M5310-A AT COMMAND SET

For the V150R100C10B300 firmware

NB-IoT Series

Version：1.4

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About

Update Record

Version	Date	Author	Description
1.0	2017-12-5	Lin Ziwei	Create based on V150R100C10B180 version
1.2	2018-01-23	Lin Ziwei	Update to V150R100C10B200 version
1.3	2018-03-13	Lin Ziwei	Update to V150R100C10B200SP1 version
1.4	2018-6-11	Lin Ziwei	Update to V150R100C10B300 version

Content

1 Introduction

This document gives details of the AT Command Set supported by the Hisi Hi2115 chip loaded with V150R100C10B300 firmware.

At boot the following string will be output:

<CR><LF>M5310-A<CR><LF>OK<CR><LF>

After this string has been received the AT Command processor is ready to accept AT commands.

If the Applications core was rebooted or restarted for any reason that wasn't a normal power-on sequence, a message will be output before the **<CR><LF>M5310-A<CR><LF>OK<CR><LF>** string. See Chapter 7 for more details.

In case external MCU intervene the process of update, unsolicited information informs the external MCU update state. Please reference AT document [1] for more detail information

<CR><LF>FIRMWARE DOWNLOADING<CR><LF>	Indicates UE is downloading update package.
<CR><LF>FIRMWARE DOWNLOAD FAILED<CR><LF>	Indicates download failed.
<CR><LF>FIRMWARE DOWNLOADED<CR><LF>	Indicates download finished.
<CR><LF>FIRMWARE UPDATING<CR><LF>	Indicates UE is updating.
<CR><LF>FIRMWARE UPDATE SUCCESS<CR><LF>	Indicates update success, but not report update state to firmware package server yet.
<CR><LF>FIRMWARE UPDATE FAILED<CR><LF>	Indicates UE update fail.
<CR><LF>FIRMWARE UPDATE OVER<CR><LF>	Indicates reported update state to firmware package server.

During FOTA procedure, device shouldn't operate modem until "FIRMWARE UPDATED" is reported.

E.g. AT+NRB, power off are not permitted, otherwise, indescribable error will be made.

1.1 Definitions

- <CR>   carriage return character
- <LF>   line feed character
- <..>   parameter name. Angle brackets do not appear on command line
- [..]   Option parameter. Square brackets do not appear on the command line.

1.2 AT Command Syntax

AT+<cmd>	Execute Command	Execute Command
AT+<cmd>=p1[,p2[,p3[.....]]]	Set Command	Set Command
AT+<cmd>?	Read Command	Check current sub-parameter values
AT+<cmd>=?	Test Command	Check possible sub-parameter values

Multiple commands can be placed on a single line using a semi-colon (';') between commands. Only the first command should have AT prefix. Commands can be in upper or lower case.

When entering AT commands spaces are ignored except in the following cases:

- within quoted strings, where they are preserved
- within an unquoted string, numeric parameter
- within an IP address
- within the AT command name upto and including a '=', '?' or '=?'

They can be used to make the input more human readable. On input, at least a carriage-return is required. A new-line character is ignored so it is permissible to use carriage-return line-feed pairs on the input.

If no command is entered after the AT token, OK will be returned. If an invalid command is entered, ERROR will be returned.

Optional parameters, unless explicitly stated, need to be provided up to the last parameter being entered.

1.3   AT Command Responses

When the AT Command processor has finished processing a line it will output either OK or ERROR indicating that it is ready to accept a new command. Solicited informational responses are sent before the final OK or ERROR. Unsolicited information responses will never occur between a solicited informational response and the final OK or ERROR.

Responses will be of the format:

```
<CR><LF>+CMD:<parameters><CR><LF>
<CR><LF>OK<CR><LF>
```
 or
```
<CR><LF><parameters><CR><LF>
<CR><LF>OK<CR><LF>
```

1.4   3GPP Alignment

3GPP commands are aligned to 3GPP TS 27.007 v14.3.0 (2017-03). For clarification on 3GPP commands, please refer to this document.

1.5   Modification History

Firmware Release	Modification
B180	Add +NPIN, NXLOG Add +NFWUPD: <cmd>=0,3,4 Add error code 518,522
B200	Add +NCONFIG:NAS_SIM_POWER_SAVING_ENABLE +NCONFIG:BARRING_RELEASE_DELAY +NSOCR: <af_type> to support IPV6 +CMGR: return SSB information +NSOST:<sequence> for data send indication +NQSOS +NSOCO,+NSOSD Error Values: 523,524,525,526,527 Modify +NPING:<p_size> range to 12-1480. Delete <tx_power> in +NRDEXEC:TXTEST Delete rdk commands. Add abort process.
B200SP1	Add the TCP packets sending status indication.
B300	Add XON/XOFF flow-control support +NATSPEED Add +CGAUTH, +CGCONTRDP,+NQPODCP,+NIPINFO, +NCPCDPR, +CNMPSD,+NCSEARFCN,+NSOCLI Add +NPOWERCLASS: <power class> support 6 Add +NCONFIG:RELEASE_VERSION +NCONFIG: SYNC_TIME_PERIOD +NCONFIG: RPM +NCONFIG: NB_CATEGORY +NCONFIG: IPV6_GET_PREFIX_TIME +NCONFIG:HEADD_COMPRESS +NCONFIG:RLF_UPDATE +NCONFIG:CONNECTION_REESTABLISHMENT Add error code:528,529,530

2 3GPP Commands

2.1 Request Manufacturer Identification (+CGMI)

Command	Response	Example
+CGMI +CGMI=?	\<manufacturer\> +CME ERROR:\<err\>	AT+CGMI CMCC OK AT+CGMI=? OK

Description

This command returns the manufacturer information. By default this will return "China Mobile IoT Company Limited" on the standard platform. Refer to Chapter *Error Values* for possible \<err\> values.

Defined values

\<manufacturer\>   the total number of characters, including line terminators.

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2.2 Request Manufacturer Model (+CGMM)

Command	Response	Example
+CGMM +CGMM=?	\<model\> +CME ERROR:\<err\>	AT+CGMM M5310-A OK AT+CGMM=? OK

Description

This command returns the manufacturer model information. By default this will return "M5310-A" on the standard platform. Refer to Chapter *Error Values* for possible \<err\> values.

Defined values

\<model\>   manufacturer model information.

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2.3 Request Manufacturer Revision (+CGMR)

This command returns the manufacturer revision. The text is human readable and is not intended for microcontroller parsing.

By default this will return the firmware revision – release and build.

Command	Response	Example
+CGMR	\<revision\> +CME ERROR:\<err\>	AT+CGMR SSB,V150R100C10B200SP1 SECURITY_A,V150R100C10B300 PROTOCOL_A,V150R100C10B300 APPLICATION_A,M5310-A-MONH0S00 SECURITY_B,V150R100C10B300 RADIO,Hi15RM1 v1 2 V003 OK
+CGMR=?		AT+CGMR=? OK

Description

Execution command returns one or more lines of information text \<revision\>. Refer to Chapter *Error Values* for possible \<err\> values.

Defined values

> *\<revision\>*   firmware version string.

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- *\<revision\>* will change format over time. It should be treated as an opaque identifier.

2.4 Request Product Serial Number (+CGSN)

Command	Response	Example
+CGSN[=\<snt\>]	when \<snt\>=0 (or omitted) and command successful: \<sn\> when \<snt\>=1 and command successful: +CGSN: \<imei\> when \<snt\>=2 and command successful: +CGSN: \<imeisv\> when \<snt\>=3 and command successful: +CGSN: \<svn\> +CME ERROR: \<err\>	AT+CGSN=0 123456789012334 OK AT+CGSN=1 +CGSN:49015420323751 OK
+CGMR=?	when TE supports \<snt\> and command successful: +CGSN: (list of supported \<snt\>s)	AT+CGSN=? +CGSN:(0,1,2,3) OK

Description

Execution command returns the IMEI (International Mobile station Equipment Identity number) and related information

For a TA which does not support *\<snt\>*, only OK is returned. Refer to Chapter *Error Values* for possible *\<err\>* values.

Defined values

> *\<snt\>*   integer type indicating the serial number type that has been requested.

>> 0   returns \<sn\>

>> 1   returns the IMEI (International Mobile station Equipment Identity)

2 returns the IMEISV (International Mobile station Equipment Identity and Software Version number)

3 returns the SVN (Software Version Number)

<sn> The 128-bit UUID of the UE. The total number of characters, including line terminators, in the information text shall not exceed 2048 characters. Text shall not contain the sequence `0<CR>` or `OK<CR>`

<imei> string type in decimal format indicating the IMEI

<imeisv> string type in decimal format indicating the IMEISV

<svn> string type in decimal format indicating the current SVN which is a part of IMEISV;

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2.5 EPS network registration status (+CEREG)

Command	Response	Example
+CEREG=<n>	+CME ERROR:<err> when <n>=0, 1, 2 or 3 and command successful: +CEREG:<n>,<stat>[,[<tac>],[<ci>],[<AcT>[,<cause_type>,<reject_ cause>]]]	AT+CEREG=1 OK
+CEREG?	when <n>=4 or 5 and command successful: +CEREG:<n>,<stat>[,[<tac>],[<ci>],[<AcT>],[<rac>][,[<cause_type>],[<reject_cause>][,[<Active-Time>],[<Periodic-TAU>]]]]	AT+CEREG? +CEREG:1,1 OK
+CEREG=?	+CEREG: (list of supported <n>s)	AT+CEREG=? +CEREG:(0,1,2,3,4,5) OK

Description

The set command controls the presentation of an unsolicited result code *+CEREG: <stat>* when *<n>*=1 and there is a change in the MT's EPS network registration status in E-UTRAN, or unsolicited result code. *+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>]]* when *<n>*=2 and there is a change of the network cell in E-UTRAN. The parameters *<AcT>, <tac>* and *<ci>* are provided only if available. The value <n>=3 further extends the unsolicited result code with *[,<cause_type>,<reject_cause>]*, when available, when the value of *<stat>* changes. Refer to Chapter *Error Values* for possible *<err>* values.

If the UE wants to apply PSM for reducing its power consumption the set command controls the presentation of an unsolicited result code:

+CEREG:<stat>[,[<tac>],[<ci>],[<AcT>][,[<cause_type>],[<reject_cause>][,[<Active-Time>],[<Periodic-TAU>]]]].

When <n>=4 the unsolicited result code will provide the UE with additional information for the Active Time value and the extended periodic TAU value if there is a change of the network cell in E-UTRAN. The value <n>=5 further enhances the unsolicited result code with *<cause_type>* and *<reject_cause>* when the value of *<stat>* changes. The parameters *<AcT>, <tac>, <ci>, <cause_type>, <reject_cause>, <Active-Time>* and *<Periodic-TAU>* are provided only

if available.

- NOTE 1: If the EPS MT in GERAN/UTRAN/E-UTRAN also supports circuit mode services and/or GPRS services, the *+CREG* command and *+CREG:* result codes and/or the *+CGREG* command and *+CGREG:* result codes apply to the registration status and location information for those services.

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

Test command returns supported parameter values.

Defined values

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

<stat>		integer type; indicates the EPS registration status
	0	not registered, MT is not currently searching for an operator to register to
	1	registered, home network
	2	not registered, but MT is currently trying to attach or searching for an operator to register to
	3	registration denied
	4	unknown (e.g. out of E-UTRAN coverage)
	5	registered, roaming

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6   registered for "SMS only", home network (not applicable)

7   registered for "SMS only", roaming (not applicable)

8   attached for emergency bearer services only

9   registered for "CSFB not preferred", home network (not applicable)

10   registered for "CSFB not preferred", roaming (not applicable)

- NOTE 2: 3GPP TS 24.008 and 3GPP TS 24.301 specify the condition when the MS is considered as attached for emergency bearer services.

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

<ci>   string type; four byte E-UTRAN cell ID in hexadecimal format

<AcT>   integer type; indicates the access technology of the serving cell

0   GSM (not applicable)

1   GSM Compact (not applicable)

2   UTRAN (not applicable)

3   GSM w/EGPRS (not applicable)

4   UTRAN w/HSDPA (not applicable)

5   UTRAN w/HSUPA (not applicable)

6   UTRAN w/HSDPA and HSUPA (not applicable)

7   E-UTRAN

8   EC-GSM-IoT (A/Gb mode) (see NOTE 5) (not applicable)

9   E-UTRAN (NB-S1 mode) (see NOTE 6)

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

- NOTE 4: 3GPP TS 25.331 specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

- NOTE 5: 3GPP TS 44.018 [156] specifies the EC-SCH INFORMATION message which, if present, indicates that the serving cell supports EC-GSM-IoT.

- NOTE 6: 3GPP TS 36.331 [86] specifies the System Information blocks which give the information about whether the serving cell supports NB-IoT, which corresponds to E-UTRAN (NB-S1 mode).

<cause_type> integer type; indicates the type of *<reject_cause>.*

0   Indicates that *<reject_cause>* contains an EMM cause value

1   Indicates that *<reject_cause>* contains a manufacturer-specific cause.

<reject_cause> integer type; contains the cause of the failed registration. The value is of type as defined by *<cause_type>*.

<Active-Time> string type; one byte in an 8 bit format. Indicates the Active Time value (T3324) allocated to the UE in E-UTRAN. The Active Time value is coded as one byte (octet 3) of the GPRS Timer 2 information element coded as bit format (e.g. "00100100" equals 4 minutes). For the coding and the value range, see the GPRS Timer 2 IE in 3GPP TS 24.008 Table/3GPP TS 24.008. See also 3GPP TS 23.682 and 3GPP TS 23.401

<Periodic-TAU> string type; one byte in an 8 bit format. Indicates the extended periodic TAU value (T3412) allocated to the UE in E-UTRAN. The extended periodic TAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours). For the coding and the value range, see the GPRS Timer 3 IE in 3GPP TS 24.008 Table 10.5.163a/3GPP TS 24.008. See also 3GPP TS 23.682 and 3GPP TS 23.401

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- *CEREG <n>* values support 0-5 now. *<stats>* return values supported are 0-5
- Unsolicited result code when *<stat>* changes.

2.6 Signalling connection status (+CSCON)

This command gives details of the terminal's perceived radio connection status (i.e. to the base-station). It returns an indication of the current state. Note, however, that this state is only updated when radio events, such as send and receive, take place. This means that the current state may be out of date. The terminal may think it is "Connected" yet cannot currently use a base station due to a change in the link quality.

The set command controls the presentation of an unsolicited result code *+CSCON*. If *<n>=1*, *+CSCON: <mode>* is sent from the MT when the connection mode of the MT is changed

Command	Response	Example
+CSCON=<n>	+CME ERROR:<err>	AT+CSCON=0 OK
+CSCON?	+CSCON:<n>,<mode>[,<state>] +CME ERROR: <err>	AT+CSCON? +CSCON:0,1 OK
+CEREG=?	+CSCON: (list of supported <n>s)	AT+CSCON=? +CSCON:(0,1) OK +CSCON:1
	+CSCON: <mode>,[state]	

Description

The set command controls the presentation of an unsolicited result code *+CSCON*.

If *<n>=1*, *+CSCON: <mode>* is sent from the MT when the connection mode of the MT is changed.

If *<n>=2* and there is a state within the current mode, *+CSCON: <mode>[,<state>]* is sent from the MT.

If *<n>=3*, *+CSCON: <mode>[,<state>[,<access>]]* is sent from the MT.

If setting fails, an MT error, +CME ERROR: <err> is returned.

Refer to Chapter *Error Values* for possible *<err>* values.

When the MT is in UTRAN or E-UTRAN, the mode of the MT refers to idle when no PS signalling connection and to connected mode when a PS signalling connection between UE and network is setup. When the UE is in GERAN, the mode refers to idle when the MT is in either the IDLE state or the STANDBY state and to connected mode when the MT is in READY state.

The *<state>* value indicates the state of the MT when the MT is in GERAN, UTRAN connected mode or E- UTRAN.

The read command returns the status of result code presentation and an integer *<mode>* which shows whether the MT is currently in idle mode or connected mode. State information *<state>* is returned only when *<n>=2*. Radio access type information *<access>* is returned only when *<n>=3*.

Test command returns supported values as a compound value.

Defined values

<n>   integer type

    0   disable unsolicited result code

    1   enable unsolicited result code *+CSCON: <mode>*

    2   enable unsolicited result code *+CSCON: <mode>[,<state>]*

    3   enable unsolicited result code *+CSCON: <mode>[,<state>[,<access>]]*

<mode>   integer type; indicates the signalling connection status

    0   idle

    1   connected

    2-255   <reserved for future use>

<state>   integer type; indicates the CS or PS state while in GERAN and the RRC state information if the MT is in connected Mode while in UTRAN and E-UTRAN.

    0   UTRAN URA_PCH state

    1   UTRAN Cell_PCH state

    2   UTRAN Cell_FACH state

    3   UTRAN Cell_DCH state

    4   GERAN CS connected state

    5   GERAN PS connected state

    6   GERAN CS and PS connected state

	7	E-UTRAN connected state
<access>		integer type; indicates the current radio access type.
	0	Indicates usage of radio access of type GERAN
	1	Indicates usage of radio access of type UTRAN TDD
	2	Indicates usage of radio access of type UTRAN FDD
	3	Indicates usage of radio access of type E-UTRAN TDD
	4	Indicates usage of radio access of type E-UTRAN FDD

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- Only *<n>=0* and *<n>=1* are supported. *<n>=0* is the default value.
- Unsolicited notifications are not currently supported. This functionality will be added in a future release.

2.7   List Available Commands (+CLAC)

This command lists the available AT commands.

Command	Response	Example
+CLAC	<AT Command> [<CR><LF><AT Command>[...]] +CME ERROR: <err>	AT+CLAC AT+CMEE AT+CGMI ... AT+CGSN AT+CLAC OK
+CLAC=?	+CME ERROR: <err>	AT+CLAC=? OK

Description

Execution command causes the MT to return one or more lines of AT Commands. Refer to Chapter *Error Values* for possible *<err>* values

NOTE: This command only returns the AT commands that are available for the user.

Defined values

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

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2.8   Get signal strength indicator (+CSQ)

The terminal will provide a current signal strength indicator of 0 to 255 where larger is generally better. This information is based on a single measurement so can be expected to change greatly over short periods of time and may never use all possible (or even the majority) of the entire possible range or codes.

Command	Response	Example
+CSQ	+CSQ:<rssi>,<ber> +CME ERROR: <err>	AT+CSQ +CSQ:4,99

		OK AT+CSQ=?
+CSQ=?	+CSQ:(list of supported <rssi>s),(list of supported <ber>s)	+CSQ:(0-31,99),(99) OK

Description

Execution command returns received signal strength indication *<rssi>* and channel bit error rate *<ber>*

from the MT. Refer to Chapter *Error Values* for possible <err> values

Test command returns values supported as compound values.

Defined values

<rssi>   integer type

    0   -113 dBm or less

    1   -111 dBm

    2...30 -109... -53 dBm

    31   -51 dBm or greater

    99   not known or not detectable

<ber>   integer type; channel bit error rate (in percent)

    0...7   as RXQUAL values (refer to 3GPP specification)

    99   not known or not detectable

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- *<ber>* is currently not implemented, and will always be 99.

2.9   Show PDP Addresses (+CGPADDR)

This command returns the IP address of the device.

Command	Response	Example
+CGPADDR[=<cid>[,<cid> [,...]]]	[+CGPADDR:<cid>[,<PDP_addr_1>[,<PDP_addr_2>]]] [<CR><LF> +CGPADDR:<cid>,[<PDP_addr_1>[,<PDP_addr_2>]][...]] IPv4: The string is given as dot-separated numeric (0-255) parameter of the form: a1.a2.a3.a4 IPv6: The string is given as colon-separated hexadecimal parameter.	AT+CGPADDR +CGPADDR:1,101.43.5.1 +CGPADDR:2,2001:db8:85a3::8a2e:370 +CGPADDR:3 AT+CGPADDR=1 +CGPADDR:1,101.43.5.1 OK AT+CGPADDR=?
+CGPADDR=?	+CGPADDR=(list of defined <cid>s)	+CGPADDR:(0,1) OK

Description

The execution command returns a list of PDP addresses for the specified context identifiers. If no *<cid>* is specified,

the addresses for all defined contexts are returned.

Refer to Chapter *Error Values* for possible *<err>* values

The test command returns a list of defined *<cid>*s. These are *<cid>*s that have been activated and may or may not have an IP address associated with them.

Defined values

<cid>   integer type; specifies a particular PDP context definition (see the *+CGDCONT* and *+CGDSCONT* commands).

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

- The string is given as dot-separated numeric (0-255) parameter of the form: *a1.a2.a3.a4* for IPv4 and *a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16* for IPv6.

- When *+CGPIAF* is supported, its settings can influence the format of the IPv6 address in parameter *<PDP_addr_1>* or *<PDP_addr_2>* returned with the execute form of *+CGPADDR*.

NOTE: In dual-stack terminals (*<PDP_type>* IPV4V6), the IPv6 address will be provided in *<PDP_addr_2>*. For terminals with a single IPv6 stack (*<PDP_type>* IPv6) or due to backwards compatibility, the IPv6 address can be provided in parameter *<PDP_addr_1>*.

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- *<cid>* values between 0 & 10 are supported.

- With autoconnect enabled, *<cid>=0* will not be listed until an IP address is acquired.

2.10 PLMN selection (+COPS)

Command	Response	Example
+COPS=<mode>[,<format>[,<oper>[,<AcT>]]]	+CME ERROR:<err>	+COPS:1,2,"46000" OK AT+COPS?
+COPS?	+COPS:<mode>[,<format>,<oper>][,<AcT>] +CME ERROR: <err>	+COPS:1,2,"46000" OK
+COPS=?	+COPS: [list of supported (<stat>, long alphanumeric <oper>, short alphanumeric <oper>, numeric <oper>[,<Act>])s][,,(list of supported <mode>s),(list of supported <format>s)] +CME ERROR: <err>	AT+COPS=? +COPS:,,(0-2),(2) OK

Description

Set command forces an attempt to select and register the GSM/UMTS/EPS network operator using the SIM/USIM card installed in the currently selected card slot. <mode> is used to select whether the selection is done automatically by the MT or is forced by this command to operator <oper> (it shall be given in format<format>) to a certain access technology, indicated in <AcT>. If the selected operator is not available, no other operator shall be selected (except <mode>=4). If the selected access technology is not available, then the same operator shall be selected in other access technology. The selected operator name format shall apply to further read commands (+COPS?) also. <mode>=2 forces an attempt to deregister from the network. The selected mode affects to all further network registration (e.g. after <mode>=2, MT shall be unregistered until <mode>=0 or 1 is selected). This command should be abortable when registration/deregistration attempt is made. Refer to Chapter *Error Values* for possible <err> values

Read command returns the current mode, the currently selected operator and the current Access Technology.

If no operator is selected, <format>, <oper> and <AcT> are omitted.

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

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

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

Defined values

<div>

<mode>   integer type

<u>0</u>   automatic (*<oper>* field is ignored)

1   manual (*<oper>* field shall be present, and *<AcT>* optionally)

2   deregister from network

3   set only *<format>* (for read command +*COPS?*), do not attempt registration/deregistration (*<oper>* and *<AcT>* fields are ignored); this value is not

</div>

	applicable in read command response
4	manual/automatic (*<oper>* field shall be present); if manual selection fails, automatic mode (*<mode>=0*) is entered

<format>	integer type
<u>0</u>	long format alphanumeric *<oper>*
1	short format alphanumeric *<oper>*
2	numeric *<oper>*

<oper>	string type; *<format>* indicates if the format is alphanumeric or numeric; long alphanumeric format can be upto 16 characters long and short format up to 8 characters; numeric format is the GSM Location Area Identification number which consists of a three BCD digit ITU-T country code coded, plus a two or three BCD digit network code, which is administration specific.

<stat>:	integer type
0	unknown
1	available
2	current
3	forbidden

<AcT>:	integer type; access technology selected
0	GSM
1	GSM Compact
2	UTRAN
3	GSM w/EGPRS (see NOTE 1)
4	UTRAN w/HSDPA (see NOTE 2)
5	UTRAN w/HSUPA (see NOTE 2)
6	UTRAN w/HSDPA and HSUPA (see NOTE 2)
7	E-UTRAN
8	EC-GSM-IoT (A/Gb mode) (see NOTE 3)
9	E-UTRAN (NB-S1 mode) (see NOTE 4)

- *NOTE 1*: 3GPP TS 44.060 specifies the System Information messages which give the information about whether the serving cell supports EGPRS.
- *NOTE 2:* 3GPP TS 25.331 specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.
- *NOTE* 3:3GPP TS 44.018 [156] specifies the EC-SCH INFORMATION message which, if present, indicates that the serving cell supports EC-GSM-IoT.

- *NOTE* 4: 3GPP TS 36.331 [86] specifies the System Information blocks which give the information about whether the serving cell supports NB-IoT, which corresponds to E-UTRAN (NB-S1 mode)

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- *<Act>*, if provided, must be set to 9
- Only *<format>=2* is supported
- Only *<mode>=0,* *<mode>=1* & *<mode>=2* are supported
- When *<mode>=1* is used, the plmn setting will not persist after the UE is rebooted
- *<mode>=1* is only for development use. *<mode>=0* should be used in production, which the mode used when *AUTOCONNECT* is enabled.
- The test command currently returns the configured values rather than performing a plmn search.
- Not return *<ACT>* for *AT+COPS?*
- *<oper>* field couldn't be present when *<mode>=0*;
- *+COPS=?* Will start a back ground search when nas is in attached and idle state. And could be aborted by any characters when progressing.

2.11   PS attach or detach (+CGATT)

Command	Response	Example
+CGATT=<state>	+CME ERROR:<err>	AT+CGATT=1 OK
+CGATT?	+CGATT:<state> +CME ERROR:<err>	AT+CGATT? +CGATT:0 OK
+CGATT=?	+CGATT:(list of supported <state>s) +CME ERROR:<err>	AT+CGATT=? +CGATT:(0,1) OK

Description

The execution command is used to attach the MT to, or detach the MT from, the Packet Domain service. After the command has completed, the MT remains in V.250 command state. If the MT is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned.

Refer to Chapter *Error Values* for possible <err> values.

- NOTE 1: If the initial PDP context is supported, the context with <cid>=0 is automatically defined at startup.

Any active PDP contexts will be automatically deactivated when the attachment state changes to detached. The read command returns the current Packet Domain service state.

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

- NOTE 2: This command has the characteristics of both the V.250 action and parameter commands.

Hence it has the read form in addition to the execution/set and test forms.

Defined Values

<state> integer type; indicates the state of PDP context activation. The default value is specific

manufacturer specific.

0   detached

1   attached

<err>   error value

M5310-A Implementation

- When <state>=1 is selected, +COPS=0 is automatically selected.
- If a CGATT is in progress, further execution of the CGATT= command prior to the attach or detach completing will return error.

2.12 PDP context activate or deactivate (+CGACT)

Command	Response	Example
+CGACT=[<state>[,<cid>[,<cid>[,...]]]]	+CME ERROR: <err>	AT+CGACT=0,1 OK
+CGACT?	[+CGACT:<cid>,<state>][<CR><LF>+CGACT:<cid>,<state>[...]]	AT+CGACT? +CGACT:1,0 OK
+CGACT=?	+CGACT:(list of supported <state>s)	AT+CGACT=? +CGACT:(0,1) OK

Description

The execution command is used to activate or deactivate the specified PDP context (s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the requested state for any specified context cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. If the MT is not PS attached when the activation form of the command is executed, the MT first performs a PS attach and then attempts to activate the specified contexts. If the attach fails then the MT responds with ERROR or, if extended error responses are enabled, with the appropriate failure-to-attach error message. Refer subclause 9.2 for possible <err> values.

For EPS, if an attempt is made to disconnect the last PDN connection, then the MT responds with ERROR or, if extended error responses are enabled, a +CME ERROR.

> NOTE: If the initial PDP context is supported, the context with <cid>=0 is automatically defined at startup, see subclause 10.1.0.

For EPS, the activation request for an EPS bearer resource will be answered by the network by either an EPS dedicated bearer activation or EPS bearer modification request. The request must be accepted by the MT before the PDP context can be set in to established state.

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

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

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

NOTE. This command has the characteristics of both the V.250 action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

Defined Values

<state>: integer type; indicates the state of PDP context activation. The default value is manufacturer specific.
  0   deactivated
  1   activated
<cid>: integer type; specifies a particular PDP context definition (see the +CGDCONT command).

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- Could only activate or deactivate one cid one time.

2.13 Request international mobile subscriber identity (+CIMI)

Returns International Mobile Subscriber Identity (string without double quotes).

Command	Response	Example
+CIMI +CIMI=?	<IMSI> +CME ERROR: <err>	AT+CIMI 460001357924680 OK AT+CIMI=? OK

Description

Execution command causes the TA to return <IMSI>, which is intended to permit the TE to identify the individual SIM card or active application in the UICC (GSM or USIM) which is attached to MT.

Refer to Chapter *Error Values* for possible <err> values

Defined values

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

<err>   TBD

M5310-A Implementation

- IMSI may not be displayed for a few seconds after power-on

2.14 Define PDP Context (+CGDCONT)

Command	Response	Example
+CGDCONT=<cid>[,<PDP type >[,<APN>[,<PDP addr>[,<d comp>[,<h_comp>[,<IPv4Add rAlloc>[,<request_type>[,	+CME ERROR:<err>	AT+CGDCONT=1,"IP" ,"CMIOT" OK

<P-CSCF_discovery> [,<IM_CN_Signalling_Flag_ Ind>[,<NSLPI>[,<securePCO >[,<IPv4 MTU discovery>][,<Local Addr Ind>]]]]]]]]]]]		
+CGDCONT?	[+CGDCONT:<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,< IPv4AddrAlloc>[,<request type>[,<P- CSCF discovery>[,<IM CN Signalling Flag Ind>[,<NSLPI>[,<securePC O>[,<IPv4_MTU_discovery>]]]]]]][<CR><LF> +CGDCONT:<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<I Pv4AddrAlloc>[,<request_type>[,<P- CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePC O>[,<IPv4_MTU_discovery>]]]]]]][...]]	AT+CGDCONT? +CGDCONT:0,"IP", "CMIOT.MNC004.MC C460.GPRS",,0,0, ,,,,0 OK
+CGDCONT=?	+CGDCONT: (range of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s),(list of supported <IPv4AddrAlloc>s),(list of supported <request type>s),(list of supported <P-CSCF discovery>s),(list of supported <IM_CN_Signalling_Flag_Ind>s) ,(list of supported <NSLPI>s),(list of supported <securePCO>s),(list of supported <IPv4_MTU_discovery>s) [<CR><LF>+CGDCONT: (range of supported <cid>s),<PDP_type>,,, (list of supported <d_comp>s),(list of supported <h comp>s),(list of supported <IPv4AddrAlloc>s),(list of supported <request type>s),(list of supported <P- CSCF_discovery>s),(list of supported <IM_CN_Signalling_Flag_Ind>s),(list of supported <NSLPI>s),(list of supported <securePCO>s,(list of supported <IPv4_MTU_discovery>s)) [...]]	AT+CGDCONT=? +CGDCONT:(0-10), ("IP","NONIP","I PV6","IPV4V6"),, ,(0),(0),,,,,(0, 1) OK

Description

The set command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid> and also allows the TE to specify whether security protected transmission of ESM information is requested, because the PCO can include information that requires ciphering. There can be other reasons for the UE to use security protected transmission of ESM information, e.g. if the UE needs to transfer an APN. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command. Refer to Chapter *Error Values* for possible <err> values.

For EPS the PDN connection and its associated EPS default bearer is identified herewith.

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

If the initial PDP context is supported, the context with <cid>=0 is automatically defined at startup, see 3GPP TS 27.007 V13.5.0, subclause 10.1.0. As all other contexts, the parameters for <cid>=0 can be modified with +CGDCONT. If the initial PDP context is supported, +CGDCONT=0 resets context number 0 to its particular default settings.

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

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

Defined values

<cid>: integer type; specifies a particular PDP context definition. The parameter is local to the TE- MT interface and is used in other PDP context-related commands. The range of permitted values (minimum value = 1 or if the initial PDP context is supported, minimum value = 0) is returned by the test form of the command.

- o NOTE 1: The <cid>s for network-initiated PDP contexts will have values outside the ranges indicated for the <cid> in the test form of the commands +CGDCONT and +CGDSCONT.

<PDP_type>: string type; specifies the type of packet data protocol. The default value is manufacturer specific.

X.25	ITU-T/CCITT X.25 layer 3 (Obsolete)
IP	Internet Protocol (IETF STD 5 [103])
IPV6	Internet Protocol, version 6
IPV4V6	Virtual <PDP_type> introduced to handle dual IP stack UE capability.
OSPIH	Internet Hosted Octect Stream Protocol (Obsolete)
PPP	Point to Point Protocol (IETF STD 51 [104])

- o NOTE 2: Only IP, IPV6 and IPV4V6 values are supported for EPS services.

NONIP	None Ip

<APN>: string type; 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. The APN is a string of up to 82 characters.

<PDP_addr>: string type; identifies the MT in the address space applicable to the PDP. This parameter can be left blank.

- • When +CGPIAF is supported, its settings can influence the format of this parameter returned with the read form of +CGDCONT.NOTE 3: The value of this parameter is ignored with the set command. The parameter is included in the set command for backwards compatibility reasons only.

<d_comp>: integer type; controls PDP data compression

<u>0</u>	off
1	on (manufacturer preferred compression)
2	V.42bis
3	V.44

<h_comp>: integer type; controls PDP header compression

> <u>0</u>   off
>
> 1   on (manufacturer preferred compression)
>
> 2   RFC 1144 [105] (applicable for SNDCP only)
>
> 3   RFC 2507 [107]
>
> 4   RFC 3095 [108] (applicable for PDCP only)

<IPv4AddrAlloc>: integer type; controls how the MT/TA requests to get the IPv4 address information

> <u>0</u>   IPv4 address allocation through NAS signalling
>
> 1   IPv4 address allocated through DHCP

<request_type>:integer type; indicates the type of PDP context activation request for the PDP context. , see 3GPP TS 24.301 (subclause 6.5.1.2) and 3GPP TS 24.008 subclause 10.5.6.17). If the initial PDP context is supported it is not allowed to assign <cid>=0 for emergency bearer services. According to 3GPP TS 24.008 (subclause 4.2.4.2.2 and subclause 4.2.5.1.4) and 3GPP TS 24.301(subclause 5.2.2.3.3 and subclause 5.2.3.2.2), a separate PDP context must be established for emergency bearer services.

- NOTE 4:   If the PDP context for emergency bearer services is the only activated context, only emergency calls are allowed, see 3GPP TS 23.401 subclause 4.3.12.9.

> <u>0</u>   PDP context is for new PDP context establishment or for handover from a non-3GPP access network (how the MT decides whether the PDP context is for new PDP context establishment or for handover is implementation specific)
>
> 1   PDP context is for emergency bearer services
>
> 2   PDP context is for new PDP context establishment
>
> 3   PDP context is for handover from a non-3GPP access network

<P-CSCF_discovery>: integer type; influences how the MT/TA requests to get the P-CSCF address, see 3GPP TS 24.229 [89] annex B and annex L.

> <u>0</u>   Preference of P-CSCF address discovery not influenced by +CGDCONT
>
> 1   Preference of P-CSCF address discovery through NAS signalling
>
> 2   Preference of P-CSCF address discovery through DHCP

<IM_CN_Signalling_Flag_Ind>: integer type; indicates to the network whether the PDP context is for IM CN subsystem-related signalling only or not.

> <u>0</u>   UE indicates that the PDP context is not for IM CN subsystem-related signalling only
>
> 1   UE indicates that the PDP context is for IM CN subsystem-related signalling only

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

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

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

- NOTE 5:   The MT utilises the provide NSLPI information as specified in 3GPP TS 24.301 [83] and 3GPP TS 24.008 .

<securePCO>: integer type. Specifies if security protected transmission of PCO is requested or not (applicable for EPS only)

0   Security protected transmission of PCO is not requested

1   Security protected transmission of PCO is requested

<IPv4_MTU_discovery>: integer type; influences how the MT/TA requests to get the IPv4 MTU size, see 3GPP TS 24.008 subclause 10.5.6.3.

0   Preference of IPv4 MTU size discovery not influenced by +CGDCONT

1   Preference of IPv4 MTU size discovery through NAS signalling

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- Only <PDP_type>="IP","NONIP"," IPV6", "IPV4V6"are supported
- Hisi supports +CGDCONT=<cid>,<PDP_type>,<APN>,,,,,,,<NSLPI> only.
- <cid> values of 0-10 are supported
- Only <hcomp> and <dcomp> values of 0 are supported.
- No default <PDP_type> value specific.
- <cid> value of 7 can't be set when bip is enabled.
- Maximum <APN> string size is 82.

2.15 Change device functionality (+CFUN)

Command	Response	Example
+CFUN=<fun>[,<rst>]	+CME ERROR:<err>	AT+CFUN=1 OK
+CFUN?	+CFUN:<fun>	AT+CFUN? +CFUN:1 OK
+CFUN=?	+CFUN:(list of supported <fun>s),(list of supported <rst>s)	AT+CFUN=? +CFUN:(0,1),(0,1) OK

Description

Set command selects the level of functionality <fun> in the MT. Level "full functionality" is where the highest level of power is drawn. "Minimum functionality" is where minimum power is drawn. Level of functionality between these

may also be specified by manufacturers. When supported by manufacturers, MT resetting with `<rst>` parameter may be utilized.

Refer to Chapter *Error Values* for possible <err> values.

NOTE 1: It is manufacturer specific if this command affects network registration. Command Operator Selection `+COPS` is used to force registration/deregistration.

Read command returns the current setting of <fun>.

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

Defined values

> `<fun>`: integer type
>
>> 0   minimum functionality
>>
>> 1   full functionality. Enable (turn on) the transmit and receive RF circuits for all supported radio access technologies. For MTs supporting +CSRA, this equals the RATs indicated by the response of +CSRA=?. Current +CSRA setting is ignored. It is not required that the MT transmit and receive RF circuits are in a disabled state for this setting to have effect.
>>
>> 2   disable (turn off) MT transmit RF circuits only
>>
>> 3   disable (turn off) MT receive RF circuits only
>>
>> 4   disable (turn off) both MT transmit and receive RF circuits
>>
>> 5...127   reserved for manufacturers as intermediate states between full and minimum functionality
>>
>> 128   Full functionality with radio access support according to the setting of +CSRA. Enables (turns on) the transmit and receive RF circuits if not already enabled. This `<fun>` setting is applicable for MTs supporting +CSRA.
>>
>> 129   Prepare for shutdown. This setting has its prime use when some of the MT's resources (e.g. file system) are located on a tightly integrated TE (host). The MT will execute pending actions resulting in "permanent" changes, e.g. execute pending file system operations. The MT will also make an orderly network detach. After this action and +CFUN has returned `OK`, the MT can be shut down with `<fun>=0`, or by other means. After setting `<fun>=129`, only `<fun>=0` is valid. All other values will make +CFUN return `ERROR`.
>
> `<rst>`: integer type
>
>> 0   do not reset the MT before setting it to `<fun>` power level
>>
>> NOTE 2: This shall be always default when `<rst>` is not given.
>>
>> 1   reset the MT before setting it to `<fun>` power level

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- Only <fun> = 0 & 1 are supported.
- <rst> is not supported and will be ignored.
- DeepSleep will be entered when the system is quiescent, but only if it has been enabled by the network.

2.16 Power saving mode setting (+CPSMS)

Command	Response	Example
+CPSMS=[<mode>[,<Requested_P eriodic-RAU>[,<Requested_GPRS-READY-timer>[,<Requested_Periodic-TAU>[,<Requested_Active-Time>]]]]]	+CME ERROR:<err>	AT+CPSMS=1,,,01000011,01000011 OK
+CPSMS?	+CPSMS:<mode>,[<Requested Periodic-RAU>],[<Requested_GPRS-READY-timer>],[<Requested_Periodic-TAU>],[<Requested_Active-Time>]	AT+CPSMS? +CPSMS:1,,,01000011,01000011 OK
+CPSMS=?	+CPSMS:(list of supported <mode>s),(list of supported <Requested_Periodic-RAU>s),(list of supported <Requested GPRS-READY-timer>s),(list of supported <Requested_Periodic-TAU>s),(list of supported <Requested_Active-Time>s)	AT+CPSMS=? +CPSMS:(0,1,2),,,(00000000-11111111), (00000000-11111111) OK

Description

The set command controls the setting of the UEs power saving mode (PSM) parameters. The command controls whether the UE wants to apply PSM or not, as well as the requested extended periodic RAU value and the requested GPRS READY timer value in GERAN/UTRAN, the requested extended periodic TAU value in E- UTRAN and the requested Active Time value. See the unsolicited result codes provided by command +CEREG for the Active Time value and the extended periodic TAU value that are allocated to the UE by the network in E-UTRAN.

A special form of the command can be given as +CPSMS=2. In this form, the use of PSM will be disabled and data for all parameters in the command +CPSMS will be removed or, if available, set to the manufacturer specific default values.

The read command returns the current parameter values.

The test command returns the supported <mode>s and the value ranges for the requested extended periodic RAU value and the requested GPRS READY timer value in GERAN/UTRAN, the requested extended periodic TAU value in E-UTRAN and the requested Active Time value as compound values.

Refer to Chapter *Error Values* for possible <err> values.

Defined values

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

0   Disable the use of PSM

| 1 | Enable the use of PSM |
| 2 | Disable the use of PSM and discard all parameters for PSM or, if available, reset to the manufacturer specific default values. |

<Requested_Periodic-RAU>: string type; one byte in an 8 bit format. Requested extended periodic RAU value (T3312) to be allocated to the UE in GERAN/UTRAN. The requested extended periodic RAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours). For the coding and the value range, see the GPRS Timer 3 IE in 3GPP TS 24.008 [8] Table 10.5.163a/3GPP TS 24.008. See also 3GPP TS 23.682 [149] and 3GPP TS 23.060 [47]. The default value, if available, is manufacturer specific.

<Requested_GPRS-READY-timer>: string type; one byte in an 8 bit format. Requested GPRS READY timer value (T3314) to be allocated to the UE in GERAN/UTRAN. The requested GPRS READY timer value is coded as one byte (octet 2) of the GPRS Timer information element coded as bit format (e.g. "01000011" equals 3 decihours or 18 minutes). For the coding and the value range, see the GPRS Timer IE in 3GPP TS 24.008 [8] Table 10.5.172/3GPP TS 24.008. See also 3GPP TS 23.060 [47]. The default value, if available, is manufacturer specific.

<Requested_Periodic-TAU>: string type; one byte in an 8 bit format. Requested extended periodic TAU value (T3412) to be allocated to the UE in E-UTRAN. The requested extended periodic TAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours). For the coding and the value range, see the GPRS Timer 3 IE in 3GPP TS 24.008 [8] Table 10.5.163a/3GPP TS 24.008. See also 3GPP TS 23.682 [149] and 3GPP TS 23.401 [82]. The default value, if available, is manufacturer specific.

<Requested_Active-Time>: string type; one byte in an 8 bit format. Requested Active Time value (T3324) to be allocated to the UE. The requested Active Time value is coded as one byte (octet 3) of the GPRS Timer 2 information element coded as bit format (e.g. "00100100" equals 4 minutes). For the coding and the value range, see the GPRS Timer 2 IE in 3GPP TS 24.008 [8] Table 10.5.163/3GPP TS 24.008. See also 3GPP TS 23.682 [149], 3GPP TS 23.060 [47] and 3GPP TS 23.401 [82]. The default value, if available, is manufacturer specific.

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- RAU is not supported by NB-IOT. No value will be output, and any input will be ignored.
- <Requested_Periodic-TAU> and <Requested_Active-Time> could be quoted.

2.17 eDRX setting (+CEDRXS)

Command	Response	Example
+CEDRXS=[<mode>,[,<AcT-type>[,<Requested_eDRX_value>]]]	+CME ERROR:<err>	AT+CEDRXS=1,5,0101 OK
+CEDRXS?	[+CEDRXS:<AcT-type>,<Requested_eDRX_value>[<CR><LF>+CEDRXS:<AcT-type>,<Requested_eDRX_value>[...]]]	AT+CEDRXS? +CEDRXS:5,"0101" OK
+CEDRXS=?	+CEDRXS:(list of supported <mode>s),(list of supported <AcT-type>s),(list of supported <Requested_eDRX_value>s)	AT+CEDRXS=? +CEDRXS:(0,1,2,3),(5),("0000"-"1111") OK

Description

The set command controls the setting of the UEs eDRX parameters. The command controls whether the UE

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wants to apply eDRX or not, as well as the requested eDRX value for each specified type of access technology.

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

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

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

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

Refer to Chapter *Error Values* for possible <err> values

Defined values

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

 <u>0</u>   Disable the use of eDRX

 1   Enable the use of eDRX

 2   Enable the use of eDRX and enable the unsolicited result code
   `+CEDRXP:<AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]]`

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

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

 0   Access technology is not using eDRX. This parameter value is only used in the unsolicited result code.

 1   EC-GSM-IoT (A/Gb mode)

 2   GSM (A/Gb mode)

 3   UTRAN (Iu mode)

 4   E-UTRAN (WB-S1 mode)

 5   E-UTRAN (NB-S1 mode)

<Requested_eDRX_value>: string type; half a byte in a 4 bit format. The eDRX value refers to bit 4 to 1 of octet 3 of the Extended DRX parameters information element (see subclause 10.5.5.32 of

3GPP TS 24.008 [8]). For the coding and the value range, see Extended DRX parameters information element in 3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008. The default value, if available, is manufacturer specific.

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

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

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- When paged, +CRING will be unsolicited
- <AcT-type> value 5 is supported
- When set <mode> to 0 and don't have parameter <Requested_eDRX_value>, will set <Requested_eDRX_value> to invalid value like 0.

2.18 Extended Error Reporting (+CEER)

Command	Response	Example
+CEER +CEER=?	+CEER:<report>	AT+CEER +CEER:ILLEGAL_ME OK AT+CEER=? OK

Description

Execution command causes the TA to return one or more lines of information text <report>, determined by the MT manufacturer, which should offer the user of the TA an extended report of the reason for
- the failure in the last unsuccessful call setup (originating or answering) or in-call modification;
- the last call release;
- the last unsuccessful PDP context activation;
- the last PDP context deactivation.

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

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<report>: 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>.

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2.19 eDRX read dynamic parameters (+CEDRXRDP)

Command	Response	Example
+CEDRXRDP +CEDRXRDP=?	+CEDRXRDP:\<report\>	AT+CEDRXRDP +CEDRXRDP:5,"0101","1000","0111" OK AT+CEDRXRDP=? OK

Description

The execution command returns \<AcT-type\> and \<Requested_eDRX_value\>, \<NW-provided_eDRX_value\> and \<Paging_time_window\> if eDRX is used for the cell that the MS is currently registered to. If the cell that the MS is currently registered to is not using eDRX, AcT-type=0 is returned.
Refer to Chapter *Error Values* for possible \<err\> values.

Defined values

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

   0   Access technology is not using eDRX
   1   EC-GSM-IoT (A/Gb mode)
   2   GSM (A/Gb mode)
   3   UTRAN (Iu mode)
   4   E-UTRAN (WB-S1 mode)
   5   E-UTRAN (NB-S1 mode)

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

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

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

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2.20 Time Zone Reporting (+CTZR)

Command	Response	Example
+CTZR[=<reporting>]	+CME ERROR:<err>	AT+CTZR=1 OK
+CTZR?	+CTZR:<reporting> +CME ERROR:<err>	AT+CTZR? OK
+CTZR=?	+CZTR:(list of supported <reporting>s) +CME ERROR:<err>	AT+CTZR=? OK

Description

This set command controls the time zone change event reporting. If reporting is enabled the MT returns the unsolicited result code +CTZV: <tz>, +CTZE: <tz>,<dst>,[<time>], or +CTZEU: <tz>,<dst>,[<utime>] whenever the time zone is changed. The MT also provides the time zone upon network registration if provided by the network. If setting fails in an MT error, +CME ERROR: <err> is returned. Refer to Chapter *Error Values* for possible <err> values.

Read command returns the current reporting settings in the MT.

Test command returns supported <reporting>-values as a compound value.

NOTE: The Time Zone reporting is not affected by the Automatic Time Zone setting command, +CTZU if implemented.

Command	Response	Example
+CTZV	<tz>	+CTZV:4
+CTZE	<tz>,<dst>,[<time>]	+CTZE:4,0
+CTZEU	<tz>,<dst>,[<utime>]	+CTZEU:4,0

Defined values

<reporting>: integer type value indicating:

    0   disable time zone change event reporting.

    1   Enable time zone change event reporting by unsolicited result code +CTZV:<tz>.

    2   Enable extended time zone and local time reporting by unsolicited result code +CTZE: <tz>,<dst>,[<time>].

    3   Enable extended time zone and universal time reporting by unsolicited result code +CTZEU: <tz>,<dst>,[<utime>].

<tz>: string type value representing the sum of the local time zone (difference between the local time and GMT expressed in quarters of an hour) plus daylight saving time. The format is "±zz", expressed as a fixed width, two digit integer with the range -48 ... +56. To maintain a fixed width, numbers in the range -9...+9 are expressed with a leading zero, e.g. "-09", "+00" and "+09".

<dst>: integer type value indicating whether <tz> includes daylight savings adjustment;

    0   <tz> includes no adjustment for Daylight Saving Time

    1   <tz> includes +1 hour (equals 4 quarters in <tz>) adjustment for daylight saving time

2	`<tz>` includes +2 hours (equals 8 quarters in `<tz>`) adjustment for daylight saving time
`<time>`:	string type value representing the local time. The format is "YYYY/MM/DD,hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). The local time can be derived by the MT from information provided by the network at the time of delivering time zone information and will be present in the unsolicited result code for extended time zone and local time reporting if the universal time is provided by the network.
`<utime>`:	string type value representing the universal time. The format is "YYYY/MM/DD,hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). The universal time can be provided by the network at the time of delivering time zone information and will be present in the unsolicited result code for extended time zone and universal time reporting if provided by the network.

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2.21 Report mobile termination error (+CMEE)

Command	Response	Example

`+CMEE=[<n>]`	`+CME ERROR:<err>`	`AT+CMEE=1`
		`OK`
		`AT+CMEE?`

`+CMEE?`	`+CMEE:<n>`	`+CMEE:1`
		`OK`
		`AT+CMEE=?`

`+CMEE=?`	`+CMEE:(list of supported <n>s)`	`+CMEE:(0,1)` `OK`

Description

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

Read command returns the current setting of `<n>`.

Test command returns values supported as a compound value.

Refer to Chapter *Error Values* for possible <err> values

Defined values

`<n>`:		integer type
	0	disable `+CME ERROR: <err>` result code and use `ERROR` instead
	1	enable `+CME ERROR: <err>` result code and use numeric `<err>` values (Refer to Chapter *Error Values* for possible <err> values

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

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- Only n=0 & n=1 are supported.

2.22 Return current date & time (+CCLK)

Command	Response	Example
+CCLK? +CCLK=?	+CCLK:[<yy/MM/dd,hh:mm:ss>[< zz>]] +CME ERROR: <err>	AT+CCLK? +CCLK:17/01/09,14:53:12+01 OK AT+CCLK=? OK

Description

The clock will be set automatically once the UE has connected to the network.Read command returns the current setting of the clock.Refer to Chapter *Error Values* for possible <err> values

Defined values

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

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

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- If the RTC has not been set by the network, no value is returned.

2.23 Initial PDP context activation (+CIPCA)

Command	Response	Example
+CIPCA=[<n>[,<AttachWithoutPDN>]]	+CME ERROR: <err>	AT+CIPCA=3 OK
+CIPCA?	+CIPCA:<n>[,<AttachWithoutPDN>]	AT+CIPCA? +CIPCA:3,0 OK
+CIPCA=?	+CIPCA:(list of supported <n>s),(list of supported <AttachWithoutPDN>s)	AT+CIPCA=? +CIPCA:(3),(0,1) OK

Description

The set command controls whether an initial PDP context (see subclause 10.1.0) shall be established automatically following an attach procedure when the UE is attached to GERAN or UTRAN RATs and whether the UE is attached

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to E-UTRAN with or without a PDN connection. For <n>≠0, deactivating the last (active) PDP context can lead to a (re)establishment of the initial PDP context. Changing setting of <n> from 0 to 1 will cause an immediate attempt to (re)establish the initial PDP context if no PDP context is active. Changing <n> from 0 to 2 will if not roaming cause an immediate attempt to (re)establish the initial PDP context if no other PDP context is active. The value of <n>=3 applies to E-UTRAN RATs and does not change the setting of PDP context activation in GERAN or UTRAN RATs. Changing <n> will never cause a PDP context deactivation.

For <AttachWithoutPDN>=1, the EPS Attach is performed without a PDN connection.

NOTE: For this command, the term roaming corresponds to being registered to a VPLMN which is notequivalent to HPLMN or EHPLMN.

The read command returns the current setting of the command.

The test command returns values supported as a compound value.

Refer to Chapter *Error Values* for possible <err> values

Defined values

<n>: integer type. Activation of PDP context upon attach.

    0   Do not activate

    1   Always activate

    2   Activate when not roaming

    3   No change in current setting

<AttachWithoutPDN>: integer type. EPS Attach with or without PDN connection.

    0   EPS Attach with PDN connection

    1   EPS Attach without PDN connection

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- Only <n>=3 is supported temporarily
- If <AttachWithoutPDN> is omitted, will use the default value 0.

2.24 APN rate control (+CGAPNRC)

Command	Response	Example
+CGAPNRC[=<cid>] APN rate control(+CGAPNRC)	[+CGAPNRC:<cid>[,<Additional_exception_reports>[,<Uplink_time_unit>[,<Maximum_uplink_rate>]]][<CR><LF> +CGAPNRC:<cid>[,<Additional_exception_reports>[,<Uplink_time_unit>[,<Maximum_uplink_rate>]]] [...]]] +CME ERROR:<err>	AT+CGAPNRC=0 +CGAPNRC:0,0,0, OK AT+CGAPNRC +CGAPNRC:0,0,0, OK
+CGAPNRC=?	+CGAPNRC:(list of <cid>s associated with active contexts) +CME ERROR:<err>	AT+CGAPNRC=? +CGAPNRC:(0) OK

Description

This execution command returns the APN rate control parameters (see 3GPP TS 24.008 [8]) associated to the provided context identifier <cid>. If the parameter <cid> is omitted, the APN rate control parameters for all active PDP contexts are returned.

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

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<cid>:		integer type; specifies a particular PDP context definition (see the +CGDCONT commands).
<Additional_exception_reports>:		integer type; indicates whether or not additional exception reports are allowed to be sent when the maximum uplink rate is reached. This refers to bit 4 of octet 1 of the APN rate control parameters IE as specified in 3GPP TS 24.008 [8] subclause 10.5.6.3.2.
	0	Additional_exception_reports at maximum rate reached are not allowed to be sent.
	1	Additional_exception_reports at maximum rate reached are allowed to be sent.
<Uplink_time_unit>:		integer type; specifies the time unit to be used for the maximum uplink rate. This refers to bits 1 to 3 of octet 1 of the APN rate control parameters IE as specified in 3GPP TS 24.008 [8] subclause 10.5.6.3.2.
	0	unrestricted
	1	minute
	2	hour
	3	day
	4	week
<Maximum_uplink_rate>:		integer type; specifies the maximum number of messages the UE is restricted to send per uplink time unit. This refers to octet 2 to 4 of the APN rate control parameters IE as specified in 3GPP TS 24.008 [8] subclause 10.5.6.3.2

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2.25 Sending of originating data via the control plane (+CSODCP)

Send a non-IP message

Command	Response	Example
+CSODCP=<cid>,<cpdata_length>,<cpdata>[,<RAI>[,<type of user data>]]	+CMS ERROR:<err>	AT+CSODCP=0,3,AA11BB OK
+CSODCP=?	+CSODCP:(rane of supported <cid>s),(maximum number of bytes of the <cpdata_length>),(list of supported <RAI>s),(list of supported <type_of_user_data>s)	AT+CSODCP=? +CSODCP:(0-10),(512),(0,1,2),(0,1) OK

Description

The set command is used by the TE to transmit data over control plane to network via MT. Context identifier <cid> is used to link the data to particular context.
This command optionally indicates that the application on the MT expects that the exchange of data:

- will be completed with this uplink data transfer; or

- will be completed with the next received downlink data.

This command also optionally indicates whether or not the data to be transmitted is an exception data.This command causes transmission of an ESM DATA TRANSPORT message, as defined in 3GPP TS 24.301 [83]. Test command returns the maximum number of bytes of the user data container supported by the MT, supported `<RAI>`s and supported `<type_of_user_data>`s as a compound value.

Refer to Chapter *Error Values* for possible <err> values.

Defined values

`<cid>`:   integer type. A numeric parameter which specifies a particular PDP context or EPS bearer context definition. The `<cid>` parameter is local to the TE-MT interface and identifies the PDP or EPS bearer contexts which have been setup via AT command (see the +CGDCONT and +CGDSCONT commands).

`<cpdata_length>`:   integer type. Indicates the number of bytes of the `<cpdata>` information element. When there is no data to transmit, the value shall be set to zero.

`<cpdata>`:string of octets. Contains the user data container contents (refer 3GPP TS 24.301 [83] subclause 9.9.4.24). When there is no data to transmit, the `<cpdata>` shall be an empty string (""). This parameter shall not be subject to conventional character conversion as per +CSCS. The coding format of the user data container and the maximum length of `<cpdata>` are implementation specific.

`<RAI>`:   integer type. Indicates the value of the release assistance indication, refer 3GPP TS 24.301 [83]   subclause 9.9.4.25.

   0   No information available.
   1   The MT expects that exchange of data will be completed with the transmission of the ESM DATA TRANSPORT message.
   2   The MT expects that exchange of data will be completed with the receipt of an ESM DATA TRANSPORT message.

`<type_of_user_data>`: integer type. Indicates whether the user data that is transmitted is regular or exceptional.

   0   Regular data.

   1   Exception data.

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- Maximum data length will be 1358 bytes when non-ip is used, otherwise will be 0.

- Only one message will be buffered at any one time.

2.26 Reporting of terminating data via the control plane (+CRTDCP)

Command	Response	Example
+CRTDCP=<reporting>	+CME ERROR:<err>	AT+CRTDCP=1 OK
+CRTDCP?	+CRTDCP:<reporting>	AT+CRTDCP? +CRTDCP:1 OK
+CRTDCP=?	+CRTDCP:(list of supported	AT+CRTDCP=?

| | <reporting>s),(range of supported <cid>s),(maximum number of octets of user data indicated by <cpdata_length>) | +CRTDCP:(0-1),(0-10),(512) OK |

Description

The set command is used to enable and disable reporting of data from the network to the MT that is transmitted via the control plane in downlink direction. If reporting is enabled, the MT returns the unsolicited result code +CRTDCP:<cid>,<cpdata_length>,<cpdata> when data is received from the network.

Read command returns the current settings.

Test command returns supported values as compound values. Refer to Chapter *Error Values* for possible <err> values.

Command	Response	Example
	+CRTDCP:<cid>,<cpdata_length>,<cpdata>	+CRTDCP:0,2,"ab"

Defined values

<reporting>: integer type, controlling reporting of mobile terminated control plane data events

0   Disable reporting of MT control plane data.

1   Enable reporting of MT control plane data by the unsolicited result code +CRTDCP.

<cid>: integer type. A numeric parameter which specifies a particular PDP context or EPS bearer context definition. The <cid> parameter is local to the TE-MT interface and identifies the PDP or EPS bearer contexts which have been setup via AT command (see the +CGDCONT and +CGDSCONT commands).

<cpdata_length>:   integer type. Indicates the number of bytes of the <cpdata> information element. When there is no data to transmit, the value shall be set to zero.

<cpdata>:   string of octets. Contains the user data container contents (refer 3GPP TS 24.301 [83] subclause 9.9.4.24). When there is no data to transmit, the <cpdata> shall be an empty string (""). This parameter shall not be subject to conventional character conversion as per +CSCS. The coding format of the user data container and the maximum length of <cpdata> are implementation specific.

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- Maximum received data length will be 1358 bytes when non-ip is set by "CGDCONT", otherwise will be 0.

- Only one message will be buffered at any one time.

2.27 PDP context read dynamic parameters (+CGCONTRDP)

Command	Response	Example
+CGCONTRDP[=<cid>]	[+CGCONTRDP:<cid>,<bearer_id>,<apn>[,<local_addr and subnet_mask>[,<gw_addr>[,<DNS_prim_addr>[, <DNS sec addr>[,<P-CSCF prim addr>[,<P-CSCF sec addr>[,<IM CN Signalling Flag>[,<LIPA in dication>[,<IPv4_MTU>[,<WLAN_Offload>[,<Local_Add r_Ind>[,<Non-	AT+CGCONTRDP +CGCONTRDP:0,,,,,,10.121.34.223 +CGCONTRDP:1,,,,,,10.121.34.224 OK AT+CGCONTRDP=1 +CGCONTRDP:1,,,,,,10.121.34.223

| | IP_MTU>[,<Serving_PLMN_rate_control_value>[,<Reliable_Data_Service]]]]]]]]]]]]]]]]] [<CR><LF> +CGCONTRDP:<cid>,<bearer_id>,<apn>[,<local_addr and subnet mask>[,<gw addr>[,<DNS prim addr>[, <DNS sec addr>[,<P-CSCF prim addr>[,<P-CSCF_sec_addr>[,<IM_CN_Signalling_Flag>[,<LIPA_indication>[,<IPv4_MTU>[,<WLAN_Offload>[,<Local_Addr_Ind>[,<Non-IP_MTU>[,<Serving_PLMN_rate_control_value>[,<Reliable Data Service]]]]]]]]]]]]]]]]] | OK |
| +CGCONTRDP=? | +CGCONTRDP: (list of <cid>s associated with active contexts) | AT+CGCONTRDP=?
+CGCONTRDP:(0,1)
OK |

Description

The execution command returns the relevant information <bearer_id>, <apn>, <local_addr and subnet_mask>, <gw_addr>, <DNS_prim_addr>, <DNS_sec_addr>, <P-CSCF_prim_addr>, <P-CSCF_sec_addr>, <IM_CN_Signalling_Flag>, <LIPA_indication>, <IPv4_MTU>, <WLAN_Offload>, <Non-IP_MTU>, <Serving_PLMN_rate_control_value> and <Reliable_Data_Service> for an active non secondary PDP context with the context identifier <cid>.

If the MT indicates more than two IP addresses of P-CSCF servers or more than two IP addresses of DNS servers, multiple lines of information per <cid> will be returned.

If the MT has dual stack capabilities, at least one pair of lines with information is returned per <cid>. First one line with the IPv4 parameters followed by one line with the IPv6 parameters. If this MT with dual stack capabilities indicates more than two IP addresses of P-CSCF servers or more than two IP addresses of DNS servers, multiple of such pairs of lines are returned.

NOTE: If the MT doesn't have all the IP addresses to be included in a line, e.g. in case the UE received four IP addresses of DNS servers and two IP addresses of P-CSCF servers, the parameter value representing an IP address that can not be populated is set to an empty string or an absent string.

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

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

Defined values

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

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

<cpdata_length>: integer type. Indicates the number of bytes of the <cpdata> information element. When there is no data to transmit, the value shall be set to zero.

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

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

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

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

returned with the execute form of +CGCONTRDP.

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

<P_CSCF_prim_addr>: string type; shows the IP address of the primary P-CSCF server.
When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

<P_CSCF_sec_addr>: string type; shows the IP address of the secondary P-CSCF server.
When +CGPIAF is supported, its settings can influence the format of this parameter returned with the execute form of +CGCONTRDP.

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

<LIPA_indication>: integer type; indicates that the PDP context provides connectivity using a LIPA PDN connection. This parameter cannot be set by the TE.
  0   indication not received that the PDP context provides connectivity using a LIPA PDN connection
  1   indication received that the PDP context provides connectivity using a LIPA PDN connection

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

<WLAN_Offload>: integer type; indicates whether traffic can be offloaded using the specified PDN connection via a WLAN or not. This refers to bits 1 and 2 of the WLAN offload acceptability IE as specified in 3GPP TS 24.008 [8] subclause 10.5.6.20.
  0   offloading the traffic of the PDN connection via a WLAN when in S1 mode or when in Iu mode is not acceptable.
  1   offloading the traffic of the PDN connection via a WLAN when in S1 mode is acceptable, but not acceptable in Iu mode.
  2   offloading the traffic of the PDN connection via a WLAN when in Iu mode is acceptable, but not acceptable in S1 mode.
  3   offloading the traffic of the PDN connection via a WLAN when in S1 mode or when in Iu mode is acceptable.

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

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

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

<Reliable_Data_Service>: integer type; indicates whether the UE is using Reliable Data Service for a PDN connection or not, see 3GPP TS 24.301 [83] and 3GPP TS 24.008 [8] subclause 10.5.6.3.
  0   Reliable Data Service is not being used for the PDN connection
  1   Reliable Data Service is being used for the PDN connection

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- Only support <cid>,<DNS_prim_addr>,<DNS_sec_addr> now.
- <DNS_prim_addr>,<DNS_sec_addr> could display only when <PDP_type> is "IP" or "IPV6".
- Could configure PDP context dynamic parameter items to read by +NCPCDPR.

2.28 Define PDP context authentication parameters (+CGAUTH)

Command	Response	Example
+CGAUTH=<cid>[,<auth_prot>[,<userid>[,<password>]]] +CGAUTH? +CGAUTH=?	+CMS ERROR:<err> [+CGAUTH: <cid>,<auth prot>,<userid>,<password>] [<CR><LF>+CGAUTH: <cid>,<auth_prot>,<userid>,<password> [...]] +CGAUTH: (range of supported <cid>s),(list of supported <auth_prot>s),(range of supported <userid>s),(range of supported <password>s)	AT+CGAUTH=1,2,"1234","1234" OK AT+CGAUTH? +CGAUTH:1 , 1 , "1234" , "1234" +CGAUTH:2 , 1 , "1234" , "1234" OK AT+CGAUTH=? +CGAUTH:(0-10),(0,1,2),(0-60) , (0-60) OK

Description

Set command allows the TE to specify authentication parameters for a PDP context identified by the (local) context identification parameter <cid> used during the PDP context activation and the PDP context modification procedures. Since the <cid> is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, +CGAUTH is effectively as an extension to these commands. Refer subclause 9.2 for possible <err> values.
The read command returns the current settings for each defined context.
The test command returns values supported as compound values.

Defined values

<cid>:	integer type. Specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).
< auth_prot>:	integer type. Authentication protocol used for this PDP context.
0	None. Used to indicate that no authentication protocol is used for this PDP context. Username and password are removed if previously specified.
1	PAP
2	CHAP
<userid>:	String type. User name for access to the IP network.
<password>:	String type. Password for access to the IP network.

M5310-A Implementation

- <userid> is needed when <auth_prot> is 1 or 2.
- Maximum <userid> string and <password> string length is 60.

2.29 Reporting o No more PS data (+CNMPSD)

Command	Response	Example
+CNMPSD	+CME ERROR:<err>	AT+CNMPSD OK
+CNMPSD=?	OK	AT+CNMPSD=? OK

Description

This command indicates that no application on the MT is expected to exchange data.

When in UTRAN, if further conditions defined in 3GPP TS 25.331 [74] are met, this can cause transmission of a SIGNALLING CONNECTION RELEASE INDICATION message with the cause "UE Requested PS Data session

end".

When in E-UTRAN, if further conditions defined in 3GPP TS 36.331 [86] are met, this can cause transmission of a UEAssistanceInformation message with powerPrefIndication set to "lowPowerConsumption" to the network.

NOTE: See subclause 10.1.38 for a command applicable to an MT using E-UTRAN, where the MT has a preference for a configuration that is not optimized for power saving.

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

Defined values

None

M5310-A Implementation

3 ETSI Commands aligned to 127.005

3.1 Select Message Service (+CSMS)

Command	Response	Example
+CSMS=<service>	+CSMS:<mt>,<mo>,<bm> +CMS ERROR:<err>	AT+CSMS=1 +CSMS:1,1,0 OK
+CSMS?	+CSMS:<service>,<mt>,<mo>,<bm>	AT+CSMS? +CSMS:0,1,1,0 OK
+CSMS=?	+CSMS: (list of supported <service>s)	AT+CSMS=? +CSMS:(0,1) OK

Description

Set command selects messaging service <service>. It returns the types of messages supported by the ME: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages. If chosen service is not supported by the ME (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned.

Also read command returns supported message types along the current service setting. Test command returns a list of all services supported by the TA.

Refer to Chapter *Error Values* for possible <err> values

Defined values

<service>:   integer type
     0   3GPP TS 23.040 [3] and 3GPP TS 23.041 [4]
     1   3GPP TS 23.040 [3] and 3GPP TS 23.041 [4] the requirement of <service>, setting 1 is mentioned under corresponding command descriptions)
     2...127   reserved
     128   manufacturer specific
<mt>, <mo>, <bm>:   integer type
     0   type not supported
     1   type supported

M5310-A Implementation

- MT will report to user if received SMS messages:
  +CMT:[<alpha>],<length><CR><LF><pdu> (PDU mode enabled); (According to +CNMI in 3GPP TS 27005)
  <alpha> Just to comply with 3GPP TS 27005, no need to care about it and always to be 0.

3.2 New Message Acknowledgement to ME/TA (+CNMA)

Command	Response	Example
+CNMA=[<n>[,<length>[<CR> PDU is given<ctrl-Z/ESC>]]]	+CMS ERROR:<err>	AT+CNMA=1 OK
+CNMA=?	+CNMA:(list of supported<n>s)	AT+CNMA=? +CNMA:(1,2) OK

Description

Execution command confirms reception of a new message (SMS-DELIVER or SMS-STATUS-REPORT)

which is routed directly to the TE (refer command +CNMI table 3.4.1-3 and table 3.4.1-5). This acknowledgement command shall be used when +CSMS parameter <service> equals 1. In PDU mode, it is possible to send either positive (RPACK) or negative (RP-ERROR) acknowledgement to the network. Parameter <n> defines which one will be sent. Optionally (when <length> is greater than zero) an acknowledgement TPDU (SMS-DELIVER-REPORT for RPACK or RP-ERROR) may be sent to the network. The entering of PDU is done similarly as specified in command Send Message +CMGS, except that the format of <ackpdu> is used instead of <pdu> (i.e. SMSC address field is not present). PDU shall not be bounded by double quotes. TA shall not send another +CMT or +CDS result code to TE before previous one is acknowledged.

If ME does not get acknowledgement within required time (network timeout), ME should respond as specified in 3GPP TS 24.011 [6] to the network. ME/TA shall automatically disable routing to TE by setting both <mt> and <ds> values of +CNMI to zero.

If command is executed, but no acknowledgement is expected, or some other ME related error occurs, final result code +CMS ERROR: <err> is returned

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

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

Refer to Chapter *Error Values* for possible <err> values

Defined Values

<n>		integer type
	0	command operates similarly as defined for the text mode (UE don't support text mode for SMS currently)
	1	send RP-ACK (or buffered result code received correctly)
	2	send RP-ERROR (if PDU is not given, ME/TA shall send SMS-DELIVER-REPORT with 3GPP TS 23.040 [3] TP-FCS value set to 'FF' (unspecified error cause))
<length>		integer type value indicating in the text mode (+CMGF=1) the length of the message body <data> > (or <cdata>) in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

M5310-A Implementation

- Only <n>=1 and <n>=2 are supported.
- +CNMI is not supported now.
- Length range 0–232.
- MT will report to user if received SMS messages:
  +CMT: [<alpha>],<length><CR><LF><pdu> (PDU mode enabled); (According to +CNMI in 3GPP TS 27005)

<alpha> Just to comply with 3GPP TS 27005, no need to care about it and always to be 0.

3.3 Service Centre Address (+CSCA)

Command	Response	Example
+CSCA=<sca>[,<tosca>]	+CMS ERROR:<err>	AT+CSCA=358501234567,145 OK
+CSCA?	+CSCA:<sca>[,<tosca>]	AT+CSCA? +CSCA:"358501234567",145 OK
+CSCA=?		AT+CSCA=? OK

Description

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

Refer to Chapter *Error Values* for possible <err> values

Defined values

<sca>   3GPP TS 24.011 [6] RP SC address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007 [9]); type of address given by <tosca>

<tosca>   3GPP TS 24.011 [6] RP SC address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)

M5310-A Implementation

3.4 Send SMS Message (+CMGS)

Command	Response	Example

+CMGS=<length><CR>
PDU is given<ctrl-Z/ESC>
 	
+CMGS=?
	if sucessful
	  +CMGS:<mr>[,<ackpdu>]]
	if fails
	  +CMS ERROR:<err>
		AT+CMGS=25
		0011000D91014698390709F00000AA0BE8329B
		FD66B56BB3180C1A
		(content: hello,M5310A
		detination: 1064899370900)
		+CMGS:1
		OK
		AT+CMGS=?
		OK

Description

Execution command sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. 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 should be abortable.

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

Refer to Chapter *Error Values* for possible <err> values

Defined values

<mr>	3GPP TS 23.040 [3] TP-Message-Reference in integer format
<length>	integer type value indicating in the text mode (+CMGF=1) the length of the message body <data> > (or <cdata>) in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)
<ackpdu>	3GPP TS 23.040 [3] RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without 3GPP TS 24.011 [6] SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

M5310-A Implementation

- <length> range 7-220.

- Don't return ackpdu now.

- For address field in PDU(3GPP TS 24.011), should put the country code at the start of it (eg, China:86).

3.5 Send SMS Command (+CMGC)

Command	Response	Example

+CMGC=<length><CR>
 	
PDU is given<ctrl-Z/ESC>
 	
+CMGC=?
	if sucessful
	    +CMGC:<mr>[,<ackpdu>]]
	if fails
	    +CMS ERROR:<err>
		AT+CMGC=25
		0011000D91014698390709F00000AA0BE8329B
		FD66B56BB3180C1A
		(content: hello,M5310A
		detination: 1064899370900)
		+CMGC:1
		OK
		AT+CMGC=?
		OK

Description

Execution command sends a command message from a TE to the network (SMS-COMMAND). The entering of text (3GPP TS 23.040 [3] TP-Command-Data) is done similarly as specified in command Send Message +CMGS,

but the format is fixed to be a sequence of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octets (refer +CMGS). Message reference value `<mr>` is returned to the TE on successful message delivery. Optionally (when +CSMS `<service>` value is 1 and network supports) `<scts>` is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: `<err>` is returned.. This command should be abortable.

Refer to Chapter *Error Values* for possible <err> values

Defined values

`<mr>`	3GPP TS 23.040 [3] TP-Message-Reference in integer format
`<length>`	integer type value indicating in the text mode (+CMGF=1) the length of the message body `<data>` > (or `<cdata>`) in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)
`<ackpdu>`	3GPP TS 23.040 [3] RP-User-Data element of RP-ACK PDU; format is same as for `<pdu>` in case of SMS, but without 3GPP TS 24.011 [6] SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

M5310-A Implementation

- <length> range 8-220.
- Don't return ackpdu now.
- For address field in PDU(3GPP TS 24.011), should put the country code at the start of it (eg, China:86).

4 Hisi-General Commands

4.1 Hisi Reboot (+NRB)

Command	Response	Example
+NRB	REBOOTING<CR><LF>	AT+NRB REBOOTING

Description

This command reboots the terminal. There is a short delay after issuing this command before the terminal reboots. No further AT commands will be processed.

Refer to Chapter *Error Values* for possible <err> values.

Note that there is no final OK to signal that the command line has finished processing as AT command processing terminates with this command. No confirmation messages are expected until the reboot.

Defined values

M5310-A Implementation

4.2 Query UE Statistics (+NUESTATS)

Command	Response	Example
+NUESTATS	Signal power: <signal power in centibels> Total power: <total power in centibels> TX power: <current Tx power level in centibels > TX time:<total Tx time since last reboot in millisecond> RX time: <total Rx time since last reboot in millisecond> Cell ID:<last cell ID> ECL: <last ECL value> SNR:< last snr value> EARFCN: < last earfcn value> PCI: < last pci value> RSRQ: <rsrq in centibels> OPERATOR MODE:<operator mode> OK	AT+NUESTATS Signal power:-787 Total power:-687 TX power:70 TX time:585 RX time:26827 Cell ID:39589684 ECL:0 SNR:81 EARFCN:3736 PCI:404 RSRQ:-113 OPERATOR MODE:4 OK
+NUESTATS=RADIO	Signal power:<signal power in centibels> Total power:<total power in centibels> TX power:<current Tx power level in centibels > TX time:<total Tx time since last reboot in millisecond> RX time:<total Rx time since last reboot in millisecond> Cell ID:<last cell ID> ECL:<last ECL value> SNR:< last snr value> EARFCN:< last earfcn value> PCI:< last pci value> RSRQ:<rsrq in centibels>	AT+NUESTATS=RADIO NUESTATS:RADIO,Signal power,50 NUESTATS:RADIO,Total power,500 NUESTATS:RADIO,TX power,30 NUESTATS:RADIO,TX time,1234567 NUESTATS:RADIO,RX time,12345 NUESTATS:RADIO,Cell ID,70 NUESTATS:RADIO,ECL,1 NUESTATS:RADIO,ECL,SNR:20 NUESTATS:RADIO,EARFCN:30 NUESTATS:RADIO,PCI:11 NUESTATS:RADIO,RSRQ:0 NUESTATS:RADIO,OPERATOR MODE:4 OK

+NUESTATS=CELL	OPERATOR MODE:<operator mode> OK or +CME ERROR:<err> NUESTATS:CELL,<earfcn>,<physical cellid>,<primary cell>,<rsrp>,<rsrq>,<rssi>,<snr> [... NUESTATS:CELL,<earfcn>,<physical cell id>,<primary cell>,<rsrp>,<rsrq>,<rssi>,<snr>] +CME ERROR:<err>	AT+NUESTATS=CELL NUESTATS:CELL,3569,69,1,23,-1073,-1145,5 OK
+NUESTATS=THP	NUESTATS:THP,<throughput type>,<throughput> [... NUESTATS:THP,<throughput_type>,<throughput>] +CME ERROR:<err>	AT+NUESTATS=THP NUESTATS:THP,RLC UL,100 NUESTATS:THP,RLC DL,98 NUESTATS:THP,MAC UL,103 NUESTATS:THP,MAC DL,100 OK
+NUESTATS=APPSMEM	APPSMEM:Current Allocated,<allocated> APPSMEM:Total Free,<free> APPSMEM:Max Free,<max free> APPSMEM:Num Allocs,<num allocs> APPSMEM:Num Frees,<num frees>	AT+NUESTATS=APPSMEM APPSMEM:Current Allocated,8240 APPSMEM:Total Free,198 APPSMEM:Max Free,8496 APPSMEM:Num Allocs, 300 APPSMEM:Num Frees, 240 OK
+NUESTATS=<type>	NUESTATS:<type>,<name/value>,<value>[,<value>[,<value>[...]]] [... NUESTATS:<type>,<name/value>,<value>[,<value>[,<value>[...]]]] +CME ERROR:<err>	AT+NUESTATS=BLER NUESTATS:BLER,RLC UL BLER,10 NUESTATS:BLER,RLC DL BLER,5 NUESTATS:BLER,MAC UL BLER,8 NUESTATS:BLER,MAC DL BLER,3 NUESTATS:BLER,Total TX bytes,1080 NUESTATS:BLER,Total RX bytes,900 NUESTATS:BLER,Total TX blocks,80 NUESTATS:BLER,Total RX blocks,80 NUESTATS:BLER,Total RTX blocks,100 NUESTATS:BLER,Total ACK/NACK RX,100 OK
+NUESTATS=?	+CZTR:(list of supported <reporting>s) +CME ERROR:<err>	AT+NUESTATS=? NUESTATS:(RADIO,CELL,BLER,THP,APPSMEM,ALL) OK

Description

This command fetches the most recent operational statistics. Refer to Chapter *Error Values* for possible <err> values. It can take an optional parameter that allows different sets of statistics to be displayed. The <type> RADIO provides the default set of values. <type>=ALL will print all data.

Defined values

<type>   Type of data to be displayed as an unquoted string. Supported values of <type> are:

       RADIO   radio specific information

       CELL   per-cell information for the top 8 cells

       BLER   block error rate information

       THP   throughput

       ALL   all information. The value of <type> output is the correct one for each data type.

<type> = RADIO

       <signal power in centibels>

       <total power in centibels>

       <current TX power level in centibels >

       <total TX time since last reboot in millisecond>

       <total RX time since last reboot in millisecond>

<last SIB1 cell ID>

<last ECL value>

< last snr value>

< last earfcn value>

< last pci value>

<rsrq in centibels>

<operator mode>		operator mode for SIB1.
	0	Unknown mode.
	1	Inband different pci mode.
	2	Inband same pci mode.
	3	Guardband mode.
	4	Standalone mode.

<type> = CELL

per-cell information for the top 5 cells.

Returned entries are of the form:

<earfcn>,<physical cell id>,<primary cell>,<rsrp>,<rsrq>,<rssi>,<snr>

<earfcn>	absolute radio-frequency channel number
<physical cell id>	physical id of the cell
<primary cell>	1 indicates the current serving cell
<rsrp>	reference signal received power
<rsrq>	reference signal received quality
<rssi>	received signal strength indicator
<snr>	signal to noise ratio

<type> = BLER

block error rate

<rlc_ul_bler>	RLC layer block error rate (uplink). Integer %
<rlc_dl_bler>	RLC layer block error rate (downlink). Integer %
<mac_ul_bler>	physical layer block error rate (uplink). Integer %
<mac_dl_bler>	physical layer block error rate (downlink). Integer %

<total bytes transmitted>

<total bytes received>

<transport blocks sent>

<transport blocks received>

<transport blocks retransmitted>

<total ack/nack messages received>

<type> = THP

throughput

<rlc_ul>	RLC layer throughput (uplink). Integer bps
<rlc_dl>	RLC layer throughput (downlink). Integer bps
<mac_ul>	physical layer throughput (uplink). Integer bps
<mac_dl>	physical layer throughput (downlink). Integer bps

<type> = APPSMEM
Application Core dynamic memory usage

<allocated>

<free>

<max free >

<num allocs >

<num frees>

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- The variant of NUESTATS without an argument prints out the RADIO arguments without the command and variant prefixes. This will be deprecated in a future release.

- +NUSTATS and +NUESTATS=RADIO,CELL,BLER,THP will be reset to invalid value when power off or out of service.

- +NUSTATS and +NUESTATS=RADIO have default invalid values,they are

Signal power:-32768

Total power:-32768

TX power:-32768

TX time:0

RX time:0

Cell ID:4294967295

ECL:255

SNR:-32768

EARFCN:4294967295

PCI:65535

RSRQ:-32768

OPERATOR MODE:0

4.3 Specify search frequencies (+NEARFCN)

Command	Response	Example
+NEARFCN=<search_mode>[,<param1>[,<param2>[,...]]]		
+NEARFCN=0,<earfcn>[,<ci>]	+CME ERROR:<err>	AT+NEARFCN=0,10,ABCD

	OK
+NEARFCN=?	AT+NEARFCN=?
	OK

Description

The set command provides a mechanism to lock to a specific E-ULTRA Absolute Radio Frequency Channel Number (EARFCN) and, if desired, Physical Cell ID. All actions will be locked to this carrier until either the lock is removed or the UE is rebooted. It is not persistent over reboots.

If the specified EARFCN is not present, the UE will enter out of service mode. If the specified PCI is not present, the UE will enter out of service mode.

Refer to Chapter *Error Values* for possible <err> values.

Defined values

`<search_mode>`	Specifies the type of search and defines the supplied parameters.
	0 `<earfcn>,<pci>` lock to a specific earfcn
`<earfcn>`	A number in the range 0-65535 representing the earfcn to search. An `<earfcn>` value of 0 will remove the earfcn restriction and any associated Physical Cell ID lock.
`<pci>`	string type; four byte E-UTRAN cell ID in hexadecimal format, Valid range 0-1F7.

M5310-A Implementation

4.4 Create Socket (+NSOCR)

Create a socket and associate with specified protocol.

Command	Response	Example
+NSOCR=<type>,<protocol>[,<listen port>[,<receive control>[,<af_type>[,<ipaddr]]]]	<socket> *+CME ERROR: <err>*	AT+NSOCR="DGRAM",17,56 1 OK AT+NSOCR="STREAM",6,1234,0 2 OK

Description

This command creates a socket on the UE. If the port is set, receiving is enabled and unsolicited +NSONMI messages will appear for any message that is received on that port.

Refer to Chapter *Error Values* for possible <err> values.

If a socket has already been created for a protocol, port combination, +NSOCR will fail if requested a second time.

Defined values

<type>	Socket Type. DGRAM for UDP, STREAM for TCP.
<protocol>	Standard internet protocol definition. For example, UDP is 17.
<listen port>	A number in the range 0-65535. This is the local port that will be included in sent messages and on which messages will be received, if assigned to 0, a random number between 32768 to 65535 will be assigned.
<socket>	This is a reference to the created socket. It is an integer greater than or equal to 0
<receive control>	Message receive control. Defaults to 1 (messages will be received)
0	incoming messages should be ignored.
1	incoming messages should be received, and +NSONMI indicated when data arrival
2	incoming messages should be received, and +NSORF indicated when data arrive
3	only reserved for test.
<af_type>	String type, "AF_INET" for IPv4 and "AF_INET6" for IPv6. Default value "AF_INET".
<ip address>	The ip address NW assigned to MT.

M5310-A Implementation

- A maximum of 7 sockets are supported, but other services may reduce this number.
- Only UDP(protocol 17), TCP(protocol 6) supported.
- <listen port> value of 20000 can't be set when bip is enabled.

4.5 SendTo Command (UDP only) (+NSOST)

Send a UDP datagram containing length bytes of data to remote_port on remote_addr.

Command	Response	Example
+NSOST=<socket>,<remote_addr>,<remote_port>,<length>,<data>[,<sequence>]	<socket>,<length> *+CME ERROR: <err>*	AT+NSOST=1,192.158.5.1,1024,2,AB30 1,2 OK

Description

This command sends a UDP datagram to the specified host:port. It will return with the socket that it was sent on, and the number of bytes of data sent. If the amount of data is larger than the largest datagram that can be sent, the +NSOST return value will indicate how much of the data was successfully sent.

If <sequence>is not omitted, when datagram is sent by rf or discard, will report the result.

Command	Response	Example
	+NSOSTR:<socket>,<sequence>,<status>	+NSOSTR:1,2,1

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<socket>	Socket number returned by +NSOCR
<remote addr>	IPv4: A dot notation IP address
<remote port>	A number in the range 0-65535. This is the remote port that messages will be received on
<length>	Decimal length of data to be sent.
<data>	Data received in hexstring format, or quoted string format.
<sequence>	Sequence of data, range 1-255.If omit, will not report data sent status.
<status>	The status of datagram.
0	Error
1	Sent

M5310-A Implementation

- Maximum data size is 1358 bytes.
- <data> Only hexstring format is supported
- IP addresses can be specified in decimal, octal or hexadecimal notation.
- Data can't be transferred if MT don't have address (could use +cgpaddr to get).

4.6 SendTo Command with Flags (UDP only) (+NSOSTF)

Send a UDP datagram containing length bytes of data to remote_port on remote_addr and allows meta-data flags to be set.

Command	Response	Example
+NSOSTF=<socket>,<remote_addr>, <remote_port>,<flag>,<length>, <data>[,<sequence>]	<socket>,<length> *+CME ERROR: <err>*	AT+NSOSTF=1,192.158.5.1,1024,0x100,2,AB30 1,2 OK

Description

This command sends a UDP datagram to the specified host:port. It will return with the socket that it was sent on, and the number of bytes of data sent. If the amount of data is larger than the largest datagram that can be sent, the +NSOST return value will indicate how much of the data was successfully sent.

If <sequence>is not omitted, when datagram is sent by rf or discard, will report the result.

Command	Response	Example
	+NSOSTR:<socket>,<sequence>,<status>	+NSOSTR:1,2,1

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<socket>	Socket number returned by +NSOCR
<remote addr>	IPv4: A dot notation IP address
<remote port>	A number in the range 0-65535. This is the remote port that messages will be received on
<flag>	Specifies the type of message transmission. Values of this argument are in hex format and are formed by logically OR'ing zero or more of the following flags:

    0x100   Exception Message: Send message with high priority

    0x200   Release Indicator: indicate release after next message

    0x400   Release Indicator: indicate release after next message has been replied to If no flags

            are set, a value of 0 should be provided.

<length>	Decimal length of data to be sent.
<data>	Data received in hexstring format, or quoted string format.
<sequence>	Sequence of data, range 1-255.If omit, will not report data sent status.
<status>	The status of datagram.
0	Error
1	Sent

M5310-A Implementation

- Maximum data size is 1358 bytes.
- <data> Only hexstring format is supported
- IP addresses can be specified in decimal, octal or hexadecimal notation.
- Data can't be transferred if MT don't have address (could use +cgpaddr to get).

4.7　Query Socket Messages Sent Pending Data List (+NQSOS)

Send a UDP datagram containing length bytes of data to remote_port on remote_addr and allows meta-data flags to be set.

Command	Response	Example
+NQSOS=<socket>[,<socket>[,<socket>[...]]]	[+NQSOS:<socket>,<sequence><CR><LF> [+NQSOS:<socket>,<sequence>][…]]	AT+NQSOS=1,2 +NQSOS:1,2 +NQSOS:2,3 OK
+NQSOS?	[+NQSOS:<socket>,<sequence><CR><LF> [+NQSOS:<socket>,<sequence>][…]] +CME ERROR:<err>	AT+NQSOS? +NQSOS:1,2 +NQSOS:2,3 OK

Description

This command queries the list of the pending upstream message by MT.

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<socket>	Socket number returned by +NSOCR
<sequence>	Sequence of data, range 1-255.If omit, will not report data sent status.

M5310-A Implementation

4.8 Receive Command (UDP only) (+NSORF)

Command	Response	Example

`+NSORF=<socket>,`
`<req_length>`
	`<socket>,<ip_addr>,<port>,<length>,<data>,<remaining_l`
	`ength>`
	`+CME ERROR: <err>`
		`AT+NSORF=1,10`
		`1,192.168.5.1,1024,2,ABAB,0`
		`OK`

Description

Reads up to <req length> characters of data from <socket>.

Returned length is the actual number of characters returned.

Receive data on a socket. When data arrives a +NSONMI response will be generated that indicates the socket the message was received on and the amount of data. The +NSORF command takes a length, which is the maximum amount of data that will be returned.

If the requested length is larger than the actual size of the returned data, only the length of returned data is provided, and the remaining length is returned as 0. If the requested length is less than the amount of data returned, only the requested amount of data will be returned, plus an indication of the number of bytes remaining. Once a message has been fully read, a new +NSONMI notification will be sent if there is another message to process.

Refer to Chapter *Error Values* for possible <err> values.

If messages arrive faster than they are read, and the internal message buffer is full, the most recent message will be discarded.

Defined values

<socket>	Socket number returned by +NSOCR
<req_length>	Maximum amount of data to be returned as a decimal byte length.
<remote addr>	Address of system sending the message
<remote port>	A number in the range 0-65535. This is the remote port that messages was sent from
<length>	Amount of data returned as a decimal byte length
<remaining_length>	Amount of data left to read for this message as a decimal byte length

<data>   Data received in hexstring format

M5310-A Implementation

- Maximum data size is 1358 bytes.

- Remaining length is always 0. The remaining data is readable.

4.9   Connect Command (TCP only) (+NSOCO)

Connect to a TCP server to remote_port on remote_addr.

Command	Response	Example
+NSOCO=<socket>,<remote_addr>,<remote_port>	*+CME ERROR: <err>*	AT+NSOCO=0,192.158.5.1,1024 OK

Description

This command Connect to a TCP sever to the specified host:port.

Defined values

<socket>   Socket number returned by +NSOCR

<remote_addr>   Address of system sending the message

<remote_port>   A number in the range 0-65535. This is the remote port that connect to.

M5310-A Implementation

- IP addresses can be specified in decimal, octal or hexadecimal notation.

4.10   Send Socket Data (TCP only) (+NSOSD)

Send a TCP datagram containing length bytes of data to TCP server.

Command	Response	Example
+NSOSD=<socket>,<length>,<data>[,<flag>[,sequence]]	*socket,length* *+CME ERROR: <err>*	AT+NSOSD=0,2,AB30 1,2 OK AT+NSOSD=0,2,AB30,0x100 1,2 OK

Description

This command sends a TCP datagram to the TCP server. It will return with the socket that it was sent on, and the number of bytes of data sent. If the amount of data is larger than the largest datagram that can be sent, the +NSOSD return value will indicate how much of the data was successfully sent.

If <sequence>is not omitted, when datagram is acked by server or discard by UE, will report the result.

Command	Response	Example
	+NSOSTR:<socket>,<sequence>,<status>	*+NSOSTR:1,2,1*

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<socket>   Socket number returned by +NSOCR

<length>   Decimal length of data to be sent.

<data>   Data to be transmitted in hexstring format, or quoted string format.

<flag>   Specifies the type of message transmission. Values of this argument are in hex format and are formed by logically OR'ing zero or more of the following flags:

        0x100   Exception Message: Send message with high priority

        0x200   Release Indicator: indicate release after next message

        0x400   Release Indicator: indicate release after next message has been replied to

        If no flags are set, a value of 0 should be provided.

<sequence>   Sequence of data, range 1-255.If omit, will not report data sent status.

<status>   The status of datagram.

        0   Error

        1   Sent

M5310-A Implementation

- Maximum data size is 1358 bytes.

- <data> Only hexstring format is supported

- IP addresses can be specified in decimal, octal or hexadecimal notation.

- <flag> couldn't work now.

4.11 Close Socket (+NSOCL)

Command	Response	Example
+NSOCL=<socket>	*+CME ERROR: <err>*	AT+NSOCL=1 OK

Description

Close the specified socket. If there are pending messages to be read, they will be dropped. No further unsolicited +NSONMI notifications will be generated. If the socket has already been closed, or was never created, an error will be returned.

Defined values

<socket>　　　　　Socket number returned by +NSOCR

M5310-A Implementation

4.12 Socket message arrived indicator (+NSONMI) (Response Only)

Command	Response	Example
+NSONMI	<socket>,<length>	+NSONMI:1,10

Description

Unsolicited message to notify that data has been received on a socket and is ready to be read. Returns socket number and number of bytes of data available to read for the first message that is queued. If another message is received on the same socket, it will only be notified when the preceding message has been completely read.

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<socket>　　Socket on which data is received. Decimal number returned by +NSOCR

<length>　　Number of bytes of data in the first message.

M5310-A Implementation

- This message can occur at any point if it is indicating a new message with no messages buffered. If there are buffered messages it will occur in the AT+NSORF command before the data is returned.

4.13 Socket close indicator (+NSOCLI) (Response Only)

Command	Response	Example
+NSOCLI	<socket>	+NSOCLI:1

Description

Unsolicited message to notify that socket has been closed by LWIP internally. Returns socket number.

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<socket>　Socket on which data is received. Decimal number returned by +NSOCR

M5310-A Implementation

- Only TCP could report +NSOCLI.

4.14 Socket extension configure (+NSOCFG)

Command	Response	Example
+NSOCFG=<socket>[,<hex_output>,<hex_input>]	OK	AT+NSOCFG=1,,0 OK
+NSOCFG=?	OK	AT+NSOCFG=? OK

Description

Set and query socket acknowledge mode (only valid for TCP) and output/input data format (hexadecimal or not). If acknowledge mode is on, when remote server receive data and send acknowledge back to module, +NSOACK will be unsolicited.
Refer to Chapter *Error Values* for possible <err> values.

Defined values

<socket>   Socket number returned by +NSOCR

<hex_output>   if enable hexadecimal format output in +NSORF command, default 1.

<hex_input>   if enable hexadecimal format input in +NSOSD/+NSOST/+NSOSTF command; if

                not, input data string will be parsed in string type, escape string supported, such

                as \r and \ddd(octal) and \xdd (hexadecimal), default 1.

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4.15 Test IP network connectivity to a remote host (+NPING)

Command	Response	Example
+NPING=<remote_address>[,<p_size>[,<timeout>,<p_times>]] +NPINGERR	+NPING:<remote_address>,<ttl>,<rtt> +CME ERROR:<err>	AT+NPING=183.232.231.172,54 OK +NPING:183.232.231.172,54,2500 ---183.232.231.172 ping statistics--- 1 packets transmitted, 1 received, 0% packet loss rtt min/avg/max = 2500/2500/2500 +NPINGERR:1

Description

This command sends an ICMP packet to the specified host address. Refer to Chapter *Error Values* for possible <err> values.

AT+NPING initiates the sending of a PING packet to the specified address. This will either cause a packet to be returned if the remote system is connected and responding to PING packets, or no response will be received. . A maximum of 1 ping attempts will be tried. If none of the packets receive a response within the timeout period, an error will be raised.

If a response is received, the unsolicited +NPING message will be returned. If no response is received the +NPINGERR unsolicited response will be returned with an error value.

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Defined values

<remote addr>	address of system sending the message
	IPv4: A dot notation IP address
<p_size>	size in bytes of echo packet payload.
	Range of 8-1460
	Default 8
<timeout>	maximum time in ms to wait for an echo reply response.
	Range 10-60000.
	Default 10000
<p_times>	send <p_times> ICMP packets continuously, default 1.
<ttl>	ttl received in the response packet
<rtt>	elapsed time in msec from packet sent to response received.
<err>	An integer value to provide some information on why the ping request failed.
	1　　No response from remote host within timeout period
	2　　Failed to send ping request

M5310-A Implementation

- IP addresses can be specified in decimal, octal or hexadecimal notation.

- Data can't be transferred if MT don't have address (could use +cgpaddr to get).

4.16 Set Supported Bands (+NBAND)

Command	Response	Example
+NBAND=n[,n[,n[...]]]	+CME ERROR:<err>	AT+NBAND=5,8 OK AT+NBAND?
+NBAND?	+NBAND: n[,n[,n[...]]]	+NBAND:5,8,28,3 OK AT+NBAND=?
+NBAND=?	+NBAND:(n[,n[,n[...]]])	+NBAND:(1,2,3,5,8,12,13,14,17,18,19,2 0,25,26,28,66) OK

Description

This command restricts the set of bands to be used. Refer to Chapter *Error Values* for possible <err> values.

Defined values

　　<n>　　Band as a decimal number.

M5310-A Implementation

- AT+NBAND=? returns the list of bands supported by the hardware.

4.17 Set Debug Logging Level (+NLOGLEVEL)

Command	Response	Example
+NLOGLEVEL=<core>,<level>	+CME ERROR:<err>	AT+NLOGLEVEL=PROTOCOL,ERROR OK AT+NLOGLEVEL?
+NLOGLEVEL?	+NLOGLEVEL:<core>,<level>	+NLOGLEVEL:SECURITY,NORMAL +NLOGLEVEL:PROTOCOL,NORMAL +NLOGLEVEL:APPLICATION,NORMAL OK AT+NLOGLEVEL=?
+NLOGLEVEL=?	+NLOGLEVEL:(<core>,...),(<level> ,<level>,...)	+NLOGLEVEL:(PROTOCOL,APPLICATION,SECURITY), (VERBOSE,NORMAL,WARNING,ERROR,NONE) OK

Description

This command sets the logging level. It can take one of the following values: The default logging level is NONE. This value is persistent across reboots.

Defined values

<core>   Core required
          PROTOCOL
          SECURITY
          APPLICATION

<level>   Logging level required

          VERBOSE
          NORMAL
          WARNING
          ERROR
          NONE

M5310-A Implementation

- Logging levels for application core and security core are not persistent.
- Default logging level is NORMAL

4.18 Card Identification (+NCCID)

Command	Response	Example
+NCCID	+NCCID:<ICCID> +CME ERROR: <err>	AT+NCCID +NCCID:4412345678901234567 OK
+NCCID?	+NCCID:<ICCID> +CME ERROR: <err>	AT+NCCID? +NCCID:4412345678901234567 OK
+NCCID=?		AT+NCCID=? OK

Description

Both the execute and read commands read the ICCID off the SIM card. If no SIM card is present, or the SIM card is

unreadable, no data is returned.

Refer to Chapter *Error Values* for possible <err> values

Defined values

<ICCID>   SIM Card Identification Number

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4.19   Configure UE Behaviour (+NCONFIG)

Command	Response	Example
+NCONFIG=<function>,<value>	+CME ERROR: <err>	AT+NCONFIG=AUTOCONNECT,TRUE OK
+NCONFIG?	+NCONFIG:<function>,<value> [+NCONFIG:<function>,<value> [..]]	AT+NCONFIG? +NCONFIG:AUTOCONNECT,FALSE +NCONFIG:CR_0354_0338_SCRAMBLING,TRUE +NCONFIG:CR_0859_SI_AVOID,TRUE +NCONFIG:COMBINE_ATTACH,FALSE +NCONFIG:CELL_RESELECTION,TRUE +NCONFIG:ENABLE_BIP,FALSE +NCONFIG:MULTITONE,TRUE +NCONFIG:NAS_SIM_POWER_SAVING_ENABLE,TRUE +NCONFIG:BARRING_RELEASE_DELAY,64 +NCONFIG:RELEASE_VERSION,13 +NCONFIG:RPM,FALSE +NCONFIG:SYNC_TIME_PERIOD,0 +NCONFIG:IPV6_GET_PREFIX_TIME,15 +NCONFIG:NB_CATEGORY,1 +NCONFIG:HEAD_COMPRESS,TRUE +NCONFIG:RLF_UPDATE,TRUE +NCONFIG:CONNECTION REESTABLISHMENT OK
+NCONFIG=?	+NCONFIG:(<function>,(<value1>,<value2>[,<value3>[,...]])) [+NCONFIG:(<function>,(<value1>,<value2>[,<value3>[,...]])) [,...]]	AT+NCONFIG=? +NCONFIG:(AUTOCONNECT,(FALSE,TRUE)) +NCONFIG:(CR_0354_0338_SCRAMBLING,(FALSE,TRUE)) +NCONFIG:(CR_0859_SI_AVOID,(FALSE,TRUE)) +NCONFIG:(COMBINE_ATTACH,(FALSE,TRUE)) +NCONFIG:(CELL_RESELECTION,(FALSE,TRUE)) +NCONFIG:(ENABLE_BIP,(FALSE,TRUE)) +NCONFIG:(MULTITONE,(FALSE,TRUE)) +NCONFIG:(NAS_SIM_POWER_SAVING_ENABLE,(FALSE,TRUE)) +NCONFIG:(BARRING_RELEASE_DELAY,(0-1800)) +NCONFIG:(RELEASE_VERSION,(13,14)) +NCONFIG:(RPM,(FALSE,TRUE)) +NCONFIG:(SYNC_TIME_PERIOD,(0-65535)) +NCONFIG:(IPV6_GET_PREFIX_TIME,(0-65535)) +NCONFIG:(NB_CATEGORY,(1,2)) +NCONFIG:(HEAD_COMPRESS,(FALSE,TRUE)) +NCONFIG:(RLF_UPDATE,(FALSE,TRUE)) +NCONFIG:(CONNECTION_REESTABLISHMENT,(FALSE,TRUE)) OK

Description

This command allows the configuration of certain aspects of UE behaviour. It takes a function and a value that controls operation of that function.

Defined values

<function>   UE function to configure

>   AUTOCONNECT

>>   Control if the platform will automatically attempt to connect to the network after power-on or reboot. When enabled, will set+ CFUN=1 and read the plmn from the SIM. It will use the APN provided by the network.

>   CR_0859_SI_AVOID

>>   Enable/disable SI_AVOID

>   CR_0354_0338_SCRAMBLING

>>   Enable/disable scrambling

>   COMBINE_ATTACH

>>   Enable/disable combine attach.

>   CELL_RESELECTION

>>   Enable support for RRC cell reselection

>   ENABLE_BIP

>>   Enable/disable bip

>   MULTITONE

>>   Enable/disable multitone. Need rf support multitone too if enable multitone.

>   NAS_SIM_POWER_SAVING_ENABLE

>>   Enable/disable sim card power saving mode. Could set only when power off.

>   BARRING_RELEASE_DELAY

>>   Time (in seconds) to delay release from barring. Value from 0-1800.

>>   Should only be set when bar release timer not running.

>   RELEASE_VERSION

>>   Release version, only 13 and 14 are supported. Could set to 13 only when MT don't use powerclass 6.

>   RPM

>>   Enable/disable rpm,if RPM files present on SIM the SIM settings will have precedence

>   SYNC_TIME_PERIOD

>>   The sync time period from eNB. Unit is hour, range 0-65535. 0 means close sync time.

>   IPV6_GET_PREFIX_TIME

>>   Set the maximum time of getting IPV6 prefix. Unit is second, range 0-65535. 0 means to get IPV6 prefix immediately, 65535 close to get IPV6 prefix.

>   NB_CATEGORY

>>   Configure the NB category. Only support 1 and 2 now.

>   HEAD_COMPRESS

>>   Enable/Disable head compress.

>   RLF_UPDATE

>>   "FALSE" represents the occurrence of radio link failure, NAS will TAU immediately. And

>>   "TRUE" representative when occurred radio link failure, ACK is expected before TAU.

>   CONNECTION_REESTABLISHMENT

>>   Enable/Disable connection reestablishment.

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- CR_ functions are temporary and will be retired when no longer required.
- MULTITONE,NAS_SIM_POWER_SAVING_ENABLE,RELEASE_VERSION,SYNC_TIME_PERIOD, NB_CATEGORY, HEAD_COMPRESS could set only when MT is power off.

4.20 Configure AT Uart Baud Rate (+NATSPEED)

Command	Response	Example
+NATSPEED=<baud_rate>,<timeout>,<store>,<sync_mode>[,<stopbits>[,<parity>[,<xonxoff>]]] +NATSPEED? +NATSPEED=?	+CME ERROR: <err> +NATSPEED:<baud_rate>,<sync_mode>,<stopbits>,<parity>,<xonoff> OK +NATSPEED:(<baudrate>),(<timeout>),(<store>),(<sync_mode>),(<stopbits>),(,<parity>),(xonxoff) OK	AT+NATSPEED=9600,30,1,3,1,0,0 OK AT+NATSPEED? +NATSPEED:9600,2,1,0,0 OK AT+NATSPEED=? +NATSPEED:(4800,9600,57600,115200,230400,460800),(0-30),(0,1),(0-3),(1,2),(0-2),(0-1) OK

Description

Configure AT uart baud rate. Refer to Chapter *Error Values* for possible <err> values.

Defined values

< baud rate>   Integer type indicating the at uart baud rate that has been requested. Only 4800,9600, 57600,115200, 230400, 460800 are supported.

<timeout>   Integer type indicating the time to wait for communication before switching back to the original speed, unit second. Default value is 3 second. Maximum value is 30s. 0 means using default value.

<store>   Integer type indicating parameter baud_rate and sync_mode store to nv or not. Default value is 0.

     0   Do not store to nv, need configure again after reboot.

     1   Will store to nv, while there is interaction before timeout.

<sync mode>   The LP UART synchronises to each start bit that it detects and uses this to configure its optimum sampling point for each subsequent bit in a data word. The Sync Mode field allows this sampling point to be modified if required.

     0   Default value for most operations
     1   Sample later
     2   Sample earlier
     3   Sample even earlier

<stopbits>   The LP UART stopbits

     1   1 stop bit
     2   2 stop bits

<parity>   The AT UART parity, default value is 0.

0	No parity enabled	
1	Odd parity	
2	Even parity	
<xonxoff>	AT UART Software (XON/XOFF) Flow Control	
0	Software flow control disabled	
1	Software flow control enabled	

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- <baud_rate>   baud rate higher than the fastest speed supported by the Low Power UART will disable Deep Sleep Low Power Operation.
- <sync mode>   parameter may be removed in a future release
- <sync mode>   don't support 3 when <baud rate> is 4800 and 57600

4.21 Firmware Update (+NFWUPD)

Command	Response	Example

`+NFWUPD=<cmd>[,<sn>,<len>,<data>,<crc>]`
 	
`+NFWUPD=?`
	`<result>`
	`+CME ERROR:<err>`
	
	`+NFWUPD:(list of supported <cmd>s)`
		`AT+NFWUPD=0`
		`OK`
		`AT+NFWUPD=?`
		`+NFWUPD:(0-5)`
		`OK`

Description

This command supports Firmware Updating. It allows package download, package validation, package nameand version querying and firmware upgrading. Before upgrading firmware, it need package download first. After download finish, it send package validity cmd. If package is legal return ok, otherwise return error and print reason. When validity is running, it refuse to exec other command with error return, After validity finish, it send firmware upgrade command. It refuse to exec firmware upgrade command without package validity.

Defined values

`<cmd>`		Package process command
	0	Erase package zone in internal flash
	1	`<sn>,<len>,<data>,<crc>` Download a package segment. Package segments are continuous segments of the FOTA package. Segments can be of any length(less than 512Bytes), but must be provided in order.
	2	Valliditate package
	3	Get package name
	4	Get package version
	5	Upgrade firmware
`<sn>`		Sequence number. It start with 0, and increments by one for each package segment
`<len>`		Data length in bytes of data, should be 32/64/128/256/512.
`<data>`		Data of this package to be transmitted, Hex String Format.
`<crc>`		CRC of the package segment binary data. CRC is sent as a Hex String. The `<crc>` is an xor8 of each byte in the package segment.,

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4.22 Read System Information (+NCHIPINFO)

Command	Response	Example
+NCHIPINFO=<cmd> +NCHIPINFO=?	<result> +CME ERROR:<err>	AT+NCHIPINFO=ALL +NCHIPINFO:VBAT,1800 +NCHIPINFO:TEMP,25 OK AT+NCHIPINFO=? +NTCHIPINFO:(ALL,VBAT,TEMP) OK

Description

Return system information, including temperature and battery voltage.
This is a Calibration time command, and shouldn't be listed in the normal set of commands. Refer to Chapter *Error Values* for possible <err> values.

Defined values

<cmd>		Command to execute
	ALL:	return all data
	TEMP:	current temperature in degrees C. If the temperature sensor has not been calibrated, it will return an error.
	VBAT:	battery voltage in mV
<result>		Integer value corresponding to specified command.

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4.23 Power saving mode status report(+NPSMR)

Command	Response	Example
+NPSMR=<n> +NPSMR? +NPSMR=?	+CME ERROR:<err> +NPSMR:<n>[,<mode>] +CME ERROR:<err> +NPSMR:(list of supported <n>s) +NPSMR:<mode>	AT+NPSMR=0 OK AT+NPSMR? +NPSMR:0,1 OK AT+NPSMR=? +NPSMR:(0,1) OK +NPSMR:1

Description

The set command controls the presentation of an unsolicited result code +NPSMR.
If <n>=1, +NPSMR：<mode> is sent from the MT when the power mode of the MT is changed.
 Refer to Chapter *Error Values* for possible <err> values.

The read command returns the status of result code presentation and an integer <mode> which shows whether the MT is currently in power saving mode or normal mode.

Test command returns supported values as a compound value.

Defined values

<n>: integer type
  0   disable unsolicited result code
  1   enable unsolicited result code +NPSMR: <mode>
<mode>: integer type; indicates the power mode of MT.
  0   normal mode
  1   power saving mode

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4.24 Set the mapping for band and power class (+NPOWERCLASS)

Command	Response	Example
+NPOWERCLASS=<band>,<power class>	+CME ERROR:<err>	AT+NPOWERCLASS=5,3 OK
+NPOWERCLASS?	[+NPOWERCLASS:<band>,<power class><CR><LF>[+NPOWERCLASS:<band>,<powerclass>][…]] +CME ERROR:<err>	AT+NPOWERCLASS? +NPOWERCLASS:5,3 OK
+NPOWERCLASS=?	+NPOWERCLASS:((list of supported bands),(list of supported power class)	AT+NPOWERCLASS=? +NPOWERCLASS:(5,8,20),(3,5,6) OK

Description

Set the mapping for band and power class.

The read command list all mapping of bands and power class.

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<band>   Band as key to map.
<powerclass>   Power class value for band.

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- <powerclass> only support 3, 5,6 now.
- <power class> could set to 6 only when <function> "RELEASE_VERSION" in +NCONFIG is 14.
-   Could set only when MT is power off.

4.25 Neul Exception Log (+NXLOG)

Command	Response	Example
AT+NXLOG=<Command>[,parameter]	[<report>] +CME ERROR:<err>	AT+NXLOG=DUMP OK
AT+NXLOG?	+NXLOG:<log mode> +CME ERROR:<err>	AT+NXLOG? +NXLOG:1 OK
AT+NXLOG=?	NXLOG:(<list of supported commands>) +CME ERROR:<err>	AT+NXLOG=? NXLOG:(DUMP,DELETE,ENABLE,DISABLE) OK

Description

NXLOG provides an interface to debug and exception log. The debug log is defined for debug. The exception log stores all debug error message of verbosity ERROR.
It allows the debug log to be enabled, disabled or cleared

Refer to Chapter *Error Values* for possible <err> values.

Defined values

<command>
    DUMP   <dump mode>.
                    dump out the debug and exception log.
    DELETE   delete all debug and exception log data.
    ENABLE   enable logging of debug data.
    DISABLE   disable logging of debug data.
<report>   hexstring encoded debug and exception log when <dump mode> is 0.
                    binary encoded debug and exception log when <dump mode> is 1.
<dump mode>   dump mode, default value is 0.
    0:      dump over at port.
    1:      dump over debug serial port
<log mode>   log mode, default value is 0.
    0:      disable logging of debug data
    1:      enable logging of debug data

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- <command>= DELETE / ENABLE/DISABLE and +NXLOG? could work only when using external flash.

4.26 Paging time window value and eDRX setting (+NPTWEDRXS)

Command	Response	Example
+NPTWEDRXS=[<mode>,[,<AcT-type>[,<Requested_Paging_time_window>[,<Requested_eDRX_value>]]]]	+CME ERROR: <err>	AT+NPTWEDRXS=1,5,1110,0101 OK
+NPTWEDRXS?	[+NPTWEDRXS: <AcT-type>,<Requested_Paging_time_window>,<Requested_eDRX_value> [<CR><LF>+NPTWEDRXS: <AcT-type>,<Requested_Paging_time_window>,<Requested_eDRX_value> [...]]]	AT+NPTWEDRXS? +NPTWEDRXS:5,1110,0101 OK
+NPTWEDRXS=?	+NPTWEDRXS: (list of supported <mode>s),(list of supported <AcTtype>s) ,(list of supported <Requested_Paging_time_window>s),(list of supported <Requested_eDRX_value>s)	AT+NPTWEDRXS=? +NPTWEDRXS:(0,1,2,3),(5),("0000"-"1111"),("0000"-"1111") OK

Description

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

The set command also controls the presentation of an unsolicited result code +NPTWEDRXP:<AcT-

```
type>[,<Requested_Paging_time_window>[,<Requested_eDRX_value>[,<NWprovided_eDR
X_value>[,<Paging_time_window>]]]]
```
when `<n>`=2 and there is a change in the paging time window and eDRX parameters provided by the network. A special form of the command can be given as +NPTWEDRXS=3. In this form, paging time window and eDRX will be disabled and data for all parameters in the command +NPTWEDRXS will be removed or, if available, set to the manufacturer specific default values.

The read command returns the current settings for each defined value of `<AcT-type>`.The test command returns the supported <mode>s and the value ranges for the access technology and the requested paging time window and requested eDRX value as compound values.
Refer to Chapter *Error Values* for possible `<err>` values

Defined values

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

    0   Disable the use of requested PTW and eDRX

    1   Enable the use of requested PTW and eDRX

    2   Enable the use of requested PTW and eDRX and enable the unsolicited result code `+NPTWEDRXP:<AcTtype>[,<Requested_Paging_time_window>][,<Requested_eDRX_value>[,<NWprovided_eDRX_value>[,<Paging_time_window>]]]`

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

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

    0   Access technology is not using eDRX. This parameter value is only used in the unsolicited result code.

    1   EC-GSM-IoT (A/Gb mode)

    2   GSM (A/Gb mode)

    4   E-UTRAN (WB-S1 mode)

    5   E-UTRAN (NB-S1 mode)

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

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

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

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

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- When set `<mode>` to 0 and don't have parameter `<Requested_Paging_time_window>` or `<Requested_eDRX_value>`, will set omit value to invalid value like 0x00.
- `<AcT-type>` value 5 is supported.

4.27 PIN operator (+NPIN)

Command	Response	Example
+NPIN=<command>,<parameter1>[,< parameter2>]	+CME ERROR:<err> +NPIN:<npin result>	AT+NPIN=0,29102394 OK +NPIN:OK

Description

Set command is used to verify, change, enable, disable, or unblock pin. Will receive an unsolicited result when execute pin command is completed.

> NOTE: `SIM PIN`, `SIM PUK` refer to the PIN of the selected application on the UICC. For example, in an UTRAN context, the selected application on the currently selected UICC should be a USIM and the `SIM PIN` then represents the PIN of the selected USIM. See 3GPP TS 31.101 [65] for further details on application selection on the UICC.

Refer to Chapter *Error Values* for possible `<err>` values.

Defined values

```
<command>
```
0	<pin>	Verify pin.
1	<old pin>,<new pin>	Change pin.
2	<pin>	Enable pin.
3	<pin>	Disable pin.
4	<puk>,<pin>	Unblock pin.

`<pin>,<old pin>,<new pin>` — Decimal string format; `<old pin>` shall be the same as password specified for the facility from the MT user interface or with command

`AT+NPIN=2, <old pin> ,<new pin>`

and `<new pin>` is the new password; minimum length is 4, maximum length is 8. `<dump mode>` 0: dump over at port.

`<puk>` — Decimal string format, string size is 8

`<npin result>` —
"OK"
"ERROR PIN disabled"
"ERROR PIN blocked"
"ERROR wrong PIN <pin retries remaining>"
"ERROR wrong format"
"ERROR"

`<pin retries remaining>` — Decimal type, remaining PIN retries. If no retries left then

> PIN is blocked. Need to enter +npin=5<puk>,<pin> before can use again

M5310-A Implementation

- Need send AT+CFUN=1 to power on MT first.
- When pin is enabled, AT+CFUN=1 will return error.

4.28 Clear Stored Earfcn (+NCSEARFCN)

Command	Response	Example
+NCSEARFCN	OK	AT+NCSEARFCN OK

Description

This command clear Stored Earfcn.
Refer to Chapter *Error Values* for possible <err> values.

Defined values

    None

M5310-A Implementation

- Could exclude only when MT is power off.

4.29 Configure PDP context dynamic parameter items to read(+NCPCDPR)

Command	Response	Example
+NCPCDPR=<parameter>,<state>	+CME ERROR:<err>	AT+NCPCDPR=1,1 OK
+NCPCDPR	+NCPCDPR:<parameter>,<state> [+NCPCDPR:<parameter>,<state> [..]]	AT+NCPCDPR +NCPCDPR:0,1 +NCPCDPR:1,1 OK
+NCPCDPR=?	+NCPCDPR:(list of <parameter>s),(0,1)	AT+NCPCDPR=? +NCPCDPR:(0,1) OK

Description

This command allows the configuration of PDP context dynamic parameters request item.
Refer to Chapter *Error Values* for possible <err> values.

Defined values

<parameter>	Unsigned char formate. Dynamic parameter to read.
0	Get DNS Server IPv4 Address request.
1	Get DNS Server IPv6 Address request.

<state>　　　　　　　PDP context dynamic parameter items read state.
　　　0　　　　　Disable to get
　　　1　　　　　Enable to get

M5310-A Implementation

- Could set only when power off.

4.30 Query pending originating data list via the control plane (+NQPODCP)

Command	Response	Example
+NQPODCP	+NQPODCP:[<sequence>[<sequence>…]]] +CME ERROR:<err>	AT+NQPODCP +QPODCP:1,2,3 OK
+NPOWERCLASS=?	OK	AT+NQPODCP=? OK

Description

This command queries the pending originating data list via the control plane by MT.
 Refer to Chapter *Error Values* for possible <err> values.

Defined values

<sequence>　　　　The sequence of pending sending originating message. Range 1-255.

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5 CMIOT Extension Commands

5.1 Domain Name System(+CMDNS)

Send a DNS request to DNS server, and return the parsed ip address

Command	Response	Example
+CMDNS=<domain>	OK +CMDNS:<ip address> ERROR	AT+CMDNS="www.baidu.com" OK +CMDNS:183.232.231.172

Description

This command is used to send a DNS request according to the input domain name from the Terminal to the DNS server. When the network is unblocked, the ip address will response. This command will give an <err> string as an intermediate message if it can't send the message or error occurs.

Defined values

<domain>   The domain name, it should be quoted with the double quotation marks.

<ip address> A dot notation IP address

M5310-A Implementation

- The domain name must be legal
- Only one message will be processed at any one time.
- When the Terminal is processing the +CMDNS command, no +CMDNS command should be sent, or error message will be returned.

5.2 Set Ring Indication(+CMSRI)

Command	Response	Example
+CMSRI=<ring_en>,<duration>,<permanent>	OK	AT+CMSRI=1,120 OK AT+CMSRI?
+CMSRI?	+CMSRI:<ring_en>,<duration>	+CMSRI:0,120 OK

Description

This command is used to enable/disable ring indication on RI pin, if enabled, RI pin will pull high in <duration> milliseconds, then output indication data through AT port.

Defined values

<ring_en>   Enable/Disable RI indication, default 0.

<duration>   High voltage duration time in milliseconds(fixed by 120ms currently, other value will be ignored).

<permanent>   if RI setting stores in permanent flash.

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- $\langle$duration$\rangle$ will be ignored in the future.

6   Error Values

The error codes listed below are enabled when CMEE is set to mode 1.

6.1   Overview

Error codes are aligned to the 3GPP spec. Refer to 3GPP TS 27.007 V13.5.0, sub-clause 9.2 for all possible <err> values.

The error codes listed are those returned for the Hi2110 implementation.

Error codes 0-255 are reserved and defined in 3GPP TS 27.007 and may be used by Hisi in future releases. Error codes

6.2   General Errors (27.007)

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
3	Operation not allowed	4	Operation not supported	23	Memory failure
30	No Network Service	50	Incorrect parameters	51	Command implemented but currently disabled
52	Command aborted by user	159	Uplink Busy/Flow Control	5	Need to enter PIN
100	Unkown				

6.3   General Errors (127.005)

Unused error codes will be removed.

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
300	ME failure	312	PH-(U)SIM PIN required	321	invalid memory index
301	SMS service of ME reserved	313	(U)SIM failure	322	memory full
302	operation not allowed	314	(U)SIM busy	330	SMSC address unknown
303	operation not supported	315	(U)SIM wrong	331	no network service
304	invalid PDU mode parameter	316	(U)SIM PUK required	332	network timeout
305	invalid text mode parameter	317	(U)SIM PIN2 required	340	no +CNMA acknowledgement expected
310	(U)SIM not inserted	318	(U)SIM PUK2 required	500	unknown error
311	(U)SIM PIN required	320	memory failure		

6.4   HISI specific error codes

Hisi specific error codes are in the range 512 onwards.

Error code 512 was previously error code 256. Error code 513 was previously error code 257.

Error Code	Error Text	Error Code	Error Text	Error Code	Error Text
512	Required parameter not configured	513	TUP not registered	514	AT Internal Error
515	CID is active	516	Incorrect State for Command	517	Cid is invalid
518	CID is not active	520	Deactive last active cid	521	Cid is not defined
522	Uart parity error	523	Uart frame error	524	Mt not power on
525	at command abort in processing	526	at command abort error	527	command interrupted
528	configuration conflicts	529	FOTA is updating	530	Not the at allocated socket

6.5 Possible Error Causes

Error Code	Error Text	Possible Causes
513	TUP not registered	IMEI needs to be set. AT+NTSETID=1 can be used to set IMEI. The CDP IP address has not been set. AT+NCDP=<ip addr> to set AT+NMSTATUS to query TUP status
512	Required parameter not configured	For AT+NCDP, if the IMEI is not set, the command will fail. AT+NTSETID=1 can be used to set IMEI.
515	CID is active	Disable CID prior to changing CID configuration
516	Incorrect State for Command	Some commands have to be executed in a specific order. Refer to the documentation for the specific command.
517	Cid is invalid	Beyond the accepted range of cid values for +CSODCP set.
518	CID is not active	Deactivate the pdp context which is not active.
520	deactivate last active cid	For +CGACT, the protocol say: if an attempt is made to disconnect the last PDN connection, then the MT responds with error. Return this error code when deactivate last active cid
521	Cid is not defined	Activate or deactivate cid which is not defined.
522	Uart parity error	The mismatch between setting and using for uart parity.
523	Uart frame error	Uart frame error.
524	MT not power on	Some command could only exclude only when power on like +CIMI, otherwise will return ERROR:524
525	at command abort in processing	Send uart characters when MT is aborting at command.
526	at command abort error	Abort blocking command error.
527	command interrupted	When start back ground search by +COPS=?, will start a protect timer. It will abort when timer timeout if back ground search not finished, then return this error code.
528	configuration conflicts	When send +NPOWERCLASS=<band>,6 to set powerclass 6 and the "RELEASE_VERSION" in +NCONFIG is 13 will return this error code because release 13 don't support powerclass 6.
529	FOTA is updating	Send UDP/TCP data when FOTA is updating.
530	not the at allocated socket	Send AT+NSOCL to close a socket which is not created.

7   Reset Reasons

If the Applications core rebooted for any reason apart from either being power cycled or being externally reset, it will return a message before the <CR><LF>M5310-A<CR><LF>OK<CR><LF> message that indicates the reason for the reboot.

The list of possible reboot reasons are:

Reboot Message Displayed
REBOOT_CAUSE_SECURITY_RESET_UNKNOWN
REBOOT_CAUSE_SECURITY_SYSRESETREQ
REBOOT_CAUSE_SECURITY_WATCHDOG
REBOOT_CAUSE_SECURITY_SELF
REBOOT_CAUSE_SECURITY_ALTBOOT
REBOOT_CAUSE_SECURITY_REG_0
REBOOT_CAUSE_SECURITY_REG_3
REBOOT_CAUSE_SECURITY_STANDARD_CHIP_WATCHDOG
REBOOT_CAUSE_SECURITY_UPDATER_CHIP_WATCHDOG
REBOOT_CAUSE_SEUCRITY_SCAN_ENTER_EXIT
REBOOT_CAUSE_SECURITY_PMU_POWER_ON_RESET
REBOOT_CAUSE_SECURITY_RESET_PIN
REBOOT_CAUSE_SECURITY_REGIONS_UPDATED
REBOOT_CAUSE_SECURITY_FOTA_UPGRADE
REBOOT_CAUSE_PROTOCOL_UNKNOWN
REBOOT_CAUSE_PROTOCOL_SYSRESETREQ
REBOOT_CAUSE_PROTOCOL_WATCHDOG
REBOOT_CAUSE_PROTOCOL_MONITOR_REBOOT_REQ
REBOOT_CAUSE_PROTOCOL_RPC_TIMEOUT
REBOOT_CAUSE_APPLICATION_UNKNOWN
REBOOT_CAUSE_APPLICATION_SYSRESETREQ
REBOOT_CAUSE_APPLICATION_WATCHDOG
REBOOT_CAUSE_APPLICATION_AT
REBOOT_CAUSE_APPLICATION_RPC_TIMEOUT
REBOOT_CAUSE_PROTOCOL_IMSI_UPDATE
REBOOT_CAUSE_UNKNOWN

8 Examples

8.1 UDP Sockets

8.1.1 Sending a message

A simple example sending a UDP datagram. Once the socket is closed, no replies will be received.

```
AT+NSOCR=DGRAM,17,56,1
1
OK
AT+NSOST=1,183.230.40.150,36000,10,30313233343536373839
OK
AT+NSOCL=1
OK
```

8.1.2 Receiving messages from multiple remote systems

An example receiving messages from multiple hosts and consuming different amounts of the received data.

```
AT+NSOCR=DGRAM,17,1024,1
1
OK
+NSONMI:1,11
AT+NSORF=1,5
1,192.168.5.1,1024,5,68656C6C6F,6
OK
AT+NSORF=1,999
1,192.168.5.1,1024,6,20776F726C64,0
OK
+NSONMI:1,8
AT+NSORF=1,8
1,10.11.12.13,32701,8,616172647661726B,0
OK
```

8.1.3 Server

Example of a server-style implementation, where multiple remote systems can request to communicate with the UE.

Messages:

63616E204920636F6E6E656374   "can I connect"

73757265   "sure"

Example

```
AT+NSOCR=DGRAM,17,56,1

1

OK

+NSONMI:1,13

AT+NSORF=1,13

1,192.168.5.1,1234,13,63616E204920636F6E6E656374,0

OK

AT+NSOCR=DGRAM,17,45678,1

2

OK

AT+NSOST=2,192.158.5.1,1234,4,73757265

2,4

OK

+NSONMI:1,13

AT+NSORF=1,13

1,10.11.12.13,2345,13,63616E204920636F6E6E656374,0

OK

AT+NSOCR=DGRAM,17,45679,1

3

OK

AT+NSOST=3,210.11.12.13,2345,4,73757265

3,4

OK
```

9 Appendix

9.1 Extended DRX parameters(3GPP TS 24.008)

The purpose of the Extended DRX parameters information element is to indicate that the MS wants to use eDRX and for the network to indicate the Paging Time Window length value and the extended DRX cycle value to be used for eDRX.

The Extended DRX parameters is a type 4 information element with a length of 3 octets.

The Extended DRX parameters information element is coded as shown in figure 10.5.5.32/3GPP TS 24.008 and table 10.5.5.32/3GPP TS 24.008.

8	7	6	5	4	3	2	1	
Extended DRX parameters IEI								octet 1
Length of Extended DRX parameters								octet 2
Paging Time Window				eDRX value				octet 3
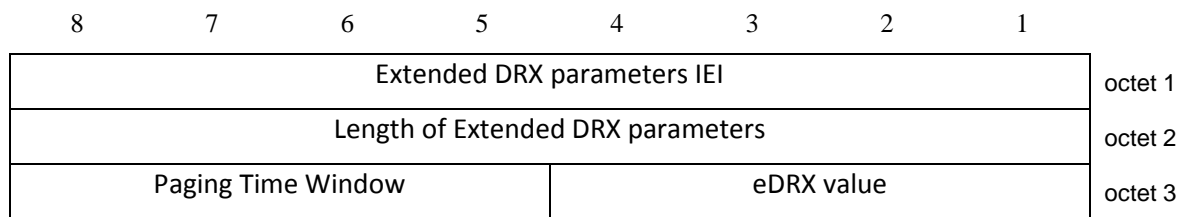
Figure 10.5.5.32/3GPP TS 24.008: Extended DRX parameters information element

Table 10.5.5.32/3GPP TS 24.008: Extended DRX parameters information element

Paging Time Window (PTW), octet 3 (bit 8 to 5)
The field contains a PTW value. The PTW value can be applied for Iu mode, WB-S1 mode and NB-S1 modeas specified below.
Iu mode
The field contains the PTW value in seconds for Iu mode.The PTW value is used as specified in 3GPP TS 23.682 [133a].The PTW value is derived as follows:
BIT

8	7	6	5	Paging Time Window length
0	0	0	0	0 seconds (PTW not used)
0	0	0	1	1 second
0	0	1	0	2 seconds
0	0	1	1	3 seconds
0	1	0	0	4 seconds
0	1	0	1	5 seconds
0	1	1	0	6 seconds
0	1	1	1	7 seconds
1	0	0	0	8 seconds
1	0	0	1	9 seconds
1	0	1	0	10 seconds
1	0	1	1	12 seconds
1	1	0	0	14 seconds
1	1	0	1	16 seconds

1	1	1	0	18 seconds
1	1	1	1	20 seconds

WB-S1 mode

The field contains the PTW value in seconds for WB-S1 mode.The PTW value is used as specified in 3GPP

TS 23.682 [133a].The PTW value is derived as follows:

BIT

8	7	6	5	Paging Time Window length
0	0	0	0	1,28 seconds
0	0	0	1	2,56 seconds
0	0	1	0	3,84 seconds
0	0	1	1	5,12 seconds
0	1	0	0	6,4 seconds
0	1	0	1	7,68 seconds
0	1	1	0	8,96 seconds
0	1	1	1	10,24 seconds
1	0	0	0	11,52 seconds
1	0	0	1	12,8 seconds
1	0	1	0	14,08 seconds
1	0	1	1	15,36 seconds
1	1	0	0	16,64 seconds
1	1	0	1	17,92 seconds
1	1	1	0	19,20 seconds
1	1	1	1	20,48 seconds

NB-S1 mode

The field contains the PTW value in seconds for NB-S1 mode.The PTW value is used as specified in 3GPP TS
23.682 [133a].The PTW value is derived as follows:

BIT

8	7	6	5	Paging Time Window length
0	0	0	0	2,56 seconds
0	0	0	1	5,12 seconds
0	0	1	0	7,68 seconds
0	0	1	1	10,24 seconds
0	1	0	0	12,8 seconds
0	1	0	1	15,36 seconds
0	1	1	0	17,92 seconds
0	1	1	1	20,48 seconds
1	0	0	0	23,04 seconds
1	0	0	1	25,6 seconds
1	0	1	0	28,16 seconds
1	0	1	1	30,72 seconds
1	1	0	0	33,28 seconds
1	1	0	1	35,84 seconds
1	1	1	0	38,4 seconds
1	1	1	1	40,96 seconds

eDRX value, octet 3 (bit 4 to 1)

The octet contains the eDRX value field. The parameter values are applied for A/Gb mode, Iu mode or S1

mode according to the tables below.

A/Gb mode

The field contains the eDRX value for A/Gb mode. The GERAN eDRX cycle length duration and Number of 51-MF per GERAN eDRX cycle values are derived from the eDRX value as follows:

BIT

4	3	2	1	GERAN eDRX cycle length duration	Number of 51-MF per GERAN eDRX cycle
0	0	0	0	~1,88 seconds (NOTE 1, NOTE 2)	8
0	0	0	1	~3,76 seconds (NOTE 1, NOTE 2)	16
0	0	1	0	~7,53 seconds (NOTE 1, NOTE 2)	32
0	0	1	1	12,24 seconds (NOTE 2)	52
0	1	0	0	24,48 seconds (NOTE 2)	104
0	1	0	1	48,96 seconds (NOTE 2)	208
0	1	1	0	97,92 seconds (NOTE 2)	416
0	1	1	1	195,84 seconds (NOTE 2)	832
1	0	0	0	391,68 seconds (NOTE 2)	1664
1	0	0	1	783,36 seconds (NOTE 2)	3328
1	0	1	0	1566,72 seconds (NOTE 2)	6656
1	0	1	1	3133,44 seconds (NOTE 2)	13312
1	1	0	0	GERAN eDRX cycle length duration	Number of 51-MF per GERAN eDRX cycle
1	1	0	1	~1,88 seconds (NOTE 1, NOTE 2)	8
1	1	1	0	~3,76 seconds (NOTE 1, NOTE 2)	16
1	1	1	1	~7,53 seconds (NOTE 1, NOTE 2)	32

All other values shall be interpreted as 0000 by this version of the protocol.

NOTE 1:   The listed values are rounded.

NOTE 2:   The value in seconds can be calculated with the formula $((3,06 / 13) * (Number\ of\ 51\text{-}MF))$. See 3GPP TS 45.001 [157], subclause 5.1.

Iu mode

The field contains the eDRX value for Iu mode. The UTRAN eDRX cycle length duration value is derived from the eDRX value as follows:

BIT

4	3	2	1	UTRAN eDRX cycle length duration
0	0	0	0	10,24 seconds
0	0	0	1	20,48 seconds
0	0	1	0	40,96 seconds
0	0	1	1	81,92 seconds
0	1	0	0	163,84 seconds
0	1	0	1	327,68 seconds
0	1	1	0	655,36 seconds
0	1	1	1	1310,72 seconds
1	0	0	0	1966,08 seconds
1	0	0	1	2621,44 seconds
1	0	1	0	UTRAN eDRX cycle length duration
1	0	1	1	10,24 seconds
1	1	0	0	20,48 seconds
1	1	0	1	40,96 seconds
1	1	1	0	81,92 seconds

1	1	1	1	163,84 seconds	
All other values shall be interpreted as 0000 by this version of the protocol.					

S1 mode

The field contains the eDRX value for S1 mode. The E-UTRAN eDRX cycle length duration value and the eDRX cycle parameter 'T$_{eDRX}$' as defined in 3GPP TS 36.304 [121] are derived from the eDRX value as follows:

BIT

4	3	2	1	E-UTRAN eDRX cycle length duration	eDRX cycle parameter 'T$_{eDRX}$'
0	0	0	0	5,12 seconds (NOTE 4)	NOTE 3
0	0	0	1	10,24 seconds (NOTE 4)	2^0
0	0	1	0	20,48 seconds	2^1
0	0	1	1	40,96 seconds	2^2
0	1	0	0	61,44 seconds (NOTE 5)	6
0	1	0	1	81,92 seconds	2^3
0	1	1	0	102,4 seconds (NOTE 5)	10
0	1	1	1	122,88 seconds (NOTE 5)	12
1	0	0	0	143,36 seconds (NOTE 5)	14
1	0	0	1	163,84 seconds	2^4
1	0	1	0	327,68 seconds	2^5
1	0	1	1	655,36 seconds	2^6
1	1	0	0	1310,72 seconds	2^7
1	1	0	1	2621,44 seconds	2^8
1	1	1	0	5242,88 seconds (NOTE 6)	2^9
1	1	1	1	10485,76 seconds (NOTE 6)	2^{10}

All other values shall be interpreted as 0000 by this version of the protocol.

NOTE 3: For E-UTRAN eDRX cycle length duration of 5,12 seconds the eDRX cycle parameter 'T$_{eDRX}$' is not used as a different algorithm compared to the other values is applied. See 3GPP TS 36.304 121] for details.

NOTE 4: The value is applicable only in WB-S1 mode. If received in NB-S1 mode it is interpreted as if the Extended DRX parameters IE were not included in the message by this version of the protocol.

NOTE 5: The value is applicable only in WB-S1 mode. If received in NB-S1 mode it is interpreted as 0010 by this version of the protocol.

NOTE 6: The value is applicable only in NB-S1 mode. If received in WB-S1 mode it is interpreted as 1101 by this version of the protocol.

9.2 GPRS Timer (3GPP TS 24.008)

9.2.1 GPRS Timer

The purpose of the *GPRS timer* information element is to specify GPRS specific timer values, e.g. for the READY timer.

The *GPRS timer* is a type 3 information element with 2 octets length.

The *GPRS timer* information element is coded as shown in figure 10.5.146/3GPP TS 24.008 and table 10.5.172/3GPP TS 24.008.

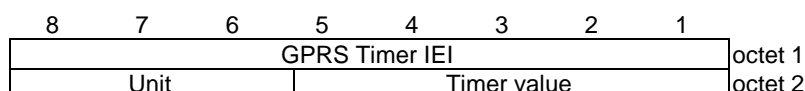| 8	7	6	5	4	3	2	1	
GPRS Timer IEI								octet 1
Unit			Timer value					octet 2

Figure 10.5.146/3GPP TS 24.008: GPRS *Timer* information element

Table 10.5.172/3GPP TS 24.008: GPRS *Timer* information element

Timer value (octet 2)

Bits 5 to 1 represent the binary coded timer value.

Bits 6 to 8 defines the timer value unit for the GPRS timer as follows:
Bits
8 7 6
0 0 0 value is incremented in multiples of 2 seconds
0 0 1 value is incremented in multiples of 1 minute
0 1 0 value is incremented in multiples of decihours
1 1 1 value indicates that the timer is deactivated.

Other values shall be interpreted as multiples of 1 minute in this version of the protocol.

9.2.2 GPRS Timer 2

The purpose of the *GPRS timer 2* information element is to specify GPRS specific timer values, e.g. for the timer T3302 or timer T3319.

The *GPRS timer 2* is a type 4 information element with 3 octets length.

The *GPRS timer 2* information element is coded as shown in figure 10.5.147/3GPP TS 24.008 and table 10.5.163/3GPP TS 24.008.

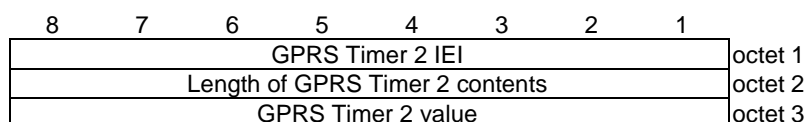| 8	7	6	5	4	3	2	1	
GPRS Timer 2 IEI								octet 1
Length of GPRS Timer 2 contents								octet 2
GPRS Timer 2 value								octet 3

Figure 10.5.147/3GPP TS 24.008: GPRS Timer 2 information element

Table 10.5.163/3GPP TS 24.008: GPRS Timer 2 information element

GPRS Timer 2 value is coded as octet 2 of the *GPRS timer* information element.

9.2.3 GPRS Timer 3

The purpose of the *GPRS timer 3* information element is to specify GPRS specific timer values, e.g. for the timer T3396.

The *GPRS timer 3* is a type 4 information element with 3 octets length.

The *GPRS timer 3* information element is coded as shown in figure 10.5.147a/3GPP TS 24.008 and table 10.5.163a/3GPP TS 24.008.
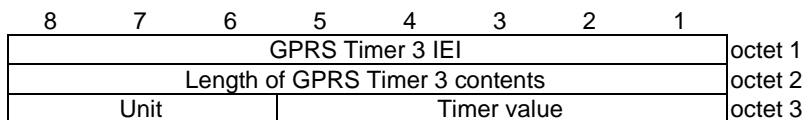
8	7	6	5	4	3	2	1	
GPRS Timer 3 IEI								octet 1
Length of GPRS Timer 3 contents								octet 2
Unit			Timer value					octet 3

Figure 10.5.147a/3GPP TS 24.008: GPRS Timer 3 information element

Table 10.5.163a/3GPP TS 24.008: GPRS Timer 3 information element

GPRS Timer 3 value (octet 3)
Bits 5 to 1 represent the binary coded timer value.
Bits 6 to 8 defines the timer value unit for the GPRS timer as follows: Bits   **8 7 6**   0 0 0 value is incremented in multiples of 10 minutes   0 0 1 value is incremented in multiples of 1 hour   0 1 0 value is incremented in multiples of 10 hours   0 1 1 value is incremented in multiples of 2 seconds   1 0 0 value is incremented in multiples of 30 seconds   1 0 1 value is incremented in multiples of 1 minute   1 1 0 value is incremented in multiples of 320 hours (NOTE)   1 1 1 value indicates that the timer is deactivated.
NOTE: This timer value unit is only applicable to the T3312 extended value IE and T3412 extended value IE (see 3GPP TS 24.301 [120]). If it is received in an integrity protected message, value shall be interpreted as multiples of 320 hours. Otherwise value shall be interpreted as multiples of 1 hour.