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GR64 & GS64
AT Command Manual

The AT Command Manual describes the AT commands that are supported by the GR64 and GS64 modules.

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1 Introduction to AT Commands

This manual lists detailed information on the function of the AT Command set that can be used with the GR64 or GS64.

This manual refers to the GR64 and GS64 as radio devices. If there is a difference in the functionality of the radio devices the GR64 and GS64, information will be listed separately.

1.1 Related Documentation

This manual is supplied with an Integrator's Manual when you purchase a GR64 or GS64. If you choose to use the M2*m*power support environment with the module you will also receive an Application Guide.

1.2 Overview

AT commands, issued from a computer in your application are used to control and implement the functions of the module.

Using AT commands, the following actions are possible:

- Control of DCE
- GPRS
- Call control
- Supplementary Service
- SIM application tool kit
- Control any embedded application in the device

The manual contains a large number of Sony Ericsson-specific commands in addition to those implemented in accordance with the 3GPP and ITU-T recommendations. These commands are provided to enhance the functions of the module. The Sony Ericsson-specific commands are identified by the asterisk that precedes the command (see the syntax description provided below).

Only commands that are listed in the AT Commands Manual are supported unless otherwise stated. Other commands may be listed by the module but these are only included for historical or legacy reasons.

1.3 History of Core Module AT Commands Manuals

The following table describes the module software version documented in each AT Command Manual version.

AT Manual Version	Gx64 Software Version
PA4	QR5.1 (P1A050)
PA4	QR5.2 (P1A051- P1A055)
PA4	QR6.0 (P1A056 - P1A060)
PA6	QR7.0 (P1A061-)

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AT Manual Version	Gx64 Software Version
PA7	P1A062 -
PA8	P1A068 -
A	P1A071 -
PB1	P1A072 -

1.4 Syntax Description

This section provides a brief description of the syntax used for the GR64 and GS64 AT command set. See the ITU-T recommendation V.25ter for additional information.

1.4.1 Conventions

In this manual, the following conventions are used to explain the AT commands.

<command> The name of the command that is to be entered.

<parameter> The parameter values that are defined for a certain command.

<CR> The command line is terminated by the Carriage Return (or Enter key) or ATS3 command.

<LF> Line feed character or ATS4 command.

< > The term enclosed in angle brackets is a syntactical element. The brackets do not appear in the command line.

[ ] Square brackets are used to indicate that a certain item is optional. For example, sub-parameters of a command or an optional part of a response. The brackets do not appear in the command line.

<Value> The default values of the supported parameters are indicated by using bold text when presenting the value.

- Other characters, including '?', parenthesis, etc., appear in commands and responses as written.
- The final result codes OK, ERROR, +CME ERROR: <err> and CMS ERROR:<err> (see sections 1.3.3 AT Response Syntax and 1.4 Error Codes) are not listed under "Possible Responses" for each AT command.
- OK and ERROR are listed if these are the only possible responses.

1.4.2 AT Command Syntax

The AT standard is a line-oriented command language. Each command is made up of the following three elements:

- the prefix;
- the body;
- the termination character.

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The prefix consists of the letters “AT”, which are derived from the first two letters of the word attention. The body is made up of the **command,** the **parameter,** and if applicable the associated **values**.

Commands may be combined in the same command line. Spaces between the individual bodies are ignored.

Basic Syntax Command

The format of basic syntax commands is as follows:

AT<command>[=][<parameter>]<CR>

ATS0=0<CR> (sets the automatic answering)

Additional commands may follow a command on the same command line without any character being required for separation. For the command D parameters, see the description for the command in question.

A version of the basic syntax is:

AT<command><parameter>

Extended Syntax Command

- AT+<command>= [<parameter>]
- AT*<command>=[<parameter>]

AT+CFUN=0<CR> (powers down the module)

If several values are included in the command, they are separated by commas. It is also possible to enter commands with no values.

Additional commands may follow an extended syntax command on the same command line if a semicolon (**;** IRA 3B) is inserted after the preceding extended command as a separator.

Read Command Syntax

The read command is used to check the current values of

parameters. Type ‘?’, after the command line:

- AT+<command>?
- AT*<command>?
- AT<command>?

AT+CSCS?<CR> (show current character set)

<CR>“IRA”<CR> (information *text* response)

<CR>OK<CR>(final result code response)

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Test Command Syntax

The test command is used to test whether the command has been implemented or to give information about the type of subparameters it contains. Type '?', after the command line:

- AT+<command>=?
- AT*<command>=?

AT+CPAS=?<CR> (shows supported values for the response parameters)

<CR>CPAS: (0, 3, 4, 129, 130, 131)<CR> *(supported values)*

<CR>OK<CR> (final result code)

If the indicated <parameter> is not recognized, the result code ERROR is issued.

Possible responses are indicated both as <command>:(list of supported<parameter>) and (in most cases) the actual range of the parameter values.

1.4.3 Other Terminology

In this document, terms "alternating mode" and "alternating call" refer to all GSM bearer and teleservices that incorporate more than one basic service (voice, data, fax) within one call.

1.4.4 AT Response Syntax

The default mode response shown below is in text mode. For information about the ATV DCE response, see ATV DCE Response Format.

Possible formats for the result codes are:

- Basic format result code, such as OK. The Basic result code also has a numerical equivalent.
- Extended format result code, prefixed with a plus sign (+) or an asterisk (*):
    - AT+<command>: <parameter >
    - AT*<command>: <parameter>

  where the <parameter> is the result code value, note that a single space character separates the colon character from the <parameter>. If several values are included in the result code, they are separated by commas. It is also possible that a result code has no value. The extended syntax result codes have no numerical equivalent. They are always issued in alphabetical form.
- Information text response may contain multiple lines separated by <CR>. The TE detects the end of informational text responses by looking for a final result code response, such as OK.

There are two types of result code responses as outlined below:

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Final Result Code

A final result code indicates to the TE that execution of the command is completed and another command may be issued.

- If you type an implemented AT command, you should get the result code OK.
- If you type an AT command that is not implemented, or which had the wrong parameter or syntax, you will get an error result code. It is ERROR or, for example, +**<command>** ERROR followed by an error code.

Final result codes are:

- Value General meaning

  OK Command executed, no errors

  ERROR Invalid command or command line too long

  NO DIALTONE No dialing possible, wrong mode

  BUSY Remote station busy

  NO ANSWER Connection completion time-out

  NO CARRIER Link not established or disconnected

- Unsolicited Result Code

  Unsolicited result codes indicate the occurrence of an event not directly associated with a command being issued from the TE.

1.5 Error Codes

1.5.1 +CME ERROR (Mobile Equipment Error Code)

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

The table below provides the numerical values for the parameter <err>.

<err>	**Description Syntax**
0	ME failure
1	No connection to MT
2	ME -adaptor link reserved
3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy

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<err>	Description Syntax
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 time-out
32	Network not allowed - emergency calls only
100	Unknown
101- 255	Reserved by ETS

1.5.2 +CMS ERROR (Message Service Failure Result Code)

This final result code indicates an error related to mobile equipment or to the network. The operation is similar to the ERROR result code. None of the following commands in the same command line will be executed. Neither ERROR nor OK result code will be returned. ERROR is returned normally when an error is related to syntax or invalid parameters. Nevertheless, it always appears when a command fails.

The syntax is as follows:

```
+CMS ERROR: <err>
```

Values for the <err> parameter are described in the following table.

<err>	Description
0 - 127	GSM 04.11 Annex E-2 values
128 - 255	GSM 03.40 subclause 9.2.3.22 values
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	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required

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<err>	Description
317	SIM PIN2 required
318	SIM PUK2 required
320	Memory failure
321	Invalid memory index
322	Memory full
330	SMSC address unknown
331	No network service
332	Network time-out
340	No +CNMA acknowledgment expected
500	Unknown error
- 511	Other values in range 256 - 511 are reserved
512-	Manufacturer specific

1.6 Examples on How to Use the AT Commands

For many of the more complicated commands, examples are provided after the command's description. Always refer to the detailed description of the command in question to check valid parameter values, AT command syntax and Response syntax.

1.7 SMS Text Mode

SMS text mode allows users to send SMSs without having to understand how PDUs are constructed. This section describes how to carry out basic operations in text mode and explains the steps that need to be taken.

Basic transmission of SMS

A script which sets the module up is shown below:

Command	Description
AT+CSMP=17,167 OK	Set text mode parameter
AT+CMGF=1 OK	Switch the module to text mode
AT+CMGS="07787154042" > Test SMS +CMGS: 204 OK	Sending an SMS The text must be ended, as in PDU mode, with a control-Z character (ASCII 26) Confirmation that the SMS has been sent successfully

Note the following points:

- Once the CSMP and CMGF commands have been carried out they will not need to be initialized for this session.
- These parameters are saved in NVRAM using the &W command.

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Notification of SMS

New message indications are similar to the PDU mode as shown below:

```
AT+CNMI=1,1
OK
+CMTI: “SM”,2
AT+CNMI=1,2
OK
+CMT: “+447747008670”,“Matt
L”,“02/11/19,09:58:42+00”,145,36,0,0,“+447785016005”,145,8
Test sms
```

Reading messages

Reading messages is performed as in PDU mode.

```
AT+CMGR=2
+CMGR: “REC UNREAD”,“+447747008670”,“Matt L”,“02/11/19,09:57:28+00”,145,36,0,0,“
+447785016005”,145,8
Test sms
OK
```

Listing messages

In PDU mode numbers are used as parameters. In text mode letters are used instead and these must be upper case as the module does not accept lower case commands. See the example below:

```
AT+CMGL=“ALL”
+CMGL: 1,“REC READ”,“+447747008670”,“Matt L”,“02/10/21,10:07:23+04”,145,4
Test
+CMGL: 2,“REC READ”,“+447747008670”,“Matt L”,“02/11/19,09:57:28+00”,145,8
Test sms
+CMGL: 3,“REC UNREAD”,“+447747008670”,“Matt L”,“02/11/19,09:58:06+00”,145,8
Test sms
OK
```

1.8 GPRS Communication

To initiate a session with the network you need to set up a ‘data account’ on the module using the AT+CGDCONT command. You need to specify the correct Access Point Name (APN) which you get from your service provider. The command below sets up the data account to access an APN called "internet."

```
AT+CGDCONT=1,“IP”,“internet”
```

After this you need to use the ATD command to make a GPRS call. The example below dials into the network using account number 1.

```
ATD*99***1#
```

If the module is able to connect to the APN it will return a CONNECT. At this point PPP/IP packets should be sent by the application, to negotiate an IP address. The easiest way of doing this whole thing is to create a windows dial up networking session with the dial string *99***1# after creating the data account on the module.

It is not possible to initiate a GPRS session from the network at present. The reason for this is that unless a PDP context has been setup it has not been assigned an IP address by the GGSN/DHCP server and as a result it cannot be addressed other than through its ME number (defeating the object of using IP). This is specified in GSM 7.60 or 3GPP 27.060.

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For additional information about GPRS communication, refer to the application note, which can be obtained from the extranet or from customer support.

1.9 Abortability

Commands that are able to be stopped or terminated while executing are said to be "abortable". These abortable commands may be terminated by sending a character or control sequence. As very few commands are abortable - all AT-Commands in this manual should be considered "not abortable" unless the following sentence is present at the end of the command description.

This command is abortable.

The following commands can be aborted:

- ATD Dial
- AT+CCFC Call Forwarding number and Conditions
- AT+CLCK Facility Lock
- AT+CLIP Calling Line Identification
- AT+CLIR Calling Line Identification Restriction
- AT+CMGC Send Command
- AT+CMGW Write Message to Memory
- AT+CMGS Send Message
- AT+CMSS Send Storage
- AT*E2CMGL List Message
- AT*E2IPL IP Listen (Server)
- Xmodem-CRC Protocol(CCITT)

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2 Call Control

2.1 ATA Answer Incoming Call

Description	Command	Possible Responses
Answer an incoming call	ATA	CONNECT CONNECT <text> NO CARRIER ERROR OK

Description:

This command is used to answer an incoming call. If the incoming call is a waiting call (call waiting), you must use the +CHLD command to answer the call.

Defined values:

<text>	Description
9600	Connected with data bit rate of 9600 bits/s
4800	Connected with data bit rate of 4800 bits/s
2400	Connected with data bit rate of 2400 bits/s

2.2 ATD Dial

Description	Command	Possible Responses
Originate a call and dial the ME number specified in the command as <dial_string> *Or* Do a network detect	ATD<dial_string>[;]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Dial the ME number stored in the ME which is located by the index <I>	ATD>ME<I>[;]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK

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Description	Command	Possible Responses
Dial the ME number stored in the SIM card which is located by the index <I>	ATD>SM<I>[;]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Dial the ME number stored in the *Last dialed number* list on the SIM card, which is located by the index <I> The most recently dialed number is assumed to have <I>="1"	ATD>LD<I>[;]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Redial the last ME number dialed.	ATDL[;]	...

Description:

Used to initiate a ME connection, which may be data or voice (ME number terminated by semicolon). The ME number used to establish the connection will consist of digits and modifiers, or a stored number specification.

If the dial string is followed by a semicolon this informs the ME that the number is a voice rather than a data number.

If the dial string is omitted, and the semicolon (;) is included, the command instructs the ME to do a network detect. If the network is available OK is returned.

This command is abortable.

Aborting an ATD command is accomplished by the transmission from the DTE to the DCE of any character. A single character shall be sufficient to abort the command in progress; however, characters transmitted during the first 125 milliseconds after transmission of the termination character are ignored. This is to allow the DTE to append additional control characters such as line feed after the command line termination character.

The following table provides a description of the predefined GSM modifers:

Modifier	Description
>	Dial from phonebook memory location. This is explicitly decribed in the command table.
I	invocation (restrict CLI presentation). Override the CLIR supplementary service subscription default value for this call.
i	suppression (allow CLI presentation). Override the CLIR supplementary service subscription default value for this call.
W	The W modifier is ignored but is included only for compatibility purposes
,	The comma modifier is ignored but is included only for compatibility purposes

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Modifier	Description
T	The T modifier is ignored but is included only for compatibility purposes
P	The P modifier is ignored but is included only for compatibility purposes

Defined values:

<dial_string>	Description
"0 1 2 3 4 5 6 7 8 9 * # + A B C"	Valid characters for origination

<text>	Description
9600	Connected with data bit rate of 9600 bits/s
4800	Connected with data bit rate of 4800 bits/s
2400	Connected with data bit rate of 2400 bits/s

<Final Result Code>	Description
CONNECT	If connection is successfully established, only valid for data connections
CONNECT <text>	If connection is successfully established, only valid for data connections
NO CARRIER	Unable to establish a connection or the connection attempt was aborted by the user
ERROR	An unexpected error occurred while trying to establish the connection
NO DIALTONE	The ME is being used for a voice call or is not within coverage of the network
BUSY	The ME number called is engaged, valid for data and voice connections
OK	Only valid for voice connections

Example:

```
ATD07747008670;
OK
```

2.3 ATH Hang up

Description	Command	Possible Responses
Terminate the call	ATH	• ERROR • OK

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Description:

This command signals the MS to terminate an active call.

This does not work for incoming calls. To terminate an incoming call use the AT+CHUP command.

To terminate a call while a GPRS session is active, use the multiparty command (AT+CHLD). If the AT+CHLD command is not used to terminate a GPRS session, the module will hang up all calls and the application cannot return to the GPRS session.

It is recommended that you use the +CHUP command instead of ATH.

2.4 ATL Monitor Speaker Loudness

Description	Command	Possible Responses
Request monitor speaker loudness	ATL[<value>]	• OK • ERROR
Test if the command is supported	ATL=?	L: (list of supported <values>s)

Description:

This command has no relevance for GSM. It is accepted, but ignored.

<value>	Description
0	accepted
1	accepted
2	accepted
3	accepted

2.5 ATO Return to Online Data Mode

Description	Command	Possible Responses
Return to on-line data mode	ATO[<value>]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR

Description:

Switch to the on-line data mode from the on-line command mode during an active call. Returns ERROR when not in on-line command mode.

This command may be used to return to a Circuit Switched Data (CSD) call started with ATD. Also this command is used to get back to GPRS sessions that were started via ATD or +CGDATA.

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This command my also be used to return to the last socket connection that was accessed by the channel. If the socket was closed then the function will return ERROR. If the user wants to reopen online data state with a specific socket then they can use *E2IPATO.

ATO will return a connection back to online data state regardlessly of which way was used to exit online data state. Currently there are three valid escape sequences; +++, +++AT, or DTR deassert.

ATO will work in all mux channels and will have results that are local to the channel.

Defined values:

<value>	Description
0	Return to on-line data state from on-line command

2.6 ATX Call Progress Monitoring Control

Description	Command	Possible Responses
Set call progress monitoring control	ATX[<n>]	• OK • ERROR
Show the current setting	ATX?	X: <n>
Test if the command is supported	ATX=?	X: (list of supported <n>s)

Description:

This command is used to indicate whether dial-tone detection and busy-tone detection are used during a call set-up. You can also use this command to display the current dial-tone and busy-tone detection settings

Defined values:

<n>	Description
0	Busy and dial tone detection off. No line-speed reported on connection. **Default value**
1	Busy and dial tone detection off. Report line-speed on connection

If there is no network available the <n> parameter will decide if “NO DIALTONE” or “NO CARRIER” will be returned. If the call recipient is busy, the <n> parameter will decide if “BUSY” or “NO CARRIER” will be returned.

2.7 AT+CHUP Hang up Call

Description	Command	Possible Responses
Request hang-up	AT+CHUP	OK ERROR

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Description	Command	Possible Responses
Test if the command is supported	AT+CHUP=?	OK ERROR

Description:

Thie command causes the TA to hang up the current CS call of the MT.

If no call is present, but an incoming call is notified, then the incoming call is rejected. This command is available without SIM access.

The purpose of this command is not to replace the V.25ter command "H", but to give an assured procedure to terminate an alternating mode call.

2.8 AT+CLCC List Current Calls

Description	Syntax	Possible Responses
Read call list	AT+CLCC	[+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty> [,<number>,<type>[,<alpha>]] [<CR><LF>+CLCC: <id2>,<dir>,<stat>,<mode>,<mpty> [,<number>,<type>[,<alpha>]] [...]]] +CME ERROR: <err>
Test if the command is supported	AT+CLCC=?	OK

Description:

This command returns the list of current calls of MT. If command succeeds but no calls are available, no information response is sent to TE.

Defined values:

<idx>	Description
integer	Call identification number as described in GSM TS 2.30 subclause 4.5.5.1; this number can be used in AT+CHLD command operations

<dir>	Description
0	Mobile originated (MO) call
1	Mobile terminated (MT) call

<stat>	Description
0	Active
1	Held

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<stat>	Description
2	Dialing (MO call)
3	Alerting (MO call)
4	Incoming (MT call)
5	Waiting (MT call)

<mode>	Description
0	Voice
1	Data
2	Fax
3	Voice followed by data, voice mode
4	Alternating voice/data, voice mode
5	Alternating voice/fax, voice mode
6	Voice followed by data, data mode
7	Alternating voice/data, data mode
8	Alternating voice/fax, fax mode
9	Unknown

<mpty>	Description
0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

<number>	Description
String	Phone number in format specified by <type>

<type>	Description
integer	Type of number octet in integer format (refer to TS 4.08 [ref 7] subclause 10.5.4.7)

<alpha>	Description
String	Alphanumeric representation of <number> corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set AT+CSCS

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2.9 AT+CSNS Single Numbering Scheme

Description	Syntax	Possible Responses
Set mode	AT+CSNS=[<mode>]	OK ERROR
Read current mode	AT+CSNS?	+CSNS: <mode> ERROR
Test if the command is supported	AT+CSNS=?	+CSNS: (list of supported <mode>s)

Description:

This command selects the bearer or teleservice to be used when mobile terminated single numbering scheme call is established. Parameter values set with AT+CBST command shall be used when the <mode> is set to a data service.

Test command returns values supported.

Defined values:

<mode>	Description
0	Voice. **Default value**
1	Not Supported
2	Not Supported
3	Alternating voice/data, voice first (BS 61). Not Supported
4	Data
5	Not Supported
6	Alternating voice/data, data first (BS 61). Not Supported
7	Voice followed by data (BS 81). Not Supported

2.10 AT+CSTA Select Type of Phone Number

Description	Syntax	Possible Responses
Set Type of Phone Number	AT+CSTA[=<type>]	OK ERROR
Read current type	AT+CSTA?	+CSTA: <type> ERROR
Test if the command is supported	AT+CSTA=?	+CSTA: (list of supported <type>s)

Description:

This command selects the type of number for further dialing commands (D) according to 3GPP specifications.

Test command returns values supported by the TA as a compound value.

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Defined values:

<type>	Description
129	National address type
145	International number. Dialing string includes international access code character "+"

2.11 AT+CVHU Voice Hang-Up

Description	Command	Possible Responses
Set Command	+CVHU=[<mode>]	• +CME ERROR: <err> • OK
Show the current setting	+CVHU?	• +CVHU: <mode> • +CME ERROR: <err>
Test if the command is supported	+CVHU=?	+CVHU: (list of supported <mode>s)

Description:

This command selects whether ATH or "drop DTR" causes a voice connection to be disconnected or not. Voice connection also includes alternating mode calls that are currently in voice mode.

When <mode>=2, this command must be viewed in conjunction with the V.25ter command &D, or &D will be ignored.

Defined values:

<mode>	Description
0	"Drop DTR" ignored but OK response given. ATH disconnects
1	"Drop DTR" and ATH ignored but OK response given
2	"Drop DTR" behavior according to &D setting. ATH disconnects. **Default value**

2.12 AT+VTD DTMF tone duration

Description	Command	Return
Set the duration of the tone	+VTD=<n>	OK ERROR
Query current setting	+VTD?	+VTD: <n>
List supported values	+VTD=?	+VTD: (0-1000) [0.1s]

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Description:

This command sets the length of tones that are emitted as a result of the +VTS command. The tone length, represented by <n>, can be any integer between 0 and 1000. A value different than zero causes a tone of duration <n> tenths of seconds. Values of <n> 1-10 cause duration of about 1 second.

This command does not affect the D command.

In 3GPP the value of tone duration is preset and cannot be altered.

Defined values:

<n>	Description
Integer	Value between 0 and 1000 denoting the duration of the DTMF tones in tenths of seconds.

2.13 AT+VTS DTMF and Tone Generation

Description	Command	Possible Responses
Request transmission of DTMF tone(s)	AT+VTS=<DTMF>	OK ERROR
Test if the command is supported	AT+VTS=?	+VTS:(0-9,#,*,A-D) OK ERROR

Description:

This command allows the transmission of DTMF tones and arbitrary tones (see note). For example, these tones might be used to indicate the start of a recording period. This command is write only. This command does not operate in data or fax modes of operation (+FCLASS=0,1,2-7).

The AT+VTS command is used only during a voice call.

Defined values:

<DTMF>	Description
ASCII characters	A string of comma separated values in the set 0-9, #, *, A-D. 'P' can also be specified which specifies no tone for the VTD set duration. The command takes a maximum of 32 elements.

Example:

In the following command issues character 8 as a DTMF tone.

```
AT+VTS="8"
OK
```


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3 Control and Status

3.1 AT&F Set to Factory Defined Configuration

Description	Command	Possible Responses
Execute	AT&F	• OK • ERROR
Test if the command is supported	AT&F=?	&F: (list of supported <profile>s)

Description:

This command instructs the DCE to set all parameters to default values specified by the manufacturer, which may take in consideration hardware configuration and other manufacturer defined criteria.

Profile Settings and Default Values

The commands AT&F, AT&V, and AT&W allow the user to restore, view and store the parameter values outlined in the table below.

Parameter Description	AT Command	Values	Factory Defined Settings
Auto Answer Ring Number	ATS0	(0 - 255)	0
Escape Character	ATS2	(0 - 127)	043 ('+')
Carriage Return Character	ATS3	(0 - 127)	013 ('\r')
Line Feed Character	ATS4	(0 - 127)	010 ('\n')
Backspace Character	ATS5	(0 - 127)	008 ('\b')
Blind Dial Pulse	ATS6	(2 - 10)	2
No Carrier Timeout	ATS7	(1 - 255)	255
Comma Dial Modifier Pause Time	ATS8	(0 - 255)	2
Carrier Loss Disconnect Time	ATS10	(1 - 254)	1
Escape Sequence Guard Time (CSD only)	ATS12	(1 - 254)	50
Serial Link Baud Rate	ATS23	Calculated	000 (Auto)
Maximum Data Link Speed	ATS37	(0-3)	002
Result Code Suppression	ATQ	(0,1)	0 - Quiet Mode is off
DCE Response Format	ATV	(0,1)	1 - Verbose is on
Call Progress Monitoring Control	ATX	(0,1)	0 - Don't Show Speed
Calling Line ID Restricted	AT+CLIR	(0-2)	0 - Don't use Network Setting
Extended Error Reporting	AT+CMEE	(0-2)	0 - CMEE is off
Command Echo	ATE	(0,1)	1 - Echo is on

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Parameter Description	AT Command	Values	Factory Defined Settings
Handshake Mode	AT\Q	(0-2)	1 - HW handshake
Indicates current bearer	Several ways to set	(voice)1-2, (data)3-11 (or 3-12 for UMTS or SIM)	OSABearer_NTData 9600 (enum, currently 10)
Last value of CurrentService	""	""	OSABearer_NTData 9600 (enum, currently 10)
Voice bearer to be used for next voice connection	""	(1,2)	ALBearer_Voice (1)
Circuit 108 Response (Data Terminal Ready)	AT&D	(0-2)	0 - DTR Ignore
Circuit 107 Response (Data Set Ready)	AT&S	(0,1)	0 - DSR On
Circuit 109 Control (Carrier Detect)	AT&C	(0-2)	1 - DCD Passage
DTE-DCE Local Flow Control	AT+IFC	DCE_DTE, DTE_DCE	{2, 2}
Selects the type of phone number for dialing cmds	AT+CSTA	129(National)/145(International)	129 - National
Select bearer service type	AT+CBST	ATCBSTServiceArray	{0xFFFF, 0xFFFF, 0xFFFF} - Dummy values
Calling Line Identification Presentation	AT+CLIP	(0,1)	0 - Off
Connected Line Identification Presentation	AT+COLP	(0,1)	0 - Off
Operator Selection Format (Auto/Numeric)	AT+COPS	(0-2)	0 - Long Alphanumeric
Service Reporting Control	AT+CR	(0,1)	0 - Off
Cellular Result Code (extended)	AT+CRC	(0,1)	0 - Off
Network Registration	AT+CREG	(0-2)	0 - Off
Radio Link Protocol	AT+CRLP	IWS, MS, T1, N2	{61, 61, 48, 6}
Cable Interface Local Rate Reporting	AT+ILRR	(0,1)	0 - Off
Select Character Set	AT+CSCS	(0-7)	0 - PCCP437
Advice of Charge	AT+CAOC	(0-2)	0 - Query mode
Call Meter Maximum Event	AT+CCWE	(0,1)	0 - Off
Phonebook Storage Select	AT+CPBS	0-6 (SEMC), 7 invalid	1 - SIM
Call Waiting (capability)	AT+CCWA	(0,1)	0 - Off
Call Waiting (mode of operation)	AT+CCWA	(0-2)	0 - Off
Call Waiting (type of connection/bearer)	AT+CCWA	0-128 (only 0, 2, 4 and 7 are supported)	1 - Voice

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Parameter Description	AT Command	Values	Factory Defined Settings
Interface Port Command (baud rate)	AT+IPR	(0,1200,2400,4800, 9600,19200,38400, 57600,115200,230400,460800,921600)	0 - Auto
Single Numbering Scheme (bearer/teleservice)	AT+CSNS	0 (voice), 4(data)	0 - Voice
SEMC Profile Values			
Message Waiting Indication (Mode)	AT*EMWI	(0-2)	1 - On
Network Info (display capability)	AT*ERINFO	(0,1)	0 - Off
DRX Reporting Mode	AT*EDRX	(0,1)	0 - Off
SIM Detection Reporting	AT*E2SDR	(0,1)	0 - Off
Cell Description (unsolicited result output control for network cell parameter changes)	AT*E2CD	(0,1)	0 - Off
Operational Temperature Reporting (unsolicited result output control for temp out of range)	AT*E2OTR	(0,1)	0 - Off
IP Setup IP Parameters	AT*E2IPS	initialTimeout/retransmitCount/ sendIntervalWait/sendBlockSize/lockEscSequence	{2, 8,2, 1020, 0}
Escape Sequence Guard Time (proprietary in seconds for GPRS)	AT*E2ESC	1-10 (0 means no timer)	0 - No Guard Time
Unstructured Supplementary Service Data (unsol. report control)	AT+CUSD	(0-2)	0 - Off
Call Monitoring (unsol report control for all call events)	AT*ECAM	(0,1)	0 - Off
Mobile Equipment Event Reporting (unsol report processing for mobile events)	AT+CMER	(0-3)	0 - Off/Buffer
Mobile Equipment Event Reporting (capability)	AT+CMER	(0,1)	0 - Off
Supplementary Service Notification (MO unsol reporting)	AT+CSSN	(0,1)	0 - Off

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Parameter Description	AT Command	Values	Factory Defined Settings
Supplementary Service Notification (MT unsol reporting)	AT+CSSN	(0,1)	0 - Off
Expanded Indicator Control (unsol report control for indicators)	AT*ECIND	each 0 (disable), 1(enable)	0 - Off (for all)
Pin Event (unsol report control)	AT*EPEE	(0,1)	0 - Off
Module State Check and report in state chage	AT*EMRDY	(0,1)	1 - On
Restart Message	AT*ESRB	(0,1)	0 - Off
DTMF Duration in sec	AT+VTD	(0-1000)	1
SMS			
Cell Broadcast Parameters for message control, Mode and MID/DCS Strings	AT+CSCB	N/A	{ 0 (Accept), '\0', '\0'}
Parameters for text mode messaging, First Octet, Validity Period, Protocol ID, Data Coding Scheme	AT+CSMP	N/A	{17, 167, 0x00, 0x00}
Controls default header in text mode	AT+CSDH	(0,1)	0 - Don't show
How to handle unsolicited messages	AT+CNMI	(0,1)	1 - Discard
How to handle received messages	AT+CNMI	(0-3)	0 - None
How to handle received CB	AT+CNMI	(0-3)	0 - None
Whether TE gets status report	AT+CNMI	(0-2)	0 - None
How to handle buffered result codes	AT+CNMI	0 (flush)	0 - Flush
GPRS			
GPRS: Automatic Response to Network Request for PDP Context Activation	AT+CGAUTO	(0-3)	1 - enable
Controls unsol output when change in network	AT+CGREG	(0-2)	0 - disable
GPRS: Packet domain event reporting	AT+CGEREP	N/A	1
GPRS: Packet domain event reporting	AT+CGEREP	N/A	1
Global Settings			

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Parameter Description	AT Command	Values	Factory Defined Settings
Band Selection	AT*EBSE	(0-8)	8 - Quadband GSM
Input/Output Read/Write (Controls operations of the I/O pins)	AT*E2IO		0
SIM Selection	AT*ESSE	(0,1)	0 - Internal
Ring indicator for SMS (duration of ring pulse in steps of 50ms)	AT*E2SMSRI	(0-1150)	0 (ms)
Daylight Saving Time (adjustment)	AT*EDST	(0-2)	0 - STD
Automatic Time Zone update (capability)	AT+CTZU	(0,1)	0
Operator Selection Mode	AT+COPS	(0,1,3)	0 - Automatic
Operator Selection (operator name)	AT+COPS	Only used when mode is set to manual	"" (empty string)
SMS Bearer Mode	AT+CGSMS	(0-3)	0 - CSD preferred
Class	AT*E2GC	(0-2)	2 - Class 10
AutoAttach	AT*E2GAA	(0-2)	0 - Never Attach
Type of Service Center Address	AT+CSCA	129 (national)	
Service Center Address	AT+CSCA	N/A	

3.2 AT&V View Configuration Profile

Description	Command	Possible Responses
Show the settings of the current user profile	&V[<value>]	• OK • ERROR

Description:

This command instructs the TA to show the settings of the specified profile.

Defined values:

< value>	Description
0	view profile 0 (default: view current settings (same as ATI7, **0**))
1	view profile 1
2	view profile 2

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3.3 AT&WStore User Profile

Description	Command	Possible Responses
Stores the current user profile to non volatile memory	AT&W[<pr>]	• OK • ERROR
Test if the command is supported	AT&W=?	&W: (list of supported <pr>s)

Description:

This command stores the current user profile in non-volatile memory. If the unit is powered down and back up gain this is the profile it will use.

Defined values:

< pr>	Description
0-2	Stores current settings in User Profile <pr>

3.4 AT&Y Select Default User Profile

Description	Command	Possible Responses
Sets the default user profile	AT&Y[<pr>]	• OK • ERROR
Tests if the command is supported	AT&Y=?	OK

Description:

This command selects which default user profile to use if no user profile is specified. This is the user profile that will be used by all channels on startup unless otherwise specified. This value is stored in non-volatile memory.

Defined values:

< pr>	Description
0-2	Selects profile 0, 1, or 2 as default.

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3.5 ATQ Result Code Suppression

Description	Command	Possible Responses
Set Result Code Suppression	ATQ<value>	OK ERROR
Test if the command is supported	ATQ=?	Q: (list of supported <value>s)

Description:

This command determines whether the DCE transmits result codes to the DTE. When result codes are being suppressed, no portion of any intermediate, final, or unsolicited result code - header, result text, line terminator, or trailer - is transmitted.

Defined values:

<value>	Description
0	DCE transmits result codes. **Default value**
1	Result codes are suppressed and not transmitted

3.6 ATS0 Automatic Answer Control

Description	Command	Possible Responses
Automatic answer control	ATS0=<rcnt>	OK ERROR
Read the current setting	ATS0?	<rcnt>
Test if the command is supported	ATS0=?	S0: (list of supported <rcnt>s)

Description:

This command sets the number of call indications (rings) before automatically answering the call; value equaling zero disables automatic answering and is the default setting.

Defined values:

<rcnt>	Description
0	Disable automatic answer. **Default value**
1-255	Answer after the specified number of rings

When <rcnt> is displayed using ATS0?, leading zeroes are added to make the result 3 digits.

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3.7 ATS2 Escape Sequence Character

Description	Command	Possible Responses
Set escape sequence character	ATS2=[<esc>]	OK ERROR
Show the current setting	ATS2?	<esc>
Test if the command is supported	ATS2=?	S2: (list of supported <esc>s)

Description:

Defines the character to be used as the escape sequence character when switching from on-line data mode to on-line command mode. The response to the command is modified to reflect the change.

Defined values:

<esc>	Description
43	Escape sequence character. **Default value**
0 to 255	Escape sequence character

If the <esc> parameter is set to a value in the range of 128-255, the escape sequence detection is disabled.

3.8 ATS3 Command Line Termination Character

Description	Command	Possible Responses
Set Command Line Termination Character	ATS3=<value>	OK ERROR
Show the current setting	ATS3?	<value>
Test if the command is supported	ATS3=?	S3: (list of supported <value>s)

Description:

This S-parameter represents the decimal IA5 value of the character recognized by the DCE from the DTE to terminate an incoming command line. It is also generated by the DCE as part of the header, trailer, and terminator for result codes and information text, along with the S4 parameter.

The previous value of S3 is used to determine the command line termination character for entry of the command line containing the S3 setting command. However, the result code issued uses the value of S3 as set during the processing of the command line.

For example, if S3 was previously set to 13 and the command line “ATS3=30” is issued, the command line is terminated with a <CR> character (IA5 0/13), but the result code issued uses the character with the ordinal value 30 (IA5 2/14) in place of the <CR>.

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Defined values:

<value>	Description
13	Command line termination character, **Default value**
0 to 127	Command line termination character

3.9 ATS4 Response Formatting Character

Description	Command	Possible Responses
Set Response Formatting Character	ATS4=<value>	OK ERROR
Show the current setting	ATS4?	<value>
Test if the command is supported	ATS4=?	S4: (list of supported <value>s)

Description:

This S-parameter represents the decimal IA5 value of the character generated by the DCE as part of the header, trailer, and terminator for result codes and information text, along with the S3 parameter (see the description of the V parameter for usage).

If the value of S4 is changed in a command line, the result code issued in response to that command line will use the new value of S4.

Defined values:

<value>	Description
10	Formatting character. **Default value** Note: ASCII character 10 is equivalent to <LF>
0 to 127	Formatting character

3.10 ATS5 Command Line Editing Character (BACKSPACE)

Description	Command	Possible Responses
Request Command Line Editing Character	ATS5=<value>	OK ERROR
Show the current setting	ATS5?	<value>
Test if the command is supported	ATS5=?	S5: (list of supported <value>s)

Description:

This S-parameter represents the decimal IA5 value of the character recognised by the DCE as a request to delete from the command line the immediately preceding character.

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Defined values:

<value>	Description
8	Line editing character. **Default value**
0 to 127	Line editing character

3.11 ATS7 Connection Completion Timeout

Description	Command	Possible Responses
Set connection completion timeout	ATS7=[<tmo>]	• OK • ERROR
Show the current setting	ATS7?	<tmo>
Test if the command is supported	ATS7=?	S7: (list of supported <tmo>s)

Description:

Defines the maximum time allowed between completion of dialing and the connection being established. If this time is exceeded then the connection is aborted.

Defined values:

<tmo>	Description
255	Timeout value in seconds. **Default value**
1-255	Timeout value in seconds

3.12 ATS12 Escape Guard Time

Description	Command	Possible Responses
Set Escape Guard Time	ATS12=[<time>]	OK ERROR
Read the current setting	ATS12?	<time>
Show if the command is supported	ATS12=?	S12: (list of supported <time>s)

Description:

This command is included for compatibility. No functionality.

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Defined values:

<val>	Description
050	Value of the Escape Guard Time. **Default value.**
1-255	Value of the Escape Guard Time.

When <time> is displayed using ATS12?, leading zeroes are added to make the result 3 digits.

The setting is not persistent.

3.13 AT+CBC Battery Charge

Description	Command	Possible Responses
Report battery status	AT+CBC	+CBC: <bcs>,<bcl> *+CME ERROR: <err>* OK ERROR
Test if the command is supported	AT+CBC=?	+CBC: (list of supported <bcs>s),(list of supported <bcl>s)+CME ERROR: <err> OK ERROR

Description:

This command returns the battery connection status <bcs> and battery charge level <bcl> of the MT.

Test command returns values supported as compound values.

Defined values:

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

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3.14 AT+CEER Extended Error Report

Description	Command	Possible Responses
Request an Extended Error Report	AT+CEER	+CEER: <report> OK ERROR
Test if the command is supported	AT+CEER=?	OK ERROR

Description:

This command causes the TA to return one or more lines of information text, <report> , which offers the user of the TA an extended report for the following events:

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

Typically, the text will consist of a single line containing the failure information given by the network in text format.

Defined values:

<report>	Description
characters	The total number of characters, including line terminators, in the information text shall not exceed 2041 characters. Text shall not contain the sequence 0<CR> or OK<CR>

3.15 AT+CFUN Set Phone Functionality

Description	Command	Possible Responses
Set MS functionality	AT+CFUN=<fun>	+CME ERROR: <err> OK
Show the current setting	AT+CFUN?	+CFUN: <fun> +CME ERROR: <err>
Test if the command is supported	AT+CFUN=?	+CFUN: (list of supported <fun>s) +CME ERROR: <err>

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Description:

This command selects the level of functionality <fun> in the MS. Level “full functionality” results in the highest level of power drawn. “Minimum functionality” results in the minimum power drawn. Manufacturers may also specify levels of functionality between these two end levels.

Test command returns values supported by the ME.

Defined values:

<fun>	Description
0	Power down
1	Full functionality
2	Not supported
3	Not supported
4	Disable phone both transmit and receive RF circuits
5	Disable receive, transmit and SIM circuits
6...127	Reserved for future use

3.16 AT+CIND Indicator Control

Description	Command	Possible Responses
Set Indicator Control	AT+CIND=[<ind> [,<ind>[,...]]]	+CME ERROR: <err> OK ERROR
Show the current setting	AT+CIND?	+CIND: <ind>,<ind>,... +CME ERROR: <err> OK ERROR
Test if the command is supported	AT+CIND=?	+CIND: (<descr>,(list of supported <ind>s)), (<descr>,(list of supported <ind>s)),... +CME ERROR: <err> OK ERROR

Description:

This command shows the values of ME indicators. <ind> value 0 means that the indicator is off (or in a state which can be identified as “off” state), 1 means that indicator is on (or in a state which is more substantial than “off” state), 2 is more substantial than 1, and so on. If the indicator is a simple on/off style element, it has values 0 and 1. The number of elements is ME specific.

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The ME does not allow setting of indicators, ERROR is returned from the set command.

Test command returns pairs, where string value <descr> is a maximum 16 character description of the indicator and compound value is the allowed values for the indicator. If ME is not currently reachable, +CME ERROR: <err> is returned (refer to 3GPP 27.007).

Defined values:

<descr>	Description
“signal”	Signal quality (0-5)
“service”	Service availability (0-1)
“sounder”	Sounder activity (0-1)
“message”	Message received (0-1)
“call”	Call in progress (0-1)
“roam”	Roaming indicator (0-1)
“sms full”	A short message memory storage in the MT has become full (1), or memory locations are available (0); i.e. the range is (0-1)

<ind>	Description
Integer type	Value shall be in range of corresponding <descr>

3.17 AT+CLAC List All Available AT Commands

Description	Command	Possible Responses
List available AT Commands	AT+CLAC	<AT Command1> [<CR><LF><AT Command2> [... [<CR><LF><ATCommand N>]]] OK +CME ERROR: <err>

Description:

This command returns the AT commands that are available to the user.

This command is available without SIM access.

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3.18 AT+CMEE Mobile Equipment Error

Description	Command	Possible Responses
Request Mobile Equipment Error	AT+CMEE=[<n>]	OK ERROR
Show the current setting	AT+CMEE?	+CMEE: <n> OK ERROR
Test if the command is supported	AT+CMEE=?	+CMEE: (list of supported <n>s) OK ERROR

Description:

Disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the ME. When enabled, ME related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters, or TA functionality. For more information, refer to "+CME ERROR (Mobile Equipment Error Code)".

Defined values:

<n>	Description
0	Disable +CME ERROR: <err> result code and use ERROR instead. **Default value**
1	Enable +CME ERROR: <err> result code and use numeric <err> values.
2	Enable +CME ERROR: <err> result code and use verbose <err> values.

3.19 AT+CMER Mobile Equipment Event Reporting

Description	Command	Possible Responses
Set ME activity status	AT+CMER=[<mode>[,<keyp>[,<disp>[,<ind>[,<bfr>]]]]]	+CME ERROR: <err> OK ERROR
Read the current setting	AT+CMER?	+CMER: <mode>,<keyp>,<disp>,<ind>,<bfr> OK ERROR

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Description	Command	Possible Responses
Test if the command is supported	AT+CMER=?	+CMER: (list of supported <mode>s), (list of supported <ind>s), (list of supported <bfr>s) OK ERROR

Description:

The command enables or disables the sending of unsolicited result codes from the TA to the TE in the case of key pressings, display changes, and indicator state changes. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1, 2 or 3 is entered.

Defined values:

<mode>	Description
0	Buffer unsolicited result codes in the TA; if TA result code buffer is full, codes can be buffered in some other place or the oldest ones can be discarded
3	Forward unsolicited result codes directly to the TE; TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<keyp>	Description
0	No keypad event reporting

<disp>	Description
0	No display event reporting

<ind>	Description
0	No indicator event reporting
1	Indicator event reporting using result code +CIEV: <ind>,<value>. <ind> indicates the indicator order number (as specified for +CIND) and <value> is the new value of indicator. Only those indicator events, which are not caused by +CIND will be indicated by the TA to the TE.

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

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Unsolicited Result Codes:

+CKEV: <key>,<press>

+CIEV: <ind>,<value>

3.19.1 +CIEV Indicator Event Unsolicited reports

Description:

This unsolicited result code is enabled with the AT+CMER command and indicates changes in indicator levels. <*ind*> in the table below indicates the indicator order number (as specified for AT+CIND). The +CIEV result code has the following syntax:

+CIEV: <n>,<value>

Defined values:

<n>	<value>	Description	<ind>
2	0-5	Signal quality indicator	1
5	0-1	Service indicator	2
6	0-1	Silent indicator	3
7	0-1	Message Received (SMS)	4
8	0-1	Call in progress indicator	5
9	0-1	SMS memory full	7

0=off, 1=on, Signal quality 5 is Best quality.

There is no +CIEV report on change in roaming. CIEV <n> codes 1, 3, and 4 represent battery and charger reports which are not used in the module.

3.20 AT+CPAS Phone Activity Status

Description	Command	Possible Responses
Execute ME Activity Status	AT+CPAS[=<mode>]	+CPAS: <pas> +CME ERROR <err> OK ERROR
Test if the command is supported	AT+CPAS=?	+CPAS: (list of supported <pas>s) +CME ERROR <err> OK ERROR

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Description:

This command returns the activity status <pas> of the ME. It can be used to interrogate the ME before requesting action from the ME.

When the command is executed without the <mode> argument, the command returns <pas> values from 0 to 128 (for supported values see table below). When, on the other hand, the command is executed with the <mode> argument set to 1, the command may return Sony Ericsson specific <pas> values from 129 to 255 (for supported values see the table below).

Test command returns values supported by the ME as a compound value: refer to 3GPP 27.007.

Defined values:

<pas>	Description
0	Ready (MT allows commands from TA/TE)
1	Unavailable (MT does not allow commands from TA/TE)
2	Unknown (MT is not guaranteed to respond to instructions)
3	Ringing (MT is ready for commands from TA/TE, but the ringer is active)
4	Call in progress (MT is ready for commands from TA/TE, but a call is in progress)
5	asleep (MT is unable to process commands from TA/TE because it is in a low functionality state)
129	Not in call
130	Mobile originated call in progress. This is a sub-state to 'call in progress'
131	Mobile terminated call in progress. This is a sub-state to 'call in progress'

<mode>	Description
0	Restricts the CPAS to return only standard <pas>values
1	Allows the CPAS to return Sony Ericsson specific <pas> values, such as 129, 130 and 131

Example:

```
AT+CPAS=?

+CPAS: (0-5,129-131)

OK
AT+CPAS

+CPAS: 0

OK
```


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3.21 AT+CPWD Change Password

Description	Command	Possible Responses
Request facility lock	AT+CPWD=<fac>, <oldpwd>, <newpwd>	• +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CPWD=?	• +CPWD: (<fac1>,<pwdlength 1>), (<fac2>,<pwdlength 2>),... • +CME ERROR <err> • OK • ERROR

Description:

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

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

Defined values:

<fac>	Description
"SC"	SIM (lock SIM card) (SIM asks password in ME power-up and when this lock command issued)
"FD"	SIM fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as <passwd>)
"AO"	BAOC (Barr All Outgoing Calls) (refer GSM 02.88 clause 1)
"OI"	BOIC (Barr Outgoing International Calls) (refer GSM 02.88 clause 1)
"AI"	BAIC (Barr All Incoming Calls) (refer GSM 02.88 clause 2)
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country) (refer GSM 02.88 clause 2)
"OX"	BOIC-exHC (Barr Outgoing International Calls except to Home Country) (refer GSM 02.88 clause 1)
"AB"	All Barring services (refer GSM 02.30)
"AG"	All outGoing barring services (refer GSM 02.30)
"AC"	All inComing barring services (refer GSM 02.30)

<oldpwd>	Description
string type	<oldpwd> shall be the same as password specified for the facility from the ME user interface or with the change password command, +CPWD

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<newpwd>	Description
string type	<newpwd> is the new password, maximum length of password can be determined with <pwdlength>

<pwdlength>	Description
Integer type	Maximum length of the password for the facility

<err>	Description
0	ME failure
3	Operation not allowed
5	PH-SIM PIN required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
23	Text string too long
24	Invalid characters in text string
100	Unknown
101..255	Reserved by ETS

Example:

AT+CPWD="SC","0000","0001"
OK

3.22 AT+CR Service Reporting Control

Description	Command	Possible Responses
Set Service Reporting Control	AT+CR=<mode>	OK ERROR
Read current setting	AT+CR?	+CR: <mode> OK ERROR
Test if the command is supported	AT+CR=?	+CR: (list of supported <mode>s) OK ERROR

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Description:

This command controls whether intermediate bearer capability result code +CR: <serv> is returned from the TA to the TE. If service reportin is enabled, the intermediate result code is transmitted at the point during connect negotiation at which the TA has determined the speed and quality of service that will be used, before any error control or data compression reports are transmitted, and before the intermediate result code CONNECT is transmitted.

Test command returns values supported as a compound value.

This command replaces old V.25ter command Modulation Reporting Control +MR, which is not appropriate for use in the GSM network.

Possible error control (other than radio link protocol) and data compression reporting can be enabled with V.25ter commands Error Control Reporting +ER and Data Compression Reporting +DR.

Defined values:

<mode>	Description
0	Disable reporting. **Default value**
1	Enable reporting

<serv>	Description
ASYNC	Asynchronous transparent
SYNC	Synchronous transparent
REL ASYNC	Asynchronous non-transparent
REL SYNC	Synchronous non-transparent
GPRS [<L2P>]	GPRS The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command.

3.22.1 +CR Service Reporting Unsolicited Response

<serv>	Description
ASYNC	Asynchronous transparent
SYNC	Synchronous transparent
REL ASYNC	Asynchronous non-transparent
REL SYNC	Synchronous non-transparent
GPRS [<L2P>]	GPRS The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command.

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Description:

The +CR unsolicited messages are enabled and disabled by the AT+CR command. Format:

```
+CR: <serv>
```

3.23 AT+CRC Cellular Result Code

Description	Command	Possible Responses
Set Cellular Result Code option	AT+CRC=[<mode>]	OK ERROR
Show the current setting	AT+CRC?	+CRC: <mode> OK ERROR
Test if the command is supported	AT+CRC=?	+CRC: (list of supported <mode>s) OK ERROR

Description:

This command controls whether the extended format of incoming call indication or GPRS network request for PDP context activation or notification for VBS/VGCS calls is used.

When enabled, an incoming call is indicated to the TE with unsolicited result code +CRING: <type> instead of the normal RING

Test command returns values supported as a compound value.

Similar command may be found in TIA IS-99 and TIA IS-135.

Defined values:

<mode>	Description
0	Disables extended format. **Default.**
1	Enables extended format

3.23.1 +CRING Incoming Call Type Notification

Description:

The +CRING unsolicited message replaces the normal RING message when it is enabled by the AT+CRC command. The following message format is used:

```
+CRING: <type>
```

<type>	Description
ASYNC	Asynchronous transparent
SYNC	Synchronous transparent
REL ASYNC	Asynchronous non-transparent

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<type>	Description
REL SYNC	Synchronous non-transparent
FAX	Facsimile
VOICE	Normal voice call

Defined values (R99):

<type>	Description
ASYNC [,<priority>[,<subaddr>,<satype>]]	Asynchronous transparent
SYNC [,<priority>[,<subaddr>,<satype>]]	Synchronous transparent
REL ASYNC [,<priority>[,<subaddr>,<satype>]]	Asynchronous non-transparent
REL SYNC [,<priority>[,<subaddr>,<satype>]]	Synchronous non-transparent
FAX [,<priority>[,<subaddr>,<satype>]]	Facsimile (TS62)
VOICE [,<priority>[,<subaddr>,<satype>]]	Normal voice call (TS11)
VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]]	Voice followed by data (BS 81) (*XXX* is ASYNC, SYNC, REL ASYNC or REL SYNC)
ALT VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]]	Alternating voice/data, voice first (BS 61)
ALT *XXX*/VOICE [,<priority>[,<subaddr>,<satype>]]	alternating voice/data, data first (BS 61)
ALT VOICE/FAX [,<priority>[,<subaddr>,<satype>]]	alternating voice/fax, voice first (TS 61)
ALT FAX/VOICE [,<priority>[,<subaddr>,<satype>]]	alternating voice/fax, fax first (TS 61)
GPRS <PDP_type>, <PDP_addr>[, [<L2P>][,<APN>]]	GPRS network request for PDP context activation
VGC <GCA>, <GId>, <ackflag> [,<priority>]	voice group call (TS 91)
VBC <GCA>, <GId>, <ackflag> [,<priority>]	voice broadcast call (TS 92)

The optional <priority> indicates the eMLPP priority level of the incoming call by paging, notification or setup message. The priority level values are as defined in eMLPP specification 3GPP TS 22.067.

<subaddr>: string type subaddress of format specified by <satype>.

<satype>: type of subaddress octet in integer format (refer to 3GPP TS 24.008).

<PDP_type> ,<PDP_addr> and <APN> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.25ter online data state) the MT shall reject the request. No corresponding unsolicited result code shall be issued when the MT returns to a command state.

<GCA> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call area.

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<Gid> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call identification. The <ackflag>=1 proposes that a predefined confirmation procedure is to be used after the call is ended. For <ackflag>=0 no confirmation procedure is required.

3.24 AT+CRES Restore SMS Settings

Description	Command	Possible Responses
Restore settings	AT+CRES[=<profile>]	• +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CRES=?	• +CRES: (list of supported <profile>s) • +CMS ERROR: <err> • OK • ERROR

Description:

Restores message service settings from non-volatile memory to active memory. A TA can contain several profiles of settings. Settings specified in commands Service Centre Address +CSCA, Set Message Parameters +CSMP and Select Cell Broadcast Message Types +CSCB (if implemented) are restored. Certain settings, such as SIM SMS parameters, cannot be restored.

Defined values:

<profile>	Description
0..2	Profile number where settings are to be stored. **Default value is 0**

3.25 AT+CSAS Save Settings

Description	Command	Possible Responses
Save Settings	AT+CSAS[=<profile>]	• +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CSAS=?	• +CSAS: (list of supported <profile>s) • +CMS ERROR: <err> • OK • ERROR

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Description:

This command saves active message service settings to SIM memory. A TA can contain several settings profiles. Settings specified in commands Service Centre Address +CSCA, Set Message Parameters +CSMP and Select Cell Broadcast Message Types +CSCB are saved. Certain settings may not be supported by the storage (e.g. SIM SMS parameters) and therefore can not be saved.

Test command shall display the supported profile numbers for reading and writing of settings.

Defined values:

<profile>	Description
0..2	Manufacturer specific profile number where settings are to be stored. **Default value is 0**

It is recommended that the AT&W command is used in preference to AT+CSAS. This is only included for compatibility. AT+CSAS only stores parameters set by AT+CSCA.

3.26 AT+CSQ Signal Strength

Description	Command	Possible Responses
Execute Signal Strength	AT+CSQ	+CSQ: <rssi>,<ber> +CME ERROR <err> OK ERROR
Test if the command is supported	AT+CSQ=?	+CSQ: (list of supported <rssi>s),(list of supported <ber>s) +CME ERROR <err> OK ERROR

Description:

Returns the received signal strength indication <rssi> and channel bit error rate <ber> from the ME.

Test command returns values supported as compound values.

Defined values (GSM):

<rssi>	Description
0	-113dBm or less
1	-111dBm
2..30	-109... -53dBm
31	-51dBm or greater
99	Not known or not detectable

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<ber>	Description (BER = Bit Error Rate)
0	0 < BER < 0.2%
1	0.2% < BER < 0.4%
2	0.4% < BER < 0.8%
3	0.8% < BER < 1.6%
4	1.6% < BER < 3.2%
5	3.2% < BER < 6.4%
6	6.4% < BER < 12.8%
7	12.8% or higher
99	Not known or not detectable

3.27 AT*E2ESC Escape Sequence Guard Time

Description	Command	Possible responses
Set GPRS online command guard time	AT*E2ESC=[<gt>]	• OK • ERROR
Show the current setting	AT*E2ESC?	• *E2ESC: <gt> • OK • ERROR
Test if the command is supported	AT*E2ESC=?	• *E2ESC: (range of supported <gt>s) • OK • ERROR

Description:

Defines a guard time for the escape sequence in GPRS to return to online command mode i.e. if +++<CR> is received either as part of the data stream or a terminating string from the application and no further data is received for the duration of the guard time the module will go into on line command mode. This guards against the module accidentally going into on line command mode. The verbose format of +++<CR> is <S2><S2><S2>AT<S3>, that is, the escape character is set in S-register 2 and the return character is set in S-register 3.

The value set by AT*E2ESC is stored in the user profile. It can be made persistent across power cycles by using the AT&W command.

Defined values:

<gt>	Description
0	No guard time. **Default value. Default value set by AT&F.**
1-10	Guard time in seconds

3.28 AT*E2RESET Restart Module

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Description	Command	Possible Responses
Perform a restart	AT*E2RESET	OK ERROR
Test if the command is supported	AT*E2RESET=?	OK ERROR

Description:

This command is used to cause the module to reset and restart. The software internally will allow a watch dog timeout to occur which will reset the microcontroller's internal registers and restart the software at the beginning of operation. Most blocks internal to the module will be reset and reinitialized. All settings and levels set by previous AT commands that are not stored in non-volatile memory will have to be reissued. The general result of this command is to return as much of the system back to normal power on conditions.

This command is available without SIM access.

3.29 AT*EBATTCNF Battery Configuration

Description	Command	Possible Responses
Load new battery voltage(mV) to capacity(%) conversion table	AT*EBATTCNF=<table=0>,<x_start=0,10,20,30,40,50,60,70,80,90>,<data0>,...<data9> AT*EBATTCNF=<table=0>,<x_start=100>,<data0>	OK ERROR
Load new battery thermistor (10 bit raw) reading to temperature limits (Celsius) conversion table	AT*EBATTCNF=<table=1>,<data0>,<data1>	OK ERROR
Read battery configuration data	AT*EBATTCNF?	*EBATTCNF: Cap, (table elements 0-9), (table elements 10-19), (table elements 20-29), (table elements 30-39), (table elements 40-49), (table elements 50-59), (table elements 60-69), (table elements 70-79), (table elements 80-89), (table elements 90-99), (table element 100) *EBATTCNF: Tmp, (0C, 40C) OK
Test if the command is supported	AT*EBATTCNF=?	*EBATTCNF: (list of possible entry parameters with range) OK

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Description:

This command is used to load and recall battery configuration data to include battery voltage (mV) to capacity (%) conversion data as well as battery thermistor data. The battery voltage to capacity table is a 101 element array with each index representing battery capacity from 0% to 100%, with each index value set to the battery voltage level (in mV, 4 digits) for that % value. The battery thermistor ADC (10 bit raw) reading to temperature (C) limit table is a 2 element array with index 0 representing 0 degrees C and index 1 representing 40 degrees C, with each index value set to the 10 bit raw ADC battery thermistor reading (3 decimal digits) for that temperature.

Warning! The battery temperature limits must be set for the customer's battery thermistor circuit design. The default values are set for the SEMC recommended battery thermistor circuit design.

Warning! Battery voltage (mV) to battery capacity values must be set for the customer's battery selection. The default values are set for the SEMC recommended battery.

Defined values:

<table>	Description
0	Battery voltage (mV) to battery capacity (%) table
1	Battery thermistor ADC (10 bit raw) reading to temperature (C)

<x_start>	Description
0,10,20,30,40,50,60,70,80,90, 100	For <table=0>, start index value for following <data> values. Table can only be loaded 10 elements at a time.

<data0-data9>	Description
0-4999 0-767	For < table=0>, data values beginning with <x_start> index. For <x_start=100>, only (1) element is required. For <table=1>, only (2) elements are required

Examples:

/* Set battery voltage (mV) to battery capacity (%) values for table elements 10-19 */

```
AT*EBATTCNF=0,10,3624,3629,3632,3636,3640,3645,3649,3653,3658,3662
```

/* Set battery voltage (mV) to battery capacity (%) value for table element 100 */

```
AT*EBATTCNF=0,100,4193
```

/* Set battery thermistor ADC (10 bit raw) reading to temperature (C) limits */

```
AT*EBATTCNF=1,162,607
```

3.30 AT*ECAM Call Monitoring

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Description	Command	Possible Responses
Set Call Monitoring on or off	AT*ECAM=<onoff>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ECAM?	• *ECAM: <on/off> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*ECAM=?	• *ECAM: list of supported <on/off>s • +CME ERROR: <err> • OK • ERROR

Description:

This command activates or deactivates the call monitoring function in the ME. When this log function is activated in the ME, the ME informs about call events, such as incoming call, connected, hang up etc.

It is preferable that the current status shall always be sent with result code *ECAV when activating the log function. The purpose of this is two fold:

- to gather relevant information for the call log in a TE;
- to make it possible for the TE to display call state information for an ongoing call.

Defined values:

<onoff>	Description
0	The call log function is disabled (off). **Default value**
1	The call log function is enabled (on)

Unsolicited result codes:

```
*ECAV: <ccid>,<ccstatus>,<calltype>,[<processid>],[<exitcause>],
[<number>,<type>]
```

Example:

```
AT*ECAM?
*ECAM: 0
AT*ECAM=1
OK
```

3.30.1 *ECAV Call Monitoring Unsolicited Result Code

Description:

The *ECAV result code is issued every time there is a change in the progress of a call. The *ECAV result code has the following syntax.

*ECAV: <ccid>,<ccstatus>,<calltype>[,<processid>][,exitcause][,<number>,<type>]

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<ccid>: This is an integer value identifying the call for which the progress has changed. Unless more than one call is in progress, this value will be 1. The maximum number of call control processes is 7 (5 multiparty members, 1 call on hold, 1 call waiting).

Defined values:

<ccid>	Description
1-7	Id of the call for which progress change is reported.

<ccstatus>: This is an integer value showing the status of the call.

<ccstatus>	Description
0	IDLE.
1	CALLING. Mobile Originated (outgoing) call started.
2	CONNECTING. Mobile Originated (outgoing) call in the process of establishing a connection.
3	ACTIVE. Connection established between A and B.
4	HOLD. Connection put on hold.
5	WAITING. Mobile Terminated (incoming).
6	ALERTING. Mobile Terminated (incoming) call ringing or Mobile Originated (outgoing) ringback (remote end ringing) detected.
7	BUSY.
8	CALL FAILED. See <exitcause> for reason.

<calltype>: This is an integer identifying what type of call is in progress.

<calltype>	Description
1	Voice.
2	Data
128	Voice 2.

<processid>: This is an hexadecimal integer identifying the process that module returns to after returning to the IDLE state.

<processid>	Description
08	CC. Call Control
44	MM. Mobile Management.
45	MS. Mobile Station.
7A	RR. Radio Resources.

<exitcause>: This is an integer value showing why the call ended. Only reported when returning to the IDLE state.

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<exitcause>	Description
1	Unassigned (unallocated) number.
3	No route to destination.
6	Channel unacceptable.
8	Operator determined barring.
16	Normal call clearing.
17	User busy.
18	No user responding.
19	User alerting, no answer.
21	Call rejected.
22	Number changed.
25	Pre-emption.
26	Non selected user clearing.
27	Destination out of order.
28	Invalid number format (incomplete number).
29	Facility rejected.
30	Response to STATUS ENQUIRY.
31	Normal, unspecified.
34	No circuit/channel available.
38	Network out of order.
41	Temporary failure.
42	Switching equipment congestion.
43	Access information discarded.
44	requested circuit/channel not available.
47	Resources unavailable, unspecified.
49	Quality of service unavailable.
50	Requested facility not subscribed.
55	Incoming calls barred within the CUG.
57	Bearer capability not authorized.
58	Bearer capability not presently available.
63	Service or option not available, unspecified.
65	Bearer service not implemented.
68	ACM equal to or greater than ACMmax.
69	Requested Facility not yet implemented.
70	Only Restricted Digital information bearer capability is available.
79	Service or option not implemented, unspecified.
81	Invalid Transaction Identifier value.
87	User not member of CUG.
88	Incompatible Destination.
91	Invalid transit network selection.
95	Semantically incorrect message.
96	Invalid mandatory information.
97	Message type non-existent or not implemented.
98	Message type not compatible with protocol state.
99	Information element non-existent or not implemented
100	Conditional IE Error
101	Message not compatible with protocol state
102	Recovery on timer expiry

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<exitcause>	Description
111	Protocol error, unspecified
127	Inter-working unspecified
150	Radio Path Not Available
255	Empty

<number>: A string containing the phone number of the party calling the module (Mobile Terminated) or the party called from the module (Mobile Originated). The <number> is only shown for state CALLING (1) and ALERTING (6) for MT calls.

<number>	Description
String	String of valid dial characters (‘0’-‘9’, ‘+’, ‘#’, ‘*’, ‘A’, ‘B’, and ‘C’)

<type>: This is an integer identifying the type of number displayed in <number>. The integer should be converted into a binary number for decoding using the tables below:

Bit8	Bit7	Bit6	Bit5	Description
0	0	0	0	Unknown number.
0	0	0	1	International number.
0	0	1	0	National number.
0	0	1	1	Network specific number.
0	1	0	0	Dedicated access, short code
0	1	0	1	Reserved
0	1	1	0	Reserved
0	1	1	1	Reserved for extension

Bits 1-4 only apply to bits 5-8 = 0000, 0001, 0010 and 0100.

Bit4	Bit3	Bit2	Bit1	Description
0	0	0	0	Unknown numbering plan.
0	0	0	1	ISDN/telephony numbering plan. (Recommendation E.164/E.163).
0	0	1	0	Reserved.

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Bit4	Bit3	Bit2	Bit1	Description
0	0	1	1	Data numbering plan (Recommendation X.121).
0	1	0	0	Telex numbering plan (Recommendation F.69).
0	1	0	1	Reserved.
0	1	1	0	Reserved.
0	1	1	1	Reserved.
1	0	0	0	National numbering plan.
1	0	0	1	Private numbering plan.
1	0	1	0	Reserved.
1	0	1	1	Reserved for CTS (see 3GPP TS 44.056 [91]).
1	1	0	0	Reserved.
1	1	0	1	Reserved.
1	1	1	0	Reserved.
1	1	1	1	Reserved for extension.

3.31 AT*ECIND Expanded Indicator Control

Description	Command	Possible Responses
Set unsolicited message reporting on/off for entire list of indicators	AT*ECIND=1, <r1>,<r2>,<r3>,....,<r12>[,<r13>]...[,<r20>]	OK ERROR
Set unsolicited message reporting on/off for a single specific indicator	AT*ECIND=2,<ind_no>,<on-off>	OK ERROR
Display unsolicited message reporting states for all indicators	AT*ECIND=3	*ECIND: 3,<r1>,<r2>,<r3>,....,<r12>[,<r13>]...[,<r20>]
Display current value for all indicators	AT*ECIND=4	*ECIND: 4,<v1>,<v2>,<v3>,.....,<v12>[,<v13>]...[,<v20>]
Test if the command is supported, and input parameters	AT*ECIND=?	*ECIND: (List of supported operational codes, <ind_no>s, <on-off>s, <rn>s)
Unsolicited report		*ECIND: 5,<ind_no>,<vn>

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Description:

This command enables/disables the unsolicited reporting of individual indicators. The command also returns the current status of all or selected indicators.

An operating code has been assigned (and hard-coded, 1-4, in the table above) for each possible kind of operation using this command. The same operating code is returned as the first parameter in the solicited and unsolicited responses.

Unsolicited reports for all indicators are default off.

The settings are persistent if saved using AT&W.

Defined values:

Parameter	Description
<rn>, n=1-20	Indicator reporting state, 0=no report, 1=report
<vn>, n=1-20	Value for each indicator. For signal strength, values are 0-5, others 0=inactive, 1=active
<on-off>	0=no report, 1=report

Ordinal number and <ind_no>	Description
1	Signal strength indicator (0-5)
2	Service indicator
3	SMS message waiting to be read
4	Call in progress indicator
5	SMS memory full
6	Roaming indicator
7	Voice message waiting, line 1
8	Voice message waiting, line 2
9	Fax message waiting, line 1
10	Fax message waiting, line 2
11	Email message waiting, line 1
12	Email message waiting, line 2
13 .. 20	Reserved

Parameter	Description
<rn>, n=1-20	Indicator reporting state, 0=no report, 1=report
<vn>, n=1-20	Value for each indicator. For signal strength, values are 0-5, others 0=inactive, 1=active
<on-off>	0=no report, 1=report

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3.32 AT*ECLCC List Current Calls

Description	Command	Possible Responses
Set unsolicited reporting on/off	AT*ECLCC=<n>	• OK • ERROR
Read the current setting	AT*ECLCC?	• *ECLCC: <n> • OK • ERROR
Read the current call status	AT*ECLCC	• *ECLCC: <ccid>,<dir>,<ccstatus>,<calltype>,<mpty>[,<exitcause>,<number>,<type>]<CR> • [,<ccid>,<dir>,<ccstatus>,<calltype>,<mpty>[,<exitcause>,<number>,<type>]]<CR> • ..etc for all calls • OK • ERROR
Show list of supported modes	AT*ECLCC=?	• *ECLCC: (list of supported <n>s) • OK • ERROR
Unsolicited report		• *ECLCC: <ccid>,<dir>,<ccstatus>,<calltype>,<mpty>[,<exitcause>,<number>,<type>]

Description:

This command enables and disables unsolicited reports of call status. It is similar to AT*ECAM (*ECAV) and the GSM standard unsolicited report +CLCC, but with a slightly different set of parameters.

When entering the command without any parameters, the current status of all calls is returned.

The command is operational with or without a SIM card available.

The setting is not persistent after a power cycle.

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Defined values:

<n>	Description
0	Call status reporting is disabled. **Default value.**
1	Call status reporting is enabled.

<ccid>	Description
1-7	Id of the call for which progress change is reported.

<dir>	Description
0	Mobile Originated Call
1	Mobile Terminated Call.

<ccstatus>	Description
0	IDLE.
1	CALLING. Mobile Originated (outgoing) call started.
2	CONNECTING. Mobile Originated (outgoing) call in the process of establishing a connection.
3	ACTIVE. Connection established between A and B.
4	HOLD. Connection put on hold.
5	WAITING. Mobile Terminated (incoming) call waiting.
6	ALERTING. Mobile Terminated (incoming) call ringing or Mobile Originated (outgoing) ringback (remote end ringing) detected.
7	BUSY.
8	CALL FAILED. See <exitcause> for reason.

<calltype>	Description
1	Voice.
2	Data
128	Voice 2.

<mpty>	Description
0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

<exitcause>: This is an integer value showing why the call ended. Only reported when returning to the IDLE state. The exit code is in most cases delivered directly from the network and therefore the codes can differ from operator to operator. There may also be more exit codes than listed in the table below.

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<exitcause>	Description
1	Unassigned (unallocated) number.
3	No route to destination.
6	Channel unacceptable.
8	Operator determined barring.
16	Normal call clearing.
17	User busy.
18	No user responding.
19	User alerting, no answer.
21	Call rejected.
22	Number changed.
25	Pre-emption.
26	Non selected user clearing.
27	Destination out of order.
28	Invalid number format (incomplete number).
29	Facility rejected.
30	Response to STATUS ENQUIRY.
31	Normal, unspecified.
34	No circuit/channel available.
38	Network out of order.
41	Temporary failure.
42	Switching equipment congestion.
43	Access information discarded.
44	requested circuit/channel not available.
47	Resources unavailable, unspecified.
49	Quality of service unavailable.
50	Requested facility not subscribed.
55	Incoming calls barred within the CUG.
57	Bearer capability not authorized.
58	Bearer capability not presently available.
63	Service or option not available, unspecified.
65	Bearer service not implemented.
68	ACM equal to or greater than ACMmax.
69	Requested Facility not yet implemented.
70	Only Restricted Digital information bearer capability is available.
79	Service or option not implemented, unspecified.
81	Invalid Transaction Identifier value.
87	User not member of CUG.
88	Incompatible Destination.
91	Invalid transit network selection.
95	Semantically incorrect message.
96	Invalid mandatory information.
97	Message type non-existent or not implemented.
98	Message type not compatible with protocol state.
99	Information element non-existent or not implemented
100	Conditional IE Error

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<exitcause>	Description
101	Message not compatible with protocol state
102	Recovery on timer expiry
111	Protocol error, unspecified
127	Inter-working unspecified
150	Radio Path Not Available
210	The network did not send a cause
211	Max Random Access channels used - Uplink failure
212	Access barred
213	Paging
214	Rejected by the Base station
215	No cell available
216	SIM has been removed
218	Ciphering Error - No Ciphering key
219	Reestablish not allowed
220	Establish failure in MPH
221	Data link error
222	Phone is not off hook
223	Reestablish in progress
224	Establish error
226	RR connection failure
227	Forced registration failure
228	GPRS detached
229	GPRS suspended
230	PDCH release
231	GSM detached
255	Empty

<number>: A string containing the phone number of the party calling the module (Mobile Terminated) or the party called from the module (Mobile Originated). The <number> is only shown for state CALLING (1) for MO calls and ALERTING (6) for MT calls.

<number>	Description
String	String of valid dial characters (‘0’-‘9’, ‘+’, ‘#’, ‘*’, ‘A’, ‘B’, and ‘C’)

<type>: This is an integer identifying the type of number displayed in <number>. The integer should be converted into a binary number for decoding using the tables below:

Bit8	Bit7	Bit6	Bit5	Description
0	0	0	0	Unknown number.
0	0	0	1	International number.
0	0	1	0	National number.
0	0	1	1	Network specific number.
0	1	0	0	Dedicated access, short code
0	1	0	1	Reserved
0	1	1	0	Reserved
0	1	1	1	Reserved for extension

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Bits 1-4 only apply to bits 5-8 = 0000, 0001, 0010 and 0100.

Bit4	Bit3	Bit2	Bit1	Description
0	0	0	0	Unknown numbering plan.
0	0	0	1	ISDN/telephony numbering plan. (Recommendation E.164/E.163).
0	0	1	0	Reserved.
0	0	1	1	Data numbering plan (Recommendation X.121).
0	1	0	0	Telex numbering plan (Recommendation F.69).
0	1	0	1	Reserved.
0	1	1	0	Reserved.
0	1	1	1	Reserved.
1	0	0	0	National numbering plan.
1	0	0	1	Private numbering plan.
1	0	1	0	Reserved.
1	0	1	1	Reserved for CTS (see 3GPP TS 44.056).
1	1	0	0	Reserved.
1	1	0	1	Reserved.
1	1	1	0	Reserved.
1	1	1	1	Reserved for extension.

3.33 AT*EDRX DRX reporting

Description	Command	Possible Responses
Set DRX reporting on or off	AT*EDRX=<state=0, 1>	OK ERROR
Query current setting of DRX reports and current BS-PA-MFRM value.	AT*EDRX?	*EDRX: <state>,<value> where <state> is 0 or 1, <value> is 0, 2-9
Test if the command is supported	AT*EDRX=?	*EDRX: (0-1) ERROR (if not supported)
Unsolicited report if DRX reporting is enabled.		*EDRX: <value> where <value> is 0, 2-9

Description:

DRX reporting is enabled and disabled by the AT command *EDRX. The query version of the command reports both the current enable/disable state of unsolicited DRX reporting and the current BS-PA-MFRM value. The test version of the command reports the allowable values for the reporting state. The unsolicited version of the command reports the current BS-PA-MFRM value whenever it changes.

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<state>	Description
0	Disabled (default after factory reset)
1	Enabled

Note! The state is persistent across power cycles.

<value>	Description
Integer (0,2-9)	The number of multi-frames between two transmissions of the same paging message to the paging group to which this MS belongs. 0 if not known.

3.34 AT*EMRDY Module Ready Command

Description	Command	Possible Responses
Set *EMRDY	AT*EMRDY=<mode>	OK ERROR
Query current setting of *EMRDY	AT*EMRDY?	*EMRDY: <mode>,<state>
Test if the command is supported	AT*EMRDY=?	*EMRDY: (0-1) ERROR (if not supported)
Unsolicited report if *EMRDY reports are enabled		*EMRDY: <state>

Description:

*EMRDY can be used to check what state the module is currently in. It can also be output as an unsolicited report that appears whenever the module changes state.

Defined values:

<mode>	Description
0	Unsolicited *EMRDY reports are disabled (default after factory reset for Gx64)
1	Unsolicited *EMRDY reports are enabled

The mode must be saved using &W in order to survive power cycles, which may occur upon module state changes.

<state>	Description
0	No functionality. The radio and SIM are both turned off and the module cannot accept AT commands. 0 can only be displayed as a result of an unsolicited *EMRDY report, as *EMRDY cannot be queried in this mode.

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<state>	Description
1	Minimum functionality. The radio and SIM are both turned off, but the module can accept AT commands.
3	Full functionality. The radio and SIM are both turned on, and the module can accept AT commands
8	SIM only functionality. The radio is turned off, but the SIM is turned on, and the module can accept AT commands.

Note! The *EMRDY <state> 3 indicates that AT commands will be accepted. Successful execution of the commands depends on whether the target process for the command has had sufficient time to initialize.

3.35 AT*ESRB Setup Restart/Shutdown Message

Description	Command	Possible Responses
Enable/disable the restart and shutdown messages	AT*ESRB=<n>	OK ERROR
Read the current settings	AT*ESRB?	*ESRB: <n> OK
Test if command is supported	AT*ESRB=?	*ESRB: (list of supported <n>s)

This command enables and disables the sending of the “Restart” message at power up and the "SHUTDOWN COMPLETE" message at power down.

These settings are persistent and will be maintained after a power cycle if saved.

<n>	Description
0	Disable messages.
1	Enable messages. **Default value.**

3.36 AT*EPIN Additional PIN Information

Description	Command	Possible Responses
Request PIN information	AT*EPIN?	*EPIN:<chv1>,<unbl_chv1>, <chv2>,<unbl_chv2> OK ERROR
Test if the command is supported	AT*EPIN=?	OK ERROR

Description:

This command returns the number of remaining attempts of entering the correct PIN code for the SIM card in use. The command returns the number of remaining attempts for both PIN1 (CHV1), PIN2 (CHV2), PUK1 (unblock CHV1) and PUK2 (unblock CHV2).

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The user has 3 attempts of entering the correct PIN. If unsuccessful the third time, the SIM will be Blocked. The attempts can occur in separate sessions.

This command is available without SIM access.

The setting is persistent through a power cycle.

Defined values:

<chv1>,<cvh2>	Description
0	No more attempts remain
1..3	Number of remaining attempts

<unbl_chv1>,<unbl_cvh2>	Description
0	No more attempts remain
1..10	Number of remaining attempts

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4 Time Commands

4.1 AT+CALA Set Alarm

Description	Command	Possible Responses
Set an alarm time in the ME	AT+CALA=<date,time>, <out_str>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CALA?	• +CALA: <date,time> • ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CALA=?	• +CME ERROR: <err> • OK • ERROR

Description:

The command sets an alarm time in the ME. If alarm setting fails, ERROR: <err> is returned.

When the alarm is timed out and executed, the <out_str> will be sent over the serial interface.

The read command returns the current active alarm settings in the ME.

If the ME is powered down with an alarm set, the ME will power up upon expiration of the alarm.

Defined values:

<date>	Description
string	YY/MM/DD

<time>	Description
string	HH:MM:SS

<out_str>	Description
string	String to be output when Alarm expires

Example:

```
AT+CALA= “05/06/07,11:22:00”, ”Alarm has expired”
OK
When the alarm expires …
“Alarm has expired”
OK
```


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4.2 AT+CALD Alarm Delete

Description	Command	Possible Responses
Delete an alarm	AT+CALD=<n>	• +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CALD=?	• +CALD: (list of supported <n>s) • +CME ERROR: <err> • OK • ERROR

Description:

This command deletes an alarm in the ME. If the command fails in an ME error, +CME ERROR: <err> is returned.

Test command returns supported array index values.

Defined values:

<n>	Description
1	Index identifying an active alarm

4.3 AT+CCLK Set Clock and Date

Description	Command	Possible Responses
Set the real time clock of the ME	AT+CCLK=<time>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CCLK?	• +CCLK: <time> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CCLK=?	• OK • ERROR

Description:

Sets the real time clock of the ME. If setting fails in an ME, error +CME ERROR: <err> is returned. Read command returns the current setting of the clock.

Note!

If the MT does not support time zone information then the three last characters of <time> are not returned by +CCLK?

If the unit time has not been set or is not considered to be valid i.e. power has been removed from the clock, then the unit will return ERROR.

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Defined values:

<time>	Description
string	Format is “yy/mm/dd,hh:mm:ss±zz”, where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47...+48), e.g. 6th of May 1994, 22:10:00 GMT+2 hours reads “94/05/06,22:10:00+08” Note: If the ME does not support time zone information then the three last characters of <time> are not returned by +CCLK?

Example:

```
AT+CCLK?
+CCLK: “00/01/01,22:54:48+00”
OK
AT+CCLK=“19/11/02,09:30:00+00”
OK
```

4.4 AT+CTZU Automatic Time Zone Update

Description	Command	Possible Responses
Enable and disable automatic time zone update via NITZ	AT+CTZU=<onoff>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CTZU?	• +CTZU: <onoff> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CTZU=?	• +CTZU: (list of supported <onoff>s) • +CME ERROR: <err> • OK • ERROR

Description:

Set command enables and disables automatic time zone update via NITZ. If setting fails in an MT error, +CME ERROR: <err> is returned.

Read command returns the current settings in the MT

Test command returns supported on- and off-values

Note! This is highly network dependent. Most networks around the world have not implemented this and as such the unit will be unable to synchronize to network time.

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Defined values:

<onoff>	Description
0	The automatic time zone update via NITZ is disabled (off). **Default value**
1	The automatic time zone update via NITZ is enabled (on)

4.5 AT*EDST Daylight Saving Time

Description	Command	Possible Responses
Set Daylight Saving Time	AT*EDST=<dst>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*EDST?	• *EDST: <dst> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*EDST=?	• *EDST: (list of supported <dst>s) • +CME ERROR: <err> • OK • ERROR

Description:

This command sets the daylight saving time hours. This command affects the MS clock set with the AT+CCLK command. To avoid confusion it is recommended the daylight saving time (DST) is set with this command before setting the actual local time with AT+CCLK.

Defined values:

<dst>	Description
0	Standard time
1	Daylight saving time, +1 hour
2	Daylight saving time, +2 hours

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5 Audio

5.1 AT*E2APR Audio Profile Manipulation

Description	Command	Possible Responses
Request operation with audio profile	AT*E2APR= <op>,[<param1>[, <param2>]]	*E2APR: <TxPGA>,<RxPGA>,<SideToneGain>, <AuxInGain>,<MicInGain>,<TxAGC>, <Volume>,<MaxVolume>,<MicPath>, <SpkPath>,<TxPCM>, <RxPCM>, <HFAlgorithm>,<LocalAudio>,<TxGainLow >, <MicVolt2V>,<SideTone>,<NoiseRed>, <EchoCancel>,<AnalogRing> ERROR OK
Show the current setting	AT*E2APR?	*E2APR: <profile> ERROR
Test if the command is supported	AT*E2APR=?	*E2APR: (list of supported <params>s) ERROR

Description:

This command implements the audio profile management. Each audio profile contains information pertaining to how the audio hardware is to be configured. The specific profile values can be selected using AT*E2EAMS.

Defined values:

<op>	Description
0	Set profile <param1> to set as current
1	Read and display <param1> settings
2	Copy profile <param1> to <param2>
3	Reset profile <param1> to factory default
4	Set default profile as <param1>. Will store as default in NVM.

<param1>, <param2>	Description
0-4	Audio profiles used as above (**default = 0**)

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5.2 AT*E2EAMS Audio Profile Modification

Description	Command	Possible Responses
Request operation with audio profile	AT*E2EAMS= <op>,[<TxPGA>,<RxPGA>, <SideToneGain>,<AuxInGain>, <MicInGain>,<TxAGC>, <Volume>,<MaxVolume>, <MicPath>,<SpkPath>, <TxPCM>, <RxPCM>, <HFAlgorithm>,<LocalAudio>, <TxGainLow>,<MicVolt2V>, <SideTone>,<NoiseRed>, <EchoCancel>,<AnalogRing>]	ERROR OK
Show the current setting	AT*E2EAMS?	*E2EAMS: <TxPGA>,<RxPGA>,<SideToneGain>, <AuxInGain>,<MicInGain>,<TxAGC>, <Volume>,<MaxVolume>,<MicPath>, <SpkPath>,<TxPCM>,<RxPCM>,<HFAlgorithm>,<LocalAudio>,<TxGainLow>,<MicVolt2V>, <SideTone>,<NoiseRed>,<EchoCancel>, <AnalogRing> ERROR
Test if the command is supported	AT*E2EAMS=?	*E2EAMS: (list of supported <params>s) ERROR

Description:

This command allows the modification and configuration of the current audio profile. This command allows user to:

- configure the whole profile, specifying each parameter in a comma separated list;
- set a single parameter, given by the parameter number;
- and save the current profile to NV memory under the current profile number.

Defined values:

<op>	Item	Range	Description
0		NA	Not supported
1	TxPGA	0-1	0 - normal, 1 - high
2	RxPGA	0-1	0 - normal, 1 - high
3	Sidetone Gain	0-0x7FFF	Sidetone gain

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<op>	Item	Range	Description
4	AuxGain	NA	Not supported
5	MicGain	NA	Not supported
6	TxAGC	NA	Not supported
7	Digital Volume	0-10	Index selection to volume gain table
8	Analog Volume	0-10	Cannot set, only displays Digital Volume (7)
9	MicPath	0-1	0 - mic. input, 1 - aux. input
10	SpkrPath	0-1	0 - speaker output, 1 - aux. output
11	TxPCM	NA	Not supported
12	RxPCM	NA	Not supported
13	HF	NA	Not supported
14	Local Audio	NA	Not supported
15	TxAMP	NA	Not supported
16	Mic Supply	NA	Not supported
17	Sidetone On/Off	NA	Not supported, off is 0 in Sidetone Gain (3)
18	Noise Reduction	0-3	0 - disabled, 1 - mic enabled, 2 - speaker enabled, 3 - mic/speaker enabled
19	Echo Cancellation	0-1	0 - off, 1 - on
20	Analog Ring	NA	Not supported
21			
255	Save Parameters		

<param1>, <param2>	Description
0-4	Audio profiles used as above

The diagram below depicts the signal and control paths for the major audio processing blocks:

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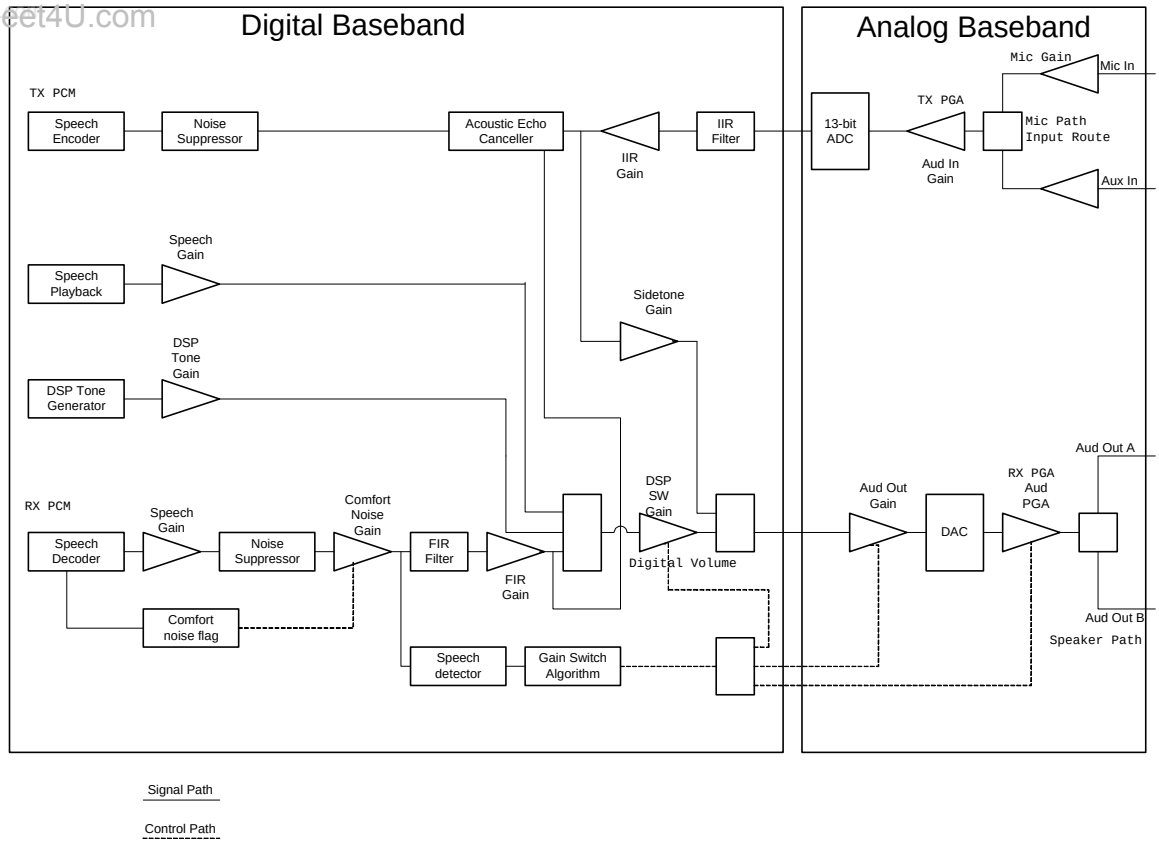

5.3 AT*EAUD Audio Parameters

Description	Command	Possible Responses
Request operation with audio profile	AT*EAUD=<op>,<param> [,<value>]	*EAUD: <ret_value> OK ERROR
Show the current setting	AT*EAUD?	ERROR
Test if the command is supported	AT*EAUD=?	*EAUD: (list of supported <params>s) ERROR

Description:

This command controls audio specific parameters.

For audio control, it is recommended that all settings be stored in a profile in non-volatile memory, preferably at the factory configuration. Whenever a change is needed, change the active profile. This will prevent unwanted noises (clicks, pops, howls, etc) in the audio path. The only exception to this is the speaker volume which can be changed at any time. This command is available without SIM access.

Note! To make AT*EAUD parameter modifications take effect, they must be saved with AT*E2EAMS=255.

Note! To make AT*EAUD changes persistent, they must be saved to a profile with AT*EAPR.

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Defined values:

<op>	Description
0	Read current setting for <param>
1	Write setting for <param>
2	Report possible range of values for <param>

<param>	Description
100-...	Audio parameter to be queried or modified

<value>	Description
variable	When <op> = 1, this is the value used to modify the audio parameter specified by <param>. The range varies based on the <param> specified

<ret_value>	Description
variable	When <op> = 0, the return value is the current setting for the audio parameter specified by <param>. The range varies based on the <param> specified When <op> = 2, the return value is the range of supported values for <param>

Supported audio parameters and values combinations

In the following tables, any item which is italic text is not supported on this platform. These are kept to maintain compatibility with other platforms.

Microphone Parameters

<item>	<param>	<value1>,<value2>
100	Microphone Gain	0 - Normal gain 1 - High gain
101	*Extra Gain*	
102	*Output Bias*	
103	*FIR Coefficients*	*<value1> = coefficient number (0-64)* *<value2> = coefficient value (0-65535)* *AT*EAUD=0,103 returns all 65 coefficients.* *Cannot query a single coefficient.*
104	*Intentionally blank*	
105	*ANR Minimum Gain*	
106	*ANR Div Factor Shift*	
107	*ANR NS Level*	
108	*FIR Filter Enable*	*0 - Disable* *1 - Enable*

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<item>	<param>	<value1>,<value2>
109	*Number FIR Coefficients*	
110	IIR Filter Enable	0 - Disable 1 - Enable single bi-quad 2 - Enable double bi-quad 3 - Enable triple bi-quad
111	*Number IIR Blocks*	
112	IIR Coefficients	<value1> = coefficient number (0-4 for single bi-quad, 0-9 for double bi-quad, or 0-14 for triple bi-quad) <value2> = coefficient value (0-65535) AT*EAUD=0,112 returns all coefficients. Cannot query a single coefficient.
113	*Number IIR Coefficients per Block*	
114	Input Route	0 - microphone input 1 - auxiliary input
115	Auto Noise Reduction Enable	0 - Disable 1 - Enable
116	*Auto Noise Reduction Coefficients*	
117	Dynamic Loudness Adjustment Enable	0 - Disable 1 - Enable
118	Dynamic Loudness Adjustment Configuration	<value1> = coefficient number (0-35) <value2> = coefficient value (0-65535) AT*EAUD=0,118 returns all 36 coefficients. Cannot query a single coefficient.
119	IR Filter Gain	<value1> coefficient value (0-32767)

Speaker Parameters

<item>	<param>	<value1>,<value2>
200	Speaker PGA Gain (in codec)	Specifies the PGA gain in 1 dB unit of the speaker. The range is from -6 dB to 6 dB
201	*Audio Filter Enable*	
202	*Audio Hi-pass Filter Enable*	
203	Speaker Volume (in codec)	Sets volume gain in codec.
204	*Limiter Enable*	
205	*Limiter Block Size*	
206	*Limiter Slope Update Period*	
207	Number of FIR Coefficients	This value cannot be set. AT*EAUD=0,207 will return 65.
208	*Limiter Coefficients*	

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<item>	<param>	<value1>,<value2>
209	*Thr (low)*	
210	*Thr Low Slope*	
211	*Thr (high)*	
212	*Thr High Slope*	
213	*Limiter Gain Fall*	
214	*Limiter Gain Rise*	
215	*IIR Enable*	*0 - Disable* *1 - Enable single bi-quad* *2 - Enable double bi-quad* *3 - Enable triple bi-quad*
216	*Num IIR blocks*	
217	*IIR Coefficients*	*<value1> = coefficient number (0-4 for single bi-quad, 0-9 for double bi-quad, or 0-14 for triple bi-quad)* *<value2> = coefficient value (0-65535)* *AT*EAUD=0,217 returns all coefficients. Cannot query a single coefficient.*
218	*Num FIR Coefficients*	
219	FIR Coefficients	<value1> = coefficient number (0-64) <value2> = coefficient value (0-65535) AT*EAUD=0,219 returns all 65 coefficients. Cannot query a single coefficient.
220	*IIR Input Scaling*	
221	*FIR Scaling*	
222	*IIR Input Gain Scaling*	
223	*IIR Output Gain Scaling*	
224	*IIR Output Gain*	*<value1> coefficient value (0-32767)*
225	*IIR Feedback*	
226	FIR Enable	0 - Disable 1 - Enable
227	Output Route	0 - speaker output 1 - auxiliary output
228	Sidetone Gain	<value1> coefficient value (0-32767)
229	Tone Limit	<value1> coefficient value (0-32767)
230	Dynamic Loudness Adjustment Enable	0 - Disable 1 - Enable
231	Dynamic Loudness Adjustment Configuration	<value1> = coefficient number (0-35) <value2> = coefficient value (0-65535) AT*EAUD=0,231 returns all 36 coefficients. Cannot query a single coefficient.
232	Auto Noise Reduction Enable	0 - Disable 1 - Enable
233	FIR Output Gain	<value1> coefficient value (0-32767)

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<item>	<param>	<value1>,<value2>
234	Volume Gain Coefficient Table	<value1> = coefficient number (0-10) <value2> = coefficient value (0-32767) AT*EAUD=0,234 returns all 11 coefficients. Cannot query a single coefficient.

Mic-Speaker-Loop Parameters

<index>	<param>	<value1>,<value2>
300	*Intentionally blank*	
301	Automatic Echo Cancellation (AEC)	0 - Disable 1 - Enable
302	*AEC Granularity Attenuation*	
303	*AEC Smoothing Coefficient*	
304	*Max Echo Suppression Level*	
305	*VAD factor*	
306	*Absolute Threshold*	
307	*Factor ASD Filtering*	
308	*Factor ASD Muting*	
309	*AEC Visibility*	
310	AEC Configuration	<value1> = coefficient number (0-19) <value2> = coefficient value (0-65535) AT*EAUD=0,310 returns all 20 coefficients. Cannot query a single coefficient.
311	Full Duplex Speaker Enable	0 - Disable 1 - Enable
312	Full Duplex Speaker Coefficients	<value1> = coefficient number (0-31) <value2> = coefficient value (0-65535) AT*EAUD=0,312 returns all 32 coefficients. Cannot query a single coefficient.
313	Anti-pop Enable	0 - Disable 1 - Enable
314	Audio Data Path	0 - Analog (CSPIO) 1 - Digital (SSPIO) 2 - Intercom 3 - Analog input, digital output (CSPI-SSPO)

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<index>	<param>	<value1>,<value2>
315	Serial Data Configuration	<value1> = parameter number (0-6) **value1 = 0**, <value2> = number of data bits per frame (4-16) **value1 = 1**, <value2> = frame format selection (0-3) 0 - SPI 1 - PCM 2 - Microwire 3 - I2S **value1 = 2**, <value2> = data format selection (0-2) (PCM only) 0 - linear 1 - A-law 2 - u-law **value1 = 3**, <value2> = general serial settings defined as follows bit 0x0001 - clock output polarity (0 - normal, 1 - inverted) bit 0x0002 - clock output phase (?) bit 0x0004 - loop back mode (0 - disable, 1 - enable) bit 0x0008 - serial port enable (0 - disable, 1 - enable) bit 0x0010 - master/slave mode (0 - master, 1 - slave) bit 0x0020 - slave mode output disable (0 - enable, 1 - disable) bit 0x0040 - dynamic master/slave switching (0 - disable, 1 - enable) bit 0x0080 - output clock invert (0 - disable, 1 - enable) bit 0x0100 - input clock invert (0 - disable, 1 - enable) **value1 = 4**, <value2> = I2S settings defined as follows bit 0x0001 - receive priority (0 - left first, 1 - right first) bit 0x0002 - transmit priority (0 - left first, 1 - right first) bit 0x0004 - transmit/receive select (0 - transmit, 1 - receive) **value1 = 5**, <value2> = serial port clock rate (?) **value1 = 6**, <value2> = serial port clock pre-scale divisor (?) AT*EAUD=0,315 returns all 7 entries. Cannot query a single entry. This command should be followed by AT*EAUD=1,314,. to complete the write to hardware.

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<index>	<param>	<value1>,<value2>
316	Auto Noise Reduction Coefficients	<value1> = coefficient number (0-19) <value2> = coefficient value (0-65535) AT*EAUD=0,316 returns all 20 coefficients. Cannot query a single coefficient.

5.4 AT*EMIC Microphone Mode

Description	Command	Possible Responses
Request operation	AT*EMIC=<value>	ERROR OK
Show the current setting	AT*EMIC?	*EMIC: <ret_value> ERROR
Test if the command is supported	AT*EMIC=?	*EMIC: (list of supported <params>s) ERROR

Description:

This command implements the microphone mute.

Defined values:

<value>	Description
0	Microphone disabled
1	Microphone enabled

5.5 AT*ERSE PCM/Analog Audio and RS232 Selection

Description	Command	Possible Responses
Request operation	AT*ERSE=<value>	ERROR OK
Show the current setting	AT*ERSE?	*ERSE: <ret_value> ERROR
Test if the command is supported	AT*ERSE=?	*ERSE: (list of supported <params>s) ERROR

Description:

This command implements the audio path selections. Any changes made using this command are not persistent, but they can be saved to the current profile using AT*E2EAMS=255.

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Defined values:

<value>	Description
0	Analog (CSPIO)
1	Digital (SSPIO)
2	Intercom
3	Analog input, digital output (CSPI-SSPO)

5.6 AT*ESIL Silence Command

Description	Command	Possible Responses
Request operation	AT*ESIL=<value>	ERROR OK
Show the current setting	AT*ESIL?	*ESIL: <ret_value> ERROR
Test if the command is supported	AT*ESIL=?	*ESIL: (list of supported <params>s) ERROR

Description:

This command implements the speaker mute.

<value>	Description
0	Speaker disabled
1	Speaker enabled

5.7 AT+CLVL Loudspeaker Volume Level

Description	Command	Possible Responses
Request operation with audio profile	AT+CLVL=<volume>	ERROR OK
Show the current setting	AT+CLVL?	+CLVL: <volume> ERROR
Test if the command is supported	AT+CLVL=?	+CLVL: (list of supported <params>s) ERROR

Description:

This command implements the audio speaker volume change. This setting is valid while on a voice call. The setting is not persistent beyond the current call.

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Defined values:

<volume>	Description
0-10	0 (silent) to 10 (maximum)

5.8 AT*TTY CTM (Cellular Text Telephone Mode) Support

Description	Command	Possible Responses
Set TTY mode	AT*TTY=<CTM_enable>,<Bearer_Id>	ERROR OK
Show the current setting	AT*TTY?	*TTY: <CTM_enable>,<Bearer_Id> ERROR
Test if the command is supported	AT*TTY=?	*TTY: (list of supported <CTM_enable>s), (list of supported <Bearer_Id>s) ERROR

Description:

The execution command causes teh MT to perform the actions necessary to enable/disable CTM support.

The Set command enables/disables CTM support

The Read command gives the status of <CTM_enable> and the value of <Bearer_Id>.

The Test command displays the ranges for <CTM_enable> and <Bearer_Id>.

Defined values:

<CTM_enable>	Description
0	Disable CTM support on the MT
1	Enable CTM support on the MT

<Bearer_Id>	Description
0-1	supported values

Note! When this command is used, both parameters must be provided.

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6 Data - CSD

6.1 AT+CBST Select Bearer Service Type

Description	Command	Possible Responses
Select bearer service type	AT+CBST=[<speed>, [<name>,[<ce>]]]	• OK • ERROR
Show the current setting	AT+CBST?	• +CBST: <speed>,<name>, <ce> • OK ERROR
Test if the command is supported	AT+CBST=?	• +CBST: (list of supported <speed>s,list of supported <name>s, list of supported <ce>s) • OK • ERROR

Description:

Selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated. Values may also be used during mobile terminated data call setup, especially in the case of single numbering scheme calls.

Test command returns values supported by the TA as compound values.

Defined values:

<speed>	Description
4	2400 bps V.22bis
6	4800 bps V.32
7	9600 bps V.32
14	14400 bps V.34
68	2400 bps V.110 (ISDN)
70	4800 bps V.110 (ISDN)
71	9600 bps V.110 (ISDN)

<name>	Description
0	Asynchronous connection (UDI or 3.1 KHz modem)
1	Synchronous connection (UDI or 3.1 KHz modem)

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<ce>	Description
0	Transparent
1	Non transparent

6.2 AT+CRLP Radio Link Protocol

Description	Command	Possible Responses
Set radio link protocol	AT+CRLP=[<iws> [,<mws>[,<T1> [,<N2>]]]]	• OK • ERROR
Show the current setting	AT+CRLP?	• +CRLP: <iws>,<mws>,<T1>,<N2><CR><LF> • +CRLP: <iws>,<mws>,<T1>,<N2>[...]] • OK • ERROR
Test if the command is supported	AT+CRLP=?	• +CRLP: (list of supported <iws>s), (list of supported <mws>s), • (list of supported <T1>s), • (list of supported<N2>s) [<CR><LF>+CRLP: (list of supported <iws>s), (list of supported <mws>s), (list of supported <T1>s), (list of supported <N2>s)[...]] OK ERROR

Description:

Radio link protocol (RLP) parameters used when non-transparent data calls are originated may be altered with this command. Available command subparameters depend on the RLP versions implemented by the device.

Read command returns current settings for each supported RLP version <verx>. Only RLP parameters applicable to the corresponding <verx> are returned.

Test command returns values supported by the TA as a compound value.

Defined values:

<iws>	Description
Supported values 1 to 61	IWF to MS window size

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<mws>	Description
Supported values 1 to 61	MS to IWF window size

<T1>	Description
Supported values 48 to 255	Acknowledgment timer T1 (*10ms)

<N2>	Description
Supported values 1 to 255	Re-transmission attempts N2

<T4>	Description
5 3 - 255	Re-sequencing period T4 (*10ms)

<ver>	Description
Integer	RLP version. When version indication is not present, <ver>=0 is assumed

Example:

```
AT+CRLP?
+CRLP: 61,61,48,6
OK
```


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7 Data - GPRS

7.1 AT*E2GDV GPRS Data Volume

Description	Command	Possible Responses
Report Connection Data Volume	AT*E2GDV=[<option>]	*E2GDV: <ulb>,<dlb> OK ERROR
Test if the command is supported	AT*E2GDV=?	*E2GDV: (list of supported <option>s) OK ERROR

Description:

The command reports the amount of data the last packet data session received and transmitted, or it will report the total amount of data received and transmitted during all past packet data sessions. Also there is an option to clear the counters. The behavior of the command is selected with the <option> parameter as described in the table below.

Note! Both counters are updated in non volatile memory at approximately every 20K of combined sent and received data. Therefore, in case of a device power loss during a data session, the counters would be off by at most 20K.

This feature is restricted to only one single PDP context being activated at a time.

Defined values:

<option>	Description
0	Report the amount data the last packet data session transmitted and received, in octets above SNDCP layer
1	Report the accumulated amount of data of all previous packet data sessions, in octets
2	Reset counter

<ulb>	Description
0-4294967295	Octets of uplink data transferred above SNDCP. Will wrap around back to 0 after 4294967295 (or ~4GB)

<dlb>	Description
0-4294967295	Octets of downlink data transferred above SNDCP. Will wrap around back to 0 after 4294967295 (or ~4GB)

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7.2 AT*E2GC GPRS Class Setting

Description	Command	Possible Responses
Sets the GPRS Class the MS uses to attach to the GPRS/packet domain service	AT*E2GC=<class>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*E2GC?	• *E2GC: <class> • OK • ERROR
Show if the command is supported	AT*E2GC=?	• * E2GC: (list of supported <class> values) • OK • ERROR

Description:

This command sets the GPRS multi-slot class the MS executes in accordance to when attaching to the GPRS/Packet Domain service. The GPRS multi-slot class defines the number of time-slots and how the time-slots are used during GPRS data transmission.

Warning! Review Module Integrator's manual prior to selecting Class 10 operation to ensure HOST power supply rating is sufficient to support Class 10 operation.

The setting does not go into effect until the MS is reset or powered up. If the MS is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses (enabled by the +CMEE command) are listed section “Error Codes”.

Note! Setting the GPRS Class to 0 will cause the MS to detach from the GPRS/Packet domain service. Setting from 0 to a supported class setting, will cause the MS to attach to the GPRS/Packet domain service if GPRS Auto Attach is enabled (see command *E2GAA).

The following table describes the possible GPRS class settings:

Defined values:

<class>	Description
0	No GPRS (GSM/SMS Only)
1	GPRS Class 8
2	GPRS Class 10 (Default Setting)
3	GPRS Class 12 (**Not currently Supported**)

Default class setting is GPRS Class 10.

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7.3 AT*E2GAA GPRS Auto Attach Setting

Description	Command	Possible Responses
Sets the GPRS Class the MS uses to attach to the GPRS/packet domain service	AT*E2GAA=<mode>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*E2GAA?	• *E2GAA: <mode> • OK • ERROR
Show if the command is supported	AT*E2GAA=?	• * E2GAA: (list of supported <mode> values) • OK • ERROR

Description:

This command sets whether the MS performs a GPRS Attach automatically at startup if the module is configured for GPRS (see command *E2GC). If GPRS Auto Attach is enabled, the MS will attempt to attach to the GPRS service after the module registers with the GPRS service. If GPRS Auto Attach is disabled, then the module must be manually attached to the GPRS service using the command +CGATT.

Note! If the MS is not attached to GPRS service, it will first attach to GPRS service when a PDP context is activated (+CGACT or *E2IPA) regardless of the setting of this command.

The following table describes the possible GPRS Auto Attach modes.

Defined values:

<mode>	Description
0	GPRS Auto Attach disabled
1	GPRS Auto Attach enabled
2	GPRS Auto Attach in home PLMN only

Note! The setting is a module specific (not per user profile), and therefore is not stored in the User Profile. The setting is, however, persisted over module restarts. Default GPRS Auto Attach mode is 0 (disabled), if this command is never used.

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7.4 AT+CGACT PDP Context Activate or Deactivate

Description	Command	Possible Responses
Activate or deactivate the specified PDP context(s)	AT+CGACT=[<state> [,<cid>[,<cid> [,...]]]]	+CME ERROR: <err> OK ERROR
Read the command	AT+CGACT?	+CGACT: <cid>, <state>[<CR><LF> +CGACT: <cid>, <state>[...]] OK ERROR
Test if the command is supported	AT+CGACT=?	+CGACT: (list of supported <state>s) OK ERROR

Description:

Used to activate or deactivate the specified PDP context(s).

A context may not be activated until the module is attached to the GPRS network either via the +CGATT command or the device may autoattach on startup (see *E2GAA).

After the command has completed, the MS remains in V.25ter command state. If the MS is already in the requested state, the command is ignored and OK is returned. If the requested state cannot be achieved, ERROR or +CME ERROR is returned. If the MS is not attached to the GPRS service when the activation form of the command is executed, the MS first performs a GPRS attach and then attempts to activate the specific contexts.

Each PDP context must be activated or deactivated individually; <state> and <cid> must be supplied.

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

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

If no PDP context is defined, AT+CGACT? returns OK only.

Note: *E2IPA may also be used to activate a context. +CEER is use to read extended error information if this command is not successful. +CGEV unsolicited response may be used to find out when a context is deactivated.

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Defined values:

<state>	Description
0	PDP context activation deactivated
1	PDP context activation activated

<cid>	Description
Integer	Value range 1-20 for a reference to a PDP context identifier previously defined with AT+CGDCONT

7.5 AT+CGANS Manual response to a network request for PDP context activation

Description	Command	Possible response(s)
Request for Packet Domain PDP context activation	+CGANS=[<response>, [<L2P> ,[<cid>]]]	OK ERROR +CME ERROR: <err>
Show if the command is supported	+CGANS=?	+CGANS: (list of supported <response>s), (list of supported <L2P>s)

Description:

The execution command requests the MT to respond to a network request for Packet Domain PDP context activation which has been signaled to the TE by the RING or +CRING: unsolicited result code. The <response> parameter allows the TE to accept or reject the request.

If <response> is 0, the request is rejected and the MT returns OK to the TE, unless an error is encountered, in which case a +CME ERROR may be returned to the TE, such as when a <cid> which is not associated with a call is used.

If <response> is 1, the following procedure is followed by the MT.

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

If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.25ter online data state.

The detailed behavior after the online data state has been entered is dependent on the PDP type. It is described briefly in 3GPP TS 27.060[34] and in more detail in 3GPP TS 29.061[39] and the specifications for the relevant PDPs. PDP context activation procedures shall take place prior to or during the PDP startup.

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The <cid> parameter is ignored when <response> is 1. The “current” call, the one that caused the RING (or +CRING) will be the one which is answered.

If the activation is successful, data transfer may proceed.

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

In the event of an erroneous termination or a failure to startup, the V.25ter command state is re-entered and the MT returns the final result code NO CARRIER or, if enabled, +CME ERROR. Attach, activate and other errors may be reported. It is also an error to issue the +CGANS command when there is no outstanding network request.

Note! This is not the same as if the MT issues a +CGDATA (or +CGACT) command after receiving a +CRING unsolicited result code. A +CGDATA (or +CGACT) does not command the MT to acknowledge the network request but rather to make a new request for context activation. The network request would be ignored.

The test command returns the values of <response> and <L2P> supported by the MT as compound values.

This command may be used in both normal and modem compatibility modes.

Defined values:

<response>	**Description**
	<response>: is a numeric parameter which specifies how the request should be responded to. If <response> is omitted it is assumed to be 0. Other values are reserved and will result in the ERROR response.
0	reject the request
1	accept and request that the PDP context be activated
<L2P>	Description
	A string parameter which indicates the layer 2 protocol to be used (see +CGDATA command).
<cid>	Description
	A numeric parameter which specifies a particular PDP context definition (see the +CGDCONT command).

7.6 AT+CGATT GPRS Attach or Detach

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Description	Command	Possible Responses
Attach or detach MS to the GPRS/packet domain/packet domain service	AT+CGATT=[<state>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CGATT?	• +CGATT: <state> • OK • ERROR
Test if the command is supported	AT+CGATT=?	• +CGATT: (list of supported <state>s) • OK • ERROR

Description:

Used to attach the MS to, or detach the MS from, the GPRS/packet domain service. After the command has completed, the MS remains in V.25ter command state. If the MS is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses (enabled by the +CMEE command) are listed under "+CME ERROR (Mobile Equipment Error Code)".

Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

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

The unit software is automatically hard coded to attach to a GPRS network therefore entering this command as part of the initialization sequence is not required.

Defined values:

<state>	Description
0	Detached
1	Attached

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

Description	Command	Possible response(s)
Disables or enables automatic positive response	AT+CGAUTO=[<n>]	OK ERROR
	AT+CGAUTO?	+CGAUTO: <n>
Test if the command is supported	AT+CGAUTO=?	+CGAUTO: (list of supported <n>s)

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Description:

The set command disables or enables an automatic positive response (auto-answer) to the receipt of a Request PDP Context Activation message from the network. The setting does not affect the issuing of the unsolicited result code RING or +CRING.

The test command returns the values of <n> supported by the MT as a compound value.

When the +CGAUTO=0 command is received, the MT shall not perform a PS detach if it is attached. Subsequently, when the MT announces a network request for PDP context activation by issuing the unsolicited result code RING or +CRING, the TE may manually accept or reject the request by issuing the +CGANS command or may simply ignore the network request.

The +CGAUTO=1 command enables automatic acceptance of incoming requests for PDP context activation. Subsequently, when the MT announces a network request for PDP context activation by issuing the unsolicited result code RING or +CRING to the TE, this is followed by the intermediate result code CONNECT. The MT then enters V.25ter online data state and follows the same procedure as it would after having received a +CGANS=1 with no <L2P> or <cid> values specified.

Defined values:

<n>:	Description
0	turn off automatic response for Packet Domain only
1	turn on automatic response for Packet Domain only

For <n> = 0 Packet Domain network requests are manually accepted or rejected by the +CGANS command.

For <n> = 1 Packet Domain network requests are automatically accepted according to the description above.

7.8 AT+CGCLASS GPRS Mobile Station Class

Description	Syntax	Possible Responses
Set class	AT+CGCLASS=<class>	OK ERROR
Read current class	AT+CGCLASS?	+CGCLASS: <class> ERROR
Test if the command is supported	AT+CGCLASS=?	+CGCLASS: (list of supported <class>s)

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Description:

The set command is used to set the specified GPRS mobile class. If the requested class is not supported, an ERROR or +CME ERROR response is returned.

The read command returns the current GPRS mobile class.

The test command returns the supported <class>s.

Defined values:

<class>	Description
B	Class B

7.9 AT+CGDATA Enter Data State

Description	Command	Possible Responses
Establish GPRS/packet domain connection	AT+CGDATA=[<L2p>,[cid[,cid>[,...]]]]	• CONNECT • ERROR • OK • ERROR
Test if the command is supported	AT+CGDATA=?	• +CGDATA: (list of supported <L2P>s) • OK • ERROR

Description:

Causes the MS to perform whatever actions are necessary to establish communication between the TE and the network using one or more GPRS/packet domain PDP types. This may include performing a GPRS/packet domain attach and one or more PDP context activations.

Defined values:

<L2P>	Description
PPP	Point-to-point protocol for a PDP such as IP

Note! There are 2 ways to escape out of online data state. First, if DTR being deasserted can be used to exit online data state. This feature is controlled by the command AT&D. The other way of exiting online data state is to use the time dependent character sequence +++. No matter which way is used to escape from online data state, once in online command state the connection is still active in the background. The connection may then be closed with the ATH command or the user can reenter the Online Data state by using the ATO command.

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7.10 AT+CGDCONT Define PDP Context

Description	Command	Possible Responses
Select PDP context parameters	AT+CGDCONT=[<cid> [,<PDP_type>[,<APN> [,<PDP_addr> [,<d_comp> [,<h_comp>]]]]]	+CME ERROR: <err> OK ERROR
Read the command	AT+CGDCONT?	+CGDCONT: <cid>, <PDP_type>,<APN>, <PDP_addr>,<d_comp>, <h_comp> [<CR><LF>+CGDCONT: <cid>, <PDP_type>,<APN>, <PDP_addr>,<d_comp>, <h_comp> [...]] OK ERROR
Test if the command is supported	AT+CGDCONT=?	+CGDCONT: (range of supported <cid>s), <PDP_type>,,,(list of supported <d_comp>s), (list of supported <h_comp>s) [,(list of supported <pd1>s) [,...[,(list of supported <pdN>s)]]] [<CR><LF>+CGDCONT: (range of supported <cid>s), <PDP_type>,,, (list of supported <d_comp>s), (list of supported <h_comp>s) [...]] OK ERROR

Description:

Specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>.

Context descriptions setup by this command are shared by all mux channels. *ENAD is used to add username and password to the PDP context dscription table. Once all PDP context information has been entered, the context may be activated using the +CGACT or *E2IPA commands.

Defined values:

<cid>	Description
Integer type	(PDP Context Identifier) a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-MS 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

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<cid>	Description
1-20	Supported values

<PDP_type>	Description
IP	Internet Protocol (IP Version 4)

<APN>	Description
String type	(Access Point Name) 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>	Description
String type	A string parameter that identifies the MS in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested

<d_comp>	Description
0	PDP data compression OFF
1	PDP data compression ON
2	V.42bis

<h_comp>	Description
0	PDP header compression OFF
1	PDP header compression ON
2	RFC1144
3	RFC2507
4	RFC3095

7.11 AT+CGEREP GPRS Event Reporting

Description	Command	Possible Responses
Set command	AT+CGEREP=[<mode> [,<bfr>]]	+CME ERROR: <err> OK ERROR
Read the command	AT+CGEREP?	+CGEREP: <mode>,<bfr> OK ERROR

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Description	Command	Possible Responses
Test if the command is supported	AT+CGEREP=?	+CGEREP: (list of supported <mode>s), (list of supported <bfr>s) OK ERROR

Description:

Enabled or disables GPRS event reporting. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1 or 2 is entered. See +CGEV for a description of the unsolicited response format.

Defined values:

<mode>	Description
0	Buffer unsolicited result codes in the MT. No codes are forwarded to the TE. If MT result code buffer is full, the oldest ones can be discarded.
1	Discard unsolicited result codes when MT-TE link is reserved (e.g. in onlne data mode); otherwise forward them directly to the TE. (online data mode indication is currently not available, therefore link is assuemed to be not reserved)
2	Buffer unsolicited result codes in the MT when MT-TE link is reserved (e.g. in on-line data mode) and flush them to the TE when MT-TE link becomes available; otherwise forward them directly to the TE. (online data mode indication is currently not available, therefore link is assuemed to be not reserved)

<bfr>	Description
0	MT buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered
1	MT buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1 or 2 is entered (OK response shall be given before flushing the codes)

7.11.1 +CGEV GPRS Event Reporting

Description:

The +CGEV unsolicited messages are enabled or disabled by the AT+CGEREP command. The format of the unsolicited report is:

```
+CGEV: <msg>[,<PDP_type>,<PDP_addr>[,<cid>]]
```

Defined values:

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

<PDP_type>	Description
IP	Internet Protocol (IETF STD 5)

7.12 AT+CGPADDR Show PDP Address

Description	Command	Possible Responses
Show PDP addresses for specified CIDs	AT+CGPADDR=[<cid> [,<cid> [,...]]]	• +CGPADDR: <cid>,<PDP_addr> • [<CR><LF>+CGPADDR: <cid>,<PDP_addr> • [...]] OK ERROR
Test if the command is supported	AT+CGPADDR=?	• +CGPADDR: (list of defined <cid>s) • OK • ERROR

Description:

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

Defined values:

<cid>	Description
Integer type	Parameter which specifies a particular PDP context definition (see +CGDCONT command). If no <cid> is specified, the addresses for all defined contexts are returned

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<PDP_address>	Description
String type	A string that identifies the MS in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the +CGDCONT command when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. <PDP_address> is omitted if none is available

7.13 AT+CGEQMIN 3G Quality of Service Profile (Minimum acceptable)

Description	Command	Possible Response(s)
set a profile for the context identified by the (local) context identification parameter	+CGEQMIN=[<cid> [,<Traffic class> [,<Maximum bitrate UL> [,<Maximum bitrate DL> [,<Guaranteed bitrate UL> [,<Guaranteed bitrate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority>]]]]]]]]]]]]	OK ERROR

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Description	Command	Possible Response(s)
Read the current setting	+CGEQMIN?	+CGEQMIN: <cid>, <Traffic class> ,<Maximum bitrate UL>, <Maximum bitrate DL> ,<Guaranteed bitrate UL> ,<Guaranteed bitrate DL>, <Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [<CR><LF> +CGEQMIN: <cid>, <Traffic class> ,<Maximum bitrate UL> ,<Maximum bitrate DL> ,<Guaranteed bitrate UL> ,<Guaranteed bitrate DL>, <Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [...]]

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Description	Command	Possible Response(s)
Test if the command is supported	+CGEQMIN=?	+CGEQMIN: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s) ,(list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s) ,(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [<CR><LF> +CGEQMIN: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s) ,(list of supported <Guaranteed bitrate UL >s), (list of supported <Guaranteed bitrate DL >s) ,(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [...]]

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Description

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

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

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

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

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

Defined values

<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).

The following parameters are defined in 3GPP TS 23.107 -

<Traffic class>	Description
Integer format	A numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.
0	Conversational
1	Streaming
2	Interactive
3	Background
	Other values are reserved.

<Maximum bitrate UL>: a numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...).

<Maximum bitrate DL>: a numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...).

<Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...).

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<Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...).

<Delivery order>	Description
Integer Type	A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.
0	No
1	Yes
	Other values are reserved.

<Maximum SDU size>: a numeric parameter (1,2,3,...) that indicates the maximum allowed SDU size in octets.

<SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQMIN=...,"5E3",...).

<Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQMIN=...,"5E3",...).

<Delivery of erroneous SDUs>	Description
Integer Type	A numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.
0	No
1	Yes
2	No detect
	Other values are reserved.

<Transfer delay>: a numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds.

<Traffic handling priority>: a numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers.

<PDP_type>: (see +CGDCONT command).

If a value is omitted for a particular class then the value is considered to be unspecified.

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7.14 AT+CGEQNEG 3G Quality of Service Profile (Negotiated)

Description	Command	Possible Response(s)
Retrieves the negotiated QoS profiles	+CGEQNEG =[<cid>[,<cid>[,...]]]	+CGEQNEG: <cid>, <Traffic class> ,<Maximum bitrate UL>, <Maximum bitrate DL> ,<Guaranteed bitrate UL>, <Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [<CR><LF> +CGEQNEG: <cid>, <Traffic class> ,<Maximum bitrate UL>, <Maximum bitrate DL> ,<Guaranteed bitrate UL>, <Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [...]]
Test if the command is supported	+CGEQNEG=?	+CGEQNEG: (list of <cid>s associated with active contexts)

Description:

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

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

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

Defined values:

<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).

The following parameters are defined in 3GPP TS 23.107 [46] -

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<Traffic class>	Description
Integer format	A numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.
0	Conversational
1	Streaming
2	Interactive
3	Background
	Other values are reserved.

<Maximum bitrate UL>: a numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...).

<Maximum bitrate DL>: a numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...).

<Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...).

<Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...).

<Delivery order>	Description
Integer Type	A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.
0	No
1	Yes
	Other values are reserved.

<Maximum SDU size>: a numeric parameter that (1,2,3,...) indicates the maximum allowed SDU size in octets.

<SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:...,"5E3",...).

<Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:...,"5E3",...).

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<Delivery of erroneous SDUs>	Description
Integer Type	A numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.
0	No
1	Yes
2	No detect
	Other values are reserved.

<Transfer delay>: a numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds.

<Traffic handling priority>: a numeric parameter (1,2,3,...) that specifies the relative importance for handling of all

SDUs belonging to the UMTS bearer compared to the SDUs of other bearers.

If a value is omitted for a particular class then the value is considered to be unspecified.

7.15 AT+CGEQREQ 3G Quality of Service Profile (Requested)

Description	Command	Possible Response(s)
Specify a UMTS Quality of Service Profile	+CGEQREQ=[<cid> [,<Traffic class> [,<Maximum bitrate UL> [,<Maximum bitrate DL> [,<Guaranteed bitrate UL> [,<Guaranteed bitrate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority>]]]]]]]]]]]]	OK ERROR

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Description	Command	Possible Response(s)
Read the current setting	+CGEQREQ?	+CGEQREQ: <cid>, <Traffic class> ,<Maximum bitrate UL> ,<Maximum bitrate DL> ,<Guaranteed bitrate UL> ,<Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [<CR><LF> +CGEQREQ: <cid>, <Traffic class> ,<Maximum bitrate UL> ,<Maximum bitrate DL> ,<Guaranteed bitrate UL> ,<Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [...]]

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Description	Command	Possible Response(s)
Test if the command is supported	+CGEQREQ=?	+CGEQREQ: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [<CR><LF> +CGEQREQ: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [...]]

Description:

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

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

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

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

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

Defined values:

<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).

The following parameters are defined in 3GPP TS 23.107 -

<Traffic class>	Description
Integer format	A numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.
0	Conversational
1	Streaming
2	Interactive
3	Background
	Other values are reserved.

If the Traffic class is specified as conversational or streaming, then the Guaranteed and Maximum bitrate parameters should also be provided. Other values are reserved.

<Maximum bitrate UL>:

A numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP.

As an example, a bitrate of 32kbit/s would be specified as '32'

(e.g. AT+CGEQREQ=...,32,...).

This parameter should be provided if the Traffic class is specified as conversational or streaming.

<Maximum bitrate DL>:

A numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP.

As an example a bitrate of 32kbit/s would be specified as '32'

(e.g. AT+CGEQREQ=...,32,...).

If the parameter is set to '0' the subscribed value will be requested.

This parameter should be provided if the Traffic class is specified as conversational or streaming.

<Guaranteed bitrate UL>:

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A numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver).

As an example a bitrate of 32kbit/s would be specified as '32'

(e.g. AT+CGEQREQ=...,32,...).

If the parameter is set to '0' the subscribed value will be requested.

This parameter should be provided if the Traffic class is specified as conversational or streaming.

<Guaranteed bitrate DL>:

A numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver).

As an example a bitrate of 32kbit/s would be specified as '32'

(e.g. AT+CGEQREQ=...,32,...).

If the parameter is set to '0' the subscribed value will be requested.

This parameter should be provided if the Traffic class is specified as conversational or streaming.

<Delivery order>	**Description**
Integer Type	A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.
0	No
1	Yes
	Other values are reserved.

<Maximum SDU size>:

A numeric parameter (1, 2, 3, ...) that indicates the maximum allowed SDU size in octets.

If the parameter is set to '0' the subscribed value will be requested.

<SDU error ratio>:

A string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'.

As an example a target SDU error ratio of 5•10-3 would be specified as '5E3'

(e.g. AT+CGEQREQ=...,"5E3",...). '0E0' means subscribed value.

<Residual bit error ratio>:

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A string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'.

As an example a target residual bit error ratio of 5•10-3 would be specified as '5E3'

(e.g. AT+CGEQREQ=...,"5E3",...). '0E0' means subscribed value.

<Delivery of erroneous SDUs>:

A numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.

- 0 no
- 1 yes
- 2 no detect
- 3 subscribed value
- Other values are reserved.

<Transfer delay>:

A numeric parameter (0, 1, 2, ...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds. If the parameter is set to '0' the subscribed value will be requested.

<Traffic handling priority>:

A numeric parameter (1, 2, 3, ...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers. If the parameter is set to '0' the subscribed value will be requested.

<PDP_type>: (see +CGDCONT command).

If a value is omitted for a particular class then the value is considered to be unspecified.

7.16 AT+CGREG GPRS Network Registration Status

Description	Command	Possible Responses
Set command	AT+CGREG=[<n>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CGREG?	• +CGREG: <n>,<stat>[,<lac>, • <ci>] • +CME ERROR: <err> • OK ERROR

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Description	Command	Possible Responses
Test if the command is supported	AT+CGREG=?	• +CGREG: (list of supported <n>s) • OK • ERROR

Description:

Controls the presentation of an unsolicited result code +CGREG: <stat> when <n>=1 and there is a change in the GPRS/packet domain network registration status of the MS, or code +CGREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

If the GPRS/Packet Domain MS also supports circuit mode services, the +CGREG command and +CGREG: result code apply to the registration status and location information for circuit switched services.

Defined values:

<n>	Description
0	Disable network registration unsolicited result code
1	Enable network registration unsolicited result code
2	Enable network registration and location information unsolicited result code

<stat>	Description
0	Not registered, MS is not searching for a new operator to register with
1	Registered, home network
2	Not registered, but MS is searching for a new operator to register with
3	Registration denied
4	Unknown
5	Registered, roaming

<lac>	Description
String type	Two byte location area code in hexadecimal format

<ci>	Description
String type	Two byte cell ID in hexadecimal format

Example:

```
AT+CGREG?
+CGREG: 0,3
OK
```


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7.17 AT+CGRDATA Send Limited Data Pattern

Description	Command	Possible Responses
Send data pattern	AT+CGRDATA=<cid>,<count>,<pattern>	• OK • ERROR
Test if the command is supported	AT+CGRDATA=?	• +CGRDATA: (list of supported <cid>s),(list of supported <count>s), (list of supported <pattern>s) • OK • ERROR

Description:

Causes the MS to send <count> bytes of data of value established by <pattern> over the PDP context identified by <cid>.

Defined values:

<cid>	Description
1-20	context ID number

<count>	Description
1-1000000	Amount of data in bytes to send

<pattern>	Description
0-255	Pattern of data to send

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8 Data - TCP/IP

Practical use of these commands is explained in a separate application note.

8.1 AT*E2IPA IP Activate

Description	Command	Possible Responses
Request Activation or Deactivation of PDP context	AT*E2IPA=<Active>, <Cid>	• CONNECT • *E2IPA: <ErrNum> • ERROR
Displays current PDP context activation status	AT*E2IPA?	• *E2IPA: <Active>, <Cid> • OK • ERROR
Shows if command is supported	AT*E2IPA=?	• *E2IPA: (list of supported <Activate>s), (list of supported <Cids>s) • OK

Description:

This command attaches a GPRS connection (if required) and activates a PDP context. Once a PDP context is activated, socket connections may be made. This command is identical to doing an AT+CGATT followed by an AT+CGACT. If successful, the PDP context will be given an IP address. If needed to activate the context, the user name and password is entered via the *ENAD command.

Once activated data may be sent using a socket interface (see E2IPO or E2IPL), the +CGDATA interface or using a command like ATD*99***1#.

This command will only return an ERROR when no SIM is inserted.

PDP Contexts are shared across all MUX channels.

This command may not be aborted. A PDP context might take up to 80 seconds to connect.

This command is executed immediately. Not time critical.

If the context has not been set up using the AT+CGDCONT command then this command will fail.

If the user name and password has not been set up correctly by using the AT*ENAD command then this command will fail.

If the device is already attached, then this command will just activate the PDP context.

The user name and password is entered by using the AT*ENAD command.

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The connection may be deactivated or detached using the AT+CGACT or AT+CGATT commands.

AT+E2IPO cannot open socket connections unless IPA command has been carried out correctly.

Note! Use the standard commands of AT+CGATT and AT+CGACT to attach and activate a GPRS connection.

Defined values:

<Active>	Description
0	Deactivate IP Session
1	Activate IP Session

<cid>	Description
Integer	Value range 1-20 for a reference to a PDP context identifier previously defined with AT+CGDCONT

Intermediate Result Codes: *E2IPA:

<ErrNum>	Description
1	PDP Invalid Context
2	PDP Account Invalid
3	PDP Shutdown Failure
8	PDP Setup Cancelled
9	PDP Too Many Active Accounts
10	PDP Conflict with Higher Priority Account
11	PDP Too Many Active Users
12	PDP Non Existent Account
13	PDP Stop at User Request
14	PDP Authentication failed
15	PDP Bearer Failed Connect
16	PDP Remote Server Busy
17	PDP Remote Server Refused
18	PDP Bearer Busy
19	PDP Line Busy
20	PDP Unknown Error
255	PDP Invalid Parameter

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Examples:

```
AT*E2IPA=?
*E2IPA= (0-1),(1-20)
OK
AT*E2IPA?
*E2IPA: 0           (IP Session Inactive)
OK
AT*E2IPA=1,1
OK                  (Activate PDP Context with id == 1)
AT*E2IPA?
*E2IPA: 1
OK                  (IP Session Active)
  AT*E2IPA=1,2      (Try activating an invalid context)
*E2IPA: 002  (Error code denotes problem)
ERROR
```

8.2 AT*E2IPC IP Socket Close

Description	Command	Possible Responses
Close a socket connection	AT*E2IPC[=<SockId>]	• ERROR • OK • *E2IPC: <ErrNum>
Shows if command is supported	AT*E2IPC=?	• *E2IPC: (list of supported <SockId>s • OK

Description:

This action command allows the closure of a currently open socket IP Connection. This command can only be called in Online Command mode. If successful the connection is closed, and it will not be possible to re-enter online data mode until another connection is established.

Defined values:

<SockId>	Description
Integer	Range from 0-15. **(Default is 1)**

Intermediate Result Codes: *E2IPC:

<ErrNum>	Description
0	IP OK - No Error
1	open failed
2	bind failed
3	Connect failed
4	listen failed
5	Accept failed
6	Close failed

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<ErrNum>	Description
7	Send to failed
8	setopt failed
9	Unknown Error
10	Fatal error
11	Socket unkown
12	destination unreachable
13	Not connected
14	Address in use
15	Connection aborted
16	Already Connected
17	Connection refused
18	Connection Timeout

This command will only return an ERROR when no SIM is inserted.

Sockets are shared across all MUX channels.

This command is executed immediately. Not time critical.

- Sockets are opened via *E2IPO.
- Online Data state cannot be reentered once the socket is closed.

Example:

```
AT*E2IPO?
*E2IPO: 0           (IP Connection closed)
OK
AT*E2IPO=1,”122.123.201.211”,80
CONNECT             (TCP Connection successful with specified host -  now in
online Data Mode (DCD asserted)
<<Data Transfer>>
NO_CARRIER    (Connection closed remotely - back into offline command mode (DCD
Deasserted))
AT*E2IPC
OK                  (IP Connection closed)
```

8.3 AT*E2IPO IP Open/Connect

Description	Command	Possible Responses
Request a IP socket connection	AT*E2IPO=<IpType>, <IpAddr>, <IpPort>[[, <SockId>],<cid>]	• CONNECT • *E2IPO: <ErrNum> • ERROR
Display mobile originated sockets that are connected using *E2IPO	AT*E2IPO?	• *E2IPO: <Open>, <SockId>,<ipAddr>, <IpPort>,<cid> • OK • ERROR

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Description	Command	Possible Responses
Shows if command is supported	AT*E2IPO=?	• *E2IPO: (list of supported <IpType>s), (list of supported IpAddr>s), (list of supported <IpPort>s), (list of supported <SockId>s), (list of supported <cid>s) • OK

Description:

This command opens a socket, binds it to a local IP address and connects to the remote IP address and port number. If the connection to the remote server is successful the interface will switch from the Command state to the Online Data state. This transition is indicated by the “CONNECT” message. This means that the bytes transferred across the serial connection will no longer be interpreted as AT commands but instead will be raw data sent directly to the server. If an error occurs during the setup of the connection with the server the unit will return an a specific error number via an intermediate response followed by an ERROR. If at any point the connection has been lost or if the user escapes out of Online Data state then a NO CARRIER response will be returned.

In order to escape out of the Online Data state the time dependent character sequence “+++” must be sent or the DTR line must de-assert. If the escape sequence is used then the socket is still active even though no data can be sent. The socket can then be closed with the *E2IPC command or the user can reenter the Online Data state by using the ATO command. When the escape sequence is used with the on-board stack, open the socket by using the AT*E2IPS command.

Defined values:

<IpType>	Description
0	UDP (Connectionless)
1	TCP (Connection Oriented)

Intermediate Result Codes: *E2IPO:

<ErrNum>	Description
0	IP OK - No Error
1	open failed
2	bind failed
3	Connect failed
4	listen failed
5	Accept failed
6	Close failed
7	Send to failed

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<ErrNum>	Description
8	setopt failed
9	Unknown Error
10	Fatal error
11	Socket unknown
12	destination unreachable
13	Not connected
14	Address in use
15	Connection aborted
16	Already Connected
17	Connection refused
18	Connection Timeout

Unsolicited Result Codes:

Result code	Description
NO CARRIER	The socket connection was dropped by the server that the module was connected. This may be due to an error condition or the server cleanly closing the socket. The device moves from Online Data state to Online Command state and the socket is closed.
OK	The module dropped out of Online Data state and is not in Online Command state. The socket connection is still active in the background.

This command will only return an ERROR when no SIM is inserted.

Sockets are shared across all MUX channels.

This command may be aborted. Abort the command by sending any character to the module. A connection can take a long time to timeout if the remote server does not respond to the connection request. Use the AT*E2IPS command to change the number of seconds before the request times out.

This command is executed immediately. Not time critical.

If a GPRS context has not been activated, then this command will always fail. This command will bind to the context with a <cid> of 1 by default. This default may be overridden by adding the last optional parameter to the command line.

If the commands AT*E2IPA or the combination of AT+CGATT and AT+CGACT have not been called in order to open a PDP context, then this command will fail.

The character escape sequences of +++ or +++at is enabled via the *E2IPS command.

Cannot operate on sockets with commands such as AT+E2IPC or AT+E2IPE if socket is not opened.

Once the serial interface enters online data state, then flow control may be turned on, depending on the values set by AT+IFC.

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When a command has dropped out of Online Data mode into Online Command mode, the command ATO (or some future equivalent) must be used to reenter Online Data mode.

Example:

```
AT*E2IPO?
*E2IPO: 0           (IP Connection closed)
OK
AT*E2IPO=1,”122.123.201.211”,80
CONNECT             (TCP Connection successful with specified host -  now in
online Data Mode (DCD asserted)
<<Data Transfer>>
NO_CARRIER   (Connection closed remotely - back into offline command mode (DCD
Deasserted))
```

8.4 AT*E2IPI IP Info

Description	Command	Possible Responses
Request IP Information	AT*E2IPI=<InfoType>[,<cid>]	• ERROR • *E2IPI: <IPAddr> OK
Shows if the command is supported	AT*E2IPI=?	• *E2IPI: list of supported <InfoType>s,<cid>s • OK· ERROR

Description:

This command allows information about the current IP Status of the module to be reported. The command will only succeed when an IP Session is Active (see AT*E2IPA).

Defined values:

<InfoType>	Description
0	IP Address of Module
1	IP Address of Primary DNS Server
2	IP Address of Secondary DNS Server

<cid>	Description
integer type	Context id numbers 1-20 are allowed

Example:

```
AT*E2IPI=0
*E2IPI: 120.211.22.102
OK
```


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8.5 AT*E2IPE IP Error

Description	Command	Possible Responses
Request a Error on Last IP Connection	AT*E2IPE[=<SockId>]	• *E2IPE: <ErrNum> • OK
Request a Error on Last IP Connection	AT*E2IPE?	• *E2IPE: <ErrNum> • OK
Shows if the command is supported	AT*E2IPE=?	• OK

Description:

This command responds with the Error code for the last IP Socket Command. This is useful to determine the cause of the last IP Connection release or why the connection couldn't be opened.

Defined values:

<SockId>	Description
Integer	Range from 0-15. **(Default is 1)**

Intermediate Result Codes: *E2IPE:

<ErrNum>	Description
0	IP OK - No Error
1	open failed
2	bind failed
3	Connect failed
4	listen failed
5	Accept failed
6	Close failed
7	Send to failed
8	setopt failed
9	Unknown Error
10	Fatal error
11	Socket unknown
12	destination unreachable
13	Not connected
14	Address in use
15	Connection aborted
16	Already Connected
17	Connection refused
18	Connection Timeout

This command will return the proper error value without the SIM.

Sockets are shared across all MUX channels.

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The error value will be set based on the last IP Socket commands

Example:

```
AT*E2IPO?
*E2IPO: 0     (IP Connection closed)
OK
AT*E2IPO=1,”122.123.201.211”,80
CONNECT       (TCP Connection successful with specified host -  now in online
Data Mode (DCD asserted))
<<Data Transfer>>
NO_CARRIER    (Connection closed remotely - back into offline command mode (DCD
Deasserted))
AT*E2IPE?
*E2IPE: 0     (No Errors)
OK
```

8.6 AT*E2IPL IP listen (server)

Description	Command	Possible Responses
Set the unit to behave as a server	AT*E2IPL=<sck>,<IPtype>,<IPport>,<to>,<cid>	• Listening on port <IPport> • ERROR
Shows all sockets currently listening. (Does not show connected sockets, either MO or MT)	AT*E2IPL?	• *E2IPL: <socketId>,<localListeningIp>,<localListeningPort>
Test if the command is supported	AT*E2IPL=?	• *E2IPL: list of supported <sck>, list of supported <IPtype>, list of supported <IPport>, list of supported <to> • +CME ERROR <err>

Description

The IP listen function is used to allow other IP address to connect to it. The command will only succeed when an IP Session is Active (see AT*E2IPA).

This command opens a socket, binds it to a local IP address and puts the socket in state to listen for incoming connections on the port number specified on the command. This command can be used in two ways. With a timeout of zero, the command will return the serial channel back to online command state so that other commands may be entered while waiting for an incoming connection. The other way of using this command is to use a timeout. In this case, the command interface will be blocked from any commands until either the user aborts the command, the timeout has occurred or if an incoming connection is detected and automatically accepted.

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In the case where the command returned immediately, there are a few commands that are important for accepting incommand connections. AT*E2IPEV is used to turn on unsolicited responses when socket event occur. Once an incoming socket connection is detected, the socket may be accepted using AT*E2IPACT.

If a connection to a remote system is successful the interface will switch from

Online command state to the online data state. This transition is indicated by the "CONNECT" message. This means that the bytes transferred across the serial connection will no longer be interpreted as AT commands but instead will be raw data sent directly to the remote system.

If an error occurs during the setup of the connection with the remote system then the unit will return an a specific error number via an intermediate response followed by an ERROR. If at any point the connection has been lost or if there is an error then a NO CARRIER response will be returned. If the user escapes out of Online Data state then an OK is returned. After seeing either the OK or NO CARRIER, the serial interface switches back to online command state and the user may enter addition commands.

There are 3 ways to escape out of online data state. First, if DTR being deasserted can be used to exit online data state. This feature is controlled by the command AT&D. The value of 2 will not close the socket. The other two ways of exiting online data state is to use the time dependent character sequence +++ or the time independent sequence +++AT. The command AT*E2IPS is used to control which of these escape sequences are active, or both turned off. No matter which way is used to escape from online data state, once in online command state the socket is still active in the background. The socket can then be closed with the *E2IPC command or the user can reenter the Online Data state by using either the ATO or E2IPATO commands.

This command may be used for both TCP and UDP sockets. When using it with UDP sockets, this command will wait for the first packet that is sent to the module at that port. From that time on, the socket will be "connected" with the system that sent the first received packet. You would need to open another socket to communicate with other systems.

This command is abortable. Abort the command by sending any character to the module.

Defined values:

Table 1. <sck> : parameter

<sck>	Description
1-15	Reference number of the socket to listen for incoming connections.

Table2. <IPtype> : parameter

<IPtype>	Description
0	UDP (connectionless)
1	TCP (connection oriented)

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Table 3. <IPport> : parameter

<IPport>	Description
0-65535	Port to listen on

Table 4. <to> : parameter

<to>	Description
0	When listen entered do not enter command mode unless aborted
1 - 65534	Time out in seconds. During this time the command interface is blocked until either the command times out, an incomming connection is successfully accepted or if the user aborts the command.
65535	The listening socket is started but the command interface is blocked indefinitely until an incoming connection is accepted successfully, if there is an error or until the user aborts the command.

8.7 AT*E2IPRH IP Resolve Host

Description	Command	Possible Responses
Request an IP Resolve Host	AT*E2IPRH=<URL>[,<cid>]	• ERROR • *E2IPRH: <IPAddr> OK
Shows if the command is supported	AT*E2IPRH=?	• OK • ERROR

Description:

This command allows an IP lookup on a given URL string denoting an IP Host. The command will only succeed when an IP Session is Active (see AT*E2IPA) and if the string is 32 characters or less.

Be aware this function can take up to 125-140 seconds to return if the URL does not exist.

Defined values:

<URL>	Description
String	URL of required server for which an IP lookup is required. The URL is encapsulated in quotes (“”) and cannot exceed 32 characters.

<cid>	Description
integer type	Context id numbers 1-20 are allowed

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Example:

```
AT*E2IPRH="www.google.co.uk"
*E2IPRH: 123.123.123.123
OK
```

8.8 AT*E2IPS IP Setup IP Parameters

Description	Command	Possible Responses
Request Setup of IP Parameters for next session	AT*E2IPS=<RetryTm>,<NmRetry>,<WaitTm>,<SendSz>,<esc>,<ConnTm>	• ERROR • OK
Read Current status of Parameters	AT*E2IPS?	• *E2IPS: <RetryTm>,<NmRetry>,<WaitTm>,<SendSz>,<esc>,<ConnTm> • OK
Shows if the command is supported	AT*E2IPS=?	• *E2IPS: list of supported <RetryTm>, list of supported <NmRetry>, list of supported <WaitTm>, list of supported <SendSz>, list of supported <esc>, list of supported <ConnTm> • OK • ERROR

Description:

This command can be used to modify the way in which the Data received by the module is handled with respect to transmitting it across TCP/UDP. When Data is sent to the Module in online data mode, the data is internally buffered until there is an amount of data that makes an IP packet send viable. This packet size is defined by <SendSz>. If <SendSz> is not received, and no data is received for <WaitTm>*100ms then the data will be send as a packet anyway - regardless of the packet size. Retransmit intervals are controlled internally but will do this for <NmRetry> times. If the data is still not sent by this time, the socket/session will be closed and revert to offline command mode with a NO CARRIER response.

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When connecting to an IP address using the AT*E2IPO command, the module will wait until its initial connection request packets have timed out (64 seconds). By changing the <ConnTm> you are able to control how long the unit will wait for the module to drop back into command mode and return the NO CARRIER response. Note, this does not change the TTL of the packets being sent out. If a connection acknowledgement is subsequently received, it will be ignored.

Defined values:

< RetryTm >	Description
1 - 10	Number of seconds to wait for retry sending an IP packet when it can't be sent immediately. Default = 2 seconds (Not supported)

< NmRetry >	Description
3 - 8	Number of retries to be made before the socket is closed due to excessive delay. Default = 8 See application note 'Using AT commands to control the TCP/IP stack in SEM modules' for more information on the retry algorithm employed in the module stack.

< WaitTm >	Description
1 - 10	Number of 100ms intervals to wait for incoming data before sending the packet to IP. Default = 2 (200ms) (Not supported)

< SendSz >	Description
255 - 1460	Size in bytes of the data chunk to be received before sending to IP. Default 1020 bytes. Note this is only applicable when using TCP connections, when using UDP all packets will be 255 bytes in length.

< esc >	Description
0	Disable escape sequence notification during a TCP/IP session (Default). DTR detection is always enabled.
1	Enable detection of the SE-proprietary escape sequence (+++AT<CR>) during a TCP/IP session. See the command AT*E2ESC for more information.
2	Enable detection of the legacy escape sequence (+++) during a TCP/IP session.

<ConnTm>	Description
0-120	Number of seconds to wait before returning NO CARRIER after a connection request has been sent with the AT*E2IPO command. 0 indicates the unit will use the default value of 64 seconds

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Example:

Show current settings

```
AT*E2IPS?
*E2IPS: 2,10,2,1020,0
OK
```

Set number of retries to 4, TCP packet size to 500 bytes and turn off the escape sequence.

```
AT*E2IPS = 2,4,2,500,0
OK
```

Set to Defaults

```
AT*E2IPS = ,,,,
OK
```

8.9 AT*ENAD Internet Account Define

Description	Command	Possible Responses
Define an internet account	AT*ENAD=[<index>][,<name>,<userid>,<password>,<bearer>,(bearer_settings)]If <bearer>=1(bearer_settings):=<pref_serv>,<pap_chap>	• *ENAD:<index>[,<cid>] • +CME ERROR <err>
Read the current settings	AT*ENAD?	• *ENAD:list of <index>s with corresponding <name>, <userid>,,<bearer> followed by the list of bearer dependent parameters • If <bearer>=1 (bearer_settings):=<pref_serv>,<pap_chap>,<cid>,<lock_state> • +CME ERROR <err>

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Description	Command	Possible Responses
Test if the command is supported	AT*ENAD=?	• *ENAD:list of supported <index>s,max length of <name>,max length of <userid>,max length of <password>,(1),list of supported <pref_serv>s,list of supported <pap_chap>s,list of supported <lock_state>s • +CME ERROR <err>

Description:

This command is used for defining an Internet Account. The primary use of this Internet Account is to define a User Id and Password for authentication purposes during PDP context activation. Up to 20 Internet Accounts can be created (AT*ENAD) and mapped directly (one to one) to an existing PDP Context as created using the AT+CGDCONT command. The Internet Account index will also be 1 - 20, same as the PDP Context.

The *ENAD command will initially only allow for the setting of a bearer type of GPRS. The *ENAD command will initially only allow PAP as its non-transparent GPRS access mode for authentication during PDP context activation. When the Authentication type, <pap-chap> , is set to “None”, then no UserID/PW will be sent during PDP context activation. The Internet Account data will be stored in RAM and initialized at startup and therefore lost over a power cycle or reset, same as the PDP Context data.

Defined values:

<index>	Description
integer 1-20	Each Internet Account is given a unique index

When a data account is created a corresponding ENAD account is created to complement it. If the account is not changed then no username or password is used during the negotiation for an IP address (see AT*E2IPA command).

When accounts are created data account 1 relates across to ENAD account 1, these numbers always reference each other.

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<name>	Description
string (max 20 16-bit characters)	Each Internet Account has a (“friendly”) name

<userid>	Description
string (max 64 8-bit characters)	The user id to be used when setting up the connection.

<passwd>	Description
string (max 64 8-bit characters)	The password to be used when setting up the connection

If the <passwd> parameter is left blank this shall be interpreted as a request for the <userid> and <passwd> parameters to be set dynamically.

For security reasons the read command shall not return the value of the <passwd> parameter. The empty place of the <passwd> parameter shall be indicated by two consecutive commas.

<bearer>	Description
0	Circuit Switched dial-up. **(Not supported)**
1	Packet Domain service
2	Bluetooth **(Not supported)**
3	SMS **(Not supported)**

This parameter is used to decide what bearer shall be used for the connection.

If <bearer>=1 the following parameters are used

<cid>	Description
integer	Id number of a PDP Context as defined in AT+CGDCONT

There is a one to one mapping between an IA and a PDP context. A certain context can thus not be reused in another IA.

When a certain PDP Context is associated with an Internet Account, it is implied that the Quality of Service Profile with the same id number is also associated. The Quality of Service Profile is defined with AT+CGQREQ and AT+CGQMIN.

<pref_serv>	Description
0	Automatic
1	Packet Domain Service only **(Not supported)**

If set to “0” the phone will try to handle incoming CSD services (e.g. phone calls).

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<pap_chap>	Description
0	Normal: Only PAP allowed
1	Secure: Only CHAP allowed **(Not supported)**
2	None: No authentication scheme is used

This parameter is used to choose which authentication scheme is to be used.

The <lock_state> parameter is set to "1" in the Internet Accounts that are predefined and not possible to alter via the AT-commands. No parameter values can be changed in an Internet Account. If the user tries to change the parameter values, ERROR is returned <err> parameter, refer to +CME ERROR - Mobile Equipment Error Result Code.

8.10 AT*E2IPACT IP Socket Accept

Description	Command	Possible Responses
Accept incoming network connection request	AT*E2IPACT=<socketId>	• CONNECT • ERROR
Displays list of all mobile terminated sockets	AT*E2IPACT?	• *E2IPACT: <socketId>,<sockType>,<localIpAddr>,<localIpPort>,<remoteIpAddr>,<remoteIpPort>,<cid> • OK • ERROR
Shows if command is supported	AT*E2IPACT=?	• *E2IPACT: (list of supported <socketId>s) • OK

Description:

This command is used to accept an incoming socket connection. This command is used to operate on a socket that was listening for incoming network connections using the command AT*E2IPL.

This command is not abortable.

Defined values:

<socketId>	Description
0-15	The socket that has the incoming network connection accepted.

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8.11 AT*E2IPEV IP Socket Events

Description	Command	Possible Responses
Turn on and off IP Socket events	AT*E2IPEV=<eventType>,<onoff>	• OK • ERROR
Displays list that shows the state of all socket events	AT*E2IPEV?	• *E2IPEV: <eventType>,<onoff>[,<info1>[,<info2>]] • OK • ERROR
Shows if command is supported	AT*E2IPEV=?	• *E2IPEV: (list of supported <eventType>s),<onoff> • OK

Description:

This command is used to turn socket event unsolicited responses on and off. If a serial channel is in online data state then the events will not be available in that channel. Events for a socket are available in all multiplexer channels.

Defined values:

<eventType>	Description
0	Reserved. Use to set all events to <onOff> value. (not displayed in Read command)
1	Open complete for <socketId>
2	Bind complete for <socketId>
3	Close complete for <socketId>
4	Outgoing Connect complete for <socketId>
5	Socket now listening for incoming connection
6	Incoming Connection request for <socketId>
7	Accept complete for <socketId>
8	Data received
9	Data sent
10	Error on socket

<onoff>	Description
0	turn socket event unsolicited responses off
1	turn socket event unsolicited responses on

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<info1>: The type of this parameter is based on the event type. The table below describes the meaning of <info1> based on <eventType>

<info1>	Description
1	Not used
2	"IP Address"
3	Not used
4	"IP Address"
5	Not used
6	Not used
7	"IP Address"
8	Size of Data
9	Size of Data
10	Error Value

<info2>: The type of this parameter is based on the event type. The table below describes the meaning of <info2> based on <eventType>

<info2>	Description
1	Not used
2	Port Number
3	Not used
4	Port Number
5	Not used
6	Not used
7	Port Number
8	Not used
9	Not used
10	Not used

8.12 AT*E2IPATO IP Socket ATO Command

Description	Command	Possible Responses
Switch to online data state	AT*E2IPATO=<socketId>	• CONNECT • ERROR
Shows if command is supported	AT*E2IPATO=?	• *E2IPATO:(list of supported <socketId>s) • OK

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Description:

This command provides the same functionality as ATO but allows the user to choose a specific socket to switch back into online data state. If the socket was closed by the remote system then this command will return an error. This command may only be used with sockets, it may not be used with CSD or GPRS connections. This command may be used with mobile originated sockets (opened with E2IPO) or mobile terminate sockets (opened with E2IPL).

This command is not abortable.

Defined values:

<socketId>	Description
integer 0-15	The socket to be switched into online data state

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9 Identification

9.1 AT Attention Command

Description	Command	Possible Responses
Checks the communication between the MS and application	AT	• OK • +CME ERROR <err>

Description:

This command is used to determine the presence of an MS. If the MS supports AT commands, it returns an OK final result code.

9.2 AT*EIDSUM Fixed Format Module Id Summary

Description	Command	Possible Responses
Display fixed format module id summary	AT*EIDSUM?	*EIDSUM: <string> OK ERROR
Test if command is supported	AT*EIDSUM=?	OK ERROR

Description:

This command provides additional module identification information, mainly KRD and product variant, in a fixed position format. Product number and variant, Hardware revision and manufacture date, Software revision, module name and product description are all included in the formatted output. Output is formatted in specific columns as specified in table below.

The string is created from the following fields:

KRD <prod_no>/<var> <hwrev> <date> <swrev> <model> <descr>

Example:

```
*EIDSUM: KRD 104 1004/00 A0A 05W52 R1A017 Gx64    "Gx64 Modem"
|        |   |   |    |  |   |     |      |       |
1       10  14  18   23  26  30   36     43      51
```

<string>	Format	Start pos	Stop pos	*Description*
<prod_no>	ppp pppp	14	21	Product number. 7 digits with space.
<var>	vv	23	24	Variant. 2 digits.
<hw_rev>	hhh	26	28	Hardware revision. 3 characters.

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<string>	Format	Start pos	Stop pos	*Description*
<*date*>	yy**W**ww	30	34	Production date. Length 5. y=year, w=week number,
<sw_rev>	ssssss	36	41	SW revision 6 characters.
<*model*>	mmmmmmm	43	49	Model name. 7 characters.
<*Module Description*>	“ddd ... d”	51	max 80	Description string. Variable length. Max 30 characters.

9.3 AT+CGMI Read MS Manufacturer Identification

Description	Command	Possible Responses
Request manufacturer identification	AT+CGMI	• <manufacturer> • +CME ERROR: <err>
Test if the command is supported	AT+CGMI=?	• OK • ERROR

Description:

Causes the MS to return one or more lines of information text.

Defined values:

<manufacturer>	Description
Sony Ericsson	This company’s name is displayed

Example:

```
AT+CGMI
Sony Ericsson
OK
```

9.4 AT+CGMM Read MS Model Identification

Description	Command	Possible Responses
Request the model identification	AT+CGMM	• <model> +CME ERROR: <err>
Test if the command is supported	AT+CGMM=?	• OK • ERROR

Description:

Causes the MS to return one or more lines of information text <model>, determined by the MS manufacturer. It is intended to permit the user of the ITAE/ETAE to identify the specific model of the MS 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.

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Defined values:

<model type>	Description
String type	A unique ASCII character/digit string, always 10 characters long. Spaces are used when the number of characters/digits is less than 10

<model>	Description
String type	Model name for the transceiver unit,

Example:

```
AT+CGMM
6100501-BVGR64
OK
```

9.5 AT+CGMR Read Revision Identification

Description	Command	Possible Responses
Request revision identification string	AT+CGMR	<revision> +CME ERROR: <err>
Test if the command is supported	AT+CGMR=?	OK ERROR

Description:

This command causes the module to return a string containing information about the software revision. This command is available without SIM access.

Also implemented as AT+GMR.

Defined values:

<revision>	Description
String type	An ASCII string containing the SW product number (CXC number) and software revision

Example:

AT+CGMR

CXC125908 P1A.40

OK

9.6 AT+CGSN Read Product Serial Number Identification

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Description	Command	Possible Responses
Request product serial number	AT+CGSN	<sn> +CME ERROR: <err>
Test if the command is supported	AT+CGSN=?	OK ERROR

Description:

This command causes the module to return the IMEI (International Mobile station Equipment Identity), which identifies the individual ME. This command is available without SIM access.

Also implemented as AT+GSN.

Defined values:

<sn>	Description
String	Similar to IMEISV, which is the IMEI (International Mobile station Equipment Identity; refer GSM 03.03) number of the ME and the software version number (SVN)

Example:

```
AT+CGSN
00460101326631001          01 is the SVN
OK
```

9.7 AT+GCAP Capabilities

Description	Syntax	Possible responses
Request complete capability list	AT+GCAP	+GCAP: CGSM OK

Description:

This command returns the module's capabilities.

Defined values:

Capabilities	Description
+CGSM	Support for GSM commands

Example:

```
AT+GCAP
+GCAP:  +CGSM
OK
```


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9.8 AT+GMI Request Manufacturer Identification

Description	Syntax	Possible responses
Read manufacturer's name	AT+GMI	+GMI: <manufacturer> OK

Description:

This command returns the name of the manufacturer.

Defined values:

Parameters	Description
<manufacturer>	
SONY ERICSSON	The name of the manufacturer.

Example:

```
AT+GMI
+GMI: SONY ERICSSON
OK
```

9.9 AT+GMM Request Model Identification

Description	Syntax	Possible responses
Read the model identification	AT+GMM	+GMM: <model> OK

Description:

This command returns the identification of the specific module model.

Defined values:

Parameter	Description
<model>	
GX64	Module name

Example:

```
AT+GMM
+GMM: GX64
OK
```


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9.10 AT+GMR Revision Identification

Description	Syntax	Possible responses
Read software revision identification.	AT+GMR	<revision> OK

Description:

This command returns the software revision.

The only possible result code is OK.

Defined values:

Parameters	Description
<revision>	
String	6 characters

Example:

```
AT+GMR
R1A001
OK
```

9.11 AT+GSN Request Product Serial Number Identification

Description	Syntax	Possible responses
Read the serial number	AT+GSN	<serial number> OK

Description:

This command returns a string with the IMEI number as per the CGSN command.

Defined values:

Parameter	Description
<serial number>	
String	Similar to IMEISV, which is the IMEI (International Mobile station Equipment Identity; refer GSM 03.03) number of the ME and the software version number (SVN)

Example:

```
AT+GSN
004601019582120001
OK
```


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9.12 ATI Identification Information

Description	Command	Possible Responses
Execute	ATI[<value>]	<information>

Description:

This command causes the DCE to transmit one or more lines of text, followed by a final result code. As an option, <value> can be used to select from among multiple types of identifying information as shown in the table below.

This command provides compatibility with Microsoft Windows 95.

Defined values:

<value>	Description
0	Same information as +GMM command (model identification)
1	Same information as +GMR command (revision identification)
3	Modem manufacturer name
8	DCE hardware type version
9	Combined identification information

Examples:

```
ATI0
GX64
OK
```


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10 Input/Output

10.1 AT*E2IO Input/Output Read/Write

Description	Command	Possible Responses
Request operation with the I/O signals	AT*E2IO=<op>,<io> [,<val>][,<adc_val>]	ERROR OK *E2IO: <op>,<io>[,[<val>] [,<adc_val>]] OK
Show if the command is supported	AT*E2IO=?	*E2IO: (list of supported <IO>s), (list of supported <ip>s), (list of supported <op>s), (list of supported <adc>s), (list of supported <dac>), (list of supported <val>s),(list of supported <adc_val>s) ERROR

Description:

Gx64 modules have up to forty-one digital I/O pins that may be configured for input or output and four analog-to-digital converters. All of these signals are controlled by the AT*E2IO command. Digital I/O pins may have alternate functions. When alternate functions are selected that include one of the pins listed below, the pin is unavailable for configuration by the *E2IO command.

A list of available I/O is shown below. Please refer to the specific module's Integrator's Guide for more information about the pin corresponding to the E2IO name.

Defined values:

E2IO name	Notes
IO1	
IO2	
IO3	
IO4	
IO5	
IO6	
IO7	
IO8	
IO9	
IO10	
IO11	

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E2IO name	Notes
IO12	
IO13	
IO14	
IO15	
IO16	
IO17	
IO18	
IO19	
IO20	
IO21	
IO22	
IO23	
IO24	
IO25	
IO26	Cannot generate an interrupt on input transition therefore cannot be configured for E2IO trigger.
IO27	Cannot generate an interrupt on input transition therefore cannot be configured for E2IO trigger.
IO28	See *E2RS232 command.
IO29	See *E2RS232 command.
IO30	See *E2RS232 command.
IO31	See *E2RS232 command.
IO32	See *E2RS232 command.
IO33	See *E2RS232 command.
IO34	
IO35	
IO36	
IO37	
IO38	
IO39	
IO40	
IO41	
AD1	
AD2	
AD3	
AD4	

All configurable IO pins are set to INPUT as a factory default. Their status (Input/Output) is stored in the profile.

IO28 through IO33 are not available by default. These pins are shared with UART 1 RS232 functionality and only become active if the AT*E2RS232 command is used. see AT*E2RS232 for more information.

The *E2IO set command controls the operations with the I/O signals for the M2M devices. It is possible to perform up to six operations. These operations have the following meaning:

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Read (<op> = 0): It reads the state of the specified signal. It returns the binary state of digital signals or value (0-1023) of an ADC input. In case of a digital I/O the command has the following syntax:

```
AT*E2IO=0,“IO1”
*E2IO: 0,“IO1”,0
OK
```

If reading from the ADCs:

```
AT*E2IO=0,“AD1”
*E2IO: 0,“AD1”,,62
OK
```

Write (<op> = 1): Sets an output to a specific value. For digital sources <val>=‘0’ or ‘1’ and for the analog sources, 0-1023. If the signal is bi-directional (IO1 to IO33) it must be configured as an output before writing is allowed. If the output can be written to, the signal is set to <val> and OK is returned, otherwise ERROR is returned.

```
AT*E2IO=1,“IO1”,1
OK
```

Configure (<op> = 2): The configuration operation is used for the bi-directional signals (IO1 to IO33). They can be configured as input, <val>= ‘0’ or output, <val>=‘1’. If the signal is not configurable, ERROR is returned in place of OK. Example shown below:

```
AT*E2IO=2,“IO1”,1   (Set IO1 as an output)
OK
```

Once set, the signal’s direction remains configured even after a power cycle. If a signal can be configured with an alternate function using the *E2RS232 or *E2IOCONF command, the pin’s direction will be remembered. If the pin is again configured for GPIO, the direction will be restored.

Configure Check (<op> = 3): This operation reads the current configuration of the signal. Returned <val> is current signal state. If the signal is configurable, the current state and OK are returned, if not ERROR is returned.

```
AT*E2IO=3,“IO1”
*E2IO: 3,“IO1”,1     (IO1 is currently set as an output)
OK
```

Trigger (<op> = 4): Input signals can be set to send an unsolicited result code whenever a change in one of the inputs has been produced. Setting a trigger (<val> = ‘1’) will cause the unsolicited result to be sent when a change from the current signal state occurs (signal must be unchanging when command is executed). Clearing a trigger (<val> = ‘0’) will clear a currently set trigger. Configurable signals (IO1 to IO33) must be set as inputs before they can be triggered. Triggers are only applicable while the module is ON. Power-cycling will clear all current triggers. If a signal is triggerable OK is returned and the trigger is set/cleared, otherwise ERROR is returned.

```
AT*E2IO=4,“IO5”,1   (Set trigger on IO5)
OK
(IO5 changes state, sometime later)
*E2IO: 4,“IO5”,1    (IO5 triggered, current state ‘1’)
```


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Trigger Check (<op> = 5): Checks if a signal input is configured as a trigger. Returned <val> shows the current trigger state; '1' for triggered or '0' for not triggered. If the signal is triggerable, the current trigger status and OK are returned, otherwise ERROR is returned.

```
AT*E2IO=5,"IO5"
*E2IO: 5,"IO5",1    (IO5 is currently set to trigger)
OK
```

The test command returns the supported I/Os and allowed value ranges.

Defined Values:

<op>	Description
0	Read
1	Write
2	Configure
3	Configure Check
4	Trigger
5	Trigger Check

<io>	Description
IO1-IO25,IO28-IO41	General-purpose configurable digital I/O. Supported Operations: 0,1,2,3,4,5.
IO26,IO27	General-purpose configurable digital I/O. Supported Operations: 0,1,2,3
AD1-AD4	Analog-to-Digital Inputs: Supported Operations: 0

<val>	Description		
	Read/Write	Configure	Trigger
0	The logic value is FALSE	I/O signal is INPUT	I/O signal is NOT set to trigger
1	Logic value is TRUE	I/O signal is OUTPUT	I/O signal is set to trigger

<adc_val>	Description
0-1023	The decimal value represents the analog voltage, converted to a 10-bit binary value, present on the pin at the time the command was issued. Applicable only to A/D signals.

Unsolicited Result Codes:

```
*E2IO: <source>, <io>, <val>
```

See the "Defined values" section and the "Triggering and Input" section for a description of the unsolicited output from Trigger(<op>=4)

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Reading an I/O

AT Command	Response	Comment
AT*E2IO=0,“IO1”		The TE is requesting for the logic value of IO1 (Digital I/O 1)
	*E2IO:0,“IO1”,1 OK	The MS responds IO1 has a TRUE logic value
AT*E2IO=0,“AD1”		The TE is requesting for the reading of AD1 value (Analog Input 1)
	*E2IO:0,“AD1”, ,87 OK	The MS responds AD1 has a decimal value of 87. In volts: 2.8*(87/256) = 0.238V

Writing in an Output

AT Command	Response	Comment
AT*E2IO=1,“IO1”,1		The TE is requesting to write a TRUE logic to IO1 (Digital I/O 1)
	OK	The MS responds OK because the operation has been performed
AT*E2IO=1,“IO3”,0		The TE is requesting to write a FALSE logic value to I3 (Digital I/O 3)
	ERROR	The MS responds ERROR because the pin is probably configured for input.

Configuring an I/O

AT Command	Response	Comment
AT*E2IO=2,”IO1”,0		The TE is requesting to configure IO1 as an input
	OK	The MS responds OK because the operation has been performed
AT*E2IO=2,”IO4”,1		The TE is requesting to configure IO4 as an output
	OK	The MS responds OK because the operation has been performed

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Checking an I/O status

AT Command	Response	Comment
AT*E2IO=3,“IO1”		The TE is requesting to check the configuration of the IO1 signal
	*E2IO: 3,“IO1”,0 OK	The MS responds IO1 is configured as an input
AT*E2IO=3,“IO4”		The TE is requesting to check the configuration of the IO4 signal
	*E2IO: 3,“IO4”,1 OK	The MS responds IO4 is configured as an output

Triggering an Input

AT Command	Response	Comment
AT*E2IO=4,“IO1”,1		The TE is requesting to trigger IO1
	OK	The MS responds OK because the operation has been performed
	*E2IO: 4,“IO1”,1 OK	An event has occurred. The IO1 has triggered on the input changing to logical value 1.
AT*E2IO=4,“IO4”,0		The TE is requesting to not trigger IO4
	OK	The MS responds OK because the operation has been performed

Checking an Input Trigger

AT Command	Response	Comment
AT*E2IO=5,“I1”		The TE is requesting the trigger state of the Input 1
	*E2IO=5,“IO1”,1 OK	The MS responds that I1 has its trigger active

10.2 AT*E2RS232 RS232 control mode

Description	Command	Possible Responses
Select RS232 control mode	AT*E2RS232=<Val>,<Sel>[,<itimr>]	ERROR OK
Read Command status	AT*E2RS232?	*E2RS232: <Val>,<Sel>,<itimr> OK ERROR

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Description	Command	Possible Responses
Show if the commands is supported	AT*E2RS232=?	*E2RS232: (list of supported <Val>),(list of supported <Sel>),(list of supported <itimr>) OK ERROR

Description:

On Gx64 modules, the RS232 control lines on UART 1 are multiplexed with general purpose I/O lines as follows:

RTS (IO14), CTS (IO15), DCD (IO11), RI (IO10), DSR (IO13), DTR (IO12)

This command allows the user to select either full RS232 modem control or no modem control. If no modem control is selected, the RS232 pins are available as general-purpose I/O pins. See the *E2IO command for more information.

This command also enables standby handshaking and Plug-and-Play identification. These functions involve use of the RS232 control lines, therefore full modem control must be selected and the function enabled if the function is needed.

The optional inactivity timer parameter <itimr> may be specified to establish a delay time before standby mode is allowed. This works in conjunction with standby handshaking.

The following table shows the role of the control/IO pins with respect to the mode selected with this command:

Signal Usage:

Mode determined by <val>	Rs232 control lines	Extended IO lines	Description
0	Tx, Rx, RTS, CTS, DCD, RI, DSR, DTR		Full RS232 control (default)
2	Tx, Rx	IO10-IO15	RS232 control off (all control lines used for IO)

The mode is not saved in the user profile. After a powerdown, the pins will revert to full RS232 control.

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Defined values:

<val>: parameter

<val>	Description
0	Full RS232 functionality - all control lines used by RS232 (as default on powerup)
2	All RS232 control lines swapped out for general use by IO (see table above)

<sel>: parameter

<sel>	Description
0	Standby handshaking and Plug-and-Play identification disabled.
1	Standby handshaking enabled.
2	Plug-and-Play identification enabled.
3	Standby handshaking and Plug-and-Play identification enabled.

<itimr>: parameter

Note! This value may be rounded up or down to represent system ticks in the module. Therefore, if you send a value of 100, then query, it will say 101 because that is closer to the number actual milliseconds in system ticks resolution.

<itimr>	Description
100-2000	Inactivity timer value in milliseconds.

10.3 AT*USB USB control mode

Description	Command	Possible Responses
Select USB control mode	AT*USB=<det>,<pars>	ERROR OK
Read Command status	AT*USB?	*USB: <det>,<pars> OK ERROR
Show if the commands is supported	AT*USB=?	*USB: (list of supported <det>s),(list of supported <pars>s) OK ERROR

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Description:

On Gx64 modules, the detection of USB cable attachment can be enabled or disabled by this command. Further, the AT command parser can be directed to monitor USB or UART traffic.

The following table shows the role of the detection state with respect to the connection of the AT command parser selected with this command:

Signal Usage:

USB detection state	AT parser switch	Description
0	x	USB detect disabled
1	0	USB detect enabled, AT parser on primary UART
1	1	USB detect enabled, AT parser moves if USB Instance1 detected
1	2	USB detect enabled, AT parser switches between primary UART and USB Instance1 automatically

The *USB settings are persistent across power cycles.

Defined values:

<det>: parameter

<det>	Description
0	Disable USB detection
1	Enable USB detection

<pars>: parameter

<pars>	Description
0	Do not parse USB traffic for AT commands
1	Parse Instance1 USB traffic for AT commands if USB is detected. If USB is detected, AT command parser is removed from the UART data path.
2	AT command parser moves automatically between USB and primary UART.

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11 Interface

11.1 AT&C Circuit 109 (DCD) Control

Description	Command	Possible Responses
Set behavior of carrier detect	AT&C[<value>]	OK ERROR

Description:

Determines how ITU-T V.24 circuit 109 (Data Carrier Detect) relates to the detection of a received line signal from the remote end.

Defined values:

<value>	Description
0	DCD always on
1	DCD follows the connection. **Default value**

If in online command mode, while running a TCP/IP session through AT Commands, DCD will only be updated when returning to online data mode using ATO.

11.2 AT&D Circuit 108 (DTR) Response

Description	Command	Possible Responses
Control actions from DTE	AT&D[<value>]	OK ERROR

Description:

Controls all actions initiated by data terminal ready from DTE.

Defined values:

<value>	Description
0	Ignore. **Default value**
1	When in on-line data mode, switch to on-line command mode. For all other states, see <value>=2
	Disconnect and switch to off-line command mode

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11.3 AT&S Circuit 107 (DSR) Response

Description	Command	Possible Responses
Set behavior of data set ready	AT&S[<value>]	• OK • ERROR

Description:

Determines the behavior of the data set ready signal.

Defined values:

<value>	Description
0	DSR always on
1	DSR on in data mode. DSR off in command mode. **Default value**

11.4 ATE Command Echo

Description	Command	Possible Responses
Request Command Echo	ATE[<value>]	• OK • ERROR
Show the current setting	ATE?	<value>
Test if the command is supported	ATE=?	E: (list of supported <value>s)

Description:

The setting of this parameter determines whether or not the DCE echoes characters received from the DTE during command state and online command state.

Defined values:

<value>	Description
0	DCE does not echo characters during command state and online command state
1	DCE echoes characters during command state and online command state. **Default value**

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11.5 ATV DCE Response Format

Description	Command	Possible Responses
Set DCE response format	ATV<value>	• OK • ERROR
Show the current setting	ATV?	V: <value>
Test if the command is supported	ATV=?	V: (list of supported <value>s)

Description:

Select either descriptive or numeric response codes. The ATV command sets the verbose numeric response codes and strips off the <S3><S4> additions to the command response.

Defined values:

<value>	Description
0	Display numeric result codes
1	Display verbose result codes. **Default value**

List of result codes

ATV1/ATV=1	ATV0/ATV=0	Description
OK	0	Acknowledges execution of a command
CONNECT	1	A connection has been established; the DCE is moving from command state to online data state
RING	2	The DCE has detected an incoming call signal from the network
NO CARRIER	3	The connection has been terminated or the attempt to establish a connection failed
ERROR	4	Command not recognized, command line maximum length exceeded, parameter value invalid, or other problem with processing the command line
NO DIALTONE	6	No dial tone detected
BUSY	7	Engaged (busy) signal detected
NO ANSWER	8	"@" (Wait for Quiet Answer) dial modifier was used, but remote ringing followed by five seconds of silence was not detected before expiration of the connection timer
CONNECT <TEXT>	Manufacturer-specific	Same as CONNECT, but includes manufacturer-specific text that may specify DTE speed, line speed, error control, data compression, or other status

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11.6 ATZ Reset to Default Configuration

Description	Command	Possible Responses
Execute	ATZ	• OK • ERROR
Execute	ATZ<profile>	• OK • ERROR
Show if supported and list available parameter range	ATZ=?	• Z: (list of supported <profile>s)

Description:

This command instructs the DCE to set all parameters to their default values as specified by the user. Consider hardware configuration switches or non-volatile parameter storage (if implemented) when using this command.

Commands included on the same command line as the Z command will be ignored. See AT&F for a list of parameters settable in a profile. Global parameters are not included in profiles.

Defined values:

<profile >	Description
0-2	Select the user profile to restore

11.7 AT+CMUX GSM 7.10 multiplexing

Description	Command	Possible Responses
Set 07.10 settings	AT+CMUX=<mode>[,<subset>[,<port_speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]	+CME ERROR: <err>
Display current settings for multiplexer	AT+CMUX?	+CMUX :<mode>,[<subset>],<port_speed>,<N1>,<T1>,<N2>,<T2>,<T3>[,<k>] +CME ERROR: <err>

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Description	Command	Possible Responses
Test if the command is supported	AT+CMUX=?	+CMUX: (list of supported <mode>s), (list of supported <subset>s), (list of supported <port_speed>s), (list of supported <N1>s), (list of supported <T1>s), (list of supported <N2>s), (list of supported <T2>s), (list of supported <T3>s), (list of supported <k>) +CME ERROR: <err>

Description:

The command is used to enable/diable the 3GPP 27.010 multiplexing protocol control channel. The AT command sets parameters for the Control Channel. If the parameters are left out, the default value is used.

Whenever the multiplexer control channel is released, the ME/TA/TE shall use autobaud to determine the interface speed.

If a +CMUX command is issued while in any multiplexer mode, then that +CMUX command will be ignored and the MT/TA will return +CME ERROR: <err>.

Defined values:

<mode>	Description
0	Basic option

<Subset> defines the way in which the multiplexer control channel is set up. A virtual channel may subsequently be set up differently but in the absence of any negotiation for the settings of a virtual channel, the virtual channel shall be set up according to the control channel <subset> setting.

<subset>	Description
0	Only UIH frames used

<port_speed>	Description
1	9600bits/s
2	19200bits/s
3	38400bits/s
4	57600bits/s
5	115200bits/s
6	230400bits/s
7	460800bits/s

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<port_speed>	Description
8	921600bits/s

<N1>	Description
10-300	Maximum frame size. **Default is 64**

<T1>	Description
10-255	Acknowledgement timer in units of ten milliseconds. **Default is 10 (100 ms)**

<N2>	Description
0-255	Maximum number of re-transmissions. Default is 3.

<T2>	Description
20-2500	Response timer for the multiplexer control channel in units of ten milliseconds. Default is 30 (300 ms). T2 must be longer than T1.

<T3>	Description
1-255	Wake up response timer in seconds. **Default is 10**

<k>	Description
1..7	Window size, for Advanced operation with Error Recovery options only. Value is ignored as Advanced mode is not supported.

11.8 AT+ICF DTE-DCE Character Framing

Description	Command	Possible Responses
Defines DTE-DCE character framing	AT+ICF=[format [,parity]]	OK ERROR
Read the current setting	AT+ICF?	+ICF: <format>[,<parity>] OK ERROR
Test if the command is supported	AT+ICF=?	+ICF: (list of supported <format>s), (list of supported <parity>s) OK ERROR

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Description:

This extended-format compound parameter is used to determine the local serial port start-stop (asynchronous) character framing used by the DCE to accept DTE commands, and while transmitting information text and result code, if this is not automatically determined;

AT+IPR=0 forces AT+ICF=0 (see AT+IPR).

The data affected by this command is contained in the User Profile.

Defined values:

<format>	Description
1	8 Data 2 Stop
2	8 Data 1 Parity 1 Stop
3	8 Data 1 Stop. **(Default value)**
4	7 Data 2 Stop
5	7 Data 1 Parity 1 Stop
6	7 Data 1 Stop

<parity>	Description
0	Odd **(Default value)**
1	Even
2	Mark
3	Space

11.9 AT+IFC DTE-DCE Local Flow Control

Description	Command	Possible Responses
Defines DTE-DCE local flow control	AT+IFC=[<by_te>, [<by_ta>]]	• OK • ERROR
Show the current setting	AT+IFC?	+IFC: <by_te>,<by_ta>
Test if the command is supported	AT+IFC=?	+IFC: (list of supported <by_te>s,<by_ta>s)

Description:

Defines the flow control between the modem and the computer when in on-line data mode.

No flow control is enabled in any of the command modes.

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Defined values:

<by_te>	Description
0	No flow control on DTE
1	Xon/Xoff flow control on DCE. Control characters are removed by the DCE interface
2	RTS flow control on DCE. **(Default value)**
3	Xon/Xoff flow control on DCE. Control characters are passed to the remote DCE/DTE

<by_ta>	Description
0	No flow control on DCE
1	Xon/Xoff flow control on DTE
2	CTS flow control on DCE. **Default value**

Note! Regardless of how this command is configured, if 3 wire communication between the module and the application is required then the RTS and CTS lines (on the module) should be looped back on each other as the chipset requires this at a hardware level.

11.10 AT+ILRR Cable Interface Local Rate Reporting

Description	Command	Possible Responses
Defines DTE-DCE character framing	AT+ILRR=<value>	OK ERROR
Show the current setting	AT+ILRR?	+ILRR:<value>
Test if the command is supported	AT+ILRR=?	+ILRR:(list of supported <values>s)

Description:

Specifies whether or not the extended-format "+ILRR:<rate>" information text is transmitted from the DCE to the DTE. The <rate> reported shall represent the current IPR setting at DTE-DCE interface. If enabled, the intermediate result code is transmitted after any modulation, error control or data compression reports are transmitted, and before any final result code (e.g. CONNECT) is transmitted. The <rate> is applied after the final result code is transmitted.

The format of the intermediate result code is:

```
+ILRR: <rate>[,<rx_rate>]
```

Values for <rate> are decimal. The optional <rx_rate> value reports the rate on circuit 104 (RXD), if it is different from the rate on circuit 103 (TXD).

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Defined values:

<value>	Description
0	Disables reporting of local port rate (+ILRR: is not transmitted). **Default value**
1	Enables reporting of local port rate (+ILRR: is transmitted)

11.11 AT+IPR Cable Interface Port baud rate

Description	Command	Possible Responses
Defines fixed DTE rate	AT+IPR=[rate]	• OK • ERROR
Show the current setting	AT+IPR?	• +IPR:<rate> • OK • ERROR
Test if the command is supported	AT+IPR=?	• +IPR: (), (list of fixed-only <rate>s)] • OK • ERROR

Description:

Specifies the data rate at which the DCE will accept commands, in addition to 1200 bits/s or 9600 bits/s (as required in v25ter, subclause 4.3). It may be used to select operation at rates used by the DTE, which the DCE is not capable of automatically detecting.

The specified rate takes effect following the issuance of any result code(s) associated with the current command line.

0 denotes autobauding.

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Defined values:

<rate>	Description
Discrete integer value	The <rate> value specified shall be the rate in bits per second at which the DTE-DCE interface should operate, e.g. “19200” or “115200”. The rates supported by a particular DCE are manufacturer specific. The following rates, are supported;
0	0 = autobaud
1200	1200 bps
2400	2400 bps
4800	4800 bps
9600	9600 bps
19200	19200 bps
38400	38400 bps
57600	57600 bps
115200	115200 bps
230400	230400 bps
460800	460800 bps
921600	921600 bps

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12 Network

12.1 AT*E2CD Cell Description

Description	Command	Possible Responses
Request network cell description	AT*E2CD=<n>	ERROR OK
Read the command	AT*E2CD?	*E2CD: <n>,<lac>,<ci>,<ta> ERROR
Test if the command is supported	AT*E2CD=?	*E2CD: (list of supported <n>s) ERROR

Description:

Controls the presentation of an unsolicited result code E2CD: when <n>=1, or when there is a change in one of the network cell parameters, E2CD: <lac>,<ci>,<ta>.

Read command returns the status of result code presentation and several values, which show the network cell parameters.

Location information <lac>, <ci> and <ta> are returned only when <n>=1 and the ME is registered in the network. To know if the ME is registered use the AT+CREG command. If the ME is not registered in the cellular network an ERROR message is returned.

*E2CD is an unsolicited response indicating changes in the Cell Description. AT*E2CD controls enabling and disabling of the unsolicited reports.

Note: The <ta> (timing advance) information is not displayed when the device in idle state.

Defined values:

<n>	Description
0	Disable network location information unsolicited result code. **Default value**
1	Enable network location information unsolicited result code *E2CD: <lac>,<ci>,<ta>

<lac>	Description
String type	Two byte location area code in hexadecimal format

<ci>	Description
string type	Two byte cell ID in hexadecimal format

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<ta>	Description
0-63	According to GSM 04.18 V8.6.0, the coding of the timing advance value is the binary representation of the timing advance in bit periods; 1 bit period = 48/13 ìs. <ta> is the integer representation of the timing advance in binary format
64-255	Reserved

12.2 AT*E2EMM Engineering Monitoring Mode

Description	Command	Possible Responses
Set the response presentation mode	AT*E2EMM=<n>[,<m>]	• ERROR • OK
Display mode neighbour cells are taken from the toplist		*E2EMM: Serving Cell MCC,MNC,LAC,CellID,BSIC,Ch[,RxL,C1,C2][,RxLFull,RxLSub,RxQFull,RxQSub,TA,TN], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>][,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>,<ta>,<tn>], NeighBours Cells MCC,MNC,LAC,CellID,BSIC,Ch,RxL[,C1,C2], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] ... <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK
Compact mode. The first cell is the serving cell, the rest are neighbour cells taken from the toplist		*E2EMM: <mcc>,<mnc>,<ci>,<bsic>,<ch>[,<rxl>][,<rxlSub>,<rxqsub>,<ta>],<mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl>, <mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl>, ... <mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl> OK

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Description	Command	Possible Responses
Verbose mode. The first cell is the serving cell and the rest are neighbour cells as provided by the network in the system info. messages (2 and 5) and via the AT*E2NBTS command		*E2EMM: <mcc>,<mnc>,<lac>, <ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>] [,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>, <ta>,<tn>], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] ... <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK
Reduced display mode - info. as display mode but without text headings or <CR><LF> separators, neighbour cells from top list		*E2EMM: <mcc>,<mnc>,<lac>, <ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>] [,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>, <ta>,<tn>], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] ... <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK
Test if the command is supported	AT*E2EMM=?	• *E2EMM: (list of supported <n>s),(list of supported <m>s) • ERROR

Description:

There is only one presentation format mode (Display)) and two response types (one shot response or continuous unsolicited responses).

The purpose of the Display presentation format mode is to display the data in a readable form, including headers and line breaks (<CR><LF>).

The response types give the user the choice of one a shot information or an unsolicited response with <m> seconds between each response. Responses occur when the module is camped on a network.

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Examples:

```
AT*E2EMM=1
*E2EMM:
GSM - Idle
Serving Cell
MCC,MNC,LAC,CellId,BSIC,Ch,RxL,C1,C2
234,15,0016,0D91,2E,0081,-085,00019,00019
Neighbour Cells
MCC,MNC,LAC,CellId,BSIC,Ch,RxL,C1,C2
000,00,0016,4047,3A,0083,-103,00001,00001
000,00,0016,423C,3A,0065,-104,00000,00000
000,00,0016,2F21,21,0067,-104,00000,00000
000,00,0016,8E3D,34,0077,-104,00000,00000
000,00,0016,348A,10,0091,-104,00000,00000
OK
```

The mode setting <n> in the set command has the combination listed in the table below.

When <n>=5, the shot information is the same as in <n>=1, but neighbouring cells, which have to be up to 16. This is the information that comes from the Serving Cell through the BCCH, reporting the BTS that are on the Serving Cell's surroundings.

Defined values:

<n>	Description
1	One shot presentation of the network location information. Display mode with headers and <CR><LF> line separators

<m>	Description
0-255	Integer type giving time (in seconds) between unsolicited responses. <m>=0 means immediately send out ONE response only.

<mcc>	Description
Integer type	Three digits in decimal format. The Mobile Country Code identifies the PLMN serving cell country according to ITU

<mnc>	Description
Integer type	Two digits in decimal format. The Mobile Network Code identifies the PLMN operator in the serving cell

<lac>	Description
Integer type	Two byte location area code in hexadecimal format

<ci>	Description
Integer type	Two byte cell ID in hexadecimal format

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<bsic>	Description
Integer type	One byte Base Stations Identification code in hexadecimal format

<ch>	Description
(0-1023)	It represents the ARFCN that shows the Absolute RF Channel, which identifies the BCCH carrier

<rxl>	Description
Integer type	Received Signal Strength level in dBm measured on idle mode

<rxlfull>	Description
Integer type	Received Signal Strength level in dBm. The Rx Level is taken in the Downlink and statistically is applied to 100 TDMA frames of the TCH or during a SACCH multiframe

<rxlsub>	Description
Integer type	Received Signal Strength level in dBm. The Rx Level is taken from the DownLink signal and the average is applied to subset of SACCH frames

<rxqfull>	Description
0	BER < 0.1%
1	0.26% < BER < 0.30%
2	0.51% < BER < 0.64%
3	1.0% < BER < 1.3%
4	1.9% < BER < 2.7%
5	3.8% < BER < 5.4%
6	7.6% < BER < 11.0%
	BER > 15.0%

<mcc>	Description
Integer type	Three digits in decimal format. The Mobile Country Code identifies the PLMN serving cell country according to ITU

<rxqsub> is the parameter that indicates the quality in the received signal on dedicated mode. The measurement average is applied to a subset of a SACCH multiframe.

<rxqsub>	Description
0	BER < 0.1%
1	0.26% < BER < 0.30%
2	0.51% < BER < 0.64%

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<rxqsub>	Description
3	1.0% < BER < 1.3%
4	1.9% < BER < 2.7%
5	3.8% < BER < 5.4%
6	7.6% < BER < 11.0%
7	BER > 15.0%

<c1>	Description
Integer	Path Loss criterion parameter for neighbour cells. The MS calculates this parameter, in idle mode, to decide if the cell is suitable to camp on. After the calculation the criterion is C1 > 0. See GSM 05.08

<c2>	Description
Integer	Cell reselection parameter for neighbour cells. This parameter shall optimise the selected cell reselection

<ta>	Description
0-63	According to GSM 04.18 V8.6.0, the coding of the timing advance value is the binary representation of the timing advance in bit periods; 1 bit period = 48/13uS. <ta> is the integer representation of the timing advance in binary format
64-255	Reserved

<tn>	Description
0-7	Its value indicates the time slot number in a traffic channel

12.3 AT*E2SPN Service Provider Name

Description	Command	Possible Responses
Request service provider indication	AT*E2SPN	• *E2SPN: <spi> • +CME ERROR: <err>
Test if the command is supported	AT*E2SPN=?	• OK • ERROR

Description:

Causes the MS to return the service provider name stored in the SIM card (<spi> parameter). The text will consist of a maximum of 16 bytes containing the service provider name stored in the EF_{SPN} file in the SIM card (see GSM 11.11). ERROR is returned if the field is not present on the SIM.

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Defined values:

<spi>	Description
String	String type field of maximum length 16 bytes; character set as specified by command Select TE character set +CSCS

12.4 AT*EBSE Band Selection

Description	Syntax	Possible Responses
Activate command	AT*EBSE=<band>	OK +CME ERROR: <err>
Query band	AT*EBSE?	*EBSE: <band> OK
Query supported bands	AT*EBSE=?	*EBSE: (list of supported <bands>) +CME ERROR: <err>

Description:

This command is used to select the band of operation. AT*EBSE? Is the read command that returns the current band and AT*EBSE=? Returns the supported bands

Defined values:

<band>	Description
Integer type	
0	GSM & EGSM (900)
1	GSM 1800
2	Dual-band 900/1800
3	PCS 1900
4	GSM 850
5	Dual-band 1900/850
6	Tri-band (900/1800/1900)
7	Tri-band (850/1800/1900)
8	Quad-band (850/900/1800/1900)

12.5 AT*E2SSCS Supported Speech Codec Set _

Description	Command	Possible Responses
Define the set of supported speech codecs.	AT*E2SSCS=<codec_mask>	*E2SSCS: <codec_mask> OK ERROR
Read the set of currently supported speech codecs.	AT*E2SSCS?	*E2SSCS: <codec_mask> OK ERROR

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Description	Command	Possible Responses
Test the available sets of supported speech codecs.	AT*E2SSCS=?	*E2SSCS: <list of supported speech codec sets> OK ERROR

Description:

The command forces selection of a set of supported speech codecs.

The behavior of the command is selected with the <codec_mask> parameter as a combination of the filters described in the table below. The value is entered and displayed in decimal format.

For a set of speech codec change to take effect, it is necessary to power-cycle the device.

A valid change is persistent through power-cycle though.

Defined values:

<filter bit mask>	Description
0000 0001	Full Rate Speech V1 (FR).
0000 0010	Half Rate Speech V1 (HR).
0000 0100	Full Rate Speech V2 (EFR = Enhanced Full Rate).
0000 1000	Half Rate Speech V2.
0001 0000	Full Rate Speech V3 (AMR FR = Adaptative Multi-Rate).
0010 0000	Half Rate Speech V3 (AMR HR = Adaptative Multi_Rate).
0100 0000	Reserved.
1000 0000	Reserved.

By default, all available speech codec are supported (codec mask of H'3F or D'63). Currently, only two other sets of supported speech codec are allowed:

All HR Speech versions (V1, V2, and V3) are disabled (codec mask of H'15 or D'21).

All HR and AMR Speech codecs are disabled (codec mask of H'5 or D'5).

All combinations other than H'3F (default) and H'15, and H'5 will be rejected.

12.6 AT*EALS Request ALS Status

Description	Command	Possible Responses
Requests current status for ALS	AT*EALS	• *EALS: <status> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*EALS=?	• +CME ERROR: <err> • OK • ERROR

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Description:

Used to request the MS to give ALS (Alternate Line Services) status. The information is available on the SIM card. If ALS is active, the user has two lines for voice calls.

Defined values:

<status>	Description
0	ALS function is not active (off)
1	ALS function is active (on)

12.7 AT*ESLN Set Line Name

Description	Command	Possible Responses
Sets the line name tag in the MS	AT*ESLN=<line> [,<name>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ESLN?	• *ESLN: <line1>,<name1><CR><LF> *ESLN: <line2>,<name2> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*ESLN=?	• *ESLN: (list of supported <line>s),<lname> • +CME ERROR: <err> • OK • ERROR

Description:

Sets the name tag for a selected line.

Defined values:

<line>	Description
0	This means that the two lines will use the default name tags, i.e. “L1” and “L2”. **Default value**
1	Line 1
2	Line 2

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<name>	Description
String	Characters for name tag This parameter is optional when <line> is set to 0

<lname>	Description
Integer	Maximum number of characters to use in <name> string (14)

12.8 AT*ELIN Line Set

Description	Command	Possible Responses
Set the current line to <line>	AT*ELIN=<line>	• *ELIN: <line> • +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ELIN?	• *ELIN: <line> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*ELIN=?	• *ELIN: list of supported <line>s • +CME ERROR: <err> • OK ERROR

Description:

This command requests the ME to set the current line to <line>.

The following command reads its value from the current line and is thus affected by the use of *ELIN:

AT+CACM - Accumulated Call Meter

12.9 AT*ECSP Customer Service Profile

Description	Command	Possible Responses
Read the customer service profile from the SIM	AT*ECSP=<service group>	• *ECSP: <service group>,<services> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*ECSP=?	• +CME ERROR: <err> • OK • ERROR

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Description:

This command is used to read the customer service profile (CSP) from the SIM. CSP is a list on the SIM, which indicates the services that are user accessible. Each of the services has a related bit within the CSP. The services are grouped into service groups, with a maximum of 8 services in a group. For each service group, a bit mask tells which services are available (bit=1). Unused bits are set to 0.

Defined values:

<service group>	Description
Byte	Each service group has a corresponding number, service group code

<services>	Description
byte	Bit mask (8 bits), indicating the services within the service group Bit=0: unused or unavailable service Bit=1: available service

12.10 AT*ERINFO Network Capability

Description	Command	Possible Responses
Active the response mode	AT*ERINFO=<mode>	OK +CME ERROR: <err>
Query the current radio access information	AT*ERINFO?	*ERINFO: <mode>, <gsm_rinfo> +CME ERROR: <err>
Test if the command is supported	AT*ERINFO=?	*ERINFO: (list of <mode>s) +CME ERROR <err>
Unsolicited report if *ERINFO reports are enabled		*ERINFO: <gsm_rinfo>

Description:

This command is used to provide an unsolicited result code indicating the current technology of the current cell.

Defined values:

<mode>	Description
0	Disable unsolicited information
1	Enable unsolicited information

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<gsm_rinfo>	Description
0	No GPRS or EDGE available
1	Only GPRS service is available
2	Only EDGE service is available
3	Both GPRS and EDGE services available

Examples:

```
AT*ERINFO=0
OK
AT*ERINFO?
*ERINFO: 0,3
OK
```

12.11 AT+CLCK Facility Lock

Description	Command	Possible Responses
Request facility lock	AT+CLCK=<fac>, <mode>[,<passwd> [,<class>]]	• when <mode>=2 and command successful: +CLCK: <status>[,<class1> [<CR><LF>+CLCK: <status>,<class2>[...]] • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CLCK=?	• +CLCK: (list of supported <fac>s) • +CME ERROR <err> • OK

Description:

The command is used to lock, unlock or interrogate an ME or a network facility <fac>. A password is normally needed to carry out such actions.

Call barring facilities are based on GSM supplementary services (refer to GSM 02.88). The interaction of these, with other commands based on other GSM supplementary services, is described in the GSM standard.

This command is abortable.

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Defined values:

<fac>	Description
“PS”	PH-SIM (lock PHone to SIM card) (ME asks password when other than current SIM card inserted)
“SC”	SIM (lock SIM card) (SIM asks password in ME power-up and when this lock command issued)
"CS"	CNTRL (lock control surface)
“P2”	SIM PIN2
“AO”	BAOC (bar all outgoing calls)
“OI”	BOIC (bar outgoing international calls)
“AI”	BAIC (bar all incoming calls)
“IR”	BIC-Roam (bar incoming calls when roaming outside the home country)
“OX”	BOIC-exHC (bar outgoing international calls except to home country)
“AB”	All barring services
“AG”	All out going barring services
“AC”	All in coming barring services
“FD”	SIM fixed dialing feature. PIN2 is required as a password
“PN”	Network personalization
“PU”	Network subset personalization
“PP”	Service provider personalization
“PC”	Corporate personalization

<mode>	Description
0	Unlock
1	Lock
2	Query status
10	Full lock (only valid for <fac>=“PS”, after power on always ask for password)

<status>	Description
0	Not active
1	Active

<passw>	Description
string type	Is the same as password specified for the facility from the ME user interface or with change password command, +CPWD

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<classx>	Description
1	Voice L1
2	Data
4	Fax (Not supported)
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD Access
1..30	When “no reply” is enabled or queried, this gives the time in seconds to wait before the call is forwarded. **Default value is 20**

12.12 AT+CNUM Subscriber Number

Description	Command	Possible Responses
Request subscriber number	AT+CNUM	+CNUM: [<alpha1>],<number1>,<type1> [,<speed>,<service>[,<itc>]][<CR> <LF> +CNUM: [<alpha2>],<number2>,<type2> [,<speed>,<service> [,<itc>]][...]] +CME ERROR: <err> OK ERROR
Test if the command is supported	AT+CNUM=?	+CME ERROR: <err> OK ERROR

Description:

This command returns the MSISDNs related to the subscriber (this information can be stored in the SIM or in the ME). If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line.

Defined values:

<alphax>	Description
Alphanumeric string	Associated with <number*x*>; used character set should be the one selected with the Select TE character set command, +CSCS

<numberx>	Description
String type	Phone number of format specified by <type*x*>

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<typex>	Description
Integer type	*Combination of Number type and Numbering Plan (see GSM 04.08, 10.5.4.7 and example below)*

<speed>	Description
data rate	Always displays 8. +CNUM is a standard command (27.007). This field makes no sense for voice numbers and fax numbers, and the module has no knowledge what speed the user (SIM) has subscribed to.

<service>	Description
0	Asynchronous modem
4	Voice
5	Fax

<itc>	Description
0	3.1kHz
1	UDI

The *typex* field is defined in GSM 04.08 as an integer which combines the Number Type parameter and the Numbering Plan parameter. The parameters may be extracted as follows:

Subtract 128 from the displayed value

Divide the result by 16.

The quotient is the Number Type parameter.

The remainder is the Numbering Plan parameter.

For example, given a displayed *typex* value of 161:

```
161 - 128 =  33
33 / 16 = 2 with a remainder of 1
```

Therefore Number Type = 2, Numbering Plan = 1

The definitions are given in the next two tables.

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Number Type	Description
0	Unknown
1	International number
2	National number
3	Network specific number
4	Dedicated address, short code
5	Reserved
6	Reserved
7	Reserved for extension

Numbering Plan	Description
0	Unknown
1	ISDN/telephony numbering plan (Rec. E.164/E.163)
2	Reserved
3	data numbering plan (Recommendation X.121)
4	telex numbering plan (Recommendation F.69)
5-7	Reserved
8	national numbering plan
9	private numbering plan
10	Reserved
11	reserved for CTS (see 3GPP TS 44.056)
12-14	Reserved
15	reserved for extension

12.13 AT+COPN Read Operator Names

Description	Command	Possible Responses
Request operator selection	AT+COPN	+COPN: <numeric1>,<alpha1> [<CR><LF> +COPN: <numeric2>,<alpha2> [...]] *+CME ERROR: <err>* *OK* *ERROR*
Test if the command is supported	AT+COPN=?	OK

Description:

Command returns the list of operator names from the ME. Each operator code <numericn> that has an alphanumeric equivalent <alpha*n*> in the ME memory shall be returned. This command can return several hundred names and can execute for up to 90 seconds..

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Defined values:

<numericn>: string type; operator in numeric format.

<alphan>: string type; operator in long alphanumeric format.

12.14 AT+COPS Operator Selection

Description	Command	Possible Responses
Request operator selection	AT+COPS=[<mode> [,<format> [,<oper>]]]	+CME ERROR <err> OK ERROR
Show the current setting	AT+COPS?	+COPS: <mode>[,<format>, <oper>,<AcT>] +CME ERROR <err> OK ERROR
Test if the command is supported; Perform operator search	AT+COPS=?	+COPS: [list of supported (<stat>,long alphanumeric <oper>, short alphanumeric <oper>,numeric <oper>,<AcT>)s] [<CR><LF>] [,,(list of supported <mode>s),(list of supported <format>s)] +CME ERROR <err> OK ERROR

Description:

The set command forces an attempt to select and register the GSM network operator.

The read part of the command returns the current mode and current operator. If there is no current operator, only the mode is returned.

The test part of this command will return a list of operators. The home network operator is listed first followed by other available network operators.

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Defined values:

<mode>	Description
0	Automatic (<oper> field is ignored)
1	Manual (<oper> field present)
3	Set only <format> (for read command +COPS?), do not attempt registration/de-registration (<oper> field is ignored); this value is not applicable in read command response

<format>	Description
0	long format alphanumeric <oper>
2	Numeric <oper>

<oper>	Description
string type	Format determined by the <format> setting

<stat>	Description
0	Unknown
1	Available
2	Current
3	Forbidden

<AcT>	Description
0	GSM Access Technology
1	GSM Compact Access Technology
2	UTRAN Access Technology

Example:

```
AT+COPS=?
+COPS: (2,“UK VODAFONE”,,“23415”,0)
+COPS: (3,“UK Orange PCS Ltd”,,“23433”,0)
+COPS: (3,“T-Mobile UK”,,“23430”,0)
+COPS: (3,“O2 - UK”,,“23410”,0)
OK
```

An invalid home network, eg. no SIM inserted, will display as null string as follows:

```
AT+COPS=?
+COPS: (0,“”,,“”,0)
+COPS: (2,“UK VODAFONE”,,“23415”,0)
OK
```


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12.15 AT+CPOL Preferred Operator List

Description	Command	Possible Responses
Request operator selection	AT+CPOL=[<index>][,<format>[,<oper>]]	*+CME ERROR: <err>* • OK ERROR
Shows the current setting	AT+CPOL?	+CPOL: <index1>,<format>,<oper1> [<CR><LF>+CPOL: <index2>,<format>,<oper2> [...]] *+CME ERROR: <err>* • OK ERROR
Test if the command is supported	AT+CPOL=?	+CPOL: (list of supported <index>s),(list of supported <format>s)*+CME ERROR: <err>* • OK ERROR

Description:

This command is used to edit the SIM preferred list of networks. Execute command writes an entry in the SIM list of preferred operators ($EF_{PLMNsel}$). If <index> is given but <oper> is left out, entry is deleted. If <oper> is given but <index> is left out, <oper> is put in the next free location. If only <format> is given, the format of the <oper> in the read command is changed

ME may also update this list automatically when new networks are selected.

Read command returns all used entries from the SIM list of preferred operators.

Test command returns the whole index range supported by the SIM.

Defined values:

<index>	Description
1-n	integer type; the order number of operator in the SIM preferred operator list (value range returned by test command)

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<format>	Description
0	long format alphanumeric <oper>
1	short format alphanumeric <oper>
2	numeric <oper>

<oper>	Description
string type	Format determined by the <format> setting

12.16 AT+CREG Network Registration

Description	Command	Possible Responses
Request network registration	AT+CREG=[<n>]	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT+CREG?	• +CREG: <n>,<stat>[,<lac>,<ci>] • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CREG=?	• +CREG: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

Description:

Set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the ME network registration status, or code +CREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

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 ME. Location information elements <lac> and <ci> are returned only when <n>=2 and ME is registered in the network.

Defined values:

<n>	Description
0	Disable network registration unsolicited result code. **Default value**
1	Enable network registration unsolicited result code
2	Enable network registration and location information unsolicited result code +CREG: <stat>[,<lac>,<ci>]

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<stat>	Description
0	Not registered, ME is not currently searching for a new operator to register with
1	Registered, home network
2	Not registered, but ME is currently searching for a new operator to register with
3	Registration denied
4	Not detailed
5	Registered, roaming

<lac>	Description
string type	two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)

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

Example:

```
AT+CREG?
+CREG: 0,1
OK
```


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13 Phonebook

13.1 AT+CPBR Phonebook Read

Description	Command	Possible Responses
Read phone book entries	AT+CPBR=<index1> [,<index2>]	+CPBR:<index1>,<number>, <type>,<text>[[,<text_datetime>]<CR><LF> +CPBR: <index2>,<number>,<type>, <text>[,<text_datetime>]] +CME ERROR <err> OK ERROR
Test if the command is supported	AT+CPBR=?	+CPBR: (list of supported <index>s),<nlength>,<tlength> +CME ERROR <err> OK ERROR

Description:

Returns phonebook entries in location number range <index1>... <index2> from the current phonebook memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned. Entry fields returned are location number <indexn>, ME number stored there <number> (of format <type>) and text <text> associated with the number.

Defined values:

<indexn>	Description
integer type	Values in the range of location numbers of phone book memory

<number>	Description
string type	Phone number of format <type>

<type>	Description
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number (not supported on Gx64 modules)
128 - 255	Other values refer to GSM 04.08 section 10.5.4.7 (not supported on Gx64 modules)

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The only number formats supported on Gx64 modules are 129 and 145.

<text>	Description
string type	Field of maximum length <tlength>; character set as specified by the Select TE Character Set command, +CSCS.

<nlength>	Description
integer type	Value indicating the maximum length of field <number>

<tlength>	Description
integer type	Value indicating the maximum length of field <text>

<text_datetime>	Description
string	Date and time in the format: yy/mm/dd,hh:mm

Example:

```
AT+CPBR=1,99
+CPBR: 1,“44123456789”,145,“Test Number”
+CPBR: 2,“440987654321”,145,“Test number 2”
+CPBR: 3,“449876543210”,129,“Test Number 3”
OK
```

13.2 AT+CPBS Phonebook Storage Select

Description	Command	Possible Responses
Set phone book storage	AT+CPBS=<storage>[,<password>]	+CME ERROR <err> OK ERROR
Read the current setting	AT+CPBS?	+CPBS: <storage>,<used>,<total> +CME ERROR <err> OK ERROR
Test if the command is supported	AT+CPBS=?	+CPBS: (list of supported <storage>s) +CME ERROR <err> OK ERROR

Description:

Selects phonebook memory storage <storage>, which is used by other phonebook commands. Read command returns currently selected memory, and when supported by manufacturer, number of used locations and total number of locations in the memory.

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Defined values:

<storage>	Description
“FD”	Fixed dialled numbers
“EN”	Emergency numbers (read only)
“ME”	ME phone book
“SM”	SIM phone book
“DC”	ME dialled calls list (30 entries)
“RC”	ME received calls list (30 entries)
“MC”	ME missed calls list (30 entries)

<passwd>	Description
String type	Represents the password required when selecting password protected <storage>s, for example PIN2 for storage “FD”

<used>	Description
Integer type	Number of locations used in the selected memory (<storage>)

<total>	Description
Integer type	Total number of locations in the selected memory (<storage>)

13.3 AT+CPBW Phonebook Write

Description	Command	Possible Responses
Request phone book write	AT+CPBW=<index> [, <number>[,<type> [,<text>]]]	+CME ERROR <err> OK ERROR
Test if the command is supported	AT+CPBW=?	+CPBW: (list of supported <index>s),<nlength> ,(list of supported <type>s),<tlength> +CME ERROR <err> OK ERROR

Description:

Writes phonebook entry in location number <index> in the current phonebook memory storage area, selected with AT+CPBS. If the <number> and <text> parameters are omitted, the entry is deleted. If <index> is omitted but <number> is included, the entry is written to the first free location in the phonebook.

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Defined values:

<index>	Description
integer type	Values in the range of location numbers of phone book memory

<number>	Description
string type	Phone number of format <type>

<type>	Description
integer format	Type of address octet, default 145 when dialing string includes international access code character "+", otherwise 129. (refer to GSM 04.08 subclause 10.5.4.7)
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number (not supported on Gx64 modules)
128-255	Other values refer GSM 04.08 section 10.5.4.7 (not supported on Gx64 modules)

The only number formats supported on Gx64 modules are 129 and 145.

<text>	Description
string type	Field of maximum length <tlength>; character set as specified by the select TE character set command, +CSCS See description at end of this section

<nlength>	Description
integer type	Value indicating the maximum length of field <number>

<tlength>	Description
integer type	Value indicating the maximum length of field <text>

Note! When using +CPBW to add entries to SIM/USIM phonebook, it is likely that not all entries will be accepted for numbers longer than 20 digits. There is a dependency on the size of the extension file EFext1. If the space allocated to the extension file is used up, then new phonebook write attempts of numbers with more than 20 digits will not be accepted.

Note! Entries stored in memories DC, RC, and MC, will not delete using +CPBW.

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14 Short Message Services - Point to Point

14.1 AT*E2SMSRI Ring indicator for SMS

Description	Command	Possible Responses
Enable RI for incoming SMS	AT*E2SMSRI=<n>	OK ERROR
Query current setting	AT*E2SMSRI?	*E2SMSRI: <n> OK ERROR
Test if command is supported	AT*E2SMSRI=?	*E2SMSRI: (range of supported <n>s) OK ERROR

Description:

This command enables or disables the Ring Indicator pin of UART 0 to be activated upon reception of an incoming SMS message. Ring Indicator (RI) is one of the defined RS-232 signal lines present between DTE and DCE often used by the DCE to signal an incoming call. The parameter indicates the duration of the ring pulse. The ring pulse duration can be set to 50 - 1150 ms, in steps of 50 ms. 0 disables the Ring Indicator.

The value set by AT*E2SMSRI is stored in the user profile. It can be made persistent across power cycles by using the AT&W command.

Defined values:

<n>	Description
0	RI is disabled for incoming SMS messages. **Default value set by AT&F**
50, 100, .., 1150	RI is enabled for incoming SMS messages, duration in steps of 50 ms

14.2 AT+CGSMS Select Service for MO SMS Messages

Description	Command	Possible Responses
Set service or service preference	AT+CGSMS=[<service>]	OK ERROR
Read the command	AT+CGSMS?	+CGSMS: <service> OK ERROR
Test if the command is supported	AT+CGSMS=?	+CGSMS: (list of available <service>s) OK ERROR

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Description:

The set command is used to specify the service or service preference that the MT will use to send MO SMS messages. The read command returns the currently selected service or service preference.

The value set by AT+CGSMS and AT&F is persistent across power cycles.

Defined values:

<services>	Description
0	GPRS
1	Circuit switched
2	GPRS/packet domain preferred (use circuit switched if GPRS/packet domain not available)
3	Circuit switched preferred (use GPRS/packet domain if circuit switched not available). **Default value set by AT&F**

14.3 AT+CMGF Message Format

Common for both PDU and Text Modes

Description	Command	Possible Responses
Set message format	AT+CMGF=<mode>	• OK • ERROR
Show the current setting	AT+CMGF?	• +CMGF: <mode> • OK • ERROR
Test if the command is supported	AT+CMGF=?	• +CMGF: (list of supported <mode>s) • OK • ERROR

Description:

This command tells the TA, which input and output format to use for messages. The <mode> parameter 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).

Test command returns supported modes as a compound value.

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Defined values:

<mode>	Description
0	PDU mode
1	Text mode

14.4 AT+CMGW Write Message to Memory

PDU Mode

Description	Command	Possible Responses
Write message to memory	AT+CMGW=<length> [,<stat>]<CR> ***PDU is given***<ctrl-Z/ESC>	• +CMGW: <index> • +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CMGW=?	• OK • ERROR

Description:

Stores a message 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 other status values to be given. ME/TA manufacturer may choose to use different default <stat> values for different message types. Entering PDU is the same as specified by the send message command, +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned. See AT+CPMS Preferred Message Storage.

This command is abortable.

Defined values:

<stat>	Description
2	Stored unsent message (only applicable to SMs)

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

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<length>	Description
Integer type	Value indicating 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)

<pdu>	Description
...	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

This command is abortable.

Text Mode

Description	Command	Possible Responses
Write message to memory	AT+CMGW [=<oa/da> [,<tooa/toda>[,<stat>]]] <CR> ***Text is entered*** <ctrl-Z/ESC>	• +CMGW: <index> • +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CMGW=?	• OK • ERROR

Description:

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. The entering of text is done as specified in the send message command, +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned.

SMS-COMMANDs and SMS-STATUS-REPORTs cannot be stored in text mode.

Note! One of the address formats, GSM 3.40 or 4.11, is required as input for this command.

Defined values:

<stat>	Description
2	Stored unsent message (only applicable to SMs)

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<oa>	Description
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <tooa>

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<tooa>	Description
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<toda>	Description
String type	GSM 04.11 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

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

14.5 AT+CMGC Send Command

PDU Mode

Description	Command	Possible Responses
Send command message	AT+CMGC=<length><CR> <pdu><ctrl-Z/ESC>	• if PDU mode (+CMGF=0) and sending successful: • +CMGC: <mr>[,<ackpdu>] • if sending fails: • +CMS ERROR: <err> OK ERROR
Test if the command is supported	AT+CMGC=?	• OK • ERROR

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Description:

Sends a command message from a TE to the network (SMS-COMMAND). The entering of PDU is as specified in the send message command, +CMGS. 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.

This command is abortable.

Defined values:

<length>	Description
Integer type	Value indicating 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)

<pdu>	Description
String	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

<ackpdu>	Description
String	GSM 03.40 RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without GSM 04.11 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

Text Mode

Description	Command	Possible Responses
Send command message	AT+CMGC=<fo>,<ct>[,<pid>[,<mn>[,<da>[,<toda>]]]]<CR> ***Text is entered***<ctrl-Z/ESC>	• if PDU mode (+CMGF=1) and sending successful: • +CMGC: <mr>[,<scts>] • if sending fails: • +CMS ERROR: <err> OK ERROR

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Description	Command	Possible Responses
Show if the commands is supported	AT+CMGC=?	• OK • ERROR

Description:

Sends a command message from a TE to the network (SMS-COMMAND). The entering of text is as specified in the send message command, +CMGS, but the format is fixed to be a sequence of two IRA character long hexadecimal numbers, which the ME/TA converts into 8-bit octets (refer to +CMGS). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when +CSMS <service> value is 1 and there is network support, <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.

This command is abortable.

Defined values:

<fo>	Description
0	First octet of SMS-DELIVER in integer format
1	First octet of SMS_SUBMIT in integer format
2	First octet of SMS-STATUS-REPORT in integer format
3	First octet of SMS-COMMAND in integer format

<ct>	Description
Integer	GSM 03.40 TP-Command-Type. **Default value is 0**

<pid>	Description
0-255	Protocol Identifier in integer format. **Default value is 0**, according to 07.05 section 9.2.3.9

<mn>	Description
Integer	GSM 03.40 TP-Message-Number

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

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<toda>	Description
String type	GSM 04.11 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

Note! In GSM there are two types of numbers 129, which are national and 145 which are international.

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

<scts>	Description
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer to <dt>)

14.6 AT+CMGS Send Message

PDU Mode

Description	Command	Possible Responses
Send message	AT+CMGS=<length> <CR> ***PDU is given***<ctrl-Z/ESC>	• +CMGS: <mr>[,<ackpdu>] • +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CMGS=?	• OK • ERROR

Description:

Sends a message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when AT+CSMS <service> value is 1 and there is network support, <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.

- <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 is in the ON state as 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.

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- 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.
- Sending can be cancelled by giving <ESC> character (IRA 27).
- MO Concatenated SMS is not supported
- <ctrl-Z> (IRA 26) must be used to indicate the ending of PDU

This command is abortable.

Defined values:

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

<length>	Description
Integer type	Value indicating 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). Message content of length greater than 140 will return an error.

<ackpdu>	Description
...	GSM 03.40 RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without GSM 04.11 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

Text Mode

Description	Command	Possible Responses
Send message	AT+CMGS=<da> [,<toda>] <CR> ***Text is entered***<ctrl-Z/ESC>	• +CMGS: <mr>[,<scts>] • +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CMGS=?	• OK • ERROR

Description:

Sends a message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when AT+CSMS <service> value is 1 and there is network support, <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.

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- The entered text (GSM 03.40 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 the ME/TA.
- The TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after the command line is terminated with <CR>; after that text can be entered from the TE to the ME/TA.
- The DCD signal is in the ON state as 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 GSM 03.38 default alphabet is used and <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set:

if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in TS 07.07): ME/TA converts the entered text into GSM alphabet according to rules of Annex A; 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 to 7-bit characters of GSM alphabet (e.g. 17 (IRA 49 and 55) will be converted to character Π (GSM 23));

if <dcs> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that GSM 03.40 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 (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42).

- Sending can be cancelled by giving <ESC> character (IRA 27).
- MO Concatenated SMS is not supported
- Message content of length greater than 140 will return and error.
- <ctrl-Z> (IRA 26) must be used to indicate the ending of the message body

This command is abortable.

Defined values:

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

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<toda>	Description
String type	GSM 04.11 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

In GSM there are two types of numbers 129, which are national and 145 which are international.

<mr>	Description
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

.

<scts>	Description
Integer	GSM 03.40 TP-Message-Reference

Example:

```
AT+CMGF=1
OK
 AT+CSMP=17,167,0,0
OK
AT+CMGS="+447747008670"
> Test SMS0
+CMGS: 15
OK
```

14.7 AT+CMSS Send From Storage

PDU mode

Description	Command	Possible Responses
Send from storage	AT+CMSS=<index>	• +CMSS: <mr> • +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CMSS=?	• OK • ERROR

Description:

Sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). Reference value <mr> is returned to the TE on successful message delivery. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. See AT+CPMS Preferred Message Storage.

This command is abortable.

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Defined values:

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

Text Mode

Description	Command	Possible Responses
Send from storage	AT+CMSS=<index> [,<da> [,<toda>]]	• +CMSS: <mr> [,<scts>] • +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CMSS=?	• OK • ERROR

Description:

Sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). 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. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

Defined values:

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

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<toda>	Description
String type	GSM 04.11 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

Note! In GSM there are two types of numbers 129, which are national and 145 which are international.

<scts>	Description
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

14.8 AT+CMGD Delete Message

Common for both PDU and Text modes

Description	Command	Possible Responses
Delete message	AT+CMGD=<index>, <delflag>	• +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CMGD=?	• OK • ERROR

Description:

Deletes message from preferred message storage <mem1> location <index>. If <delflag> is present and not set to 0, the ME shall ignore <index> and act according to the definition of <delflag> in the table shown below. If <delflag> is omitted, only the entry in <index> will be deleted.

If deleting fails, final result code +CMS ERROR: <err> is returned. Test command shows the valid memory locations.

Defined values:

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<delflag>	Description
0	Delete the message specified in <index>. **Default.**

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<delflag>	Description
4	Delete all messages from preferred message storage including unread messages (ignore <index>)

14.9 AT+CMGL List Message

PDU Mode

Description	Command	Possible Responses
List message	AT+CMGL [=<stat>]	• +CMGL: <index>,<stat>,[<alpha>],<length> • <CR><LF><pdu>[<CR><LF>+CMGL: <index>,<stat>,[<alpha>],<length> <CR><LF><pdu>[...]] +CMS ERROR: <err>
Test if the command is supported	AT+CMGL=?	• +CMGL: (list of supported <stat>s)

Description:

Returns messages with status value <stat> from preferred message storage <mem1> to the TE. Entire data units <pdu> are returned. 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.

Defined values:

<stat>	Description
0	Received unread message (i.e. new message)
1	Received read message
2	Stored unsent message (only applicable to SMs)
3	Stored sent message (only applicable to SMs)
4	All messages (only applicable to +CMGL command)

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<alpha>	Description
String type	Manufacturing specific. Should be left empty but not omitted

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<length>	Description
Integer type	Value indicating 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)

<pdu>	Description
	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

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Text Mode

Description	Command	Possible Responses
List message	AT+CMGL =[<stat>]	• If text mode (+CMGF=1), command successful and SMS-SUBMITs and SMS-DELIVERs: +CMGL: <index1>,<stat>,<oa/da>,[<alpha>], • [<scts>][,<tooa/toda>,<length>] <CR><LF><data>[<CR><LF> +CMGL: • <index2>,<stat>,<oa/da>,[<alpha>], [<scts>][,<tooa/toda>,<length>] <CR><LF><data>[...]] • If text mode (+CMGF=1), command successful and SMS-STATUS-REPORT: +CMGL: <index1>,<stat>,<fo>,<mr>, [<ra>], • [<tora>],<scts>,<dt>,<st> [<CR><LF> +CMGL: <index2>,<stat>,<fo>,<mr>,[<ra>], [<tora>],<scts>,<dt>,<st>[...]] If text mode (+CMGF=1), command successful and SMS-COMMANDs: +CMGL: <index>,<stat>,<fo>,<ct> [<CR><LF> +CMGL: <index>,<stat>,<fo>,<ct>[...]] If text mode (+CMGF=1), command successful and CBM storage: +CMGL: <index>,<stat>,<sn>,<mid>,<page>, <pages>,<CR><LF><data>[<CR><LF> +CMGL: <index>,<stat>,<sn>,<mid>,<page>, <pages><CR><LF> <data>[...]] Otherwise: +CMS ERROR: <err>
Show the current setting	AT+CMGL?	• +CMGL:<stat> • +CMS ERROR: <err>
Test if the command is supported	AT+CMGL=?	• +CMGL: (list of supported <stat>s) • +CMS ERROR: <err>

Description:

Returns messages with status value <stat> from message storage <mem1> to the TE. About text mode parameters in Italics, refer command Show Text Mode Parameters (+CSDH). If the 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.

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Defined values:

<index>	Description
Integer type	Value in the range of location numbers supported by <mem1>

<stat>	Description
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)

<oa>	Description
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <tooa>

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<toda>	Description
String type	GSM 04.11 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

<tooa>	Description
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<tora>	Description
String type	GSM 04.11 TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

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<alpha>	Description
String type	Manufacturing specific. Should be left empty but not omitted i.e. commas shall mark the place were it should be. Used character set should be the one selected with command Select TE Character Set +CSCS

<scts>	Description
String type	GSM 03.40 TP-service-centre-time-stamp in time-string format (refer <dt>)

<length>	Description
Integer type	Value indicating 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>
The entered text should be formatted as follows: if <dcs> (set with +CSMP) indicates that GSM 03.38 default alphabet is used and <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set: if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in TS 07.07): ME/TA converts the entered text into GSM alphabet according to rules of Annex A; 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 to 7-bit characters of GSM alphabet (e.g. 17 (IRA 49 and 55) will be converted to character Π (GSM 23)); if <dcs> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that GSM 03.40 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 (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42); 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

<fo>	Description
0	First octet of SMS-DELIVER in integer format
1	First octet of SMS_SUBMIT in integer format
2	First octet of SMS-STATUS-REPORT in integer format
3	First octet of SMS-COMMAND in integer format

<mr>	Description
Integer	GSM 03.40 TP-Message-Reference

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<ra>	Description
String	GSM 03.40 TP-Recipient-Address-Value field. BCD (or GSM default alphabet) are converted to characters of the currently selected TE character set (refef command +CSCS. Type of address given by <tosca>

<dt>	Description
String	GSM 03.40 TP-Discharge-Time in string format "yy/MM/dd,hh:mm:ss+-zz where characters indicate year, month, day, hour,minutes, seconds and time zone

<st>	Description
Integer	GSM 03.40 TP-Status

<ct>	Description
Integer	GSM 03.40 TP-Command-Type (default 0)

<sn>	Description
Integer	GSM 03.41 CBM Serial Number

<mid>	Description
String type	All different possible combinations of CBM message identifiers (refer <mid>) (default is empty string); e.g. "0,1,5-7" <mid> GSM 03.41 CBM Message Identifier in integer format

<page>	Description
Integer format	GSM 03.41 CBM Page Parameter bits 4-7 in integer format

<pages>	Description
Integer format	GSM 03.41 CBM Page Parameter bits 0-3 in integer format

Example:

```
AT+CMGF=1
OK
AT+CMGL=?
+CMGL: “REC UNREAD”,“REC READ”,“STO UNSENT”,“STO SENT”,“ALL”
OK
```


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14.10 AT+CMGR Read Message

PDU Mode

Description	Command	Possible Responses
Read message	AT+CMGR= <index>	• +CMGR: <stat>,[<alpha>],<length> <CR><LF><pdu> • +CMS ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CMGR=?	• OK • ERROR

Description:

Returns message with location value <index> from preferred message storage <mem1> to the TE. Status of the message and entire message data unit <pdu> is returned. 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.

It is possible to send SMS in PDU mode, if help for this is required then please contact customer support.

Prior to the R6 build of software the unit was only able to read upto 30 messages on a SIM, messages in locations over 30 could not be seen or access. In R6 this has been increased to 100.

Defined values:

<stat>	Description
0	Received unread message (i.e. new message)
1	Received read message
2	Stored unsent message (only applicable to SMs)
3	Stored sent message (only applicable to SMs)

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<alpha>	Description
String type	Manufacturing specific. Should be left empty but not omitted

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<length>	Description
Integer type	Value indicating 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)

<pdu>	Description
	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

Text Mode

Description	Command	Possible Responses

Read message	AT+CMGR=
	[<index>]
		• if text mode (+CMGF=1), command successful and SMS-DELIVER:
		+CMGR:
		<stat>,<oa>,[<alpha>],<scts>,[<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>
		• if text mode (+CMGF=1), command successful and SMS-SUBMIT:
		+CMGR:
		<stat>,<da>,[<alpha>],*[<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]*<CR><LF><data>
		• if text mode (+CMGF=1), command successful and SMS-STATUS-REPORT:
		+CMGR:
		<stat>,<fo>,<mr>,[<ra>],[<tora>],
		• <scts>,<dt>,<st>
		if text mode (+CMGF=1), command successful and SMS-COMMAND:
		• +CMGR:
		<stat>,<fo>,<ct>*[,<pid>,[<mn>],[<da>],[<toda>],<length><CR><LF><cdata>]*
		if text mode (+CMGF=1), command successful and CBM storage:
		• +CMGR:
		<stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>
		• +CMS ERROR: <err>
		• OK
		ERROR

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Description	Command	Possible Responses
Test if the command is supported	AT+CMGR=?	• OK • ERROR

Description:

Returns messages with location index <index> from message storage <mem1> to the TE. About text mode parameters in Italics, refer command Show Text Mode Parameters (+CSDH), If the 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.

Defined values:

<index>	Description
Integer type	Value in the range of location numbers supported by <mem1>

<stat>	Description
0	Received unread message (new message)
1	Received read message
2	Stored unsent message (only applicable to SMs)
3	Stored sent message (only applicable to SMs)

<oa>	Description
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <tooa>

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<toda>	Description
String type	GSM 04.11 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

<tooa>	Description
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

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<tora>	Description
String type	GSM 04.11 TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<alpha>	Description
String type	Manufacturing specific. Should be left empty but not omitted, i.e. commas shall mark the place were it should be. Used character set should be the one selected with command Select TE Character Set +CSCS

<scts>	Description
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<length>	Description
Integer type	Value indicating 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>
The entered text should be formatted as follows: if <dcs> (set with +CSMP) indicates that GSM 03.38 default alphabet is used and <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set: if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in TS 07.07): ME/TA converts the entered text into GSM alphabet according to rules of Annex A; 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 to 7-bit characters of GSM alphabet (e.g. 17 (IRA 49 and 55) will be converted to character Π (GSM 23)); if <dcs> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that GSM 03.40 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 (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42); 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

<fo>	Description
0	First octet of SMS-DELIVER in integer format
1	First octet of SMS_SUBMIT in integer format
2	First octet of SMS-STATUS-REPORT in integer format
3	First octet of SMS-COMMAND in integer format

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<mr>	Description
Integer	GSM 03.40 TP-Message_Reference

<ra>	Description
String type	GSM 03.40 TP-Recipient-Address-Value field. BCD (or GSM default alphabet) are converted to characters of the currently selected TE character set (refef command +CSCS. Type of address given by <tosca>

<dt>	Description
String type	GSM 03.40 TP-Discharge-Time in string format "yy/mm/dd,hh:mm:ss±zz where characters indicate year, month, day, hour,minutes, seconds and time zone

<st>	Description
Integer	GSM 03.40 TP-status

<ct>	Description
Integer	GSM 03.40 TP-command-type. **Default value is 0**

<sn>	Description
Integer	GSM 03.41 CBM serial number

<mid>	Description
String type	All different possible combinations of CBM message identifiers (refer <mid>) (default is empty string); e.g. "0,1,5-7" <mid> GSM 03.41 CBM message identifier in integer format

<page>	Description
Integer format	GSM 03.41 CBM page parameter bits 4-7 in integer format

<pages>	Description
Integer type	GSM 03.41 CBM page parameter bits 0-3 in integer format

<pid>	Description
0 - 255	Protocol Identifier in integer format. **Default value is 0**, according to 07.05 section 9.2.3.9

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<dcs>	Description
0 - 255	Data coding scheme. See GSM 03.48. **UCS2 and compressed text not supported**

<sca>	Description
String type	GSM 04.11 RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set

<tosca>	Description
Integer type	GSM 04.11 RP SC address type-of-address octet in integer format
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128 - 255	Other values refer to GSM 04.08 section 10.5.4.7

<vp>	Description
0 - 143	(TP-VP+1) x 5 minutes (i.e. 5 minute intervals up to 12 hous)
144 - 167	12 hours + ((TP_VP-143) x 30 minutes)
168 - 196	(TP-VP-166) x 1 day
197 - 255	(TP-VP-192) x 1 week

<mn>	Description
Integer type	GSM 03.40 TP-message-number

Prior to the R6 build of software the unit was only able to read upto 30 messages on a SIM, messages in locations over 30 could not be seen or access. In R6 this has been increased to 100.

14.11 AT+CNMI New Message Indications to TE

PDU Mode

Description	Command	Possible Responses
Set new message indication to TE	AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>]]]]	• +CMS ERROR: <err> • OK • ERROR
Show the current setting	AT+CNMI?	• +CNMI: <mode>,<mt>,<bm>,<ds>,<bfr> • OK • ERROR

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Description	Command	Possible Responses
Show if the command is supported	AT+CNMI=?	• +CNMI: • (list of supported <mode>s), • (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s), (list of supported <bfr>s OK ERROR

Description:

Selects the procedure for the way in which new messages received from the network, are indicated to the TE when it is active, e.g. DTR signal is ON. If the TE is inactive (DTR signal is OFF), message receiving is carried out as specified in GSM 03.38 (3G TS 23.038).

If the command fails and the error is related to mobile equipment or network, the final result code CMS ERROR: <err> is returned.

Defined values:

<mode>	Description
0	indication mode to buffer in TA
1	indication mode to discard

<mt>	Description
0	No SMS-DELIVER indications are routed to the TE. No class, Class 0, class 1 and class 3 use <mem3> as preferred storage. Class 2 messages shall be stored in the SIM. If it this is not possible then the MS shall send an error message accordingly to GSM 03.38
1	SMS-DELIVER is stored into ME/TA and the indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index>
2	Class 0, class 1, and class 3 SMS-DELIVERs are routed directly to the TE using the unsolicited result code but not stored in ME/TA: +CMT:[<alpha >], <length><CR><LF><pdu> (PDU mode enabled) Class 2 data coding scheme result in indication as defined in <mt>=1
3	Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes +CMT: <length><CR><LF><pdu>. Class 3 SMS-DELIVER is not stored in ME/TA. Messages of other data coding schemes result in indication as defined in <mt>=1

Note! See the examples section for a table showing the indication and message destination dependency on SMS Class.

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<bm>	Description
0	Store message to “BM” (or some manufacturer specific memory). 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). New CBMs are not stored in CBM memory

<ds>	Description
0	No SMS-STATUS-REPORTs are routed to the TE. SMS-STATUS-REPORT is stored in ME/TA
1	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDS: < length>< CR>< LF>< pdu> (PDU mode enabled). SMS-STATUS-REPORT is not stored in ME/TA
2	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDSI: < mem><index> (PDU mode enabled). SMS-STATUS-REPORT is stored in ME/TA

<bfr>	Description
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).

Text Mode

Description	Command	Possible Responses
Set new message indication to TE	AT+CNMI=[<mode> [,<mt>[,<bm> [,<ds>[,<bfr>]]]]]	+CMS ERROR: <err> OK ERROR
Shows the current setting	AT+CNMI?	+CNMI: <mode>,<mt>,<bm>,<ds>, <bfr> OK ERROR
Show if the command is supported	AT+CNMI=?	+CNMI: (list of supported <mode>s), (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s) OK ERROR

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Description:

Selects the procedure for the way in which new messages received from the network, are indicated to the TE when it is active (e.g., DTR signal is ON). If TE is inactive (DTR signal is OFF), message receiving is carried out as specified in GSM 03.38 (3G TS 23.038).

If the command fails and the error is related to mobile equipment or network, the final result code CMS ERROR: <err> is returned.

The settings are not persistent.

Defined values:

<mode>	Description
0	Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications. **Default value**
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

<mt>	Description
0	No SMS-DELIVER indications are routed to the TE No class, Class 0, class 1 and class 3 use <mem3> as preferred storage. Class 2 messages shall be stored in the SIM. If it this is not possible then the MS shall send an error message accordingly to GSM 03.38
1	SMS-DELIVER is stored into ME/TA and the indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index> **Default value**
2	Class 0, class 1, and class 3 SMS-DELIVERs are routed directly to the TE using the unsolicited result code: +CMT:<oa>, [<alpha>, <scts> [,<tooa>,<fo>,<pid>,<dcs>, <sca>,<tosca>,<length>]<CR><LF><data> (text mode enabled). About parameters in italics, refer to the show text mode command, AT+CSDH
3	Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes +CMT: <oa>, [<alpha>, <scts> [,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR> <LF><data> (Text Mode enabled). About parameters in italics, refer to the show text mode command, AT+CSDH. Messages of other data coding schemes result in indication as defined in <mt>=1

Note! See the examples section for a table showing the indication and message destination dependency on SMS Class.

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<bm>	Description
0	Store message to "BM" (or some manufacturer specific memory). No CBM indications are routed to the TE. **Default value**
1	
2	New CBMs are routed directly to the TE using unsolicited result code: +CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data> (Text mode enabled).
3	

<ds>	Description
0	No SMS-STATUS-REPORTs are routed to the TE
1	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: : +CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> (Text mode enabled). SMS-STATUS-REPORT is not stored in ME/TA. **Default value**

<bfr>	Description
0	Buffered unsolicited reports defined within this command are flushed to host when mode 1..2 entered. **Default value**

Examples:

AT+CNMI=1,1,2,0,0 Indicate SMS message arrival, transfer CB messages

AT+CNMI=1,2,0,1 Route status reports and all SMS except Class 2 to TE

Indication and destination of message routing vs. SMS class and <mt> setting.

SMS Class	<mt>	Indication	Destination CPMS <mem3>="ME"	Destination CPMS<mem3>="SM"
none	0	none	ME	SM
none	1	+CMTI...	ME	SM
none	2	+CMT...	TE	TE
none	3	+CMTI...	ME	SM
0	0	none	ME	SM
0	1	+CMTI...	ME	SM
0	2	+CMT...	TE	TE
0	3	+CMTI...	ME	SM
1	0	none	ME	SM
1	1	+CMTI...	ME	SM
1	2	+CMT...	TE	TE
1	3	+CMTI...	ME	SM
2	0		SM	SM
2	1	+CMTI...	SM	SM

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SMS Class	<mt>	Indication	Destination CPMS <mem3>="ME"	Destination CPMS<mem3>="SM"
2	2	+CMTI...	SM	SM
2	3	+CMTI...	SM	SM
3	0	none	ME	SM
3	1	+CMTI	ME	SM
3	2	+CMT...	TE	TE
3	3	+CMT...	TE	TE

14.11.1 +CMTI New Message Indication Unsolicited Response

Description:

An Unsolicited Response indicating that a message is received. AT+CNMI is used to control the format of the message received indication.

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

Defined values:

<mem>	Description
"ME"	ME message storage
"SM"	SIM message storage

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

14.12 AT+CPMS Preferred Message Storage

Common for both PDU (Protocol Data Unit) and Text Modes

Description	Command	Possible Responses
Set preferred message storage	AT+CPMS=<mem1> [,<mem2>] [,<mem3>]	• +CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> • +CMS ERROR: <err> • OK • ERROR

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Description	Command	Possible Responses
Show the current setting	AT+CPMS?	• +CPMS: <mem1>,<used1>,<total1>, <mem2>,<used2>,<total2>, <mem3>,<used3>,<total3> • +CMS ERROR: <err> OK ERROR
Test if the command is supported	AT+CPMS=?	• +CPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s) • OK • ERROR

Description:

Selects memory storage <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> is returned.

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

Defined values:

<mem1>	Description
string type	Memory from which messages are read and deleted (commands List Messages +CMGL, Read Message +CMGR and Delete Message +CMGD)
"BM"	CBM message storage
“ME”	ME message storage
“SM”	SIM message storage. **Default value**

<mem2>	Description
string type	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”	SIM message storage

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<mem3>	Description
string type	Memory to which received SMSs are preferred to be stored (unless forwarded directly to TE). Received CBMs are always stored in “BM” (or some manufacturer specific storage) unless directly forwarded to TE
“ME”	ME message storage
“SM”	SIM message storage

<used1>,<used2>,<used3>	Description
integer type	Total number of messages currently in <mem1>, <mem2> and <mem3> respectively

<total1>,<total2> ,<total3>	Description
integer type	Total number of message locations in <mem1>, <mem2> and <mem3> respectively

If the command is entered in at power up and the unit has not finished loading the messages the unit will return +CMS ERROR: 98 (busy).

Examples:

```
AT+CPMS=?
+CPMS: ("BM",“ME”,“SM”),(“ME”,“SM”),(“SM”)
OK
AT+CPMS?
+CPMS: “ME”,0,100,“SM”,0,13,“SM”,0,13
OK
AT+CPMS=“me”,“me”,“sm”
+CPMS: 0,100,0,100,0,13
OK
```

14.13 AT+CSCA Service Centre Address

Common for both PDU and Text Modes

Description	Command	Possible Responses
Set service centre address	AT+CSCA=<sca> [,<tosca>]	• OK • ERROR
Show the current setting	AT+CSCA?	• +CSCA: <sca>,<tosca> • OK • ERROR
Test if the command is supported	AT+CSCA=?	• OK • ERROR

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Description:

Updates the SMSC address, through which mobile originated SMs are transmitted. In text mode, the setting is used by send (+CMGS) and write (+CMGW) commands. In PDU mode, the setting is used by the same commands, but only when the length of the SMSC address coded into <pdu> parameter equals zero. Note that a "+" in front of the number in <sca> has precedence over the <tosca> parameter, so that a number starting with "+" will always be treated as an international number.

Defined values:

<sca>	Description
string type	GSM 04.11 (3G TS 24.011) RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set

<tosca>	Description
integer type	GSM 04.11 (3G TS 24.011) RP SC address type-of-address octet in integer format
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128-255	Other values refer GSM 04.08 section 10.5.4.7

Example:

```
AT+CSCA?
+CSCA: "44385016005",145
OK
```

14.14 AT+CSCS Select Character Set

Description	Command	Possible Responses
Set command informs TA which character set is used by the TE	AT+CSCS=<chset>	• OK • ERROR
Show the current setting	AT+CSCS?	• +CSCS: <chset> • OK • ERROR
Test if the command is supported	AT+CSCS=?	• +CSCS: (list of supported <chset>s) • OK • ERROR

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Description:

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

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

How the internal alphabet of ME is converted to, or from, the TE alphabet is manufacturer specific.

If writing an ENAD account to the module with an @ symbol in either the username or password and the application is using the ASCII character set then the character set that the module should be set to is UTF-8. If it is not then the module will interpret the symbol incorrectly.

Read command shows current setting and test command display conversion schemes implemented in the TA.

Defined values:

<chset>	Description
"PCCP437"	PC character set Code Page 437. **Default value**
“UCS2”	Unicode, 16-bit Universal Multiple Octet Coded Character Set 2
“GSM”	GSM default alphabet (GSM 03.38 subclause 6.2.1).
“IRA”	International reference alphabet (ITU-T T.50).
"HEX"	hexadecimal encoding
“8859-*n*”	ISO 8859 graphic character sets, where *n* is an integer (1-6,C,A,G,H) that indicates the specific character set. Currently, Gx64 modules support only the 8859-1 Latin1 character set.
"PCDN"	PC Danish/Norwegian character set
"UTF-8"	Universal text format, 8 bit

Example:

```
AT+CSCS?
+CSCS: “GSM”
OK
```

14.15 AT+CSDH Show Text Mode Parameters

Only Applicable to Text Mode

Description	Command	Possible Responses
Set the show text mode	AT+CSDH=[<show>]	• +CME ERROR: <err> • OK
Show the current setting	AT+CSDH?	• +CSDH: <show> • +CME ERROR: <err>

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Description	Command	Possible Responses
Test if the command is supported	AT+CSDH=?	• +CSDH: (list of supported <show>s) • OK • +CME ERROR: <err>

Description:

Controls whether detailed header information is shown in text mode result codes.

Defined values:

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

14.16 AT+CSMP Set Text Mode Parameters

Only Applicable to Text Mode

Description	Command	Possible Responses
Set the text mode parameters	AT+CSMP=[<fo> [,<vp>[,<pid> [,<dcs>]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CSMP?	• +CSMP: <fo>,<vp>,<pid>,<dcs> • +CME ERROR: <err>
Test if the command is supported	AT+CSMP=?	• OK

Description:

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). The <pid> parameter identifies the higher protocol being used or indicates interworking with a certain type of telematic service and <dcs> determines the way the information is encoded as in GSM 03.38.

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Defined values:

<fo>	Description
0-255	Depending on the command or result code: first octet of GSM 03.40 SMS-DELIVER, SMS-SUBMIT (default value 17),SMS-STATUS-REPORT, or SMS-COMMAND (default value 2) in integer format

<vp>	Description
0-143	(TP-VP+1) x 5 minutes (i.e 5 minutes intervals up to 12 hours)
144-167	12 hours + ((TP_VP-143) x 30 minutes)
168-196	(TP-VP-166) x 1 day
197-255	(TP-VP-192) x 1 week

<pid>	Description
0-255	Protocol Identifier in integer format. **Default value is 0**, according to 07.05 section 9.2.3.9

<dcs>	Description
0-255	Data coding scheme. See GSM 03.38. **UCS2 and compressed text not supported**

14.17 AT+CSMS Select Message Service

Common for both PDU and Text Modes

Description	Command	Possible Responses
Select message service	AT+CSMS=<service>	• +CSMS: <mt>,<mo>,<bm> • +CMS ERROR: <err> • OK • ERROR
Show the current setting	AT+CSMS?	• +CSMS: <service>,<mt>,<mo>, • <bm> • OK • ERROR
Test if the command is supported	AT+CSMS=?	• +CSMS: (list of supported <service>s) • OK • ERROR

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Description:

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 the chosen service is not supported by the ME (but is supported by the TA), final result code +CMS ERROR: <err> is returned.

Defined values:

<service>	Description
0	GSM 03.40 and 03.41. The syntax of SMS AT commands is compatible with GSM 07.05 Phase 2 version 4.7.0; Phase 2+ features which do not require new command syntax may be supported (e.g. correct routing of messages with new Phase 2+ data coding schemes)
2..127	Reserved

<mt>	Description
0	Mobile terminated messages not supported
1	Mobile terminated messages supported

<mo>	Description
0	Mobile originated messages not supported
1	Mobile originated messages supported

<bm>	Description
0	Broadcast messages not supported
1	Broadcast messages supported

<err>	Description
0...127	GSM 04.11 Annex E-2 values
128...255	GSM 03.40 subclause 9.2.3.22 values
300	ME failure
302	Operation not allowed
304	Invalid PDU mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required

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<err>	Description
500	Unknown error
...511	Other values in range 256...511 are reserved
512...	Manufacturer specific

14.18 AT*E2CMGA Modify message attribute

Description	Command	Possible Responses
Set message attribute	AT*E2CMGA=<op>, <index>[,<attr>]	*E2CMGA: <attr> (for read operation) OK ERROR
Test if the command is supported	AT*E2CMGA=?	*E2CMGA: (list of supported <op>s and <attr>s)

Description:

This command reads or modifies (selected by <op>) the attributes for a specific message selected by <index>.

Defined values:

<op>	Description
0	Read attribute
1	Write attribute

<index>	Description
Integer type	Index number to message to be modified

<attr>	Description
0	Received-unread
1	Received-read
2	Stored unsent (only for <op>=0, read attribute)
3	Stored sent (only for <op>=0, read attribute)

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14.19 AT*E2CMGL List message, without marking message Read

Description	Command	Possible Responses
List message	AT*E2CMGL=[<stat>] [,<exclude_body>]	*E2CMGL: <index>,<stat>,[<alpha>],<length><CR><LF><pdu>[<CR><LF>*E2CMGL: <index>,<stat>,[<alpha>],<length><CR><LF><pdu>[...]]*E2CMGL: <index>,<stat>,[<alpha>],<length><CR><LF>+CMS ERROR: <err>
Test if the command is supported	AT*E2CMGL=?	*E2CMGL: (list of supported <stat>s and <exclude_body>s)

Description:

This command is the same command as AT+CMGL with two exceptions:

- The messages are not marked as Read
- An optional second parameter allows the user to list the messages without the text body (UD).

This command is abortable.

Defined values:

<exclude_body>	Description
0	Include UD portion of messages. Default value if parameter omitted.
1	Exclude UD portion of messages. In PDU mode, will truncate the UD portion of the <pdu> output. In Text mode, does not display <data> output. (See AT+CMGL)

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14.20 AT*E2CMGR Read Message without Read mark

PDU Mode

Description	Command	Possible Responses
Read message	AT*E2CMGR=<index>	*E2CMGR: <stat>,[<alpha>],<length> <CR><LF><pdu> +CMS ERROR: <err> OK ERROR
Test if the command is supported	AT*E2CMGR=?	OK ERROR

Description:

This command has the same parameters and works in the same way as AT+CMGR, except the SMS to be read will not be marked as Read.

See AT+CMGR, for a description of functionality, parameters and definition for Text mode.

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15 Short Message Services - Cell Broadcast

15.1 AT+CSCB Select Cell Broadcast Message Type

Common for both PDU and text modes

Description	Command	Possible Responses
Select cell broadcast message type	+CSCB=[<mode>[,<mids>[,<dcss>]]]	• +CMS ERROR: <err> • OK • ERROR
Show the current setting	AT+CSCB?	• +CSCB: <mode>,<mids>,<dcss> • OK • ERROR
Test if the command is supported	AT+CSCB=?	• +CSCB: (list of supported <mode>s) • OK • ERROR

Description:

Selects which types of CBMs are to be received by the ME.

Defined values:

<mode>	Description
0	Message types in <mids> and <dcss> are accepted
1	Message types in <mids> and <dcss> are not accepted

<mids>	Description
string type	All different possible combinations of CBM message identifiers (refer <mid>) (default is empty string); e.g. “0,1,5-7” <mid> GSM 03.41 CBM Message Identifier in integer format

<dcss>	Description
string type	all different possible combinations of CBM data coding schemes (refer <dcs>) (default is empty string); e.g. "0-3,5"

Example:

```
AT+CSCB?
+CSCB: 0,“50”,""
OK
```


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15.2 AT*EMBOX Mailbox Numbers

Description	Command	Possible Responses
Set to write a mailbox number.	AT*EMBOX=<mbid>,<number>[,<type>]	OK ERROR *+CME ERROR <err>*
Retrieve mailbox dialing numbers.	AT*EMBOX?	*EMBOX: <mbid1>,<number1>[,<type1>] <mbid2>,<number2>[,<type2>] ... OK ERROR *+CME ERROR <err>*
Test to list the mailbox types which are supported.	AT*EMBOX=?	*EMBOX: (list of supported <mbid>s) OK ERROR

Description:

The command is to write or read out the mailbox dialing numbers associated with voicemail, fax, electronic mail, data or other messages.

SET operation of this command is to write a mailbox dialing number to EFMBDN or CPHS's EFMN in the case of EFMBDN is not available.

READ operation of this command is to retrieve mailbox dialing numbers.

TEST operation is to list the mailbox types which are supported.

This command may be entered via any instance of the AT command parser that is in V.25ter command state. The input syntax is as follow:

Defined values:

<mbid>	Description
0	Voice Mailbox
1	Fax Mailbox
2	E-Mailbox
3	Other Mailbox

<number>	Description
String type	Mailbox dialling number

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<type> is of Integer type, it denotes the type of address octet. It contains TON and NPI. For more see 24.008 section 10.5.4.7. As <type> is listed as optional in SET operation, it shall default to 145, if given <number> string has proceeding '+'; otherwise it shall default to 129;

<type>	Description
129	TON: unknown; NPI: ISDN telephone numbering plan
145	TON: international number; NPI: ISDN telephone numbering plan
161	TON: national number; NPI: ISDN telephone numbering plan
128-155	Other, see 24.008 section 10.5.4.7

For read or write mailbox dialling numbers, standard USIM file takes the precedence over CPHS files. Therefore the first thing to do in SET or READ operation is to check if it is a SIM or an USIM card. If an USIM is presented, so act upon EFMBDN, EFMBI and EFEXT6; otherwise act upon EFMN (a CPHS EF file) and EFEXT1.

15.3 AT*EMWI Message Waiting Indication

Description	Command	Possible Responses
Set message waiting indication	AT*EMWI =<mode>	OK +CMS ERROR: <err>
Shows the current setting	AT*EMWI?	*EMWI: <mode>+CMS ERROR: <err>
Show if the command is supported	AT*EMWI=?	*EMWI: (list of supported <mode>s) +CMS ERROR: <err>
Response		*EMWI: <unsolicited>, <status>, (<count>)

Description:

This command interrogates voice mail status. This AT command shall provide an indication of waiting messages and message count if available. An unsolicited result code shall be enabled/disabled to inform the host of a new message waiting. The host can read at power up. USIM file contents shall have priority over CPHS contents.

Defined values:

<mode>	Description
0	Disable unsolicited voice mail indication.
1	Enable unsolicited voice mail indication. **Default value**
2	Query voice mail indication for all lines.

<unsolicited>	Description
0	This is a solicited response.

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<unsolicited>	Description
1	This is an unsolicited response.

<status>	Description
0	The specific line has no voice mail waiting.
1	The specific line has voice mail waiting.

<count>	Description
0-255	Integer type. Count of messages waiting, if available.

Example:

Query command

```
AT*EMWI=2
*EMWI: 0,1,1
OK
```


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16 SIM Commands

16.1 AT+CRSM Restricted SIM Access

Description	Command	Possible Responses
Transmit command	AT+CRSM=<cmd>[,<fileid>[,<P1>,<P2>,<P3>[,<data>]]]	+CRSM: <sw1>,<sw2>[,<resp>] +CME ERROR: <err>
Test if the command is supported	AT+CRSM=?	OK

Description:

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

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

Defined values:

<cmd>	Description
176	Read binary
178	Read record
192	Get response
214	Update binary
220	Update Record
242	Status
Other values	Reserved

Note! The MT internally executes all commands necessary for selecting the desired file, before performing the actual command.

<fileid>	Description
integer	Identifier of a elementary datafile on SIM. Mandatory for every command except STATUS Note 1:The MT internally executes all commands necessary for selecting the desired file, before performing the actual command. Note 2:The range of valid file identifiers depends on the actual SIM and is defined in GSM 51.011. Optional files may not be present at all

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Note! The range of valid file identifiers depends on the actual SIM and is defined in GSM 11.11. Optional files may not be present at all.

<p1>,<p2>,<p3>	Description
integer	Parameters passed on by the MT to the SIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in GSM 51.011 [ref 10]

<data>	Description
hexadecimal	Information which shall be written to the SIM

<sw1>,<sw2>	Description
integer	Information from the SIM about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command

<resp>	Description
hexadecimal	Response of a successful completion of the command previously issued The STATUS and GET RESPONSE commands return data which gives information about the current elementary datafield. This information includes the type of file and its size (refer to GSM 51.011 [ref 10]) After the READ BINARY or READ RECORD command, the requested data will be returned A <resp> is not returned after a successful UPDATE BINARY or UPDATE RECORD command

16.2 AT+CSIM Generic SIM Access

Description	Syntax	Possible Responses
Send command	AT+CSIM=<length>, <command>	+CSIM: <length>,<resp> +CME ERROR: <err>
Test if the command is supported	AT+CSIM=?	OK

Description:

This command transmits to the MT the <command> which will then be sent as it is to the SIM. In the same manner the SIM <resp> shall be sent back by the MT to the TA as it is.

This command allows a direct control of the SIM by a distant application on the TE. The TE shall then take care of processing SIM information within the frame specified by GSM.

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Note! Compared to Restricted SIM Access command AT+CRSM, the definition of AT+CSIM allows TE to take more control over the SIM-MT interface. The locking and unlocking of the interface may be done by a special <command> value or automatically by TA/MT (by interpreting <command> parameter). In case that TE application does not use the unlock command (or does not send a <command> causing automatic unlock) in a certain timeout value, MT may release the locking.

Defined values:

<length>	Description
Integer	Length of the characters that are sent to TE in <command> or <resp> (two times the actual length of the command or response)

<command>	Description
hexadecimal	Command passed on by the MT to the SIM in the format as described in GSM 51.011 [ref 10] (hexadecimal character format; refer to AT+CSCS)

<resp>	Description
hexadecimal	Response to the command passed on by the SIM to the MT in the format as described in GSM 51.011 [ref 10] (hexadecimal character format; refer to AT+CSCS)

16.3 AT*ESSE SIM selection

Description	Command	Possible Responses
Set SIM selection	AT*ESSE=<sel>	+CME ERROR <err> OK ERROR
Read current setting	AT*ESSE?	*ESSE: <sel> OK ERROR
Test if the command is supported	AT*ESSE=?	*ESSE: (list of supported <sel>s) OK ERROR

Description:

The AT*ESSE command selects which SIM source, internal card slot, external card slot or Bluetooth SIM Access Profile (SAP), should be active. Only one SIM source can be active at a time.

The change of active SIM source will occur even if a card is not present in the selected SIM card slot or the SAP is inactive. The active SIM source will not change automatically when a SIM card is inserted or removed from an active or inactive SIM card slot.

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SIM source events can be tracked using the AT*E2SDR command.

Initially, the internal SIM card slot is selected. Some variants of the GS/GR series do not have an internal SIM card slot. For these variants, the external SIM card slot is selected at power-up. Attempting to select the internal SIM card slot will result in an error.

Defined values:

<sel>	Description
0	Internal SIM slot (default after factory reset)
1	External SIM slot

16.4 AT*E2SDR SIM Detection Reporting

Description	Command	Possible Responses
Enable/disable SIM detection reporting	AT*E2SDR=<n>	+CME ERROR <err> OK ERROR
Read current setting	AT*E2SDR?	*E2SDR: <n>, <stat> OK ERROR
Test if the command is supported	AT*E2SDR=?	*E2SDR: (list of supported <n>s) OK ERROR

Description:

The AT*E2SDR command enables or disables SIM detection unsolicited reports. When reporting is enabled, the unsolicited response *E2SDR is sent every time a SIM card is inserted or removed in the external or internal SIM card slot. The unsolicited response reports the current SIM card presence status as defined in the table below.

If the reporting is enabled, a report will always be sent at start-up, even if there has not been a change.

The report setting is persistent if the AT&W command is used to save the current profile.

Defined values:

<n>	Description
0	SIM detection reporting disabled (default after factory reset)
1	SIM detection reporting enabled

The SIM detection reporting setting is stored in the user profile.

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16.4.1 *E2SDR SIM Detection Unsolicited Response

*E2SDR reports changes in SIM presence status. If enabled by the AT*E2SDR command, a report is generated every time a SIM card is inserted in or removed from the internal or external SIM card holder.

Format:

```
*E2SDR: <stat>
```

<stat>	Description
0	Internal SIM only is present
1	External SIM only is present
2	Internal SIM and external SIM present
3	No SIM present
4	SIM Access Profile present
5	SIM Access Profile + internal SIM present
6	SIM Access Profile + external SIM present
7	SIM Access Profile + internal SIM + external SIM present

16.5 AT+CPIN PIN Control

Description	Command	Possible Responses
Request PIN Control	AT+CPIN=<pin>[,<newpin>]	• +CME ERROR: • <err> • OK • ERROR
Show the current setting	AT+CPIN?	• +CPIN: <code> • +CME ERROR: • <err> • OK • ERROR
Test if the command is supported	AT+CPIN=?	• +CME ERROR: • <err> • +CPIN: (supported <code>s) • OK • ERROR

Description:

Sends the password to the ME, which is necessary to make the ME operational (SIM PIN or SIM PUK). If the PIN is to be entered twice, the TA autonomously repeats the PIN. If no PIN request is pending, no action is taken towards the ME and an error message (+CME ERROR <err>) is returned to the TE.

If the PIN required is PUK, the second pin is required. This second PIN, <newpin>, is used to replace the old PIN in the SIM in the active application in the UICC (GSM or USIM) or SIM card.

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Note! Commands which interact with MT that are accepted when MT is pending SIM PIN or SIM PUK are: +CGMI, +CGMM, +CGMR, +CGSN, D112; (emergency call), +CPAS, +CFUN, +CPIN, +CDIS (read and test command only) and +CIND (read and test command only).

Defined values:

<pin>,<newpin>	Description
String	The range for the SIM PIN is 4 - 8 digits. The SIM PUK consists of 8 digits

<code>	Description
READY	MT is not pending for any password
SIM PIN	ME is waiting for UICC/SIM PIN to be given
SIM PUK	ME is waiting for UICC/SIM PUK to be given
PH-FSIM PIN	MT is waiting phone-to-very first SIM/UICC card password to be given
PH-FSIM PUK	MT is waiting phone-to-very first SIM/UICC card unblocking password to be given
SIM PIN2	MT is waiting active application in the UICC (GSM or USIM) or SIM card PIN2 to be given (this <code> is to be returned only when the last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered right after the failure, the MT does not block its operation)
SIM PUK2	MT is waiting active application in the UICC (GSM or USIM) or SIM card PUK2 to be given (this <code> is to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR: 18); if PUK2 and new PIN2 are not entered right after the failure, the MT does not block its operation)
PH-NET PIN	MT is waiting network personalization password to be given
PH-NET PUK	MT is waiting network personalization unblocking password to be given
PH-NETSUB PIN	MT is waiting network subset personalization password to be given
PH-NETSUB PUK	MT is waiting network subset personalization unblocking password to be given
PH-SP PIN	MT is waiting service provider personalization password to be given
PH-SP PUK	MT is waiting service provider personalization unblocking password to be given
PH-CORP PIN	MT is waiting corporate personalization password to be given
PH-CORP PUK	MT is waiting corporate personalization unblocking password to be given
BLOCKED	The SIM card is blocked for the user

Example:

```
AT+CPIN="0000"
OK
```


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16.6 AT*EPEE Pin Event

Description	Command	Possible Responses
Enable/disable PIN1 code events	AT*EPEE=<onoff>	• +CME ERROR: <err> • OK • ERROR
Read the current status for PIN1 Code Request	AT*EPEE?	• *EPEE: <onoff> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT*EPEE=?	• *EPEE: (list of supported <onoff>s) • +CME ERROR: <err> • OK • ERROR

Description:

The command requests the module to report when the PIN1 code has been entered and accepted. The data affected by this command is contained in the User Profile.

<onoff>	Description
0	Request for report on correctly entered PIN1 code is not activated (off). **Default value**
1	Request for report on correctly inserted PIN1 code is activated (on)

16.6.1 *EPEV Pin Event Unsolicited report

The *EPEV PIN Event code unsolicited response is issued when a pin code has been entered and accepted. The unsolicited reports are enabled using the AT*EPEE command (see above).

The *EPEV unsolicited response has the following syntax (no parameters): *EPEV

16.7 AT*E2SSN SIM Serial Number

Description	Command	Possible Responses
Request SIM Serial number	AT*E2SSN	<SSN>
Shows if the command is supported	AT*E2SSN=?	• OK • ERROR

Description:

This command requests the SIM serial number held in the ICCid field (address 2FE2) on the SIM and returns all valid characters to the TE. This field is detailed in GSM 11.11 section 10.1.1.

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Defined values:

<SSN>	Description
String without double quotes	SIM serial number

Examples:

```
AT*E2SSN
8944110063503224707
OK
```

where the raw data contained in the ICCid field on the SIM is 984411003605234207F7.

Test command:

```
AT*E2SSN=?
OK
```

16.8 AT+CIMI Subscriber Identification

Description	Command	Possible Responses
Read IMSI	AT+CIMI	• <IMSI> • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CIMI=?	• OK • ERROR

Description:

Causes the TA to return <IMSI>, identifying the individual SIM attached to the ME.

Defined values:

<IMSI>	Description
string without double quotes	International Mobile Subscriber Identity

Examples:

```
AT+CIMI
234157411545420
OK
```


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17 SIM Application Toolkit

17.1 AT*ESTKMENU Menu Selection

Description	Command	Possible responses
Do the menu selection	AT*ESTKMENU=<item>	+CME ERROR <err> OK ERROR
Test if the command is supported	AT*ESTKMENU=?	*E2STKN: (list of supported <sel_item>) +CME ERROR <err> OK ERROR

Description:

User has selected a menu item set up by the SET UP MENU proactive command from the SIM/USIM.

Defined values:

<item>	Description
Integer type	The identifier is a single byte between 1 and 255. It identifies the selected menu item corresponding to SET-UP MENU command.

17.2 AT*ESTKRES Terminal Response

Description	Syntax	Possible Responses
Send the TERMINAL RESPONSE	AT*ESTKRES=<command>,<result>,[<result2>],[<text>],[<id>]	OK +CME ERROR: <err>

Description:

This AT command provides the method for responding to the SIM/USIM Toolkit commands. The host will provide as much information that it knows. In some instances, the wireless modem device will have more detailed information and is expected to provide this in the TERMINAL RESPONSE sent to the SIM/USIM.

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Defined values:

<command>	Description
0	DISPLAY TEXT
1	GET INKEY
2	GET INPUT
3	PLAY TONE
4	SELECT ITEM
5	SEND SS
6	SEND USSD
7	SET UP CALL
8	SET UP MENU
9	BLANK
10	REFRESH
11	SEND SHORT MESSAGE
12	OPEN CHANNEL
13	CLOSE CHANNEL
14	RECEIVE DATA
15	SEND DATA

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
12	No response from user
14	USSD transaction terminated by the user
20	Host currently unable to process command
21	Network currently unable to process command
22	User did not accept call set up request
23	User cleared down call before connection or network release
30	Command beyond host's capabilities
31	Command type not understood by host
32	Command data not understood by host
33	Command number not known by host
34	SS Return Error (error cause handled by wireless modem device
36	Error, required values are missing
37	USSD Return Error (error cause provide by wireless modem device

<result2>	Description
0	No specific cause can be given
1	Screen is busy
2	Host currently busy on call
3	Host currently busy on SS transaction
7	Not in speech call

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<result2>	Description
8	Host currently busy on USSD transaction

<text>	Description
String type	0-9,*,#,+
	GSM 3.38 SMS default alphabet (unpacked)
	YES/NO

<id>	Description
1-255	Identifier of menu item

17.3 AT*ESTKS SIM Application Toolkit Settings

Description	Command	Possible responses
Set the presentation of the unsolicited result codes corresponding to STK	AT*ESTKS=<on_off>	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT*ESTKS?	• *ESTKS: <on_off> • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT*ESTKS=?	• *ESTKS: list of supported <on_off> • +CME ERROR <err> • OK • ERROR

Description:

Allows the external application to disable or enable the presentation of the unsolicited result codes corresponding to the STK commands. Parameter <on_off> is used to disable or enable the presentation of an unsolicited result code *ESTK. Setting chosen is stored internally so that it is not necessary to change it each time the ME is switched on.

If the presentation of the unsolicited result codes is disabled, the messages below are not sent to the application.

The unsolicited result codes shall be disabled by default.

Defined values:

<on_off>	Description
0	Disable the presentation of the unsolicited result codes related to STK. **Default value**
1	Enable the presentation of the unsolicited result codes related to STK

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17.4 AT*E2STKTO SIM Application Toolkit Settings

Parameter Command Syntax:

```
AT*E2STKTO = <Command>, <timer>
```

This command allows the external application to configure some general settings related to STK.

Defined values:

Parameter <Command> is used to define the command that the time parameter is going to be applied.

Parameter <timer> is used to fix the timeout period applicable to Proactive SIM mechanism.

<Command>	Description
Integer type (0-6)	It defines the command that the time parameter is going to be applied
0	All the commands with timeout associated are set to the value of <timer>
1	Set Up Menu command timeout is set to the value of <timer>
2	Set Up Call command timeout is set to the value of <timer>
3	Display Text command timeout is set to the value of <timer>
4	Get Input command timeout is set to the value of <timer>
5	Select Item command timeout is set to the value of <timer>

<timer>	Description
Integer type (0-99)	Specifies the value in seconds to be set in the timeout associated with the command specified in <command>
0	All the commands timeouts are set to its default value
(1-99)	The timeout of the command specified in <command> is set to this value

Unsolicited result code:

```
*E2STKTO: <command>
```

17.5 SIM Tookkit Unsolicited Result Codes

17.5.1 *ESTKCALL Set Up Call

Command	Possible responses
	AT*ESTKCALL=<mode>,[<alphaid>],<dest>,[<unit>,<interval>]

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Description:

The host will handle the initiation of new calls by the SIM/USIM Toolkit.

Defined values:

<mode>	Description
0	Set up call, but only if not currently busy on another call
1	Set up call, but only if not currently busy on another call, with redial
2	Set up call, putting all other calls (if any) on hold
3	Set up call, putting all other calls (if any) on hold, with redial
4	Set up call, disconnecting all other calls (if any)
5	Set up call, disconnecting all other calls (if any), with redial

<alphaid>	Description
String type	Corresponds to Alpha Identifier specified in 51.014 and 31.111

<dest>	Description
	Destination address (called party number)

<unit>	Description Time unit for redial duration
0	Minutes
1	Seconds
2	Tenths of seconds

<interval>	Description
Integer type	1-255 of <unit>

Response

The response to SET UP CALL is TERMINAL RESPONSE as follows

AT*ETSTKRES=7,<result>,<result2>

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
12	No response from user
20	Host currently unable to process command (require <result2>)
21	Network currently unable to process command
22	User did not accept call set-up request

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<result>	Description
23	User cleared down call before connection or network release
30	Command beyond Host capabilities
34	SS Return Error (Firmware to provide the error cause to SIM/USIM)

<result2>	Description
2	Host currently busy on call
3	Host currently busy on SS Transaction

17.5.2 *ESTKCC Call Control Event From SIM/USIM Application Toolkit

Command	Possible Responses
	AT*ESTKCC: <resultMode>[,<errCode>, <oldType>[,<newType>]],<"alpha">

When Call Control by SIM/USIM is activated in SIM/USIM Profile, the result of the STK Call Control will return as this unsolicited event.

<resultMode>	Description
1	Allowed, no modification.
2	Allowed, modified (type or dial string).
3	Not allowed.
4	Call control failed.

<status>	Description
0	Call not allowed.
1	SIM/USIM toolkit is busy, cannot setup call.
2	SIM/USIM error causes setup fail.
3	There is other ongoing call setup.
4	Beyond ME capabilities.
5	Call control by SIM/USIM, modified.
6	Call control by SIM/USIM, not allowed, temporary.
7	Call control by SIM/USIM, not allowed, permanent.

<oldType>, <newType>	Description
1	Voice Call.
2	SS.
3	USSD.
4	SMS.

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<"aipha">	Description
String type	Alphanumeric representation of the alpha ID text that is displayed along with the STK CC result.

Note! When <resultMode> is not "Call Control failed", the <errCode> field will not be present.

*ESTKCC: <resultMode>,<oldType>,<newType>,<"alpha">

When <resultMode> is "Call Control failed", the <errCode> field will always be present and the <newType> field will not be present.

*ESTKCC: <resultMode>,<errCode >,< oldType >,<"alpha">

17.5.3 *ESTKCLOSE Close Channel

The channel is being closed.

```
*ESTKCLOSE=<alphaid>
```

Response:

```
AT*ESTKRES=23
<result>
```

17.5.4 *ESTKDISP Display Text

Command	Possible responses
Displays text of unsolicited result code	AT*ESTKDISP: <priority>,<clear>,<CR><LF><data>

Description:

The ME passes the parameters within DISPLAY TEXT command to the external application by means of the unsolicited result code *ESTKDISP.

Command AT*ESTKDISP allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

Test command returns the list of supported <answer>. Values follow GSM 11.14 standard

Defined values:

<priority>	Description
0	Display normal priority text
1	Display high priority text

<clear>	Description
0	Clear message after a delay (60s)
1	Wait for user to clear message

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<data>	Description
	Text of message to be displayed. 160 characters maximum

Response

```
AT*ESTKRES=0,<result>,[<result2>]
```

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
20	Host currently unable to process command (require <result2>)

<result2>	Description
1	Screen busy

17.5.5 *ESTKGIN Get Input

Command	Possible responses
	AT*ESTKGIN: <input>,<alphabet>,<echo>,<minl>,<maxl><CR><LF><data>[,<default text>]

Description:

The host will display this request for input from the SIM/USIM Toolkit application. Data entered by the user shall be returned to the wireless modem device.

Defined values:

<input>	Description
0	0-9, *, #, + only
1	Alphabet set

<alphabet>	Description
0	SMS default alphabet
1	UCS2 alphabet

<echo>	Description
1	Echo user input on display
0	Hide user input

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<minl>	Description
0	No minimum length
1-255	Minimum length

<maxl>	Description
255	No maximum length
0-254	Maximum length

<data>	Description
String type	Text to be displayed

<default text>	Description
String type	Default Text. If omitted, then two double quote characters will be presented.

Response:

```
AT*ESTKRES=2,<result>,,<text>
```

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
12	No response from user

<text>	Description
String type	Single digit within this range: 0-9,*,# or +
	GSM 3.38 SMS default alphabet, unpacked

17.5.6 *ESTKKEY Get Inkey

Command	Possible responses
	AT*ESTKKEY:<input>,<alphabet>,<resp><CR><LF><data>

Description:

The host will display the text message provided in *ESTKKEY. The single character or digit shall be returned to the wireless modem device.

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Defined values:

<input>	Description
0	YES/NO
1	0-9,*,#,+ only
2	Alphabet set

<alphabet>	Description
0	SMS default alphabet
1	UCS2 alphabet

<resp>	Description
0	<input> and <alpha> enabled
1	<input> and <alpha>disabled, yes/no expected

<data>	Description
String type	Text to be displayed

Response

```
AT*ESTKRES=1,<result>,,<text>
```

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
20	Host currently unable to process command (require <result2>)

<text>	Description
String type	Single digit within this range: 0-9,*,# or +
	A single character from GSM 3.38 SMS default alphabet, unpacked
	"YES"
	"NO"

17.5.7 *ESTKITEM Select Item

Command	Possible responses
	AT*ESTKITEM:[<title>],<id1>,<text>[<CR><LF><id2>,<text><CR><LF>...<idn><texto>]

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Description:

The host will display a list of items and return the selected item to wireless modem device.

Defined values:

<title>	Description
String type	Text describing menu

<id>	Description
1-255	The identifier of menu item

<text>	Description
String type	Text of menu item

Response

```
AT*ESTKRES=4,<result>,,,<id>
```

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
12	No response from user

<id>	Description
1-255	Identifier of menu item

17.5.8 *ESTKOPEN Open Channel

Description:

The AT command will serve to alert the host as if there is an incoming call. Retry shall be indicated using this command as well.

*ESTKOPEN: <alphaid>,<bearer>

Response:

```
AT*ESTKRES=12,
<result>
Channel Setup accepted
Channel setup rejected
End session
Busy
```


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17.5.9 *ESTKRCVD Receive Data

Description:

Indication that data is being received.

*ESTKRCVD: <alphaid>

17.5.10 *ESTKRSH Refresh

Command	Possible responses
	AT*ESTKRSH: <refreshType>[<CR><LF><EF list>]

Description:

The REFRESH command contains the refresh type and the list of EF files (separated by comma), if any.

In the case the refresh type is not SIM/USIM RESET, EF list will be given and cached data in the firmware will be updated. The host will need to update any cached data and respond with Terminal Response to inform the SIM/USIM if the command is carried out successfully. If the response is not result=0 or 3, the same command will be send again.

In the case the refresh type is SIM/USIM RESET, the host will need to response if the reset can be carried out (result=0) or currently unable to process the reset (result=20). If the response is result=0, the firmware will be reset, and the host will need to turn radio back on again. To save unsaved data, the host shall perform such task before responding back to the firmware using Terminal Response. If the response result=20, the firmware will resend the command again at a later time.

Defined values:

<refresh type>	Description
0	Initialization with full file change
1	File change
2	Initialization with file change
4	SIM/USIM Reset

<EF list>	Description
	List of EF files that have changed corresponding to file definitions given in the standard.
0xFF	No files have changed

Response

The response to REFRESH is TERMINAL RESPONSE described as follows:

```
AT*ESTKRES=10 ,<result>, [<result2>]
```


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<result>	Description
0	Command performed successfully
3	Refresh performed with additional EF files read
20	Host currently unable to process command (require <result2>)

<result2>	Description
1	Screen busy
2	Host currently busy on call

17.5.11 *ESTKSMENU Set Up Menu

Command	Possible responses
	AT*ESTKSMENU:<alphaid>,<id1>,<text1>[,<CR><LF><id2>,<text2><CR><LF>,...<idn>,<texto>

Description:

The SET UP MENU command is used to add SIM/USIM applications for selection to the host application menu system. The SET UP MENU command is also used to remove SIM/USIM applications from the menu system.

Defined values:

<alphaid>	Description
String type	Text description of menu
"NULL"	Indicates that the alphaid is not available

<id>	Description
1-255	Item number of menu item

<text>	Description
String type	Text for menu item

Response:

```
AT*ESTKRES=8,<result>
```

<result>	Description
0	Command performed successfully
30	Command beyond host capabilities

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17.5.12 *ESTKSNDD Send Data

Description:

Indication that data is being sent.

```
*ESTKSNDD: <alphaid>
```

17.5.13 *ESTKSMS Send Short Message

Command	Possible responses
	AT*ESTKSMS: [<alphaid>],<result>

Description:

The wireless modem device will be responsible for sending the SIM/USIM Toolkit application SMS message. The result of sending the message shall be reported to the host. The host will display an info. Box indicating that an SMS message was sent. However, this will be received “after the fact”. If <alphaid> is not sent with the AT command, then the host will inform the user that an SMS had been sent with a generic display message. If the Alpha id is valid then it will be displayed. If the SEND SHORT MESSAGE command from the SIM/USIM contains an empty/NULL Alpha Identifier, then this AT command shall not be sent to the host.

Defined values:

<alphaid>	Description
	Text message to be displayed for SMS message

<result>	Description
0	Message succeeded
1	Message failed

Response

```
AT*ESTKRES=11,0
```


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17.5.14 *ESTKSS Send SS

Command	Possible responses
	AT*ESTKSS:<alphaid>,<SSstring>

Description:

The host will support parsing the SSstring and initiating the SS procedures. When the alpha id is sent by the SIM/USIM toolkit application, it will be displayed while the host is processing the Supplementary Service procedure. If the alpha id indicates that it is empty, then no indication is given to the user that a supplementary service procedure is being processed. If no alpha id is provided, then the normal procedures for processing a supplementary service procedure shall be followed. The SS procedure will not be included in the Last Number Dialed list.

Defined values:

<alpha_id>	Description
String type	Text message to be displayed while processing Supplementary Service string
"NULL"	Empty alpha identifier

<SS_string>	Description
String type	a supplementary service control procedure

Response:

```
AT*ESTKRES=5,<result>,<result2>
```

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
12	No response from user
20	Host currently unable to process command (require <result2>)
21	Network currently unable to process command
30	Command beyond Host capabilities
34	SS Return Error (firmware must provide the error cause

<result2>	Description
3	Host currently busy on SS transaction

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17.5.15 *ESTKTONE Play Tone

Command	Possible responses
	AT*ESTKTONE: [<alphaid>],<tone>,[<unit>,<duration>]

Description:

AT*ESTKTONE is sent to the host to play a tone.

Defined values:

<alpha_id>	Description
String type	Text message to be displayed during tone
"NULL"	Indicates an empty alphaid

<tone>	Description
8	Ringing tone
10	General Beep
11	Positive acknowledgement
12	Negative acknowledgement
	Maybe others

<unit>	Description
0	Minutes
1	Seconds
2	Tenths of seconds

<interval>	Description
1-255	Value in <units>

Response:

```
AT*ESTKRES=3,<result>
```

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
30	Command beyond host's capabilities

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17.5.16 *ESTKUSSD Send USSD

Command	Possible responses
	AT*ESTKUSSD: [<alphaid>]<USSDstring>

Description:

The host shall support parsing the USSDstring and initiating the USSD procedures. When the alpha id is sent by the SIM/USIM toolkit application, it will be displayed while the host is processing the initial USSD procedure. If the alpha id indicates that it is empty, then no indication is given to the user that a USSD procedure is being processed. If no alpha id is provided, then the normal procedures for processing a USSD procedure shall be followed. The USSD procedure will not be included in the Last Number Dialed list.

Defined values:

<alpha_id>	Description
String type	Text message to be displayed
"NULL"	Indicates an empty alphaid

Response:

```
AT*ESTKRES=6,<result>,<result2>
```

<result>	Description
0	Command performed successfully
10	Proactive SIM/USIM session terminated successfully
11	Backward move in proactive SIM/USIM session requested
12	No response from user
14	USSD transaction terminated by the user
20	Host currently unable to process command (require <result2>)
21	Network currently unable to process command
30	Command beyond host's capabilities
34	SS Return Error (wireless modem device must provide the error cause)
37	USSD Return Error (wireless modem device must provide the error cause

<result2>	Description
3	Currently busy on SS transaction
8	Currently busy on USSD transaction

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18 Supplementary Services

18.1 AT+COLP Connected Line Identification Presentation

Description	Command	Possible Responses
Request connected line identification presentation	AT+COLP=[<n>]	OK ERROR
Show the current setting	AT+COLP?	+COLP: <n>,<m> OK ERROR
Test if the command is supported	AT+COLP=?	+COLP: (list of supported <n>s) OK ERROR

Description:

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

When enabled (and allowed by the called subscriber), +COLP: <number>,<type>[,<subaddr>,<satype> [,<alpha>]] intermediate result code is returned from the TA to the TE before any +CR or V.25ter responses. It is manufacturer specific if this response is used when normal voice call is established.

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

Test command returns values supported by the TA as a compound value.

Defined values:

<n>	Description
0	Disable
1	Enable

<m>	Description
0	COLP not provisioned
1	COLP provisioned
2	unknown (e.g. no network, etc.)

Intermediate Result codes:

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


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18.2 AT+CACM Accumulated Call Meter

Description	Command	Possible Responses
Reset the ACM (Accumulated Call Meter) value on the SIM	AT+CACM=[<passwd>]	+CME ERROR: <err> OK ERROR
Show the current value	AT+CACM?	+CACM: <acm> +CME ERROR: <err> OK ERROR
Tests if the command is supported	AT+CACM=?	+CME ERROR: <err> OK ERROR

Description:

Resets the Advice of Charge related accumulated call meter value in SIM file EF_{ACM}. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is usually required to reset the value. If setting fails in an ME error, +CME ERROR: <err> is returned. See " +CME ERROR (Mobile Equipment Error Code)".

This command must take into account what line is chosen with AT*ELIN.

Read command returns the current value of ACM.

Defined values:

<passwd>	Description
String type	SIM-PIN2

<acm>	Description
String type	Accumulated call meter value similarly coded as <ccm> under +CAOC

18.3 AT+CAOC Advice of Charge

Description	Command	Possible Responses
Execute command	AT+CAOC[=<mode>]	• [+CAOC: <ccm>] • +CME ERROR: <err> • OK ERROR
Show the current setting	AT+CAOC?	• +CAOC: <mode> • OK • ERROR

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Description	Command	Possible Responses
Test if the command is supported	AT+CAOC=?	• [+CAOC: (list of supported <mode>s] • OK • ERROR

Description:

Use of Advice of Charge supplementary service command enables the subscriber to get information about the cost of calls. With <mode>=0, the execute command returns the current call meter value from the ME. The command also includes the possibility to enable an unsolicited event reporting of the CCM information. The unsolicited result code +CCCM: <ccm> is sent when the CCM value changes, but no more than every 10 seconds. Deactivation of the unsolicited event reporting is made with the same command.

Read command indicates whether the unsolicited reporting is activated or not. Read command is available when the unsolicited result code is supported.

It is recommended (although optional) that the test command return the supported mode values.

Defined values:

<mode>	Description
0	Query CCM value
1	Deactivate the unsolicited reporting of CCM value
2	Activate the unsolicited reporting of CCM value

<ccm>	Description
String type	Three bytes of the current call meter value in hexadecimal format (e.g. “00001E” indicates decimal value 30); value is in home units and bytes are similarly coded as ACMmax value in the SIM

18.3.1 +CCCM Current Call Meter Unsolicited Response

Description:

An Unsolicited Response indicating the accumulated charge as computed by the MS, expressed in terms of Home units. AT+CAOC is used to activate or deactivate the reporting of CCM.

+CCCM: <ccm>

Defined values:

<ccm>	Description
	Value in Home units

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18.4 AT+CCWE Call Meter Maximum Event

Description	Syntax	Possible Responses
Enable/Disable event	AT+CCWE=<mode>	OK ERROR
Read current state	AT+CCWE?	+CCWE: <mode> ERROR
Test if the command is supported	AT+CCWE=?	+CCWE: (list of supported <mode>s)

Description:

Shortly before the ACM (Accumulated Call Meter) maximum value is reached, an unsolicited result code +CCWV will be sent, if enabled by this command. The warning is issued when approximately 30 seconds call time remains. It is also issued when starting a call if less than 30 seconds call time remains.

The read command returns the current setting.

The test command returns supported settings.

Defined values:

<mode>	Description
0	Disable the call meter warning event
1	Enable the call meter warning event

18.5 AT+CCFC Call Forwarding number and Conditions

Description	Syntax	Possible Responses
Request Calling forwarding number and conditions	AT+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<subaddr>[,<satype>[,<time>]]]]]]	+CME ERROR <err> when <mode>=2 and command successful: +CCFC: <status>,<class1>[,<number>,<type>[,<subaddr>[,<satype>[,<time>]]]][<CR><LF> +CCFC: <status>,<class2>[,<number>,<type>[,subaddr>[,<satype>[,<timer>]]]] […]] OK ERROR
Test if the command is supported	AT+CCFC=?	+ CCFC: (list of supported <reason>s) +CME ERROR <err> OK ERROR

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Description:

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

The command is abortable.

Defined values:

<reason>	Description
0	Unconditional
1	Mobile busy
2	No reply
3	Not reachable
4	All call forwarding
5	All conditional call forwarding

<mode>	Description
0	Disable
1	Enable
2	Query status
3	Registration
4	Erasure

<number>	Description
string type	String type phone number of forwarding address in format specified by <type>

<type>	Description
integer format	Type of address octet
129	ISDN/telephony numbering plan, national/international unknown. **Default value if '+' is not in <sca>**
145	ISDN/telephony numbering plan, international number. **Default value if '+' is in <sca>**
161	ISDN/telephony numbering plan, national number
128 - 255	Other values

<satype> Not supported	Description Not supported, provided for compatibility
integer format	Type of subaddress octet
128	NSAP (X.213/ISO 8348 AD2), even number of address signals
136	NSAP (X.213/ISO 8348 AD2), odd number of address signals
160	User defined, even number of address signals
168	User defined, odd number of address signals

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<satype> Not supported	Description Not supported, provided for compatibility
128 - 255	Other values reserved

<subaddr> Not supported	Description Not supported, provided for compatibility
string format	string type subaddress of format specified by <satype>

<time>	Description
5-30	When “no reply” is enabled or queried, this gives the time in seconds to wait before call is forwarded, **default value 20**

<classx>	Description
integer	Sum of integers each representing a class of information. **Default value is 7**
1	Voice L1
2	Data
4	Fax (Not supported)
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access

<status>	Description
0	Not active
1	Active

18.6 AT+CCWA Call Waiting

Description	Command	Possible Responses
Request call waiting	AT+CCWA=[<n> [,<mode> [,<class>]]]	• when<mode>=2 and command successful: • +CCWA:<status>,<class1>[<CR><LF> • +CCWA: <status>,<class2>[...]] • +CME ERROR <err> • OK • ERROR

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Description	Command	Possible Responses
Show the current setting	AT+CCWA?	• +CCWA: <n> • +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CCWA=?	• +CCWA: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

Description:

This command allows control of the call waiting supplementary service according to 3GPP TS 22.083. Activation, deactivation and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Parameter <n> is used to disable or enable the presentation of an unsolicited result code +CCWA: <number>,<type>,<class>,[<alpha>][,<CLI validity>] to the TE when call waiting service is enabled. The command is abortable when the network is interrogated.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

Test command returns values supported by the TA as a compound value.

Defined values:

<n>	Description
0	Disable
1	Enable

<mode>	Description
0	Disable
1	Enable
2	Query status

<classx>	Description
integer	Sum of integers each representing a class of information. **Default value is 7**
1	Voice L1
2	Data
4	Fax (Not supported)
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access

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<classx>	Description
128	Dedicated PAD access

<status>	Description
0	Not active
1	Active

<number>	Description
String type	String type ME number of forwarding address in format specified by <type>

<type>	Description
Integer format	Type of address octet in integer format (GSM 04.08 10.5.4.7)

<err>	Description
0	ME failure
3	Operation not allowed
4	Operation not supported
21	Invalid index
30	No network service
31	Network timeout
100	Unknown

Unsolicited Result Codes:

```
+CCWA:  <number>, <type>, <class>
  AT+CCWA=?
  +CCWA: (0-1)
   OK
AT+CCWA?
+CCWA: 0
OK
```

18.7 AT+CHLD Call Hold and Multiparty

Description	Command	Possible Responses
Request call related supplementary services	AT+CHLD=<n>	• +CME ERROR <err> • OK • ERROR
Test if the command is supported	AT+CHLD=?	• +CHLD: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

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Description:

This command allows control of the following call related services:

- a call can be temporarily disconnected from the ME but the connection is retained by the network;
- multiparty conversation (conference calls);
- the served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.
- This command should also be used when hanging up calls which have been initiated while a GPRS session is on going.

Calls can be put on hold, recovered, released, added to conversation, and transferred similarly as defined in 3GPP TS 22.030.

This is based on the GSM/UMTS supplementary services HOLD (Call Hold; refer 3GPP TS 22.083 clause 2), MPTY (MultiParty; refer 3GPP TS 22.084) and ECT (Explicit Call Transfer; refer 3GPP TS 22.091). The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

Call Hold and MultiParty are only applicable to teleservice 11.

It is recommended (although optional) that test command returns a list of operations which are supported. The call number required by some operations is denoted by “x” (e.g. +CHLD: (0,0x,1,1x,2,2x,3)).

Defined values:

<n>	Description
...	Integer type; equals to numbers entered before SEND button in GSM 02.30 subclause 4.5.5.1
0	Releases all held calls or sets User Determined User Busy (UDUB) for a waiting call
0X	Releases a specific call X from a held multiparty call
1	Releases all active calls (if any exist) and accepts the other (held or waiting) call
1X	Releases a specific active call X
2	Places all active calls (if any exist) on hold and accepts the other (held or waiting) call
2X	Places all active calls on hold, except call X with which communication is supported
3	Adds a held call to the conversation
4	Connects the two calls and disconnects the subscriber from both calls (explicit call transfer)

“X” is the numbering (starting with 1) of the call given by the sequence of setting up or receiving the calls (active, held or waiting) as seen by the served subscriber. Calls hold their number until they are released. New calls take the lowest available number. Where both a held and a waiting call exists, the above procedures shall apply to the waiting call (i.e. not to the held call) in conflicting situation.

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The "directory number" case shall be handled with dial command D, and the END case with hangup command H (or +CHUP).

18.8 AT+CLIP Calling Line Identification

Description	Command	Possible Responses
Set calling line identification	AT+CLIP=<n>	• +CME ERROR: <err> • OK • ERROR
Shows the current setting	AT+CLIP?	• +CLIP: <n>,<m> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CLIP=?	• +CLIP: (list of supported <n>s) • +CME ERROR: <err> • OK • ERROR

Description:

This command refers to the GSM supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. Set command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

When the presentation of the CLI at the TE is enabled (and calling subscriber allows), the unsolicited response, +CLIP, is sent for every incoming call.

Read command gives the status of <n> and also triggers an interrogation of the provision status of the CLIP service according to GSM 02.81 (given in <m>).

Test command returns values supported by the TA as a compound value.

This command is abortable.

Defined values:

<n>	Description
0	Disable
1	Enable

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<m>	Description
0	CLIP not provisioned
1	CLIP provisioned
2	Unknown (e.g. no network)

The data affected by this command is contained in the User Profile.

18.8.1 +CLIP Calling Line Identification Unsolicited Response

The unsolicited response, enabled/disabled by AT+CLIP, reports the caller ID of any incoming call. Format:

```
+CLIP: <number>,<type>[,<subaddr>,<satype>[,[<alpha>] [,<CLI_validity>]]]
```

When CLI is not available (<CLI validity>=2), <number> shall be an empty string ("") and <type> value will not be significant.

When CLI has been withheld by the originator, (<CLI validity>=1) and the CLIP is provisioned with the "override category" option (refer 3GPP TS 22.081 and 3GPP TS 23.081), <number> and <type> is provided. Otherwise, the module will return the same setting for <number> and <type> as if the CLI was not available.

<number>	Description
String type	String type phone number of format specified by <type>

<type>	Description
Integer format	Type of address octet in integer (refer to GSM 04.08 sub-clause 10.5.4.7)

<subaddr>	Description
String type	String type subaddress of format specified by <satype>

<satype>	Description
Integer format	Type of subaddress octet in integer format (refer TS 4.08 subclause 10.5.4.8)

<alpha>	Description
String type	String type alphanumeric representation of <number> corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set AT+CSCS

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<CLI_validity>	Description
0	CLI is valid
1	CLI has been withheld by originator
2	CLI is not available due to interworking problems or limitations of originating network

Example:

```
AT+CLIP=1
OK
RING
+CLIP: “07747008670”,129,,,“Matt L”,0
```

18.9 AT+CLIR Calling Line Identification Restriction

Description	Command	Possible Responses
Request calling line identification restriction	AT+CLIR=[<n>]	• +CME ERROR: <err> • OK • ERROR
Read the current setting	AT+CLIR?	• +CLIR: <n>,<m> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CLIR=?	• +CLIR: (list of supported <n>s) • +CME ERROR: <err> • OK • ERROR

Description:

This command refers to CLIR-service according to GSM 02.81 that allows a calling subscriber to enable or disable the presentation of the CLI to the called party when originating a call.

Set command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as a default adjustment for all following outgoing calls. Using the opposite command can revoke this adjustment. If this command is used by a subscriber without provision of CLIR in permanent mode the network will act according GSM 02.81.

The setting shall be per logical channel.

When the MS is turned off and then turned on again the parameter setting <n> shall turn back to default, i.e. the presentation of CLI shall be used according to the subscription of the CLIR service, <n> is 0.

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Read command gives the default adjustment for all outgoing calls (given in <n>), and also triggers an interrogation of the provision status of the CLIR service (given in <m>).

Test command returns values supported by the TA as a compound value.

On a per call base CLIR functionality is explained in subclause “ITU-T V.25ter dial command”.

This command is abortable.

The data affected by this command is contained in the User Profile.

Defined values:

<n>	Description
0	Presentation indicator is used according to the subscription of the CLIR service
1	CLIR invocation
2	CLIR suppression

<m>	Description
0	CLIR not provisioned
1	CLIR provisioned in permanent mode
2	Unknown (e.g. no network)
3	CLIR temporary mode presentation restricted
4	CLIR temporary mode presentation allowed

18.10 AT+CSSN Supplementary Service Notification

Description	Command	Possible Responses
Presentation of notification result codes from TA to TE	AT+CSSN=[<n>[,<m>]]	• +CME ERROR: <err> • OK • ERROR
Read the current setting	AT+CSSN?	• +CSSN: <n>,<m> • +CME ERROR: <err> • OK • ERROR
Test if the command is supported	AT+CSSN=?	• +CSSN: (list of supported <n>s), (list of supported <m>s) • +CME ERROR: <err> • OK • ERROR

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Description:

This command refers to supplementary service related network initiated notifications. The set command enables or disables the presentation of notification result codes from TA to TE.

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, unsolicited result code +CSSI: <code1> [,<index>] is sent to TE before any other MO call setup result codes presented in this manual or in V.25ter. When several different <code1>s are received from the network, each of them shall have its own +CSSI result code.

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, unsolicited result code +CSSU: <code2>[,<index>] is sent to TE. In case of MT call setup, result code is sent after every +CLIP result code (refer command "Calling line identification presentation +CLIP") and when several different <code2>s are received from the network, each of them shall have its own +CSSU result code.

Test command returns values supported by the TA as a compound value.

Defined values:

<n>	Description
0	Disable the +CSSI result code presentation status in the TA
1	Enable the +CSSI result code presentation status in the TA

<m>	Description
0	Disable the +CSSU result code presentation status in the TA
1	Enable the +CSSU result code presentation status in the TA

<code1>	Description
0	Unconditional call forwarding is active
1	Some of the conditional call forwarding are active
2	Call has been forwarded
3	Call is waiting
5	Outgoing calls are barred
6	Incoming calls are barred
7	CLIR suppression rejected
8	Call has been deflected

<code2>	Description
0	This is a forwarded call (MT call setup)
2	Call has been put on hold (during a voice call)
3	Call has been retrieved (during a voice call)
4	Multiparty call entered (during a voice call)

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<code2>	Description
5	Call on hold has been released (this is not a SS notification) (during a voice call)
6	Forward check SS message received (can be received whenever)
7	Call is being connected (alerting) with the remote party in alerting state in explicit call transfer operation (during a voice call)
8	Call has been connected with the other remote party in explicit call transfer operation (also number and subaddress parameters may be present) (during a voice call or MT call setup)
9	This is a deflected call (MT call setup)

18.10.1 +CSSI Supplementary Services Notification

Description:

The +CSSI unsolicited message is enabled or disabled by the AT+CSSN command. Unsolicited response format:

```
+CSSI: <code>[,<index>]
```

Defined values:

<code>	Description
0	Unconditional Call Forwarding is active
1	Some of the conditional call forwardings are active
2	A call has been forwarded
3	A call is waiting
5	Outgoing calls are barred
6	Incoming calls are barred
7	CLIR suppression is rejected
8	Call has been deflected

18.10.2 +CSSU Supplementary Services Notification

Description:

The +CSSU unsolicited message is enabled or disabled by the AT+CSSN command. When enabled, the message is of the following form:

```
+CSSU: <code>[,<index>[,<number>,<type>[,<subaddr>,<satype>]]]
```

Defined values:

<code>	Description
0	This is a forwarded call
2	A call has been put on hold (during voice call)
3	A call has been retrieved (during voice call)
4	A multi-party call has been entered (during voice call)

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<code>	Description
5	The call on hold has been released (during voice call) (this is not a SS notification)
6	Forward check SS messages
7	Call is being connected (alerting) with the remote party in alerting state in explicit call transfer operation (during a voice call)
8	Call has been connected with the other remote party in explicit call transfer operation (also number and subaddress parameters may be present) (during a voice call or MT call setup)
9	This is a deflected call (MT call setup)

<number>	Description
String	Phone number in format specified by <type>

<type>	Description
integer	Type of number octet in integer format (refer to TS 4.08 [ref 7] subclause 10.5.4.7)

See +CLIP for description <subaddr> and <satype> parameters.

18.11 AT+CUSD Unstructured Supplementary Service Data

Description	Command	Possible Responses
Request unstructured supplementary service data	AT+CUSD=[<n>[,<str>]]	• +CME ERROR: <err> • OK
Show the current setting	AT+CUSD?	• +CUSD: <n> • OK • ERROR
Test if the command is supported	AT+CUSD=?	• +CUSD: (list of supported <n>s) • OK • ERROR

Description:

This command allows control of the Unstructured Supplementary Service Data (USSD) according to GSM 02.90. Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD: <m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session. If <n> is not given then the default value 0 is taken.

When <str> is given, a mobile initiated USSD string or a response USSD string to a network initiated operation is sent to the network. The response USSD string from the network is returned in a subsequent unsolicited +CUSD: result code.

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The interaction of this command with other commands based on other GSM supplementary services is described in the GSM standard.

Test command returns values supported by the TA as a compound value.

Some different scenarios are shown below:

- An incoming network initiated USSD-Notify should be presented to the external application as an unsolicited result code +CUSD: if the external application has enabled result code presentation.
- An incoming USSD-request asking for a reply should sent to the external application as an unsolicited result code +CUSD: if the external application has enabled result code.
- If the external application answers to the request with the command AT+CUSD then the ME sends the answer to the network.
- A USSD-request sent with the command AT+CUSD from the external application.
- The different alternatives are shown below.

Defined values:

	Network	Mobile Equipment	External application
1	Signal	Sends unsolicited result code +CUSD	Result code presentation enabled, presented
2	Signal asking for reply	Sends unsolicited result code +CUSD	Result code presentation enabled, presented
3			Answer AT+CUSD
3b			Sends AT+CUSD

<n>	Description
0	Disable result code presentation in the TA
1	Enable result code presentation in the TA
2	Terminate (abort) USSD dialogue. This value is not applicable to the read command response

<str>	Description
string	String type USSD (when <str> parameter is not given, network is not interrogated): -If <dcs> indicates that GSM 03.38 default alphabet is used: *if TE character set other than “HEX” (refer command Select TE Character Set +CSCS): ME/TA converts GSM alphabet into current TE character set according to rules of GSM 07.05 Annex A

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Example:

```
AT+CUSD=1,"*34#"
+CUSD:1,"id code"
AT+CUSD=1,"7465338"
+CUSD:0
OK
```

Example:

```
+CUSD:0,"Expensive incoming call"
```

Example:

```
AT+CUSD=1,"*55*0700#"
```

+CUSD:0,"ALARM"

Example:

```
AT+CUSD=1,"*#100#"
+CUSD: 0,"07787154042"
```

18.11.1 +CUSD Unstructured Supplementary Service Unsolicited Response

Description:

Unsolicited response reporting changes in USSD status. Format:

```
+CUSD: <m>[,<str>,<dcs>]
```

See AT+CUSD, for more details.

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19 Embedded Application

19.1 AT*E2APC Application Program Control

Description	Command	Possible Responses
Set application Program Control	AT*E2APC=<cmd>[,<stopType>][,<StartType>][, <Ctrl Byte>]	• ERROR • OK
Displays current settings	AT*E2APC?	• E2APC: <running>,<RunOnStartUp>,<halted>,<Ctrl Byte> • OK
Shows if the command is supported	AT*E2APC=?	• *E2APC: (list of supported <cmd>s, list of supported <StartType>s, list of supported <CtrlByte>s) • ERROR

Description:

This command allows the user to start and stop the application running in the module. The command allows a number of ways to start the application code, and some ways to stop/pause the running application.

Start Application (<cmd> = 1)

This parameter sets the application to start. The application can be started straight away, in which the currently active script (set with AT*E2APD command) is loaded and run, or it can be set to run on the next powercycle, from startup. The second option is stored persistently, so the application will start on power up every time it is switched on. The script marked as active will be the one that is started.

Error Recovery - If a new script is downloaded, the old script id is stored as a “Last Known Good Script” (until it is overwritten or deleted). If the module is reset and on startup the application runs and then hits a runtime error, the module will delete the offending script and reinstitute the last good script. The module will then restart, and run the old script. This behavior only occurs if the script is set to run on startup.

The final option allowed lets the application restart from a “Pause” state - see the Stop command.

Stop Application (<cmd> = 0)

This parameter sets the application to stop. This will only work if the application is currently running. There are three options - the application can be requested to stop and restart, can be forced to halt (“pause”), or stopped on the next powercycle of the module.

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The stop and restart function sends a signal to the application, which it will read when it handles system signals. The handler to this function will clear down the current interpreter instance and respond to the signal that the application has restarted. If there is no response to this signal within 1 second, then the command will respond that it is unsucessful. This command will not affect the running of the application on subsequent powercycles.

The halt function does not request anything of the application - it just stops the application process and renders it inactive (by force). This is “pause” mode, as the application cannot be reset until the module is power cycled. The application can be “restarted” from the pause state, which will re-enable the process and allow it to run from the point it was stopped - this may cause information to be lost. This command will not affect the running of the application on subsequent powercycles.

The stop on next powercycle does not affect the current running of the application, but will mean that it is not run at start up on the next module powercycle.

Write to CtrlByte (<cmd> = 2)

This parameter sets a byte variable which is available in the system status register available to the script when it is running. Just writing a valid value to this byte will set the APPS_AT_CTRL_TRIGGER flag in the application, and the value written is stored in the APPS_AT_CTRL_BYTE variable. These flags and variables can be read using intrinsic functions in the script, and allows the script to be dynamically controlled by the AT command port. This can be used to add breakpoints when debugging scripts, and also allow runtime modification of the scripts operation.

Defined values:

Table 1. <cmd>: parameter

<cmd>	**Description**
0	Stop application
1	Start application
2	Write to CtrlByte (available to read by a running script)

Table 2. <StartType>: parameter

<StartType>	**Description**
0	Start Now (one shot) - Default
1	Start on next powercycle (persistent)
2	Restart (from pause state)

Table 3. <StopType>: parameter

<StopType>	**Description**
0	Stop and Reinitialise (one shot) -Default
1	Stop on next powercycle (persistent)

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<StopType>	Description
2	Halt / Pause

Table 4. <CtrlByte>: parameter

<CtrlByte>	Description
0 - 255	CtrlByte value from 0 - 255

Table 5. <running>: parameter

<running>	Description
0	*Application is not running*
1	*Application is running*

Table 6. <Halted>: parameter

<Halted>	Description
0	*Application is not Halted*
1	*Application is Halted*

Table 7. <RunOnStartUp>: parameter

<RunOnStartUp >	Description
0	Application is not run on module start up
1	Application is run on module start up

19.2 AT*E2APD Application Program Download

Description	Command	Possible Responses
Set Application Program Download	AT*E2APD=<cmd>,<ScriptNum>[,<length>]	ERROR OK *E2APD: <error>ERROR
Displays current settings	AT*E2APD?	*E2APD: <ScriptNum>,<AvlSpace> OK
Shows if the command is supported	AT*E2APD=?	*E2APD: (list of supported <cmd>s,list of supported <ScriptNum>s) ERROR

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Description:

This command allows the user to download scripts to the module for execution as an embedded application. It also allows the management of the active script, and the deletion of scripts. If there is no script active, then all the NVM space is available for scripts. Only an active script will be considered as non-overwriteable.

Four operations are currently allowed:

Download (<cmd> = 0)

With this command, the number of the script to be downloaded, and the length in number of “lines” (128 byte chunks), is supplied as initial parameters. After the <CR> the switch is made into script download mode (Xmodem-CRC protocol). The data is then transferred across the serial interface using the Xmodem-CRC protocol. Transfer is terminated by sending 2*EOT bytes. The first chunk of data sent contains the script information, the subsequent chunks are script data.

```
AT*E2APD=0,1,100<CR>
C (Script downloaded here) …… (EOT*2)
OK
```

OK is only returned if the downloaded script is verified without errors, otherwise an error code is reported. The script is verified by checking the number of chunks received is as given by the command, and that the script information given in the first chunk matches with the script information generated by the interpreter internal to the module. The script that may previously have been in this slot will be rendered invalid, even if the download fails.

Upload Script (<cmd> = 1) (NOT YET SUPPORTED)

With this command it is possible to retrieve the specified script from the Module NVM. The file is output in hex bytes, terminated by <CR><LF>OK.

```
AT*E2APD=1,1<CR>
*E2APD: 1
< Script Data >
OK
```

This example requests script 1 to be uploaded.

Delete Script (<cmd> = 2)

With this command, the script which is defined is deleted from NVM. If it is the inactive script it is deleted, without affecting the active script. This can be done while the application is running. If the script is the running script and the application is running or paused, then the command will return an error. The application will need to be stopped before erasing the running script (using AT*E2APC).

Make Script Active (<cmd>= 3)

With this command, the script defined is made active. If there is another script that is currently active and running, the command will fail. If it is not running then the active script will be made inactive and the new script will be made active. If the script number provided is outside the valid script number range, then no scripts are made active (effective deactivation).

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When one script is running, it is possible to make the other script active. This means that the next time the application is started the other script will be run. This allows the possibility of hot swapping scripts. If one script is running and the other is made active, then the read function returns that there is no space for more scripts - as neither an active or a running script can be overwritten until deactiveted, deleted or stops running.

Defined values:

Table 7. <cmd>: parameter

<cmd>	Description
0	Download Script (to module)
1	Upload Script (from module)
2	Delete Script
3	Make Script Active

Table 8. <ScriptNum>: parameter

<ScriptNum>	Description
0-1 (255)	Integer giving script number cmd is to operate on. With activate command, script numbers > 0-1 will make no scripts active (255 indicates no script active).

Table 9. <length>: parameter

<length>	Description
0-992	Length of Script in 128byte chunks

Table 10. <error>: parameter

<error>	Description
0	Download OK
1	Syntax error in code
2	Not enough space for script
3	Transfer cancelled
4	Transfer timeout
5	Miscellaneous (structural) error

Table 11. <Script Data>: parameter

<ScriptData>	Description
Hex Data	Data sent in Xmodem-CRC packets. (128bytes payload per packet)

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Table 12. < AvlSpace >: parameter

<AvlSpace>	Description
Decimal value 0-350	Decimal value representing available swap space for a non-active script. (Max Space - ActiveScript Size)

19.2.1 Xmodem-CRC Protocol (CCITT)

The information here is not enough to write your own loader for the embedded applications, if you want to write your own contact customer support.

The Download of scripts with the AT*E2APD command uses the Xmodem-CRC protocol. This section explains how this is implemented with respect to the module:

Background

The following terms are simply ASCII codes:

```
SOH = chr(1) = CTRL-A = Start of header
EOT = chr(4) = CTRL-D = End of Transmission
ACK = chr(6) = CTRL-F = Positive Acknowledgement
NAK = chr(21) = CTRL-U = Negative Acknowledgement
CAN = chr(24) = CTRL-X = Cancel
```

In order to send the file, you must first divide it into 128 byte sections (packets). Bytes 0-127 of the file make up the first packet, bytes 128-255 make up the second packet, etc.

The packet number sent is simply the number of the packet (packet number starts at 0 at beginning of transmission). If the packet number is greater than 255, then subtract 256 repeatedly until the number is between 0 and 255. For example, if you were sending packet 731, then you would send 731 - 256 - 256 = 219.

The 1's complement of a byte (to make life easy) is simply 255 minus the byte. For example, if you had to take the 1's complement of 142, the answer would be 255 - 142 = 113.

CRC stands for Cyclical Redundancy Check. In X-Modem CRC, it is also referred to as CRC-16 since there are 16 bits (1 word) at the end of the block that contain the CRC. This 1 word (2 byte) CRC replaces the 1 byte checksum in X-Modem. In this implementation the CCITT polynomial is used to generate the CRC - X16 + X12 + X5 + 1.

CRC-16 guarantees detection of all single and double bit errors, all errors with an odd number of bits and over 99.9969% of all burst errors.

The easiest and fastest way to calculate the CRC is to use a lookup table.

The first byte the downloader sends is referred to as the NCGbyte, in this case is capital C in ASCII.

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The Actual Transfer

The uploader waits until the downloader sends a NCG byte. The NCG byte is the signal that the downloader is ready to start. If the downloader takes too long or an error occurs then the uploader will stop waiting or “Time Out” (after 20 seconds). If this happens, then the file transfer must restart (a CAN byte is sent by the module and an error code is output)

With each packet sent the uploader sends:

SOH byte {1 byte}
The packet number {1 byte}
The 1's complement of the packet number {1 byte}
The packet {128 bytes}
The high byte of the CRC-16 {1 byte}
The low byte of the CRC-16 {1 byte}

The above six things are called the block.

The downloader:

Ensures that the packet number sent matches the actual packet number that it is (If the third block sent has a '4' as the second byte, something is wrong --> CANCEL TRANSFER (send CAN byte)).

Adds the packet number and the 1's complement of it together to make sure that they add up to 255. If they don't --> CANCEL TRANSFER.

Sets the CRC to 0xFFFFFFFF and then calculates the CRC for the 128 bytes of data.

Compares the received CRC-16 with the calculated one.

If everything looks ok, then the downloader appends the bytes in the packet to the file being created (sent). The downloader then sends an ACK byte which tells the uploader to send the next block. If the sums do not match then the downloader sends an NAK byte which tells the uploader to send the same block it is just sent over again.

When the uploader sends an EOT byte instead of an SOH byte, the downloader sends a NAK byte. If the uploader sends another EOT immediately after that, the downloader sends an ACK byte and the transfer is complete.

This command is abortable.

The downloader can cancel the transfer at any time by sending a CAN byte. The uploader can only cancel between blocks by sending a CAN byte. It is recommended that you send anywhere between 2 and 8 consecutive CAN bytes when you wish to cancel as some programs will not let you abort if only 1 CAN byte is sent.

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20 Environmental

20.1 AT*E2OTR Operational Temperature Reporting

Description	Command	Possible Responses
Enable/disable Temperature Reporting	AT*E2OTR=<n>	• +CME ERROR <err> • ERROR • OK
Read current setting	AT*E2OTR?	• E2OTR: <n>,<stat>,<temp> • OK • ERROR
Test if the command is supported	AT*E2OTR=?	• E2OTR: (list of supported <n>s) • OK • ERROR
Unsolicited response		• E2OTR: <stat>

Description:

The AT*E2OTR command enables or disables Operational Temperature unsolicited reports. When reporting is enabled, the unsolicited response *E2OTR is sent every time the module gets in and out of operational temperature range.

If the reporting is enabled, a report will always be sent at start-up, even if there has not been a change.

A transition from -40C to -41C or from +85C to +86C will cause an unsolicited report with an out of range indication, if the module was in range.

A transition from -40C to -39C or from +85 to +84C will cause an unsolicited report with an in range indication, if the module was out of range.

The report setting is persistent and will remain after a power cycle if stored in a profile using AT&W.

Defined values:

Table 1. <n> : parameter

<n>	Description
0	Disable Operational Temperature Reporting
1	Enable Operational Temperature Reporting

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Table 2. <stat> : parameter

<stat>	Description
0	Out of range
1	In range

Table 3. <temp> : parameter

<temp>	Description
(~ -50 to 100)	Integer Temperature in degree Celcius

20.1.1 *E2OTR Operational Temperature Range Reporting

Description:

The *E2OTR unsolicited messages are enabled or disabled by the AT*E2OTR command. The unsolicited response reports the current operational temperature status (in or out of range) as defined in the AT command definition. The format of the unsolicited report is:

```
*E2OTR: <stat>
```


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21 Alphabetic Listing of AT Commands

Provided below is an alphabetic list of all AT Commands by section and page number.

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