

M5311 AT Command Interface Specification

NB-IoT Series

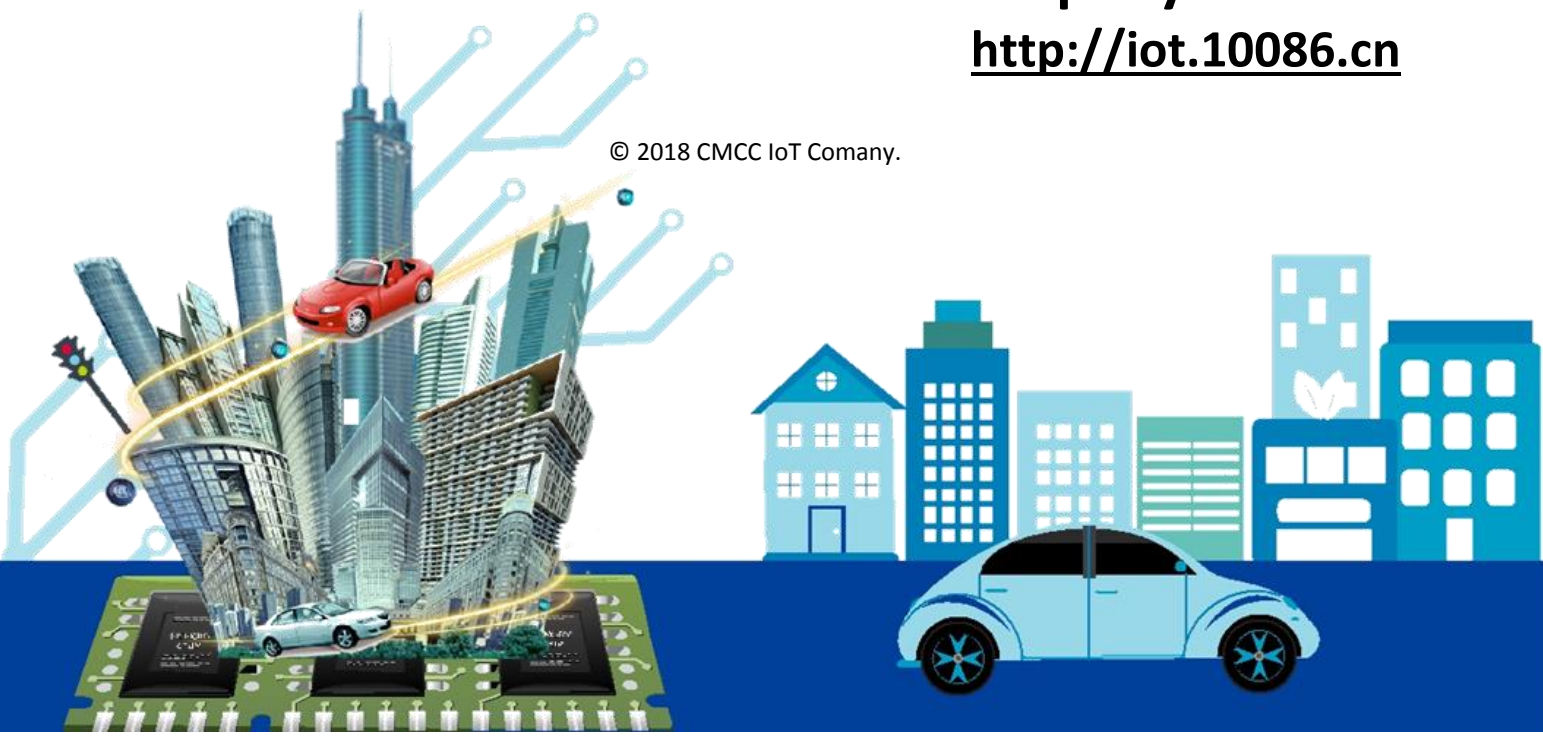
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Document Revision History

Revision	Date	Notes
1.0	2018-01-26	Initial release
1.1	2018-02-22	Change tcp/ip network commands
1.2	2018-04-04	Add CMCC OneNET commands
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2.0	2018-06-28	Remove unsupported AT command and Add AT Commands special for CMIOT/AT+CRLA Change HTTP/HTTPS commands Updated AT+CMSYSCTRL/AT+CTZR
2.1	2018-12-29	Add AT+CMADC/AT+COLDREB/AT+DNSSE/AT+TAUAC commands Add AT*WAKETIME/AT*ENTERSLEEP commands Add AT*CMBAND set command, support to lock/select Band Add AT+IPR=0, support atuo baud rate. Change AT*CMBAND? result code form 'Current Band' to 'Configured Band'. Change AT+GPIO commands, change parameter <gpio_id> to <gpio_pin>, from 9/10 to 34/35. Fix the Incorrect time-zone of the result AT+CCLK? Change +HTTPEER command Add +HTTPDICONN command Change +HTTPNMIH command Change +HTTPNMIC command Change AT+IPRD result data from Synchronous way to Add AT+CLPLMN Remove AT^SYSINFO Change AT+EPORT command Add AT*EDRXCFG to support eDRX PTW configuration(Only the M5311_CM version is supported.)

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Definitions and Abbreviations

3GPP	3 rd Generation Partnership Project
AID	Application Identifier
AT	Attention; this two-character abbreviation is always used to start a command line to be sent from TE to TA
ATCI	AT Command Interface
BCD	Binary Coded Decimal
BER-TLV	Basic Encoding Rule - TLV
DF	Dedicated File
DO	Data Object
EF	Elementary File
FCP	File Control Parameters
GSM	Global System for Mobile communications
IMSI	International Mobile Subscriber Identity
MCC	Mobile Country Code
ME	Mobile Equipment
MMI	Man Machine Interface
MNC	Mobile Network Code
MT	Mobile Termination
PIN	Personal Identification Number
PS_DO	PIN Status Data Object
RFU	Reserved for Future Use
SIM	Subscriber Identity Module
SFI	Short EF Identifier
STK	SIM Toolkit
TA	Terminal Adaptor (e.g. a GSM data card equal to DCE Data Circuit terminating Equipment)
TE	Terminal Equipment, e.g. a computer (equal to DTE; Data Terminal Equipment)
TLV	Tag Length Value
UE	User Equipment
UICC	Universal Integrated Circuit Card
USIM	Universal Subscriber Identity Module
B-TID	Bootstrapping Transaction Identifier
GBA	Generic Bootstrapping Architecture
GBA_ME	ME-based GBA
GBA_U	GBA with UICC-based enhancements
TMGI	Temporary Mobile Group Identity

1. General Command Line specifications

1.1. Manufacturer Specific Responses to AT Commands

A number of AT commands require generating a manufacturer specific response. These commands are listed below:

- ATI
- AT+GMM/AT+CGMM
- AT+GMR/AT+CGMR
- AT+GMI/AT+CGMI
- AT+GOI/AT+CGOI
- AT+HVER/AT+SWVER

Note: The result of AT+HVER/AT+SWVER is the current version. Other commands return the result to the factory factory version.

1.2. SMS Handling Details

1.3.1. SMS PDU Mode

The M5311 data services software supports two type of PDU mode:

- PDU mode according to 3GPP standard 27.005
- PDU mode backward compatible with data solutions currently on the market (called TPDU only).

Both methods have been implemented to allow more compatibility with SMS programs, which can be downloaded off the Internet.

The software can be configured to use either method by using the profile AT+CSMS command. The table below gives details of the two methods:

PDU Mode	AT+CSMS	Description
3GPP Standard	0	PDU mode implemented exactly as described in 3GPP TS 27.005.
3GPP Standard	1	The same as above, but acknowledgement command must be sent, as described in 3GPP TS 27.005.
TPDU only	128	PDU mode implemented such that only the SMS TPDU is sent, stored, and displayed. The Service Centre Address information is omitted.

1.3.2. Handling of SMS Status Reports

SMS status reports are handled differently in a number of areas to standard SMS messages. This section describes the specifics of how they are dealt with within the modem software.

2. AT Command Overview

This section gives an overview of the AT command interface.

2.1. Command Syntax

The AT command set is a combination of 3GPP TS 27.005, 3GPP TS 27.007 and ITU-T recommendation V.250. The format of an AT command can be described in BNF (Backus-Naur Form) as follows:

```

ATCommand ::= <CR> AT [<command>] <CR>
command ::= {<basicSyntax> | <basicSyntaxS>} [<command>] |
            {<extendedSyntax> [<command>]}

basicSyntax ::= <commandString> [<number>]

basicSyntaxS ::= S <number> = [<number>]

extendedSyntax ::= + <commandString> ? | = { ? |
<arguments> } arguments ::= [<number>] [, <arguments>]

number ::= 0..9 [<number>]

commandString ::= A..Z|0..9|!|!%|-|.|/|^| [<commandString>]
    
```

According to the format, the AT commands can be split into three categories syntactically; “basic”, “S parameter”, and “extended”. Details are provided in the next sections.

2.2. Basic Syntax

These have the format AT<x><n>, or AT&<x><n>, where <x> is the command, and <n> is/are the argument(s) for that command. An example of this is ATE<n>, which tells the DCE whether received characters should be echoed back to the DTE according to the value of <n>. <n> is optional and a default will be used if missing.

2.2.1. Parameter Syntax

These have the format ATS<n>=<m>, where <n> is the index of the S register to set, and <m> is the value to assign to it. <m> is optional; if it is missing, then a default value is assigned.

2.2.2. Extended Syntax

These commands can operate in several modes, as follows:

AT+<x>=?	This is test mode, which will cause a response of the command and valid argument ranges. A typical response might be of the form “+TFG=(0,2), (1-10)”, to indicate that command +TFG takes 2 arguments, which can be values 0 or 2, 1 to 10 and 3 only respectively.
AT+<x>?	This is read mode. The command will respond with the present values of its arguments.
AT+<x>=<n>	This is write mode. Here the command will take the arguments supplied and use them in the way specified. If the argument is missing, a default will be used.

2.3. Result Codes

Verbose Result Code	Short Result Code	Description
OK	0	Indicates execution of a valid command
CONNECT	1	A connection has been established; ATCI is moving from command state to online data state
RING	2	Incoming call indication
NO CARRIER	3	A call attempt has failed.
ERROR	4	Command error. The parser will execute as much of the command as it can until an error is detected, when it will abort the process and respond with this message.

2.4. CME Error Codes

2.4.1. General CME Error Codes

Verbose CME Error Code	Short CME Code	Description
Phone failure	0	Phone failure
No connection to phone	1	No connection to phone
Phone-adaptor link reserved	2	The requested connection is not allowed due to one or more other active connections.
Operation not allowed	3	The operation requested is not allowed (generally operations performed in a restrictive state i.e. fixed dialing)
Operation not supported	4	The operation requested is not supported (generally parameters in operations which aren't supported)
PH-SIM PIN required	5	PIN required for the SIM the phone is locked to
PH-FSIM PIN required	6	PIN required for the First SIM the phone is locked to
PH-FSIM PUK required	7	PUK required for the First SIM the phone is locked to
SIM not inserted	10	Operation not allowed: SIM Card hasn't been inserted (or has been removed)
SIM PIN required	11	Operation not allowed: SIM PIN required (possibly as a result of the pending command failing)
SIM PUK required	12	Operation not allowed: SIM PUK required (possibly as a result of the pending command failing)
SIM failure	13	Operation not allowed: SIM fault has occurred (possibly as a result of the pending command failing)
SIM busy	14	Operation not allowed: SIM is being used by another procedure
SIM wrong	15	Operation not allowed: MEP check has failed
Incorrect password	16	The incorrect password for the operation has been provided
SIM PIN2 required	17	Operation not allowed: SIM PIN2 required (possibly as a result of the pending command failing)
SIM PUK2 required	18	Operation not allowed: SIM PUK2 required

		(possibly as a result of the pending command failing)
Memory full	20	Operation failed due to SIM memory being full
invalid index	21	Operation failed – invalid memory index supplied
not found	22	The requested index (call, memory) has not been found
memory failure	23	NVRAM read/write has failed
text string too long	24	The entered text string is longer than allowed
invalid characters in text string	25	Invalid characters in string (i.e. characters in expected numeric string)
dial string too long	26	The entered dial string is longer than allowed
invalid characters in dial string	27	Invalid characters in dial string
no network service	30	Operation can't be performed due to ME not currently camped on network
network timeout	31	Operation failed: network timed out
network not allowed - emergency calls only	32	Only emergency calls are currently allowed (due to either requiring PIN/PUK or reduced network coverage)
network personalization PIN required	40	Operation failed: require MEP PIN code
network personalization PUK required	41	Operation failed: require MEP PUK code
network subset personalization PIN required	42	Operation failed: require MEP PIN code
network subset personalization PUK required	43	Operation failed: require MEP PUK code
service provider personalization PIN required	44	Operation failed: require MEP PIN code
service provider personalization PUK required	45	Operation failed: require MEP PUK code
corporate personalization PIN required	46	Operation failed: require MEP PIN code
corporate personalization PUK required	47	Operation failed: require MEP PUK code
hidden key required	48	Operation failed: require hidden key entry (Release 5 / 3G only)
Incorrect Parameters	50	Incorrect parameters entered.
Unknown	100	An unknown error has occurred

2.4.2. CRSM/CSIM CME Error Codes

Verbose CME Error Code	Short CME Code	Description
invalid command length	749	Invalid command length provided to CSIM
invalid input string	750	Invalid command string provided to CSIM
command not allowed for 3G SIM	751	SIM command not allowed on 3G SIM (Release 5 only)
Invalid <pathid> parameter	752	Invalid pathid for SIM
missing required command parameter	753	Command type parameter missing from CRSM command
invalid SIM command	754	Command type parameter for CRSM invalid
invalid File Id	755	FileID parameter for CRSM invalid

missing required P1/2/3 parameter	756	P1/2/3 for CRSM command missing
invalid P1/2/3 parameter	757	P1/2/3 for CRSM command invalid
missing required command data	758	Command Data for CRSM command missing
invalid characters in command data	759	Command Data for CRSM command invalid

2.4.3. +CSCS CME Error Codes

Verbose CME Error Code	Short CME Code	Description
+CSCS type not supported	737	The CSCS mode specified is not supported
+CSCS type not found	738	The CSCS mode specified is not supported

2.4.4. +CPOL CME Error Codes

Verbose CME Error Code	Short CME Code	Description
must include <format> with <oper>	741	Operator format parameter is missing
incorrect <oper> format	742	Operator data is in incorrect format
<oper> length too long	743	Operator data is too long
SIM full	744	PLMN data cannot be written as the PLMN store is full
unable to change PLMN list	745	The SIM PLMN list cannot be changed since CPOL cannot access it
network operator not recognized	746	Operator specified is not recognized
access technology missing	747	Specified access technology missing
access technology not supported	748	Specified access technology not supported

2.4.5. Miscellaneous Proprietary CME Error Codes

Verbose CME Error Code	Short CME Code	Description
SIM toolkit menu has not been configured	720	The SIM toolkit menu has not been configured
SIM toolkit already in use	721	The SIM toolkit is already in use
SIM toolkit not enabled	722	SIM toolkit not enabled on the SIM
MMI profile not updated	724	The MMI profile has not been updated
invalid SIM toolkit proactive command ID	725	An invalid SIM toolkit proactive command ID was received
invalid SIM proactive command response data	726	Invalid SIM toolkit proactive command response data received
invalid input value	765	One or more input values are invalid
unsupported value or mode	766	One or more input values are unsupported
operation failed	767	Operation failed
multiplexer already active	768	Multiplexer already active – cannot be changed or re-activated
unable to get control of required module	769	Command cannot be executed since a required resource cannot be allocated
SIM invalid - network reject	770	The SIM has been rejected by the network
SIM powered down	772	The SIM has been powered down
SIM File not present	773	The SIM file is not present

invalid input value	794	One or more input values are invalid
No valid GId	795	No valid GId

2.4.6. PSD and Packet Domain CME Error Codes

Note that “PSD” in the Verbose CME Error Code refers to any Packet Domain error.

Verbose CME Error Code	Short CME Code	Description
illegal MS	103	Illegal MS
illegal ME	106	Illegal ME
PSD services not allowed	107	Attach not allowed due to SIM/network restrictions
PLMN not allowed	111	Operation failed due to incorrect PLMN
location area not allowed	112	Operation failed due to incorrect LA
roaming not allowed in this location area	113	Operation failed due to incorrect LA
service option not supported	132	Operation failed due to service not being supported
requested service option not subscribed	133	Operation failed due to service not being subscribed
service option temporarily out of order	134	Operation failed due to service option being temporarily out of order
Unspecified GPRS error	148	Operation failed due to unknown Packet Domain error
PDP authentication failure	149	Operation failed due to PDP authentication failure
invalid mobile class	150	Operation failed due to invalid ME operation class
Last PDN Disconnection not allowed #49	151	UE attempted to disconnect the last PDN connection.
PSD - activation rejected by GGSN	577	Activation failed due to rejection by Gateway GPRS Support Node
PSD - unspecified activation rejection	578	Activation failed for unspecified reason
PSD - bad code or protocol rejection	579	PPP failure due to bad code or protocol rejection
PSD - can't modify address	580	PPP failure, address cannot be modified
PSD - CHAP close	581	PPP failure – CHAP close
PSD - profile (cid) currently unavailable	582	CID is currently in use by another entity
PSD - a profile (cid) is currently active	583	An active context currently exists
PSD - combined services not allowed	584	Combined services are not allowed
PSD - conditional IE error	585	Conditional IE error
PSD - context activation rejected	586	PPP failure – context activation rejected
PSD - duplicate TI received	587	Duplicate Transaction Identifier received
PSD - feature not supported	588	Feature not supported
PSD - service not available	589	PPP Failure – either service not available or device powering down
PSD - unknown IE from network	590	IE non-existent or not implemented
PSD - implicitly detached	591	EMM Implicitly detached
PSD - insufficient resources	592	Insufficient resources to complete action
PSD - invalid activation state (0-1)	593	An operation has been carried out where the

		context is in the incorrect state
PSD - invalid address length	594	PPP Failure – invalid address length
PSD - invalid character in address string	595	PPP Failure – invalid character in address string
PSD - invalid cid value	596	The supplied CID value is out of the allowed range
PSD - invalid dial string length	597	PPP Failure – invalid dial string length
PSD - mode value not in range	598	Invalid mode for Packet Domain event reporting
PSD - invalid MAND information	599	Invalid mandatory information
PSD - SMS service preference out of range	600	Invalid SMS service preference value supplied
PSD - invalid TI value	601	Invalid Transaction Identifier
PSD - IPCP negotiation timeout	602	PPP Failure – IPCP negotiation timeout
PSD - LCP negotiation timeout	603	PPP Failure – LCP negotiation timeout
PSD - LLC error	604	LLC error
PSD - LLC or SNDTCP failure	605	LLC or SNDTCP failure
PSD - lower layer failure	606	Lower layer failure
PSD - missing or unknown APN	607	Missing or unknown APN specified
PSD - mobile not ready	608	Mobile not ready
PSD - MS identity not in network	609	MS ID not in network
PSD - MSC temporarily not reachable	610	MSC temporarily not reachable
PSD - message incompatible with state	611	Message incompatible with state
PSD - message type incompatible with state	612	Message type incompatible with state
PSD - unknown message from network	613	Unknown message from network
PSD - NCP close	614	PPP Failure – NCP close
PSD - network failure	615	Network failure
PSD - no echo reply	616	PPP Failure – no echo reply
PSD - no free NSAPIs	617	PPP Failure – no free NSAPIs
PSD - processing of multiple cids not supported	618	Only a single CID may be active at any one time
PSD - no PDP context activated	619	No PDP context activated
PSD - normal termination	620	PPP Failure – normal termination
PSD - NSAPI already used	621	NSAPI already used
PSD - address element out of range	622	PPP Failure - address element out of range
PSD - PAP close	623	PPP Failure – PAP close
PSD - PDP context w/o TFT already activated	624	PPP Failure - context without TFT already activated
PSD - pdp type not supported	625	PPP Failure – invalid PDP type
PSD - peer refuses our ACCM	626	PPP Failure - peer refuses our ACCM
PSD - peer refuses our IP address	627	PPP Failure - peer refuses our IP address
PSD - peer refuses our MRU	628	PPP Failure - peer refuses our MRU
PSD - peer re-requested CHAP	629	PPP Failure - peer re-requested CHAP
PSD - profile (cid) not defined	630	Operation on an inactive/undefined CID
PSD - unspecified protocol error	631	Unspecified protocol error
PSD - QOS not accepted	632	PPP Failure - QOS not accepted

PSD - QOS validation fail	633	PPP Failure - QOS validation fail
PSD - reactivation required	634	Reactivation required
PSD - regular deactivation	635	Regular deactivation
PSD - semantic error in TFT operation	636	Semantic error in TFT operation
PSD - semantic errors in packet filter	637	Semantic errors in packet filter
PSD - semantically incorrect message	638	Semantically incorrect message
PSD - service type not yet available	639	Service type not available
PSD - syntactical error in TFT operation	640	Syntactical error in TFT operation
GPRS - syntactical errors in packet filter	641	Syntactical errors in packet filter
PSD - too many RXJs	642	PPP Failure - too many RXJs
PSD - unknown PDP address or type	643	Unknown PDP address or type
PSD - unknown PDP context	644	Unknown PDP context
PSD - user authorization failed	645	User authorization failed
PSD - QOS invalid parameter	646	Invalid QoS parameters
PSD - FDN failure	647	FDN failure
PSD - bad pdp context parameters	649	Bad PDP context parameters
PSD - PDP context already active	650	PDP context already active
PSD - LCP termination negotiation timeout	651	PPP LCP termination negotiation timeout
more than one double colon in IPv6 address	652	IPv6 PDP context addressing error: more than one double colon
IPv6 address ended with part of an IPv4 address	653	IPv6 PDP context addressing error: IPv6 address ended with part of an IPv4 address
IPv6 address used dotted-decimal form outside an IPv4 address	654	IPv6 PDP context addressing error: IPv6 address used dotted-decimal form outside an IPv4 address
in an IPv6 address, a byte of an IPv4 address was too big, causing overflow	655	IPv6 PDP context addressing error: in an IPv6 address, a byte of an IPv4 address was too big, causing overflow
in an IPv6 address, a byte of an IPv4 address was missing	656	IPv6 PDP context addressing error: in an IPv6 address, a byte of an IPv4 address was missing
in an IPv6 address, a byte of an IPv4 address was more than 255	657	IPv6 PDP context addressing error: in an IPv6 address, a byte of an IPv4 address was more than 255
in an IPv6 address, a byte pair was more than hex ffff	658	IPv6 PDP context addressing error: in an IPv6 address, a byte pair was more than hex ffff
in an IPv6 address, a byte of an IPv4 address was too short or contained invalid characters	659	IPv6 PDP context addressing error: in an IPv6 address, a byte of an IPv4 address was too short or contained invalid characters
an IPv6 address was too short or contained invalid characters	660	IPv6 PDP context addressing error: an IPv6 address was too short or contained invalid characters
in an IPv6 address, a byte pair was too big, causing overflow	661	IPv6 PDP context addressing error: in an IPv6 address, a byte pair was too big, causing overflow
an IPv6 address started with a single colon	662	IPv6 PDP context addressing error: an IPv6 address started with a single colon
an IPv6 address ended with a single colon	663	IPv6 PDP context addressing error: an IPv6 address ended with a single colon

an IPv6 address contained an IPv4 address other than at the end	664	IPv6 PDP context addressing error: an IPv6 address contained an IPv4 address other than at the end
an IPv6 address was too long	665	IPv6 PDP context addressing error: an IPv6 address was too long
an IPv6 address was followed by invalid characters	666	IPv6 PDP context addressing error: an IPv6 address was followed by invalid characters
PSD - operator Determined Barring	670	Operator has barred the PSD connection
PSD - activation rejected by GW or PDNGW	671	The activation was rejected by the Gateway or PDN Gateway
PSD – PTI already in use	672	NB-IOT PTI already in use
PSD – EPS Bearer Context without TFT already activated	673	EPS bearer context without a TFT has already been activated with the same bearer settings
PSD - PTI mismatch	674	PTI mismatched during EPS bearer procedure
PSD - PDN Type IPV4 only allowed	675	Only IPV4 type connections are allowed
PSD – PDN Type IPV6 only allowed	676	Only IPV6 type connection are allowed
PSD – single address bearers only allowed	677	Only single IP address (either IPV4 or IPV6) type connections allowed
PSD – ESM information not received	678	No information received at the ESM level
PSD – PDN connection does not exist	679	PDN connection referenced for bearer modification or deactivations non-existent
PSD – multiple PDN connection not allowed for one APN	680	Multiple PDN connections (primary contexts) cannot be made using the same APN on NB-IOT
PSD – collision with network initiated request	681	UE initiated operation clashed with network initiated operation
PSD – unsupported QCI value	682	QCI value not supported
PSD – invalid PTI value	683	PTI value is not valid
PSD – incompatible APN restriction value	684	APN restriction value not compatible
PSD – reactivation request	685	Network is requesting the UE to re-activate the PDN connection
LTE - IMSI unknown in HSS	690	UE not known (registered) in the HSS
LTE - illegal UE	691	Networks refused service to UE (ID failure or authentication failure)
LTE - EPS service not allowed	692	UE not allowed to operate EPS services
LTE - EPS and non EPS Service not allowed	693	UE not allowed to operate in EPS or non-EPS services
LTE - UE ID cannot be derived	694	Network cannot derive UE's ID
LTE - EPS tracking area not allowed	695	UE not allowed to operate in tracking area
LTE - roaming not allowed in TA	696	Roaming not allowed in current tracking area
LTE - roaming not allowed in PLMN	697	Roaming not allowed in current PLMN
LTE - no suitable cells in TA	698	UE required to operate in different tracking area in order to do a tracking area update
LTE - CS domain not available	699	CS (voice) services not available
LTE - ESM failure	700	ESM messaging failure
LTE - MAC failure	701	USIM detected MAC in authentication not fresh
LTE - synch failure	702	SQN in authentication messaging out of range
LTE - congestion	703	Congestion in the network
LTE - UE security capability mismatch	704	UE security capability does not match that of the network

LTE - security mode rejected, unspecified	705	Security mode command rejected by UE
LTE - UE not authorized in CSG cell	706	UE not allowed to operate in CSG cell with CSG ID
LTE – non-EPS authorization unacceptable	707	Non EPS authorization not accepted by UE
LTE - CS domain temporarily unavailable	708	CS fallback request cannot be served temporarily
LTE - no EPS bearer context activated	709	Tracking area update occurred when no active EPS bearer
PSD – PSD Mode not possible	710	PSD Mode setting not possible due to current network registration status
PSD – invalid connection type	711	Invalid connection type
PSD – no free PSD bearer IDs	712	No free PSD bearer IDs for connection (NSAPIs for 2G/3G)
PSD – no free PSD PTIs	713	No free PSD PTIs
PSD – unable to open data connection	714	Data connection to the TE is not possible at this time
PSD- Incorrect username/password	715	Username and password set for EPS bearer (i.e. using AT*MCGDUSNPWD command or from PPP negotiation) was incorrect compared to that used to set up the EPS bearer on power-on attach (i.e. using AT*MCGDEFCONT command)

2.4.7. *ENGINFO CME Error Codes

Verbose CME Error Code	Verbose CME Error Code	Verbose CME Error Code
No Service state	840	Current state is no service state
In cell search state	841	Current state is cell search state
ERRC is deactivated	842	ERRC has been deactivated
In cell reselection state	843	Current state is cell reselection state
In L1 test mode	844	Current L1 is in test mode
In reestablishment state	845	Current state is reestablishment state
In PSM state	846	Current state is PSM state
No data transfer in idle state	847	Data transfer information can not be reported in idle mode

2.4.8. CMS Error Codes

Verbose CMS Error Code	Short CMS Code	Description
unassigned (unallocated) number	1	SMS operation failed due to unassigned number
operator determined barring	8	SMS operation failed due to operator determined barring
call barred	10	SMS operation failed due to call barred
Short message transfer rejected	21	SMS operation failed due to short message transfer being rejected
Destination out of service	27	SMS operation failed due to destination out of service
Unidentified subscriber	28	SMS operation failed due to unidentified subscriber

Facility rejected	29	SMS operation failed due to facility rejected
Unknown subscriber	30	SMS operation failed due to unknown subscriber
Network out of order	38	SMS operation failed due to network out of order
Temporary failure	41	SMS operation failed due to temporary failure
Congestion	42	SMS operation failed due to network congestion
Resources unavailable, unspecified	47	SMS operation failed due to network resources unavailable, unspecified
Requested facility not subscribed	50	SMS operation failed due to requested facility not being subscribed to
Requested facility not implemented	69	SMS operation failed due to requested facility not implemented in network
Invalid short message transfer reference value	81	SMS operation failed due to invalid short message transfer reference value
Invalid message, unspecified	95	SMS operation failed due to invalid message, or other unspecified error
Invalid mandatory information	96	SMS operation failed due to invalid mandatory information
Message type non-existent or not implemented	97	SMS operation failed due to message type non-existent or not implemented
Message not compatible with short message protocol state	98	SMS operation failed due to message not compatible with short message protocol state
Information element non-existent or not implemented	99	Information element non-existent or not implemented
Protocol error, unspecified	111	Protocol error, unspecified
Interworking, unspecified	127	Interworking, unspecified
ME failure	300	General Mobile Equipment failure
SMS ME reserved	301	SMS ME reserved
operation not allowed	302	Failed due to either attempting to send an incorrect PDU (i.e. not a SUBMIT) or due to a currently active submit operation.
operation not supported	303	SMS operation has failed due to it not being supported
invalid PDU mode parameter	304	SMS Operation has failed due to an incorrect PDU mode parameter
invalid text mode parameter	305	SMS Operation has failed due to an incorrect text mode parameter
operation not supported	303	SMS operation has failed due to it not being supported
invalid PDU mode parameter	304	SMS Operation has failed due to an incorrect PDU mode parameter
invalid text mode parameter	305	SMS Operation has failed due to an incorrect text mode parameter
SIM not inserted	310	SMS Operation not allowed: SIM Card hasn't been inserted (or has been removed)
SIM pin necessary	311	SMS Operation not allowed: SIM PIN is required
PH SIM pin necessary	312	PIN required for the SIM the phone is locked to
SIM failure	313	SIM fault has occurred
SIM busy	314	SIM is busy
SIM wrong	315	MEP check failed
SIM PUK required	316	SIM PUK is required
SIM PIN2 required	317	SIM PIN2 is required

SIM PUK2 required	318	SIM PUK2 is required
memory failure	320	SMS Operation failed due to memory error
invalid memory index	321	SMS Operation failed due to invalid SM index
memory full	322	SMS Operation failed due to SM memory full
SMSC address unknown	330	SMS Operation failed due to invalid SMSC address
no network	331	No network coverage
network timeout	332	SMS Operation failed due to network timeout
no+CNMA acknowledgment expected	340	CNMA command executed, but no SMS acknowledgement is expected
Unknown	500	SMS Operation failed, cause unknown
SIM not ready	512	Operation failed due to SIM card not ready
unread records on SIM	513	(Generally unsolicited) There are unread SM on the SIM
PS busy	515	Protocol stack currently running other processes
Couldn't read SMS parameters from SIM	516	SM parameters (VP, SMSC address etc.) read fail from NVRAM
SM BL not ready	517	Protocol stack currently initializing
invalid parameter	518	SMS AT command parameter invalid
ME temporary not available	519	When saving or retrieving SMS info: NVRAM was not available.
Invalid (non-hex) chars in PDU	528	Non hexadecimal characters in entered TPDU data
Incorrect PDU length	529	Entered PDU is either too long or data longer than specified length
Invalid MTI	530	Invalid Message Type Indication on PDU
Invalid (non-hex) chars in address	531	Non hexadecimal characters in entered DA
Invalid address (no digits read)	532	No DA supplied
Incorrect PDU length (UDL)	533	PDU User Data length exceeds allowed size or differs from specified length
Incorrect SCA length	534	Service Centre address too long
Invalid First Octet (should be 2 or 34)	536	Invalid FO for SMS COMMAND
Invalid Command Type	537	Invalid SMS COMMAND type specified
SRR bit not set	538	SRR bit for SMS COMMAND ENQUIRY not set
SRR bit set	539	SRR bit for SMS COMMAND is set
Invalid User Data Header IE	540	Invalid User Data Header Information Element data entered

2.5. General Examples

Examples of valid AT command lines, with typical responses are as follows:

```

ATE1                      Echo on
OK
ATS0=1                    Set S0 to 1
OK
ATE1S0=1                  Echo on and set S0 to 1
OK
AT+CGDCONT=1,"IP","internet";
AT+CGDATA="M-PT",1
CONNECT
  
```

As can be seen from the above, a given AT line can contain several commands. The AT parser will try to interpret each command and return an appropriate response at the end of parsing.

Extended commands require a separator (;) after them in a multiple command line. Each line must be started with 'AT' but multiple commands do not need to be prefixed with 'AT' thereafter.



3. AT Command Interface

This section details all standard and proprietary AT commands that are supported by AT interface. The interface supports the following specifications:

- ITU V.250
- 3GPP TS 27.007 Release 14
- 3GPP TS 27.005 Release 14

In the following AT command tables, each AT command has a scope for the 27.010 MUX of either Channel Specific (one 27.010 MUX channel) or Generic (all 27.010 MUX channels). When the serial interface or USB interface is used in 27.010 multiplexer mode, there are multiple AT command channels which are available to use.

Those commands with Channel Specific scope apply only to the channel on which they are received. If the command relates to the setting of profile data, the effect of the profile data change will only apply to that channel.

Those commands with Generic scope apply to the MS as a whole. If the command relates to the setting of profile data, the effect of the profile data change will apply to all channels.

Where applicable, if an AT command parameter has a default value, that value is underlined in the parameter list for that AT Command.

3.1. Guidance on AT Command Syntax Definitions

For some AT commands, some parameters are optional. When this is the case, they are specified as shown in the example below:

```
AT+CRLP=[<iws> [, <mws> [, <T1> [, <N2> [, <ver> [, <T4> ] ] ] ] ] ]
```

In this case, all parameters are optional. If an optional parameter is missed out, then the comma must still be inserted if other optional parameters after are entered. For example:

```
AT+CRLP=61, 61, , , 1, 3
```

If, however, no further optional parameters are entered, then no commas are required. For example:

```
AT+CRLP=61, 61
```

Note that this command is given as an example only and is not supported by the M5311 NB-IOT software.

3.2. Supported AT Commands According to V.250

3.2.1. Overview

The V.250 commands correspond to the commands of AT Hayes-compatible modems applicable for 3GPP TS 27.007.

Command	Description
+++	Escape from data mode
ATE	Set command echo mode
ATH	Disconnect existing connection
ATI	Display product identification information
ATL	Set monitor speaker loudness
ATM	Set monitor speaker mode
ATN1	Some PC modem driver initial setting to handshake at highest speed larger than S37
ATO	Switch from command mode to data mode
ATQ	Set Result code presentation mode
ATS0	Set number of rings before automatically answering the call
ATS1	Read RING counter
ATS2	Set escape sequence character
ATS3	Set command line termination character
ATS4	Set response formatting character
ATS5	Set command line editing character
ATS6	Set pause before blind dialing
ATS7	Set number of seconds to wait for connection completion
ATS8	Set number of seconds to wait when comma dial modifier used
ATS10	Set disconnect delay after indicating the absence of data carrier
ATS12	Set Escape Code Guard Time
ATS25	Set DTR change Time
ATS95	Some PC modem driver initial setting to enable extended result codes
ATV	Set result code format mode
ATX	Set connect result code format and call monitoring
ATZ	Set all current parameters to user defined profile
AT&C	Set DCD function mode
AT&D	Set DTR function mode
AT&F	Set all current parameters to manufacturer defaults
AT&K	Some PC modem driver initial setting to enable RTS/CTS flow control
AT&V	Display current configuration
AT&W	Store current parameter to user defined profile

AT+DR	V.42bis data compression reporting control
AT+DS	V.42bis data compression control
AT+GCAP	Request complete TA capabilities list
AT+GMI	Request manufacturer identification
AT+GMM	Request TA model identification
AT+GMR	Request TA revision identification
AT+GOI	Request global object identification
AT+GSN	Request TA serial number identification (IMEI)
AT+ICF	Set TE-TA control character framing
AT+IFC	Set TE-TA local data flow control
AT+ILRR	Set TE-TA local rate reporting mode
AT+IPR	Set fixed local rate
ATD*99#	Call control command

3.2.2. Detailed Description of Commands

3.2.2.1. +++

+++ Escape from data mode	
Execute command	+++ Response The escape sequence is used to transfer from in-call data mode to in-call command mode without disconnecting from the remote modem. After a pause, responds with OK. Register S2 can be used to alter the escape character from '+', the default, to any decimal value in the range 0 to 255.
Parameter	None
Scope	Channel Specific
Reference V.250	Note This command is not preceded by AT and does not require a line terminator.

3.2.2.2. ATE

ATE Set command echo mode	
Set command	ATE[<value>] Response <ul style="list-style-type: none"> This setting determines whether the TA echoes characters received from TE during command state. OK
Parameter	<value> 0 Echo mode off 1 Echo mode on
Scope	Channel Specific

Reference V.250	Note
-----------------	------

3.2.2.3. ATH

ATH Disconnect existing connection							
Execute command	ATH[n] Response <ul style="list-style-type: none"> Disconnect existing call by local TE from command line and terminate call OK, or, if there is an outstanding request for mobile-terminate PDP context activation and AT+CGAUTO is set accordingly, the request is rejected. Note: OK is issued after circuit 109(DCD) is turned off, if it was previously on.						
Parameter	<table border="0"> <tr> <td><n></td> <td>0</td> <td>disconnect from line and terminate call</td> </tr> <tr> <td></td> <td>1</td> <td>ask for outgoing call disconnection</td> </tr> </table>	<n>	0	disconnect from line and terminate call		1	ask for outgoing call disconnection
<n>	0	disconnect from line and terminate call					
	1	ask for outgoing call disconnection					
Scope	Channel Specific						
Reference V.250, 27.007	Note <ul style="list-style-type: none"> Note that an outgoing data call can be aborted using any input character. 						

3.2.2.4. ATI

ATI Display product identification information	
Execute command	ATI Response TA issues product information text Example: <ul style="list-style-type: none"> CMCC M5311 < Software_Version > < Hardware_Version > OK
Parameter	None
Scope	Channel Specific
Reference V.250	Note

3.2.2.5. ATL

ATL Set monitor speaker loudness	
Set command	ATL<value>

	Response								
	<ul style="list-style-type: none"> No effect OK 								
Parameter	<table> <tr> <td><value> 0</td> <td>low speaker volume</td> </tr> <tr> <td>1</td> <td>low speaker volume</td> </tr> <tr> <td>2</td> <td>medium speaker volume</td> </tr> <tr> <td>3</td> <td>high speaker volume</td> </tr> </table>	<value> 0	low speaker volume	1	low speaker volume	2	medium speaker volume	3	high speaker volume
<value> 0	low speaker volume								
1	low speaker volume								
2	medium speaker volume								
3	high speaker volume								
Scope	Generic								
Reference V.250	Note								

3.2.2.6. ATM

ATM Set monitor speaker mode							
Set command	ATM<value> Response <ul style="list-style-type: none"> No effect OK 						
Parameter	<table> <tr> <td><value> 0</td> <td>speaker is always off</td> </tr> <tr> <td>1</td> <td>speaker on until TA inform TE that carrier has been detected</td> </tr> <tr> <td>2</td> <td>speaker is always on when TA is off-hook</td> </tr> </table>	<value> 0	speaker is always off	1	speaker on until TA inform TE that carrier has been detected	2	speaker is always on when TA is off-hook
<value> 0	speaker is always off						
1	speaker on until TA inform TE that carrier has been detected						
2	speaker is always on when TA is off-hook						
Scope	Generic						
Reference V.250	Note						

3.2.2.7. ATN1

ATN1 Some PC modem driver initial setting to handshake at highest speed larger than S37	
Set command	ATN1 Response <ul style="list-style-type: none"> Some standard PC modem drivers will send this AT command to initialize the setting, but it is meaningless in the 3GPP standard. Return OK and no effect for the setting. OK
Parameter	None
Scope	Generic
Reference V.250	Note

3.2.2.8. ATO

ATO Switch from command mode to data mode	
Execute	ATO[n]

command	Response <ul style="list-style-type: none"> TA resumes the connection and switches back from command mode to data mode. If connection is not successfully resumed <ul style="list-style-type: none"> NO CARRIER else <ul style="list-style-type: none"> TA returns to data mode from command mode CONNECT <text> Note: <text> only if parameter setting X>0
Parameter	<ul style="list-style-type: none"> <n> 0 switch from command mode to data mode
Scope	Channel Specific
Reference V.250	Note

3.2.2.9. ATQ

ATQ Set result code presentation mode	
	ATQ[<n>]
Set command	Response This parameter setting determines whether the TA transmits any result code to the TE. Information text transmitted in response is not affected by this setting. If <n>=0: OK If <n>=1: (none)
Parameter	<n> 0 TA transmits result code 1 Result codes are suppressed and not transmitted
Scope	Channel Specific
Reference V.250	Note <ul style="list-style-type: none"> This command only affects V.250 AT commands and not all other AT commands in this specification.

3.2.2.10. ATSO

ATSO Set number of rings before automatically answering the call	
	ATSO?
Read command	Response <ul style="list-style-type: none"> <n> OK
	ATSO=[<n>]
Set command	Response <ul style="list-style-type: none"> This parameter setting determines the number of rings before auto-answer. OK

Parameter	<n> 0 automatic answering is disabled 1-255 enable automatic answering on the ring number specified
Scope	Channel Specific
Reference V.250	Note

3.2.2.11. ATS1

ATS1 Ring Counter	
Read command	ATS1?
	Response <ul style="list-style-type: none"> • <n> • OK
Set command	ATS1=[<n>]
	Response <ul style="list-style-type: none"> • This command will not alter the RING counter, but simply display: • OK
Parameter	<n> The number of "RING" strings sent to the TE as a result of receiving an incoming call. 0-255
Scope	Channel Specific
Reference	Note <ul style="list-style-type: none"> • If "RING" is not displayed on a particular channel due to other settings (such as suppression of all unsolicited events (ATQ)) then this value should not be incremented. This value is reset to 0 when receiving a new incoming call. Note that this command should also be made channel specific as with other ATS<x> commands.
Reference V.250	Note

3.2.2.12. ATS2

ATS2 Set escape sequence character	
Read command	ATS2?
	Response <ul style="list-style-type: none"> • <n> • OK
Set command	ATS2=[<n>]
	Response <ul style="list-style-type: none"> • This parameter setting determines the character recognized by the TA to indicate the escape sequence. • OK

Parameter	<n> 0-43-255 escape sequence character Note: default 43 = '+'
Scope	Channel Specific
Reference V.250	Note

3.2.2.13. ATS3

ATS3 Set command line termination character	
Read command	ATS3?
	Response <ul style="list-style-type: none"> • <n> • OK
Set command	ATS3=[<n>]
	Response <p>This parameter setting determines the character recognized by the TA to terminate an incoming command line. The TA also returns this character in output.</p> <ul style="list-style-type: none"> • OK
Parameter	<ul style="list-style-type: none"> • <n> 0-13-127 command line termination character <ul style="list-style-type: none"> ○ Note: default 13 = CR
Scope	Channel Specific
Reference V.250	Note

3.2.2.14. ATS4

ATS4 Set response formatting character	
Read command	ATS4?
	Response <ul style="list-style-type: none"> • <n> • OK
Set command	ATS4=[<n>]
	Response <ul style="list-style-type: none"> • This parameter setting determines the character generated by the TA for result code and information text. • OK
Parameter	<ul style="list-style-type: none"> • <n> <ul style="list-style-type: none"> ○ 0-10-127 response formatting character ○ Note: default 10 = LF
Scope	Channel Specific
Reference V.250	Note

3.2.2.15. AT55

AT55 Set command line editing character	
Read command	AT55?
	Response <ul style="list-style-type: none"> • <n> • OK
Set command	AT55=[<n>]
	Response <ul style="list-style-type: none"> • This parameter setting determines the character recognized by TA as a request to delete from the command line the immediately preceding character. • OK
Parameter	<ul style="list-style-type: none"> • <n> <ul style="list-style-type: none"> ○ 0-8-127 command line editing character ○ Note: default 8 = Backspace
Scope	Channel Specific
Reference V.250	Note

3.2.2.16. AT56

AT56 Set pause before blind dialing	
Read command	AT56?
	Response <ul style="list-style-type: none"> • <n> • OK
Set command	AT56=[<n>]
	Response <ul style="list-style-type: none"> • No effect • OK
Parameter	<ul style="list-style-type: none"> • <n> <ul style="list-style-type: none"> ○ 0-2-10 number of seconds to wait before blind dialing
Scope	Channel Specific
Reference V.250	Note

3.2.2.17. AT57

AT57 Set number of seconds to wait for connection completion	
Read command	AT57?
	Response <ul style="list-style-type: none"> • <n> • OK

Set command	ATS7=[<n>]
	Response <ul style="list-style-type: none"> This parameter setting determines the amount of time to wait for the connection completion in case of answering or originating a call. OK
Parameter	<ul style="list-style-type: none"> <n> <ul style="list-style-type: none"> 1-60-255 number of seconds to wait for connection completion
Scope	Channel Specific
Reference V.250	Note

3.2.2.18. ATS8

ATS8 Set number of seconds to wait when comma dial modifier	
Read command	ATS8?
	Response <ul style="list-style-type: none"> <n> OK
Set command	ATS8=[<n>]
	Response <ul style="list-style-type: none"> No effect OK
Parameter	<ul style="list-style-type: none"> <n> <ul style="list-style-type: none"> 0 no pause when comma encountered in dial string 1-2-255 number of seconds to wait
Scope	Channel Specific
Reference V.250	Note

3.2.2.19. ATS10

ATS10 Set disconnect delay after indicating the absence of data carrier	
Read command	ATS10?
	Response <ul style="list-style-type: none"> <n> OK
Set command	ATS10=[<n>]
	Response <ul style="list-style-type: none"> This parameter setting determines the amount of time that the TA will remain connected in absence of data carrier. If the data carrier is once more detected before disconnect, the TA remains connected. OK
Parameter	<ul style="list-style-type: none"> <n> <ul style="list-style-type: none"> 1-15-254 number of tenths seconds of delay
Scope	Channel Specific
Reference V.250	Note <ul style="list-style-type: none"> This command is not used, as there have been issues with in-band DCD

dropping unexpectedly for CSD calls on some networks.

3.2.2.20. ATS12

This command sets the escape code guard time in fiftieths of a second. The escape guard time is used to measure when to detect the +++ escape sequence has been entered by the PC in order to drop out of data mode back to AT command mode.

The guard time determines the time that forms a guard period before and after three escape sequence characters. In order to distinguish an escape sequence from just three escape sequence characters in the data stream there is timing associated to the three escape sequence characters of an escape sequence.

The time between the last byte of the data stream and the first escape sequence character must be at least the guard time and the time between each escape sequence character of the escape sequence must be less than the guard time and no other byte is received after the third escape sequence character for the time of the guard time. If an escape sequence is detected, the OK result code will be sent to the DTE. Otherwise, the DCE will stay in data mode.

For example: “<Guard time>+++<Guard time>”

ATS12 Set Escape Code Guard Time	
Read command	ATS12?
	Response <ul style="list-style-type: none"> • <n> • OK • NB: <n> is in 3 decimal digits format (e.g. Default value is given as 050). If error is related to wrong AT syntax: <ul style="list-style-type: none"> • +CME ERROR: <err>
Execution command	ATS12=<n>
	Response <ul style="list-style-type: none"> • OK If error is related to wrong AT syntax: <ul style="list-style-type: none"> • +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <n> Numeric value of the escape guard time value in 1/50 seconds: <ul style="list-style-type: none"> ○ 000-255 Number of 20 ms. Default is 050 (1 sec).
Scope	Channel Specific
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • Set Escape Code Guard Time command

S12 Examples:

```

ATS12=100
OK

ATS12?
100
OK
    
```


3.2.2.21. ATS25

This command sets the S-register 25 Detect DTR change time that contain the threshold for noticing a change in DTR. This time permits to the modem to ignore DTR before taking action specified by &Dn (See AT&D Circuit 108 behavior).

The value unit is in 1/100 seconds. Default value is set to 5 (50ms delay after a DTR drop before the modem acts on it).

ATS25		Set DTR change time
Read command	ATS25?	
	Response <ul style="list-style-type: none"> • <n> • OK • <n> is in 3 decimal digits format (e.g. Default value is given as 000) • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err> 	
Execution command	ATS25=<n>	
	Response <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err> 	
Parameters	<ul style="list-style-type: none"> • <n> Numeric value of DTR delay in 10 milliseconds: <ul style="list-style-type: none"> ○ 000-255 Number of 10 ms. Default is 005. 	
Scope	Channel Specific	
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • Set DTR change Time command 	

S25 Examples:

```

ATS25?
5
OK

ATS25=150
OK

ATS25?
150
OK
    
```

3.2.2.22. ATS95

ATS95		Some PC modem driver initial setting to enable extended result codes
Read command	ATS95?	
	Response <ul style="list-style-type: none"> • OK 	

	ATS95=[<n>]
Set command	<p>Response</p> <ul style="list-style-type: none"> Some standard PC modem drivers will send this AT command to initialize the setting, but it is meaningless in the 3gpp standard. So we just return OK and no effect for the setting. OK
Parameter	<ul style="list-style-type: none"> <n> 0-255 meaningless for the GSM, and GPRS/Packet Domain setting
Scope	N/A
Reference V.250	Note

3.2.2.23. ATV

ATV Set result code format mode	
	ATV[<value>]
Set command	<p>Response</p> <p>This parameter setting determines the contents of the header and trailer transmitted with result codes and information responses.</p> <p>When <value>=0</p> <p>0</p> <p>When <value>=1</p> <p>OK</p>
Parameter	<p><value></p> <p>0 Information response: <text><CR><LF> Short result code format: <numeric code><CR></p> <p>1 Information response: <CR><LF><text><CR><LF> Long result code format: <CR><LF><verbose code><CR><LF></p>
Scope	Channel Specific
Reference V.250	Note

3.2.2.24. ATX

ATX Set CONNECT result code format and call monitoring	
	ATX[<value>]
Set command	<p>Response</p> <ul style="list-style-type: none"> This parameter setting determines whether or not the TA detected the presence of dial tone and busy signal and whether or not TA transmits particular result codes OK

Parameter	<value> 0 CONNECT result code only returned, dial tone and busy detection are both disabled 1 CONNECT<text> result code only returned, dial tone and busy detection are both disabled 2 CONNECT<text> result code returned, dial tone detection is enabled, busy detection is disabled 3 CONNECT<text> result code returned, dial tone detection is disabled, busy detection is enabled 4 CONNECT<text> result code returned, dial tone and busy detection are both enabled
Scope	Channel Specific
Reference V.250	Note

3.2.2.25. ATZ

ATZ Set all current parameters to user defined profile	
Execute command	ATZ[<value>] Response <ul style="list-style-type: none"> • TA sets all current parameters to the user defined profile. <ul style="list-style-type: none"> ○ Note1: The user-defined profile is stored in non-volatile memory. ○ Note2: If the user profile is not valid, it will default to the factory default profile. ○ Note3: Any additional commands on the same command line are ignored. • OK
Parameter	<value> 0 Reset to profile number 0
Scope	<ul style="list-style-type: none"> • Channel Specific and Generic: each parameter may be Channel Specific or Generic (see command for individual parameter)
Reference V.250	Note

3.2.2.26. AT&C

AT&C Set circuit Data Carrier Detect (DCD) function mode	
Set command	AT&C[<value>] Response <ul style="list-style-type: none"> • This parameter determines how the state of circuit 109(DCD) relates to the detection of received line signal from the distant end. • OK
Parameter	<value> 0 DCD line is always ON 1 DCD line is ON only in the presence of data carrier
Scope	Channel Specific
Reference V.250	Note

3.2.2.27. AT&D

AT&D Set circuit Data Terminal Ready (DTR) function mode							
Set command	AT&D[<value>]						
	Response <ul style="list-style-type: none"> This parameter determines how the TA responds when circuit 108/2(DTR) is changed from the ON to the OFF condition during data mode. OK 						
Parameter	<value> <table style="margin-left: 20px;"> <tr> <td>0</td> <td>TA ignores status on DTR</td> </tr> <tr> <td>1</td> <td>ON->OFF on DTR: Change to command mode with call remaining connected</td> </tr> <tr> <td>2</td> <td>ON->OFF on DTR: Disconnect call, change to command mode. During state DTR=OFF is auto-answer off.</td> </tr> </table>	0	TA ignores status on DTR	1	ON->OFF on DTR: Change to command mode with call remaining connected	2	ON->OFF on DTR: Disconnect call, change to command mode. During state DTR=OFF is auto-answer off.
0	TA ignores status on DTR						
1	ON->OFF on DTR: Change to command mode with call remaining connected						
2	ON->OFF on DTR: Disconnect call, change to command mode. During state DTR=OFF is auto-answer off.						
Scope	Channel Specific						
Reference V.250	Note						

3.2.2.28. AT&F

AT&F Set all current parameters to manufacturer defaults			
Execute command	AT&F[<value>]		
	Response <ul style="list-style-type: none"> TA sets all current parameters to the manufacturer defined profile. OK 		
Parameter	<value> <table style="margin-left: 20px;"> <tr> <td>0</td> <td>set all TA parameters to manufacturer defaults</td> </tr> </table>	0	set all TA parameters to manufacturer defaults
0	set all TA parameters to manufacturer defaults		
Scope	Channel Specific and Generic: each parameter may be Channel Specific or Generic (see command for individual parameter)		
Reference V.250	Note		

3.2.2.29. AT&K

AT&K Flow control setting							
Execute command	AT&K[<value>]						
	Response <ul style="list-style-type: none"> OK 						
Parameter	<value> <table style="margin-left: 20px;"> <tr> <td>0</td> <td>No flow control</td> </tr> <tr> <td>3</td> <td>RTS /CTS flow control (hardware)</td> </tr> <tr> <td>4</td> <td>XON/XOFF flow control (software)</td> </tr> </table>	0	No flow control	3	RTS /CTS flow control (hardware)	4	XON/XOFF flow control (software)
0	No flow control						
3	RTS /CTS flow control (hardware)						
4	XON/XOFF flow control (software)						

Scope	<ul style="list-style-type: none"> For S/W flow control, this sets on a per channel basis when using the 27.010 MUX. I.e. flow control characters are sent/received within the 27.010 MUX frame as part of the data. For hardware flow control the setting will apply to all channels routed through one connection level (e.g. USB, UART).
Reference V.250	<p>Note</p> <ul style="list-style-type: none"> This command does not store anything in the profile data because it sets the AT+IFC settings when used: <ul style="list-style-type: none"> AT&K0 is equivalent of entering AT+IFC=0,0 AT&K3 is equivalent of entering AT+IFC=2,2 AT&K4 is equivalent of entering AT+IFC=1,1

3.2.2.30. AT&V

AT&V Display current configuration	
Execute command	AT&V[<n>] Response <ul style="list-style-type: none"> TA returns the current parameter setting. <current configurations text> OK
Parameter	<n> 0 profile number
Scope	Channel Specific and Generic: each parameter may be Channel Specific or Generic (see command for individual parameter)
Reference	Note

3.2.2.31. AT&W

AT&W Store current parameter to user defined profile	
Execute command	AT&W[<n>] Response <ul style="list-style-type: none"> TA stores the current parameter setting in the user-defined profile. <ul style="list-style-type: none"> Note1: The user-defined profile is stored in non-volatile memory. OK
Parameter	<n> 0 profile number to store to
Scope	<ul style="list-style-type: none"> Channel Specific Only one user profile is stored in NVRAM. This command will store the current Generic parameters values and the Channel Specific values for the channel on which the command is received.
Reference	Note

3.2.2.32. AT+DR

AT+DR		V.42bis data compression reporting control	
Test command	AT+DR=?		
	Response	<ul style="list-style-type: none"> +DR:(list of supported <value>s) OK 	
Read command	AT+DR?		
	Response	<ul style="list-style-type: none"> +DR: <value> OK 	
Set command	AT+DR=<value>		
	Response	<ul style="list-style-type: none"> This parameter setting determines whether the intermediate result code of the current data compressing is reported by TA to TE after a connection establishment. OK 	
Unsolicited result code	Intermediate result code	<ul style="list-style-type: none"> +DR: <type> Note: reported at call set up	
Parameter	<value>	0	reporting disabled
		1	reporting enabled
	<type>	NONE	data compression is not in use
		V42B Rec.	V42bis is in use in both direction
		V42B RD Rec.	V42bis is in use in receive direction only
		V42B TD Rec.	V42bis is in use in transmit direction only
Scope	Channel Specific		
Reference V.250	Note		

3.2.2.33. AT+DS

AT+DS		V.42bis data compression control	
Test command	AT+DS=?		
	Response	<ul style="list-style-type: none"> +DS:(list of supported <p0>s), (list of supported <n>s), (list of supported <p1>s), (list of supported <p2>s) OK 	
Read command	AT+DS?		
	Response	<ul style="list-style-type: none"> +DS: <p0>,<n>,<p1>,<p2> OK 	

	AT+DS=[<p0>,<n>,<p1>,<p2>]]]]																								
Set command	Response <ul style="list-style-type: none"> • OK This parameter setting determines the possible data compression mode by TA at the compression negotiation with the remote TA after a call set up. Note1: only for data call Note2: GSM transmits the data transparent. The remote TA may support this compression.																								
Parameter	Note: see also ITU V.42bis <table border="0"> <tr> <td><p0></td> <td></td> </tr> <tr> <td>0</td> <td>NONE</td> </tr> <tr> <td>1</td> <td>transmit only</td> </tr> <tr> <td>2</td> <td>receive only</td> </tr> <tr> <td>3</td> <td>both direction, but allow negotiation</td> </tr> <tr> <td><n></td> <td></td> </tr> <tr> <td>0</td> <td>allow negotiation of p0 down</td> </tr> <tr> <td>1</td> <td>do not allow negotiation of p0 - disconnect on difference</td> </tr> <tr> <td><p1></td> <td></td> </tr> <tr> <td>512-1024</td> <td>dictionary size.(default determined by manufacturer)</td> </tr> <tr> <td><p2></td> <td></td> </tr> <tr> <td>6-20-64</td> <td>maximum string size (default 20)</td> </tr> </table>	<p0>		0	NONE	1	transmit only	2	receive only	3	both direction, but allow negotiation	<n>		0	allow negotiation of p0 down	1	do not allow negotiation of p0 - disconnect on difference	<p1>		512-1024	dictionary size.(default determined by manufacturer)	<p2>		6-20-64	maximum string size (default 20)
<p0>																									
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<p2>																									
6-20-64	maximum string size (default 20)																								
Scope	Channel Specific																								
Reference V.250	Note																								

3.2.2.34. AT+GCAP

AT+GCAP Request complete TA capabilities list	
Execute command	AT+GCAP Response <ul style="list-style-type: none"> • TA reports a list of additional capabilities. • +GCAP: <name>s • OK
Parameter	<name> example, +CGSM
Scope	Channel specific (response output only on channel which entered the command)
Reference V.250	Note

3.2.2.35. AT+GMI

AT+GMI Request manufacturer identification	
Execute command	AT+GMI Response <ul style="list-style-type: none"> • TA returns manufacturer identification text. • <manufacturer> OK

Parameters	<manufacturer>
Scope	Channel specific (response output only on channel which entered the command)
Reference V.250	Note

3.2.2.36. AT+GMM

AT+GMM Request TA model identification	
Execute command	AT+GMM
	Response <ul style="list-style-type: none"> • TA returns product model identification text. • <model> • OK
Parameters	<model>
Scope	Channel specific (response output only on channel which entered the command)
Reference V.250	Note

3.2.2.37. AT+GMR

AT+GMR Request TA revision identification	
Execute command	AT+GMR
	Response <ul style="list-style-type: none"> • TA reports one or more lines of information text that permit the user to identify the version, revision level or data or other information of the device. • <Revision> • OK
Scope	Channel specific (response output only on channel which entered the command)
Reference V.250	Note

3.2.2.38. AT+GOI

AT+GOI Request global object identification	
Execute command	AT+GOI
	Response <ul style="list-style-type: none"> • TA reports one or more lines of information text that permit the user to identify the device, based on the ISO system for registering unique object identifiers.
Parameter	<Object Id> identifier of device type <ul style="list-style-type: none"> ○ see X.208, 209 for the format of <Object Id>. This string is customer specific
Scope	Channel specific (response output only on channel which entered the command)
Reference V.250	Note

3.2.2.39. AT+GSN

AT+GSN Request TA serial number identification (IMEI)	
	AT+GSN
Execute command	Response <ul style="list-style-type: none"> TA reports the IMEI (International Mobile Equipment Identifier) number in information text that permits the user to identify the individual ME device. <sn> OK
Parameter	<sn> IMEI of the telephone (International Mobile station Equipment Identity)
Scope	Channel specific (response output only on channel which entered the command)
Reference V.250	Note <ul style="list-style-type: none"> The serial number (IMEI) is varied by individual ME device.

3.2.2.40. AT+ICF

AT+ICF Set TE-TA control character framing	
	AT+ICF=?
Test command	Response <ul style="list-style-type: none"> +ICF:(list of supported <format>s), (list of supported <parity>s) OK
	AT+ICF?
Read command	Response <ul style="list-style-type: none"> +ICF: <format>,<parity> OK <ul style="list-style-type: none"> Note: This framing is applied for command state
	AT+ICF=[<format>],[<parity>]
Set command	Response <ul style="list-style-type: none"> This parameter setting determines the serial interface character framing format and parity received by TA from TE. Note: +IPR=0 forces +ICF=0 OK

Parameter	Note: The parity field is ignored if the format field specifies no parity.
	<pre> <format> 1 8 data 0 parity 2 stop 2 8 data 1 parity 1 stop 3 8 data 0 parity 1 stop 4 7 data 0 parity 2 stop 5 7 data 1 parity 1 stop 6 7 data 0 parity 1 stop <parity> 0 odd 1 even 2 mark (1) 3 space (0) </pre>
Scope	Channel Specific
Reference V.250	Note <ul style="list-style-type: none"> Not applicable to USB interface.

3.2.2.41. AT+IFC

AT+IFC Set TE-TA local data flow control	
Test command	AT+IFC=?
	Response <ul style="list-style-type: none"> +IFC:(list of supported <dce_by_dte>s), (list of supported <dte_by_dce>s) OK
Read command	AT+IFC?
	Response <ul style="list-style-type: none"> +IFC:<dce_by_dte>,<dte_by_dce> OK Note: This flow control is applied for data mode
Set command	AT+IFC=[<dce_by_dte>,<dte_by_dce>]
	Response <ul style="list-style-type: none"> This parameter setting determines the data flow control on the serial interface for data mode. OK
Parameter	<dce_by_dte> specifies the method will be used by TE at receive of data from TA <ul style="list-style-type: none"> 0 None 1 XON/XOFF, don't pass characters on to data stack 2 line 133: Ready for Receiving
	<dte_by_dce> specifies the method will be used by TA at receive of data from TE <ul style="list-style-type: none"> 0 None 1 XON/XOFF 2 line 106: Clear to send(CTS)
Scope	Channel Specific

Reference V.250	Note <ul style="list-style-type: none"> • M5311 uses line 105 (RTS) for this method. • For Software flow control, this sets on a per channel basis when using the 27.010 MUX. I.e. flow control characters are sent/received within the 27.010 MUX frame as part of the data. • For hardware flow control the setting will apply to all channels routed through one connection level (e.g. USB, UART).
-----------------	---

3.2.2.42. AT+ILRR

AT+ILRR	Set TE-TA local rate reporting mode
Test command	AT+ILRR=?
	Response <ul style="list-style-type: none"> • +ILRR:(list of supported <value>s OK
Read command	AT+ILRR?
	Response <ul style="list-style-type: none"> • +ILRR: <value> OK
Set command	AT+ILRR=<value>
	Response <ul style="list-style-type: none"> • This parameter setting determines whether an intermediate result code of local rate is reported at connection establishment. The rate is applied after the result code of the connection is transmitted to TE. • OK
Unsolicited result code	<ul style="list-style-type: none"> • +ILRR:<rate> Note: It indicates port rate settings on connection.
Parameter	<value> <ul style="list-style-type: none"> 0 Disables reporting of local port rate 1 Enables reporting of local port rate <rate> port rate setting on call connection in Baud per second <ul style="list-style-type: none"> 9600 19200 38400 57600 115200 230400 460800
Scope	<ul style="list-style-type: none"> • Scope <ul style="list-style-type: none"> ○ Channel Specific
Reference V.250	Note

3.2.2.43. AT+IPR

AT+IPR Set fixed local rate	
Test command	AT+IPR=?
	Response <ul style="list-style-type: none"> +IPR: (list of supported auto detectable <rate>s),(list of supported fixed-only<rate>s) OK
Read command	AT+IPR?
	Response <ul style="list-style-type: none"> +IPR: <rate> OK
Set command	AT+IPR=<rate>
	Response <ul style="list-style-type: none"> This parameter setting determines the data rate of the TA on the serial interface. The rate of command takes effect following the issuance of any result code associated with the current command line. OK
Parameter	<rate> Baud-rate per second 0(auto baud rate) 110 300 1200 2400 4800 9600 19200 38400 57600 115200 230400 460800 921600
Scope	Channel Specific
Reference V.250	Note <ul style="list-style-type: none"> The setting will apply to all channels routed through one connection level for UART. Not applicable for USB interface. AT+IPR=0, auto baud rate takes effect following these three cases: 1. Commands AT+IPR=0 returns 'OK'. 2.wake up from sleep. 3. Software/Hardware reboot. Only one of these three cases can trigger an adaptive baud rate.

3.2.2.44. ATD*99#

This command is used by the PC to make a packet domain connection using the standard AT dial command.

Note that it is possible for ATD*99# to re-use an already active context as long as the context was activated

with no data connection on the same channel (i.e. activated with AT+CGACT).

ATD Request Packet Domain Service	
Execute command	<p>ATD*<GPRS_SC>[*<called_address>] [*<L2P>][*<cid>[,<cid>[,...]]]]#</p> <hr/> <p>Response</p> <ul style="list-style-type: none"> • UE attempts to set up a mobile originated PDP context. <p><u>Note:</u> This command may be aborted generally by receiving a character during execution. The aborting is not possible during some states of PDP context activation.</p> <ul style="list-style-type: none"> ○ If no dial tone and (parameter setting X=2 or X=4) NO DIALTONE ○ If busy and (parameter setting X=3 or X=4) BUSY ○ If a PDP context cannot be established NO CARRIER ○ If connection successful CONNECT UE switches to packet switched data state. ○ When UE returns to command mode after PDP MO context deactivation OK
Parameter	<p><GPRS_SC> GPRS Service code. Digit string value 99 identifies a request to use PSD.</p> <p><called_address> String identifying called party in address space applicable to PDP. This parameter is not supported.</p> <p><L2P> Layer 2 protocol to be used.</p> <p>90001: Raw TCP/IP (No L2P required). Note that username and password must be set for the <cid> using the appropriate proprietary AT command (AT+CGAUTH).</p> <p><cid> Digit string specifying a particular PDP context definition (see AT+GCDCONT, AT+GCDSCONT).</p>
Scope	Channel Specific

Reference 3GPP TS 27.007	<p>Note</p> <p><L2P> value 90001 is used only for communication to a peer which supports raw TCP/IP routing to the modem and the additional AT commands required to support setup of IP configuration information.</p> <p>Note that if the <cid> value is omitted (i.e. just ATD*99# is entered) then the following takes place:</p> <ul style="list-style-type: none">• If the entity has a defined cid or a cid is defined but has an invalid entity, we will use that cid if the cid is not provided• If the above condition is not met, we will use the next free cid• In addition, we also check the cid is not reserved for a Mobile Terminated (MT) PDP context (by using AT*MMTPDPCID command). If it is reserved, we will skip it and continue to find a cid according to the rules above• When a Mobile Terminated PDP context is incoming, we firstly check whether a cid has been reserved for MT PDP or not (using the AT*MMTPDPCID command). If not, we will get a free cid according to the rules above <p>Note that it is better to enter the <cid> value as the behavior of the dialup will be more predictable.</p> <p>When a new cid is used, the PDP context information associated with the cid (APN, etc) is copied from the default PDP context information stored in the background layer using AT command AT*MCGDEFCONT.</p>
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3.3. Supported AT Commands According to 3GPP TS 27.007

3.3.1. Overview

The 3GPP TS 27.007 commands are for remote control of NB-IoT functionality.

Command	Description
AT+CCLK	Clock
AT+CEER	Extended error report
AT+CFUN	Set phone functionality
AT+CGACT	Context activation
AT+CGATT	GPRS/Packet Domain attach or detach
AT+CGDATA	Enter Data State
AT+CGDCONT	Define PDP context
AT+CGMI	Request manufacturer identification
AT+CGMM	Request model identification
AT+CGMR	Request revision identification
AT+CGOI	Request global object identification
AT+CGPADDR	Show PDP address
AT+CGREG	Network registration status
AT+CEREG	EPS network registration status
AT+CGCONTRDP	PDP context read dynamic parameters
AT+CGSN	Request product serial number identification (identical with +GSN)
AT+CIMI	Request international mobile subscriber identity
AT+CLCK	Facility lock
AT+CMAR	Master Reset
AT+CMEE	Report mobile equipment error
AT+CMUX	3GPP TS 27.010 Multiplexer control
AT+COPN	Read operator names
AT+COPS	Operator selection
AT+CESQ	Extended signal quality
AT+CSQ	Signal Quality
AT+CPIN	Enter pin
AT+CPOL	Preferred operator list
AT+CPWD	Change password
AT+CR	Service reporting control
AT+CREG	Network registration
AT+CSIM	Generic SIM Access
AT+CRSM	Restricted SIM access
AT+CSCS	Select TE character set

AT+CTZR	Time Zone Reporting
AT+CTZU	Automatic Time Zone Update
AT+CPLS	Selection of preferred PLMN List
AT+CPSMS	Power saving mode selection
AT+CIPCA	Enable/disable activation of PDN connection on attach.
AT+CCIOTOPT	CloT optimization configuration
AT+CEDRXS	eDRX setting
AT+CEDRXRDP	eDRX read dynamic parameters
AT+CGAPNRC	Report APN uplink rate control information
AT+CSCON	Query and generate URC for signaling connection station (CONNECTED or IDLE)
AT+CCHO	Open UICC Logical Channel
AT+CCHC	Close UICC Logical Channel
AT+CGLA	Generic UICC Logical Channel Access
AT+CRLA	Restricted UICC Logical Channel Access
AT+CPINR	Remaining PIN Retries
AT+CGPIAF	Printing IP Address Format
AT+CGEREP	Packet Domain Event Reporting
AT+CGDEL	Delete non-active PDP Context(s)
AT+CGAUTH	Define PDP Context Authentication Parameters

3.3.2. Detailed Descriptions of Commands

3.3.2.1. AT+CCLK

AT+CCLK	Clock
Read command	AT+CCLK?
	Response <ul style="list-style-type: none"> • +CCLK: <time> • OK • +CME ERROR: <err>
Set command	AT+CCLK=<time>
	Response <ul style="list-style-type: none"> • OK • +CME ERROR: <err>

Parameters	<p><time> string type value; format is "yy/MM/dd, hh:mm:ss±zz"; where characters indicate year (two last digits), month, day, hour, minutes and seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47...+48). E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals to "94/05/06,22:10:00+08"</p> <p>Note: If MT does not support time zone information then the three last characters of <time> are not returned by +CCLK?.</p>
Scope	<ul style="list-style-type: none"> ○ Channel specific for read command ○ Generic for set command
Reference 3GPP TS 27.007	Note

3.3.2.2. AT+CEER

AT+CEER	Extended error report
Execute command	AT+CEER Response <ul style="list-style-type: none"> • TA returns an extended report of the reason for the last call release. • +CEER: <report> • OK
Scope	Channel Specific
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • Note that the cause display mode is set using the AT command AT*MCEERMODE. The response can be in either textual format (default) or numeric (according to 3GPP cause values). For more details see the AT*MCEERMODE command description.

3.3.2.3. AT+CFUN

AT+CFUN	Set phone functionality
Test command	AT+CFUN=? Response <ul style="list-style-type: none"> • +CFUN: (list of supported <fun>s), (list of supported <rst>s) • OK • +CME ERROR: <err>
Read command	AT+CFUN? Response <ul style="list-style-type: none"> • +CFUN: <fun> • OK • +CME ERROR: <err>

Set command	AT+CFUN=<fun>[,<rst>] Response <ul style="list-style-type: none"> • OK • +CME ERROR: <err>
Parameters	<fun> <ul style="list-style-type: none"> 0 minimum functionality 1 full functionality (Default) 4 disable phone both transmit and receive RF circuits 7 disable phone SIM only. Transmit and receive circuits still active 5,6,8...127 reserved for manufacturers as intermediate states between full and minimum functionality <rst> <ul style="list-style-type: none"> 0 do not reset the MT before setting it to <fun> power level Only set to <fun> power level after MT has been reset, and for all subsequent resets. Do not reset MT before setting it to <fun> power level and save <fun> value in NVRAM for all subsequent resets.
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test and read command ○ Generic for set command
Reference 3GPP TS 27.007	Note Settings 2 and 3 of <fun> are not supported. <ul style="list-style-type: none"> • <fun> = 0 performs all system shutdown actions without removing power. It will take some time to return ok or error, during this time, other At Command input will not responded. The response time does not exceed 90s. • <fun> = 1 performs a system startup • <rst> = 0 shall always be the default if the <rst> parameter is not given. Note that <rst> of 1 and 2 does not reset the modem as described in the 27.007 specification. They simply set a value in NVRAM so that <fun> value is activated on all subsequent modem resets.

3.3.2.4. AT+CGACT

The execution command is used to activate or deactivate the specified PDP context (s). After the command has completed, the UE 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 UE is not PS attached when the activation form of the command is executed, the UE first performs a PS attach and then attempts to activate the specified contexts.

Note that in the 27.007 specification there is the following statement:

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

This applies when use of CID0 is enabled for the PDN connection activated during attach. In fact, entering AT+CGACT=<0 or 1>,0 will generate ERROR response.

If CID0 mode is not enabled then it is possible to enter the AT+CGACT command to deactivate the last PDN connection from the point of view of the middleware. When the user uses AT+CGACT to disconnect the last PDN connection the following occurs:

- The PDN connection is preserved in the protocol stack

- The PDN connection is disconnected at the middleware, so the <cid> for the PDN connection is marked as deactivated
- OK response is returned rather than ERROR

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 UE 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 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.

AT+CGACT	PDP Context activate or deactivate
Test command	AT+CGACT=?
	Response <ul style="list-style-type: none"> • +CGACT: (list of supported <state>s) • OK
Read command	AT+CGACT?
	Response <ul style="list-style-type: none"> • +CGACT:<cid>,<state>[<CR><LF>+CGACT: <cid>,<state>[...]] • OK
Set command	AT+CGACT=[<state>[,<cid> [,<cid>[,...]]]]
	Response <ul style="list-style-type: none"> • OK • NO CARRIER • ERROR
Parameter	<p><state> indicates the state of PDP context activation</p> <p>0 deactivated</p> <p>1 activated</p> <p>Other reserved and will result in an ERROR response to the execution command.</p> <p><cid> a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command)</p>
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test and read command ○ Generic for set command
Reference 3GPP TS 27.007	<p>Note</p> <ul style="list-style-type: none"> • If context is deactivated successfully, NO CARRIER is returned • If CID0 for PDN activated during attach is enabled, then AT+CGACT=<0 or 1>,0 will cause ERROR response.

3.3.2.5. AT+CGATT

AT+CGATT	GPRS/Packet Domain attach or detach								
Test command	AT+CGATT=?								
	Response <ul style="list-style-type: none"> +CGATT: (list of supported <state>s) OK 								
Read command	AT+CGATT?								
	Response <ul style="list-style-type: none"> +CGATT: <state> OK 								
Set command	AT+CGATT=[<state>]								
	Response <ul style="list-style-type: none"> OK ERROR 								
Parameter	<table border="0"> <tr> <td><state></td> <td>indicates the state of GPRS/Packet Domain attachment</td> </tr> <tr> <td>0</td> <td>detached</td> </tr> <tr> <td>1</td> <td>attached</td> </tr> <tr> <td>Other</td> <td>reserved and will result in an ERROR response to the execution command.</td> </tr> </table>	<state>	indicates the state of GPRS/Packet Domain attachment	0	detached	1	attached	Other	reserved and will result in an ERROR response to the execution command.
<state>	indicates the state of GPRS/Packet Domain attachment								
0	detached								
1	attached								
Other	reserved and will result in an ERROR response to the execution command.								
Scope	<ul style="list-style-type: none"> Channel Specific for test and read command Generic for set command 								
Reference 3GPP TS 27.007	<ul style="list-style-type: none"> <state>= 0 performs GPRS/Packet Domain detach actions. It will take some time to return ok or error, during this time, other At Command input will not responded. The response time does not exceed 90s. 								

3.3.2.6. AT+CGDATA

This command is used activate a PDP context / EPS bearer rather than using the ATD*99# method. It will be used by the Packet Transport mechanism for activating a PDP context / EPS bearer.

Note that it is possible for AT+CGDATA to re-use an already active context as long as the context was activated with no data connection on the same channel (i.e. activated with AT+CGACT).

AT+CGDATA	Enter Data State
Test command	AT+CGDATA=?
	Response <ul style="list-style-type: none"> +CGDATA: (list of supported <L2P>s) OK
Set command	AT+CGDATA=[<L2P>[,<cid>[,<cid>[,...]]]]

	Response <ul style="list-style-type: none"> • OK • ERROR
Parameter	<ul style="list-style-type: none"> • <L2P> a string parameter that indicates the layer 2 protocol to be used between the TE and MT: <ul style="list-style-type: none"> ○ M-PT – Packet Transport Mechanism protocol for a PDP such as IP ○ Other values are not supported and will result in an ERROR response to the execution command. • <cid> a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command)
Scope	Channel Specific
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • The command will enter data state once the PDP context has been activated<L2P> value M-PT represents no <l2p> but raw IP packet transfer. • +++ escape from data mode.

3.3.2.7. AT+CGDCONT

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

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

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

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

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

The feature "initial PDP context" may be supported and is a manufacturer specific option. For this option, the context with <cid>=0 (context number 0) is defined upon startup and does not need to be created with the +CGDCONT command. The initial PDP context has particular manufacturer specific default settings disassociated with any other default settings of +CGDCONT. When in E-UTRAN, the initial PDP context is automatically activated by the MT following a successful registration to the network depending on the setting of AT+CIPCA command. If all active contexts are deactivated, the initial PDP context can be (re)established. This is manufacturer specific and depends on the current RAT as well as how the active contexts are deactivated.

AT+CGDCONT Define the PDP context	
	AT+CGDCONT=?
Test command	Response +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),(list of supported

	<p><Local_Addr_Ind>),(list of supported<Non-IPMTUdiscovery>s)</p> <p>[<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),(list of supported <Local_Addr_Ind>s),,(list of supported <Non-IP_MTU_discovery>s)[...]]</p>
<p>Read command</p>	<p>AT+CGDCONT?</p> <p>Response</p> <p>[+CGDCONT:<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<request_type>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<Local_Addr_Ind>[,<Non-IP_MTU_discovery>]]]]]]]]]]]</p> <p>[<CR><LF>+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<request_type>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<Local_Addr_Ind>[,<Non-IP_MTU_discovery>]]]]]]]]]]]</p> <p>[...]]</p>
<p>Set command</p>	<p>AT+CGDCONT=[<cid>,[<PDP_type>,[<APN>,[<PDP_addr>,[<d_comp>,[<h_comp>[<IPv4AddrAlloc>[,<request_type>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<Local_Addr_Ind>[,<Non-IP_MTU_discovery>]]]]]]]]]]]]]]]]]</p> <p>Response</p> <ul style="list-style-type: none"> • OK • ERROR
<p>Parameter</p>	<p><cid> (PDP Context Identifier) a numeric parameter that specifies a particular PDP context definition.</p> <ul style="list-style-type: none"> ○ The parameter is local to the UE-TE 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. <ul style="list-style-type: none"> • <PDP_type> (Packet Data Protocol type) a string parameter which specifies the type of packet data protocol : <ul style="list-style-type: none"> ○ IP Internet Protocol (IETF STD 5) ○ IPV6 Internet Protocol, version 6 (IETF RFC 2460) ○ IPV4V6 Virtual <PDP_type>) introduced to handle dual IP stack UE capability (see 3GPP Technical Specifications 24.301). ○ Non-IP Transfer of Non-IP data to external packet data Network (see 3GPP Technical Specifications 24.301). • <APN> (Access Point Name) a string parameter, a logical name to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested. • <PDP_addr> a string parameter that identifies the UE in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The read form of the command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the +CGPADDR command. <ul style="list-style-type: none"> ○ NOTE: For EPS, this field is omitted. • <d_comp>: a numeric parameter that controls PDP data compression (applicable for SMDCP only) (refer 3GPP TS 04.65)

	<ul style="list-style-type: none"> ○ 0 - off (default if value is omitted) ○ 1 - on (manufacturer preferred compression) ○ 2 – V.42bis ○ Other values are reserved. • <h_comp>: a numeric parameter that controls PDP header compression (refer 3GPP TS 04.65) <ul style="list-style-type: none"> ○ 0 – off (default if value is omitted) ○ 1 – on (manufacturer preferred compression) ○ 2 – RFC1144 (applicable for SMDCP only) ○ 3 – RFC 2507 ○ 4 – RFC 3095 (ROHC) (applicable for PDCP only) ○ Other values are reserved. • <IPv4_MTU_discovery>: integer type; influences how the MT/TA requests to get the IPv4 MTU size, see 3GPP TS 24.008 sub-clause 10.5.6.3. <ul style="list-style-type: none"> ○ 0 Preference of IPv4 MTU size discovery not influenced by +CGDCONT ○ 1 Preference of IPv4 MTU size discovery through NAS signaling • <Non-IP_MTU_discovery>: integer type; influences how the MT/TA requests to get the Non-IP MTU size, see 3GPP TS 24.008 sub-clause 10.5.6.3. <ul style="list-style-type: none"> ○ 0 Preference of Non-IP MTU size discovery not influenced by +CGDCONT ○ 1 Preference of Non-IP MTU size discovery through NAS signaling supported
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test and read command ○ Generic for set command
Reference 3GPP TS 27.007	<ul style="list-style-type: none"> • Note <ul style="list-style-type: none"> ○ If the initial PDP context is supported, the context with <cid>=0 is automatically defined at startup. 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. ○ Parameters: <IPv4AddrAlloc>,<request_type>,<P-CSCF_discovery>,<IM_CN_Signalling_Flag_Ind>,<NSLPI>,<securePCO>,<Local_Addr_Ind>,<IPv4_MTU_discovery> and <Non-IP_MTU_discovery> are not supported in M5311 modem.

3.3.2.8. AT+CGMI

AT+CGMI	Request manufacturer identification
	AT+CGMI
Execute command	Response <ul style="list-style-type: none"> • TA returns manufacturer identification text. • <manufacturer> • OK
Parameters	<ul style="list-style-type: none"> • <manufacturer>
Scope	Channel Specific
Reference 3GPP TS 27.007	Note

3.3.2.9. AT+CGMM

AT+CGMM Request model identification	
Execute command	AT+CGMM
	Response <ul style="list-style-type: none"> TA returns product model identification text
Parameters	<model>
Scope	Channel Specific
Reference 3GPP TS 27.007	Note

3.3.2.10. AT+CGMR

AT+CGMR Request revision identification	
Execute command	AT+CGMR
	Response <ul style="list-style-type: none"> TA returns product software version identification text <revision> OK
Parameters	<revision>
Scope	Channel Specific
Reference 3GPP TS 27.007	Note

3.3.2.11. AT+CGOI

AT+CGOI Request global object identification	
Execute command	AT+CGOI
	Response <ul style="list-style-type: none"> OK TA reports one or more lines of information text that permit the user to identify the device, based on the ISO system for registering unique object identifiers.
Parameter	<Object Id> identifier of device type <ul style="list-style-type: none"> See X.208, 209 for the format of <Object Id>. This string is customer specific.
Scope	Channel Specific
Reference V.250/ 3GPP TS 27.007	Note

3.3.2.12. AT+CGPADDR

AT+CGPADDR Show PDP address	
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Test command	AT+CGPADDR=?
	Response <ul style="list-style-type: none"> • +CGPADDR: (list of defined <cid>s) • OK
Set command	AT+CGPADDR=[<cid>[,<cid>[,...]]]
	Response <ul style="list-style-type: none"> • +CGPADDR:<cid>,<PDP_addr>[<CR><LF>+CGPADDR:<cid>,<PDP_addr>[...]] • OK
Parameter	<ul style="list-style-type: none"> • <cid> a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command). If no <cid> is specified, the addresses for all defined contexts are returned. • <PDP_addr> a string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. <ul style="list-style-type: none"> ○ For a static address, it will be the one set by the +CGDCONT command when the context was defined. ○ For a dynamic address, it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. <PDP_address> is omitted if none is available.
Scope	Channel specific for test command
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • This command dictates the behavior of PPP in the ME but not that of any other GPRS/Packet Domain-enabled foreground layer, e.g. browser.

3.3.2.13. AT+CGREG

This command is used to display the packet switched network registration status.

AT+CGREG	Network registration status
Test command	AT+CGREG=?
	Response <ul style="list-style-type: none"> • +CGREG: (list of supported <n>s) • OK
Read command	AT+CGREG?
	Response <ul style="list-style-type: none"> • +CGREG: <n>,<stat>[,<lac>,<ci>[,<AcT>]] • +CME ERROR: <err> • OK
Set command	AT+CGREG=[<n>]
	Response <ul style="list-style-type: none"> • OK

Parameter	<p><n></p> <p>0 disable network registration unsolicited result code</p> <p>1 enable network registration unsolicited result code +CGREG: <stat></p> <p>2 enable network registration and location information unsolicited result code +CGREG: <stat>[,<lac>,<ci>[,<Act>,<rac>]]</p> <p><stat></p> <p>0 not registered, ME is not currently searching a new operator to register to</p> <p>1 registered, home network</p> <p>2 not registered, but ME is currently searching for a new operator to register to</p> <p>3 registration denied</p> <p>4 unknown</p> <p>5 registered, roaming</p> <p>6 registered for "SMS only", home network (applicable only when <Act> indicates E-UTRAN)</p> <p>7 registered for "SMS only", roaming (applicable only when <Act> indicates E-UTRAN)</p> <p><lac> string type; two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)</p> <p><ci> string type; four byte UTRAN/GERAN/E-UTRAN cell ID in hexadecimal format</p> <p><Act> access technology of the registered network</p> <p>9 NB-IoT</p> <p><rac> string type; one byte routing area code in hexadecimal format</p>
Scope	Channel Specific
Reference 3GPP TS 27.007	<p>Note</p> <ul style="list-style-type: none"> The set command controls the presentation of an unsolicited result code +CGREG: <stat> when <n>=1 and there is a change in the UE's GPRS network registration status, or code +CGREG: <stat>[,<lac>,<ci>[,<Act>,<rac>]] when <n>=2 and there is a change of the network cell. For NB-IoT product, only <Act> value of 9 is valid.

3.3.2.14. AT+CEREG

The set command controls the presentation of an unsolicited result code +CEREG: <stat> when <n>=1 and there is a change in the UE's EPS network registration status, or result code +CEREG: <stat>[,<tac>,<ci>[,<Act>]] when <n>=2 and there is a change of the network cell.

NOTE: If the EPS UE also supports circuit mode services and/or GPRS services, the +CEREG command and +CEREG: 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> that shows whether the network has currently indicated the registration of the UE. Location information elements <tac>, <ci> and <Act> are returned only when <n>=2 and UE is registered in the network.

AT+CEREG	EPS Network Registration Status
Test Command	AT+CEREG=?

	Response <ul style="list-style-type: none"> • +CEREG: (list of supported <n>s) • OK 																																
Read command	AT+CEREG? Response <ul style="list-style-type: none"> • when <n>=0, 1, 2 or 3 and command successful: <ul style="list-style-type: none"> ○ +CEREG: <n>,<stat>[,<tac>],[<ci>],[<Act>,<cause_type>,<reject_cause>]] • when <n>=4 or 5 and command successful: <ul style="list-style-type: none"> ○ +CEREG: <n>,<stat>[,<lac>],[<ci>],[<Act>],[<rac>],[<cause_type>],[<reject_cause>],[<Active-Time>],[<Periodic-TAU>]]] • If error is related to wrong AT syntax or operation not allowed: <ul style="list-style-type: none"> ○ +CME ERROR: <err> 																																
Execution command	AT+CEREG=<n> Response <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err> 																																
Unsolicited result code	See Parameters below																																
Parameters	<table border="0"> <tr> <td style="padding-left: 20px;"><n></td> <td></td> </tr> <tr> <td style="padding-left: 40px;">0</td> <td>disable network registration unsolicited result code</td> </tr> <tr> <td style="padding-left: 40px;">1</td> <td>enable network registration unsolicited result code +CEREG: <stat></td> </tr> <tr> <td style="padding-left: 40px;">2</td> <td>enable network registration and location information unsolicited result code +CEREG: <stat>[,<lac>],[<ci>],[<Act>],[<rac>]]</td> </tr> <tr> <td style="padding-left: 40px;">3</td> <td>enable network registration, location information and EMM cause value information unsolicited result code +CEREG: <stat>[,<lac>],[<ci>],[<Act>],[<rac>],[<cause_type>,<reject_cause>]]</td> </tr> <tr> <td style="padding-left: 40px;">4</td> <td>For a UE that wants to apply PSM, enable network registration and location information unsolicited result code +CEREG: <stat>[,<lac>],[<ci>],[<Act>],[<rac>][,],[<Active-Time>],[<Periodic-RAU>],[<GPRS-READY-timer>]]]</td> </tr> <tr> <td style="padding-left: 40px;">5</td> <td>For a UE that wants to apply PSM, enable network registration, location information and EMM cause value information unsolicited result code +CEREG: <stat>[,<lac>],[<ci>],[<Act>],[<rac>],[<cause_type>],[<reject_cause>],[<Active-Time>],[<Periodic-RAU>],[<GPRS-READY-timer>]]]</td> </tr> <tr> <td style="padding-left: 20px;"><stat></td> <td>EPS registration status</td> </tr> <tr> <td style="padding-left: 40px;">0</td> <td>not registered, ME is not currently searching a new operator to register to</td> </tr> <tr> <td style="padding-left: 40px;">1</td> <td>registered, home network</td> </tr> <tr> <td style="padding-left: 40px;">2</td> <td>not registered, but ME is currently searching for a new operator to register to</td> </tr> <tr> <td style="padding-left: 40px;">3</td> <td>registration denied</td> </tr> <tr> <td style="padding-left: 40px;">4</td> <td>unknown</td> </tr> <tr> <td style="padding-left: 40px;">5</td> <td>registered, roaming</td> </tr> <tr> <td style="padding-left: 40px;">6</td> <td>registered for "SMS only", home network (applicable only when <Act> indicates NB-IOT</td> </tr> <tr> <td style="padding-left: 40px;">7</td> <td>registered for "SMS only", roaming (applicable only when</td> </tr> </table>	<n>		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>[,<lac>],[<ci>],[<Act>],[<rac>]]	3	enable network registration, location information and EMM cause value information unsolicited result code +CEREG: <stat>[,<lac>],[<ci>],[<Act>],[<rac>],[<cause_type>,<reject_cause>]]	4	For a UE that wants to apply PSM, enable network registration and location information unsolicited result code +CEREG: <stat>[,<lac>],[<ci>],[<Act>],[<rac>][,],[<Active-Time>],[<Periodic-RAU>],[<GPRS-READY-timer>]]]	5	For a UE that wants to apply PSM, enable network registration, location information and EMM cause value information unsolicited result code +CEREG: <stat>[,<lac>],[<ci>],[<Act>],[<rac>],[<cause_type>],[<reject_cause>],[<Active-Time>],[<Periodic-RAU>],[<GPRS-READY-timer>]]]	<stat>	EPS registration status	0	not registered, ME is not currently searching a new operator to register to	1	registered, home network	2	not registered, but ME is currently searching for a new operator to register to	3	registration denied	4	unknown	5	registered, roaming	6	registered for "SMS only", home network (applicable only when <Act> indicates NB-IOT	7	registered for "SMS only", roaming (applicable only when
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7	registered for "SMS only", roaming (applicable only when																																

	<p><Act> indicates NB-IOT</p> <p><ta> string type; two byte tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).</p> <p><ci> string type; four byte GERAN/UTRAN/E-UTRAN cell ID in hexadecimal format</p> <p><AcT> access technology of the registered network 9 NB-IoT</p> <p><cause_type> integer type; indicates the type of <reject_cause> 0 Indicates that <reject_cause> contains an EMM cause value, see 3GPP TS 24.301 Annex A. 1 Indicates that <reject_cause> contains a manufacturer-specific cause.</p> <p><reject_cause> integer type; contains the cause of the failed registration. The value is of type as defined by <cause_type>.</p> <p><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 10.5.163/3GPP TS 24.008. See also 3GPP TS 23.682 and 3GPP TS 23.401.</p> <p><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.</p>
Scope	Channel Specific
Reference	<p>Note</p> <ul style="list-style-type: none"> For NB-IoT product, only <AcT> value of 9 is valid.

3.3.2.15. AT+CGCONTRDP

The execution command returns the relevant information for a primary PDP Context established by the network with the primary context identifier <cid>. If the context cannot be found an ERROR response is returned.

If the UE has dual stack capabilities, two lines of information are returned per <cid>. First one line with the IPv4 parameters followed by one line with the IPv6 parameters.

If the parameter <cid> is omitted, the relevant information for all established PDP contexts are returned.

NOTE: The dynamic part of the PDP context will only exist if established by the network.

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

AT+CGCONTRDP PDP Context Read Dynamic Parameters	
Test Command	AT+CGCONTRDP=?
	<p>Response</p> <ul style="list-style-type: none"> +CGCONTRDP: (list of <cid>s associated with active contexts) OK
Read command	AT+CGCONTRDP?
	<p>Response</p> <ul style="list-style-type: none"> +CME ERROR: <err>

3.3.2.16. AT+CGSN

AT+CGSN Request product serial number identification (Identical with +GSN)											
Test command	AT+CGSN=?										
	Response <ul style="list-style-type: none"> • +CGSN: (list of supported <snt>s) • OK 										
Execute command	AT+CGSN										
	Response <ul style="list-style-type: none"> • when <snt>=0 (or omitted) and command successful: <ul style="list-style-type: none"> ○ <sn> • when <snt>=1 and command successful: <ul style="list-style-type: none"> ○ +CGSN: <imei> • when <snt>=2 and command successful: <ul style="list-style-type: none"> ○ +CGSN: <imeisv> • when <snt>=3 and command successful: <ul style="list-style-type: none"> ○ +CGSN: <svn> 										
Parameters	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: right;"><snt></td> <td>Integer type indicating serial number type that has been requested</td> </tr> <tr> <td style="text-align: right;">0</td> <td>returns <sn></td> </tr> <tr> <td style="text-align: right;">1</td> <td>returns IMEI</td> </tr> <tr> <td style="text-align: right;">2</td> <td>returns IMEISV (IMEI & SV)</td> </tr> <tr> <td style="text-align: right;">3</td> <td>returns SVN</td> </tr> </table>	<snt>	Integer type indicating serial number type that has been requested	0	returns <sn>	1	returns IMEI	2	returns IMEISV (IMEI & SV)	3	returns SVN
<snt>	Integer type indicating serial number type that has been requested										
0	returns <sn>										
1	returns IMEI										
2	returns IMEISV (IMEI & SV)										
3	returns SVN										
Scope	Channel Specific										
Reference 3GPP TS 27.007	Note										

3.3.2.17. AT+CIMI

AT+CIMI Request international mobile subscriber identity	
Execute command	AT+CIMI
	Response <ul style="list-style-type: none"> • TA returns <IMSI>for identifying the individual SIM which is attached to ME. <ul style="list-style-type: none"> ○ +CIMI: <IMSI> ○ OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameter	<ul style="list-style-type: none"> • <IMSI> International Mobile Subscriber Identity (string without double quotes)
Scope	Channel Specific
Reference 3GPP TS 27.007	Note

3.3.2.18. AT+CLCK

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

AT+CLCK	Facility lock
Test command	AT+CLCK=? Response <ul style="list-style-type: none"> +CLCK: (list of supported <fac>s) OK
Execute command	AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]] Response This command is used to lock, unlock or interrogate a ME or a network facility <fac>. Password is normally needed to do such actions. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. <ul style="list-style-type: none"> If <mode><>2 and command is successful <ul style="list-style-type: none"> OK If <mode>=2 and command is successful <ul style="list-style-type: none"> +CLCK: <status>[,<class1>[<CR><LF> +CLCK: <status>, class2....]] OK If error is related to ME functionality: <ul style="list-style-type: none"> +CME ERROR: <err>
Parameters	<fac> "SC" SIM (lock SIM card) (SIM asks password in ME power-up and when this lock command issued) <mode> 0 unlock 1 lock 2 query status <passwd> password <class> Field not required for NB-IOT, so will be ignored <status> 0 off 1 on
Scope	Generic
Reference 3GPP TS 27.007	Note

3.3.2.19. AT+CMAR

AT+CMAR Master Reset	
Set command	AT+CMAR=<phone lock code>
	Response <ul style="list-style-type: none"> • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameters	<phone lock code> string type; Security code (Phone Lock code) must be verified before performing the master reset.
Scope	<ul style="list-style-type: none"> ○ Channel specific for test and read command ○ Generic for set command
Reference 3GPP TS 27.007	Note

3.3.2.20. AT+CMEE

AT+CMEE Report mobile equipment error							
Test command	AT+CMEE=?						
	Response <ul style="list-style-type: none"> • +CMEE: (list of supported <n>s) • OK 						
Read command	AT+CMEE?						
	Response <ul style="list-style-type: none"> • +CMEE: <n> • OK 						
Set command	AT+CMEE=<n>						
	Response <ul style="list-style-type: none"> • TA disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the ME. • OK 						
Parameters	<n> <table style="margin-left: 20px;"> <tr> <td>0</td> <td>disable result code</td> </tr> <tr> <td>1</td> <td>enable result code and use numeric values</td> </tr> <tr> <td>2</td> <td>enable result code and use verbose values</td> </tr> </table>	0	disable result code	1	enable result code and use numeric values	2	enable result code and use verbose values
0	disable result code						
1	enable result code and use numeric values						
2	enable result code and use verbose values						
Scope	Channel Specific						
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • <n> value 0 is set as default in production (non-development) builds. • <n> value 2 is set as default in development builds. 						

3.3.2.21. AT+CMUX

AT+CMUX	Serial Multiplexer control
Test command	AT+CMUX=? Response <ul style="list-style-type: none"> • +CMUX: (list of supported <mode>s), (list of supported <subset>s), (list of supported <port_speed>s), (list of supported <N1>s), (list of supported <T1>s), (list of supported <N2>s), (list if supported <T2>s), (list of supported <T3>s), <list of supported <k>s)
Read command	AT+CMUX? Response <ul style="list-style-type: none"> • If <mode> = 0 : <ul style="list-style-type: none"> o +CMUX:<mode>, [<subset>], <port_speed>, <N1>, <T>, <N2>, <T2>, <T3>, <k>] • Otherwise : <ul style="list-style-type: none"> o +CMUX:<mode> • +CME ERROR: <err>
Set command	AT+CMUX=<mode>[,<subset>[,<port_speed>[,<N1> [,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]]] Response <ul style="list-style-type: none"> • +CME ERROR: <err>



中国移动
China Mobile

Parameters	<p><mode></p> <p>-1 Multiplexer not active (Only available in read mode)</p> <p>0 27.010 multiplexer</p> <p><subset> Initial control channel setup UIH frames used only</p> <p><port_speed> Transmission rate (not relevant for USB interface)</p> <p>Autobauding</p> <p>9600 bps</p> <p>19200 bps</p> <p>38400 bps</p> <p>57600 bps</p> <p>115200 bps</p> <p>230400 bps</p> <p>460800 bps</p> <p><N1> Maximum frame size:</p> <p>1-4096 (default value 31 for basic option)</p> <p><T1> Acknowledgement time in units of 10ms:</p> <p>1-255 (default value 10 (100ms))</p> <p><N2> Maximum number of re-transmissions:</p> <p>0-100 (default value is 3)</p> <p><T2> Response timer for the MUX channel in units of 10ms:</p> <p>2-255 (default value is 30 (300ms))</p> <p><T3> Wake up response timer in seconds:</p> <p>1-255 (default value 10 (100ms))</p> <p><k> Window size for Advanced operation with Error Recovery options:</p> <p>1-7 (default value is 2)</p>
Scope	Connection Level Specific (can be set on a per channel basis if it is appropriate for connection level)
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> The values of <<subset>, <port_speed>, <N1>,<T>,<N2>,<T2>,<T3>,<k> are only relevant to the 27.010 MUX control channel.

3.3.2.22. AT+COPS

AT+COPS	Operator selection
Test command	AT+COPS=? <p>Response</p> UE returns a list of quadruplets, each representing an operator present in the network. 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, and other networks. <ul style="list-style-type: none"> +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)] OK <ul style="list-style-type: none"> • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err> 																																										
Read command	AT+COPS?																																										
	Response UE returns the current mode and the currently selected operator. If no operator is selected, <format> and <oper> are omitted. <ul style="list-style-type: none"> • +COPS: <mode>[, <format>[, <oper>[,<Act>]]] • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err> 																																										
Set command	AT+COPS=<mode>[,<format>[,<oper>[,<Act>]]]																																										
	Response UE forces an attempt to select and register the GSM (or UMTS for 3G only) network operator. If the selected operator is not available, no other operator shall be selected (except <mode>=4). The selected operator name format shall apply to further read commands (+COPS?). <ul style="list-style-type: none"> • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err> 																																										
Parameters	<table border="0"> <tr> <td><stat></td> <td>0</td> <td>unknown</td> </tr> <tr> <td></td> <td>1</td> <td>operator available</td> </tr> <tr> <td></td> <td>2</td> <td>operator current</td> </tr> <tr> <td></td> <td>3</td> <td>operator forbidden</td> </tr> <tr> <td><oper></td> <td colspan="2">operator in format as per <mode></td> </tr> <tr> <td><mode></td> <td>0</td> <td>automatic mode; <oper> field is ignored</td> </tr> <tr> <td></td> <td>1</td> <td>manual operator selection; <oper> field shall be present</td> </tr> <tr> <td></td> <td>2</td> <td>manual deregister from network</td> </tr> <tr> <td></td> <td>3</td> <td>set only <format> (for read command +COPS?) – not shown in Read command response</td> </tr> <tr> <td></td> <td>4</td> <td>manual/automatic selected; if manual selection fails, automatic mode (<mode>=0) is entered</td> </tr> <tr> <td><format></td> <td>0</td> <td>long format alphanumeric <oper>;can be up to 16 characters long</td> </tr> <tr> <td></td> <td>1</td> <td>short format alphanumeric <oper></td> </tr> <tr> <td></td> <td>2</td> <td>numeric <oper>; GSM Location Area Identification number</td> </tr> <tr> <td><Act></td> <td>9</td> <td>NB-IoT</td> </tr> </table>	<stat>	0	unknown		1	operator available		2	operator current		3	operator forbidden	<oper>	operator in format as per <mode>		<mode>	0	automatic mode; <oper> field is ignored		1	manual operator selection; <oper> field shall be present		2	manual deregister from network		3	set only <format> (for read command +COPS?) – not shown in Read command response		4	manual/automatic selected; if manual selection fails, automatic mode (<mode>=0) is entered	<format>	0	long format alphanumeric <oper>;can be up to 16 characters long		1	short format alphanumeric <oper>		2	numeric <oper>; GSM Location Area Identification number	<Act>	9	NB-IoT
<stat>	0	unknown																																									
	1	operator available																																									
	2	operator current																																									
	3	operator forbidden																																									
<oper>	operator in format as per <mode>																																										
<mode>	0	automatic mode; <oper> field is ignored																																									
	1	manual operator selection; <oper> field shall be present																																									
	2	manual deregister from network																																									
	3	set only <format> (for read command +COPS?) – not shown in Read command response																																									
	4	manual/automatic selected; if manual selection fails, automatic mode (<mode>=0) is entered																																									
<format>	0	long format alphanumeric <oper>;can be up to 16 characters long																																									
	1	short format alphanumeric <oper>																																									
	2	numeric <oper>; GSM Location Area Identification number																																									
<Act>	9	NB-IoT																																									
Scope	<ul style="list-style-type: none"> ○ Channel specific for test and read command ○ Generic for set command 																																										
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • AT+COPS=?, It will take some time to return quadruplets. during this time, other At Command input will not responded until the quadruplets return. The response time does not exceed 200s. • AT+COPS=1,..., It will take some time to return ok or error, during this time, other At Command input will not responded. The response time does not exceed 200s. • <Act> field is fixed at 9 for NB-IoT product • <format> 0 and 1 (long format alphanumeric and short format alphanumeric) are not supported 																																										

3.3.2.23. AT+CESQ

Execution command returns received signal quality parameters. If the current serving cell is not a GERAN cell, <rssi> and <ber> are set to value 99. If the current serving cell is not a UTRA FDD or UTRA TDD cell, <rscp> is set to 255. If the current serving cell is not a UTRA FDD cell, <ecno> is set to 255. If the current serving cell is not an E-UTRA cell, <rsrq> and <rsrp> are set to 255.

Test command returns values supported as compound values.

AT+CESQ Extended Signal Quality	
Test Command	AT+CESQ=? Response <ul style="list-style-type: none"> • +CESQ: (list of supports <rxlev>s), (list of supported <ber>s), (list of supported <rscp>s), (list of supported <ecno>s), (list of supported <rsrq>s), (list of supported <rsrp>s) • OK
Execution command	AT+CESQ Response <ul style="list-style-type: none"> • +CESQ: <rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameters	<rxlev>: Integer type. Rx signal strength level 0: -110 dBm or less 1: -110 dBm <= rssi < -109 dBm 2: -109 dBm <= rssi < -108 dBm: 61: -50dBm <= rssi < -49 dBm 62: -49dBm <= rssi < -48 dBm 63: -48dBm <= rssi 99: not known or not detectable <ber>: Integer type; channel bit error rate (in percent) 0...7: as RXQUAL values RXQUAL_0 RXQUAL_7 as defined in 45.008. 99: not known or not detectable <rscp>: Integer type, received signal code power (see 3GPP 25.133 and 3GPP 25.123) 0: -120 dBm or less 1: -120 dBm <= rscp < -119 dBm 2: -119 dBm <= rscp < -118 dBm ...: ... 94: -27 dBm <= rscp < -26 dBm 95: -26 dBm <= rscp < -25 dBm 96: -25 dBm <= rscp 255: not known or not detectable <ecno> : Integer type, Ec/No (see 3GPP 25.133) 0: -24 dBm or less 1: -24dBm <= Ec/lo < -23.5 dBm 2: -23.5dBm <= Ec/lo < -23 dBm ...: ... 47: -1dBm <= Ec/lo < -0.5 dBm 48: -0.5dBm <= Ec/lo < 0 dBm

	49: 0 dBm <= Ec/Io 255: not known or not detectable <rsrq>: Integer type, reference signal received quality (see 3GPP 36.133) 0: -19.5 dB or less 1: -19.5dB <= rsrq < -19 dB 2: -19dB <= rsrq < -18.5 dB ...: ... 32: -4 dB <= rsrq < -3.5 dB 33: -3.5 dB <= rsrq < -3 dB 34: -3 dB <= rsrq 255: not known or not detectable <rsrp>: Integer type, reference signal received power (see 3GPP 36.133) 0: -140 dBm or less 1: -140dBm <= rsrp < -139 dBm 2: -139dBm <= rsrp < -138 dBm ...: ... 95: -46dBm <= rsrp < -45 dBm 96: -45dBm <= rsrp < -44 dBm 97: -44dBm <= rsrp 255: not known or not detectable
Scope	Generic
Reference	Note <ul style="list-style-type: none"> <ber>,<rsrp>,<ecno> are not applicable for NB-IOT so are set to "not known" value

+CESQ examples

AT+CESQ=?	Test command
+CESQ: (0-63,99), (99), (255), (255), (0-34,255), (0-97,255)	
OK	
AT+CESQ	Execute command
+CESQ: 24,99,255,255,26,87	Currently on NB-IOT cell
OK	

3.3.2.24. AT+CSQ

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

Test command returns values supported as compound values.

AT+CSQ	Signal Quality
Test Command	AT+CSQ=?
	Response <ul style="list-style-type: none"> +CSQ: (list of supports <rsqi>s), (list of supported <ber>s) OK
Execution command	AT+CSQ
	Response <ul style="list-style-type: none"> +CSQ: <rsqi>,<ber> OK If error is related to wrong AT syntax:

	o +CME ERROR: <err>
Parameters	<p><rssI> integer type</p> <ul style="list-style-type: none"> 0 -113 dBm or less 1 -111 dBm 2...30 -109... -53 dBm 31 -51 dBm or greater 99 not known or not detectable <p><ber> Integer type; channel bit error rate (in percent)</p> <ul style="list-style-type: none"> 0...7 as RXQUAL values RXQUAL_0...RXQUAL_7 as defined in 45.008. 99 not known or not detectable
Scope	Generic
Reference	Note

3.3.2.25. AT+CPIN

AT+CPIN	Enter PIN
Read command	AT+CPIN?
	<p>Response</p> <ul style="list-style-type: none"> • TA returns an alphanumeric string indicating whether some password is required or not. • +CPIN: <code> OK • If error is related to ME functionality: <ul style="list-style-type: none"> o +CME ERROR: <err>
Set command	AT+CPIN=<pin> [, <new pin>] [,<new pin>]]
	<p>Response</p> <p>TA stores a required password (SIM PIN, SIM PUK, PH-SIM PIN, etc.). If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If no PIN request is pending, no action is taken and an error message, +CME ERROR, is returned to TE.</p> <p>If the PIN required is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the SIM.</p> <p>When a new password is set, a third optional parameter may also be specified. This extra parameter is compared to the new password to check they are equivalent as an additional security feature.</p> <ul style="list-style-type: none"> • OK • If error is related to ME functionality: <ul style="list-style-type: none"> o +CME ERROR: <err>

Parameters	<p><pin> string type; password</p> <p><new pin> string type; If the PIN required is SIM PUK or SIM PUK2: new password</p> <p><code> READY no further entry needed</p> <p>SIM PIN ME is waiting for SIM PIN</p> <p>SIM PUK ME is waiting for SIM PUK</p> <p>SIM PIN2 PIN2, e.g. for editing the FDN book possible only if preceding command was acknowledged with +CME ERROR:17</p> <p>SIM PUK2 possible only if preceding command was acknowledged with error +CME ERROR:18.</p> <p>PH-SIM PIN ME is waiting for phone to SIM card (antitheft) PH-NET PIN Network personalization password is required. PH-NETSUB PIN Network subset is required.</p> <p>PH-SP PIN Service provider personalization password is required.</p> <p>PH-CORP PIN Corporate personalization password is required.</p>
Scope	<ul style="list-style-type: none"> ○ Channel specific for test and read command ○ Generic for set command
Reference 3GPP TS 27.007	<p>Note</p> <ul style="list-style-type: none"> • Note that syntax differs from B1 specification, as syntax matches 27.007 specification. • Original implementation had incorrect syntax: PH_SIM now changed to PH-SIM. • PH-SIM PUK is not in the code or in 27.007 so has been removed from this spec for AT+CPIN.

3.3.2.26. AT+CPOL

AT+CPOL	Preferred operator list
Test command	<p>AT+CPOL=?</p> <p>Response</p> <ul style="list-style-type: none"> • +CPOL: (list of supported <index>s),(list of supported <format>s) • OK
Read command	<p>AT+CPOL?</p> <p>Response</p> <ul style="list-style-type: none"> • +CPOL: <index1>,<format>,<oper1>[,<GSM_Act1>,<GSMcomp_Act1>,<UTRAN_Act1>,<E-UTRAN_Act1] • [<CR><LF>+CPOL: <index2>,<format>,<oper2>[,<GSM_Act2>,<GSMcomp_Act2>,<UTRAN_Act2>,<E-UTRAN_Act2>] • [...]] • OK • +CME ERROR: <err>
Set command	<p>AT+CPOL=[<index>][,<format>[,<oper>[,<GSM_Act>,<GSM_Compact_Act>,<UTRAN_Act>,<E-UTRAN_Act>]]]</p>

	Response <ul style="list-style-type: none"> • OK • +CME ERROR: <err>
Parameters	<index> integer type: order number of operator in USIM preferred operator list <format> 0 long format alphanumeric <oper> 1 short format alphanumeric <oper> 2 numeric <oper> <opern> string type: <format> indicates whether alphanumeric or numeric format used (see +COPS command) <GSM_AcTn> GSM Access technology; 0 access technology not selected 1 access technology selected <GSM_Comp_AcTn> GSM compact Access technology; 0 access technology not selected 1 access technology selected <UTRAN_AcTn> UTRA Access technology; 0 access technology not selected 1 access technology selected <E-UTRAN_AcTn> E-UTRAN Access technology; 0 access technology not selected 1 access technology selected
Scope	<ul style="list-style-type: none"> ○ Channel specific for test and read command ○ Generic for set command
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • Not all USIMs support the preferred operator list.

3.3.2.27. AT+CPWD

AT+CPWD	Change password
Test command	AT+CPWD=? Response TA returns a list of pairs that present the available facilities and the maximum length of their password. <ul style="list-style-type: none"> • +CPWD: list of supported (<fac>, <pwdlength>)s OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Execute command	AT+CPWD=<fac>,<oldpwd>,<newpwd> Response TA sets a new password for the facility lock function. <ul style="list-style-type: none"> • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>

Parameters	<p><fac> "SC" SIM (lock SIM card) (SIM asks password in ME power-up and when this lock command issued)</p> <p><oldpwd> old password</p> <p><newpwd> new password</p> <p><pwdlength> integer maximum length of password</p>
Scope	<ul style="list-style-type: none"> ○ Channel specific for test command ○ Generic for set command
Reference 3GPP TS 27.007	Note

3.3.2.28. AT+CR

This command is used to control the display of the intermediate result code +CR: <serv> at call setup or PDP context / EPS bearer activation.

AT+CR	Service Reporting Control
Test command	<p>AT+CR=?</p> <p>Response</p> <ul style="list-style-type: none"> • +CR: list of supported <mode>s • OK
Read command	<p>AT+CR?</p> <p>Response</p> <ul style="list-style-type: none"> • +CR: <mode> • OK
Set command	<p>AT+CR=<mode></p> <p>Response</p> <ul style="list-style-type: none"> • TA controls whether or not intermediate result code +CR: <serv> is returned from the TA to the TE at a call set up. • OK
Unsolicited result code	<p>If enabled, an intermediate result code is transmitted at the point during connect negotiation at which the TA has determined which speed and quality of service will be used, before any error control or data compression reports are transmitted, and before any final result code (e.g. CONNECT) is transmitted.</p> <p>+CR:<serv></p>

Parameters	<p><mode></p> <ul style="list-style-type: none"> 0 disable 1 enable 2 enable M5311 proprietary intermediate result code <p><serv></p> <p>GPRS [<L2P>] GPRS / Packet Switched connection</p> <p><L2P></p> <p>M-PT Packet Transport mechanism protocol for a PDP such as IP</p>
Scope	<ul style="list-style-type: none"> ○ Channel Specific
Reference 3GPP TS 27.007	<p>Note</p> <ul style="list-style-type: none"> • <mode> = 2 is M5311 proprietary. • <L2P> value M-PT represents no <l2p> but raw IP packet transfer.

3.3.2.29. AT+CREG

AT+CREG	Network registration
Test command	<p>AT+CREG=?</p> <p>Response</p> <ul style="list-style-type: none"> • +CREG: list of supported <n>s • OK
Read command	<p>AT+CREG?</p> <p>Response</p> <p>UE returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the ME. Location information elements <lac>, <ci> and <AcT> are returned only when <n>=2 and ME is registered in the network.</p> <ul style="list-style-type: none"> • When <n> = 0 or 1: <ul style="list-style-type: none"> ○ +CREG: <n>,<stat> ○ OK • When <n> = 2: <ul style="list-style-type: none"> ○ +CREG: <n>,<stat>[,<lac>,<ci>[,<AcT>]] ○ OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Set command	<p>AT+CREG=<n></p> <p>Response</p> <ul style="list-style-type: none"> • UE controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the ME network registration status. • OK

Unsolicited result code	<ul style="list-style-type: none"> When <n>=1 and there is a change in the ME network registration status: +CREG: <stat> When <n>=2 and there is a change in the ME cell status: +CREG: <stat>[,<lac>,<ci>[,<AcT>]] 																								
Parameters	<p><n></p> <table> <tr><td>0</td><td>disable network registration unsolicited result code</td></tr> <tr><td>1</td><td>enable network registration unsolicited result code +CREG: <stat></td></tr> <tr><td>2</td><td>enable network registration and location information unsolicited result code +CREG:<stat>[,<lac>,<ci>[,<AcT>]]</td></tr> </table> <p><stat></p> <table> <tr><td>0</td><td>not registered, ME is not currently searching a new operator to register to</td></tr> <tr><td>1</td><td>registered, home network</td></tr> <tr><td>2</td><td>not registered, but ME is currently searching a new operator to register to</td></tr> <tr><td>3</td><td>registration denied</td></tr> <tr><td>4</td><td>unknown</td></tr> <tr><td>5</td><td>registered, roaming</td></tr> <tr><td>6</td><td>registered for "SMS only", home network (applicable only when <AcT> indicates NB-IOT)</td></tr> <tr><td>7</td><td>registered for "SMS only", roaming (applicable only when <AcT> indicates NB-IOT)</td></tr> </table> <p><lac></p> <p>string type; two byte location area code or tracking area code in hexadecimal format (e.g."00C3" equals 195 in decimal)</p> <p><ci></p> <p>string type; four byte UTRAN/GERAN/E-UTRAN cell ID in hexadecimal format</p> <p><AcT></p> <table> <tr><td>9</td><td>NB-IoT</td></tr> </table>	0	disable network registration unsolicited result code	1	enable network registration unsolicited result code +CREG: <stat>	2	enable network registration and location information unsolicited result code +CREG:<stat>[,<lac>,<ci>[,<AcT>]]	0	not registered, ME is not currently searching a new operator to register to	1	registered, home network	2	not registered, but ME is currently searching a new operator to register to	3	registration denied	4	unknown	5	registered, roaming	6	registered for "SMS only", home network (applicable only when <AcT> indicates NB-IOT)	7	registered for "SMS only", roaming (applicable only when <AcT> indicates NB-IOT)	9	NB-IoT
0	disable network registration unsolicited result code																								
1	enable network registration unsolicited result code +CREG: <stat>																								
2	enable network registration and location information unsolicited result code +CREG:<stat>[,<lac>,<ci>[,<AcT>]]																								
0	not registered, ME is not currently searching a new operator to register to																								
1	registered, home network																								
2	not registered, but ME is currently searching a new operator to register to																								
3	registration denied																								
4	unknown																								
5	registered, roaming																								
6	registered for "SMS only", home network (applicable only when <AcT> indicates NB-IOT)																								
7	registered for "SMS only", roaming (applicable only when <AcT> indicates NB-IOT)																								
9	NB-IoT																								
Scope	Channel Specific																								
Reference 3GPP TS 27.007	<p>Note</p> <ul style="list-style-type: none"> For NB-IoT product, only <AcT> value of 9 is valid 																								

3.3.2.30. AT+CSIM

AT+CSIM	Generic SIM Access
Test command	AT+CSIM=? Response <ul style="list-style-type: none"> OK
Set command	AT+CSIM=<length>,<command> Response <ul style="list-style-type: none"> +CSIM: <length>,<response> OK +CME ERROR: <err>

Parameters	<p><length> integer type: length of characters sent to the TE in <command> or <response> (i.e. twice the number of octets in the raw data)</p> <p><command> string type: hex format: 3GPP 102.221 SIM command sent from the ME to the SIM</p> <p><response> string type: hex format: 3GPP 102.221 response from SIM to <command></p>
Scope	<ul style="list-style-type: none"> ○ Channel specific for test command ○ Generic for set command
Reference 3GPP TS 27.007	Note

3.3.2.31. AT+CRSM

AT+CRSM	Restricted SIM Access
Set command	AT+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]
Parameters	Response <ul style="list-style-type: none"> • +CRSM: <sw1>,<sw2>[,<response>] • OK • +CME ERROR: <err> <ul style="list-style-type: none"> • <command> integer type: 3GPP 102.221 SIM command sent from the ME to the SIM <ul style="list-style-type: none"> 176 READ BINARY 178 READ RECORD 192 GET RESPONSE 214 UPDATE BINARY 220 UPDATE RECORD 242 STATUS • <fileid> integer type; this is the identifier of an elementary datafile on SIM. Mandatory for every command except STATUS. • <P1>,<P2>,<P3> integer type; parameters passed on by the ME to the SIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in 3GPP 102.221 • <data> information which shall be written to the SIM (hexadecimal character format; refer +CSCS) • <sw1>,<sw2> integer type; information from the SIM about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command • <response> response of a successful completion of the command previously issued (hexadecimal character format; refer +CSCS). STATUS and GET RESPONSE return data, which gives information about the current elementary datafile. This information includes the type of file and its size (refer 3GPP 102.221). After READ BINARY or READ RECORD command the requested data will be returned. <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command • <pathid> String type; contains the path of an elementary file on the SIM/UICC in hexadecimal format as defined in ETSI TS 102.211 (e.g. "7F205F70" in SIM

	and UICC case). The <pathid> only used in the mode “select path from MF” as defined in ETSI TS 102.211.
Scope	<ul style="list-style-type: none"> ○ Channel specific for test command ○ Generic for set command
Reference 3GPP TS 27.007	Note <ul style="list-style-type: none"> • <pathid> is only valid for USIMs <ul style="list-style-type: none"> ○ Since valid elementary file identifiers may not be unique over all valid dedicated file identifiers the <pathid> indicates the targeted UICC/SIM directory path in case of ambiguous file identifiers. For earlier versions of this specification or if <pathid> is omitted, it could be implementation specific which one will be selected.

3.3.2.32. AT+CSCS

AT+CSCS	Select TE Character Set
Test command	AT+CSCS=? Response <ul style="list-style-type: none"> • +CSCS: (list of supported <chset>s)
Read command	AT+CSCS? Response <ul style="list-style-type: none"> • +CSCS: <chset> OK
Set command	AT+CSCS=[<chset>] Response <ul style="list-style-type: none"> • Sets which character set <chset> is used by the TE. The TA can then convert character strings correctly between the TE and ME character sets.
Parameter	<chset> “GSM” GSM default alphabet. “HEX” Hexadecimal numbers in character strings “IRA” International reference alphabet (ITU-T T.50) “PCCP” PC character set Code Page “PCDN” PC Danish/Norwegian character set “UCS2” UCS2 alphabet “8859-1” ISO 8859 Latin (1) character set
Scope	Channel specific
Reference 3GPP TS 27.007	Note

3.3.2.33. AT+CTZR

AT+CTZR	Time Zone Reporting
Test command	AT+CTZR=? Response <ul style="list-style-type: none"> • +CTZR: (list of supported <onoff>s) • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>

Read command	AT+CTZR?						
	Response <ul style="list-style-type: none"> • +CTZR: <onoff> • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err> 						
Set command	AT+CTZR=<onoff>						
	Response <ul style="list-style-type: none"> • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err> <p>This set command enables and disables the time zone change event reporting. If the reporting is enabled the MT returns the unsolicited result code +CTZV: <tz> whenever the time zone is changed.</p>						
Parameter	<onoff> <table style="margin-left: 20px;"> <tr> <td style="padding-right: 20px;">0</td> <td>Disable time zone change event reporting</td> </tr> <tr> <td>1</td> <td>Enable time zone change event reporting</td> </tr> <tr> <td>2</td> <td>Enable extended time zone and local time reporting by unsolicited result code +CTZE: <tz>,<dst>,[<time>].</td> </tr> </table>	0	Disable time zone change event reporting	1	Enable time zone change event reporting	2	Enable extended time zone and local time reporting by unsolicited result code +CTZE: <tz>,<dst>,[<time>].
0	Disable time zone change event reporting						
1	Enable time zone change event reporting						
2	Enable extended time zone and local time reporting by unsolicited result code +CTZE: <tz>,<dst>,[<time>].						
Scope	Channel Specific						
Reference	Note						
3GPP TS 27.007							

3.3.2.34. AT+CTZU

AT+CTZU	Automatic Time Zone Update
Test command	AT+CTZU=?
	Response <ul style="list-style-type: none"> • +CTZU: (list of supported <onoff>s) • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Read command	AT+CTZU?
	Response <ul style="list-style-type: none"> • +CTZU: <onoff> OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Read command	AT+CTZU?
	Response <ul style="list-style-type: none"> • +CTZU: <onoff> OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Set command	AT+CTZU=<onoff>
	Response <ul style="list-style-type: none"> • OK • If error is related to ME functionality:

	<ul style="list-style-type: none"> ○ +CME ERROR: <err> Set command enables and disables automatic time zone update via NITZ
Parameter	<ul style="list-style-type: none"> • <onoff> 0 disable automatic time zone update via NITZ 1 automatic time zone update via NITZ
Scope	Generic
Reference 3GPP TS 27.007	Note

3.3.2.35. AT+CPLS

AT+CPLS	Selection of Preferred PLMN List
Test command	AT+CPLS=?
	Response <ul style="list-style-type: none"> • +CPLS: (list of supported <list>s)
Set command	AT+CPLS=<list>
	Response <ul style="list-style-type: none"> • OK • ERROR
Read command	AT+CPLS?
	Response <ul style="list-style-type: none"> • +CPLS:<list> • OK • ERROR
Parameter	<list>: <ul style="list-style-type: none"> 0 (Default). User controlled PLMN selector with Access Technology EFPLMNwAcT, if not found in the SIM/UICC then PLMN preferred list EFPLMNSe1 (this file is only on SIM card or GSM application in UICC). 1 Operator controlled PLMN selector with Access Technology EFOPLMNwAcT 2 HPLMN selector with Access Technology EFHPLMNwAcT
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for set command
Reference 3GPP TS 27.007	Note

3.3.2.36. AT+CPSMS

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 TAU value in E-UTRAN and the requested Active Time value. See the unsolicited result codes provided by commands +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 TAU value in E-UTRAN and the requested Active Time value as compound values.

AT+CPSMS	Power Saving Mode Setting
Test Command	AT+CPSMS=?
	Response <ul style="list-style-type: none"> +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) OK
Read command	AT+CPSMS=?
	Response <ul style="list-style-type: none"> +CPSMS:<mode>,<Requested_Periodic-RAU>,<Requested_GPRS-READY-timer>,<Requested_Periodic-TAU>,<Requested_Active-Time>] If error is related to wrong AT syntax or operation not allowed: <ul style="list-style-type: none"> +CME ERROR: <err>
Execution command	AT+CPSMS=[<mode>,<Requested_Periodic-RAU>,<Requested_GPRS-READY-timer>,<Requested_Periodic-TAU>,<Requested_Active-Time>]]]]]
	Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax: <ul style="list-style-type: none"> +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> <mode>: integer type. Indication to disable or enable the use of PSM in the UE. <ul style="list-style-type: none"> 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>: N/A for NB-IoT <Requested_GPRS-READY-timer>: N/A for NB-IoT <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 Table 10.5.163a/3GPP TS 24.008. See also 3GPP TS 23.682 and 3GPP TS 23.401. 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 Table 10.5.163/3GPP TS 24.008. See also 3GPP TS 23.682, 3GPP TS 23.060 and 3GPP TS 23.401. The default value, if available, is manufacturer specific.
Scope	Generic
Reference	Note

3.3.2.37. AT+CIPCA

The set command controls whether an initial PDP context (see sub-clause 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 to E-UTRAN with or without a PDN connection.

- For $\langle n \rangle \neq 0$, deactivating the last (active) PDP context can lead to a (re)establishment of the initial PDP context. Changing setting of $\langle n \rangle$ from 0 to 1 will cause an immediate attempt to (re)establish the initial PDP context if no PDP context is active. Changing $\langle n \rangle$ 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 $\langle n \rangle = 3$ applies to E-UTRAN RATs and does not change the setting of PDP context activation in GERAN or UTRAN RATs. Changing $\langle n \rangle$ will never cause a PDP context deactivation.
- For $\langle \text{AttachWithoutPDN} \rangle = 1$, 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 not equivalent to HPLMN or EHPLMN.

The read command returns the current setting of the command.

The test command returns values supported as a compound value.

AT+CIPCA Initial PDP Context Activation	
Test Command	AT+CIPCA=?
	Response <ul style="list-style-type: none"> • +CIPCA: (list of supported $\langle n \rangle$s),(list of supported $\langle \text{AttachWithoutPDN} \rangle$s) • OK
Read command	AT+CIPCA?
	Response <ul style="list-style-type: none"> • +CIPCA:$\langle n \rangle$,[$\langle \text{AttachWithoutPDN} \rangle$] • OK • If error is related to wrong AT syntax or operation not allowed: <ul style="list-style-type: none"> ○ +CME ERROR: $\langle \text{err} \rangle$
Execution command	AT+CIPCA=[$\langle n \rangle$],[$\langle \text{AttachWithoutPDN} \rangle$]
	Response <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: $\langle \text{err} \rangle$
Parameters	<ul style="list-style-type: none"> • $\langle n \rangle$: integer type. Activation of PDP context upon attach. <ul style="list-style-type: none"> 0 Do not activate 1 Always activate 2 Activate when not roaming 3 No change in current setting • $\langle \text{AttachWithoutPDN} \rangle$: integer type. EPS Attach with or without PDN connection. <ul style="list-style-type: none"> 0 EPS Attach with PDN connection 1 EPS Attach without PDN connection
Scope	Generic
Reference	Note <ul style="list-style-type: none"> • The execution command will work at any time but will only take effect once the UE registers on a network either for the first time, or re-registers. • Only $\langle n \rangle$ value of 3 is valid for NB-IOT.

3.3.2.38. AT+CCIOTOPT

The set command controls which CloT EPS optimizations the UE indicates as supported and preferred in the ATTACH REQUEST and TRACKING AREA UPDATE REQUEST messages. The command also allows reporting of the CloT EPS optimizations that are supported by the network. A UE supporting CloT functionality may support control plane CloT EPS optimization or user plane CloT EPS optimization or both (see 3GPP TS 24.301, sub-clause 9.9.3.34). Based on the application characteristics the UE may prefer to be registered for control plane CloT EPS optimization or for user plane CloT EPS optimization (see 3GPP TS 24.301, sub-clause 9.9.3.0B).

Further the network may support control plane CloT EPS optimization or user plane CloT EPS optimization or both (see 3GPP TS 24.301, sub-clause 9.9.3.12A).

The set command is used also to control the unsolicited result code +CCIOTOPTI. An unsolicited result code +CCIOTOPTI: <supported_Network_opt> is used to indicate the supported CloT EPS optimizations by the network.

The read command returns the current settings for supported and preferred CloT EPS optimizations and the current status of unsolicited result code +CCIOTOPTI.

AT+CCIOTOPT	CloT Optimization Configuration
Test Command	AT+CCIOTOPT=?
	Response <ul style="list-style-type: none"> +CCIOTOPT: (list of supported <n>s),(list of supported <supported_UE_opt>s),(list of supported <preferred_UE_opt>s) OK
Read command	AT+CCIOTOPT?
	Response <ul style="list-style-type: none"> +CCIOTOPT:<n>,<supported_UE_opt>,<preferred_UE_opt>
Execution command	AT+CCIOTOPT=[<n>,[<supportedUE_opt>],[<preferred_UE_opt>]]
	Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax: <ul style="list-style-type: none"> +CME ERROR: <err>
Unsolicited result code	+CCIOTOPTI: <supported_Network_opt> is used to indicate the supported CloT EPS optimizations by the network.
Parameters	<ul style="list-style-type: none"> <n>: integer type, enables or disables reporting of unsolicited result code +CCIOTOPTI. <ul style="list-style-type: none"> 0 Disable reporting. 1 Enable reporting. 3 Disable reporting and reset the parameters for CloT EPS optimization to the default values. <supported_UE_opt>: integer type; indicates the UE's support for CloT EPS optimizations. <ul style="list-style-type: none"> 0 No support 1 Support for control plane CloT EPS optimization. 2 Support for user plane CloT EPS optimization. 3 Support for both control plane CloT EPS optimization and user plane CloT EPS optimization. <preferred_UE_opt>: integer type; indicates the UE's preference for CloT EPS optimizations.

	0 No preference 1 Preference for control plane CloT EPS optimization 2 Preference for user plane CloT EPS optimization • <supported_Network_opt>: integer type; indicates the Network support for CloT EPS optimizations. 0 No support 1 Support for control plane CloT EPS optimization. 2 Support for user plane CloT EPS optimization. 3 Support for both control plane CloT EPS optimization and user plane CloT EPS optimization.
Scope	Channel Specific
Reference	Note

3.3.2.39. AT+CEDRXS

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

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

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

AT+CEDRXS	eDRX Setting
Test Command	AT+CEDRXS=?
	Response <ul style="list-style-type: none"> +CEDRXS: (list of supported <mode>s),(list of supported <AcT-type>s),(list of supported <Requested_eDRX_value>s) OK
Read command	AT+CEDRXS?
	Response <ul style="list-style-type: none"> [+CEDRXS: <AcT-type>,<Requested_eDRX_value> [<CR><LF>+CEDRXS: <AcT-type>,<Requested_eDRX_value> [...]] OK
Execution command	AT+CEDRXS=[<mode>[,<AcT-type>[,<Requested_eDRX_value>]]]
	Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax: <ul style="list-style-type: none"> +CME ERROR: <err>
Unsolicited result code	<ul style="list-style-type: none"> +CEDRXP:<AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]]
Parameters	<ul style="list-style-type: none"> <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>

	<p>will take effect for all specified values of <AcT>.</p> <p>0 Disable the use of eDRX</p> <p>1 Enable the use of eDRX</p> <p>2 Enable the use of eDRX and enable the unsolicited result code</p> <p> +CEDRXP: <AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]]</p> <p>3 Disable the use of eDRX and discard all parameters for eDRX or, if available, reset to the manufacturer specific default values.</p> <ul style="list-style-type: none"> • <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. <ul style="list-style-type: none"> 0 Access technology is not using eDRX. This parameter value is only used in the unsolicited result code. 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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see Extended DRX parameters information element in 3GPP TS 24.008 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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see Extended DRX parameters information element in 3GPP TS 24.008 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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see the Extended DRX parameters information element in 3GPP TS 24.008 Table 10.5.5.32/3GPP TS 24.008.
Scope	Generic
Reference	Note

3.3.2.40. AT+CEDRXP

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.

AT+CEDRXP eDRX Read Dynamic Parameters	
Execution command	AT+CEDRXP
	<p>Response</p> <ul style="list-style-type: none"> • +CEDRXP: <AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>

	[,<Paging_time_window>]] <ul style="list-style-type: none"> OK
Parameters	<ul style="list-style-type: none"> <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 4 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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see Extended DRX parameters information element in 3GPP TS 24.008 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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see Extended DRX parameters information element in 3GPP TS 24.008 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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see the Extended DRX parameters information element in 3GPP TS 24.008 Table 10.5.5.32/3GPP TS 24.008.
Scope	Generic
Reference	Note

3.3.2.41. AT+CGAPNRC

This execution command returns the APN rate control parameters (see 3GPP TS 24.008) 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.

AT+CGAPNRC	APN Rate Control
Test Command	AT+CGAPNRC=? Response <ul style="list-style-type: none"> +CGAPNRC: (list of <cid>s associated with active contexts) OK
Execution command	AT+CGAPNRC[=<cid>] Response <ul style="list-style-type: none"> [+CGAPNRC: <cid>,<Additional_exception_reports>[,<Uplink_time_unit>,<Maximum_uplink_rate>]] [<CR><LF>+CGAPNRC: <cid>[,<Additional_exception_reports>,<Uplink_time_unit>,<Maximum_uplink_rate>]] [...]] OK
Parameters	<ul style="list-style-type: none"> <cid>: integer type; specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).

	<ul style="list-style-type: none"> • <Additional_exception_reports>: integer type; indicates whether an additional exception reports are allowed to send 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 sub-clause 10.5.6.3.2. <ul style="list-style-type: none"> 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 send. • <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 sub-clause 10.5.6.3.2. <ul style="list-style-type: none"> 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 sub-clause 10.5.6.3.2.
Scope	Generic
Reference	Note

3.3.2.42. AT+CSCON

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.

For NB-IoT, only <n>=1 is supported.

The mode of the MT refers to idle when no PS signaling connection and to connected mode when a PS signaling connection between UE and network is setup.

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.

Test command returns supported values as a compound value.

AT+CSCON	Signaling Connection Status
Test Command	AT+CSCON=?
	Response <ul style="list-style-type: none"> • +CSCON: (list of <n>s) • OK
Read command	AT+CSCON?
	Response <ul style="list-style-type: none"> • +CSCON: <n>,<mode>[,<state>] • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err>

Execution command	AT+CSCON[=<n>]
	Response <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Unsolicited result code	+CSCON: <mode>[<state>[<access>]]
Parameters	<ul style="list-style-type: none"> • <n>: integer type: <ul style="list-style-type: none"> 0 disable unsolicited result code 1 enable unsolicited result code +CSCON: <mode> • <mode>: integer type; indicates signaling connection status <ul style="list-style-type: none"> 0 idle 1 connected
Scope	Channel specific
Reference	Note <ul style="list-style-type: none"> • <state> and <access> parameters not supported for NB-IoT

3.3.2.43. AT+CCHO

Execution of this command causes the MT to return <sessionid> to allow the TE to identify a channel that is being allocated by the currently selected UICC, which is attached to ME. The currently selected UICC will open a new logical channel; select the application identified by the <dfname> received with this command and return a session Id as the response. The ME restricts the communication between the TE and the UICC to this logical channel.

This <sessionid> is used when sending commands with Generic UICC Logical Channel access +CGLA commands.

AT+CCHO	Open UICC Logical Channel
Execution command	AT+CCHO=<dfname>
	Response <ul style="list-style-type: none"> • <sessionid> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <dfname>: String type in hexadecimal character format. All selectable applications in the UICC are referenced by a DF name coded on 1 to 16 bytes • <sessionid>: integer type; a session Id to be used to target a specific application on the smart card (e.g. (U)SIM, WIM, ISIM) using logical channels mechanism • See 3GPP TS 31.101 for more information about defined values.
Scope	Channel Specific
Reference	Note

3.3.2.44. AT+CCHC

This command asks the ME to close a communication session with the active UICC. The ME closes the previously opened logical channel. The TE will no longer be able to send commands on this logical channel. The UICC will close the logical channel when receiving this command.

AT+CCHC Close UICC Logical Channel	
Execution command	AT+CCHC=<sessionid> <hr/> Response <ul style="list-style-type: none"> • CCHC • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <sessionid>: integer type; the session used to target a specific application on the smart card (e.g. (U)SIM, WIM, ISIM) using logical channels mechanism • See 3GPP TS 31.101 for more information about defined values.
Scope	Channel Specific
Reference	Note

3.3.2.45. AT+CGLA

Set command transmits to the MT the <command> is sent as is to the selected UICC. The UICC <response> is sent back by the MT to the TA as is.

This command allows a direct control of the currently selected UICC by a distant application on the TE. Although +CGLA allows the TE to take control over the UICC-MT interface, there are some functions of the UICC-MT interface that logically do not need to be accessed from outside the TA/MT and, for security reasons the GSM network authentication should not be handled outside the TA/MT. So, a Run GSM Algorithm command or an Authenticate command in GSM context shall not be allowed whether the +CGLA is locked or unlocked. However, the TE may send Authenticate commands in other security contexts (e.g. EAP security context).

AT+CGLA Generic UICC Logical Channel Access	
Execution command	AT+CGLA=<sessionid>,<length>,<command> <hr/> Response <ul style="list-style-type: none"> • +CGLA: <length>,<response> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <sessionid> integer type; this is the identifier of the session used to send the APDU commands to the UICC. It is mandatory to send commands to the UICC when targeting applications on the smart card using a logical channel other than the default channel (channel "0"). • <length> integer type; length of the characters that are sent to TE in <command> or <response> (two times the actual length of the command or response) • <command> command passed on by the MT to the UICC in the format as described in 3GPP TS 31.101 (hexadecimal character format) • <response> : response to the command passed on by the UICC to the MT in the format as described in 3GPP TS 31.101 (hexadecimal character format)
Scope	Channel Specific

Reference	Note
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3.3.2.46. AT+CRLA

AT+CRLA	UICC logical channel access
Execution command	AT+CRLA=<sessionid>, <command>[,<fileid> [,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]] Response <ul style="list-style-type: none"> • +CGLA: <sw1>,<sw2>[,<response>] • OK • +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <sessionid> integer type; this is the identifier of the session used to send the APDU commands to the UICC. It is mandatory to send commands to the UICC when targeting applications on the smart card using a logical channel other than the default channel (channel "0"). • <command> integer type: 3GPP 102.221 SIM command sent from the ME to the SIM. <ul style="list-style-type: none"> 176 READ BINARY 178 READ RECORD 192 GET RESPONSE 214 UPDATE BINARY 220 UPDATE RECORD 242 STATUS • <fileid> integer type; this is the identifier of an elementary datafile on SIM. Mandatory for every command except STATUS. • <P1>,<P2>,<P3> integer type; parameters passed on by the ME to the SIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in 3GPP 102.221 • <data> information which shall be written to the SIM (hexadecimal character format; refer +CSCS) • <sw1>,<sw2> integer type; information from the SIM about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command • <response> response of a successful completion of the command previously issued (hexadecimal character format; refer +CSCS). STATUS and GET RESPONSE return data, which gives information about the current elementary datafield. This information includes the type of file and its size (refer 3GPP 102.221). After READ BINARY or READ RECORD command the requested data will be returned. <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for set command
Reference	Note <ul style="list-style-type: none"> • <pathid> is only valid for USIMs

o Since valid elementary file identifiers may not be unique over all valid dedicated file identifiers the <pathid> indicates the targeted UICC/SIM directory path in case of ambiguous file identifiers. For earlier versions of this specification or if <pathid> is omitted, it could be implementation specific which one will be selected.

3.3.2.47. AT+CPINR

Execution command cause the UE to return the number of remaining PIN retries for the UE passwords with intermediate result code +CPINR: <code>,<retries>[,<default_retries>] for standard PINs and +CPINRE: <ext_code>,<retries>[,<default_retries>] for manufacturer specific PINs. One line with one intermediate result code is returned for every <code> or <ext_code> selected by <sel_code>.

When execution command is issued without the optional parameter <sel_code>, intermediate result codes are returned for all <code>s and <ext_code>s.

In the intermediate result codes, the parameter <default_retries> is an optional (manufacturer specific) parameter, per <code> and <ext_code>.

Note that the M5311 modem does not support the +CPINRE indication.

AT+CPINR	Remaining PIN Retries
Execution Command	AT+CPINR[=<sel_code>] Response <ul style="list-style-type: none"> • [+CPINR: <code>,<retries>[,<default_retries>] • [<CR>,<LF>:CPINR: <code>,<retries>[,<default_retries>] • [...]] • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> o +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <sel_code>: String type. Same values as for the <code> parameter. These values are strings and shall be indicated within double quotes. Wildcard match by '*', meaning match any (sub-)string, or '?' meaning an character can be used. • <retries>: Integer type. Number of remaining retries per PIN. • <default_retries>: Integer type. Number of default/initial retries per PIN. • <code>: Type of PIN. All values listed under the description of the AT+CPIN Command, <code> parameter except "READY".
Scope	Generic
Reference	Note <ul style="list-style-type: none"> • M5311 modem does not support the +CPINRE indication. • "SIM UPIN" and "SIM UPUK" are used to display the universal PIN values if the USIM supports it.

+CPINR examples

AT+CPINR=? OK	Test command
AT+CPINR? ERROR	Read command
AT+CPINR="SIM*"	Execute command. Read all SIM PIN retries

	starting with the string "SIM".
+CPINR: "SIM PIN",3,3 +CPINR: "SIM PUK",10,10 +CPINR: "SIM PIN2",3,3 +CPINR: "SIM PUK2",10,10 +CPINR: "SIM UPIN",3,3 +CPINR: "SIM UPUK",10,10 OK	
AT+CPINR	Execute command. Read all SIM PIN retries starting with the string "SIM".
+CPINR: "SIM PIN",3,3 +CPINR: "SIM PUK",10,10 +CPINR: "SIM PIN2",3,3 +CPINR: "SIM PUK2",10,10 +CPINR: "SIM UPIN",3,3 +CPINR: "SIM UPUK",10,10 OK	
AT+CPINR="SIM PIN*"	Execute command. Read all SIM PIN retries starting with the string "SIM PIN".
+CPINR: "SIM PIN",3,3 +CPINR: "SIM PIN2",3,3 OK	

3.3.2.48. AT+CGPIAF

Set command decides what format to print IPV6 address parameters of other AT commands. See RFC 4291 for details of the IPv6 address format.

The +CGPIAF parameters <IPv6_AddressFormat>, <IPv6_SubnetNotation>, <IPv6_LeadingZeros> and <IPv6_CompressedZeros> affect the following commands and parameters:

- 1) in +CGTFT and +CGTFRDP, the <source address and subnet mask>;
- 2) in +CGDCONT, the <PDP_addr>;
- 3) in +CGPADDR, the <PDP_addr_1> and <PDP_addr_2>;
- 4) in +CGCONTRDP, the <source address and subnet mask>, <DNS_prim_addr>, <DNS_sec_addr>, <P_CSCF_prim_addr> and <P_CSCF_sec_addr>;

Read command returns the current command parameter settings. Test command returns values supported as compound values.

AT+CGPIAF	Printing IP Address Format
	AT+CGPIAF=?
Test Command	Response <ul style="list-style-type: none"> • +CGPIAF: (list of supported <IPv6_AddressFormat>s), (list of supported <IPv6_SubnetNotation>s), (list of supported <IPv6_LeadingZeros>s), (list of supported <IPv6_CompressedZeros>s) • OK
Read Command	AT+CGPIAF? Response <ul style="list-style-type: none"> • +CGPIAF: <IPv6_AddressFormat>,<IPv6_SubnetNotation>,<IPv6_LeadingZeros>,<IPv6_CompressedZeros>

	<p><IPv6_CompressZeros></p> <ul style="list-style-type: none"> • OK • +CME ERROR: <err>
Read Command	<p>AT+CGPIAF?</p> <p>Response</p> <ul style="list-style-type: none"> • +CGPIAF:<IPv6_AddressFormat>,<IPv6_SubnetNotation>,<IPv6_LeadingZeros>,<IPv6_CompressZeros> • OK • +CME ERROR: <err>
Execution Command	<p>AT+CGPIAF=[IPv6_AddressFormat][,<IPv6_SubnetNotation>[,<IPv6_LeadingZeros>[,<IPv6_CompressZeros>]]]</p> <p>Response</p> <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameters	<p><IPv6_AddressFormat>: Integer type, decides the IPV6 address format.Relevant for all AT command parameters that can hold an IPV6 address.</p> <p>0: Use IPV4-like dot-notation. IP address, and Subnetwork mask if applicable, are dot-separated.</p> <p>Example: For <source address and subnet mask>: "32.1.13.184.0.0.205.48.0.0.0.0.0.0.0.0.0.255.255.255.255.255.255.255.255.255.255.40.0.0.0.0.0.0.0"</p> <p>For other IP address parameters: "32.1.13.184.0.0.205.48.0.0.0.0.0.0.0"</p> <p>1: Use IPV6-like colon notation. IP address, and subnetwork mask if applicable and when given explicitly, are separated by a space.</p> <p>Example: For <source address and subnet mask>: "2001:0DB8:0000:CD30:0000:0000:0000:0000 FFFF:FFFF:FFFF:FFF0:0000:0000:0000:0000" For other IP address parameters: "2001:0DB8:0000:CD80:0000:0000:0000:0000"</p> <p><IPv6_SubnetNotation>: Integer type, decides the subnet-notation for <sourceAddress and subnet mask>. Setting does not apply If <IPVv6_AddressFormat>=0.</p> <p>0: Both IP Address and subnet mask are stated Explicitly, separated by a space.</p> <p>Example: "2001:0DB8:0000:CD30:0000:0000:0000:0000 FFFF: FFFF:FFFF:FFF0:0000:0000:0000:0000"</p> <p>1 The printout format is applying / (forward slash) subnet-prefix Classless Inter-Domain Routing (CIDR) notation:</p> <p>Example: "2001:0DB8:0000:CD30:0000:0000:0000:0000/60"</p> <p><IVv6_LeadingZeros>: Integer type, decides whether leading zeros areOmitted or not. Setting does not apply if <IPv6_AddressFormat>=0.</p> <p>0: Leading zeros are omitted.</p>

	Example: "2001:DB8:0:CD30:0:0:0:0" 1: Leading zeros are included. Example: "2001:0DB8:0000:CD30:0000:0000:0000:0000" <IPv6_CompressZeros>: Integer type, decides whether 1-n instances of 16 bit zero-values are replaced by only "..". This Applies only once. Setting does not apply if <IPv6_AddressFormat>=0. 0: No zero compression. Example: "2001:DB8:0:CD30:0:0:0:0" 1 Use zero compression. Example: "2001:DB8:0:CD30:."
Scope	Channel Specific
Reference	Note <ul style="list-style-type: none"> M5311 modem does not support the +CPINRE indication. "SIM UPIN" and "SIM UPUK" are used to display the universal PIN values if the USIM supports it.

+CGPIAF examples

AT+CGPIAF=?	Test command
+CGPIAF: (0,1), (0,1), (0,1), (0,1)	
OK	
AT+CGPIAF?	Read command
+CGPIAF: 0,0,0,0	All Settings at default format
OK	
AT+CGPIAF=1,1,0,1	Set command. Use IPV6-like notation, with the "/" format for subnet mask, omit leading zeros and use zero compression.
OK	

3.3.2.49. AT+CGEREP

Set command enables or disables sending of unsolicited result codes, +CGEV: XXX from UE to TE in the case of certain events occurring in the Packet Domain UE or the network. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1 or 2 is entered.

Read command returns the current mode and buffer settings.

Test command returns the modes and buffer settings supported by the UE as compound values.

AT+CGEREP	Packet Domain Event Reporting
	AT+CGEREP=?
Test Command	Response <ul style="list-style-type: none"> +CGEREP: (list of supported <mode>s), (list of supported <bfr>s) OK

Read Command	<p>AT+CGEREP?</p> <hr/> <p>Response</p> <ul style="list-style-type: none"> • +CGEREP: <mode>,<bfr> • OK
Execution Command	<p>AT+CGEREP=[<mode>]</p> <hr/> <p>Response</p> <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax: <ul style="list-style-type: none"> o +CME ERROR: <err>
Parameters	<p><mode> 0 buffer unsolicited result codes in the UE; if UE result code buffer is full, the oldest ones can be discarded. No codes are forwarded to the TE.</p> <p> 1 discard unsolicited result codes when UE-TE link is reserved (e.g. in on-line data mode); otherwise forward them directly to the TE</p> <p> 2 buffer unsolicited result codes in the UE when UE-TE link is reserved (e.g. in on-line data mode) and flush them to the TE when UE-TE link becomes available; otherwise forward them directly to the TE</p> <p><bfr> 0 UE buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered</p> <p> 1 UE buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1 or 2 is entered (OK response shall be given before flushing the codes)</p> <p><u>Unsolicited Result Codes supported:</u></p> <p>For network attachment, the following unsolicited result codes and the corresponding events are defined:</p> <p>+CGEV: NW DETACH The network has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.</p> <p>+CGEV: ME DETACH The mobile termination has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.</p> <p>For PDP context activation, the following unsolicited result codes and the corresponding events are defined:</p> <p>+CGEV: NW PDN ACT <cid></p> <p>The network has activated a context. The context represents a Primary PDP context in GSM/UMTS. The <cid> for this context is provided to the TE. The format of the parameter <cid> is found in command +CGDCONT.</p> <p>NOTE 1: This event is not applicable for EPS.</p> <p>+CGEV: ME PDN ACT <cid>[,<reason>[,<cid_other>]]</p> <p>The mobile termination has activated a context. The context represents a PDN connection in NB-IOT. The <cid> for this context is provided to the TE. This event is sent either in result of explicit context activation request (+CGACT), or in result of implicit context activation request associated to attach request (+CGATT=1). The format of the parameter <cid> and <cid other> are found in command +CGDCONT.</p> <p>For PDP context deactivation, the following unsolicited result codes and the corresponding events are defined:</p> <p>+CGEV: NW PDN DEACT <cid></p> <p>The network has deactivated a context. The context represents a PDN connection in NB-IOT. The associated <cid> for this context is provided to the TE. The format of the parameter <cid> is found in command +CGDCONT.</p> <p>NOTE 2: Occurrence of this event replaces usage of the event</p> <p>+CGEV: NW DEACT <PDP_type>, <PDP_addr>, [<cid>]</p>

+CGEV: ME PDN DEACT <cid>

The mobile termination has deactivated a context. The context represents a PDN connection in NB-IOT. The <cid> for this context is provided to the TE. The format of the parameter <cid> is found in command +CGDCONT.

NOTE 3: Occurrence of this event replaces usage of the event

+CGEV: ME DEACT <PDP_type>, <PDP_addr>, [<cid>]

For other PDP context handling, the following unsolicited result codes and the corresponding events are defined:

+CGEV: REJECT <PDP_type>, <PDP_addr>

A network request for context activation occurred when the UE was unable to report it to the TE with a +CRING unsolicited result code and was automatically rejected. The format of the parameters <PDP_type> and <PDP_addr> are found in command +CGDCONT.

NOTE 6: This event is not applicable for EPS.

+CGEV: NW REACT <PDP_type>, <PDP_addr>, [<cid>]

The network has requested a context reactivation. The <cid> that was used to reactivate the context is provided if known to the UE. The format of the parameters <PDP_type>, <PDP_addr> and <cid> are found in command +CGDCONT.

NOTE 7: This event is not applicable for EPS.

Parameter:

<PDP_type>	Packet Data Protocol type (see +CGDCONT command)
<PDP_addr>	Packet Data Protocol address (see +CGDCONT command)
<cid>	Context Id (see +CGDCONT command) Note: <cid> only given if known to the UE.
<class>	GPRS mobile class (see +CGCLASS command)
<event_type>	Integer type parameter indicates whether this is an informational Event of whether the TE as acknowledged it. 0 Informational event 1 Information request: Acknowledgement required. The Acknowledgement can be accept or reject, see AT+CGANS.
<change_reason>	Integer type parameter indicates what kind of change occurred. 1 TFT only changed 2 QoS only changed 3 Both TFT and QoS changed
<reason>	Integer type parameter indicates the reason why the context activation request for PDP type IPV4V6 was not granted. This parameter is only included if the requested PDP type associated with <cid> is IPV4V6, and the PDP type assign by the network for <cid> is either IPV4 or IPV6 0 IPV4 only allowed 1 IPV6 only allowed 2 single address bearers only allowed 3 single address bearers only allowed and MT initiated context activation for a second address type bearer was not successful
<cid_other>	Indicated the context identifier allocated by MT for an MT initiated context of a second address type. MT shall only include this parameter if <reason> parameter indicates single address bearers only allowed, and MT support MT initiated context activation of a second address type without additional commands from the TE, and MT has activated the PDN connection or PDP context associated with <cid_other>.

Scope	Channel Specific
Reference	Note <ul style="list-style-type: none"> Parameter <mode> option 2 is not supported. Parameter <cid_other> is not supported by NB-IOT modem software.

3.3.2.50. AT+CGDEL

The execution command +CGDEL=<cid> removes the indicated PDP context and removes all associated data related to the indicated PDP contexts that are not activated. The AT command will not delete or remove information for activated PDP contexts. The removed PDP context is listed by the +CGDEL: <cid> intermediate result code.

- If <cid> points to a primary PDP context, the PDP context will be deleted together with all linked secondary PDP contexts if none of the PDP contexts are activated.
- If <cid> points to a secondary PDP context, the PDP context will be deleted if it is not activated.

A special form of the command can be given as +CGDEL (with the =<cid> omitted). In this form, all primary PDP contexts that are not activated or have any activated secondary PDP contexts will be removed and all secondary PDP contexts that are not activated will be removed. The associated data of all the deleted PDP contexts will be removed, and the removed PDP context are listed by the +CGDEL: <cid>[,<cid>[,...]] intermediate result code. Activated PDP contexts will not cause this form of the command to return ERROR or +CME ERROR.

Note, +CGDEL will remove associated PDP context data that can be set by the AT commands +CGDCONT, +CGDSCONT, +CGTFT, +CGEQREQ, +CGEQMIN and +CGEQOS.

For an attempt to delete PDP context(s) which would violate these rules, a +CME ERROR response is returned. Refer sub-clause 9.2 for possible <err> values.

AT+CGDEL	Delete Non-Active PDP Contexts
Execution Command	AT+CGDEL=<cid> Response <ul style="list-style-type: none"> +CGDEL: <cid>[,<cid>[,...]] OK If error is related to wrong AT syntax: <ul style="list-style-type: none"> +CME ERROR: <err>
Parameters	<cid>: a numeric parameter which specifies a particular PDP context Definition.
Scope	Generic
Reference	Note

3.3.2.51. AT+CGAUTH

Set command allows the user 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.

Note, this AT command transfers information in the clear that can be regarded as sensitive in security terms. Care must be exercised in providing this command where the AT commands are used in insecure scenarios. The read command returns the current settings for each defined context.

The test command returns values supported as a compound value.

AT+CGAUTH Define PDP Context Authentication Parameters	
Test Command	AT+CGAUTH=?
	Response <ul style="list-style-type: none"> +CGAUTH: (range of supported <cid>s),(list of supported <auth_prot>s),(range of supported <userid>s),(range of supported <password>s) OK
Read Command	AT+CGAUTH?
	Response <ul style="list-style-type: none"> [+CGAUTH: <cid>,<auth_prot>,<userid>,<password>] [<CR><LF>+CGAUTH: <cid>,<auth_prot>,<userid>,<password>] [...] OK
Execution Command	AT+CGAUTH=<cid>[,<auth_prot>[,<userid>[,<password>]]]
	Response <ul style="list-style-type: none"> When <auth_prot>/<username>/<password> set: <ul style="list-style-type: none"> OK When no <auth_prot>/<username>/<password> set displays current auth_prot username and password for <cid>: <ul style="list-style-type: none"> +CGAUTH:<cid>,<auth_prot>,<username>,<password> OK OK If error is related to wrong AT syntax: <ul style="list-style-type: none"> +CME ERROR: <err>
Parameters	<cid>: A numeric parameter which specifies a particular PDPcontext definition (see the +CGDCONT and +CGDSCONT commands). <auth_prot>: Numeric parameter. 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 <userid>: String type. User name for access to the IP network. <password>: String type. Password for access to the IP network.
Scope	Generic
Reference	Note <ul style="list-style-type: none"> M5311 only supports <auth_prot> = PAP

3.4. AT Commands According to 3GPP TS 27.005 for SMS

3.4.1. Overview

The 3GPP TS 27.005 commands are for performing SMS and CBS related operations for both Text and PDU modes.

Command	Description
AT+CMGD	Delete SMS Message
AT+CMGF	Select SMS Message Format
AT+CMGL	List SMS Messages From Preferred Store
AT+CMGR	Read SMS Message
AT+CMGS	Send SMS Message
AT+CMGW	Write SMS Message To Memory
AT+CMSS	Send SMS Message From Storage
AT+CMGC	Send SMS Command
AT+CNMI	New SMS Message Indications
AT+CPMS	Preferred SMS Message Storage
AT+CRES	Restore SMS Settings
AT+CSAS	Save SMS Settings
AT+CSCA	SMS Service Centre Address
AT+CSDH	Show SMS Text Mode Parameters
AT+CSMP	Set SMS Text Mode Parameters
AT+CSMS	Select Message Service
AT+CNMA	New SMS Message Acknowledgment
AT+CMMS	More SMS Messages to Send
AT+CMS ERROR	Message Service Failure Result Code

3.4.2. Concatenated SMSs

M5311 always treats SMSs in PDU mode as separate SMS messages even if they are part of a concatenated SMS.

By default, M5311 will not support concatenated SMS for text mode. They will be handled by the MMI or PC. However, if AT*MFTRCFG=2,3,1 is set (and M5311 rebooted for this to take effect) then M5311 will handle concatenated SMSs in text mode. In this case, M5311 will check if incoming SMSs are part of a concatenated SMS and manage message read, write, send and deletion differently.

Specifically, when reading concatenated SMSs, the number of unread messages is equal to the number of unread SMSs with all message segments of a concatenated SMS treated as one message. A concatenated SMS message is marked as unread if any of its segments are unread.

Also this will allow the user to enter an SMS longer than a single SMS (80, 140, or 160 characters depending on the data coding scheme (dcs)) and manage sending of it as a number of SMSs being part of a single concatenated SMS. The maximum length SMS that can be sent or received in concatenated mode is 1024 characters.

The behavior of the SMS related AT commands: CMGS, CMGW, CMGR, CMGL, CMGD, CMSS, and CMMS changes depending on if concatenated SMS handling is enabled or disabled within the M5311 modem software. This is detailed in the descriptions of the AT commands.

3.4.2.1. Concatenated SMSs and AT+CSMP

When M5311 is operating in default mode (i.e. no support for concatenated SMSs in text mode), then in order that

In this example:

- 07913386094000F051000A8160137345920000A7A0 is the SMS header
- 050003AA0201 still is the SMS concatenated header

all the remaining characters are the '*' character (7-bits default alphabet) encoded into 8-bits bytes.

3.4.3. Detailed Descriptions of Commands

3.4.3.1. AT+CMGD

AT+CMGD	Delete SMS message
Test command	AT+CMGD=? Response <ul style="list-style-type: none"> • +CMGD: list of supported <index>s • OK
Execute command	AT+CMGD=<index>[,<DelFlag>] Response <ul style="list-style-type: none"> • TA deletes one or several messages from preferred message storage <mem1> location <index> or message groups indicated by <DelFlag>. • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CMS ERROR <err>
Parameters	<ul style="list-style-type: none"> • <index> integer type; value in the range of location numbers supported by the associated memory. This value is only used if <DelFlag> = 0 • <DelFlag> message delete mode <ul style="list-style-type: none"> 0 Delete message at location <index> (Default value) 1 Delete all read messages 2 Delete all READ and SENT messages 3 Delete all READ, SENT and UNSENT messages 4 Delete all messages
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for execute command
Reference 3GPP TS 27.005	Note <ul style="list-style-type: none"> • When the M5311 software has concatenated SMS handling in modem enabled (see AT command AT*MFTRCFG) the user can delete a concatenated text SMS up to 1024 characters in length. A concatenated SMS is stored on the SIM as number of smaller SMSs. (This is not possible when MMI is present). • When the M5311 software does not have concatenated SMS handling in the modem enabled, the maximum text SMS length is restricted depending on the data coding scheme (160 for 7-bit, 140 for 8-bit, 80 for 16-bit). • An attempt to delete anything other than the first segment of a concatenated SMS, when concat SMS is enabled, will result in ERROR response. • Deleting an empty entry will result in OK response rather than ERROR.

3.4.3.2. AT+CMGF

AT+CMGF Select SMS Message Format	
Test command	AT+CMGF=?
	Response <ul style="list-style-type: none"> • +CMGF: list of supported <mode>s • OK
Read command	AT+CMGF?
	Response <ul style="list-style-type: none"> • +CMGF: <mode> • OK
Set command	AT+CMGF=[<mode>]
	Response <ul style="list-style-type: none"> • TA sets parameter to denote which input and output format of messages to use. • OK
Parameters	<mode> 0 PDU mode 1 text mode
Scope	Channel Specific
Reference 3GPP TS 27.005	Note

3.4.3.3. AT+CMGL

AT+CMGL List SMS messages from preferred store	
Test command	AT+CMGL=?
	Response <ul style="list-style-type: none"> • +CMGL: list of supported <stat>s • OK
Execute command	AT+CMGL[=<stat>]
	Response TA returns messages with status value <stat> from message storage <mem1> to the TE. . If status of the message is 'received unread', status in the storage changes to 'received read'. <ul style="list-style-type: none"> • If text mode (+CMGF=1) and command successful: for SMS-SUBMITs and/or SMS-DELIVERs: <ul style="list-style-type: none"> ○ +CMGL: <index>, <stat>, <oa/da>, [<alpha>], [<scts>][, <tooa/toda>, <length>]<CR><LF><data>[<CR><LF> ○ +CMGL: <index>, <stat>, <da/oa>, [<alpha>], [<scts>][, <tooa/toda>, <length>]<CR><LF><data>[...] OK • If SMS-STATUS-REPORT and text mode: <ul style="list-style-type: none"> ○ +CMGL: <index>, <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st> ○ [<CR><LF>

	<ul style="list-style-type: none"> ○ +CMGL: <index>, <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st> [...]] OK • If PDU mode (+CMGF=0) and command successful: <ul style="list-style-type: none"> ○ +CMGL: <index>, <stat>, [<alpha>], <length><CR><LF><pdu> ○ [<CR><LF>+CMGL: <index>, <stat>, [<alpha>], <length><CR><LF><pdu> ○ [...]] ○ OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CMS ERROR: <err> <p>Parameters</p> <ul style="list-style-type: none"> • <alpha> string type alphanumeric representation of <da> or <oa> corresponding to the entry found in MT phonebook; implementation of this feature is manufacturer specific • <da> 3GPP 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters; type of address given by <toda> • <data> In the case of SMS: 3GPP 23.040 TP-User-Data in text mode responses; format: <ul style="list-style-type: none"> ○ if <dc> indicates that 3GPP 23.038 default alphabet is used and <fo> indicates that 3GPP 23.040 TP-User-Data-Header-Indication is not set: ME/TA converts GSM alphabet into current TE character set according to rules of Annex A ○ if <dc> indicates that 8-bit or UCS2 data coding scheme is used, or <fo> indicates that 3GPP 23.040 TP-User-Data-Header-Indication is set: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: 3GPP 23.041 CBM Content of Message in text mode responses; format: <ul style="list-style-type: none"> ○ if <dc> indicates that 3GPP 23.038 default alphabet is used: ME/TA converts GSM alphabet into current TE character set according to rules of Annex A ○ if <dc> indicates that 8-bit or UCS2 data coding scheme is used: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number • <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) • <index> integer type; value in the range of location numbers supported by the associated memory • <oa> 3GPP 23.040 TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters; type of address given by <tooa> • <pdu> In the case of SMS: 3GPP 24.011 SC address followed by 3GPP 23.040 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). In the case of CBS: 3GPP 23.041 TPDU in hexadecimal format. • <scts> 3GPP 23.040 TP-Service-Center-Time-Stamp in time-string format (refer <dt>)
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	<ul style="list-style-type: none"> • <tda> 3GPP 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129) • <tooa> 3GPP 24.011 TP-Originating-Address Type-of-Address octet in integer format (default refer<tda>) • <fo> First byte of SMS-DELIVER, SMS-SUBMIT or SMS-STATUS-REPORT in integer format. • <mr> Message reference. Integer format. • <ra> Recipient address. String type. • <tora> Type of address of <ra>. <ul style="list-style-type: none"> ○ 145: International number ○ 129: National number • <scts> Service centre time stamp. String format: "yy/MM/dd, hh:mm:ss+/-zz" (Year/Month/Dat, Hour:Seconds+/TimeZone) • <dt> Discharge time. String format: "yy/MM/dd, hh:mm:ss+/-zz" (Year/Month/Dat, Hour:Seconds+/TimeZone) • <st> Status of an SMS-STATUS-REPORT. Integer format. 																														
Parameters	<ul style="list-style-type: none"> • If text mode: <table border="0"> <tr> <td><stat></td> <td>"REC UNREAD"</td> <td>Received unread messages (default)</td> </tr> <tr> <td></td> <td>"REC READ"</td> <td>Received read messages</td> </tr> <tr> <td></td> <td>"STO UNSENT"</td> <td>Stored unsent messages</td> </tr> <tr> <td></td> <td>"STO SENT"</td> <td>Stored sent messages</td> </tr> <tr> <td></td> <td>"ALL"</td> <td>All messages</td> </tr> </table> • If PDU mode: <table border="0"> <tr> <td><stat></td> <td>0</td> <td>Received unread messages (default)</td> </tr> <tr> <td></td> <td>1</td> <td>Received read messages</td> </tr> <tr> <td></td> <td>2</td> <td>Stored unsent messages</td> </tr> <tr> <td></td> <td>3</td> <td>Stored sent messages</td> </tr> <tr> <td></td> <td>4</td> <td>All messages</td> </tr> </table> 	<stat>	"REC UNREAD"	Received unread messages (default)		"REC READ"	Received read messages		"STO UNSENT"	Stored unsent messages		"STO SENT"	Stored sent messages		"ALL"	All messages	<stat>	0	Received unread messages (default)		1	Received read messages		2	Stored unsent messages		3	Stored sent messages		4	All messages
<stat>	"REC UNREAD"	Received unread messages (default)																													
	"REC READ"	Received read messages																													
	"STO UNSENT"	Stored unsent messages																													
	"STO SENT"	Stored sent messages																													
	"ALL"	All messages																													
<stat>	0	Received unread messages (default)																													
	1	Received read messages																													
	2	Stored unsent messages																													
	3	Stored sent messages																													
	4	All messages																													
Scope	Channel Specific (reads from generic SMS store)																														
Reference 3GPP TS 27.005	<p>Note</p> <ul style="list-style-type: none"> • Read of SMS-SRs when <mem1> is set to "SR" can read SIM memory • When the M5311 software has concatenated SMS handling in modem enabled (see AT command AT*MFTRCFG) the user can read a concatenated text SMS up to 1024 characters in length. A concatenated SMS is stored on the SIM as number of smaller SMSs. (This is not possible when MMI is present). • When the M5311 software does not have concatenated SMS handling in the modem enabled, the maximum text SMS length is restricted depending on the data coding scheme (160 for 7-bit, 140 for 8-bit, 80 for 16-bit). 																														

3.4.3.4. AT+CMGR

AT+CMGR	Read SMS message
Test command	AT+CMGR=? Response <ul style="list-style-type: none"> • OK
Execute command	AT+CMGR=<index> Response TA returns SMS message with location value <index> from message storage <mem1> to the

	<p>TE. If status of the message is 'received unread', status in the storage changes to 'received read'.</p> <ul style="list-style-type: none"> • If text mode (+CMGF=1) and command successful: <ul style="list-style-type: none"> ○ for SMS-DELIVER: <pre>+CMGR:<stat>,<oa>,[<alpha>],<scts> [,<toa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data> OK</pre> ○ for SMS-SUBMIT: <pre>+CMGR:<stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcs>,<vp>],<sca>,<tosca>,<length>]<CR><LF><data> OK</pre> • If SMS-STATUS-REPORT and text mode: <pre>+CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> OK</pre> • If PDU mode (+CMGF=0) and command successful: <pre>+CMGR: <stat>,[<alpha>],<length><CR><LF><pdu> OK</pre> • If error is related to ME functionality: <pre>+CMS ERROR: <err></pre>
Parameters	<ul style="list-style-type: none"> • <index> integer type; value in the range of location numbers supported by the associated memory • <alpha> string type alphanumeric representation of <da> or <oa> corresponding to the entry found in MT phonebook; implementation of this feature is manufacturer specific. • <da> 3GPP 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (specified by +CSCS); type of address given by <toda> • <data> In the case of SMS: 3GPP 23.040 TP-User-Data in text mode responses; format: <ul style="list-style-type: none"> ○ if <dcs> indicates that 3GPP 23.038 default alphabet is used and <fo> indicates that 3GPP 23.040 TP-User-Data-Header-Indication is not set: <pre>ME/TA converts GSM alphabet into current TE character set according to rules of Annex A</pre> ○ if <dcs> indicates that 8-bit or UCS2 data coding scheme is used, or <fo> indicates that 3GPP 23.040 TP-User-Data-Header-Indication is set: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). In the case of CBS: 3GPP 23.041 CBM Content of Message in text mode responses; format: <ul style="list-style-type: none"> ○ if <dcs> indicates that 3GPP 23.038 default alphabet is used: <pre>ME/TA converts GSM alphabet into current TE character set according to rules of Annex A</pre> ○ if <dcs> indicates that 8-bit or UCS2 data coding scheme is used: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number • <dcs> depending on the command or result code: 3GPP 23.038 SMS Data Coding Scheme (default 0), or Cell Broadcast Data Coding Scheme in integer format • <fo> depending on the command or result code: first octet of 3GPP 23.040 SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, or SMS-COMMAND (default 2) in integer format

	<ul style="list-style-type: none"> • <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) • <mid> 3GPP 23.041 CBM Message Identifier in integer format • <oa> 3GPP 23.040 TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted characters of the currently selected TE character set (specified by +CSCS);; type of address given by <tooa> • <pdu> In the case of SMS: 3GPP 24.011 SC address followed by 3GPP 23.040 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). In the case of CBS: 3GPP 23.041 TPDU in hexadecimal format. • <sca> 3GPP 24.011 RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (specified by +CSCS);; type of address given by <tosca> • <scts> 3GPP 23.040 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>) • <stat> <ul style="list-style-type: none"> 0 "REC UNREAD" Received unread messages 1 "REC READ" Received read messages 2 "STO UNSENT" Stored unsent messages 3 "STO SENT" Stored sent messages 4 "ALL" All messages • <toda> 3GPP 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129) • <tooa> 3GPP 24.011 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>) • <tosca> 3GPP 24.011 RP SC address Type-of-Address octet in integer format (default refer <toda>) • <vp> depending on SMS-SUBMIT <fo> setting: 3GPP 23.040 TP-Validity-Period either in integer format (default 167) or in time-string format (refer <dt>) • <mr> Message reference. Integer format. • <ra> Recipient address. String type. • <tora> Type of address of <ra>. <ul style="list-style-type: none"> ○ 145: International number ○ 129: National number • <dt> Discharge time. String format: "yy/MM/dd, hh:mm:ss+/-zz" (Year/Month/Date, Hour:Seconds+/TimeZone) • <st> Status of an SMS-STATUS-REPORT. Integer format.
Scope	Channel Specific (reads from generic SMS store)
Reference 3GPP TS 27.005	<p>Note</p> <ul style="list-style-type: none"> • Read of SMS-SRs when <mem1> is set to "SR" can read SIM memory • When the M5311 software has concatenated SMS handling in modem enabled (see AT command AT*MFTRCFG) the user can read a concatenated text SMS up to 1024 characters in length. A concatenated SMS is stored on the SIM as number of smaller SMSs. (This is not possible when MMI is present).

- When the M5311 software does not have concatenated SMS handling in the modem enabled, the maximum text SMS length is restricted depending on the data coding scheme (160 for 7-bit, 140 for 8-bit, 80 for 16-bit).

3.4.3.5. AT+CMGS

AT+CMGS	Send SMS message
Test command	AT+CMGS=? Response <ul style="list-style-type: none"> • OK
Execute command	1) If text mode (+CMGF=1): AT+CMGS=<da>[,<toda>]<CR> text is entered<ctrl-Z/ESC> ESC quits without sending 2) If PDU mode (+CMGF=0): AT+CMGS=<length><CR> PDU is given <ctrl-Z/ESC> Response TA transmits SMS message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Value can be used to identify message upon unsolicited delivery status report result code. <ul style="list-style-type: none"> • If text mode(+CMGF=1) and sending successful: <ul style="list-style-type: none"> ○ +CMGS: <mr> OK • If PDU mode(+CMGF=0) and sending successful: <ul style="list-style-type: none"> ○ +CMGS: <mr> OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CMS ERROR: <err> Parameters
Parameters	<ul style="list-style-type: none"> • <da> 3GPP 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (specified by +CSCS); type of address given by <toda> • <toda> 3GPP 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129) • <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) • <mr> 3GPP 23.040 TP-Message-Reference in integer format
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for execute command
Reference 3GPP TS 27.005	Note <ul style="list-style-type: none"> • When the M5311 software has concatenated SMS handling in modem enabled (see

	<p>AT command AT*MFTRCFG) the user can send a text SMS up to 1024 characters in length. A concatenated SMS is sent to the network in a number of smaller SMSs. (This is not possible when MMI is present).</p> <ul style="list-style-type: none"> When the M5311 software does not have concatenated SMS handling in the modem enabled, the maximum text SMS length is restricted depending on the data coding scheme (160 for 7-bit, 140 for 8-bit, 80 for 16-bit).
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3.4.3.6. AT+CMGW

AT+CMGW	Write SMS message to memory
Test command	<p>AT+CMGW=?</p> <p>Response</p> <ul style="list-style-type: none"> OK
Execute command	<p>1) If text mode (+CMGF=1): AT+CMGW[=<oa/da>[,<tooa/toda>[,<stat>[,<scts>]]]]<CR> text is entered <ctrl-Z/ESC> <ESC> quits without sending</p> <p>2) If PDU mode (+CMGF=0): AT+CMGW=<length>[,<stat>]<CR> PDU is given <ctrl-Z/ESC></p> <p>Response TA transmits SMS message (either SMS-DELIVER or SMS-SUBMIT) from TE to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows also other status values to be given.</p> <ul style="list-style-type: none"> If writing is successful: <ul style="list-style-type: none"> +CMGW: <index> OK If error is related to ME functionality: <ul style="list-style-type: none"> +CMS ERROR: <err>
Parameters	<ul style="list-style-type: none"> <oa> 3GPP 23.040 TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (specified by +CSCS);; type of address given by <tooa> <da> 3GPP 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (specified by +CSCS);; type of address given by <toda> <tooa> 3GPP 24.011 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>) <toda> 3GPP 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129) <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

	<p>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)</p> <ul style="list-style-type: none"> • <pdu> In the case of SMS: 3GPP 24.011 SC address followed by 3GPP 23.040 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). In the case of CBS: 3GPP 23.041 TPDU in hexadecimal format. • <index> Index of message in selected storage <mem2> • <stat> Status of message when stored in memory <ul style="list-style-type: none"> 0 "REC UNREAD" Received unread message 1 "REC READ" Received read message 2 "STO UNSENT" Stored unsent message (default) 3 "STO SENT" Stored sent message • <scts> 3GPP 23.040 TP-Service-Centre-Time-Stamp in time- string format String format: "yy/MM/dd,hh:mm:ss+/-zz" (Year/Month/Day,Hour:Seconds+/TimeZone). Field only required when writing SMS-DELIVER.
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for execute command
Reference 3GPP TS 27.005	<p>Note</p> <ul style="list-style-type: none"> • When the M5311 software has concatenated SMS handling in modem enabled (see AT command AT*MFTRCFG) the user can write a text SMS up to 1024 characters in length. A concatenated SMS is stored on the SIM as number of smaller SMSs. (This is not possible when MMI is present). • When the M5311 software does not have concatenated SMS handling in the modem enabled, the maximum text SMS length is restricted depending on the data coding scheme (160 for 7-bit, 140 for 8-bit, 80 for 16-bit).

3.4.3.7. AT+CMSS

AT+CMSS Send SMS message from storage	
Test command	AT+CMSS=? Response <ul style="list-style-type: none"> • OK
Execute command	AT+CMSS=<index>[,<da>[,<toda>]] Response TA sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT). If new recipient address <da> is given, it shall be used instead of the one stored with the message. Reference value <mr> is returned to the TE on successful message delivery. Values can be used to identify message upon unsolicited delivery status report result code. <ul style="list-style-type: none"> • If text mode(+CMGF=1) and sending successful: <ul style="list-style-type: none"> ○ +CMSS: <mr> OK • If PDU mode(+CMGF=0) and sending successful: <ul style="list-style-type: none"> ○ +CMSS: <mr> OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CMS ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <index> integer type; value in the range of location numbers supported by the associated memory

	<ul style="list-style-type: none"> • <da> 3GPP 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (specified by +CSCS); type of address given by < toda > • < toda > 3GPP 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of < da > is + (IRA 43) default is 145, otherwise default is 129) • < mr > 3GPP 23.040 TP-Message-Reference in integer format
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for execute command
Reference 3GPP TS 27.005	<p>Note</p> <ul style="list-style-type: none"> • When the M5311 software has concatenated SMS handling in modem enabled (see AT command AT*MFTRCFG) this command will send the all stored messages which form part of a concatenated SMS. (This is not possible when the MMI is present).

3.4.3.8. AT+CMGC

AT+CMGC	Send SMS Command
Test command	AT+CMGC=? Response <ul style="list-style-type: none"> • OK
Execute command	1) If text mode (+CMGF=1): AT+CMGC=<fo>,<ct>[<pid>,<mn>[,<da>[,<toda>]]]<CR> text is entered <ctrl-Z/ESC> ESC quits without sending 2) If PDU mode (+CMGF=0): AT+CMGC=<length><CR> PDU is given <ctrl-Z/ESC> Response TA transmits SMS Command message from a TE to the network (SMS-COMMAND). Message reference value <mr> is returned to the TE on successful message delivery. Value can be used to identify message upon unsolicited delivery status report result code. <ul style="list-style-type: none"> • If text mode (+CMGF=1) and sending successful: <ul style="list-style-type: none"> ○ +CMGC: <mr> OK • If PDU mode (+CMGF=0) and sending successful: <ul style="list-style-type: none"> ○ +CMGC: <mr> OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CMS ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <fo> first octet of 3GPP 23.040 SMS-COMMAND (default 2) in integer format • <ct> 3GPP 23.040 TP-Command-Type in integer format (default 0) • <pid> 3GPP 23.040 TP-Protocol-Identifier in integer format (default 0) • <mn> 3GPP 23.040 TP-Message-Number in integer format • <da> 3GPP 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are

	converted to characters of the currently selected TE character set (specified by +CSCS);; type of address given by < toda > <ul style="list-style-type: none"> • < toda > 3GPP 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of < da > is + (IRA 43) default is 145, otherwise default is 129) • < length > integer type value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length) • < mr > 3GPP 23.040 TP-Message-Reference in integer format
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for execute command
Reference 3GPP TS 27.005	Note

3.4.3.9. AT+CNMI

AT+CNMI	New SMS message indications
Test command	AT+CNMI=? Response <ul style="list-style-type: none"> • +CNMI: (list of supported < mode > s), (list of supported < mt > s), (list of supported < bm > s), (list of supported < ds > s), (list of supported < bfr > s) • OK
Read command	AT+CNMI? Response <ul style="list-style-type: none"> • +CNMI: < mode >, < mt >, < bm >, < ds >, < bfr > • OK
Set command	AT+CNMI = [< mode > [, < mt > [, < bm > [, < ds > [, < bfr >]]]] Response <ul style="list-style-type: none"> • TA selects the procedure for how the receiving of new messages from the network is indicated to the TE when TE is active, e.g. DTR signal is ON. If TE is inactive (e.g. DTR signal is OFF), message receiving should be done as specified in 3GPP 23.038. • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CMS ERROR: < err >
Parameters	<ul style="list-style-type: none"> • < mode > <ul style="list-style-type: none"> 0 Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications. 1 Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved (e.g. in on-line data mode). Otherwise forward them directly to the TE. 2 Buffer unsolicited result codes in the TA when TA-TE link is reserved (e.g. in on-line data mode) and flush them to the TE after reservation. Otherwise forward them directly to the TE. 3 Forward unsolicited result codes directly to the TE. TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode. • < mt > (the rules for storing received SMSs depend on its data coding scheme)

	<p>(refer 3GPP 23.038 [2]), preferred memory storage (+CPMS) setting and this value):</p> <p>0 No SMS-DELIVER indications are routed to the TE.</p> <p>1 If SMS-DELIVER is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index> SMS-DELIVERs (except class 2) are routed directly to the TE using unsolicited result code: +CMT: [<i><alpha></i>],<length><CR><LF><pdu> (PDU mode enabled) or +CMT: <oa>,[<i><alpha></i>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sc>,<tosca>,<length>]<CR><LF><data> (text mode enabled; about parameters in italics, refer command Show Text Mode Parameters +CSDH). Class 2 messages result in indication as defined in <mt>=1.</p> <p>3 Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes defined in <mt>=2. Messages of other classes result in indication as defined in <mt>=1.</p> <ul style="list-style-type: none"> • <bm> (the rules for storing received CBMs depend on its data coding scheme (refer 3GPP 23.038 [2]), the setting of Select CBM Types (+CSCB) and this value): <ul style="list-style-type: none"> 0 No CBM indications are routed to the TE (default) • <ds> <ul style="list-style-type: none"> 0 No SMS-STATUS-REPORTs are routed to the TE. 1 SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDS: <length><CR><LF><pdu> (PDU mode enabled) or +CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> (text mode enabled) 2 SMS status reports are stored and indication of memory location routed to TE using unsolicited result +CDSI: "SR",<index> • <bfr> <ul style="list-style-type: none"> 0 TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes). TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1...3 is entered. • <mem> <ul style="list-style-type: none"> "SM" SMS message storage in SIM (default) "SR" status report message storage (in SIM if EF-SMR file present) or in MMI NVRAM if MMI present. • <index> Integer type indicating storage location (for +CMTI and +CBMI indications)
Unsolicited result code	<ul style="list-style-type: none"> • +CMTI: <mem>,<index> Indication that new message has been received with storage location • +CMT: <length><CR><LF><pdu> Short message is output directly
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test and read command ○ Generic for set command
Reference 3GPP TS 27.005	<p>Note</p> <ul style="list-style-type: none"> • CB messages are not supported for NB-IoT.

3.4.3.10. AT+CPMS

AT+CPMS	Preferred SMS Message Storage
Test command	AT+CPMS=? Response <ul style="list-style-type: none"> +CPMS: (list of supported <mem1>s),(list of supported <mem2>s) ,(list of supported <mem3>s) OK
Read command	AT+CPMS? Response <ul style="list-style-type: none"> +CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> OK If error is related to ME functionality: <ul style="list-style-type: none"> +CMS ERROR
Set command	AT+CPMS =<mem1> [,<mem2> [,<mem3>]] Response <ul style="list-style-type: none"> TA selects memory storages <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. +CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> OK If error is related to ME functionality: <ul style="list-style-type: none"> +CMS ERROR:<err>
Parameters	<ul style="list-style-type: none"> <mem1> Messages to be read and deleted from this memory storage <ul style="list-style-type: none"> "SM" SIM message storage "SR" Status Report message storage (EF-SMR if available on SIM). SR in SIM are only associated with SMSs stored on SIM. If EF-SMR not available and MMI is present then status reports are stored in NVRAM. In addition MMI can store status reports in NVRAM as well as ones stored on SIM (EF-SMR file), if available. <mem2> Messages will be written and sent to this memory storage <ul style="list-style-type: none"> "SM" SIM message storage <mem3> Received messages will be placed in this memory storage if routing to PC is not set ("+CNMI") <ul style="list-style-type: none"> "SM" SIM message storage <usedx> Number of messages currently in <memx> <totalx> Number of messages storable in <memx>
Scope	<ul style="list-style-type: none"> Channel Specific for test and read command Generic for set command
Reference 3GPP TS 27.005	Note

3.4.3.11. AT+CRES

AT+CRES Restore SMS settings	
Test command	AT+CRES=?
	Response <ul style="list-style-type: none"> • +CRES: list of supported <profile>s • OK
Execute command	AT+CRES[=<profile>]
	Response <ul style="list-style-type: none"> • TA restores SMS settings for +CMGF, +CNMI, and +CSDH from non-volatile memory to active memory. • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CMS ERROR:<err>
Parameters	<ul style="list-style-type: none"> • <profile> 0 manufacturer specific profile number to store the settings
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for execute command
Reference 3GPP TS 27.005	Note

3.4.3.12. AT+CSAS

AT+CSAS Save SMS settings	
Test command	AT+CSAS=?
	Response <ul style="list-style-type: none"> • +CSAS: list of supported <profile>s • OK
Execute command	AT+CSAS[=<profile>]
	Response <ul style="list-style-type: none"> • TA saves current message service settings for +CMGF, +CNMI, and +CSDH, to a non- volatile memory. • OK • If error is related to ME functionality: <ul style="list-style-type: none"> ○ +CMS ERROR:<err>
Parameters	<ul style="list-style-type: none"> • <profile> 0 manufacturer specific profile number where settings are to be stored
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test command ○ Generic for execute command
Reference 3GPP TS 27.005	Note

3.4.3.13. AT+CSCA

AT+CSAS Save SMS settings	
Test command	AT+CSCA=?
	Response <ul style="list-style-type: none"> • OK
Read command	AT+CSCA?
	Response <ul style="list-style-type: none"> • +CSCA: <sca>,<tosca> • OK
Set command	AT+CSCA =<sca>[,<tosca>]
	Response <ul style="list-style-type: none"> • TA 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. • Note: The command writes the parameters in NON-VOLATILE memory. • OK
Parameters	<ul style="list-style-type: none"> • <sca> 3GPP 24.011 RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (specified by +CSCS); type of address given by <tosca> • <tosca> Service center address format 3GPP 24.011 RP SC address Type-of-Address octet in integer format (default refer <toda>)
Scope	<ul style="list-style-type: none"> ○ Channel Specific for test and read command ○ Generic for set command
Reference 3GPP TS 27.005	Note

3.4.3.14. AT+CSDH

AT+CSDH Show SMS text mode parameters	
Test command	AT+CSDH=?
	Response <ul style="list-style-type: none"> • +CSDH: list of supported <show>s • OK
Read command	AT+CSDH?
	Response <ul style="list-style-type: none"> • +CSDH:<show> • OK
Set command	AT+CSDH=<show>
	Response <ul style="list-style-type: none"> • TA determines whether detailed header information is shown in text mode result codes. • OK
Parameters	<ul style="list-style-type: none"> • <show> <ul style="list-style-type: none"> 0 do not show header values defined in commands +CSCA and

	+CSMP (<sca>,<tosca>, <fo>, <vp>, <pid> and <dcsc> nor <length>, <tda> or <toa> in +CMT, +CMGL, +CMGR result codes in text mode 1 show the values in result codes
Scope	<ul style="list-style-type: none"> o Channel Specific
Reference 3GPP TS 27.005	Note

3.4.3.15. AT+CSMP

AT+CSMP	Set SMS text mode parameters
Test command	AT+CSMP=? Response <ul style="list-style-type: none"> • OK
Read command	AT+CSMP? Response <ul style="list-style-type: none"> • +CSMP:<fo>,<vp>,<pid>,<dcsc> • OK
Set command	AT+CSMP=[<fo> [<vp>[,<pid>[,<dcsc>]]]] Response <ul style="list-style-type: none"> • TA selects values for additional parameters needed when SM is sent to the network or placed in storage when text mode is selected (+CMGF=1). It is possible to set the validity period starting from when the SM is received by the SMSC (<vp> is in range 0... 255). • OK
Parameters	<ul style="list-style-type: none"> • <fo> first octet of 3GPP 23.040 SMS-DELIVER, SMS-SUBMIT in integer format. The following fields can be modified: <ul style="list-style-type: none"> o TP-Message-Type-Indicator (bits 0-1) (SMS-DELIVER or SMS-SUBMIT) o TP-Reject-Duplicates (bit 2) o TP-Validity-Period-Format (bits 3-4) o TP-Status-Report-Request (bit 5) o TP-User-Data-Header-Indicator (bit 6) o TP-Reply-Path (bit 7). Default value is 17 (SMS-SUBMIT and Validity Period in relative format) When concatenated SMS is supported by M5311, attempts to change the following fields from the default will produce an ERROR: TP-User-Data-Header-Indicator (bit 6) – the UDHI field is used for concatenated SMSs and is set by the Background Layer where appropriate. <ul style="list-style-type: none"> • <vp> 3GPP 23.040 TP-Validity-Period in integer format (default 167). • <pid> 3GPP 23.040 TP-Protocol-Identifier in integer format (default 0) • <dcsc> 3GPP 23.038 SMS Data Coding Scheme in Integer format (default 0 i.e. 7-bit coding).
Scope	<ul style="list-style-type: none"> o Channel Specific for test and read command o Generic for set command
Reference 3GPP TS 27.005	Note The command writes the settings <vp>, <pid> and <dcsc> in SIM memory. <fo> field is not stored anywhere.

	<ul style="list-style-type: none"> On startup, the settings <vp>, <pid> and <dc> are read from the SIM and used for SMS AT commands. If they cannot be found in the SIM they are set to the default values. The <fo> field is always set to the default value at startup.
--	---

3.4.3.16. AT+CSMS

AT+CSMS	Select Message Service
Test command	AT+CSMS=? Response <ul style="list-style-type: none"> +CSMS: list of supported <service>s OK
Read command	AT+CSMS? Response <ul style="list-style-type: none"> +CSMS: <service>,<mt>,<mo>,<bm> OK
Set command	AT+CSMS=<service> Response <ul style="list-style-type: none"> +CSMS: <mt>,<mo>,<bm> OK If error is related to ME functionality: <ul style="list-style-type: none"> +CMS ERROR: <err>
Parameters	<ul style="list-style-type: none"> <service> <ul style="list-style-type: none"> 0 3GPP 23.040 and 23.041. 1 3GPP 23.040 and 23.041, with a requirement that a message routed directly to TE should be acknowledged via +CNMA. 128 SMS PDU mode - TPDU only used for sending/receiving SMSs. <mt> Mobile Terminated Messages: <ul style="list-style-type: none"> 0 Type not supported 1 Type supported <mo> Mobile Originated Messages: <ul style="list-style-type: none"> 0 Type not supported 1 Type supported <bm> Broadcast Type Messages: <ul style="list-style-type: none"> 0 Type not supported
Scope	<ul style="list-style-type: none"> Channel Specific for test and read command Generic for set command
Reference 3GPP TS 27.005	Note <ul style="list-style-type: none"> <bm> message type is not supported

3.4.3.17. AT+CNMA

This command is only valid when AT+CSMS? <service> returns 1.

AT+CNMA	New Message Acknowledgement to ME/TA
Test command	AT+CNMA=? Response <ul style="list-style-type: none"> If PDU mode (+CMGF=0):

	<ul style="list-style-type: none"> ○ +CNMA: list of supported <n>s
Set command	AT+CNMA [=<n>[,<length>[<CR> PDU is entered <CTRL-Z/ESC]]]
	Response After SMS is routed to the TA (based on message class and +CNMI settings as defined in 27.005), TA sends acknowledgement command to the network. Note: this functionality shall be used only when +CSMS parameter <service> equals 1. <ul style="list-style-type: none"> • If command is executed but no acknowledgement is expected, or some other error ME related error occurs: <ul style="list-style-type: none"> ○ +CMS ERROR: <err> • If PDU mode (+CMGF=0):
Parameters	<n> 0 Operates similarly as defined for text mode (if ME doesn't get acknowledgement within required time, ME should respond as specified in 3GPP 24.011, and ME shall automatically disable routing to TE setting both <mt> and <ds>values of CNMI to zero).
	1 Send positive acknowledgement to the network with optional PDU message 2 Send negative acknowledgement to the network with optional PDU message <length> Length of the optional PDU message. Integer type
Scope	Generic
Reference 3GPP TS 27.005	Note

3.4.3.18. AT+CMMS

AT+CMMS	More Messages to Send
Test command	AT+CMMS=?
	Response <ul style="list-style-type: none"> • +CMMS: list of supported <n>s
Read command	AT+CMMS?
	Response <ul style="list-style-type: none"> • +CMMS: <n>
Set command	AT+CMMS= [<n>]
	Response TA sets continuity of SMS relay protocol link. When feature is enabled multiple messages can be sent much faster as link is kept open: <ul style="list-style-type: none"> • If error is related to ME functionality: • +CMS ERROR <err>
Parameters	<n> 0 Disable
	1 Keep enabled until the time between the response of the latest message send command (+CMGS, +CMSS, etc.) and the next send command exceeds 1-5 seconds (the exact value is up to ME implementation), then ME shall close the link and TA switches <n> automatically back to 0
	2 Enable (if the time between the response of the latest message send command and the next send command exceeds 1-5 seconds (the exact

	value is up to ME implementation), ME shall close the link but TA shall not switch automatically back to <n>=0)
Scope	<ul style="list-style-type: none">○ Channel Specific for test and read command○ Generic for set command
Reference 3GPP TS 27.005	<p>Note</p> <ul style="list-style-type: none">• When the M5311 software has concatenated SMS handling in modem enabled (see AT command AT*MFTRCFG) the software automatically sends all segments of a concatenated message one after the other. (This is not possible when the MMI is present).



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3.5. AT Commands Special for CMIOT

3.5.1. Overview

Command	Description
AT+HVER	Request Hardware Version
AT+SWVER	Request Hardware Version
AT+CPOF	Shut down the system
AT+CMRB	Software reboots the terminal
AT+COLDREB	Cold reboots the terminal
AT+GPIO	Operate GPIO
AT+SM	Set sleep mode
AT+EPORT	Control and query serial port
AT+CMADC	Read ADC
AT+CMSYSCTRL	Enable output of sleep/net status
AT+TAUAC	Read periodic TAU value
AT+ICCID	Read USIM ICCID file
AT+CLPLMN	Clear PLMN, EARFCN, PCI attachment record
AT*ENGINF	Network/cell/UE engineering information reporting.
AT*FRCLLCK	Lock cell & freq: MD only camps on specified frequency and cell ID (if specified)
AT*SPCHSC	Set scrambling algorithm of NPDSCH
AT*CGDEFCONT	Set default PSD connection settings (for attach PDN connection)
AT*PLMNURI	PLMN uplink rate indication.
AT*NBIOTDT	NB-IOT data type per APN (normal/exceptional)
AT*NBIOTRAI	NB-IOT release assistance indication
AT*HOMENW	Display Home Network Information
AT*CMSPN	Get Service Provider name from SIM
AT*CMUNSOL	Extra Unsolicited Indications
AT*CMBAND	Query current operating band
AT*MATWAKEUP	Configure URC on specific AT channel when module woken up from deep sleep
AT*SLEEP	Configure URC on specific AT channel when module enter deep sleep
AT*WAKETIME	Config wake-up time after WAKEUP_IN triggering
AT*ENTERSLEEP	Enter light/deep sleep mode immediately
AT*MDPDNP	Set default PDN Parameter
AT*EDRXCFCG	eDRX configuration
AT^SYSCONFIG	Configure system Reference
AT^CARDMODE	Request SIM/USIM Mode
AT^SPN	Read Service Provider Name

3.5.2. Detailed Description of Commands

3.5.2.1. AT+HVER

The command returns the hardware version of the UE. The format is not specified.

AT+HVER Request Hardware Version	
Execution command	AT+HVER
	Response <ul style="list-style-type: none"> • +HVER:<Hardware_Version> • OK
Parameters	<Hardware_Version> : Hardware version, string type up to 31 bytes.
Scope	Channel Specific
Reference	Note

+HVER Examples

```
AT+HVER
+HVER: LV-V005
OK
```

3.5.2.2. AT+SWVER

The command returns the software version of the UE. The format is not specified.

AT+SWVER Request Software Version	
Execution command	AT+SWVER
	Response <ul style="list-style-type: none"> • <Software_Version> • OK
Parameters	< Software_Version > : Software version, string type up to 31 bytes.
Scope	Channel Specific
Reference	Note

+SWVER Examples

```
AT+SWVER
M5311-MLVH0S00
OK
```

3.5.2.3. AT+CPOF

Shut down the system.

AT+CPOF Power Off	
Test Command	AT+CPOF=?
	Response <ul style="list-style-type: none"> • +CPOF: • OK
Execution command	AT+CPOF

	Response <ul style="list-style-type: none"> • OK • ERROR if operation failed. Otherwise system will Power off.
Unsolicited result code	<ul style="list-style-type: none"> • POWER OFF
Scope	Channel Specific
Reference	Note

+CPOF Examples

```

AT+CPOF=?
+CPOF:
OK

AT+CPOF                               Shut down the system
OK
POWER OFF
    
```

3.5.2.4. AT+CMRB

Software reboots the terminal.

AT+CMRB	Reboots the terminal
Test Command	AT+CMRB=?
	Response <ul style="list-style-type: none"> • +CMRB: • OK
Execution command	AT+CMRB
	Response <ul style="list-style-type: none"> • OK • ERROR if operation failed. Otherwise system will reboot.
Unsolicited result code	<ul style="list-style-type: none"> • REBOOTING..
Scope	Channel Specific
Reference	Note

+CMRB Examples

```

AT+CMRB=?
+CMRB:
OK

AT+CMRB                               trigger terminal reset.The system will
                                         reboot immediately.

OK
REBOOTING..

*ATREADY: 1
+CFUN: 1
+CPIN: READY                           reboot successful.
    
```



3.5.2.5. AT+COLDDB

Cold reboots the terminal. Hardware peripherals will be powered off and reset.

AT+COLDDB Reboots the terminal	
Test Command	AT+COLDDB=?
	Response <ul style="list-style-type: none"> • +COLDDB: • OK
Execution command	AT+COLDDB
	Response <ul style="list-style-type: none"> • OK • ERROR if operation failed. Otherwise system will reboot.
Unsolicited result code	<ul style="list-style-type: none"> • COLD REBOOTING..
Scope	Channel Specific
Reference	Note

+COLDDB Examples

```

AT+COLDDB=?
+COLDDB:
OK

AT+COLDDB                                trigger terminal reset.The system will
                                           reboot immediately.

OK
COLD REBOOTING..

*ATREADY: 1
+CFUN: 1
+CPIN: READY                                reboot successful.
    
```

3.5.2.6. AT+GPIO

Query GPIO configuration and Change GPIO configuration. This AT command is case sensitive.

AT+GPIO Operate GPIO	
Test Command	AT+GPIO=?
	Response <ul style="list-style-type: none"> • +GPIO: (1-7),(9,10),(,) • OK • ERROR

Set command	AT+GPIO=<op>,<gpio_pin>,[<md_val>][<s_dir>][<di_val>][<od_val>][<pull_value>][<s_pull_type>][<drv_val>]
Unsolicited result code	See Table Below
Parameters	Response <ul style="list-style-type: none"> • ATCI_CMD_MODE_EXECUTION OK • OK
	See Table Below <ul style="list-style-type: none"> • <op>: integer <ul style="list-style-type: none"> 1 query the GPIO configuration, return +GPIO: <gpio_pin>,<md_value>,<s_dir>,<di_val>,<od_val>,<s_current_status>,<pull_value> 2 set mode to one pin. 3 set direction to one pin 4 set pull up/down to one pin 5 set pull resistance to one pin 6 set output data to one pin 7 set current driving to one pin • <gpio_pin>: integer, gpio pin number, only Pin34 and Pin35 supported <ul style="list-style-type: none"> 34 Pin 34, GPIO0 35 Pin 35, GPIO1 • <md_val>: integer, GPIO mode value <ul style="list-style-type: none"> 0 gpio(just support gpio mode) • <s_dir>: integer, direction value <ul style="list-style-type: none"> 0 input 1 output • <di_val>: integer input direction value; <ul style="list-style-type: none"> 0 low 1 high • <od_val>: integer, output direction value; <ul style="list-style-type: none"> 0 low 1 high • <pull_value>: integer, pull value; 0 means pull-up, 1 means pull-down. <ul style="list-style-type: none"> 0 pull-up 1 pull-down 2 disable pull • <s_pull_type> integer <ul style="list-style-type: none"> 0 no pull (high impedance) 1 75K pull-up(not support) 2 75K pull-down(not support) 3 47K pull-up 4 47K pull-down 5 23.5K pull-up 6 23.5K pull-down • <drv_val>: integer, the current driving. <ul style="list-style-type: none"> 0 4ma 1 8ma 2 12ma 3 16ma

Scope	Channel Specific
Reference	Note

Command	Possible URC(s)
+GPIO=1,<gpio_pin>	+GPIO: <gpio_pin>,<md_val>,<s_dir>,<di_val>,<od_val>,<drv_val>,<s_pull_type>
+GPIO=2,<gpio_pin>,<mod_val>	<gpio_pin>,<md_val>
+GPIO=3,<gpio_pin>,<di_val>	<gpio_pin>,<s_dir>
+GPIO=4,<gpio_pin>,<pull_val>	<gpio_pin>,<s_pull_type>
+GPIO=5,<gpio_pin>,<s_pull_type>	<gpio_pin>,<s_pull_type>
+GPIO=6,<gpio_pin>,<od_val>	<gpio_pin>,<od_val>
+GPIO=7,<gpio_pin>,<drv_val>	<gpio_pin>,<drv_val>

+GPIO Examples

```

at+gpio=1,34 //get GPIO_9 status
+GPIO: 34,0,1,1,1,0,0 //GPIO 9 in input mode, input value is low

OK

AT+GPIO=3,34,1 //set GPIO_9 to output direction
34,1
OK

AT+GPIO=6,34,0 //set output low voltage
34,0
OK

AT+GPIO=7,34,3 //set GPIO_9 current to 16mA
34,3
OK

AT+GPIO=4,34,1 //set GPIO_9 to pull-down state
OK

AT+GPIO=3,34,0 //set GPIO_9 to input direction
34,0
OK

AT+GPIO=4,34,1 //set GPIO_9 to pull-down state
34,4

OK

at+gpio=5,34,0 //set GPIO_9 to high impedance
34,0

OK
    
```

3.5.2.7. AT+SM

Set the sleep mode.

AT+SM Set the sleep mode	
Set command	AT+SM=<op>
	Response <ul style="list-style-type: none"> • OK • ERROR
Parameters	<ul style="list-style-type: none"> • <op>: string LOCK acquire a temporary lock to prevent system enter sleep. UNLOCK release the temporary lock acquired by AT+SM=LOCK command. LOCK_FOREVER acquire a lock to prevent system enter sleep. This lock will be written into NVDM, so it will still valid even after reboot. UNLOCK_FOREVER release lock acquired by AT+SM=LOCK_FOREVER command, and clear the NVDM data. <p>show lock status. All these setting will be written into NVDM, will still take effect after reboot</p>
Scope	Channel Specific
Reference	Note

+SM Examples

```

AT+SM=LOCK //acquire a lock to prevent system enter sleep.
OK

AT+SM=UNLOCK //release lock acquired by AT+SM=LOCK.
OK

AT+SM=LOCK_FOREVER //acquire a lock to prevent system enter sleep, this
                    lock will stay valid even after reboot.
OK
AT+SM=UNLOCK_FOREVER //release a lock acquired by AT+SM=LOCK_FOREVER
                    command.
OK
    
```

3.5.2.8. AT+EPORT

These AT commands are used to show or modify serial port assignment for the application, show or modify parameters of serial port devices, and switch serial port for the application, the setting will work after module reboot.

AT+EPORT Control and query serial port	
Test Command	AT+EPORT=?
	Response <ul style="list-style-type: none"> • usage • OK
Set command	+EPORT=<op>[,<param1>...]

	Response <ul style="list-style-type: none"> • +EPORT: <param2> • OK • ERROR
Parameters	<ul style="list-style-type: none"> • <op>: integer <ul style="list-style-type: none"> 0 display port assignment for applications/users. 1 reassign port for the specific applications/users and store in nvdm. 2 switch old port to specific port for the specific applications/users. 3 modify parameters of port service devices. 4 show parameters of port service devices • <param1>... more parameters in AT command <ul style="list-style-type: none"> If <op> is 1 or 2, <param1>... is <owner_name>,<port_id> in AT command If <op> is 3, <param1>... is <port_id>,<baudrate> in AT command If <op> is 4, <port_id>,<baudrate> in AT response • <owner_name> string <ul style="list-style-type: none"> Application name that uses port service. For example, “uls” HSL log “emmi” GKI log • <port_id> integer <ul style="list-style-type: none"> The specific device of port service support. Just support 0, 0 DBG(PIN 1-2) Like as <ul style="list-style-type: none"> ○ AT+EPORT=1,<owner_name>,<port_id> ○ AT+EPORT=2,<owner_name>,<port_id> • <baudrate> integer <ul style="list-style-type: none"> The specific baudrate of port service device Like as <ul style="list-style-type: none"> ○ +EPORT=3,<port_id>,<baudrate>
Scope	Channel Specific
Reference	Note

Command	Possible URC(s)
+EPORT=0	+EPORT: <owner_name>,<port_id>
+EPORT=1,<owner_name>,<port_id>	None
+EPORT=2,<owner_name>,<port_id>	None
+EPORT=3,<port_id>,<baudrate>	None
+EPORT=4	+EPORT:<port_id>,<baudrate>

+EPORT Examples

AT+EPORT=0 +EPORT: uls,2 conn1,1	display port assignment for applications/users
---	--

```

emmi,0
OK

AT+EPOR=1,emmi,0           reassign port for the GKI and store in NVDM.
OK

AT+EPOR=3,0,921600         set UART0's baud rate to 921600bps.
OK

AT+EPOR=4                   show current parameters stored in NVDM.
+EPOR:
0,921600
1,115200
2,115200
3,115200
4,none
5,none

OK
    
```

3.5.2.9. AT+CMADC

AT+CMADC	Read ADC
Test Command	AT+CMADC=?
	Response <ul style="list-style-type: none"> +CMADC: (0-1) OK
Execution command	AT+CMADC=<channel>
	Response <ul style="list-style-type: none"> +CMADC: <voltage> OK If error is related to wrong AT syntax: +CMADC: Over range! ERROR
Parameters	<channel> integer type 0 Read ADC from ADC0 (Pin38) 1 Read ADC from ADC1(Currently not supported) <voltage> integer type, 0-1399. Indicate the ADC voltage.
Scope	Channel Specific
Reference	Note

+CMADC Examples

```

AT+CMADC=?
+CMADC: (0-1)
OK

AT+CMSYSCTRL=0           //ADC0
    
```

```
+CMADC: 977mV
OK

AT+CMADC=0
+CMADC: Over range!
ERROR
```

3.5.2.10. AT+CMSYSCTRL

The command enable/disable output of the sleep/net status.

AT+CMSYSCTRL Enable output of sleep/net status	
Test Command	AT+CMSYSCTRL=?
	Response <ul style="list-style-type: none"> +CMSYSCTRL: (0-1)(0-2) OK
Read command	AT+CMSYSCTRL?
	Response <ul style="list-style-type: none"> <status_mode>,<wakeupout_mode>[,<nonreg_h>,<reg_h>,<nonreg_l>,<reg_l>] OK
Execution command	AT+CMSYSCTRL=<op>,<mode>[,<nonreg_h>,<reg_h>,<nonreg_l>,<reg_l>]
	Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax: +CME ERROR: <err>
Parameters	<op> integer type 0 Select operation STATE (Pin21) 1 Select operation WAKEUP-OUT (Pin16) <mode> integer type 0 Disable the output of status from STATE. 1 <op>=0 : Enable the output of light sleep status from STATE. When M5311 enter light sleep mode, it will Output high. <op>=1: Enable the output of deep sleep status from WAKEUP-OUT. When M5311 wakeup out from deep sleep, it will Output high. 2 integer type, Only in the case of <op>=0, Enable the output of EPS registration status from STATE. When M5311 EPS has been not registered, by default, it will cycle output high of 80ms and low of 800ms. When M5311 EPS has been registered, by default, it will cycle output high of 80ms and low of 3000ms. When M5311 enter deep sleep mode, it will turn off until wake up. <status_mode> integer type, Indicate <mode> of the STATE. <wakeupout_mode> integer type, Indicate <mode> of the WAKEUP_OUT. <nonreg_h> integer type, Only in the case of <op>=0 & <mode>=2, default 80ms, range 40-65535(ms), it represents the high level duration in unregistered.

	<p><reg_h> integer type, Only in the case of <op>=0 &<mode>=2, default 80ms, range 40-65535(ms), it represents the high level duration in registered.</p> <p><nonreg_h> integer type, Only in the case of <op>=0 &<mode>=2, default 800ms, range 40-65535(ms), it represents the low level duration in unregistered.</p> <p><reg_h> integer type, Only in the case of <op>=0 &<mode>=2, default 3000ms, range 40-65535(ms), it represents the low level duration in registered.</p>
Scope	Channel Specific
Reference	Note <ul style="list-style-type: none"> The default value is disable report of the sleep status.

EPS registration default status(status_mode:2)

EPS registration status	Description
unregistered	80ms high/800ms low
registered	80ms high/3000ms low

+CMSYSCTRL Examples

```

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

AT+CMSYSCTRL=0,2,50,300,100,800 //enable net status output
//output (STATE)
OK

AT+CMSYSCTRL?
2,0,50,300,100,800
OK

AT+CMSYSCTRL=0,1 //enable light sleep status
//output (STATE)
OK

AT+CMSYSCTRL=1,1 //enable deep sleep status
//output (WAKEUP_OUT)
OK

AT+CMSYSCTRL?
1,1
OK
    
```

3.5.2.11. AT+TAUAC

This command is required for periodic TAU value (T3412) allocated to the UE in E-UTRAN.

AT+TAUAC	Read periodic TAU value
Test Command	AT+TAUAC=?

	Response <ul style="list-style-type: none"> • +TAUAC: (0-1116000) • OK
Read command	AT+TAUAC?
	Response <ul style="list-style-type: none"> • +TAUAC: <periodic_tau> • OK If error is related to wrong AT syntax +CME ERROR: <err>
Parameter	<ul style="list-style-type: none"> • <periodic_tau> integer type, range 0-1116000(s). Indicates the periodic TAU value (T3412) allocated to the UE in E-UTRAN.
Scope	Generic
Reference	Note

+ICCID examples

```

AT+TAUAC=?
+TAUAC: (0-1116000)
OK

AT+TAUAC?
+TAUAC: 3240
OK
    
```

3.5.2.12. AT+ICCID

This command is required for Windows 7 NDIS driver. It is used to read the USIM ICCID field (EFICCID).

AT+ICCID	Read USIM ICCID File
Execution command	AT+ICCID
	Response <ul style="list-style-type: none"> • +ICCID: <ICCID> • OK If error is related to wrong AT syntax <ul style="list-style-type: none"> • +CME ERROR: <err>
Parameter	<ul style="list-style-type: none"> • <ICCID> International Circuit Card (ICC) ID of the (U)SIM. Formatted as a numeric string without double quotes. The string can be up to a maximum of 20 digits long.
Scope	Generic
Reference	Note

+ICCID examples

AT+ICCID +ICCID: 56979649586978380293 OK	Execution command
--	-------------------

3.5.2.13. AT+CLPLMN

Clear PLMN, EARFCN, PCI attachment record.

AT+CLPLMN	Clear PLMN, EARFCN, PCI attachment record						
Execution command	AT+CLPLMN						
	Response <ul style="list-style-type: none"> +CLPLMN: <status> OK If error is related to wrong AT syntax <ul style="list-style-type: none"> +CME ERROR: <err> 						
Parameter	<ul style="list-style-type: none"> <status> result of clear record <table border="0" style="margin-left: 20px;"> <tr> <td>0</td> <td>Successful</td> </tr> <tr> <td>1</td> <td>NVDM corrupt</td> </tr> <tr> <td>2</td> <td>Other failure</td> </tr> </table> 	0	Successful	1	NVDM corrupt	2	Other failure
0	Successful						
1	NVDM corrupt						
2	Other failure						
Scope	Generic						
Reference	Note						

+CLPLMN examples

AT+CLPLMN +CLPLMN: 0 OK	Execution command Clear record success
-------------------------------	---

3.5.2.14. AT*ENGINFO

This command is used to query current network status, and modem status information for serving cell.

AT*ENGINFO	Report Network State
Test Command	AT*ENGINFO=?
	Response <ul style="list-style-type: none"> *ENGINFO: (list of supported <mode>) OK
Execution command	AT*ENGINFO=<mode>
	Response <ul style="list-style-type: none"> If <mode> = 0 display serving cell and up to 4 neighbor cell information: <ul style="list-style-type: none"> *ENGINFOSC: <ul style="list-style-type: none"> <sc_earfcn>,<sc_earfcn_offset>,<sc_pci>,<sc_cellid>,[<sc_rsrp>],[<sc_rsrq>],[<sc_rssi>],[<sc_snr>],[<sc_band>,<sc_tac>],[<sc_ec1>],[<sc_tx_pwr>] [<CR><LF>*ENGINFONC:<nc_earfcn>,<nc_earfcn_offset>,<nc_pci>,<nc_rsrp> [...] OK If <mode> = 1 display data transfer information only if modem in RRC-CONNECTED state: <ul style="list-style-type: none"> *ENGINFODT: <ul style="list-style-type: none"> <RLC_UL_BLER>,<RLC_DL_BLER>,<MAC_UL_BLER>,<MAC_DL_BLER>,<MAC_

	<p>UL_total_bytes>, <MAC_DL_total_bytes>, <MAC_UL_total_HARQ_TX>, <MAC_DL_total_HARQ_TX>, <MAC_UL_HARQ_re_TX>, <MAC_DL_HARQ_re_TX>, <RLC_UL_tput>, <RLC_DL_tput>, <MAC_UL_tput>, <MAC_DL_tput></p> <ul style="list-style-type: none"> ○ OK • If error is related to wrong AT syntax or incorrect <mode> or UE in incorrect state <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameters	<p><mode> Integer value indicating requested engineering information. 0: Radio information for serving and neighbor cells</p> <p>Serving Cell/Neighbor Cell information:</p> <p><sc_earfcn> Integer value indicating the EARFCN for serving cell. Range 0-262143</p> <p><sc_earfcn_offset> Integer value indicating the EARFCN offset for serving cell: 0: Offset of -2 1: Offset of -1 2: Offset of -0.5 3: Offset of 0 4: Offset of 1</p> <p><sc_pci> Integer value indicating the serving cell physical cell ID. Range 0 – 503.</p> <p><sc_cellid> String type; four byte (28 bit) cell ID in hexadecimal format for serving cell.</p> <p><sc_rsrp> Signed integer indicating serving cell RSRP value in units of dBm (can be negative value). Available only in RRC-IDLE state.</p> <p><sc_rsrq> Signed integer indicating serving cell RSRQ value in units of dB (can be negative value). Available only in RRC-IDLE state.</p> <p><sc_rssi> Signed integer indicating serving cell RSSI value in units of dBm (can be negative value). Available only in RRC-IDLE state.</p> <p><sc_snr> Signed integer value. Last SNR value for serving cell in units of dB. Available only in RRC-IDLE state.</p> <p><sc_band> Integer value; current serving cell band</p> <p><sc_tac> String type; two byte tracking area code (TAC) in hexadecimal format (e.g. "00C3" equals 195 in decimal).</p> <p><sc_ecl> Integer value. Last Enhanced Coverage Level (ECL) value for serving cell. Range 0-2.</p> <p><sc_tx_pwr> Signed integer value indicating current UE transmit power. Units of cBm Centibels relative to one milliwatt (can be negative value).</p> <p><nc_earfcn> Integer value indicating the EARFCN for neighbor cell. Range 0-262143</p> <p><nc_earfcn_offset> Integer value indicating the EARFCN offset for neighbor cell: 0: Offset of -2 1: Offset of -1 2: Offset of -0.5 3: Offset of 0 4: Offset of 1</p> <p><nc_pci> Integer value indicating the neighbor cell physical cell ID. Range 0-503.</p> <p><nc_rsrp> Signed integer indicating neighbor cell RSRP value in units of dBm (can be negative value).</p> <p>Data Transfer Information:</p> <p><RLC_UL_BLER> Integer value. Represented in % value (range 0 to 100). UL block error rate (as per IRQ) in RLC. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established/resumed RRC connection or since previous AT*ENGINFQ query with <mode>=1, whichever is later. Only valid in RRC-CONNECTED state.</p> <p><RLC_DL_BLER> Integer value Represented in % value (range 0 to 100). DL block error rate</p>

	(as per ARQ) in RLC. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established / resumed RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state.
<MAC_UL_BLER>	Integer value. Represented in % value (range 0 to 100). UL block error rate (as per HARQ) in MAC for UL-SCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state.
<MAC_DL_BLER>	Integer value. Represented in % value (range 0 to 100). DL block error rate (as per HARQ) in MAC for DL-SCH, excluding BCCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state.
<MAC_UL_total_bytes>	Integer value. Total number of transport block bytes (re)transmitted on UL-SCH. Calculated for UL-SCH over all HARQ transmissions and retransmissions. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: bytes
<MAC_DL_total_bytes>	Integer value. Total number of transport block bytes (re)transmitted on DL-SCH, excluding BCCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: bytes
<MAC_UL_total_HARQ_TX>	Integer value. Total number of HARQ (re)transmissions for transport blocks on UL-SCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: (re)transmissions
<MAC_DL_total_HARQ_TX>	Integer value. Total number of HARQ (re)transmissions for transport blocks on DL-SCH, excluding BCCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: (re)transmissions
<MAC_UL_HARQ_re_TX>	Integer value. Number of HARQ retransmissions for transport blocks on UL-SCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: retransmissions
<MAC_DL_HARQ_re_TX>	Integer value. Number of HARQ retransmissions for transport blocks on DL-SCH, excluding BCCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: retransmissions.
<RLC_UL_tput>	Integer value. RLC uplink throughput. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established / resumed RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits / s
<RLC_DL_tput>	Integer value. RLC downlink throughput. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established / resumed RRC connection, or since previous AT*ENGINFO

	<p>query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits / s</p> <p><MAC_UL_tput> Integer value. UL throughput in MAC for UL-SCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits / s</p> <p><MAC_DL_tput> Integer value. DL throughput in MAC for DL-SCH, excluding BCCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*ENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits / s</p>
Scope	Channel specific
Reference	<p>Note</p> <ul style="list-style-type: none"> If modem is not in RRC-CONNECTED state then *ENGINFODT: will not be generated for <mode> = 1. Only OK response will be generated.

***ENGINFO examples**

```

(power up in in CFUN=0 mode)
AT*ENGINFO=0

ERROR                Cannot display information in CFUN=0 mode
AT+CFUN=1
OK
(Not yet registered to network)
AT*ENGINFO=0

OK

(Registered to network)
AT*ENGINFO=0

*ENGINFOSC: 3701,3,69,"27447553",-1073,-1175,-1145,290,18,11,0,0,-35
*ENGINFONC: 3701,0,60,-1073
*ENGINFONC: 3369,1,37,-1073
*ENGINFONC: 3210,2,23,-1073
*ENGINFONC: 3001,1,15,-1073
OK

AT*ENGINFO=1
(Modem not in RRC-CONNECTED state - so no valid information)
OK

(Modem in RRC-CONNECTED state - so information valid)
*ENGINFODT: 10,5,8,3,1080,900,80,80,100,100,1000,980,1030,1000
OK
    
```

3.5.2.15. AT*FRCLLCK

This command is used to lock UE to specific frequency and optionally Cell ID.

AT*EFRCLLCK Frequency & Cell Lock	
Read command	AT*FRCLLCK?
	Response

	<ul style="list-style-type: none"> *FRCLLCK: <lock>[,<earfcn>,<earfcn_offset>[,<pci>]] OK
Execution command	AT*FRCLLCK=<lock>[,<earfcn>,<earfcn_offset>[,<pci>]]
	Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax or incorrect parameters. <ul style="list-style-type: none"> +CME ERROR: <err>
Parameters	<lock> Integer value indicating whether to activate lock, or remove lock: 0: Remove lock 1: Activate lock <earfcn> Integer value indicating requested EARFCN on which to lock. Range 0-262143. Value of 0 indicates to remove any lock for EARFCN and Cell <earfcn_offset> Integer value indicating requested EARFCN offset: 0: Offset of -2 1: Offset of -1 2: Offset of -0.5 3: Offset of 0 4: Offset of 1 <pci> Integer value: Physical cell ID. Range: 0-503
Scope	Generic
Reference	Note

***FRCLLCK examples**

AT*FRCLLCK=1,10,3,301 OK	Lock to EARFCN 10, offset 0, PCI 301
AT*FRCLLCK=0 OK	Remove lock

3.5.2.16. AT*SPCHSC

This command is used to select new or old scrambling code for NPDSCH. This is because code has been updated by 3GPP, and UE needs to select correct code for network.

AT*SPCHSC Set Scrambling Algorithm for NPDSCH	
Test Command	AT*SPCHSC=?
	Response <ul style="list-style-type: none"> *SPCHSC: (0-1) OK
Read command	AT*SPCHSC?
	Response <ul style="list-style-type: none"> *SPCHSC: <mode> OK
Execution command	AT*SPCHSC=<mode>
	Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax or incorrect <mode>

	o +CME ERROR: <err>
Parameters	<mode> 0: New algorithm (default) 1: Old algorithm
Scope	Generic
Reference	Note

***SPCHSC examples**

AT*FRCLLCK=1,10,3,301	Lock to EARFCN 10, offset 0, PCI 301
OK	
AT*FRCLLCK=0	Remove lock
OK	
AT+SPCHSC=1	Select old algorithm
OK	

3.5.2.17. AT*CGDEFCONT

This command is used to set the PSD connection settings for PDN connection on power up. In NB-IOT, when you attach to the NB-IOT network on power-on then you must also perform a PDN connection setup. In order to allow this to happen we must store PDN connection settings in NVRAM to be used by the modem during the attach procedure.

Note, that if this command is not entered, there will already be default settings stored in NVRAM at compile time.

Note that this command is similar in syntax to AT+CGDCONT, but without the <cid> parameter, and with additional parameters <username> and <password>.

AT*CGDEFCONT Set Default PSD Connection Settings	
Test Command	AT*CGDEFCONT=?
	Response <ul style="list-style-type: none"> • *CGDEFCONT: (List of supported <PDP_type>) • OK
Read command	AT*CGDEFCONT?
	Response <ul style="list-style-type: none"> • *CGDEFCONT:<PDP_type>,<APN>,<username>,<password> • OK
Execution command	AT*CGDEFCONT=<PDP_type>[,<APN>[,<username>[,<password>]]]
	Response <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax or unsupported <mode>: <ul style="list-style-type: none"> o +CME ERROR: <err>
Parameters	<PDP_type> (Packet Data Protocol type) a string parameter which specifies the type of packet data protocol : <ul style="list-style-type: none"> IP Internet Protocol (IETF STD 5) IPV6 Internet Protocol, version 6 (IETF RFC 2460) IPV4V6 Virtual <PDP_type> introduced to handle dual IP stack UE capability (see 3GPP TS 24.301). Non-IP Transfer of Non-IP data to external packet data Network

	(see 3GPP TS 24.301).
	<APN> (Access Point Name) a string parameter 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. <username> String value. Username for the connection to the service provider <password> String value. Password for the connection to the service provider
Scope	Generic
Reference	Note

***CGDEFCONT examples**

- Mobile in CFUN=0 Mode

```

AT*CGDEFCONT=?                Test command
*MCGDEFCONT: ("IP","IPV6","IPV4V6","Non-IP")  IP versions supported
OK

AT*CGDEFCONT?                Read command
*CGDEFCONT: "IP","internet","username","password"  Default settings in
NVRAM
OK

AT*CGDEFCONT="IPV4V6","web.o2.co.uk","web","web"  Set command. Set
default settings for O2 network, IPV4/V6
OK

AT+CFUN=1
OK

(Mobile attaches to NB-IOT network and sets up PDN connection using
default settings set with AT*CGDEFCONT)

AT+CGACT?
+CGACT: 1,1
OK
    
```

3.5.2.18. AT*PLMNURI

This command is used to enable/disable generation of unsolicited result code to indicate when the aggregated "maximum number of packets" for a particular PLMN changes.

AT*PLMNURI	PLMN Rate Control Indication
Test Command	AT*PLMNURI=?
	Response <ul style="list-style-type: none"> • *PLMNURI: (list of supported <mode>s) • OK
Read command	AT*PLMNURI?
	Response <ul style="list-style-type: none"> • *PLMNURI: <mode>,<urc_active>[,<Serving_PLMN_rate_control_value>]

	<ul style="list-style-type: none"> • OK
Execution command	AT*PLMNURI=<mode>
	Response <ul style="list-style-type: none"> • OK
Unsolicited result code	*PLMNURI:<urc_active>[,<Serving_PLMN_rate_control_value>]
Parameters	<ul style="list-style-type: none"> • <mode>: integer type <ul style="list-style-type: none"> ○ 0 – No unsolicited result codes are forwarded to the TE. ○ 1 – Forward unsolicited result codes to the TE. • <urc_active>: integer type. Indicates if uplink rate control is active or not: <ul style="list-style-type: none"> ○ 0 – inactive ○ 1 – active • <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 sub-clause 9.9.4.28.
Scope	Channel Specific
Reference	Note

3.5.2.19. AT*NBIOTDT

This command is used to set the NB-IOT data type per APN (Normal or Exceptional data).

AT*MNBIOTDT	NB-IOT Data Type
Test Command	AT*NBIOTDT=?
	Response <ul style="list-style-type: none"> • *NBIOTDT: (list of supported <types>s) • OK
Read command	AT*NBIOTDT?
	Response <ul style="list-style-type: none"> • Displays <type> for all active PDP contexts: <ul style="list-style-type: none"> ○ [*NBIOTDT:<cid>,type] ○ [<CR><LF>*MNBIOTDT:<cid>,<type>] ○ [...] ○ OK
Execution command	AT*NBIOTDT=<type>[,<cid>[,<cid>[,...]]]
	Response <ul style="list-style-type: none"> • OK
Parameters	<ul style="list-style-type: none"> • <type>: integer type <ul style="list-style-type: none"> 0 Normal data (default) 1 Exceptional data • <cid>: integer type. Specifies a particular PDP context definition. If no <cid>s are specified the command sets <type> for all active PDP contexts.
Scope	Generic
Reference	Note
	<ul style="list-style-type: none"> • The UE will not remember this setting over sleep cycles (i.e. the UE will fall

back to default setting after sleep)

3.5.2.20. AT*NBIOTRAI

This command is used to set the NB-IOT release assistance indication as follows:

- No information available
- TE will send only 1 UL packet and no DL packet is expected
- TE will send only 1 UL packet and only 1 DL packet is expected

AT*NBIOTRAI	NB-IOT release assistance indication
Test Command	AT*NBIOTRAI=?
	Response <ul style="list-style-type: none"> • *NBIOTRAI: (range of supported <rai>s) • OK
Read command	AT*NBIOTRAI?
	Response <ul style="list-style-type: none"> • *NBIOTRAI: <rai> • OK
Execution command	AT*NBIOTRAI=<rai>
	Response <ul style="list-style-type: none"> • OK
Parameters	<ul style="list-style-type: none"> • <rai>: integer type. Specifies release assistance information: <ul style="list-style-type: none"> ○ 0: No information available (or none of the other options apply) (default) ○ 1: TE will send only 1 UL packet and no DL packets expected ○ 2: TE will send only 1 UL packet and only 1 DL packet expected
Scope	Generic
Reference	Note <ul style="list-style-type: none"> • This command may never be required as it is likely that the TE will not know this information. • Modem applies specified <rai> value only to next UL packet sent by TE • TE will not remember this setting over sleep cycles (i.e. will fall back to default after sleep)

3.5.2.21. AT*HOMENW

This command is required for the NDIS driver in order to display the home network information in alphanumeric (short and long format) and numeric format. This information is extracted from the IMSI.

AT*HOMENW	Display Home Network Information
Execution command	AT*HOMENW
	Response UE returns the home network information (extracted from the IMSI) in numeric, short alpha and long alpha formats. <ul style="list-style-type: none"> • *HOMENW: <oper long alpha>, <oper short alpha>, <oper numeric> • OK

	If error is related to wrong AT syntax <ul style="list-style-type: none"> • +CME ERROR: <err>
Parameter	<ul style="list-style-type: none"> • <oper long alpha> Home operator in long alphanumeric format • <oper short alpha> Home operator in short alphanumeric format • <oper numeric> Home operator in numeric GSM Location Area Identification number format
Scope	Generic
Reference	Note

***HOMENW examples**

AT*HOMENW	Execution command. Display home network Information
*HOMENW: "46004", "46004", "46004"	
OK	

3.5.2.22. AT*CMSPN

AT*CMSPN	Service Provider Name (from SIM)
Read command	AT*CMSPN? Response <ul style="list-style-type: none"> • *CMSPN: <spn>, <display mode> • +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <spn> string type; service provider name on SIM • <display mode> <ul style="list-style-type: none"> 0 no PLMN. Already registered on PLMN 1 display PLMN
Scope	o Channel Specific (reads from generic SPN setting)
Reference	Note

3.5.2.23. AT*CMUNSOL

AT*CMUNSOL	Extra Unsolicited Indications
Test command	AT*MUNSOL=? Response <ul style="list-style-type: none"> • *CMUNSOL: (list of supported <ind>s)
Set command	AT*MUNSOL=<ind>,<mode> Response <ul style="list-style-type: none"> • OK • +CME ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <ind> values currently reserved by the present document: <ul style="list-style-type: none"> o "SQ" Signal Quality Displays signal strength and quality information for the current serving cell in form *MSQN: <rssi>,<rsrq>,<rsrp> when values are measured by the protocol stack. Note that the current signal quality level is displayed immediately if this unsolicited event is enabled and there is already valid signal quality information available. o "FN" Forbidden Networks Available Only

	<p>When returning to a non-registered state this indicates whether all the available PLMNs are forbidden. The unsolicited message is of the form *MFPLMN.</p> <ul style="list-style-type: none"> ○ “MW” SMS Message Waiting On receiving an SMS (as indicated by the +CMTI indication) the SMS is decoded and checked to see if it contains one or more of the message waiting indications (i.e. voicemail, email, fax etc). If so, an unsolicited indication is shown in the form for each message type: *MMWI: <Bearer Id>,<MWI Status>[,<MWI Flag State>[,MW Number]] See detailed of AT*MMWI command for more details of how to configure the *MMWI unsolicited event. ○ “SM” Additional SMS Information Displays additional information about SMS events in the form of Unsolicited messages of the following format *MSMSINFO: <CMS error info> where <CMS error info> is a standard CMS error in the format defined by the AT+CMEE command i.e. either a number or a string. <ul style="list-style-type: none"> • <mode> <ul style="list-style-type: none"> ○ 0 disable ○ 1 enable ○ 2 query • <rssI> Signed integer indicating serving cell RSSI value in units of dBm (can be negative value). • <sc_rsrp> Signed integer indicating serving cell RSRP value in units of dBm (can be negative value). • <sc_rsrq> Signed integer indicating serving cell RSRQ value in units of dB (can be negative value).
Scope	Channel specific.
Reference	Note

3.5.2.24. AT*CMBAND[*]

This command is used to lock UE to optionally Band.

AT*CMBAND Set and Query NB-IOT Operation Band	
Test command	AT*CMBAND=?
	Response <ul style="list-style-type: none"> • *CMBAND: list of valid <op_band>s • OK
Read command	AT*CMBAND?
	Response <ul style="list-style-type: none"> • *CMBAND: < op_band >s • OK
Set command	AT*CMBAND=<op_band>[,<op_band>s]
	Response <ul style="list-style-type: none"> • OK

[*] AT*CMBAND Set command Only support the version of M5311-MLVH0S01 and Later version. The version of M5311-CM is not supported.

Parameters	<op_band> Integer type, Optional range 0,3,5,8 0 Restore Defaults, <op_band>s=1,3,5,8,28 1,3,5,8,28 Selected NB-IOT band
Scope	Channel specific.
Reference	Note <ul style="list-style-type: none"> This command takes effect following the issuance of rebooting system.

3.5.2.25. AT*MATWAKEUP

This command is used to enable an unsolicited result code on a channel that indicates when the module is woken up after a deep sleep.

AT*MATWAKEUP	Enable Deep Sleep Wakeup Indication
Test Command	AT*MATWAKEUP=? Response <ul style="list-style-type: none"> *MATWAKEUP: (0-1) OK
Read command	AT*MATWAKEUP? Response <ul style="list-style-type: none"> *MATWAKEUP: <enable> OK
Execution command	AT*MATWAKEUP=<enable> Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax or incorrect <mode> <ul style="list-style-type: none"> +CME ERROR: <err>
Unsolicited result code	*WAKEUP
Parameters	<ul style="list-style-type: none"> <enable> <ul style="list-style-type: none"> 0: Disable indication on this channel when module wakes up from deep sleep (default) 1: Enable indication on this channel when module wakes up from deep sleep
Scope	Channel specific
Reference	Note

*MATWAKEUP examples

```

AT*MATWAKEUP=1          Enable wakeup indication
OK

(Modem wakes up after deep sleep)
*MATWAKEUP             Modem fully woken up and ready to receive AT
                        commands/data
    
```

3.5.2.26. AT*SLEEP

This command is used to enable an unsolicited result code on a channel that indicates when the module is

entered after a deep sleep.

AT*SLEEP	Enable Deep Sleep Enter Indication
Test Command	AT*SLEEP=?
	Response <ul style="list-style-type: none"> • *SLEEP: (0-1) • OK
Read command	AT*SLEEP?
	Response <ul style="list-style-type: none"> • *SLEEP: <enable> • OK
Execution command	AT*SLEEP=<enable>
	Response <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax or incorrect <mode> <ul style="list-style-type: none"> o +CME ERROR: <err>
Unsolicited result code	*GOTOSLEEP
Parameters	<ul style="list-style-type: none"> • <enable> <ul style="list-style-type: none"> o 0: Disable indication on this channel when module enters deep sleep (default) o 1: Enable indication on this channel when module enters deep sleep
Scope	Channel specific
Reference	Note

*SLEEP examples

```

AT*SLEEP=1           Enable wakeup indication
OK

(Modem goes in to deep sleep)
*SLOTSLEEP          Modem will goto deep sleep mode immediately
  
```

3.5.2.27. AT*WAKETIME

Triggering a falling edge of WAKEUP_IN will wake up light/deep sleep. This command is used to config Wake-up time after WAKEUP_IN triggering.

AT*WAKETIME	Config wake-up time after WAKEUP_IN triggering
Test Command	AT*WAKETIME=?
	Response <ul style="list-style-type: none"> • *WAKETIME: (1-300) • OK
Read command	AT*WAKETIME?
	Response <ul style="list-style-type: none"> • *WAKETIME: <time>

	<ul style="list-style-type: none"> • OK
Execution command	AT*WAKETIME =<time> Response <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax or incorrect <mode> <ul style="list-style-type: none"> o +CME ERROR: <err>
Parameters	<time> integer type, 1-300s, Default 10s.
Scope	Channel specific
Reference	Note

***WAKETIME examples**

```

AT* WAKETIME=?
*WAKETIME: (10-300)
OK

AT*WAKETIME?
*WAKETIME: 10 // Default 10s.WAKEUP_IN will lock the wake-up
mode for 10s from deep/light sleep.
OK

AT*WAKETIME=5 //WAKEUP_IN will lock the wake-up mode for 5s
from deep/light sleep.
OK
    
```

3.5.2.28. AT*ENTERSLEEP

Triggering a falling edge of WAKEUP_IN will wake up light/deep sleep and lock the wake-up mode for some time (see AT*WAKETIME). If the terminal does not do network related services, it will still be in the light/deep sleep mode, After the wake-up time elapse, it will enter sleep mode again. This command can be used to enter light/deep sleep immediately in this case without waiting for the wake-up timer to end.

By default, AT command will also lock the wake-up mode for 10s. If the terminal does not do network related services, The terminal will enter sleep mode at least 10 s after you send the last AT command, This command can be used to enter light/deep sleep immediately in this case.

AT*ENTERSLEEP Enter light/deep sleep mode immediately	
Execution command	AT*ENTERSLEEP Response <ul style="list-style-type: none"> • OK • If error is related to wrong AT syntax or incorrect <mode> <ul style="list-style-type: none"> o +CME ERROR: <err>
Parameters	None
Scope	Channel specific
Reference	Note

***ENTERSLEEP examples**

AT*MATWAKEUP=1 OK	//Enable wakeup indication
AT*SLEEP=1 OK	//Enable wakeup indication
AT*WAKETIME=20 OK	//Set wake-up time 20s
*GOTOSLEEP	
*MATWAKEUP	//Triggering a falling edge of WAKEUP_IN, It will keep wake-up mode 20s
AT*ENTERSLEEP OK	//Enter deep sleep immediately
*GOTOSLEEP	//Enter deep sleep
*MATWAKEUP	//Triggering a falling edge of WAKEUP_IN
AT*WAKETIME=5 OK	//Set wake-up time 5s, AT command will lock the wake-up mode as 10s.
AT*ENTERSLEEP OK	//Enter deep sleep immediately
*GOTOSLEEP	//Enter deep sleep

3.5.2.29. AT*EDRXCFG[*]

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

The set command also controls the presentation of an unsolicited result code +CEDRXP: `<AcTtype>[,<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 `*EDRXCFG=3`. In this form, eDRX will be disabled and data for all parameters in the command `*EDRXCFG` will be removed or, if available, set to the manufacturer specific default values.

AT*EDRXCFG	eDRX configuration
	AT*EDRXCFG=?
Test Command	Response <ul style="list-style-type: none"> *EDRXCFG: (list of supported <mode>s),(list of supported <AcTtype>s),(list of supported <Requested_eDRX_value>s),(list of supported <Requested_Paging_time_window_value>s) OK

[*] Only the M5311_CM version is supported.

Read command	<p>AT*EDRXCFG?</p> <p>Response</p> <ul style="list-style-type: none"> *ERDRXCFG: <AcTtype>,<Requested_eDRX_value>[,<Requested_Paging_time_window_value>] OK If error is related to wrong AT syntax or operation not allowed: +CME ERROR: <err>
Execution command	<p>AT*EDRXCFG=[<mode>[,<AcTtype>[,<Requested_eDRX_value>[,<Requested_Paging_time_window_value>]]]]</p> <p>Response</p> <ul style="list-style-type: none"> OK If error is related to wrong AT syntax: +CME ERROR: <err>
Unsolicited result code	<p>*+CEDRXP:<AcT-type>[,<Requested_eDRX_value>[,<NWprovided_eDRX_value>[,<Paging_time_window>]]]</p>
Parameters	<p><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>.</p> <p>0 Disable the use of eDRX</p> <p>1 Enable the use of eDRX</p> <p>2 Enable the use of eDRX and enable the unsolicited result code +CEDRXP: <AcT-type>[,<Requested_eDRX_value>[,<NWprovided_eDRX_value>[,<Paging_time_window>]]]</p> <p>3 Disable the use of eDRX and discard all parameters for eDRX or, if available, reset to the manufacturer specific default values.</p> <p><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.</p> <p>0 Access technology is not using eDRX. This parameter value is only used in the unsolicited result code.</p> <p>5 E-UTRAN (NB-S1 mode)</p> <p><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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see Extended DRX parameters information element in 3GPP TS 24.008 Table 10.5.5.32/3GPP TS 24.008. The default value, if available, is manufacturer specific.</p> <p><Requested_Paging_time_window_value> 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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see the Extended DRX parameters information element in 3GPP TS 24.008 Table 10.5.5.32/3GPP TS 24.008.</p> <p><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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and</p>

	<p>the value range, see Extended DRX parameters information element in 3GPP TS 24.008 Table 10.5.5.32/3GPP TS 24.008.</p> <p><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 sub-clause 10.5.5.32 of 3GPP TS 24.008). For the coding and the value range, see the Extended DRX parameters information element in 3GPP TS 24.008 Table 10.5.5.32/3GPP TS 24.008.</p>
Scope	Channel Specific
Reference	Note <ul style="list-style-type: none"> The default value is disable report of the event.

3.5.2.30. AT*MDPDNP

AT*MDPDNP	Default PDN Parameter
Test Command	AT*MDPDNP=? Response <ul style="list-style-type: none"> *MDPDNP: (list of supported <n>s) OK
Read command	AT*MDPDNP? Response <ul style="list-style-type: none"> *MDPDNP: <n> OK If error is related to wrong AT syntax or operation not allowed: +CME ERROR: <err>
Execution command	AT*MDPDNP=[<n>] Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax: +CME ERROR: <err>
Unsolicited result code	*MDPDNP: <APN>,<PDP type>
Parameters	<p><n> integer type</p> <p>0 disable default PDN parameter unsolicited result code</p> <p>1 enable default PDN parameter unsolicited result code</p> <p><APN> (Access Point Name) a string parameter, a logical name to select the GGSN or the external packet data network.</p> <p><PDP_type> (Packet Data Protocol type) a string parameter which specifies the type of packet data protocol :</p> <p>IP Internet Protocol (IETF STD 5)</p> <p>IPV6 Internet Protocol, version 6 (IETF RFC 2460)</p> <p>IPV4V6 Virtual <PDP_type> introduced to handle dual IP stack UE capability (see 3GPP TS 24.301).</p> <p>Non-IP Transfer of Non-IP data to external packet data Network (see 3GPP TS 24.301).</p>
Scope	Channel Specific

Reference	Note <ul style="list-style-type: none"> The default value is disable report of the event.
-----------	--

3.5.2.31. AT^SYSCONFIG

Configures system mode, access network order, roaming support and domain selection.

AT^SYSCONFIG	Configure System Reference
Test Command	AT^SYSCONFIG=? Response <ul style="list-style-type: none"> ^SYSCONFIG: (list of supported <mode>),(list of supported <acqorder>), (list of supported <roam>),(list of supported <srvdomain>) OK Error Case: <ul style="list-style-type: none"> +CME ERROR: <err>
Read command	AT^SYSCONFIG? Response <ul style="list-style-type: none"> ^SYSCONFIG: <mode>,<acqorder>,<roam>,<srvdomain> OK Shows current settings.
Execution command	AT^SYSCONFIG=<mode>,<acqorder>,<roam>,<srvdomain> Response <ul style="list-style-type: none"> OK If error is related to wrong AT syntax or wrong parameter value: <ul style="list-style-type: none"> +CME ERROR: <err> Sets the system configuration to the selected parameter settings.
Parameters	<mode>: System mode: 2: Automatic selection 16: No modification <acqorder>: Access network order: 0: Automatic 3: No modification <roam>: Roaming support: 0: Not support 1: Support 2: No modification <srvdomain>: Domain setting: 1: PS only 3: Any 4: No modification
Scope	<ul style="list-style-type: none"> Generic for set command Channel specific for read command.
Reference	Note "No modification" for a parameter setting means that the system configurations for that parameter is not to be changed from its current setting. Note that for NB-IOT, AT^SYSCONFIG? will always respond with:

	<mode>: Automatic
	<acqorder>: Automatic

^SYSCONFIG Examples

```

AT^SYSCONFIG=?           Test command
^SYSCONFIG: (2,16), (0,3), (0-2), (1,3,4)
OK

AT^SYSCONFIG?           Read command
^SYSCONFIG:2,0,1,1     Automatic selection, automatic network order,
                        roaming supported, PS domain.
OK

AT^SYSCONFIG=2,0,0,1     Execute command:Disable roaming
OK

AT^SYSCONFIG?           Read command
^SYSCONFIG:2,0,0,1     Roaming now disabled
OK
    
```

3.5.2.32. AT^CARDMODE

Returns mode of currently inserted SIM. If SIM not exist, or any error caused in this request, CME ERROR is returned.

AT^CARDMODE	Request SIM/USIM Mode
Execution command	AT^CARDMODE
	Response <ul style="list-style-type: none"> • ^CARDMODE: <sim_type> • OK Displays the current SIM/USIM card type. <ul style="list-style-type: none"> • If SIM not present or other SIM access error: <ul style="list-style-type: none"> ○ +CME ERROR: <err>
Parameters	<sim_type >: SIM card type: <ul style="list-style-type: none"> 0: Unknown SIM type 1: SIM 2: USIM
Scope	Channel Specific
Reference	Note

^CARDMODE Examples

```

AT^CARDMODE           Execute command
^CARDMODE:2           USIM inserted.
OK
    
```

3.5.2.33. AT^SPN

Returns Service Provider Name stored in SIM/USIM. For USIM card, file type shall be specified since there are two EFSPN files that are separately located in GSM and USIM directory. Please refer to 3GPP TS 31.102 V5.9.0 for format of EFSPN file.

Service Provider Name includes operator name, such as CMCC, and brand name, such as GoTone and M-Zone. Service Provider Name is usually stored in SIM/USIM with file name EFSPN and file ID 6F46.

AT^SPN Read Service Provider Name	
Test Command	AT^SPN=?
	Response <ul style="list-style-type: none"> • ^SPN: (list of supported <spn_type>s) • OK
Execution command	AT^SPN=<spn_type>
	Response <ul style="list-style-type: none"> • ^SPN: <disp_rplmn>,<coding>,<spn_name> • OK • If error is related to wrong AT syntax or wrong parameter value: <ul style="list-style-type: none"> ○ +CME ERROR: <err> • Returns service provider name.
Parameters	<spn_type>: SPN type: 0: GSM SPN 1: USIM SPN <disp_rplmn>: Whether to display RPLMN: 0: No display 1: Display 99: Invalid, and no need to read <spn_name> <coding>: Coding scheme for <spn_name>: 0: GSM 7 bit default 1: RAW mode (i.e. with original format). <spn_name>: String type value indicating SPN, not more than 16 bytes in format Specified by <coding>.
Scope	Channel specific.
Reference	Note <ul style="list-style-type: none"> • <spn_type> field is ignored as it will display the SPN for the currently selected directory. This is done to prevent system re-start which may have other undesirable effects on the Modem software during normal operation.

^SPN Examples

AT^SPN=? ^SPN: (0,1) OK	Test command
AT^SPN? ERROR	Read command
AT^SPN=1 ^SPN:1,7,"Vodafone UK" OK	Execute command. Read USIM SPN.

3.5.2.34. *SMPUKBLKD Unsolicited Indication

This proprietary unsolicited events indicates on startup (power on or transition from CFUN=0 mode to CFUN=1 mode) if the (U)SIM is PUK blocked and therefore unusable. This unsolicited event can also be generated if the

user enters incorrect PUK code 10 times.

*MSMPUKBLKD SIM Blocked Unsolicited Indication	
Unsolicited result code	*SMPUKBLKD Generated on startup or when PUK code is entered incorrectly 10 times, when the (U)SIM is PUK Blocked and therefore unusable.
Parameters	None
Scope	Generic
Reference	Note <ul style="list-style-type: none"> Unsolicited event is always generated if the SIM is (or becomes) PUK blocked.

*SMPUKBLKD examples

Modem powered up in CFUN=0 mode with PUK blocked SIM

```

AT+CFUN=1
OK
*SMPUKBLKD           Unsolicited Event indicates SIM is PUK
                       blocked and unusable.
    
```

Modem powered up in CFUN=0 mode with PUK entry required (3 retries left)

```

AT+CFUN=1
OK

+CPIN: SIM PUK

AT+CPIN="33333333","0000","0000" Incorrect PUK code
+CME ERROR: incorrect password

AT+CPIN="33333333","0000","0000" Incorrect PUK code
+CME ERROR: incorrect password

AT+CPIN="33333333","0000","0000" Incorrect PUK code

+CPIN: NOT READY

*SMPUKBLKD
    
```

3.5.2.35. *ATREADY

This unsolicited result code is generated on any new AT channel that is enabled. It is not configurable and will always be generated when a channel is enabled. This URC is not generated on channels re-enabled after wakeup from deep sleep.

*MATREADY AT Channel Enabled Unsolicited Result Code	
Unsolicited result code	*ATREADY: <ready_status>
Parameters	<ready_status> 1 AT channel ready (only valid value)
Scope	o Channel Specific
Reference	Note

***ATREADY URC examples**

```
(AT channel enabled)
*ATREADY: 1
```



4. Network Related Proprietary AT Command Interface

This chapter introduces the supported proprietary platform AT command set on M5311.

We support single AT command. When executing the previous AT command is finished, the next AT command will be executed.

4.1. PDN Command

4.1.1 AT+EGACT

Activate or deactivate a specified PDN context.

There are three kinds of responses for both the activation requirement and the deactivation requirement. If the PDN context is active/inactive, "+EGACT=<cid>,<type>,<result>[,<activated_pdp_type>] OK" is returned immediately for activation/deactivation requirement. If not, "+EGACT=<cid> OK" is returned first and URC "+EGACT=<cid>,<type>,<result>[,<activated_pdp_type>]" is reported for the activation/deactivation result latter. If any error occurs, such as invalid parameter(s), "ERROR" is returned immediately. In any case, activated_pdp_type only exists for the activation requirement.

Besides, URC "+EGACT=<cid>,<type>" is reported when passive deactivation occurs.

For the activation requirement, the format of the EGACT is

"+EGACT=<op>,<pdp_type>,<apn>,<user_name>,<pwd>[,<bearer_type>[,<sim_id>]]", while for the deactivation requirement, the format is "+EGACT=<op>,<cid>". For the purpose of normalization, the format of EGACT is "+EGACT=<op>,<pdp_type/cid>[,<apn>,<user_name>,<pwd>[,<bearer_type>[,<sim_id>]]]".

AT+EGACT	Activate or deactivate a PDN context
	AT+EGACT=<op>,<pdp_type/cid>[,<apn>,<user_name>,<pwd>[,<bearer_type>[,<sim_id>]]]
Set command	Response <ul style="list-style-type: none"> +EGACT=<cid>,<type>,<result>[,<activated_pdp_type>] OK +EGACT=<cid> OK ERROR
Parameters	<ul style="list-style-type: none"> <op> integer type; <ul style="list-style-type: none"> 0 deactivation requirement 1 activation requirement <pdp_type/cid> integer type; <ul style="list-style-type: none"> If <op> is 0, it is pdp_type. Otherwise, it is cid. pdp_type: It is the pdp_type wanted to activate. <ul style="list-style-type: none"> 1 IPv4 2 IPv6 3 IPv4v6 4 Non-IP <cid> It is a numeric parameter specifying a particular PDP context. Here it should be equal to the <cid> returned by the activation

	<p>response</p> <ul style="list-style-type: none"> • <apn> string type; It is the access point name which is mandatory for the activation requirement and should be omitted for the deactivation requirement. • <user_name> string type; It is the user name for access to the IP network which is mandatory for the activation requirement and should be omitted for the deactivation requirement. • <pwd>: string type; It is the password for access to the IP network which is mandatory for the activation requirement and should be omitted for the deactivation requirement. • <bearer_type> integer type; It is the type of bearer wanted to activate which is optional for the activation requirement and should be omitted for the deactivation requirement. <ul style="list-style-type: none"> 1 NBIOT (Only NBIOT is supported currently) • <sim_id>: integer type; It is the id of the SIM Card wanted to use which is optional for the activation requirement and should be omitted for the deactivation requirement. <ul style="list-style-type: none"> 1 SIM Card 1 (Only SIM Card 1 is supported currently). • <cid>: integer type; It is a numeric parameter specifying a particular PDP context. • <type>: integer type; <ul style="list-style-type: none"> 0 Result/URC for deactivation requirement 1 Result/URC for activation requirement 2 URC for passive deactivation • <result> integer type; <ul style="list-style-type: none"> 0 failure 1 success • <activated_pdp_type>: integer type; It is the pdp_type actually activated. <ul style="list-style-type: none"> 1 IPv4 2 IPv6 3 IPv4v6 4 Non-IP
Reference	<p>Note</p> <ul style="list-style-type: none"> • This command name is temporary and may be changed in the later release.

+EGACT Examples

```
AT+EGACT=1,1,"apn_example","username_example","password_example"  Activate a
                                PDN context
+EGACT=1
```

OK	Return OK immediately for no error
+EGACT=1,1,1,1	Notify activation result via URC
AT+EGACT=0,1 +EGACT=1	Deactivate a PDN context
OK	Return OK immediately for no error
+EGACT=1,0,1	Notify deactivation result via URC

4.2. Network Command

4.2.1 AT+PING

This command sends an ICMP packet to the specified host address.

AT+PING 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.

AT+PING		Test IP network connectivity to a remote host
Set command	AT+PING=<remote addr>[,<p_size>[,<timeout>[,<p_count>[,<type>]]]]	
Unsolicited result code	Response • OK • ERROR Display test result, such as: +PING: <remote addr>,,<rtt> +PINGERR: 1	
Parameters	<ul style="list-style-type: none"> • <remote addr> address of system sending the message, IPv4: A dot notation IP address • <p_size> integer size in bytes of echo packet payload. Range of 8-1460, Default 64 • <timeout> ping timeout, if this ping packet acknowledge received timeout, considering it as a lost packet. • <p_count> integer, number of packet to send. Default 3 • <type> integer, ipv4 or ipv6, 0 - ipv4, 1 - ipv6. Default 0 • <rtt> ping latency result 	
Reference	Note	

+PING Examples

```

at+ping=183.232.231.173,16,8000,10 //start ping
OK
+PING: 183.232.231.173,,3190 //ping result of first ping packet
+PING: 183.232.231.173,,3700
+PING: 183.232.231.173,,1520
+PING: 183.232.231.173,,1500
+PING: 183.232.231.173,,1510
    
```

```

+PING: 183.232.231.173,,1510
+PING: 183.232.231.173,,1460
+PING: 183.232.231.173,,1120
+PING: 183.232.231.173,,1750
+PING: 183.232.231.173,,1710
--- 183.232.231.173 ping statistics --- //pings result
10 packets transmitted, 10 received, 0% packet loss
rtt min/avg/max = 1120/1897/3700
    
```

4.2.1 AT+DNSSER

This command set DNS server address, it takes effect following the issuance of 'OK' result code with the current command line. The DNS server address will effect on all DNS associated network services, such as MQTT/HTTP/TLS/OneNET, it very important to make sure that the dns servers address is valid.

AT+ DNSSER	set DNS server address
Test Command	AT+DNSSER=?
	Response <ul style="list-style-type: none"> +DNSSER: <server_ip>,(0-1),(0-1) OK ERROR
Read command	AT+DNSSER?
	Response <ul style="list-style-type: none"> +DNSSER: <dns_id>,<server_ip> OK
Execution command	AT+DNSSER=<server_ip>[,<dns_id>[,<iptype>]]
	Response <ul style="list-style-type: none"> OK ERROR
Parameters	<server_ip> string, DNS server address. Default DNS server address is: 119.29.29.29 114.114.114.114
	<dns_id> integer, DNS ID. Default 0. 0 preferred server address. 1 secondary server address. If preferred server address is invalid, it will request Secondary.
	<ip_typed> integer, type of the DNS return ip address. Default 0 0 IPv4 1 IPv6
Scope	Generic
Reference	Note

+DNSSER Examples

```

AT+DNSSER="180.76.76.76",0,0 //Set preferred ipv4 server address.
OK
    
```

```

AT+DNSSER="223.5.5.5",1,0           //Set secondary ipv4 server address.
OK

AT+DNSSER?
+DNSSER: 0,180.76.76.76
+DNSSER: 1,223.5.5.5
OK
    
```

4.2.2 AT+CMDNS

This command send a DNS request to DNS server, and return the parsed ip address.

AT+CMDNS		Send a DNS request
Set command		AT+CMDNS =<domain>[,<ip_type>[,<server_ip>]]
	Response	<ul style="list-style-type: none"> OK ERROR
Unsolicited result code		+CMDNS: <ip_address>
Parameters	< domain>	string, domain name.
	<ip_typed>	integer, type of the DNS return ip address.default 0
	0	IPv4
	1	IPv6
	<server_ip>	string, DNS server address, Only effective once.
	<ip_address>	A dot notation IP address
Reference		Note

+ CMDNS Examples

```

AT+EGACT=1,1,"cmiot","",""       //activate pdn connection
OK

+IP: 10.212.231.112
+EGACT:1,1,1,1
AT+CMDNS="iot.10086.cn"
                                     // request iot.10086.cn DNS service
OK

+CMDNS: 183.230.40.127           //receive ip address
    
```

4.2.3 AT+IPSTART

This command creates a TCP or UDP socket and connect to remote server.

AT+IPSTART		Creates a TCP or UDP socket
Set command		AT+IPSTART=<sockid>,<type>,<addr>,<port>[,<cid>[,<domian>[,<protocol>]]]

	Response
	<ul style="list-style-type: none"> • OK • Or ERROR
Parameters	<ul style="list-style-type: none"> • <sockid> integer, socket channel number, 0-5 • <type> string <ul style="list-style-type: none"> “TCP” TCP socket “UDP” UDP socket “RAW” RAW socket • <addr> string, remote address • <port> integer, remote port • <cid> integer, PDP context ID, AT+EGACT response. • <domain> integer, default 2 <ul style="list-style-type: none"> 2 IPv4 10 IPv6 • <protocol> number of packet to send, default 0, only 0 supported now. <ul style="list-style-type: none"> 0 IP 1 ICMP 6 TCP 17 UDP
Reference	Note

+IPSTART Examples

```

AT+EGACT=1,1,"cmiot","","" //activate pdn connection
OK

+IP: 10.212.231.112
+EGACT:1,1,1,1
at+ipstart=0,"TCP","47.93.217.230",2008
//setup and connect to 47.93.217.230:2008

OK

CONNECT OK //connect to 47.93.217.230:2008 OK

+IPRD: 0,15,hello, CMCC IOT //receive 37 bytes data "hello, CMCC IOT"
from 47.93.217.230:2008
    
```

4.2.4 AT+IPLPORT

This command used to bind to local port. Used chiefly set local port.

AT+IPLPORT		Bind local address and local port
Set command	AT+IPLPORT=<socket_id>,<local_port>	
	Response	
		<ul style="list-style-type: none"> • OK • ERROR

Parameters	<ul style="list-style-type: none"> • <socket_id> integer, socket id, refer to AT+IPSTART • <local_port> integer, local port.
Reference	Note

4.2.5 AT+IPSEND

This command used to send data to network.

The response "OK" just mean the ATCMD format is right and data have been put to socket, waiting for send.

AT+IPSEND Send data to remote via socket	
Set command	TCP : AT+IPSEND=<socket_id>,<data_len>,<data>,<pri_flag>]
	UDP : AT+IPSEND=<socket_id>,<data_len>,<data>,<addr>,<port>,<pri_flag>]]
	Response <ul style="list-style-type: none"> • +IPSEND: <socket_id>,<sent_len> • OK • ERROR
Parameters	<ul style="list-style-type: none"> • <socket_id> integer, socket id, AT+ESOC's response. • <data_len> integer, length of data. Default 0. • <data> string, raw_data. When <data_len> is greater than 0, <data> is hex format string , else if <data_len> set to 0 or omit, <data> is normal string. • <addr> string, remote address, only valid in UDP socket. • <port> integer, remote port, only valid in UDP socket. • <pri_flag> integer, priority flag. <ul style="list-style-type: none"> 0 IPTOS reliability, default 1 IPTOS lowdelay 2 IPTOS hroughput 3 IPTOS lowcost • <sent_len> integer, actual sent-out data length
Reference	Note

+IPSEND Examples

```

at+ipsend=0,0,"this is normal string" //send normal string
+IPSEND: 0,21
OK

at+ipsend=0,,"this is another normal string" //send normal string
+IPSEND: 0,29
OK

at+ipsend=0,2,"3132" //send hex string
+IPSEND: 0,2
OK

For TCP socket:
at+ipsend=0,0,"this is normal string",1 //send normal string with
    
```

```

priority flag of lowdelay
+IPSEND: 0,21
OK

For UDP socket:
at+ipend=0,0,"this is normal string",,,1 //send normal string with
                                           priority flag of lowdelay
+IPSEND: 0,21
OK

at+ipend=0,0,"this is normal string",,,1 //send normal string with
                                           priority flag of lowdelay
+IPSEND: 0,21
OK

at+ipend=0,0,"this is normal string", "183.230.40.150",36000,1
//send normal string with priority flag of lowdelay to Specify ip
address
+IPSEND: 0,21
OK
    
```

4.2.6 AT+IPCLOSE

This command used to disconnect and close socket.

If the socket is TCP, it will start to send TCP FIN packet; if the socket is UDP, there is no packet being sent.

AT+IPCLOSE	Close Socket
Set command	+IPCLOSE=<socket_id> Response <ul style="list-style-type: none"> OK ERROR
Parameters	<ul style="list-style-type: none"> <socket_id> integer, socket id.
Reference	Note

4.2.7 AT+IPRCFG

This command used to set socket receive configuration.

AT+IPRCFG	Set Socket Receive Configuration
Set command	+IPRCFG=<auto_receive>[,<mode>[,<hex>]] Response <ul style="list-style-type: none"> OK ERROR
Parameters	<ul style="list-style-type: none"> <auto_receive> integer, set to 1, when IP data come, directly output to AT port; when set to 0, use +IPRD command to read IP data manually. <mode> integer, control data format mode.

	0	+IPRD: <socket_id>,<data_len>,<data>
	1	<data>
	2	+IPRD: <socket_id>,<remote_addr>,<remote_port>,<data_len>,<data>
	• <hex>	integer, data in hex format.
Reference	Note	

+IPRCFG Examples

```

at+ipstart=0,"TCP","47.93.217.230",2008
OK
CONNECT OK
at+iprcfg? //current setting
+IPRCFG: 1,0,0
OK
+IPRD: 0,15,hello, CMCC IOT //auto receive 15 Bytes data
at+iprcfg=1,1,0 //only output <data>
OK
hello, CMCC IOT //receive 15 Bytes data
at+iprcfg=1,2,0 //set <mode>=2
OK
+IPRD: 0,"47.93.217.230",2008,15,hello, CMCC IOT //show ip and port
at+iprcfg=1,2,1 //data in hex mode
OK
+IPRD: 0,"47.93.217.230",2008,15,68656C6C6F2C20434D434320494F54
at+iprcfg=0,2,1 //manually receive data
OK
+IPNMI: 0,15 //data coming

at+iprd=0,512 //read IP data
+IPRD: 0,"47.93.217.230",2008,15,68656C6C6F2C20434D434320494F54
OK
    
```

4.2.8 AT+IPRD

This command used to read socket data manually.

AT+IPRCFG Set Socket Receive Configuration	
Set command	+IPRD=<socket_id>,<data_length>
	Response
	<ul style="list-style-type: none"> OK ERROR
Unsolicited result code	[+IPRD:] [<socket_id>],[<remote_addr>,<remote_port>],[<data_len>],<data>
Parameters	<ul style="list-style-type: none"> <socket_id> integer, socket channel identity. <data_length> integer, required read data length, if actual received is less than <data_length>, return actual data length in +IPRD response.

Reference	Response format refers to +IPRCFG command
-----------	---

4.2.9 +IPNMI

Indicated there is received some data from network.

+IPNMI	Socket data from network URC
Unsolicited result code	+IPNMI: <socket_id>,<data_len>
Parameters	<ul style="list-style-type: none"> • <socket_id> integer, socket channel id. • <data_len> integer, length of data incoming. If read length is less than <data_length> using +IPRD command, the remaining data will unsolicited after some seconds if not read anymore.
Reference	Note

4.2.10 AT+IPKPA

Set TCP socket keepalive parameters.

AT+IPKPA	TCP Keepalive Configuration
Set command	AT+IPKPA=<socket_id>,<keepalive>,<keep_idle>,<keep_interval>,<keep_cnt>
	Response <ul style="list-style-type: none"> • OK • ERROR
Read command	AT+IPKPA=<socket_id>
	Response <ul style="list-style-type: none"> • +IPKPA: <socket_id>,<keepalive>,<keep_idle>,<keep_interval>,<keep_cnt> • OK
Parameters	<ul style="list-style-type: none"> • <socket_id> integer, socket channel identity. • <keepalive> integer, enable/disable keepalive mode, default 0. • <keep_idle> integer, idle time to trigger keepalive mechanism in s, default 120 • <keep_interval> integer, check alive interval in s, default 30. • <keep_cnt> integer, maximum check alive times if last check fail, default 9
Reference	Note

4.2.11 AT+IPSACK

Query Socket send and read bytes statistics.

AT+IPSACK	Query socket statistics such as tx/rx length and tcp unacked bytes
Read command	AT+IPSACK=<socket_id>
	Response <ul style="list-style-type: none"> • <sent>,<received>[,<rx_buf_left>,<unsent>,<unacked>] • OK • ERROR

Parameters	<ul style="list-style-type: none"> • <socket_id> integer, socket channel identity. • <sent> integer, total sent bytes of specified socket. • <received> integer, total received bytes of specified socket • <rx_buf_left> integer, total sent buffer left, default max 4KB. Only valid in TCP socket • <unsent> integer, data not sent. Only valid in TCP socket • <unacked> integer, data send out and ack not received from remote host. Only valid in TCP socket
Reference	Note

4.2.12 AT+IPSTATUS

Query Socket connection status.

AT+IPSTATUS	Query socket Status
Read command	AT+IPSTATUS=<socket_id> Response <ul style="list-style-type: none"> • <socket_id>,<type>,<addr>,<port>,<stat> • OK • ERROR
Parameters	<ul style="list-style-type: none"> • <socket_id> integer, socket channel identity. • <type> string, TCP or UDP. • <addr> string, remote address • <port> integer, remote port • <stat> string "IP INITIAL" "IP START" "IP CONFIG" "PDP ACT" "IP STATUS" "CONNECTING" "CONNECTED" "CLOSING" "CLOSED" "PDP DEACT" "CONNECT FAIL"
Reference	Note

4.2.13 Create a TCP socket example

```

AT+EGACT=1,1,"apn","user_name","pwd" //activate apn
+EGACT=<cid>,1,1,1
OK
at+ipstart=0,"TCP","47.93.217.230",2008 //connect to 47.93.217.230:2008
OK
    
```



```
OK
```

4.2.14 Create a UDP socket example

```
AT+EGACT=1,1,"apn","user_name","pwd" //activate apn
+EGACT=<cid>,1,1,1
OK
at+ipstart=0,"UDP","47.93.217.230",2008 //create udp socket
OK

at+ipstatus=0 //udp always in connected state
+IPSTATUS: 0,"UDP","47.93.217.230",2008,"CONNECTED"
OK

at+ipsend=0,0,"1233",,1 //send 4 bytes udp data to 47.93.217.230:2008
//with lowdelay priority
+IPSEND: 0,4
OK

at+ipsend=0,2,"1233" //send 2 bytes udp data to 47.93.217.230:2008
+IPSEND: 0,2
OK

at+ipsend=0,0,"1233","183.230.40.150",36000,1 //send 4 bytes udp data to specified address
//with lowdelay priority
+IPSEND: 0,4
OK

at+ipsend=0,0,"1233","47.93.217.230",2008 //send 4 bytes udp data to specified address
+IPSEND: 0,4
OK

+IPRD: 0,11,ffffffffffff //received 11 bytes data

at+ipsack=0
+IPSACK: 40,11
OK

at+iprcfg=1,2,0 //set receive mode to show remote address
OK

+IPRD: 0,"47.93.217.230",2008,5,hello // show remote address when receiving data

at+ipclose=0
OK

at+ipstatus=0
```

```
+IPSTATUS: 0,"", "", 0, ""
OK
```

4.3. MQTT Command

4.3.1 AT+MQTTCFG

This command is used to config the MQTT client

AT+MQTTCFG	Config the Client
Set command	AT+MQTTCFG=<server>,<port>,<id>,<keepAlive>,<user>,<passwd>,<clean>,<encrypt> Response <ul style="list-style-type: none"> OK
Parameters	<ul style="list-style-type: none"> <server> string, MQTT server IP address <port> string, MQTT server port <id> string, client ID, should be unique <cmdtimeout> integer, ack should be received during the interval <keepAlive> integer, keep alive interval (s) <user> string, user name <passwd> string, password <clean> integer, clean session(0-1) <encrypt> integer, 0 : TCP , 1 : SSL
Reference	Note if encrypt =1 ,write the CA in flash before using

+MQTTCFG Examples

```
AT+MQTTCFG=183.230.40.39,6002,4069959,15,75829,
IIOu0oFUg1guk20ornTKluzAcnM=,1,0
OK
```

4.3.2 AT+MQTTOPEN

This command is used to send MQTT connection packet.

AT+MQTTOPEN	Send Connection Packet
Set command	AT+MQTTOPEN=<usrFlag>,<pwdFlag>,<willFlag>,<willRetain>,<willQos>,<will-topic>,<will- msg>] Response <ul style="list-style-type: none"> OK ERROR
Unsolicited result code	+MQTTOPEN: <connack_rc>,<sessionPresent>
Parameters	<ul style="list-style-type: none"> <usrFlag> integer, weather to use username (0-1) <pwdFlag > integer, weather to use pwdFlag (0-1) <willFlag> integer, weather to set willmsg (0-1)

	<ul style="list-style-type: none"> • <willRetain> interger, retained flag(0-1) • <willQos> integer, message Qos(0-2) • <will-topic> string, topic name of will • <will-mesg> string, message of will
Reference	Note

+MQTTOPEN Examples

```

AT+MQTTOPEN=1,1,0
+MQTTOPEN: OK
AT+MQTTOPEN=1,1,1,1,1,mywill,bye
+MQTTCONACK: FAIL
    
```

4.3.3 AT+MQTTSTAT

This command is used to query MQTT client's state.

AT+MQTTSTAT		Query MQTT Client's State	
	AT+MQTTSTAT?		
Query command	Response		
	<ul style="list-style-type: none"> • +MQTTSTAT:<stat> • OK • ERROR 		
Parameters	• <stat>		
	0	UNINITIALED	
	1	INITIALED	
	2	DISCONNECTED	
	3	CONNECTING	
	4	RECONNECTING	
	5	CONNECTED	
Reference	Note		

4.3.4 AT+MQTTSUB

This command is used to send MQTT subscribe packet.

AT+MQTTSUB		Send MQTT Subscribe Packet	
	AT+MQTTSUB=<topic>,<Qos>,<index>		
Set command	Response		
	<ul style="list-style-type: none"> • OK • ERROR 		
Unsolicited result code	+MQTTSUBACK:<packet id>,<qos>,<topic name>		
Parameters	<ul style="list-style-type: none"> • <topic> string, topic of subscribe message 		

	<ul style="list-style-type: none"> • <Qos> integer, message Qos, can be 0, 1, or 2 • <index> 0-text, 1-hex string
Reference	Note

4.3.5 AT+MQTTPUB

This command is used to send MQTT publish packet.

AT+MQTTPUB	Send MQTT Publish Packet
Set command	AT+MQTTPUB=<topic>,<Qos>,<retained>,<dup>,<message_len>,<message> Response <ul style="list-style-type: none"> • OK • ERROR
Unsolicited result code	+MQTTPUBACK: <packet_id>,<dup> (qos =1) +MQTTPUBREC: <packet_id>,<dup> +MQTTPUBCOMP: <packet_id>,<dup> (qos =2)
Parameters	<ul style="list-style-type: none"> • <topic> string, topic of unsubscribe message • <Qos> integer, message Qos, can be 0, 1, or 2 • <retained> interger, retained flag, can be 0 or 1 • <dup> integer, duplicate flag, can be 0 or 1 • <message_len> integer, length of publish message(option), if set to 0 or omitted, <message> will be parsed in text format, else hexadecimal format • <message> string, publish message
Reference	Note

+MQTTPUB Examples

```

AT+MQTTPUB=pyr,1,0,0,3,7E7A7A (HEX)
OK
AT+MQTTPUB=pyr,1,0,0,0,abcdef (TEXT)
OK
    
```

4.3.6 AT+MQTTUNSUB

This command is used to send MQTT unsubscribe packet.

AT+MQTTUNSUB	Send MQTT Unsubscribe Packet
Set command	+MQTTUNSUB=<topic> Response <ul style="list-style-type: none"> • OK • ERROR
Unsolicited result code	+MQTTUNSUBACK:<packet id>,<topic name>
Parameters	<ul style="list-style-type: none"> • <topic> string, topic of unsubscribe message

Reference	Note
-----------	------

4.3.7 AT+MQTTDISC

This command is used to send MQTT disconnect packet.

AT+MQTTDISC Send MQTT Disconnect Packet	
Execute command	AT+MQTTDISC
	Response <ul style="list-style-type: none"> • OK • ERROR
Unsolicited result code	+MQTTDISC
Reference	Note

4.3.8 AT+MQTTDEL

This command is used to delete MQTT client's configuration.

AT+MQTTDEL Delete MQTT Client's Configuration	
Execute command	AT+MQTTDEL
	Response <ul style="list-style-type: none"> • OK • ERROR
Reference	Note

4.3.9 AT+MQTTTO

This command is used to set MQTT command timeout.

AT+MQTTTO Set MQTT Command Timeout	
Set command	AT+MQTTTO=<tiemout>
	Response <ul style="list-style-type: none"> • OK • ERROR
parameter	<ul style="list-style-type: none"> • <timeout> integer, mqtt command timeout in second, default 10s
Reference	Note

4.3.10 +MQTTPUBLISH

This urc is used to receive MQTT publish packet.

+MQTTPUBLISH Receive MQTT Publish Packet	
Unsolicited result code	+MQTTPUBLISH: <dup>,<qos>,<retained>,<packet_id>,[<message_len>],<message>
Parameters	<ul style="list-style-type: none"> • <dup> integer, duplicate flag, can be 0 or 1 • <qos> integer, message Qos, can be 0, 1, or 2 • <retained> integer, retained flag, can be 0 or 1 • <packet_id> integer, the id of current packet • <message_len> integer, length of publish message • <message> string, publish message
Reference	Note

4.3.11 +MQTTTO

This urc is used to indicate timeout when user send a MQTT command without ACK during the setting time .

+MQTTTO Indicate Time Out													
Unsolicited result code	+MQTTTO: <cmd>												
Parameters	<ul style="list-style-type: none"> • <cmd> integer, mqtt command type <table style="margin-left: 20px; border: none;"> <tr><td>1</td><td>connect timeout</td></tr> <tr><td>2</td><td>publish timeout</td></tr> <tr><td>3</td><td>subscribe timeout</td></tr> <tr><td>4</td><td>unsubscribe timeout</td></tr> <tr><td>5</td><td>ping timeout</td></tr> <tr><td>6</td><td>unkown timeout type</td></tr> </table>	1	connect timeout	2	publish timeout	3	subscribe timeout	4	unsubscribe timeout	5	ping timeout	6	unkown timeout type
1	connect timeout												
2	publish timeout												
3	subscribe timeout												
4	unsubscribe timeout												
5	ping timeout												
6	unkown timeout type												
Reference	Note												

4.4. HTTP/HTTPS Command

4.4.1 AT+HTTPCREATE

This command is used to create an HTTP/HTTPS client instance. If <host> is start with "https://" , MT will create an HTTPS client.

AT+HTTPCREATE Create an HTTP/HTTPS Client instance	
Set command	AT+HTTPCREATE=<host>[,<auth_user>,<auth_passwd>]
	Response <ul style="list-style-type: none"> • +HTTPCREATE: <httpclient_id> • OK • ERROR
Parameters	<ul style="list-style-type: none"> • <host> http server host • <auth_user> authorization name [option] • <auth_passwd> authorization password [option] • <httpclient_id> indicator a http client instance All option parameter should be exist or not exist in one command

Reference	Note
-----------	------

4.4.2 AT+HTTPCFG

This command is used to configure the https instance.http don't need configuration.

AT+HTTPCFG	Config an HTTPS Client instance
Set command	AT+HTTPCFG= <httpclient_id>,<type>[,<certificate>[,<encode_method>]] Response <ul style="list-style-type: none"> • +HTTPCFG: <httpclient_id>,<type>[,<length>] • OK • ERROR
Unsolicited result code	<certificate>
Parameters	<ul style="list-style-type: none"> • <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command. • <type> <ul style="list-style-type: none"> 1 https server_cert 2 https client_cert 3 https client_pk • <certificate> certificate • <length> the certificate length • <encode_method> integer, it is the encoded method used for <certificate>. 0 or NULL is for string encoding and it is the default value which can be omitted, 1 is for hex encoding. [option]
Reference	Note: It must create httpclient instance first. If only input httpclient_id and type,UE will response current type cert information like: +HTTPCFG:0,1,1306 -----BEGIN CERTIFICATE----- -----END CERTIFICATE-----

4.4.3 AT+HTTPHEADER

This command is used to set http/https header information.

AT+HTTPHEADER	Config an HTTP/HTTPS Client Header
Set command	AT+HTTPHEADER= <httpclient_id>[,<header>[,<encode_method>]] Response <ul style="list-style-type: none"> • +HTTPHEADER: <httpclient_id>[,<length>] • OK • ERROR
Unsolicited result code	<header>
Parameters	<ul style="list-style-type: none"> • <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command.

	<ul style="list-style-type: none"> • <header> header • <length> the header length • <encode_method>: integer, it is the encoded method used for < header >. 0 or NULL is for string encoding and it is the default value which can be omitted, 1 is for hex encoding. [option]
Reference	Note: <ul style="list-style-type: none"> • if only input httpclient_id,the UE will return header information the header MAX size supported is 512 bytes

+HTTPHEADER example:

```

AT+HTTPHEADER=0,6170692D6B65793A4A4459694B794B6669344934734F4657654A73493453
3343626C303D0d0a,1

Or
AT+HTTPHEADER=0,"api-key:JDYiKyKfi4I4sOFWeJsI4S3Cb10=\r\n",0 //set header
OK
AT+HTTPHEADER=0 //query header
+HTTPHEADER:0,38

OK
api-key:JDYiKyKfi4I4sOFWeJsI4S3Cb10=

AT+HTTPHEADER=0,"" //clear header
Or
AT+HTTPHEADER=0, //clear header
OK
AT+HTTPHEADER=0 //header is NULL
OK
    
```

4.4.4 AT+HTTPCONTENT

This command is used to set http/https content information

AT+HTTPCONTENT Config an HTTP/HTTPS Client Content	
Set command	AT+HTTPCONTENT= <httpclient_id>[,<content_string>[,<encode_method>]] Response <ul style="list-style-type: none"> • +HTTPCONTENT: <httpclient_id>[,<length>] • OK • ERROR
Unsolicited result code	<content_string>
Parameters	<ul style="list-style-type: none"> • <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command. • <content_string> content_string • <length> the content length • <encode_method>: integer, it is the encoded method used for <content_string>. 0 or NULL is for string encoding and it is the default value which can be omitted, 1 is for hex encoding. [option]
Reference	Note <ul style="list-style-type: none"> • if only input httpclient_id,the UE will return content information

4.4.5 AT+HTTPSEND

This command is used to send HTTP package to server with the created http instance.

AT+HTTPSEND Send HTTP/HTTPS Package											
Set command	AT+HTTPSEND= <httpclient_id>,<method>,<path> Response <ul style="list-style-type: none"> OK ERROR 										
Unsolicited result code	+HTTPCON: <httpclient_id>,<result>										
Parameters	<ul style="list-style-type: none"> <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command. <method> http method <table border="0"> <tr><td>0</td><td>HTTPCLIENT_GET</td></tr> <tr><td>1</td><td>HTTPCLIENT_POST</td></tr> <tr><td>2</td><td>HTTPCLIENT_PUT</td></tr> <tr><td>3</td><td>HTTPCLIENT_DELETE</td></tr> </table> <path> the resource path on server, ex. "/html/login/index.html" mean the url full path is "<host>/html/login/index.html" <result> tcp connect result <table border="0"> <tr><td>OK</td></tr> <tr><td>ERROR</td></tr> </table> 	0	HTTPCLIENT_GET	1	HTTPCLIENT_POST	2	HTTPCLIENT_PUT	3	HTTPCLIENT_DELETE	OK	ERROR
0	HTTPCLIENT_GET										
1	HTTPCLIENT_POST										
2	HTTPCLIENT_PUT										
3	HTTPCLIENT_DELETE										
OK											
ERROR											
Reference	Note:if the httpclient is not connected or being in receive httpserver data,this command will response error! Once send data out,UE will set being receiving flag,until http disconnected or receive done										

4.4.6 AT+HTTPCLOSE

This command is used to close the created http instance.

AT+HTTPCLOSE Close the HTTP/HTTPS Client Instance	
Set command	AT+HTTPCLOSE=<httpclient_id> Response <ul style="list-style-type: none"> OK ERROR
Parameters	<ul style="list-style-type: none"> <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command.
Reference	Note

4.4.7 +HTTPNMIH

The response from host has 2 parts. This is the header part and content part will follow this URC.

+HTTPNMIH	Header of the response from host
-----------	----------------------------------

Unsolicited result code	+HTTPNMIH: <httpclient_id>,<flag>,<header_length>,<header>
Parameters	<ul style="list-style-type: none"> • <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command. • < flag > indicate if there are more data of the HTTP header • < header_length > the length of the header string • <header> header data of response
Reference	Note

4.4.8 +HTTPNMIH

The response from host has 2 parts. This is the content part and follow by the header part URC. And there are multi content URC follow one header URC .

+EHTTPNMIH	Content of the response from host
Unsolicited result code	+HTTPNMIH: <httpclient_id>,<flag>,<total_length>,<content_len>,<content>
Parameters	<ul style="list-style-type: none"> • <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command. • <flag> indicate if there are more data of the HTTP content • <total_length> the total length of the content. It is got from header "Content-Length: xxx", so if the response if not 200 OK, maybe the value is -1 • <content_len> content data length os current URC • <content> content data string
Reference	Note

4.4.9 +HTTPDICONN

When the URC send, there is some error happen on the http client. Normally is TCP connection is disconnected.

+HTTPERR	HTTP/HTTPS Client connection error indicator
Unsolicited result code	+HTTPDICONN: <httpclient_id>,<error_code>
Parameters	<ul style="list-style-type: none"> • <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command. • <error_code> if it is -1, means disconnected by network problem. If -2, means connection is disconnected by remote host.
Reference	Note <ul style="list-style-type: none"> • If the URC send out, the HTTP client will be disconnected automatically.

4.4.10 +HTTPERR

When the URC send, there is some error happen on the http client. Normally is TCP connection is disconnected.

AT+HTTPErr		HTTP/HTTPS Client connection error indicator	
Unsolicited result code	+HTTPErr=<httpclient_id>,<error_code>		
Parameters	<ul style="list-style-type: none"> <httpclient_id> the indicator of http client instance created by the AT+HTTPCREATE command. <response_code> the http response code,not include 200 		
Reference Other Proprietary commands	if http receive response code not be 200,this URC will be output		

4.4.11 HTTP/HTTPS Example

Get Texts from HTTP server

```

AT+HTTPCREATE="http://11869245.iask.in:30686/"
+HTTPCREATE:0
OK

AT+HTTPSEND=0,0,"/"
OK

CONNECT OK

+HTTPNMIH:0,200,146,Server: Microsoft-IIS/5.1
X-Powered-By: ASP.NET
Content-Type: text/html
Accept-Ranges: bytes
ETag: "0c76c133e39c71:8f6"
Content-Length: 496

+HTTPNMIC:0,1,496,399
<html>

<head>
<meta http-equiv="Content-Type"
content="text/html; charset=gb2312">
<meta name="GENERATOR"
content="Microsoft FrontPage 4.0">
<meta name="ProgId"
content="FrontPage.Editor.Document"
>
<title>New Page 1</title>
</head>

<body>
<center>
<p>

</p>
<p><font face="宋体" size="2">成都众山科技邢薰郊?/font</p>
<p><font face="宋体" size="2">&nbsp;&nbsp;&nbsp;&nbsp;<a
href

+HTTPNMIC:0,0,496,97
="http://www.zstel.com">HTTP://
    
```

```
WWW.ZSTEL.COM</a></font></p>
</center>
</body>

</html>

+HTTDPDICONN:0,-2
OK
```

POST Texts to HTTP server

```
Header: api-key:JDYiKyKfi4I4sOFWeJsI4S3Cb10=
Content-type:NULL (default)
Content-length:10
Content: {"RPM":22}

AT+HTTPCREATE="http://1i869245.iask.in:30686/"
+HTTPCREATE:0
OK

If use default encode(string),the AT Command is:
AT+HTTPHEADER=0,api-key:JDYiKyKfi4I4sOFWeJsI4S3Cb10=\r\n,0
OK

AT+HTTPCONTENT=0,{"RPM":22},0
OK

If use HEX encode,the AT Command is:
AT+HTTPHEADER=0,6170692D6B65793A4A4459694B794B6669344934734F4657654A734934533
343626C303D0d0a,1
OK

AT+HTTPCONTENT=0,7B2252504D223A32327D,1
OK

AT+HTTPSEND=0,1,"/"
OK

CONNECT OK

...

Note:in <Header>,the "\r\n" is need,stand for a newline.if user want to input
a char \r\n in default encode,an \'should be add like this:
AT+HTTPHEADER=0,api-key:JDYiKyKfi4I4sOFWeJsI4S3Cb10=\\r\\n,0
AT+HTTPCONTENT=0,{"RPM":2\\r\\n2},0
```

Get a text file from an HTTPS server

```
AT+HTTPCREATE=https://182.150.27.42:50090/
+HTTPCREATE:0
OK

AT+HTTPCFG=0,1,-----BEGIN CERTIFICATE-----
\r\nMIIDhzCCAm+gAwIBAgIBADANBgkqhkiG9w0BAQUFADA7MQswCQYDVQQGEwJOTDER\r\nnMA8GA
1UEChMIUG9sYXJ0U0wxGTAXBgNVBAMTEFBvbGFyU1NMIFRlc3QgQ0EwHhcN\r\nnMTEwMjE5MTQ0ND
```



```
AwWhcNMjEwMjEyMTQ0NDAAWjA7MQswCQYDVQQGEwJOTDERMA8G\r\nA1UEChMIUG9sYXJTU0wxGTA  
XBgNVBAMTEFBvbGFyU1NMIFRlc3QgQ0EwgGgEiMA0G\r\nnCSqGSIB3DQEBAQUAA4IBDwAwggEKAoIB  
AQDA3zf8F7vglp0/ht6WMn1EpRagzSHx\r\nnmdTs6st8GFgIlKXsm8WL3xoemTiZhx57wI053zhdc  
Hgh057Zk+i5clHFzqMwUqny\r\nn50BwFMtEonILWuVA+T7lpg6z+exKY8C4KQB0nFc7qKUEkHHxvY  
PZP9a14jwqj+8n\r\nnYMPGn8u67GB9t+aEMr5P+1gmIgNb1LTV+/Xjli5wwOQuvfwu7uJBVcA0Ln0  
kcmnL\r\nnR7EUQIN9Z/SG9jGr8XmksrUuEvmEF/Bibyc+ElixVA0hmnM3oTDPb5Lc9un8rNsu\r\nn  
KNF+AksjoBXyOGVkcCeomBo4bF6BxyLObyavpw/LPh5aPgAIynplYb6LVAgMBAAGj\r\nngZUwgZIWd  
AYDVR0TBAUwAwEB/zAdBgNVHQ4EFgQUtFrkpbPe01L2udWmlQ/rPrzH\r\nn,0  
OK
```

```
AT+HTTPCFG=0,1,/f8wYwYDVR0jBFwwWoAUtFrkpbPe01L2udWmlQ/rPrzH/f+hP6Q9MDsx CzAJBg  
NV\r\nnBAYTAK5MMREwDwYDVQQKEwhQb2xhc1NTTDEZMBcGA1UEAxMQUG9sYXJTU0wgVGZv\r\nndCB  
DQYIBADANBgkqhkiG9w0BAQUFAAOCAQEAAuP1U2ABUKislsCfdlc2i94QHYYeJ\r\nnSsR4EdgHtdci  
UI5I62J6Mom+Y0dT/7a+8S6MVMCZP6C5NyNyXw1GWY/YR82XTJ8H\r\nnDBJiCTok5DbZ6SzaONBzd  
WHXwWwmi5vgldxn7YxrM9d0IjxM27WNks4sDQhZBQkF\r\nnpjmfs2cb4oP14Y9T9meTx/lvdkRYEu  
g61Jfn6cA+qHpyPYdTH+UshITnmp5/Ztkf\r\nnm/UTSLBNFNHesiTZeH31NcxYGdHSme9Nc/gfidR  
a0FLOCFwXr1FqAI47zG9jAQCZ\r\nn7Z2mCGDNMhjQc+BYcdnl01PXjdDK6V0qCgldVewhUBcW5gZK  
zV7e9+DpVA==\r\nn-----END CERTIFICATE-----\r\nn,0  
OK
```

or HEX encode:

```
AT+HTTPCFG=0,1,2D2D2D2D2D424547494E2043455254494649434154452D2D2D2D0D0A4D49  
4944687A4343416D2B6741774942416749424144414E42676B71686B694739773042415155464  
14441374D517377435159445651514745774A4F544445520D0A4D4138474131554543684D4955  
47397359584A54553077784754415842674E5642414D54454642766247467955314E4D4946526  
C63335167513045774868634E0D0A4D5445774D6A45794D5451304E4441775768634E4D6A4577  
4D6A45794D5451304E444177576A41374D517377435159445651514745774A4F544445524D413  
8470D0A4131554543684D495547397359584A54553077784754415842674E5642414D54454642  
766247467955314E4D4946526C6333516751304577676745694D4130470D0A435371475349623  
3445145424151554141344942447741776767454B416F494241514441337A6638463776676C70  
302F687436574D6E3145705261677A5348780D0A6D64547336737438474667496C4B58736D385  
74C33786F656D54695A6878353777493035337A6864634867483035375A6B2B6935636C48467A  
714D7755716E790D0A,1  
OK
```

```
AT+HTTPCFG=0,1,35304277464D74456F6E494C777556412B54376C7067367A2B65784B593843  
344B5142306E466337714B55456B4848787659505A5039616C346A77716A2B386E0D0A594D504  
76E38753637474239742B61454D7235502B31676D49674E62314C54562B2F586A6C693577774F  
51757666777537754A42566341304C6E306B636D6E4C0D0A5237455551494E395A2F5347396A4  
77238586D6B7372557545766D45462F42696279632B45316978564130686D6E4D336F54445062  
354C6339756E38724E73750D0A4B4E462B416B736A6F4258794F47566B43656F4D626F3462463  
64278794C4F6279617670772F4C5068356150674149796E706C5962364C5641674D424141476A  
0D0A675A5577675A4977444159445652305442415577417745422F7A416442674E56485134454  
66751557446726B70625065306C4C327564576D6C512F7250727A480D0A2F6638775977594456  
52306A4246777576F41557446726B70625065306C4C327564576D6C512F7250727A482F662B6  
8503651394D447378437A414A42674E560D0A42415954416B354D4D524577447759445651514B  
4577685162327868636C4E545444455A4D4263474131554541784D515547397359584A5455307  
7675647567A0D0A,1  
OK
```

```
AT+HTTPCFG=0,1,64434244515949424144414E42676B71686B6947397730424151554641414F  
434151454175503155324142556B49736C734366646C633269393451484859654A0D0A5373523  
445646748746463695549354936324A364D6F6D2B593064542F37612B3853364D564D435A5036  
43354E794E795877314757592F5952383258544A38480D0A44424A6943546F6B3544625A36537  
A614F4E427A645748587757776D693576673164786E375978724D396430496A784D3237574E4B  
7334734451685A42516B460D0A706A6D6673326362346F506C34593954396D6554782F6C76646  
B525945756736314A666E3663412B7148707950596454482B55736849546E6D70352F5A746B66
```

```

0D0A6D2F5554534C424E464E48657369545A654833314E637859476448536D65394E632F67666
964526130464C4F43665778526C4671414934377A47396A4151435A0D0A375A326D4347444E4D
686A51632B425963646E6C306C50586A64444B3656307143673164566577685542635735675A4
B7A563765392B447056413D3D0D0A2D2D2D2D454E442043455254494649434154452D2D2D2D
2D0D0A, 1
OK

AT+HTTPSEND=0,0,"/"
OK

CONNECT OK

+HTTPNMIH:0,200,224,Date: Mon, 09 Apr 2018 01:07:13 GMT
Server: Apache/2.4.27 (Win32) OpenSSL/1.0.21
Last-Modified: Mon, 27 Nov 2017 01:57:39 GMT
ETag: "15c-55eed3a259fdb"
Accept-Ranges: bytes
Content-Length: 348
Content-Type: text/html

+HTTPNMIC:0,0,348,348
<!doctype html public "-//W3C//DTD HTML 4.0 Transitional//EN">
<html>
  <head>
    <title> Test </title>
  </head>
  <body>
    <H1>This is an example page for testing.</H1>
    <H2>This is an example page for testing.</H2>
    <H3>This is an example page for testing.</H3>
    <strong>This</strong> is an example page for testing.
  </body>
</html>

+HTTPDICONN:0,-2
    
```

4.5. TLS Command

4.5.1. AT+TLSCFG

Configure TLS parameters. Multiple <type> and <value> groups are supported. When the TLS parameters are in use such as during TLS configuration, ERROR will be returned for this AT command.

There are three <encode_type> supported which are string, hex and base64. String encoding uses escape character \ to express un-printable characters and \o00 and \xhh are supported. For example, 0x0D can be encoded as '\r', \15 or \x0D. In hex encoding, the high four bits and the low four bits of character will be encoded as an ASCII character separately. For example, 0x0D will be encoded as 0x00 and 0x0D.

AT+TLSCFG	Configure TLS Parameters
Set command	AT+TLSCFG=<tid>,<type>,<value>[,<type>,<value>[,<type>,<value>[...]]]
	Response

	<ul style="list-style-type: none"> OK ERROR
Parameters	<ul style="list-style-type: none"> <tid> integer, the identifier of the TLS connection to be created. Range 1 to 5. <type> integer, the type of the parameter to be configured. <value> interger, the value of the parameter to be configured.
Reference	Note

parameter	type	Value			mandatory
		Value type	Value content	Default value	
Server name	1	string	Server name	None	Y
port	2	integer	Port number	443	N
Socket type	3	integer	0,TCP 1,UDP(Not Support currently)	0	N
Authentication mode	4	integer	0,none 1,optinal 2,required	2	N
Debug Level	5	integer	0,no log 1-4,the bigger the value is, the more log will be generated.	0	N
Server CA certificate	6	Sub parameters	<size>,<more>,<certificate>,<encode_method> <size>: integer, the size of the buffer to store the whole certificate. It should be the total size of the whole encoded certificate using <encode_method> and could be bigger than that. <more> integer, 1 means more certificate content will be inputted. The server CA cerfition configuration always ends by +TLSCFG with <more> of 0. <certificate>: string, the total or partial content of the encoded certificate with quotation marks. <encode_method>: integer, it is the encoded method used for <certificate>. 801 is for string encoding and it is the default value which can be omitted, 802 is for hex encoding. And 803 is for base64 encoding.	Null	If authentication mode is 2, it's Y, otherwise, N
Client CA certificate	7	Sub parameters	Same as server CA certifocate	Null	If client authentication is needed, it's Y, otherwise, N
Client private key	8	Sub parameters	<size>,<more>,<private_key>,<encode_method> <private_key>: the total or partial content od the encoded private key with quotation marks. Other parameters are the same as the ones for server CA certificate.	Null,	If client certificate is Y, it's Y, otherwise, it should not be configured.

+TLSCFG Example

```

AT+TLSCFG=1,1,"182.150.27.42",2,50090,3,0,4,2,5,2 //set server ip, port
OK
AT+TLSCFG=1,6,1344,1,"-----BEGIN CERTIFICATE-----\r\n
MIIDhzCCAm+gAwIBAgIBADANBgkqhkiG9w0BAQUFADA7MQswCQYDVQQGEwJOTDER\r\n
MA8GA1UEChMIUG9sYXJ0eWVudG9wYXVzGTAxBgNVBAMTEFBvbGFyU1NMIFRlc3QgQ0EwHhcN\r\n
MTEwMjE5MTQ0NDAwWhcNMjEwMjE5MTQ0NDAwWjA7MQswCQYDVQQGEwJOTDERMA8G\r\n
A1UEChMIUG9sYXJ0eWVudG9wYXVzGTAxBgNVBAMTEFBvbGFyU1NMIFRlc3QgQ0Ew\r\n
CSqGSIB3DQEBAAQAA4IBDwAwggEKAoIBAQA3zf8F7vglp0/ht6WMn1EpRagzSHx\r\n
mdTs6st8GFgI1KXsm8WL3xoemTiZhX57wI053zhdcHgH057Zk+i5clHFzqmWUqny\r\n

```

```

50BwFMtEonILwuVA+T7lpg6z+exKY8C4KQB0nFc7qKUEkHHxvYPZP9a14jwqj+8n\r\n
YMPGn8u67GB9t+aEMr5P+1"

AT+TLSCFG=1,6,1344,1,"gmIgNb1LTV+/Xjli5wwOQuvfwu7uJBVcA0Ln0kcmnL\r\n
R7EUQIN9Z/SG9jGr8XmksrUuEvmEF/Bibyc+ElixVA0hmnM3oTDPb5Lc9un8rNsu\r\n
KNF+AksjoBXyOGVvKceomBo4bF6BxyLObyavpw/LPh5aPgAIynplYb6LVAgMBAAGj\r\n
gZUwgZIwDAYDVR0TBAUwAwEB/zAdBgNVHQ4EFgQUtFrkpbPe01L2udWmlQ/rPrzH\r\n
/f8wYwYDVR0jBFwwWoAUtFrkpbPe01L2udWmlQ/rPrzH/f+hP6Q9MDsxZAJBgNV\r\n
BAYTAK5MMREwDwYDVQQKEwhQb2xhc1NTTDEZMBcGA1UEAxMQUG9sYXJlU0wgVGZz\r\n
dCBDQYIBADANBgkqhkiG9w0BAQUFAAOCAQEAAuP1U2ABUkIsIsCfdlc2i94QHHeJ\r\n
SsR4EdgHtdciUI5I62J"

AT+TLSCFG=1,6,1344,0,"6Mom+Y0dT/7a+8S6MVMCZP6C5NyNyXw1GWY/YR82XTJ8H\r\n
DBJiCTok5DbZ6SzaONBzdWHXwWwmi5vg1dxn7YxrM9d0IjxM27WNKs4sDQhZBQkF\r\n
pjmfs2cb4oP14Y9T9meTx/lvdkRYEug61Jfn6cA+qHpyPYdTH+UshITnmp5/Ztkf\r\n
m/UTSLBNFNHesiTZeH31NcxYGdHSme9Nc/gfidRa0FLOCfWxRlFqAI47zG9jAQcz\r\n
7Z2mCGDNMhjQc+BYcdnl01PXjdDK6V0qCg1dVewhUBcW5gZKzV7e9+DpVA==\r\n
-----END CERTIFICATE-----" //set server's CA
OK
    
```

4.5.2. AT+TLSCONN

Create a TLS connection . a PDN context should be activated by +EGACT before using +TLSCONN. The result of TLS connection is returned by +TLSCONN URC if OK is returned for TLSCONN AT command.

AT+TLSCONN	Create a TLS connection
Set command	AT+TLSCONN=<tid>,<cid>[,<time>] Response <ul style="list-style-type: none"> OK ERROR
Unsolicited result code	+TLSCONN: <tid>,<ret>
Parameters	<ul style="list-style-type: none"> <tid> integer, the identifier of the TLS connection to be created. It should be the same as the one in +TLSCFG. <cid> integer, a specified particular PDP context ID returned by +EGACT <time> integer, the parameter of receive timeout, specified in seconds, Default 60s. <ret> interger, it tells the result of the TLS connection. If the connection succeeds, it is 1, otherwise, it is the error code.
Reference	Note

<ret> error code

<ret>	Description
-1	TLS Parameters of tid has not configure
-21	Initialize RNG and the session data failed
-22	Loading cli_cert or Parse cli_cert private key failed
-23	Loading the CA root certificate failed
-240	Failed to get an IP address for the given hostname
-241	The connection to the given server/ port failed

-25	SSL/TLS structure set failed
-3	Handshake or Certificate verification failed
-4	Connection timed out

+TLSCONN Example

```

AT+TLSCONN=1,1,60      create a TLS connection
OK
+TLSCONN: 1,1         return TLS connection result
    
```

4.5.3. AT+TLSCLOSE

Close a TLS connection indicated by <tid> and release all related resources. The result is returned by +TLSCLOSE URC if OK is returned for +TLSCLOSE AT command. If the TLS connection is not created before, ERROR will be returned.

AT+TLSCLOSE		Close a TLS connection
Set command	AT+TLSCLOSE=<tid>	
	Response	<ul style="list-style-type: none"> OK ERROR
Unsolicited result code	+TLSCLOSE: <tid>,<ret>	
Parameters	<tid>	integer, the identifier of the TLS connection to be created. It should be the same as the one in +TLSCFG
	<ret>	integer, it tells the result of the TLS closure. If the closure succeeds, it is 1, If the closure failed, it is -1.
Reference Other Proprietary commands	Note	

+TLSCONN Example

```

AT+TLSCLOSE=1      Close the TLS connection
OK
+TLSCLOSE: 1,1     Return the TLS connection closure result
    
```

4.5.4. AT+TLSEND

Send data to the remote TLS server. The actual number of data sent is returned by +TLSEND URC if OK is returned for +TLSEND AT command. If the TLS connection is not created before, ERROR will be returned. -30848 will be returned if the TLS connection has been shut down by the peer gracefully. Three <encode_method>s are supported for data encoding which are the same as the ones used in +TLSCFG.

AT+TLSEND		Send TLS Data
Set command	AT+TLSEND=<tid>,<data_len>[,<encoded_method>]	
	Response	

	<ul style="list-style-type: none"> • OK • ERROR
Unsolicited result code	+TLSSEND: <tid>,<ret>
Parameters	<ul style="list-style-type: none"> • <tid> integer, the identifier of the TLS connection to be created. It should be the same as the one in +TLSCFG • <data_len> integer, the length of the encoded <data> • <data> string, the encoded data to be sent • <encoded_method> the encode method used for <data>. 801 for string encoding and it is the default value which can be omitted. 802 is for hex encoding, and 803 is for base64 encoding. • <ret> interger, it tells result of the data sending. If it is greater than 0, it is the actual number of data sent, If it is equal to -1, it sent failed.
Reference	Note

+TLSSEND Example

```

AT+TLSSEND=1,75,"GET https://182.150.27.42/test.html HTTP/1.1\r\nHost:
182.150.27.42\r\n\r\n"
                                     Send TLS data
OK
+TLSEND: 1,69                       return TLS sending result
    
```

4.5.5. AT+TLSRCV

Receive data from the remote TLS server. The actual number of data received is returned by +TLSRCV URC if OK is returned for +TLSRCV AT command. If the TLS connection is not created before, ERROR will be returned. -30848 will be returned if the TLS connection has been shut down by the peer gracefully.

Three <encode_method>s are supported for data encoding which are the same as the ones used in +TLSCFG.

AT+TLSRCV	Receive TLS Data
Set command	AT+TLSRCV=<tid>,<max_len>[,<encoded_method>] Response <ul style="list-style-type: none"> • OK • ERROR
Unsolicited result code	+TLSRCV: <tid>,<ret>[,<data>[,<encode_method>]]
Parameters	<ul style="list-style-type: none"> • <tid> integer, the identifier of the TLS connection to be created. It should be the same as the one in +TLSCFG • <max_len> integer, the maximum number of plain data without encoding that could be received. It should be greater than the <data_len> of +TLNMI. • <data> string, the data received with encoding. • <encoded_method> the encode method used for <data>. <ul style="list-style-type: none"> 801 for string encoding and it is the default value which can be omitted. 802 for hex encoding. 803 for base64 encoding. When it is in +TLSRCV AT command, it is the encode method required to be used

	in +TLSRECV URC and it can be omitted if it is the default value . When it is in +TLSRECV URC, it is the encode method of <data> which should be aligned with the one in +TLSRECV AT command and it will be omitted if it is the default value. <ul style="list-style-type: none"> • <ret> interger, if it is greater than , it is the length of data received after encoding, otherwise, it is the error code.
Reference	Note

<ret> error code

<ret>	Description
-1	TLSRECV Parameters of tid, max_len or encoded_method configure failed
-2	Receive failed
-3	-3 is returned when TLS connection is shut down gracefully by the peer

+TLSRECV Example

```

+TLSNMI: 1,100

AT+TLSRECV=1,100,801  receive TLS data
OK
+ETLRECV: 1,106,"HTTP/1.1 200 OK\r\n..."  return the data received with
encoding. <ret> of 106 is the length of
encoded data which is greater than <max_len>
of 100 which indicates the length of plain
data.
    
```

4.5.6. AT+TLSSRMOD

This command used to set TLS receive configuration.

AT+TLSSRMOD	Set TLS receive configuration
Test Command	AT+TLSSRMOD=? Response <ul style="list-style-type: none"> • +TLSSRMOD: (1-5),(0-1),(5-300),(801-803),(1-1400),(1-60000) • OK • ERROR
Read command	AT+TLSSRMOD? Response <ul style="list-style-type: none"> • +TLSSRMOD: 1,0,20,801 • +TLSSRMOD: 2,1,30,802,512,1000 • OK • ERROR
Set command	AT+TLSSRMOD=<tid>,<rev_mode>[<time_out>],[<encoded_method>],[<auto_len>[,<atuo_interval>]]] Response <ul style="list-style-type: none"> • OK • ERROR
Unsolicited result code	+TLSRECV: <tid>,<len>,<data>[,<encode_method>]

Parameters	<ul style="list-style-type: none"> • <tid> integer, the identifier of the TLS connection to be created. Range 1 to 5. • <rev_mode> integer, set the TLS data receiving mode. Range 0 to 1. Default 0. <ul style="list-style-type: none"> 0 Manual receive mode, use AT+TLSRECV command to read TLS data manually. 1 Automatic receive mode, when TLS data come, directly output to AT port. • <time_out> integer, The maximum time for TLS reception waiting. Range 5 to 300s. Default 20. • <encoded_method> the encode method used for <data>. Default 801. <ul style="list-style-type: none"> 801 for string encoding and it is the default value which can be omitted. 802 for hex encoding. 803 for base64 encoding. • <atuo_len> Maximum packet length for automatic receive mode. Only valid with rev_mode=1. Range 1 to 1400. Default 512. • <atuo_interval> time interval of automatic receive mode. Only valid with rev_mode=1. Range 1 to 60000ms. Default 1000.
Reference	Note

+TLSSMOD Example

```

AT+TLSSMOD=1,1,30,802 //set directly output mode and encode for
                        hex
                        //encoding.
OK
// Automatically output data at the AT port when receiving TLS data
+TLSRECV: 1,1024,"485454502F312E3120...",802

+TLSRECV: 1,158,"3E0D0A090...",802
    
```

4.5.7. +TLSNMI

Indicated there is received some data from network.

+TLSNMI	TLS data from network URC
Unsolicited result code	+TLSNMI: <tid>,<data_len>
Parameters	<ul style="list-style-type: none"> • <tid> integer, the identifier of the TLS connection to be created. It should be the same as the one in +TLSCFG • <data_len> integer, length of data incoming.
Reference	Note

4.5.8. +TLSERR

Indicates that a connection error has occurred.

+TLSERR TLS Client connection error indicator	
Unsolicited result code	+TLSNMI: <tid>,<err_code>
Parameters	<ul style="list-style-type: none"> <tid> integer, the identifier of the TLS connection to be created. It should be the same as the one in +TLSCFG <err_code> integer, connection error code.
Reference	Note

+TLSNMI connection error code

<err_code>	Description
-1	Common connection error
-2	No buffer space available
-3	I/O error or Invalid argument
-4	Transport endpoint is not connected
-5	Connection reset by peer
-6	Software caused connection abort
-7	No route to host
-8	The peer notified us that the connection is going to be closed or The connection indicated an EOF
-9	Verification of our peer failed
-10	A fatal alert message was received from our peer
-11	The receive operation of one message timed out more than 5 times
-12	The alert message of one message received indicates a non-fatal error more than 5 times

4.6. OneNET Command
4.6.1. AT+MIPLCREATE

This command create an instance of communication to CMloT OneNET platform.

AT+MIPLCREATE Create OneNET Instance	
Set command	AT+MIPLCREATE=<totalsize>,<config>,<index>,<currentsize>,<flag> Response <ul style="list-style-type: none"> <ref> OK +CIS ERROR:<err>
Parameters	<ul style="list-style-type: none"> <totalsize> integer, total size of configuration data of OneNET connection parameter. <config> string, configuration data, refer to configuration structure. <index> integer, index of each configuration data block, beginning from N-1 to 0.

	<ul style="list-style-type: none"> • <currentsize> integer, current size of this AT command. • <flag> integer, flag indicates if configuration stream is started or finished(first packet,middle packet,last packet), if set to 0,the last configuration package is sent, and the whole setting goes into effect. 1: first packet 2: middle packet 3: last packet
Reference Other Proprietary commands	Note

+MIPLCREATE Example

```
AT+MIPLCREATE=56,130038F10003F2002A04001100000000000010196E62696F7462742E686
5636C6F7564732E636F6D3A35363833000131F300080000000000,0,56,0
OK
```

4.6.2. AT+MIPLDEL

Delete a specified OneNET communication instance.

AT+MIPLDEL	Add LwM2M Object
Set command	AT+MIPLDEL=<ref>
	Response <ul style="list-style-type: none"> • OK • +CIS ERROR: <err>
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance.
Reference	Note

4.6.3. AT+MIPLOPEN

Sending register request to OneNET with set command, and querying registe state with read command.

AT+MIPLOPEN	Send OneNET Register Request
Set command	AT+MIPLOPEN=<ref>,<lifetime>[,<timeout>]
	Response <ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Read command	AT+MIPLOPEN?
	Response <ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Unsolicited result code	+MIPLEVENT:<ref>,<evt_code>
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance.

	<ul style="list-style-type: none"> • <lifetime> the lifetime of this registration • <timeout> timeout of current login, if no response from server overtime, UE will response +MIPLEVENT, default 15s.
Reference	<ul style="list-style-type: none"> • Note

+MIPLOPEN Example

```

AT+MIPLOPEN=0,3000,30
OK
+MIPLEVENT:0,4
+MIPLEVENT:0,6

AT+MIPLOPEN?
OK
+MIPLEVENT:0,6
    
```

4.6.4. AT+MIPLUPDATE

This command updates the register information, such as lifetime.

AT+MIPLUPDATE Send OneNET Register Request	
Set command	AT+MIPLUPDATE=<ref>,<lifetime>,<withobjectflag>
	Response <ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Unsolicited result code	+MIPLEVENT:<ref>,<evt_code>
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance. • <lifetime> update lifetime value in second of the client • <withobjectflag> 1:update object info at the same time 0:don't update object info
Reference	Note

4.6.5. AT+MIPLADDOBJ

Add lwm2m object to a specified OneNET instance. Concepts and definitions of Object, instance and resource, please refer to Lightweight Machine to Machine Technical Specification, ext-label Objects Produced by IPSO Alliance and oma-label Objects Produced by OMA.

<http://www.openmobilealliance.org/wp/OMNA/LwM2M/LwM2MRegistry.html>

AT+MIPLADDOBJ Add LWM2M Object	
Set command	AT+MIPLADDOBJ=<ref>,<objectid>,<instancecount>,<instancebitmap>,<attributecount>,<actioncount>
	Response <ul style="list-style-type: none"> • OK • +CIS ERROR:<err>

Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance. • <objectid> object identity.(refer to documentation above) • <instancecount> the number of new instance identity • <instancebitmap> instance bitmap, string format, each character is represented as an instance, of which 1 is available, and 0 is unavailable. For example, the currently added object has 5 instances, of which 1, 3 are available, and the instance bitmap is 00101. • <attributecount> readable number of resources • <actioncount> executable number of resources
References	Note

4.6.6. AT+MIPLDELOBJ

Delete an object from a specified OneNET instance.

AT+MIPLDELOBJ Delete LWM2M Object	
Set command	AT+MIPLDELOBJ=<ref>,<objectid>
	Response
	<ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance. • <objectid> object identity.
Reference	Note

4.6.7. AT+MIPLCLOSE

Sending unregister request to OneNET according to specified reference ID.

AT+MIPLCLOSE Send OneNET Unregister Request	
Set command	AT+MIPLCLOSE=<ref>
	Response
	<ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance.
Reference	Note

4.6.8. AT+MIPLNOTIFY

Notify OneNET that specified values changed.

AT+MIPLNOTIFY Notify Value Changes	
Set command	+MIPLNOTIFY=<ref>,<msgid>,<objectid>,<instanceid>,<resourceid>,<valuetype>,<len>,<value>,<index>,<flag>[,<ackid>]

	Response <ul style="list-style-type: none"> OK +CIS ERROR:<err> 										
Unsolicited result code	+MIPLEVENT:<ref>,<evt_code>,<ackid>										
Parameters	<ul style="list-style-type: none"> <ref> reference ID of OneNET communication instance. <msgid> message id, It should be the msgid when the resource is observed <objectid> object identity <instanceid> instance identity <resourceid> resource identity <valuetype> data type <table border="1" data-bbox="675 638 1401 714"> <thead> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>string</td> <td>opaque</td> <td>integer</td> <td>float</td> <td>bool</td> </tr> </tbody> </table> <len> The length of the value <value> values of specified value type <flag> Message identification.1:The first message; 2:Middle message; 0: The last message. <index> Instruction sequence number. If a Notify operation requires some messages combination to be a complete instruction, the index is numbered from N-1 to 0, and the end of the Notify instruction when the index number is 0. <ackid> If <ackid> is set, OneNET server will response ACK message to UE, if UE received ack-messages, output following message:+MIPLEVENT. If <ackid> omitted, no ACK will response, set to 0 causes errors. 	1	2	3	4	5	string	opaque	integer	float	bool
1	2	3	4	5							
string	opaque	integer	float	bool							
References	Note										

+MIPLNOTIFY Example

```

AT+MIPLNOTIFY=0,1477,3202,0,5600,4,3,"1.2",0,0,35
OK
+MIPLEVENT:0,26,35
AT+MIPLNOTIFY=0,1478,3202,2,5600,4,5,"-0.08",2,1
OK
AT+MIPLNOTIFY=0,1478,3202,2,5601,4,3,"-0.08",1,2
OK
AT+MIPLNOTIFY=0,1478,3202,2,5602,4,5,"-0.08",0,0
OK
    
```

4.6.9. AT+MIPLREADRSP

The read command set specified resource values, and when flag set to 1, upload these updating values to OneNET. This should be operated when +MIPLREAD URC is received as reply of remote read command.

AT+MIPLREADRSP Upload Read Messages	
Set command	AT+MIPLREADRSP=<ref>,<msgid>,<result>[,<objid>,<insid>,<resid>,<valuetype>,<len>,<value>,<index>,<flag>]
	Response <ul style="list-style-type: none"> OK

	<ul style="list-style-type: none"> +CIS ERROR:<err> 												
Unsolicited result code	+MIPLREAD:<ref>,<msgid>,<objectid>,<instanceid>,<resourceid>[,<count>]												
Parameters	<ul style="list-style-type: none"> <ref> reference ID of OneNET communication instance. <msgid> message identity from +MIPLREAD. <result> the result of the read operation; the code can be returned as <table border="1" style="margin-left: 40px;"> <tr><td>1</td><td>2.05 Content OK</td></tr> <tr><td>11</td><td>4.00 Bad Request</td></tr> <tr><td>12</td><td>4.01 Unauthorized</td></tr> <tr><td>13</td><td>4.04 Not Found</td></tr> <tr><td>14</td><td>4.05 Method Not Allowed</td></tr> <tr><td>15</td><td>4.06 Not Acceptable</td></tr> </table> <ul style="list-style-type: none"> <objectid> object identity <instanceid> instance identity <resourceid> resource identity <valuetype> data type of value, refer to +MIPLNOTIFY command <len> The length of the value <value> values of specified value type <flag> Message identification. refer to +MIPLNOTIFY command. <count> The number of resources that are currently required to be read.when < resourceid > is -1,the command have <count> parameter. 	1	2.05 Content OK	11	4.00 Bad Request	12	4.01 Unauthorized	13	4.04 Not Found	14	4.05 Method Not Allowed	15	4.06 Not Acceptable
1	2.05 Content OK												
11	4.00 Bad Request												
12	4.01 Unauthorized												
13	4.04 Not Found												
14	4.05 Method Not Allowed												
15	4.06 Not Acceptable												
Reference	Note												

+MIPLREADRSP Example

```
+MIPLREAD:0,289,3200,0,5750
AT+MIPLREADRSP=0,289,1,3202,0,5750,1,5,"-0.08",0,0
OK
```

4.6.10. AT+MIPLWRITERSP

This command used as reply of remote write command after +MIPLWRITE URC received, to feedback the results of updating specified resource value.

AT+MIPLWRITERSP	Upload Write Result		
Set command	AT+MIPLWRITERSP=<ref>,<msgid>,<result> Response <ul style="list-style-type: none"> OK +CIS ERROR:<err> 		
Unsolicited result code	+MIPLWRITE:<ref>,<msgid>,<objectid>,<instanceid>,<resourceid>,<valuetype>,<len>,<value>,<flag>		
Parameters	<ul style="list-style-type: none"> <ref> reference ID of OneNET communication instance. <msgid> message identity in +MIPLWRIT. <result> result of writing specified resource; the code can be returned as <table border="1" style="margin-left: 40px;"> <tr><td>2</td><td>2.04 Changed OK</td></tr> </table>	2	2.04 Changed OK
2	2.04 Changed OK		

	11	4.00 Bad Request
	12	4.01 Unauthorized
	13	4.04 Not Found
	14	4.05 Method Not Allowed
	15	4.06 Not Acceptable
	<ul style="list-style-type: none"> • <objectid> object identity • <instanceid> instance identity • <resourceid> resource identity • <valuetype> data type of value, refer to +MIPLNOTIFY command • <len> The length of the value • <value> values of specified value type • <flag> Message identification. refer to +MIPLNOTIFY command 	
Reference	Note	

+MIPLWRITERSP Example

```
+MIPLWRITE:0,321,3200,0,5750,1,3,123,0
AT+MIPLWRITERSP=0,321,2
OK
```

4.6.11. AT+MIPLEXECUTERSP

This command is used as reply of remote execute command after +MIPLEXECUTE URC received to feedback the results of user-defined operation.

AT+MIPLWRITERSP	Upload Write Result
Set command	AT+MIPLEXECUTERSP=<ref>,<msgid>,<result> Response <ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Unsolicited result code	+MIPLEXECUTE:<ref>,<msgid>,<objectid>,<instanceid>,<resourceid>[,<len>,<value>,<flag>]
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance. • <msgid> message identity in +MIPLWRIT. • <result> result of writing specified resource; refer to +MIPLWRITERSP • <objectid> object identity • <instanceid> instance identity • <resourceid> resource identity • <len> The length of the value

	<ul style="list-style-type: none"> • <value> values of specified value type • <flag> Message identification. refer to +MIPLNOTIFY command
Reference	Note

4.6.12. AT+MIPLDISCOVERRSP

This command is used as reply of remote execute command after +MIPLEXECUTE URC received to feedback the results of user-defined operation.

AT+MIPLDISCOVERRSP	Upload Discover Result
Set command	+MIPLEXEDISCOVERRSP=<ref>,<msgid>,<result>,<length>,<value> Response <ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Unsolicited result code	+MIPLPARAMETER:<ref>,<msgid>,<objectid>
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance. • <msgid> message identity in +MIPLWRIT. • <result> result of writing specified resource; refer to +MIPLREADRSP • <objectid> object identity • <len> The length of the value • <value> The object attribute requires the use of a semicolon between multiple attributes to separate "1101;1102;1103".
Reference	Note

+MIPLDISCOVERRSP Example

```
+MIPLDISCOVER=0,879,1,3200
AT+MIPLDISCOVERRSP=0,879,3200,9,"5600;5750"
OK
```

4.6.13. AT+MIPLOBSEVERSP

This command is used as reply of remote execute command after +MIPLOBSEVER URC received to feedback the results of user-defined operation.

AT+MIPLOBSEVERSP	Upload Discover Result
Set command	AT+MIPLOBSEVERSP=<ref>,<msgid>,<result> Response <ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Unsolicited result code	+MIPLOBSEVER:<ref>,<msgid>,<oper>,<objectid>,<instanceid>,<resourceid>
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance. • <msgid> message identity in +MIPLWRIT.

	<ul style="list-style-type: none"> • <result> result of writing specified resource; refer to +MIPLREADRSP • <oper> 1:observe added; 0: observe canceled • <objectid> object identity • <instanceid> instance identity • <resourceid> resource identity
Reference	Note

+MIPOBSERVERSP Example

```
+MIPOBSERVE:0,2657,1,3200,0,-1
AT+MIPOBSERVERSP=0,2657,1
OK
```

4.6.14. AT+MIPLPARAMETERRSP

This command is used as reply of remote execute command after MIPLPARAMETER URC received to feedback the results of user-defined operation.

AT+MIPLPARAMETERRSP Upload Discover Result	
Set command	AT+MIPLPARAMETERRSP=<ref>,<msgid>,<result> Response <ul style="list-style-type: none"> • OK • +CIS ERROR:<err>
Unsolicited result code	+MIPLPARAMETER:<ref>,<msgid>,<objectid>,<instanceid>,<resourceid>,<len>,<parameter>
Parameters	<ul style="list-style-type: none"> • <ref> reference ID of OneNET communication instance. • <msgid> message identity in +MIPLWRIT. • <result> result of writing specified resource; refer to +MIPLWRITERSP • <objectid> object identity • <instanceid> instance identity • <resourceid> resource identity • <len> The length of the parameter • <parameter> string type, like: pmin=xxx;pmax=xxx;gt=xxx;lt=xxx;stp=xxx
Reference	Note

4.6.15. AT+MIPLVER

Get version of OneNET protocol.

AT+MIPLVER Upload Discover Result	
Read command	AT+MIPLVER? Response <ul style="list-style-type: none"> • +MIPLVER:<version> • OK

Reference Other Proprietary commands	Note
---	------



5. Appendix

5.1. 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 mode as 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 $((3,06 / 13) * (\text{Number of 51-MF}))$. 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.					

5.2. GPRS Timer (3GPP TS 24.008)

5.2.1 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.

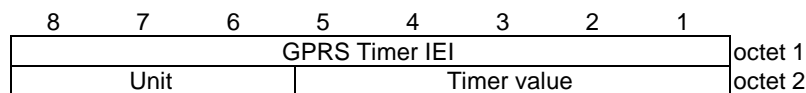


Figure 10.5.146/3GPP TS 24.008: GPRS *Timer* information element

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.

5.2.2 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.

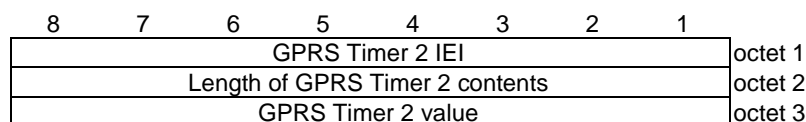


Figure 10.5.147/3GPP TS 24.008: GPRS Timer 2 information element

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

GPRS Timer 2 value is coded as octet 2 of the <i>GPRS timer</i> information element.
--

5.2.3 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.

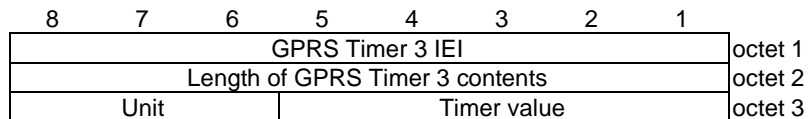


Figure 10.5.147a/3GPP TS 24.008: GPRS Timer 3 information element

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

<p>GPRS Timer 3 value (octet 3)</p> <p>Bits 5 to 1 represent the binary coded timer value.</p> <p>Bits 6 to 8 defines the timer value unit for the GPRS timer as follows:</p> <p>Bits</p> <p>8 7 6</p> <p>0 0 0 value is incremented in multiples of 10 minutes</p> <p>0 0 1 value is incremented in multiples of 1 hour</p> <p>0 1 0 value is incremented in multiples of 10 hours</p> <p>0 1 1 value is incremented in multiples of 2 seconds</p> <p>1 0 0 value is incremented in multiples of 30 seconds</p> <p>1 0 1 value is incremented in multiples of 1 minute</p> <p>1 1 0 value is incremented in multiples of 320 hours (NOTE)</p> <p>1 1 1 value indicates that the timer is deactivated.</p> <p>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.</p>
--