_SW_501_AT_Commands Guide_Rev3.pdf

Description:

The execution command reads the ICCID (card identification number) from SIM EFICCID. It is a unique identification number for the SIM. If a SIM card is not inserted, the ERROR is returned by execution command.

Defined values:

<iccid>: string, a string of 19 or 20 decimal digits, which reflects SIM ICCID value; the format of the ICCID is: MMCC IINN NNNN NNNN NN C x
MM = Constant (ISO 7812 Major Industry Identifier)
CC = Country Code
II = Issuer Identifier
N{12} = Account ID ("SIM number")
C = Checksum calculated from the other 19 digits using the Luhn algorithm
x = An extra 20th digit which may be returned by SIM, but it is not officially part of the ICCID.

Example: Read SIM card ICCID

```
AT%CCID
8952530076180102132
OK
```

10. Internet Service Commands

10.1. AT@DNSSEVR DNS Server Setting

AT@DNSSEVR parameter and command syntax

Command	Possible response(s)
AT@DNSSEVR=<pri_sevr>,<sec_sevr>	Normally respond: OK If something is wrong, then respond: ERROR
AT@DNSSEVR?	[@DNSSEVR:<pri_sevr>,<sec_sevr>] OK
AT@DNSSEVR=?	@DNSSEVR:(<pri_sevr>),(<sec_sevr>) OK

Description:

This command serves to query or set the manual DNS servers.

Defined values:

<pri_sevr>: string, the primary DNS server IP address

<sec_sevr>: string, the secondary DNS server IP address

<err_code>: integer: error code;

Example:

```
AT@DNSSEVR=?  
  
@DNSSEVR:(<pri_sevr>),(<sec_sevr>)  
OK  
AT@DNSSEVR="8.8.8.8", ""  
OK  
AT@DNSSEVR?
```

```
@DNSSEVR: "8.8.8.8", "0.0.0.0"  
OK
```

10.2. AT% DNSRSLV Resolve Domain Name

AT%DNSRSLV parameter and command syntax

Command	Possible response(s)
AT%DNSRSLV= <SessionID>,<domain_name>	<i>Normally respond:</i> %DNSRSLV:<ip_type>,<ip_addr> [%DNSRSLV: <ip_type>,<ip_addr>[...]] OK <i>If something is wrong, then respond:</i> ERROR
AT%DNSRSLV?	ERROR
AT%DNSRSLV=?	%DNSRSLV:<session_id>,<hostname> OK
Reference:	Altair_SW_501_AT_Commands Guide_Rev3.pdf

Description:

This command serves to resolve IP from domain name by querying a DNS server.

Defined values:

< SessionID>: decimal, a numerical numeric value defined in NP configuration file which point to the PDN on which the IP address should be resolved.

<domain_name>: string, domain name to be resolved

<ip_type>: decimal,

0 – IPv4

1 – IPv6

<ip_addr>: string, IPv4 or IPv6 resolved address

10.3. AT%SOCKETCMD Socket Service

AT%SOCKETCMD parameter and command syntax

Command	Possible response(s)
AT%SOCKETCMD= <cmd>[,<param1>[,<param2>[,<param3>...]]]	<p><i>Normally respond:</i></p> <p>For "INFO" command: [%SOCKETCMD:<socket_stat>,<socket_type>,<src_ip>,<dst_ip>,<src_port>,<dst_port>[,<socket_dir>,<socket_to>]]</p> <p>OK</p> <p>For "LASTERROR" command: [%SOCKETCMD:<socket_err>]</p> <p>OK</p> <p>For "ALLOCATE" command %SOCKETCMD:<socket_id></p> <p>OK</p> <p>For "FASTSEND" command: %SOCKETCMD:<wlength></p> <p>OK</p> <p>For other commands: OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
AT%SOCKETCMD?	<p>Return the list of created sockets and their status: [%SOCKETCMD:<socket_id>,<socket_stat>[<CR><LF> %SOCKETCMD:<socket_id>,<socket_stat> [...]]]</p>
AT%SOCKETCMD=?	<p>%SOCKETCMD:(ALLOCATE,SSLALLOC,ACTIVATE,INFO,SSLINFO,DEACTIVATE,FASTSEND,DELETE,LASTERROR,SETOPT)</p> <p>OK</p>

(unsolicited)	%SOCKETEV:<event>,<socket_id> [,<connected_socket_id>]
Reference:	Altair_SW_501_AT_Commands Guide_Rev4.pdf

Description:

This command is create and maintain a socket by the device.

The IP address formatting for use in this command is:

- o IPv4 format shall use the format (xxx.xxx.xxx.xxx). Where xxx is a decimal number from 0-255. when the leading digits in each segment are 0, the number of digits is adjusted accordingly, and then output. Example: 192.0.2.1, 127.0.0.1 etc ...

The unsolicited %SOCKETEV command is automatically enabled when the socket is opened (using "OPEN" or "LISTEN" command). The unsolicited is sent with <event> in 4 cases:

1. Rx buffer has more Bytes to read
2. Socket terminated due to Idle timer expiration
3. Socket terminated by peer
4. New connected socket is accepted/spawned from listening socket.

There are two types of listener socket: "synchronous" and "asynchronous":

- o Synchronous: The connection has been established once "OK" is responded. The maximum waiting time for the connection establishment is deterministic.
- o Asynchronous: The connection is not yet established even "OK" is responded. User must wait for URC, which can be happened at any time (or never).

Asynchronous listening socket is also called Parent Listening socket below. Parent listening socket and spawned from it connected sockets will have different IDs.

After activating of parent listening socket, %SOCKETEV=4 unsolicited response will be used to notify "accept incoming connection". This URC provides both listening and spawned from it connected sockets IDs.

Parent listening socket cannot be used for fast send operation. The ERROR will be returned on "FASTSEND" call for such socket.

If connected socket has been spawned from parent listening socket, the connected socket deactivation will close this connected socket completely.

Notes

- o AT%SOCKETCMD command is blocking. This may cause blocking of the AT channel for a

long time in case of an "OPEN" command. The "CLOSE" command is also blocking and can take time (the socket implementation may take about 8 sec to close the connection due to internal TCP FIN timer).

- o The "CLOSE" command may be ordered while data is still inside the module. In such cases, the module activates the "close" process only after it has sent the internally-retained data to its destination. However, the module may still drop the internally-retained data in case of connection loss and in case of PDN closure.
- o The local IP address cannot be configured by the AT%SOCKETCMD command (It is assigned by the network).
- o The local IP port can be configured by the AT%SOCKETCMD command, or it can be set automatically by the socket.

Defined values:

<cmd>

- o "ALLOCATE" –Allocates socket session with the following parameters

<param1>: decimal

- o The "Session ID" - a numerical value defined in NP configuration file which points to the PDN on which the socket should be opened on.

<param2>: string

- o "TCP" – For creation of TCP socket
- o "UDP" – For creation of UDP socket

<param3>: string

- o "OPEN" – The socket opens the TCP/UDP connection with the peer
- o "LISTEN" – The socket create TCP/UDP listener
- o "LISTENP" – The socket create TCP/UDP parent listener socket. Once activated, multiple connected sockets could be spawned from it.

<param4>: string

- o Destination IPv4 address

<param5>: decimal

- o Destination UDP/TCP port number in the range 1-65535

<param6>: string

- o Source (local) UDP/TCP port number in the range 0–65535 ('0' means auto port selection by the socket and it's also used as the default value)

<param7>: decimal

- Packet size to be used by the TCP/UDP/IP stack for data sending
- o 0 - Automatically selects default value (MTU based)

- o 1–1500 - Packet size in bytes

<cmd>

- o "ACTIVATE" – Activate the predefined socket

<param1>: decimal

- o The socket ID (identifier) of the specified socket

<cmd>

- o "INFO" – return the details of specific socket ID

<param1>: decimal

- o The socket ID (identifier) for which info is requested

<cmd>: string

- o "DEACTIVATE" – Request to deactivate specific socket ID and release its resources

<param1>: decimal

- o The socket ID (identifier) to be closed

<cmd>

- o "FASTSEND" – This command activate the predefined socket, write to the socket and then deactivate it.

<param1>: decimal

- o the socket ID (identifier) of the socket

<param2>: decimal

- o The length in Bytes of the data which need to be written; range is 1 to 1500 and represent the length of the "HEX" string.

<param3>: string

- o The data, in HEX format (in quotes)., which will be written to the specified socket.

<cmd>: string

- o "DELETE" – Request to delete specific socket ID allocation

<param1>: decimal

- o The socket ID (identifier) to be closed

<cmd>: string

- o "LASTERROR" – Request to get the last Socket error code

<param1>: decimal

- o The socket ID (identifier)

<socket_id>: decimal

- o The socket ID (identifier) of the specified socket

<socket_stat>: string

- o "DEACTIVATED" – The socket is not active

- o "ACTIVATED " – The socket is active
- o "LISTENING" – The socket is listening
- <socket_type>: string
 - o "TCP" – for creation of TCP socket
 - o "UDP" – for creation of UDP socket
- <src_ip>: string
 - o Source IP address
- <dst_ip>: string
 - o Destination IP address
- <src_port>: string
 - o Source UDP/TCP port number in the range 1-65535
- <dst_port>: string
 - o Destination UDP/TCP port number in the range 1-65535
- <socket_dir>: decimal, the direction of the TCP socket
 - o 0 – No set
 - o 1 – Dialer
 - o 2 – Listener
- <socket_to>: decimal
 - o TCP connection setup timeout as specified in "OPEN" command
- <socket_err>: decimal
 - o Error values as defined by 3GPP TS 27.007 subclause 9.2 for <err> values with extension.

The following extensions are proposed (TBD):

- TCP connection setup failure.
- Tx Buffer Full
- TCP connection closed by peer
- TCP connection closed due to idle timer expiration
- Can't execute command because PDN disconnected
- etc...

- <event>: decimal
 - o 1 – Rx buffer has more Bytes to read
 - o 2 – Socket deactivate due to idle timer expiry
 - o 3 – Socket terminated by peer
 - o 4 – New connected socket is accepted/spawned from parent listening socket
- <wlength>: decimal
 - o The actual length in Bytes of data written to the socket in "FASTSEND" command.

10.4. AT% SOCKETDATA Socket Data Delivery

AT%SOCKETDATA parameter and command syntax

Command	Possible response(s)
AT%SOCKETDATA= <cmd>[,<param1>[,<param2>[,<param3>...]]]	<p><i>Normally respond:</i></p> <p>For "RECEIVE" command: [%SOCKETDATA:<socket_id>[,<rlength>,<moreData>[,<rdata>]]] OK</p> <p>For "SEND" command: [%SOCKETDATA:<socket_id>[,<wlength>]] OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
AT%SOCKETDATA?	ERROR
AT%SOCKETDATA=?	% SOCKETDATA:(SEND,RECEIVE) OK
Reference:	Altair_SW_501_AT_Commands Guide_Rev3.pdf

Description:

This command is used to send/receive to/from the socket.

Note: An operation that returns with ERROR can be evidence that the TCP socket was closed (by the user, the socket idle timer, or the peer). There is unsolicited indication for socket closure by idle timer or by peer.

The "SEND" command returns "OK" after the actual transmission of the data, but before "ACK" reception from the peer. This can result in TX buffer fill-up and which may cause an additional "SEND" command with an ERROR.

The application can issue AT%SOCKET="LASTERROR" to get the reason for the last failure.

Defined values:

<cmd>

- "SEND" –Write to the socket
 - <param1>: decimal
 - The socket ID (identifier) of the socket.
 - <param2>: decimal
 - The length in Bytes of the data which need to be written; range is 1 to 1500 and represent the length of the "HEX" string.
 - <param3>: string
 - The data, in HEX format (in quotes), which will be written to the specified socket.

<cmd>

- "RECEIVE" –Read from the socket
 - <param1>: decimal
 - The socket ID (identifier) of the socket
 - <param2>: decimal
 - The maximal length of data buffer to be read from the socket; the range is 1 to 1500 and represent the length of the "HEX" string.

<socket_id>: decimal

- The socket ID (identifier) of the specified socket

<rlength>: decimal

- The actual length in Bytes of the data which was actually read.

<moreData>: decimal

- The length in bytes of the data left in the RX buffer

<rdata>: string

- The read data in HEX format (in quotes).

<wlength>: decimal

- The actual length in Bytes of data written to the socket.

10.5. AT% SOCKETEV Socket Event

AT%SOCKETEV parameter and command syntax

Command	Possible response(s)
AT%SOCKETEV= <event_id>,<mode>	<p><i>Normally respond:</i></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p>

	ERROR
AT%SOCKETEV?	ERROR
AT%SOCKETEV=?	% SOCKETEV:(0-4),(0-1) OK
(unsolicited)	%SOCKETEV:<event>,<socket_id> [,<connected_socket_id>]
Reference:	Altair_SW_501_AT_Commands Guide_Rev7.pdf

Description:

- The command is used to notify about socket events. The reporting may be enabled/disabled per event type.
- The unsolicited %SOCKETEV command is automatically enabled for all event types when the socket is opened using "OPEN" or "LISTEN" sub-commands of AT%SOCKETCMD.
- The unsolicited is sent in the following 4 cases:
 - o Rx buffer has more Bytes to read.
 - o Socket terminated due to Idle timer expiration
 - o Socket terminated by peer
 - o New connected socket is accepted/spawned from listening socket.
- There are two types of listener socket: "synchronous" and "asynchronous". For asynchronous socket user must wait for URC, which can be happened at any time (or never).
- An asynchronous listening socket is also called Parent Listening socket below. Parent listening socket, and connected sockets that are spawned from it, will have different IDs.
- The %SOCKETEV=4 command unsolicited response will be used to notify "accept incoming connection" after activating the parent listening socket. This URC provides both listening and spawned from its connected socket's IDs.

Defined values:

<event_id>: integer:

- o 0 – All events, used only in execution command
- o 1 – Rx buffer has more Bytes to read
- o 2 – Socket terminated due to Idle timer expiration
- o 3 – Socket terminated by peer
- o 4 – New connected socket is accepted/spawned from listening socket.

<mode>: integer; unsolicited result response presentation:

- o 0 - disabled
- o 1 – enabled

<socket_id>: integer; the socket ID (identifier) of the socket (parent for async)

<connected_socket_id>: integer; the socket ID (identifier) of connected socket spawned from specified parent listening socket

Example 1:

```
AT@DNSSEVR="8.8.8.8", ""
OK

AT%DNSRSLV=0,"ifconfig.co"
%DNSRSLV:0,"185.138.35.117"
%DNSRSLV:1,"2001:470:28:840::CAFE:D00D"
OK

AT%SOCKETCMD="ALLOCATE",0,"TCP","OPEN","185.138.35.117",80
%SOCKETCMD:1
OK

AT%SOCKETCMD="ACTIVATE",1
OK

/* The content sent by this command is as the below:
GET /ip HTTP/1.1\r\nHost: ifconfig.co\r\n\r\n
*/
AT%SOCKETDATA="SEND",1,39,"474554202F697020485454502F312E310D0A486
F73743A206966636F6E6669672E636F0D0A0D0A"
%SOCKETEV:1,1
%SOCKETDATA:1,39
OK

AT%SOCKETDATA="RECEIVE",1,1500
%SOCKETDATA:1,239,0,"485454502F312E3120323030204F4B0D0A53657276657
23A206E67696E780D0A446174653A205468752C203033204D61792032303138203
```

```
1303A33353A303020474D540D0A436F6E74656E742D547970653A20746578742F7
06C61696E3B20636861727365743D7574662D380D0A436F6E74656E742D4C656E6
774683A2031330D0A436F6E6E656374696F6E3A206B6565702D616C6976650D0A5
374726963742D5472616E73706F72742D53656375726974793A206D61782D61676
53D31353736383030303B20696E636C756465537562646F6D61696E733B2070726
56C6F61640D0A3230332E36392E33362E3739"
```

OK

/* The content received by this command is as the below:

HTTP/1.1 200 OK

Server: nginx

Date: Thu, 03 May 2018 10:35:00 GMT

Content-Type: text/plain; charset=utf-8

Content-Length: 13

Connection: keep-alive

Strict-Transport-Security: max-age=15768000; includeSubdomains;
preload

203.69.36.79

*/

Example 2:

```
/* Create an asynchronous TCP socket to listen port 9873 */
```

```
AT%SOCKETCMD="ALLOCATE",0,"TCP","LISTENP",,,9873
```

```
%SOCKETCMD:1
```

OK

```
AT%SOCKETCMD="ACTIVATE",1
```

OK

```
%SOCKETEV:4,1,2
```

```
AT%SOCKETDATA="SEND",2,4,"212D2E2D"
```

```
%SOCKETDATA:2,4
```

OK

```

/* Create an UDP socket to listen port 12345 */
AT%SOCKETCMD="ALLOCATE",0, "UDP","LISTEN",,,12345
%SOCKETCMD:1

OK
AT%SOCKETCMD="ACTIVATE",1
OK

%SOCKETEV:1,1
AT%SOCKETDATA="RECEIVE",1,1500
%SOCKETDATA:1,5,0,"212D2E2D0A"

OK

```

10.6. AT%PINGCMD Ping Request

AT%PINGCMD parameter command syntax

Command	Possible response(s)
%PINGCMD=<ip_type>,<dst_ip>[,<count>[,<packetsize>,<timeout>]]	<p><i>Normally respond:</i></p> <p>%PINGCMD:<id>,<dest_ip>,<rtt>,<ttl> [%PINGCMD:<id>,<dest_ip>,<rtt>,<ttl>[...]]</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
%PINGCMD?	ERROR
%PINGCMD=?	<p><i>Normally respond:</i></p> <p>OK</p>
Reference:	Altair_SW_501_AT_Commands Guide_Rev4.pdf

Description:

This command serves to send a PING request.

Defined values:

<id>: decimal

The identifier of each individual reply of the ping request (can be 1 to <count>)

<IP type>: decimal

0 – Ipv4

1 – IPv6

<dst_ip>: string

Destination (remote machine) IPv4 or IPv6 address

<packetsize>: decimal

Specifies the number of data bytes to be sent. The default is 56, which translates into 64 ICMP data bytes when combined with the 8 bytes of ICMP header data.

<count>: decimal

The number of ping request retries (default is 1)

<timeout>: decimal

Time to wait for a response, in seconds.

<ttl>: decimal

The time to leave within the PING reply. TTL specify how long to hold or use the packet or any of its included data before expiring and discarding it.

<rtt>: decimal

The round trip time of the PING

Example:

```
AT%PINGCMD=0,"216.58.200.36",20
%PINGCMD:1,"216.58.200.36",0,52
%PINGCMD:2,"216.58.200.36",0,52
%PINGCMD:3,"216.58.200.36",0,52
...
%PINGCMD:20,"216.58.200.36",0,52
OK
```

11. Hardware Related Commands

11.1. AT@GPIOCFG Configure The Specific GPIO

AT@GPIOCFG parameter and command syntax

Command	Possible response(s)
AT@GPIOCFG=<pin>,<direction>[,<state>]	<p>When the command is AT@GPIOCFG=<pin>,0</p> <p>Normally respond:</p> <p>OK</p> <p>If something is wrong, then respond:</p> <p>@EXTERR:<err_code></p> <p>When the command is AT@GPIOCFG=<pin>,0,<state></p> <p>Always respond:</p> <p>@EXTERR:<err_code></p> <p>When the command is AT@GPIOCFG=<pin>,1,<state></p> <p>Normally respond:</p> <p>OK</p> <p>If something is wrong, then respond:</p> <p>@EXTERR:<err_code></p> <p>When the command is AT@GPIOCFG=<pin>,1</p> <p>Always respond:</p> <p>@EXTERR:<err_code></p>
AT@GPIOCFG?	ERROR
AT@GPIOCFG=?	<p>@GPIOCFG:(<pin>),(0-1)[,(0-1)]</p> <p>OK</p>

Description:

This command serves to configure the specific GPIO.

Defined values:

<pin>^[Note #1]: integer, the specific pin to be controlled.

<direction>: integer

0 – Configure to be an input pin.

1 – Configure to be an output pin.

<state>: integer

0 – Set the voltage level of the specific pin to be low.

1 – Set the voltage level of the specific pin to be high.

<err_code>: integer, error code; refer to [Table B-1: Error codes supported for @EXTERR commands](#).

Note #1: IMA2A support GPIO 35,37,38,43,44,45,46,47,48,49,51,52,53

11.2. AT@GPIOGET Get The Logical State of The Specific GPIO

AT@GPIOGET parameter and command syntax

Command	Possible response(s)
AT@GPIOGET=<pin>	<i>Normally respond:</i> @GPIOGET:<state> OK <i>If something is wrong, then respond:</i> @EXTERR:<err_code>
AT@GPIOGET?	ERROR
AT@GPIOGET=?	@GPIOGET:(<pin>) OK

Description:

This command serves to get the state of the specific GPIO.

Defined values:

<pin>: integer, the specific pin to be controlled.

<state>: integer

0 – The voltage level of the specific pin is low.

1 – The voltage level of the specific pin is high.

<err_code>: integer, error code; refer to [Table B-1: Error codes supported for @EXTERR commands](#).

11.3. AT@GPIOSET Set The Logical State of The Specific GPIO

AT@GPIOSET parameter and command syntax

Command	Possible response(s)
AT@GPIOSET=<pin>,<state>	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> @EXTERR:<err_code>
AT@GPIOSET?	ERROR
AT@GPIOSET=?	@GPIOSET:(<pin>),(0-1) OK

Description:

This command serves to set the state of the specific GPIO.

Defined values:

<pin>: integer, the specific pin to be controlled.

<state>: integer

0 – Set the voltage level of the specific pin to be low.

1 – Set the voltage level of the specific pin to be high.

<err_code>: integer, error code; refer to [Table B-1: Error codes supported for @EXTERR](#)

[commands.](#)**Example:**

```
/* Configure GPIO_52 to be an output but forget to give a initial
state. An error code will be responded for warning. */
AT@GPIOCFG=52,1
@EXTERR:513

/* Configure GPIO_52 to be an output and initialize its logical
level to low. */
AT@GPIOCFG=52,1,0
OK

/* Check GPIO_52's state to make sure it is under logical level
low if necessary. */
AT@GPIOGET=52
@GPIOGET:0
OK

/* Set GPIO_52's logical level to be high. */
AT@GPIOSET=52,1
OK

/* Re-configure GPIO_52 to be an input pin. */
AT@GPIOCFG=52,0
OK

/* Try to set an input to be specific logical level and get a
erroneous response with failure code. */
AT@GPIOSET=52,1
@EXTERR:521

/* Try to get the logical level of an input. */
AT@GPIOGET=52
@GPIOGET:1
OK
```

11.4. AT@THERMO Thermal Detection

AT@THERMO parameter and command syntax

Command	Possible response(s)
AT@THERMO=<sensor_id>	<i>When the command is AT@THERMO=<sensor_id></i> <i>Normally respond:</i> @THERMO:<temperature> OK <i>If something is wrong, then respond:</i> @EXTERR:<err_code>
AT@THERMO?	ERROR
AT@THERMO=?	@THERMO: 0 OK

Description:

This command serves to query the temperature of the specific sensor.

Defined values:

<sensor_id>: integer

0 – The first sensor on the module.

<temperature>: integer, current temperature in degree Celsius for the specific sensor.

<err_code>: integer, error code; refer to [Table B-1: Error codes supported for @EXTERR commands](#).

Example:

```
at@THERMO=?
@THERMO:0
OK
```

```
/* Read the first sensor embedded on a WNC data module. */  
AT@THERMO=0  
@THERMO:34  
OK
```

12. Miscellaneous Commands

12.1. AT@HOSTINFO Send the Host's Information to the Module

AT@HOSTINFO parameter command syntax

Command	Possible response(s)
AT@HOSTINFO=<ver_number>,<manufacturer>,<model_name>,<model_id>	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> @EXTERR:<err_code>
AT@HOSTINFO?	@HOSTINFO:<ver_number>,<manufacturer>,<model_name>,<model_id> OK
AT@HOSTINFO=?	@HOSTINFO:(<ver_number>),(<manufacturer>),(<model_name>),(<model_id>) OK

Description:

Command sending the host's information to the module

Defined values:

<ver_number>: string, indicates the firmware version number of the host

<manufacturer>: string, indicates the manufacturer of host

<model_name>: string, indicates the model name of host

<model_id>: string, indicates the model id of host

Notes:

Once you set the HOST's information, restart device via ATZ command to store data

Example:


```
AT@HOSTINFO=?
@HOSTINFO:(<ver_number>),(<manufacturer>),(<model_name>),(<model_id>)
OK

AT@HOSTINFO="27","WNC","IMA2A","01"
OK

AT@HOSTINFO?
@HOSTINFO:27,WNC,IMA2A,01
OK

/* Once you send the HOST's information to the Module, please restart device via ATZ
command to store data */

ATZ
OK
```

13. Short Message Service Commands

13.1. AT+CMGF Select SMS Message Format

AT+CMGF parameter command syntax

Command	Possible response(s)
+CMGF=[<mode>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+CMGF?	<i>Normally respond:</i> +CMGF: <mode> OK <i>If something is wrong, then respond:</i> ERROR
+CMGF=?	<i>Normally respond:</i> +CMGF: (list of supported <mode>s) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.005

Description:

Set command tells the TA, which input and output format of messages to use. <mode> indicates the format of messages used with send, list, read and write commands and unsolicited result codes resulting from received messages. Mode can be either PDU mode (entire TP data units used) or text mode (headers and body of the messages given as separate parameters). Text mode uses the value of parameter <chset> specified by command Select TE Character Set +CSCS to inform the character set to be used in the message body in the TA-TE interface.

Test command returns supported modes as a compound value.

Defined values:

<mode>: integer

0 – PDU mode

1 – Text mode

Example :

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

13.2. AT+CMGL List SMS Messages from Preferred Store

AT+CMGL parameter command syntax

Command	Possible response(s)
+CMGL[=<stat>]	<i>Normally respond:</i> +CMGL: <index>,<stat>,<oa/da>,<[alpha]>,<[scts]>,<[tooa/toda>,<length>><CR><LF><data><[CR><LF> +CMGL: <index>,<stat>,<da/oa>,<[alpha]>,<[scts]>,<[tooa/toda>,<length>><CR><LF><data>[...]] OK <i>If something is wrong, then respond:</i> ERROR or +CMS ERROR: <err>

+CMGL=?	<i>Normally respond:</i>
	+CMGL: (list of supported <stat>s)
	OK
	<i>If something is wrong, then respond:</i>
	ERROR
Reference:	3GPP TS 27.005

Description:

Execution command returns messages with status value <stat> from message storage <mem1> to the TE. About text mode parameters, refer command Show Text Mode Parameters +CSDH. If status of the message is 'received unread', status in the storage changes to 'received read'. If listing fails, final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#).

Test command shall give a list of all status values supported by the TA.

NOTE: Support only Text mode

Defined values:

<stat>: string type in text mode (default "REC UNREAD"); indicates the status of message in memory;

- "REC UNREAD" – Received unread message (i.e. new message)
- "REC READ" – Received read message
- "STO UNSENT" – Stored unsent message (only applicable to SMs)
- "STO SENT" – Stored sent message (only applicable to SMs)
- "ALL" – All Messages (only applicable to +CMGL command)

<index>: integer, value in the range of location numbers supported by the associated memory

<oa>: string, 3GPP TS 23.040 TP-Originating-Address Address-Value field; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <tooa>

<da>: string, 3GPP TS 23.040 TP-Destination-Address Address-Value field; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address

given by <toa>

<alpha>: string, alphanumeric representation of <da> or <oa> corresponding to the entry found in MT phonebook; implementation of this feature is manufacturer specific; used character set should be the one selected with command Select TE Character Set +CSCS (see definition of this command in 3GPP TS 27.007)

<scts>: string, 3GPP TS 23.040 TP-Service-Centre-Time-Stamp in time-string format

<toa>: integer, 3GPP TS 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)

<toa>: integer, 3GPP TS 24.011 TP-Originating-Address Type-of-Address octet in integer format (default refer <toa>)

<length>: integer, value indicating in the text mode (+CMGF=1) the length of the message body <data> in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<data>: In the case of SMS: 3GPP TS 23.040 TP-User-Data in text mode responses; format:

- if <dcs> indicates that 3GPP TS 23.038 GSM 7 bit default alphabet is used and <fo> indicates that TP-User-Data-Header-Indication is not set:
 - if TE character set other than "HEX": ME/TA converts GSM alphabet into current TE character set
 - if TE character set is "HEX": ME/TA converts each 7-bit character of GSM 7 bit default alphabet into two IRA character long hexadecimal number
- if <dcs> indicates that 8-bit or UCS2 data coding scheme is used, or <fo> indicates that 3GPP TS 23.040 TP-User-Data-Header-Indication is set: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number

Example:

```
AT+CMGL=?
+CMGL: ("ALL","REC UNREAD","REC READ","STO UNSENT","STO SENT")
OK
AT+CMGL="ALL"
+CMGL: 1,"STO UNSENT","0123456789",,"70/01/01,01:11:21-00",
sdfsdafjkljl
OK
```

13.3. AT+CMGD Delete Short Message

AT+CMGD parameter command syntax

Command	Possible response(s)
+CMGD=<index>[,<delflag>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR or +CMS ERROR: <err>
+CMGD=?	<i>Normally respond:</i> +CMGD: (list of supported<index>s)[,(list of supported<delflag>s)] OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.005

Description:

Execution command deletes message from preferred message storage <mem1> location <index>. If <delflag> is present and not set to 0 then the ME shall ignore <index> and follow the rules for <delflag> shown below. If deleting fails, final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#).

Test command shows the valid memory locations and optionally the supported values of <delflag>.

Defined values:

<index>: integer type; value in the range of location numbers supported by the associated memory

<delflag>: integer

- 0 – Delete the message specified in <index>
- 1 – Delete all read messages from preferred message storage, leaving unread messages and stored mobile originated messages (whether sent or not) untouched
- 2 – Delete all read messages from preferred message storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched
- 3 – Delete all read messages from preferred message storage, sent and unsent mobile originated messages leaving unread messages untouched.
- 4 – Delete all messages from preferred message storage including unread messages.

Example:

```

AT+CMGD=?
+CMGD: (1 - 300),(0-4)
OK
AT+CMGL="ALL"
+CMGL: 1,"REC READ","+1234567890",,"17/07/27,18:40:34+32",
{"type":"g", "cmd":"1","txn_id":"437b535da83e346f"}
+CMGL: 2,"STO UNSENT","764332637249279",,"70/01/01,00:35:43-00",
Hello World
+CMGL: 3,"REC UNREAD","764332637249279",,"17/12/28,11:17:08+00",
Short Message Service Text.
OK
AT+CMGD=2
OK
AT+CMGL="ALL"
+CMGL: 1,"REC READ","+1234567890",,"17/07/27,18:40:34+32",
{"type":"g", "cmd":"1","txn_id":"437b535da83e346f"}
+CMGL: 3,"REC READ","764332637249279",,"17/12/28,11:17:08+00",
Short Message Service Text.
OK

```

13.4. AT+CMGR Read SMS Messages

AT+CMGR parameter command syntax

Command	Possible response(s)
---------	----------------------

+CMGR=<index>	<p><i>Normally respond(Text mode +CMGF=1) SMS-DELIVER:</i></p> <p>+CMGR:</p> <p><stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcsc>,<sca>,<tosca>,<length>]<CR><LF><data></p> <p>OK</p> <p><i>Normally respond(Text mode +CMGF=1) SMS-SUBMIT:</i></p> <p>+CMGR:</p> <p><stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcsc>,[<vp>],<sca>,<tosca>,<length>]<CR><LF><data></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p> <p>or</p> <p>+CMS ERROR: <err></p>
+CMGR=?	<p><i>Normally respond:</i></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	3GPP TS 27.005

Description:

Execution command returns message with location value <index> from message storage <mem1> to the TE. About text mode parameters, refer command Show Text Mode Parameters +CSDH. If status of the message is 'received unread', status in the storage changes to 'received read'. If reading fails, final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#).

NOTE: Support only Text mode

Defined values:

<stat>: string type in text mode (default "REC UNREAD"); indicates the status of message in memory;

- "REC UNREAD" – Received unread message (i.e. new message)
- "REC READ" – Received read message
- "STO UNSENT" – Stored unsent message (only applicable to SMS)
- "STO SENT" – Stored sent message (only applicable to SMS)
- "ALL" – All Messages (only applicable to +CMGL command)

<index>: integer, value in the range of location numbers supported by the associated memory

<oa>: string, 3GPP TS 23.040 TP-Originating-Address Address-Value field; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <tooa>

<da>: string, 3GPP TS 23.040 TP-Destination-Address Address-Value field; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <toda>

<alpha>: string, alphanumeric representation of <da> or <oa> corresponding to the entry found in MT phonebook; implementation of this feature is manufacturer specific; used character set should be the one selected with command Select TE Character Set +CSCS (see definition of this command in 3GPP TS 27.007)

<scts>: string, 3GPP TS 23.040 TP-Service-Centre-Time-Stamp in time-string format

<toda>: integer, 3GPP TS 23.040 TP-Destination-Address Type-of-Address octet (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)

<tooa>: integer, 3GPP TS 23.040 TP-Originating-Address Type-of-Address octet

<length>: integer, value indicating in the text mode (+CMGF=1) the length of the message body <data> in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<data>: In the case of SMS: 3GPP TS 23.040 TP-User-Data in text mode responses; format:
- if <dc> indicates that 3GPP TS 23.038 GSM 7 bit default alphabet is used and <fo> indicates that TP-User-Data-Header-Indication is not set:
 - if TE character set other than "HEX": ME/TA converts GSM alphabet into current TE character set
 - if TE character set is "HEX": ME/TA converts each 7-bit character of GSM 7 bit default alphabet into two IRA character long hexadecimal number
- if <dc> indicates that 8-bit or UCS2 data coding scheme is used, or <fo> indicates that TP-User-Data-Header-Indication is set: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number

- <fo>: integer, depending on the command or result code: first octet of SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, or SMS-COMMAND (default 2) in integer format
- <pid>: integer, 3GPP TS 23.040 TP-Protocol-Identifier (default 0)
- <dc>: integer, depending on the command or result code: 3GPP TS 23.038 SMS Data Coding Scheme (default 0), or Cell Broadcast Data Coding Scheme
- <sca>: string, 3GPP TS 24.011 RP SC address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <tosca>
- <tosca>: integer, 3GPP TS 24.011 RP SC address Type-of-Address octet
- <vp>: integer or string, depending on SMS-SUBMIT <fo> setting: 3GPP TS 23.040 TP-Validity-Period either in integer format (default 167) or in time-string format

Example:

```
AT+CMGR=1
+CMGR: "REC READ", "+1234567890", , "17/07/27,18:40:34+32",
{"type": "g", "cmd": "1", "txn_id": "437b535da83e346f"}
OK
AT+CMGR=?
OK
```

13.5. AT+CMGS Send Short Message

AT+CMGS parameter command syntax

Command	Possible response(s)
---------	----------------------

Text mode(+CMGF=1): *Normally respond(Text mode +CMGF=1):*

+CMGS=<da>[,<tda>]<CR> +CMGS: <mr>[,<scts>]

text is entered<ctrl-Z/ESC> OK

PDU mode(+CMGF=0): *Normally respond(PDU mode +CMGF=0):*

+CMGS=<length><CR> +CMGS: <mr>[,<ackpdu>]

PDU is given<ctrl-Z/ESC> OK

If something is wrong, then respond:

ERROR

or

+CMS ERROR: <err>

+CMGS=? *Normally respond:*

OK

If something is wrong, then respond:

ERROR

Reference: 3GPP TS 27.005

Description:

Execution command sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Value can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#). This command should be abortable.

- entered text (3GPP TS 23.040 TP-Data-Unit) is sent to address <da> and all current settings (refer Set Text Mode Parameters +CSMP and Service Centre Address +CSCA) are used to

construct the actual PDU in ME/TA.

- the TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after command line is terminated with <CR>; after that text can be entered from TE to ME/TA.

- the DCD signal shall be in ON state while text is entered.

- the echoing of entered characters back from the TA is controlled by V.25ter echo command E.

- the entered text should be formatted as follows:

- if <dcs> (set with +CSMP) indicates that 3GPP TS 23.038 GSM 7 bit default alphabet is used and <fo> indicates that 3GPP TS 23.040 TP-User-Data-Header-Indication is not set:

- if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in 3GPP TS 27.007): ME/TA converts the entered text into the GSM 7 bit default alphabet; backspace can be used to delete last character and carriage returns can be used (previously mentioned four character sequence shall be sent to the TE after every carriage return entered by the user);

- if TE character set is "HEX": the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into the GSM 7 bit default alphabet characters.

- if <dcs> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that 3GPP TS 23.040 TP-User-Data-Header-Indication is set: the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet.

- sending can be cancelled by giving <ESC> character (IRA 27).

- <ctrl-Z> (IRA 26) must be used to indicate the ending of the message body.

For PDU mode:

Execution command sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when +CSMS <service> value is 1 and network supports) <ackpdu> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#). This command should be abortable.

- <length> must indicate the number of octets coded in the TP layer data unit to be given (i.e. SMSC address octets are excluded).
- the TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after command line is terminated with <CR>; after that PDU can be given from TE to ME/TA.
- the DCD signal shall be in ON state while PDU is given.
- the echoing of given characters back from the TA is controlled by V.25ter echo command E.
- the PDU shall be hexadecimal format (similarly as specified for <pdu>) and given in one line; ME/TA converts this coding into the actual octets of PDU.
- when the length octet of the SMSC address (given in the PDU) equals zero, the SMSC address set with command Service Centre Address +CSCA is used; in this case the SMSC Type-of-Address octet shall not be present in the PDU, i.e. TPDU starts right after SMSC length octet.
- sending can be cancelled by giving <ESC> character (IRA 27).
- <ctrl-Z> (IRA 26) must be used to indicate the ending of PDU.

Defined values:

- <da>: string, 3GPP TS 23.040 TP-Destination-Address Address-Value field; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <tda>
- <scts>: string, 3GPP TS 23.040 TP-Service-Centre-Time-Stamp in time-string format
- <tda>: integer, 3GPP TS 23.040 TP-Destination-Address Type-of-Address octet (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)
- <mr>: integer, 3GPP TS 23.040 TP-Message-Reference in integer format
- <ackpdu>: string, 3GPP TS 23.040 RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without 3GPP TS 24.011 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

Example:

```
AT+CMGS="764332637249279"  
> sdfsdsgdsg<ctrl_z>  
+CMGS: 2
```

```
AT+CMGS=?  
OK
```

13.6. AT+CMGW Write Short Messages to Memory

AT+CMGW parameter command syntax

Command	Possible response(s)
Text mode(+CMGF=1): +CMGW[=<oa/da>[,<tooa/toda>[,<stat>]]<CR>text is entered<ctrl-Z/ESC>	<i>Normally respond(Text mode +CMGF=1):</i> +CMGW: <index> OK <i>If something is wrong, then respond:</i> ERROR or +CMS ERROR: <err>
+CMGW=?	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.005

Description:

Execution command stores message (either SMS-DELIVER or SMS-SUBMIT) to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows also other status values to be given. (ME/TA manufacturer may choose to use different default <stat> values for different message types.) The entering of text is done similarly as specified in command Send Message +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#).

NOTE: SMS-COMMANDs and SMS-STATUS-REPORTs can not be stored in text mode.

NOTE: Support only Text mode

Defined values:

<stat>: string type in text mode (default "REC UNREAD"); indicates the status of message in memory;

- "REC UNREAD" – Received unread message (i.e. new message)
- "REC READ" – Received read message
- "STO UNSENT" – Stored unsent message (only applicable to SMS)
- "STO SENT" – Stored sent message (only applicable to SMS)
- "ALL" – All Messages (only applicable to +CMGL command)

<index>: integer, value in the range of location numbers supported by the associated memory

<oa>: string, 3GPP TS 23.040 TP-Originating-Address Address-Value field; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <tooa>

<da>: string, 3GPP TS 23.040 TP-Destination-Address Address-Value field; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <toda>

<tooa>: integer, 3GPP TS 23.040 TP-Originating-Address Type-of-Address octet

<toda>: integer, 3GPP TS 23.040 TP-Destination-Address Type-of-Address octet (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)

<length>: integer, value indicating in the text mode (+CMGF=1) the length of the message body <data> in characters; (i.e. the RP layer SMSC address octets are not counted in the length)

Example:

```
AT+CMGW="764332637249279"
> Hello world!(ctrl_z)
+CMGW: 2
OK
AT+CMGL="ALL"
+CMGL: 1,"REC READ","+1234567890",,"17/07/27,18:40:34+32",
{"type":"g", "cmd":"1","txn_id":"437b535da83e346f"}
+CMGL: 2,"STO UNSENT","764332637249279",,"70/01/01,00:00:56-00",
Hello world!
+CMGL: 3,"REC READ","764332637249279",,"17/12/28,11:17:08+00",
```

```
Short Message Service Text.
```

```
OK
```

```
AT+CMGW=?
```

```
OK
```

13.7. AT+CMSS Send Short Messages from Storage

AT+CMSS parameter command syntax

Command	Possible response(s)
+CMSS=<index>[,<da>[,<toda>]]	<p><i>Normally respond(Text mode +CMGF=1):</i> +CMSS: <mr>[,<scts>] OK</p> <p><i>Normally respond(PDU mode +CMGF=0):</i> +CMSS: <mr>[,<ackpdu>] OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p> <p>or +CMS ERROR: <err></p>
+CMSS=?	<p><i>Normally respond:</i> OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
Reference:	3GPP TS 27.005

Description:

Execution command sends message with location value <index> from preferred message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). If new recipient address <da> is given for SMS-SUBMIT, it shall be used instead of the one stored with the message. Reference value <mr> is returned to the TE on successful message delivery.

Optionally (when +CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#). This command should be abortable.

Defined values:

- <index>: integer, value in the range of location numbers supported by the associated memory
- <da>: string, 3GPP TS 23.040 TP-Destination-Address Address-Value field; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <toda>
- <scts>: string, 3GPP TS 23.040 TP-Service-Centre-Time-Stamp in time-string format
- <toda>: integer, 3GPP TS 23.040 TP-Destination-Address Type-of-Address octet (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)
- <mr>: integer, 3GPP TS 23.040 TP-Message-Reference
- <ackpdu>: string, 3GPP TS 23.040 RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without 3GPP TS 24.011 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

Example:

```
AT+CMSS=?
OK
AT+CMGL="ALL"
+CMGL: 1,"STO SENT","764332637249279",,"00/57/07,74:81:03+09",
This is the message body
OK
AT+CMSS=1
+CMSS: 9
OK
```

13.8. AT+CNMA New Message Acknowledgement to UE/TE

AT+CNMA parameter command syntax

Command	Possible response(s)
Text mode(+CMGF=1): +CNMA	<i>Normally respond(Text mode +CMGF=1):</i> OK
PDU mode(+CMGF=0): +CNMA[=<n>[,<length>[<CR> PDU is given<ctrl-Z/ESC>]]]	<i>Normally respond(PDU mode +CMGF=0):</i> OK <i>If something is wrong, then respond:</i> ERROR or +CMS ERROR: <err>
+CNMA=?	<i>Normally respond(Text mode +CMGF=1):</i> OK <i>Normally respond(PDU mode +CMGF=0):</i> +CNMA: (list of supported <n>s) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.005

Description:

For text mode:

Execution command confirms correct reception of a new message (SMS-DELIVER or SMS-STATUS-REPORT) which is routed directly to the TE (refer command +CNMI). This acknowledgement command (causing ME to send RP-ACK to the network) shall be used when +CSMS parameter <service> equals 1. TA shall not send another +CMT or +CDS result code to TE before previous one is acknowledged.

For PDU mode:

Execution command confirms reception of a new message (SMS-DELIVER or SMS-STATUS-REPORT) which is routed directly to the TE (refer command +CNMI). This acknowledgement

command shall be used when +CSMS parameter <service> equals 1. In PDU mode, it is possible to send either positive (RPACK) or negative (RP-ERROR) acknowledgement to the network. Parameter <n> defines which one will be sent. Optionally (when <length> is greater than zero) an acknowledgement TPDU (SMS-DELIVER-REPORT for RPACK or RP-ERROR) may be sent to the network. The entering of PDU is done similarly as specified in command Send Message +CMGS, except that the format of <ackpdu> is used instead of <pdu> (i.e. SMSC address field is not present). PDU shall not be bounded by double quotes. TA shall not send another +CMT or +CDS result code to TE before previous one is acknowledged.

If ME does not get acknowledgement within required time (network timeout), ME should respond as specified in 3GPP TS 24.011 to the network. ME/TA shall automatically disable routing to TE by setting both <mt> and <ds> values of +CNMI to zero.

If command is executed, but no acknowledgement is expected, or some other ME related error occurs, final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#).

NOTE: In case that a directly routed message must be buffered in ME/TA (possible when +CNMI parameter <mode> equals 0 or 2) or AT interpreter remains too long in a state where result codes cannot be sent to TE (e.g. user is entering a message using +CMGS), acknowledgement (RP-ACK) must be sent to the network without waiting +CNMA command from TE. Later, when buffered result codes are flushed to TE, TE must send +CNMA[=0] acknowledgement for each result code. In this way, ME/TA can determine if message should be placed in non-volatile memory and routing to TE disabled (+CNMA[=0] not received). Refer command +CNMI for more details how to use <mode> parameter reliably.

For PDU mode, test command returns a list of supported <n> values. If the only value supported is 0, the device does not support sending of TPDU.

Defined values:

<n>: integer

- 0 – Command operates similarly as defined for the text mode
- 1 – Send RP-ACK (or buffered result code received correctly)
- 2 – Send RP-ERROR (if PDU is not given, ME/TA shall send SMS-DELIVER-REPORT with 3GPP TS 23.040 TP-FCS value set to 'FF' (unspecified error cause))

<length>: integer, value indicating in the text mode (+CMGF=1) the length of the message body <data> in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

Example:

```
/* Set Text mode */
AT+CMFG=1
OK
/* SMS Event Reporting Configuration */
AT+CNMI=2,2,0,0,0
OK
/* message received*/
+CMT: "764332637249279",,"17/12/29,10:37:48+00",
Short Message Service Text.
/* acknowledge the message received and then send positive
acknowledgment to the network */
AT+CNMA
OK
/* try to acknowledge again */
AT+CNMA
+CMS ERROR: 340
```

13.9. AT+CNMI SMS Event Reporting Configuration

AT+CNMI parameter command syntax

Command	Possible response(s)
+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR or +CMS ERROR: <err>

+CNMI?	<p><i>Normally respond:</i></p> <p>+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
+CNMI=?	<p><i>Normally respond:</i></p> <p>+CNMI: (list of supported <mode>s),(list of supported <mt>s),(list of supported <bm>s),(list of supported <ds>s),(list of supported <bfr>s)</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	3GPP TS 27.005

Description:

Set command selects the procedure, how receiving of new messages from the network is indicated to the TE when TE is active, e.g. DTR signal is ON. If TE is inactive (e.g. DTR signal is OFF), message receiving should be done as specified in 3GPP TS 23.038.

NOTE 1: When DTR signal is not available or the state of the signal is ignored (V.25ter command &D0), reliable message transfer can be assured by using +CNMA acknowledgement procedure.

<mode> controls the processing of unsolicited result codes specified within this command, <mt> sets the result code indication routing for SMS-DELIVERs, <bm> for CBMs and <ds> for SMS-STATUS-REPORTs. <bfr> defines the handling method for buffered result codes when <mode> 1, 2 or 3 is enabled. If ME does not support requested item (although TA does), final result code +CMS ERROR: <err> is returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#).

Test command gives the settings supported by the TA as compound values.

NOTE 2: Command Select Message Service +CSMS should be used to detect ME support of

mobile terminated SMs and CBMs, and to define whether a message routed directly to TE should be acknowledged or not (refer command +CNMA).

Defined values:

<mode>: integer

NOTE 3: The buffering mechanism may as well be located in the ME; the setting affects only to unsolicited result codes specified within this command):

- 1 – Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved (e.g. in on-line data mode). Otherwise forward them directly to the TE.
- 2 – Buffer unsolicited result codes in the TA when TA-TE link is reserved (e.g. in on-line data mode) and flush them to the TE after reservation. Otherwise forward them directly to the TE.

NOTE 4: It is possible that ME/TA result code buffer is in volatile memory. In this case messages may get lost if the power of ME/TA is switched off before codes are sent to TE. Thus, it is not recommended to use direct message routing (<mt>=2 or 3, <bm>=2 or 3, or <ds>=1) with <mode> value 0 or 2.

<mt>: integer, the rules for storing received SMs depend on its data coding scheme (refer 3GPP TS 23.038), preferred memory storage (+CPMS) setting and this value;

NOTE 5: If AT command interface is acting as the only display device, the ME must support storing of class 0 messages and messages in the message waiting indication group (discard message):

- 0 – No SMS-DELIVER indications are routed to the TE.
- 1 – If SMS-DELIVER is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code:

+CMTI: <mem>,<index>

- 2 – SMS-DELIVERs (except class 2 messages and messages in the message waiting indication group (store message)) are routed directly to the TE using unsolicited result code:

+CMT: [<alpha>],<length><CR><LF><pdu> (PDU mode enabled); or

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

If ME has its own display device then class 0 messages and messages in the message waiting indication group (discard message) may be copied to both ME display and to TE. In this case, ME shall send the acknowledgement to the network. Class 2 messages and messages in the message waiting indication group (store

message) result in indication as defined in <mt>=1.

<mt>	Receiving procedure for different message data coding schemes (refer 3GPP TS 23.038 [2])
0	no class: as in 3GPP TS 23.038 [2], but use <mem3> as preferred memory class 0: as in 3GPP TS 23.038 [2], but use <mem3> as preferred memory if message is tried to be stored class 1: as in 3GPP TS 23.038 [2], but use <mem3> as preferred memory class 2: as in 3GPP TS 23.038 [2] class 3: as in 3GPP TS 23.038 [2], but use <mem3> as preferred memory message waiting indication group (discard message): as in 3GPP TS 23.038 [2], but use <mem3> as preferred memory if message is tried to be stored message waiting indication group (store message): as in 3GPP TS 23.038 [2], but use <mem3> as preferred memory
1	as <mt>=0 but send indication if message stored successfully
2	no class: route message to TE class 0: as in 3GPP TS 23.038 [2], but also route message to TE and do not try to store it in memory class 1: route message to TE class 2: as <mt>=1 class 3: route message to TE message waiting indication group (discard message): as in 3GPP TS 23.038 [2], but also route message to TE and do not try to store it in memory message waiting indication group (store message): as <mt>=1

<bm>: integer, the rules for storing received CBMs depend on its data coding scheme (refer 3GPP TS 23.038), the setting of Select CBM Types (+CSCB) and this value;

- 0 – No CBM indications are routed to the TE.
- 2 – New CBMs are routed directly to the TE using unsolicited result code:

+CBM: <length><CR><LF><pdu> (PDU mode enabled);

If ME supports data coding groups which define special routing also for messages other than class 3 (e.g. (U)SIM specific messages), ME may choose not to route messages of such data coding schemes into TE (indication of a stored CBM may be given as defined in <bm>=1).

<ds>: integer

- 0 – No SMS-STATUS-REPORTs are routed to the TE.
- 1 – SMS-STATUS-REPORTs are routed to the TE using unsolicited result code:

+CDS: <length><CR><LF><pdu> (PDU mode enabled); or

+CDS: <fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st> (text mode enabled)

- 2 – If SMS-STATUS-REPORT is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code:

+CDSI: <mem>,<index>

<bfr>: integer

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

when <mode> 1...3 is entered.

Example:

```
AT+CNMI=?
+CNMI: (1,2),(0-2),(0,2),(0-2),(0-1)
OK
AT+CNMI?
+CNMI: 1,1,0,2,1
OK
AT+CNMI=2,1,0,0,0
OK
/* message received*/
+CMTI: "SM",2

AT+CNMI=2,2,0,0,0
OK
/* message received*/
+CMT: "764332637249279",,"17/12/29,10:22:45+00",
Short Message Service Text.
```

13.10. AT+CPMS Preferred SMS Message Storage

AT+CPMS parameter command syntax

Command	Possible response(s)
+CPMS=<mem1>[,<mem2>[,<mem3>]]	<i>Normally respond:</i> +CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> OK <i>If something is wrong, then respond:</i> ERROR or +CMS ERROR: <err>

+CPMS?	<p><i>Normally respond:</i></p> <p>+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p> <p>or`</p> <p>+CMS ERROR: <err></p>
+CPMS=?	<p><i>Normally respond:</i></p> <p>+CPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s) OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	3GPP TS 27.005

Description:

Set command selects memory storages <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. If chosen storage is not appropriate for the ME (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#).

Test command returns lists of memory storages supported by the TA.

Defined values:

<mem1>: string, memory from which messages are read and deleted (commands List Messages +CMGL, Read Message +CMGR and Delete Message +CMGD); defined values (others are manufacturer specific):

- "ME" – ME message storage
- "SM" – (U)SIM message storage

<mem2>: string, memory to which writing and sending operations are made (commands

Send Message from Storage +CMSS and Write Message to Memory +CMGW));

- "ME" – ME message storage
- "SM" – (U)SIM message storage

<mem3>: string, memory to which received SMs are preferred to be stored (unless forwarded directly to TE; refer command New Message Indications +CNMI); received CBMs are always stored in "BM" (or some manufacturer specific storage) unless directly forwarded to TE; received status reports are always stored in "SR" (or some manufacturer specific storage) unless directly forwarded to TE.

- "ME" – ME message storage
- "SM" – (U)SIM message storage

<total1>: integer, total number of message locations in <mem1>

<total2>: integer, total number of message locations in <mem2>

<total3>: integer, total number of message locations in <mem3>

<used1>: integer, number of messages currently in <mem1>

<used2>: integer, number of messages currently in <mem2>

<used3>: integer, number of messages currently in <mem3>

Example:

```
AT+CPMS=?
+CPMS: ("ME","SM"),("ME","SM"),("ME","SM")
OK
AT+CPMS?
+CPMS: "ME",0,150,"ME",0,150,"ME",0,150
OK
AT+CPMS="SM","SM","SM"
+CPMS: 0,30,0,30,0,30
OK
```

13.11. AT+CSCA SMS Service Center Address

AT+CSCA parameter command syntax

Command	Possible response(s)
---------	----------------------

+CSCA=<sca>[,<tosca>]	<p><i>Normally respond:</i> OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
+CSCA?	<p><i>Normally respond:</i> +CSCA: <sca>,<tosca> OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
+CSCA=?	<p><i>Normally respond:</i> OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
Reference:	3GPP TS 27.005

Description:

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

Defined values:

<sca>: string, 3GPP TS 24.011 RP SC address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <tosca>

<tosca>: integer, 3GPP TS 24.011 RP SC address Type-of-Address octet

Example:

```
AT+CSCA?
+CSCA: "00",129
```

```
OK
AT+CSCA=?
OK
AT+CSCA="01234",145
OK
```

13.12. AT+CSDH Show SMS Text Mode Parameters

AT+COPN parameter command syntax

Command	Possible response(s)
+CSDH=[<show>]	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
+CSDH?	<i>Normally respond:</i> +CSDH: <show> OK <i>If something is wrong, then respond:</i> ERROR
+CSDH=?	<i>Normally respond:</i> +CSDH: (list of supported <show>s) OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.005

Description:

Set command controls whether detailed header information is shown in text mode result codes ex: <today> or <fo>.

Test command returns supported values as a compound value.

Defined values:

<show>: integer

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

Example:

```
AT+CSDH=?
+CSDH: (0,1)
OK
AT+CSDH?
+CSDH: 0
OK
/* Do not show header values */
AT+CMGR=4
+CMGR: "REC READ","764332637249279",,"17/12/29,09:59:25+00",
Short Message Service Text.
OK
AT+CSDH=1
OK
/* Show the values in result codes */
AT+CMGR=4
+CMGR: "REC
READ","764332637249279",,"17/12/29,09:59:25+00",128,4,0,0,"7643326
37249279",128,31
Short Message Service Text.
OK
```

13.13. AT+CSMP Set SMS Text Mode Parameters

AT+CSMP parameter command syntax

Command	Possible response(s)
+CSMP=[<fo>[,<vp>[,<pid>[,<dc>]]]]	<p><i>Normally respond:</i> OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
+CSMP?	<p><i>Normally respond:</i> +CSMP: <fo>,<vp>,<pid>,<dc> OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
+CSMP=?	<p><i>Normally respond:</i> +CSMP: (list of supported <fo>s),(list of supported <vp>s),(list of supported <pid>s),(list of supported <dc>s) OK</p> <p><i>If something is wrong, then respond:</i> ERROR</p>
Reference:	3GPP TS 27.005

Description:

Set command is used to select values for additional parameters needed when SM is sent to the network or placed in a storage when text format message mode is selected. It is possible to set the validity period starting from when the SM is received by the SMSC (<vp> is in range 0... 255) or define the absolute time of the validity period termination (<vp> is a string). The format of <vp> is given by <fo>. If TA supports the EVPE, see 3GPP TS 23.040 [3], it shall be given as a hexadecimal coded string (refer e.g. <pdu>) with double quotes.

NOTE: When storing a SMS-DELIVER from the TE to the preferred memory storage in text mode (refer command Write Message to Memory +CMGW), <vp> field can be used for <scts>.

Defined values:

<fo>: integer, depending on the command or result code: first octet of SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, or SMS-COMMAND (default 2) in integer format

<pid>: integer, 3GPP TS 23.040 TP-Protocol-Identifier (default 0)

<dcs>: integer, depending on the command or result code: 3GPP TS 23.038 SMS Data Coding Scheme (default 0), or Cell Broadcast Data Coding Scheme

<vp>: integer or string, depending on SMS-SUBMIT <fo> setting: 3GPP TS 23.040 TP-Validity-Period either in integer format (default 167) or in time-string format

Example:

```
AT+CSMP=?  
+CSMP: (1,17,33,49,65,81,97,113),(0-255),(0),(0,4,8)  
OK  
AT+CSMP?  
+CSMP: 49,169,0,0  
OK  
AT+CSMP=17,172,0,8  
OK
```

13.14. AT+CSMS Select Message Service

AT+CSMS parameter command syntax

Command	Possible response(s)
---------	----------------------

+CSMS=<service>	<p><i>Normally respond:</i></p> <p>+CSMS: <mt>,<mo>,<bm></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p> <p>or</p> <p>+CMS ERROR: <err></p>
+CSMS?	<p><i>Normally respond:</i></p> <p>+CSMS: <service>,<mt>,<mo>,<bm></p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
+CSMS=?	<p><i>Normally respond:</i></p> <p>+CSMS: (list of supported <service>s)</p> <p>OK</p> <p><i>If something is wrong, then respond:</i></p> <p>ERROR</p>
Reference:	3GPP TS 27.005

Description:

Set command selects messaging service <service>. It returns the types of messages supported by the ME: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages. If chosen service is not supported by the ME (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned. Refer to [Table A-2 Error codes supported for +CMS ERROR for <err> values](#).

Also read command returns supported message types along the current service setting.

Defined values:

<service>: integer

- 0 – 3GPP TS 23.040 and 3GPP TS 23.041
- 1 – 3GPP TS 23.040 and 3GPP TS 23.041 the requirement of <service> setting 1 is mentioned under corresponding command descriptions)

<mt>,<mo>,<bm>: integer

- 0 – Type not supported
- 1 – Type supported

Example:

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

14. PPP Configuration Commands

14.1. ATD*99*** PPP Data Session Command

ATD*99*** parameter command syntax

Command	Possible response(s)
ATD*99***<ext_session_id>#	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
Reference:	3GPP TS 27.005

Description:

AT command to initiate end to end PPP session with the LTE network on specific PDN which is set by the <ext_session_id> parameter.

Defined values:

<ext_session_id>: integer, numeric value of the session identifier defined in the NP config file.

14.2. AT%PPPLOC Local PPP Session Command

AT%PPPLOC parameter command syntax

Command	Possible response(s)
AT%PPPLOC	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
AT%PPPLOC=?	<i>Normally respond:</i> OK

Reference: Altair_SW_501_AT_Commands Guide_Rev3.pdf

Description:

AT command to initiate local PPP session for modem management without LTE network PPP data connectivity. This command purpose is to provide user with management access to the modem, in a case when there is no active PDN available. To establish PPP data session with LTE network use the ATD*99***command.

Example:

```
/* Set a local PPP session for modem management without LTE
network PPP data connectivity." */
AT%PPLOC
CONNECT /* Change to data mode */

/* Establish PPP data session with LTE network." */
AT%CMATT=1
OK
AT%CMATT?
%CMATT: 1
OK
atd*99***1#
CONNECT /* Change to data mode */
```

15. FOTA Commands

15.1. AT@FOTACHECK Checking the Server for New Release

AT@FOTACHECK parameter and command syntax

Command	Possible response(s)
AT@FOTACHECK=<url>	<i>Normally respond:</i> @FOTACHECK:<fw_ver>. Please start to upgrade FW. OK or @FOTACHECK:<version-C> is not source version. Please update to <version-A> version. OK or @FOTACHECK: <version-B> is destination version. OK <i>If something is wrong, then respond:</i> @EXTERR:<err_code>
AT@FOTACHECK?	ERROR
AT@FOTACHECK=?	@FOTACHECK:<url> OK

Description:

This command serves to check whether a new released firmware is ready for upgrading.

Defined values:

<url>: string, the URL of the FOTA server where to check if a new released firmware is ready.

<fw_ver>: string, the version of the new released firmware which is ready in the server for upgrading. The new released firmware is a delta image between source version

(e.g. version-A) & destination version (e.g. version-B).

<version-A>: string, the version of A is source version. If DUT's firmware is outdated, you cannot automatically upgrade your DUT's firmware.

<version-B>: string, the version of B is destination version.

<version-C>: string, the version of C is outdated version.

<err_code>: integer, error code; refer to [Table B-1: Error codes supported for @EXTERR commands](#)

Example:

```
/* Check HTTP Server */
AT%PINGCMD=0,"210.59.249.3"
%PINGCMD:1,"210.59.249.3",507,44
OK

/* Start to check if a new released firmware is ready for
upgrading */
AT@FOTACHECK="http://210.59.249.3"
@FOTACHECK:"182731-182721". Please start to upgrade FW.
OK

/* Start to upgrade */
AT@FOTAUPGRADE
OK
@FOTAIND:1,1

/* Something wrong when downloading the firmware. */
@FOTAIND:3,2

/* Here, we are going to try again. */
AT@FOTAUPGRADE
OK
@FOTAIND:1,1
@FOTAIND:1,2
Shutting down...
```

```
/* Wait 3 minutes and then send AT Command to check if device
finished */
AT
OK

/* Check if device has upgraded */
at@FOTADONE
OK
@FOTAIND:2
```

15.2. AT@FOTAUPGRADE Start to Upgrade

AT@FOTAUPGRADE parameter and command syntax

Command	Possible response(s)
AT@FOTAUPGRADE	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> @EXTERR:<err_code>
AT@FOTAUPGRADE?	ERROR
AT@FOTAUPGRADE=?	OK

Description:

This command serves to start upgrading.

<err_code>: integer, error code; refer to [Table B-1: Error codes supported for @EXTERR commands](#)

15.3. AT@FOTADONE Upgrade Status

AT@FOTADONE parameter and command syntax

Command	Possible response(s)
AT@FOTADONE	<i>Normally respond:</i> OK <i>If something is wrong, then respond:</i> ERROR
AT@FOTADONE?	ERROR
AT@FOTADONE=?	OK

Description:

This command serves to check upgrade status.

15.4. @ FOTAIND FOTA Indication

@FOTAIND parameter command syntax

Command	Possible response(s)
	@FOTAIND=<event>[,<arg>]
Reference:	
Note:	Response

Description:

Unsolicited message for indications of FOTA messages.

Defined values:

<event>: integer

- 1 – FOTA is in progress.
- 2 – FOTA operation has been completed
- 3 – A failure happened during FOTA.

<arg>: integer

When <event> = 1

- 1 – Start to download the new firmware.
- 2 – Finish downloading the new firmware.

When <event> = 3

- 1 – Fail to compare CRC checksum.
- 2 – Fail to download the new firmware.
- 3 – Fail to upgrade the new firmware.

A Supported Error Codes

Table A-1: Error codes supported for +CME ERROR

Error Code	Error Message
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
11	SIM PIN required
12	SIM PUK required
13	SIM failure
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	Memory full
21	Invalid index
22	Not found
23	Memory failure
24	Text string too long
25	Invalid characters in text string
26	Dial string too long
27	Invalid characters in dial string
30	No network service
31	Network timeout
32	Network not allowed - emergency calls only
40	Network personalisation PIN required

41	Network personalisation PUK required
42	Network subset personalization PIN required
43	Network subset personalization PUK required
44	Network provider personalization PIN required
45	Service provider personalization PUK required
46	Corporate personalization PIN required
47	Corporate personalization PUK required
49	EAP method not supported
50	Incorrect parameters
51	Parameter length error for all Auth commands
52	Temporary error for all auth cmds
100	Unknown
103	Illegal Mem_Store
106	Illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
132	Service option not supported
133	Requested service option not subscribed
134	Service option temporarily out of order
148	Unspecified GPRS error
149	PDP authentication failure
150	Invalid mobile class

Table A-2: Error codes supported for +CMS ERROR

Error Code	Error Message
1	Unassigned (unallocated) number
8	Operator determined barring
10	Call barred
21	Short message transfer rejected
27	Destination out of service

28	Unidentified subscriber
29	Facility rejected
30	Unknown subscriber
38	Network out of order
41	Temporary failure
42	Congestion
47	Resources unavailable, unspecified
50	Requested facility not subscribed
69	Requested facility not implemented
81	Invalid short message transfer reference value
95	Invalid message, unspecified
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message not compatible with short message protocol state
99	Information element non-existent or not implemented
111	Protocol error, unspecified
127	Interworking, unspecified
128	Telematic interworking not supported
129	Short message Type 0 not supported
130	Cannot replace short message
143	Unspecified TP-PID error
144	Data coding scheme (alphabet) not supported
145	Message class not supported
159	Unspecified TP-DCS error
160	Command cannot be actioned
161	Command unsupported
175	Unspecified TP-Command error
176	TPDU not supported
192	SC busy
193	No SC subscription
194	SC system failure
195	Invalid SME address
196	Destination SME barred

197	SM Rejected-Duplicate SM
198	TP-VPF not supported
199	TP-VP not supported
208	(U)SIM SMS storage full
209	No SMS storage capability in (U)SIM
210	Error in MS
211	Memory Capacity Exceeded
212	(U)SIM Application Toolkit Busy
213	(U)SIM data download error
255	Unspecified error cause
300	ME failure
301	SMS service of ME reserved
302	Operation not allowed
303	Operation not supported
304	Invalid PDU mode parameter
305	Invalid text mode parameter
310	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	Memory failure
321	Invalid memory index
322	Memory full
330	SMSC address unknown
331	No network service
332	Network timeout
340	No +CNMA acknowledgement expected
500	Unknown error

B Proprietary Error Codes

The following table details the error codes supported only by @EXTERR for Internet Service commands.

Table B-1: Error codes supported for @EXTERR commands

Error Code	Error Message
512	Invalid argument(s) is(are) input.
513	Wrong argument numbers are input.
514	Out of memory.
515	Temporary failure.
516	System is busy.
517	Network error.
518	Invalid IP address is input.
519	Invalid domain name is input.
520	No response from the server.
521	Operation failure.
522	The specific GPIO is not supported.
523	I2C device address is not specified yet.
524	Socket disconnect
525	Too many sockets created
526	Socket not created

C References

Related documents

Standards	Number
AT command set for 3GPP User Equipment (UE)	3GPP TS 27.007 (Release 9)
Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)	3GPP TS 27.005 (Release 7)
Serial Asynchronous Automatic Dialing and Control	ITU-T V.25ter (Jul 1997)
Data Transmission Systems and Equipment — Serial Asynchronous Automatic Dialing and Control for Character Mode DCE on Wireless Data Services	PCCA STD-101 (Jun 1995)
In-band DCE control and synchronous data modes for asynchronous DTE	ITU-T V.80 (Aug 1996)
Asynchronous Facsimile DCE Control, Service Class I	ITU-T T.31 (Aug 1995)
Data Service Options for Spread Spectrum Systems Terminal Equipment to User Equipment (TE-UE) multiplexer protocol	TIA/EIA/IS-707-A-2 (Mar 2001) 3GPP TS 27.010
QMI AT 1.2, QMI Access Terminal Svc Spec	80-VB816-22
Comprehensive AT Command Set in AMSSSoftware	80-VR432-1