FN980 family AT Commands Reference Guide

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APPLICABILITY TABLE

- ■ ■ FN980
- ■ ■ FN980m
- ■ ■ FT980
- ■ ■ FT980m
- ■ ■ FT980-KS

▐▐▐▌ 38.X2.002 / M0H.020002

▐▐▐▌ 38.X2.202 / M0H.020202

CONTENTS

1. INTRODUCTION

1.1. Scope

This document is aimed in providing a detailed specification and a comprehensive listing as a reference for the whole set of AT command.

1.2. Audience

Readers of this document should be familiar with Telit modules and their ease of controlling by means of AT Commands.

1.3. Contact Information, Support

For general contact, technical support services, technical questions and report documentation errors contact Telit Technical Support at:

- TS-EMEA@telit.com
- TS-AMERICAS@telit.com
- TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/support

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

http://www.telit.com

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4.   Icons and Text Conventions

SET section – This section provides all information related to SET functionality of involved AT command. If it has got strictly and relevant SET information, these are located at section end.

READ section – This section provides all information related to READ functionality of involved AT command. If it has got strictly and relevant READ information, these are located at section end.

TEST section – This section provides all information related to TEST functionality of involved AT command. If it has got strictly and relevant TEST information, these are located at section end.

Additional info – This section provides any kind of additional and useful information related to the AT command section as well as command exceptions or special behavior cases.

REFERENCE section – This section provides useful references (standards or normative) related to involved AT command.

EXAMPLE section – This section provides useful examples related to involved AT command.

NOTE section – This section provides all information related to involved AT commands. Each note can provide a different level of information: danger, caution/warning and tip/information.

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

2. AT COMMANDS

The Telit wireless module family can be controlled via the serial interface using the standard AT commands [1]. The Telit wireless module family is compliant with:

1. Hayes standard AT command set, to maintain the compatibility with existing SW programs.

2. 3GPP TS 27.007 specific AT command and GPRS specific commands.

3. 3GPP TS 27.005 specific AT commands for SMS (Short Message Service) and CBS (Cell Broadcast Service)

Moreover, Telit wireless module family supports also Telit proprietary AT commands for special purposes.

The following is a description of how to use the AT commands with the Telit wireless module family.

2.1. Definitions

The following syntactical definitions apply:

<CR> **Carriage return character**, is the command line and result code terminator character, which value, in decimal ASCII between 0 and 255, is specified within parameter **S3**. The default value is 13.

<LF> **Linefeed character**, is the character recognized as line feed character. Its value, in decimal ASCII between 0 and 255, is specified within parameter **S4**. The default value is 10. The line feed character is output after carriage return character if verbose result codes are used (**V1** option used) otherwise, if numeric format result codes are used (**V0** option used) it will not appear in the result codes.

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

[...] Optional sub parameter of a command or an optional part of TA information response is enclosed in square brackets. Brackets themselves do not appear in the command line. When sub parameter is not given in AT commands which have a Read command, new value equals to its previous value. In AT commands which do not store the values of any of their sub parameters, and so have not a Read command, which are called *action type* commands, action should be done based on the recommended default setting of the sub parameter.

2.2. AT Command Syntax

The syntax rules followed by Telit implementation of either Hayes AT commands, GSM commands are very similar to those of standard basic and extended AT commands.

There are two types of extended command:

- **Parameter type commands**. This type of commands may be "set" (to store a value or values for later use), "read" (to determine the current value or values stored), or "tested" (to determine ranges of values supported). Each of them has a test command (trailing **=?**) to give information about the type of its sub parameters; they also have a Read command (trailing?) to check the current values of sub parameters.

- **Action type commands**. This type of command may be "executed" or "tested".

  - "executed" to invoke a function of the equipment, which generally involves more than the simple storage of a value for later use

  - "tested" to determine:

    o if sub parameters are associated with the action, the ranges of sub parameters values that are supported; if the command has no sub parameters, issuing the correspondent Test command (trailing **=?**) raises the result code "**ERROR**".
      Note: issuing the Read command (trailing?) causes the command to be executed.

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[1] The AT is an ATTENTION command and is used as a prefix to other parameters in a string. The AT command combined with other parameters can be set up in the communications package or typed in manually as a command line instruction combined with other parameters can be set up in the communications package or typed in manually as a command line instruction.

○ whether or not the equipment implements the Action Command (in this case issuing the correspondent Test command - trailing **=?** - returns the **OK** result code), and, if sub parameters are associated with the action, the ranges of sub parameters values that are supported.

Action commands don't store the values of any of their possible sub parameters.

Moreover:

The response to the Test Command (trailing **=?**) may be changed in the future by Telit to allow the description of new values/functionalities.

If all the sub parameters of a parameter type command **+CMD** are optional, issuing **AT+CMD=<CR>** causes the **OK** result code to be returned and the previous values of the omitted sub parameters to be retained.

2.2.1.   String Type Parameters

A string, either enclosed between quotes or not, is a valid string type parameter input. According to V25.ter space characters are ignored on the command line and may be used freely for formatting purposes, unless they are embedded in numeric or quoted string constants; therefore a string containing a space character has to be enclosed between quotes to be considered a valid string type parameter (e.g. typing **AT+COPS=1,0,"A1"** is the same as typing **AT+COPS=1,0,A1**; typing **AT+COPS=1,0,"A BB"** is different from typing **AT+COPS=1,0,A BB**).

A string is always case sensitive.

A small set of commands requires always to write the input string parameters within quotes: this is explicitly reported in the specific descriptions.

2.2.2.   Command Lines

A command line is made up of three elements: the **prefix**, the **body** and the **termination character**.

The **command line prefix** consists of the characters "**AT**" or "**at**", or, to repeat the execution of the previous command line, the characters "**A/**" or "**a/**" or **AT#/** or **at#/**.

The **termination character** may be selected by a user option (parameter S3), the default being **<CR>**.

The basic structures of the command line are:

- **ATCMD1<CR>** where **AT** is the command line prefix, **CMD1** is the body of a **basic command** (nb: the name of the command never begins with the character "**+**") and **<CR>** is the command line terminator character

- **ATCMD2=10<CR>** where 10 is a sub parameter

- **AT+CMD1;+CMD2=, ,10<CR>** These are two examples of **extended commands** (nb: the name of the command always begins with the character "**+**"[2]). They are delimited with semicolon. In the second command the sub parameter is omitted.

- **+CMD1?<CR>** This is a Read command for checking current sub parameter values

- **+CMD1=?<CR>** This is a test command for checking possible sub parameter values

These commands might be performed in a single command line as shown below:

ATCMD1 CMD2=10+CMD1;+CMD2=, ,10;+CMD1?;+CMD1=?<CR>

anyway, it is always preferable to separate into different command lines the basic commands and the extended commands; furthermore, it is suggested to avoid placing several action commands in the same command line,

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[2] The set of proprietary AT commands differentiates from the standard one because the name of each of them begins with either "@", "#", "$" or "*". Proprietary AT commands follow the same syntax rules as extended commands

because if one of them fails, then an error message is received but it is not possible to argue which one of them has failed the execution.

If command **V1** is enabled (verbose responses codes) and all commands in a command line has been performed successfully, result code **<CR><LF>OK<CR><LF>** is sent from the TA to the TE, if sub parameter values of a command are not accepted by the TA or command itself is invalid, or command cannot be performed for some reason, result code **<CR><LF>ERROR<CR><LF>** is sent and no subsequent commands in the command line are processed.

If command **V0** is enabled (numeric responses codes), and all commands in a command line has been performed successfully, result code **0<CR>** is sent from the TA to the TE, if sub-parameter values of a command are not accepted by the TA or command itself is invalid, or command cannot be performed for some reason, result code **4<CR>** and no subsequent commands in the command line are processed.

In case of errors depending on ME operation, **ERROR** (or **4**) response may be replaced by **+CME ERROR: <err> or +CMS ERROR: <err>**.

> The command line buffer accepts a maximum of 560 characters. If this number is exceeded none of the commands will be executed and TA returns **ERROR**.

2.2.2.1.   ME Error Result Code - +CME ERROR: <err>

This is NOT a command, it is the error response to **+Cxxx** 3GPP TS 27.007 commands.

Syntax: **+CME ERROR: <err>**

Parameter: **<err>** - error code can be either numeric or verbose (see **+CMEE**). The possible values of **<err>** are reported in the table:

Numeric Format [3]	Verbose Format [4]
0	phone failure
1	no connection to phone
2	phone adaptor link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed - emergency calls only

---

[3] Not all modules support the error codes shown in the table.

[4] There could be small variations in the message depending on the module in use.

Numeric Format [3]	Verbose Format [4]
34	numeric parameter instead of text parameter
35	text parameter instead of numeric parameter
36	numeric parameter out of bounds
37	text string too short
38	The GPIO Pin is already used
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
49	EAP method not supported
50	Invalid EAP parameter
51	Parameter length error for all Auth commands
52	Temporary error for all Auth command
53	not verified hidden key
100	unknown
103	Illegal MESSAGE
106	Illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
132	service option not supported
133	requested service option not subscribed
134	service option temporarily out of order
148	unspecified GPRS error
149	PDP authentication failure
150	invalid mobile class
257	network rejected request
258	retry operation
259	invalid deflected to number
260	deflected to own number
261	unknown subscriber
262	service not available
263	unknown class
264	unknown network message
273	Minimum TFT per PDP address error
274	Duplicate TFT eval prec index
275	Invalid TFT param combination
277	Invalid number of parameters
278	Invalid Parameter
320	Call index error
321	Call state error
322	Sys state error
323	Parameters error
550	generic undocumented error
551	wrong state
552	wrong mode
553	context already activated
554	stack already active
555	activation failed
556	context not opened
557	can not setup socket
558	can not resolve DN
559	time-out in opening socket
560	can not open socket
561	remote disconnected or time-out
562	connection failed
563	tx error
564	already listening

Numeric Format [3]	Verbose Format [4]
565	socket disconnection
566	can not resume socket
567	ip version type incompatible
568	ipv6 not enabled
569	
600	Generic undocumented error
601	wrong state
602	Can not activate
603	Can not resolve name
604	Can not allocate control socket
605	Can not connect control socket
606	Bad or no response from server
607	Not connected
608	Already connected
609	Context down
612	Resource used by other instance
613	Data socket yet opened in cmdmode
614	FTP CmdMode data socket closed
615	FTP not connected
616	FTP disconnected
617	FTP read command closed
618	FTP read command error
619	FTP write command closed
620	FTP write command error
621	FTP read data closed
622	FTP read data error
623	FTP write data closed
624	FTP write data error
625	FTP host not found
626	FTP accept failure
627	FTP listen failure
628	FTP bind failure
629	FTP file create failure
630	FTP file get failure
631	FTP file put failure
632	FTP file not found
633	FTP timed out
634	FTP login incorrect
635	FTP close error
636	FTP server not ready
637	FTP server shutdown
638	FTP unexpected reply
639	FTP user ID and password don't match
640	FTP user ID and password don't match
641	FTP user already logged in
642	FTP open channel timeout
643	FTP communication timeout
644	FTP unknown error
657	Network survey error (No Carrier)
658	Network survey error (Busy)
659	Network survey error (Wrong request)
660	Network survey error (Aborted)
680	LU processing
681	Network search aborted
682	PTM mode
683	Network search terminated
684	CSG Search processing
690	Active call state
691	RR connection established
770	SIM invalid
900	No Response for AT Command
1000	SSL not activated
1001	SSL certs and keys wrong or not stored
1002	SSL generic error

Numeric Format [3]	Verbose Format [4]
1003	SSL already activated
1004	SSL error during handshake
1005	SSL socket error
1006	SSL invalid state
1007	SSL cannot activate
1008	SSL not connected
1009	SSL already connected
1010	SSL error enc/dec data
1011	SSL disconnected
1100	Model not recognized
1101	Model information missing
1102	Unable to open the file
1103	Unable to close the file
1104	Unable to read the nv file
1105	Unable to write the nv file
1106	Input pattern is wrong
1113	Call establishment failed
1114	File name already exist
1251	This APN is not allowed on this device. Please try another one.

2.2.2.2.   Message Service Failure Result Code - +CMS ERROR: <err>

This is NOT a command, it is the error response to +Cxxx 3GPP TS 27.005 commands.

Syntax: **+CMS ERROR: <err>**
Parameter: **<err>** - numeric error code.
The **<err>** values are reported in the table:

Numeric Format	Meaning
According to 3GPP TS 24.011 section 8.2.5.4	
0...127	
According to 3GPP TS 23.040 sub clause 9.2.3.22 values	
128...255	
According to 3GPP TS 27.005 section 3.2.5 - Message Service Failure Result Code +CMS ERROR	
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network time-out
340	no +CNMA acknowledgement expected

Numeric Format	Meaning
500	unknown error
510	msg blocked
<err> 512 and on are manufacturer specific	
512	No SM resources
513	TR1M timeout
514	LL error
515	No response from network

2.2.3. Information Responses and Result Codes

The TA response, in case of verbose response format enabled, for the previous examples command line could be as shown below:

- information response to **+CMD1?**
  <CR><LF>+CMD1:2,1,10<CR><LF>

- information response to **+CMD1=?**
  <CR><LF>+CMD1(0-2),(0,1),(0-15)<CR><LF>

- result code   **<CR><LF>OK<CR><LF>**

Moreover, there are other two types of result codes:

- *result code*s that inform about progress of TA operation (e.g. connection establishment **CONNECT**)

- *result code*s that indicate occurrence of an event not directly associated with issuance of a command from TE (e.g. ring indication **RING**).

Here the basic result codes according to ITU-T V25Ter recommendation

Numeric form	Verbose form
0	OK
1	CONNECT or CONNECT <text>3F3F5
2	RING
3	NO CARRIER
4	ERROR
6	NO DIALTONE
7	BUSY
8	NO ANSWER
10	CONNECT 24004
11	CONNECT 48004
12	CONNECT 96004
15	CONNECT 144004
23	CONNECT 1200/754

2.2.4. Command Response Time-Out

Every command issued to the Telit modules returns a result response, if response codes are enabled (default). The time needed to process the given command and return the response varies, depending on the command type. Commands that do not interact with the SIM or the network, and only involve internal setups or readings, have an immediate response. Commands that interact with the SIM or the network could take many seconds to send a response, depending on SIM configuration (e.g., number of contacts stored in the phonebook, number of stored SMS), or on the network the command may interact with.

2.2.5. Command Issuing Timing

The chain Command -> Response shall always be respected, and a new command must not be issued before the module has terminated all the sending of its response result code (whatever it may be).

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[5] <text> can be"300", "1200", "2400", "4800", "9600", "14400" or "1200/75"

This applies especially to applications that "sense" the **OK** text and therefore may send the next command before the complete code **<CR><LF>OK<CR><LF>** is sent by the module.

It is advisable anyway to wait for at least 20ms between the end of the reception of the response and the issue of the next AT command.

If the response codes are disabled and therefore the module does not report any response to the command, then at least the 20ms pause time shall be respected.

2.3. Storage

2.3.1. Factory Profile and User Profiles

The Telit wireless modules store the values, set by several commands, in the internal nonvolatile memory (NVM), allowing to remember this setting even after power off. In the NVM, these values are set either as factory profile or as user profiles. There are two customizable user profiles and one factory profile in the NVM of the device: by default, the device will start with user profile 0 equal to factory profile.

For backward compatibility, each profile is divided into two sections, one base section which was historically the one that was saved and restored in early releases of code, and the extended section which includes all the remaining values.

The **&W** command is used to save the current values of both sections of profiles into the NVM user profile.

Commands **&Y** and **&P** are both used to set the profile to be loaded at startup. **&Y** instructs the device to load at startup only the base section. **&P** instructs the device to load at startup the full profile: base + extended sections.

The **&F** command resets to factory profile values only the command of the base section of profile, while the **&F1** resets to factory profile values the full set of base + extended section commands.

The values set by other commands are stored in NVM outside the profile: some of them are stored always, without issuing any **&W**, some other are stored issuing specific commands **(+CSAS)**; all these values are read at power-up.

In this document, each AT command description begins with a "AT Command short overview table" having the following format:

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
/	see below	/	/	/

This chapter focus on the values that **Setting saved** field can assume and their meaning. The meaning of the other fields will be described in the next chapter. **Setting saved** field can have one of the values listed below:

Specific profile / Common profile	The parameters values set by the command are stored in the profile base section. Examples of the AT commands: **+IPR, E, Q, V, X, &C**, etc.
	The parameters values set by the command are stored in the profile extended section. Examples of the AT commands: **+CREG, +CMEE**, etc.
	ⓘ There is no difference between "Specific profile" and "Common profile" in FN980m.
Auto	The parameters values set by the command are automatically stored in NVM, without issuing any storing AT command, and independently from the profile (unique values). The values are automatically restored at startup. Examples of the AT commands: **+COPS, +CGQREQ**, etc.
	In some cases, the parameters values are store in the file system.
Other	The parameters values set by the command are stored in NVM issuing a specific command and independently from the profile. Examples of the AT commands: **+CSCA, +CSMP** setting is saved by **+CSAS** and restored by **+CRES** command.

2.4. AT Command Short Overview Table

As stated before, each AT command description begins with a "AT Command short overview table" having the following format:

SIM Presence	Setting saved	Can be aborted		MAX timeout	SELINT
Not required	/	No		-	2

Here are the table fields meanings:

SIM Presence   indicates if the AT command to be executed needs the SIM presence.

Can be aborted indicates if the AT command can be aborted during its execution.

MAX timeout   indicates the time within which the command must be executed.

SELINT   indicates on which AT interface type the AT command is available.

3. AT COMMANDS REFERENCES

3.1.   Call & DTMF

3.1.1.   AT+CHUP - Hang Up Call

This command cancels all active and held calls

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CHUP
Execution command cancels all active and held calls, also if a multi-party session is running

AT+CHUP=?
Test command returns the **OK** result code

3.1.2. AT+CSTA - Select Type of Address

Select type of address.

3GPP TS 24.008

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CSTA=[<type>]

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

Parameter:

Name	Type	Default	Description
<type>	integer	129	type of address octet in integer format (refer to 3GPP TS 24.008, sub clause 10.5.4.7); default 145 when dialing string includes international access code character "+", otherwise 129

Values:

129 : National address type.

145 : International number. Dialing string includes international access code character "+".

AT+CSTA?

Read command returns the current value of **<type>** parameter in the format:
+CSTA: <type>

AT+CSTA=?

Test command reports the range of the **<type>** parameter values.

3.1.3. AT+FCLASS - Select Active Service Class

This command sets the wireless module in specified connection mode (data, voice), hence all the calls done afterwards will be data or voice.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+FCLASS=<n>

Parameter:

Name	Type	Default	Description
<n>	integer	0	type of call

Values:

0 : data type

8 : voice type

AT+FCLASS?

Read command returns the current configuration value of the parameter **<n>**.

AT+FCLASS=?

Test command returns all supported values of the parameters **<n>**.

3.1.4.　AT#ACALEXT - Extended Automatic Call

This command enables the extended automatic call function.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT#ACALEXT=[<mode>,<index>]

Set command enables/disables the extended automatic call function.

Parameters:

Name	Type	Default	Description
<mode>	integer	0	enables/disables the automatic call function to a contact in the selected phonebook

Values:

0 : disable

1 : enable, internal phonebook

2 : enable, "SM" phonebook

3 : enable, "ME" phonebook

Name	Type	Default	Description
<index>	integer	0	position in the currently selected phonebook

Value:

0÷max : index

ⓘ The max value of **<index>** is given by the test command.

ⓘ If the extended automatic call function is enabled and **&D2** has been issued, the transition OFF/ON of DTR causes an automatic call to the number stored in position **<index>** in the selected phonebook.

ⓘ The type of call depends on the last setting of the command **+FCLASS**.

AT#ACALEXT?

Read command returns the current value of <**mode**> and <**index**> in the format:

#ACALEXT: <mode>,<index>

AT#ACALEXT=?

Test command returns three ranges of values: the first for parameter <**mode**>, the second for parameter <**index**>, when the internal phonebook is chosen, and the third for parameter <**index**>, when the "SM" phonebook is chosen, the fourth for parameter <index> when "ME" phonebook is chosen.

ⓘ The range of available positions in a phonebook depends on the selected phonebook.

3.1.5. AT#ECAM - Extended Call Monitoring

This command enables/disables the call monitoring function in the ME.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT#ECAM=[<onoff>]

Set command enables/disables the call monitoring function in the ME.

Parameter:

Name	Type	Default	Description
<onoff>	integer	0	Enables/disables the call monitoring function in the ME, that informs the user about call events such as incoming call, connected, hang up etc. using the following unsolicited indication:

#ECAM: <ccid>,<ccstatus>,<calltype>,,,[<number>,<type>]

Values:

0 : disables call monitoring function

1 : enables call monitoring function

Unsolicited fields:

Name	Type	Description
<ccid>	integer	call ID number
<ccstatus>	integer	call status
		Values:
		0 : idle
		1 : calling (MO)
		2 : connecting (MO)
		3 : active
		4 : hold
		5 : waiting (MT)
		6 : alerting (MT)
		7 : busy
		8 : retrieved
		9 : CNAP (Calling Name Presentation) information (MT)
<calltype>	integer	call type indicator
		Values:
		1 : voice
		2 : data
<number>	string	called number (valid only if **<ccstatus>** is 1)
<type>	string	type of **<number>**

Values:

129	:	national number
145	:	international number

ⓘ the unsolicited indication is sent along with usual codes (**OK**, **NO CARRIER**, **BUSY**...)

AT#ECAM?
Read command reports whether the extended call monitoring function is currently enabled or not, in the format:

#ECAM: <onoff>

AT#ECAM=?
Test command returns the list of supported values for <**onoff**>

3.1.6.   AT+VTS - DTMF Tones Transmission

The command handles the transmission of DTMF tones.

3GPP TS 27.007
TIA IS-101

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+VTS=<dtmfString>[,<duration>]

Execution command allows the transmission of DTMF tones.

Parameters:

Name	Type	Default	Description
<dtmfString>	string	-	string of **<dtmf>**s, i.e. ASCII characters in the set (0 9), #,*,(A-D),P; it allows the user to send a sequence of DTMF tones, each of them with a duration that was defined through **+VTD** command
<duration>	integer	0	duration of a tone in 1/100 sec; this parameter can be specified only if the length of first parameter is just one ASCII character

Values:

0	:	a single DTMF tone will be transmitted for a duration depending on the network, no matter what the current AT+VTD setting is
1÷255	:	a single DTMF tone will be transmitted for a time <duration> (in 10 ms multiples), no matter what the current AT+VTD setting is

ⓘ The character P does not correspond to any DTMF tone, but it is interpreted as a pause of 3 seconds between the preceding and succeeding DTMF string elements.

AT+VTS=?

Test command provides the list of supported **<dtmf>**s and the list of supported **<duration>**s in the format:

(list of supported **<dtmf>**s)**[,**(list of supported **<duration>**s)**]**

3.1.7.   AT+VTD - Tone Duration

This command sets the length of tones transmitted with **+VTS** command.

3GPP TS 27.007
TIA IS-101

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Common profile	No	-	2

AT+VTD=<n>

Set command refers to an integer **<n>** that defines the length of tones emitted with **+VTS** command.

Parameter:

Name	Type	Default	Description
<n>	integer	0	duration of a tone

Values:

0   :   the duration of every single tone is dependent on the network

1÷255   :   duration of every single tone in 1/10 sec

AT+VTD?

Read command reports the current Tone Duration, in the format:

<duration>

AT+VTD=?

Test command provides the list of supported <**duration**>

3.1.8. AT+CRC - Cellular Result Codes

Set command controls whether the extended format of incoming call indication is used.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CRC=[<mode>]

Parameter:

Name	Type	Default	Description
<mode>	integer	0	disables/enables extended format reporting. When enabled, an incoming call is indicated to the TE with unsolicited result code **+CRING: <type>** instead of the normal **RING**

Values:

0 : disables extended format reporting (factory default)

1 : enables extended format reporting

Unsolicited field:

Name	Type	Description
<type>	string	call type

Values:

ASYNC : asynchronous transparent data

SYNC : synchronous transparent data

REL ASYNC : asynchronous non-transparent data

REL SYNC : synchronous non-transparent data

VOICE : normal voice (TS 11)

> Entering **AT+CRC=** returns **OK** but has no effect.

AT+CRC?

Read command returns current value of the parameter <**mode**>

AT+CRC=?

Test command returns supported values of the parameter <**mode**>

3.1.9.   AT#ACAL - Automatic Call

Automatic Call.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT#ACAL=[<mode>]

Set command enables/disables the automatic call function.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	disables or enables the automatic call function
		Values:	
		0 :	disable the automatic call function
		1 :	enable the automatic call function

Additional info:

▶▶   <mode>=1

   If the automatic call function is enabled, and **&D2** command has been issued, the transition
   OFF/ON of DTR causes an automatic call to the first number (position 0) stored in the
   internal phonebook.

🛈   Type of call depends on the last issue of command **+FCLASS**.

🛈   See **&Z** and **&N** commands respectively to write or read the phone number on/from the
   internal phonebook of the module.

AT#ACAL?

Read command reports the current automatic call function mode in the format:

#ACAL: <mode>

As a consequence of the introduction of the command **#ACALEXT** (Extended Automatic Call), it is
possible that the read command returns a value supported by **#ACALEXT** but not supported by
#ACAL. Due to this possible situation it is strongly recommended not to use contemporaneously
both commands.

🛈   Because of the typing in of the **#ACALEXT** (Extended Automatic Call) command, the
   #ACAL? read command could return a value supported by **#ACALEXT** and not
   by **#ACAL** set command. Therefore, it is strongly recommended to avoid the use of these
   two commands at the same time.

AT#ACAL=?

Test command returns the supported range of **<mode>** parameter values.

- Assume that **#ACALEXT** command has been entered. The **#ACAL?** read command could return the following parameter value.
  AT#ACAL?
  #ACAL: 2
  OK

3.1.10. AT+CVHU - Voice Hung Up Control

This command is used in order to set how to disconnect a voice connection.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CVHU=[<mode>]

Set command selects whether **ATH** or "drop DTR" shall cause a voice connection to be disconnected or not.

Parameter:

Name	Type	Default	Description
<mode>	integer	2	Selects how to disconnect a voice connection.

Values:

0 : "Drop DTR" ignored but OK result code given. ATH disconnects.

1 : "Drop DTR" and ATH ignored but OK result code given.

2 : "Drop DTR" behavior according to &D setting. ATH disconnects.

OK result code is displayed only when using UART.

AT+CVHU?

Read command reports the current value of the <**mode**> parameter, in the format:
+CVHU: <mode>

AT+CVHU=?

Test command reports the range of supported values for parameter <**mode**>.

3.1.11. AT#UDUB - User Determined User Busy

This command disconnects all active calls setting the "user busy" cause for disconnection.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT#UDUB

Execution command disconnects all active calls (like **H** or **+CHUP**), but setting the "user busy" cause for disconnection (only if we have an incoming call that has not been answered yet, and that we want to reject).

AT#UDUB=?

Test command returns the **OK** result code

3.2. General Control and Config

3.2.1. AT#DIALMODE - Set Dialing Mode

This command sets dialing modality.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#DIALMODE=[<mode>]

Set command sets dialing modality.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	sets dialing modality

Values:

    0 : voice call only, see Additional info

    1 : voice call only, see Additional info

    2 : voice call and data call, see Additional info

Additional info:

▶▶ **<mode>**=0

Voice call only, **OK** result code is received as soon as it starts remotely ringing.

▶▶ **<mode>**=1

Voice call only, **OK** result code is received only after the called party answers. Any character typed aborts the call and **OK** result code is received.

▶▶ **<mode>**=2

Voice call and data call, the following custom result codes are received, monitoring step by step the call status:

DIALING (MO in progress)
RINGING (remote ring)
CONNECTED (remote call accepted)
RELEASED (after **ATH**)
DISCONNECTED (remote hang-up).

Any character typed before the **CONNECTED** message aborts the call.

ℹ️ In case a BUSY tone is received and at the same time **ATX0** is enabled **ATD** will return **NO CARRIER** instead of **DISCONNECTED**.

ℹ️ The setting is saved in **NVM** and available on following reboot.

AT#DIALMODE?

Read command returns current **ATD** dialling mode in the format:
#DIALMODE: <mode>

AT#DIALMODE=?

Test command returns the supported range of values for parameter <**mode**>.

3.2.2.   AT#GETFW - Get firmware status

This command used to read all modem carrier firmware information.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#GETFW

Execution command return all modem firmware information in the following format:

HOST FIRMWARE   : <Host Version>
SLOT   STATUS   CARRIER   VERSION   TMCFG
<modem firmware 1 >
<modem firmware 2 >

ⓘ   Carrier name has been deprecated(only for backward compatibility)

AT#GETFW=?

Test command returns **OK**.

3.2.3. AT#ACTIVEFW - Active firmware

This command used to select active modem firmware.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#ACTIVEFW=<op_mode>,<option>

Set command active the selected modem firmware at **<slot_idx>**.

If the specified modem firmware selected, it return OK result. Power-cycle (reboot) action will be performed, automatically. And a new selected modem firmware loaded at boot time.

Parameters:

Name	Type	Default	Description
<op_mode>	integer	N/A	option mode
			Values:
	1	:	Active specific modem firmware by slot index
	2	:	Active specific modem firmware by carrier name
	3	:	Active specific modem firmware by version name
<option>	mixed	-	If **<op_mode>** is 1:
			<option> is decimal number of slot index to active 1 : Active modem firmware at slot 1 2 : Active modem firmware at slot 2
			If **<op_mode>** is 2:
			<option> is string value of firmware name to active (ex) "GCF"
			If **<op_mode>** is 3:
			<option> is string value of version name to active (ex) "M0H.000000-A002"

🛈 If **<op_mode>** is 2:
Carrier name has been deprecated(only for backward compatibility)

AT#ACTIVEFW?

Read command returns information of the activated modem carrier firmware

AT#ACTIVEFW=?

Test command returns **OK**

3.2.4. AT#CLEARFW - Clear firmware

This command used to clear modem firmware from module.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#CLEARFW=<op_mode>[,<option>]

Execution command clear modem firmware from module

Parameters:

Name	Type	Default	Description
<op_mode>	integer	N/A	option mode
			Values:
			0 : clear all modem firmware
			1 : clear specific modem firmware by slot index
			2 : clear specific modem firmware by firmware name
			3 : clear specific modem firmware by version name
<option>	mixed	-	If **<op_mode>** is 0:
			There are no option field for <op_mode> 0
			If **<op_mode>** is 1:
			<option> is decimal number of slot index to clear (ex) 2
			If **<op_mode>** is 2:
			<option> is string value of firmware name to clear (ex) "firmware name"
			If **<op_mode>** is 3:
			<option> is string value of version name to clear (ex) "version name"

> ℹ Slot 1 is fixed for specific firmware image and cannot be erased by this command

> ℹ Double Quotation (" ") should be added for "firmware name" and "version name".

> ℹ If **<op_mode>** is 2:
> Carrier name has been deprecated(only for backward compatibility)

AT#CLEARFW=?
Test command returns **OK**.

3.2.5.   AT#FIRMWARE - Firmware

This command used to get modem firmware information.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#FIRMWARE[=<mfw_idx>]

Set command load the selected modem carrier firmware.

If the specified modem carrier firmware selected, it return **OK** result. Power-cycle (reboot) action will be performed, automatically. And a new selected modem carrier firmware loaded at boot time.

Parameter:

Name	Type	Default	Description
<mfw_idx>	integer	-	1 : modem carrier firmware 1
			...
			N : modem carrier firmware N
			Where N is the maximum index for the modem firmware

Additional info:

▶▶   Execution command return all firmware information in the following format

HOST FIRMWARE   : <Host Version>
MODEM FIRMWARE : <The maximum value of N>
INDEX STATUS CARRIER VERSION TMCFG LOC
<modem carrier firmware 1 >
...
<modem carrier firmware N >

🛈   **#FIRMWARE** has been replaced by **AT#ACTIVEFW**.

🛈   Carrier name has been deprecated(only for backward compatibility)

AT#FIRMWARE?

Read command returns the activated modem firmware index
#FIRMWARE: <mfw_idx>

AT#FIRMWARE=?

Test command returns the list of supported carrier firmware index.
#FIRMWARE: (1-N)

3.2.6. AT#HWREV - Hardware Identification

This command returns the device Hardware revision identification code.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#HWREV
Execution command returns the device Hardware revision identification code without command echo.

AT#HWREV=?
Test command returns the **OK** result code.

3.2.7. AT#ICMP - Ping Support

This command enables/disables the ICMP Ping support.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT#ICMP=<mode>

Set command enables/disables the ICMP Ping support.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	ICMP mode selection.

Values:

0 : disable ICMP Ping support

1 : enable firewalled ICMP Ping support (Not available)

2 : enable free ICMP Ping support; the module is sending a proper ECHO_REPLY to every IP Address pinging it.

AT#ICMP?

Read command returns whether the ICMP Ping support is currently enabled or not, in the format:

#ICMP: <mode>

AT#ICMP=?

Test command reports the supported range of values for the **<mode>** parameter.

3.2.8. AT#B30TXDIS - Set B30 TX disable

This command enable or disable the LTE B30 TX.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#B30TXDIS=<mode>

Set command allows the LTE B30 TX enable/disable.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	LTE B30 TX enable/disable value.
			Values:
			0 : B30 TX enable
			1 : B30 TX disable

ⓘ The value set by command operate after power cycle.

AT#B30TXDIS?

Read command reports the currently selected **<mode>** in the format:
#B30TXDIS: <mode>

AT#B30TXDIS=?

Test command reports the supported range of values.

</>
AT#B30TXDIS?
#B30TXDIS: 0 : Modem support LTE B30 TX.
#B30TXDIS: 1 : Modem don't support LTE B30 TX.

3.2.9. AT#SELQTMANT - Select QTM Antenna

This command is used to select MMWAVE QTM Antenna configuration.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#SELQTMANT=<mode>

Set command is used to select MMWAVE QTM Antenna configuration.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	select the QTM configuration. (default : 0)

Values:

    0 : Use QTM Antenna #0, #1, #2, #3

    1 : Use QTM Antenna #0, #1, #2

    2 : Use QTM Antenna #0, #1, #3

    3 : Use QTM Antenna #0, #2, #3

    4 : Use QTM Antenna #1, #2, #3

    5 : Use QTM Antenna #0, #1

    6 : Use QTM Antenna #0, #2

    7 : Use QTM Antenna #0, #3

    8 : Use QTM Antenna #1, #2

    9 : Use QTM Antenna #1, #3

    10 : Use QTM Antenna #2, #3

Additional info:

Mode\QTM	#0	#1	#2	#3
0	O	O	O	O
1	O	O	O	X
2	O	O	X	O
3	O	X	O	O
4	X	O	O	O
5	O	O	X	X
6	O	X	O	X
7	O	X	X	O
8	X	O	O	X
9	X	O	X	O
10	X	X	O	O

▶▶ If **AT#SELQTMANT=1** has been issued, the QTM Antenna #0,#1 and #2 will be automatically set. This means that customer want to use only QTM Antenna #0,#1 and #2 except #3.

ℹ️ This setting will take effect after the next boot.

ℹ️ If module which does not equipped with QTM 525 Antenna set **<mode>,** ERROR will be returned.

◀📟 **AT#SELQTMANT?**
Read command reports current QTM configuration in the format:
#SELQTMANT: <mode>

where:
<mode> as above.

?📟 **AT#SELQTMANT=?**
Test command reports the available range of values for parameter **<mode>.**

3.2.10. Command Line Prefixes

3.2.10.1. AT - Starting a Command Line

AT is the prefix used to start a command line.

➡️⊚ ITU-T Recommendation V.25 ter
3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

➡️📟 **AT**
The prefix **AT** is a two-character abbreviation ("ATtention"), always used to start a command line to be sent from TE to TA, with the only exception of AT#/ prefix. As a command, it can be issued just to test if the device is responding to AT commands.

3.2.10.2. A/ - Last Command Automatic Repetition

The command immediately executes the previously issued command or commands.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

A/

If the prefix **A/** is issued, the device immediately executes once again the body of the preceding command line. No editing is possible, and no termination character is necessary. A command line may be repeated multiple times through this mechanism, if desired.

If **A/** is issued before any command line has been executed, the preceding command line is assumed to have been empty (that results in an **OK** result code).

ℹ️ This command works only at fixed IPR.

ℹ️ The custom prefix AT**#/** has been defined: it causes the last command to be executed again too; but it doesn't need a fixed **+IPR**.

3.2.10.3. AT#/ - Repeat Last Command

The command immediately executes the previously issued command or commands.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#/

If **AT#/** is issued, the device immediately executes once again the body of the preceding command line. No editing is possible, and no termination character is necessary. A command line may be repeated multiple times through this mechanism, if desired.

If **AT#/** is issued before any command line has been executed, the preceding command line is assumed to have been empty (that results in an **OK** result code).

ℹ️ This command is the same as **A/** but does not need a fixed **+IPR**.

3.2.11. Generic Modem Control

3.2.11.1. AT#SELINT - Select Interface Style

This command sets the AT command interface style.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

➡️ **AT#SELINT=[<v>]**

Set command sets the AT command interface style depending on parameter.

Parameter:

Name	Type	Default	Description
<v>	integer	2	AT command interface style
	Value:		
	2 :	standard AT parser	

⬅️ **AT#SELINT?**

Read command reports the current interface style in the format:

#SELINT: <v>

❓ **AT#SELINT=?**

Test command reports the available range of values for parameter **<v>**.

3.2.11.2. AT&F - Set to Factory-Defined Configuration

Set configuration parameters to default values.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT&F[<value>]

Execution command sets the configuration parameters to default values specified by manufacturer; it takes in consideration hardware configuration switches and other manufacturer-defined criteria.

Parameter:

Name	Type	Default	Description
<value>	integer	0	parameters to reset

Values:

- 0 : only the factory profile base section parameters are considered
- 1 : either the factory profile base section and the extended section are considered (full factory profile)

If parameter **<value>** is omitted, the command has the same behavior as **AT&F0**.

3.2.11.3. ATZ - Soft Reset

Soft Reset

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

ATZ[<n>]

Execution command loads the base section of the specified user profile and the extended section of the default factory profile

Parameter:

Name	Type	Default	Description
<n>	integer	N/A	user profile number
	Value:		
	0,1 :	user profile number	

ⓘ If parameter **<n>** is omitted, the command has the same behavior as **ATZ0**

ⓘ Any active call is terminated.

3.2.11.4. AT&Y - Default Reset Basic Profile Designation

Define the basic profile is loaded on startup.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

➡️ **AT&Y[<n>]**

Execution command defines the basic profile that will be loaded on startup.

Parameter:

Name	Type	Default	Description
<n>	integer	0	basic profile that will be loaded on startup.

Value:

0,1 : profile number: the wireless module can store 2 complete configurations (see command &W).

ℹ️ Differently from command **Z**<n>, which loads just once the desired profile, the one chosen through command **&Y** will be loaded on every startup.

ℹ️ If parameter is omitted the command has the same behavior as **AT&Y0**.

3.2.11.5. AT&P - Default Reset Full Profile Designation

Define which full profile is loaded at startup.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT&P[<n>]

Execution command defines which full profile will be loaded at startup.

Parameter:

Name	Type	Default	Description
<n>	integer	0	full profile will be loaded on startup.

    Value:

     0,1 :   profile number: the wireless module can store 2 full configurations (see command &W).

🛈   Differently from command **Z<n>**, which loads just once the desired profile, the one chosen through command **&P** will be loaded at every startup.

🛈   If parameter is omitted, the command has the same behavior as **AT&P0**

3.2.11.6.   AT&W - Store Current Configuration

Stores the complete configuration of the device.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT&W[<n>]

Execution command stores on profile **<n>** the complete configuration of the device.

Parameter:

Name	Type	Default	Description
<n>	integer	0	profile identifier
	Value:		
	0,1 :	profile identifiers	

🛈   If parameter is omitted, the command has the same behavior of **AT&W0**.

3.2.11.7. AT&V - Display some Configuration and Profile

The command displays some of the basic modem configuration settings and parameters

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT&V

Execution command returns some of the basic modem configuration settings and parameters, one for each row, in the format:

setting/parameter   : value

ℹ️ The row of information about **CTS (C106) OPTIONS** is in the output of **&V** for compatibility reasons and represents only a dummy value.

Example of returned values.

- **AT&V**

COMMAND ECHO	:	E1=YES
RESULT MESSAGES	:	Q0=YES
VERBOSE MESSAGES	:	V1=YES
EXTENDED MESSAGES	:	X1=YES
LINE SPEED	:	F0=autodetect
CONSTANT DTE SPEED	:	YES
FLOW CONTROL OPTIONS	:	&K3=HW bidirect.
ERROR CORRECTION MODE	:	RLP
CTS (C106) OPTIONS	:	&B2=OFF while disc.
DSR (C107) OPTIONS	:	&S3=PHONE ready->ON
DTR (C108) OPTIONS	:	&D0=ignored
DCD (C109) OPTIONS	:	&C1=follows carrier
RI (C125) OPTIONS	:	\R1=OFF dur. off-hk
C108/1 OPERATION	:	&D0=NO
POWER SAVING ON DTR	:	+CFUN:1=NO
DEFAULT PROFILE	:	&Y0=user profile 1

OK

3.2.11.8. AT\V - Single Line Connect Message

This command sets single line connect message.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT\V[<n>]

Execution command sets single line connect message.

Parameter:

Name	Type	Default	Description
<n>	integer	0	set single line connect message
	Values:		
	0 : set OFF		
	1 : set ON		

ℹ if parameter is omitted, the command has the same behaviour of **AT\V0**.

3.2.11.9. AT+GCI - Country of Installation

Set command allows to select the installation country code according to ITU-T35 Annex A.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+GCI=<code>

Parameter:

Name	Type	Default	Description
<code>	integer	59	installation country code

Value:

59 : it currently supports only the Italy country code

AT+GCI?

Read command reports the currently selected country code.

AT+GCI=?

Test command reports the supported values of parameter **<code>**.

3.2.11.10. AT%L - Line Signal Level

It has no effect and is included only for backward compatibility with landline modems.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

3.2.11.11. AT%Q - Line Quality

It has no effect and is included only for backward compatibility with landline modems

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

3.2.11.12. ATL - Speaker Loudness

It has no effect and is included only for backward compatibility with landline modems.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

ATL<n>

Set command has no effect and is included only for backward compatibility with landline modems.

Parameter:

Name	Type	Default	Description
<n>	integer	-	This parameter has no effect

3.2.11.13. ATM - Speaker Mode

It has no effect and is included only for backward compatibility with landline modems.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

ATM=<n>

Set command has no effect and is included only for backward compatibility with landline modems.

Parameter:

Name	Type	Default	Description
<n>	integer	-	No effect.

3.2.11.14. AT+GCAP - Capabilities List

This command returns the equipment supported command set list.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+GCAP

Execution command returns the equipment supported command set list:

+GCAP: +CGSM

Additional info:

▶▶ Supported Command Set:

+CGSM: GSM ETSI command set

AT+GCAP=?

Test command returns **OK** result code.

3.2.11.15. AT+GMI - Manufacturer Identification

This command returns the manufacturer identification.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+GMI
Execution command returns the manufacturer identification followed by an <**OK**> at newline.

AT+GMI=?
Test command returns **OK** result code.

3.2.11.16. AT+GMM - Model Identification

The command returns the model identification.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+GMM
The execution command returns the model identification followed by an <**OK**> at newline.

AT+GMM=?
Test command returns **OK** result code.

3.2.11.17. AT+GMR - Revision Identification

The command returns the software revision identification.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+GMR

Execution command returns the software revision identification followed by an <**OK**> at newline.

AT+GMR=?

Test command returns **OK** result code.

3.2.11.18. AT+CEER - Extended Error Report

Reports extended error related to the last unsuccessful call.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CEER

Execution command returns one or more lines of information text <**report**> offering the TA user an extended error report, in the format:

+CEER: <report>

This report regards some error condition that may occur:
1.   the failure in the last unsuccessful call setup (originating or answering)
2.   the last call release

> If no error condition has occurred since power up, then **"Normal, unspecified"** condition is reported

AT+CEER=?

Test command returns **OK** result code.

3.2.11.19. AT+GSN - Serial Number

The command reports the device board serial number.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+GSN

Execution command returns the device board serial number.

ℹ The number returned is not the IMSI, but it is the board number.

AT+GSN=?

Test command returns **OK** result code.

3.2.11.20. AT+CGMI - Request Manufacturer Identification

The command returns device manufacturer identification code.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CGMI

Execution command returns the device manufacturer identification code followed by an **OK** at newline.

AT+CGMI=?

Test command returns **OK** result code.

3.2.11.21. AT+CGMM - Request Model Identification

This command returns the device model identification.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT+CGMM

Execution command returns the device model identification code followed by an **OK** at newline.

AT+CGMM=?

Test command returns **OK** result code.

3.2.11.22. AT+CGMR - Request Revision Identification

The command returns device software revision number.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CGMR
Execution command returns device software revision number followed by an **OK** at newline.

AT+CGMR=?
Test command returns **OK** result code.

3.2.11.23. AT+CGSN - Request Product Serial Number Identification

This command allows to retrieve the product serial number in form of IMEI of the mobile.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CGSN
Execution command returns the product serial number, identified as the IMEI of the mobile.

AT+CGSN=?
Test command returns **OK** result code.

3.2.11.24. AT#CGMI - Request Manufacturer Identification

The command returns device manufacturer identification code.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CGMI
Execution command returns the device manufacturer identification code, with command echo.
The response is as follows
#CGMI: *<code>*
OK

AT#CGMI=?
Test command returns **OK** result code.

3.2.11.25. AT#CGMR - Request Revision Identification

The command returns device software revision number.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CGMR
Execution command returns device software revision number, with command echo.
The response is as follows
#CGMR: <num>
OK

AT#CGMR=?
Test command returns **OK** result code.

3.2.11.26. AT#CGSN - Product Serial Number Identification

This command returns the product serial number in form of IMEI of the mobile.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CGSN

Execution command returns the product serial number in form of IMEI of the mobile, with command echo.

The response is as follows

#CGSN: <sn>

OK

AT#CGSN=?

The test command returns the **OK** result code.

3.2.11.27. AT#CGMF - Request Product Code

Execution command returns the device product parameter code

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CGMF
The command returns the following message:

AT#CGMF
\<product parameter version\>

OK

AT#CGMF=?
Test command returns **OK** result code.

3.2.11.28. AT#SWPKGV - Request Software Package Version

This command allows to retrieve the software package version.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#SWPKGV

Execution command returns the software package version without **#SWPKGV:** command echo.
The response is as follows:

AT#SWPKGV
<Telit Software Package Version>-<Production Parameters Version>
<Modem FW Version>
<Production Parameters Version>
<Application FW Version>

OK

AT#SWPKGV=?
Test command returns **OK** result code.

```
AT#SWPKGV
38.02.000-B006-P0H.000400
M0H.020000-B014
P0H.000400
A0H.000200-B006
OK
```

3.2.11.29. AT+CPAS - Phone Activity Status

Execution command reports the device status in the form shown in Additional info section.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CPAS

Additional info:

▶▶ Message format returned by the execution command:

+CPAS: <pas>

Name	Type	Default	Description
<pas>	integer	0	phone activity status.

Values:

0 : ready (device allows commands from TA/TE)

1 : unavailable (device does not allow commands from TA/TE)

2 : unknown (device is not guaranteed to respond to instructions)

3 : ringing (device is ready for commands from TA/TE, but the ringer is active)

4 : call in progress (device is ready for commands from TA/TE, but a call is in progress)

ⓘ '1' and '2' at <pas> is not supported.

ⓘ In the LTE registration state, CPAS: 4 (call in progress) is displayed.

AT+CPAS=?

Test command reports the supported range of values for **<pas>**.

ⓘ Although **+CPAS** is an execution command, 3GPP TS 27.007 requires the Test command to be defined.

3.2.11.30. AT+CFUN - Set Phone Functionality

This command selects the level of functionality in the ME.

➡️) 3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

➡️⎕ **AT+CFUN=[<fun>[,<rst>]]**

Set command selects the level of functionality in the ME.

Parameters:

Name	Type	Default	Description
<fun>	integer	1	Power saving function mode.

Values:

0 : minimum functionality (low power mode)

1 : mobile full functionality

4 : disable both TX and RX

6 : reset

7 : offline mode

Name	Type	Default	Description
<rst>	integer	0	reset flag

Values:

0 : do not reset the ME before setting it to <fun> functionality level

1 : reset the ME before setting it to <fun> full functionality

ℹ️ Issuing **AT+CFUN=0[,0]** causes the module to perform either a network deregistration and a SIM deactivation.

ℹ️ In the **<fun>=7**(offline), modem can only be changed to **<fun>=6**(reset)

⬅️⎕ **AT+CFUN?**

Read command reports the current setting of <**fun**>.

?⎕ **AT+CFUN=?**

Test command returns the list of supported values for <**fun**> and <**rst**>.

3.2.11.31. AT+CIND - Indicator Control

This command is used to control the registration state of modem indicators.

🎯 3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CIND=[<state>[,<state[,...]]]

Set command is used to control the registration state of ME indicators, in order to automatically send the **+CIEV** URC, whenever the value of the associated indicator changes. The supported indicators (**<descr>**) and their order appear from test command **AT+CIND=?**

Parameter:

Name	Type	Default	Description
<state>	integer	1	registration state

Values:

0 : the indicator is deregistered; there's no unsolicited result code (+CIEV URC) automatically sent by the modem to the application, whenever the value of the associated indicator changes; the value can be directly queried with +CIND?

1 : the indicator is registered: an unsolicited result code (+CIEV URC) is automatically sent by the modem to the application, whenever the value of the associated indicator changes; it is still possible to query the value through AT+CIND?

ℹ️ When the modem is switched on all of the indicators are in registered mode.

ℹ️ See also command **+CMER**

AT+CIND?

Read command returns the current value of ME indicators, in the format:

+CIND: <ind>[,<ind>[,...]]

Additional info:

▶▶ Read command response parameter

Name	Type	Default	Description
<ind>	integer	-	indicator value, which shall be in range of corresponding **<descr>**. See test command **AT+CIND=?**

ⓘ   The order of the values <**ind**>s is the one returned by test command **AT+CIND=?**

?▢   **AT+CIND=?**

Test command returns pairs, where string value **<descr>** is a description of the indicator and compound value is the supported values for the indicator, in the format:

+CIND: ((**<descr>,** (list of supported **<ind>s**))**[,(<descr>,** (list of supported **<ind>s**))**[,...]])**

Additional info:

▶▶   Test command response parameters

Name	Type	Default	Description
<descr>	string	N/A	indicators names, maximum 16 chars long

Values:

"battchg" : battery charge level; indicator <ind> in the range 0...5, or 99 (not measurable)

"signal" : signal quality; indicator <ind> in the range 0...7, or 99 (not measurable); same as bit error rate (<ber>) in +CSQ command

"sounder" : sounder activity; indicator <ind> is 0 (no sound activity) or 1 (sound activity)

"service" : service availability; indicator <ind> is 0 (not registered to any network) or 1 (registered)

"message" : message received; indicator <ind> is 0 (no unread SMS in memory "SM") or 1 (unread SMS in memory "SM")

"call" : call in progress; indicator <ind> is 0 (no calls in progress) or 1 (at least a call has been established)

"roam" : roaming; indicator <ind> is 0 (registered to home network, or not registered) or 1 (registered to other network))

"smsfull" : SMS memory status; indicator <ind> is 0 (memory locations available) or 1 (an SMS storage in the modem is full)

"rssi" : received signal strength level; indicator <ind> values are 0 (signal strength under -112dBm), from 1 to 4 (signal strength from -97 to -66 dBm, in 15 dBm steps), 5 (signal strength greater than -51 dBm), or 99 (not measurable)

Next command causes all the indicators to be registered
AT+CIND=1,1,1,1,1,1,1,1

Next command causes all the indicators to be de-registered
AT+CIND=0,0,0,0,0,0,0,0

Next command to query the current value of all indicators
AT+CIND?
CIND: 4,0,1,0,0,0,0,2

OK

3.2.11.32. AT+CMER - Mobile Equipment Event Reporting

This command configures sending of unsolicited result codes from TA to TE.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CMER=[<mode>[,<keyp>[,<disp>[,<ind>[,<bfr>]]]]]

Set command enables/disables sending of unsolicited result codes from TA to TE in the case of indicator state changes.

Parameters:

Name	Type	Default	Description
<mode>	integer	0	controls the processing of unsolicited result codes

Values:

0	:	buffer +CIEV Unsolicited Result Codes
1	:	discard +CIEV Unsolicited Result Codes when TA-TE link is reserved (e.g. on-line data mode); otherwise forward them directly to the TE
2	:	buffer +CIEV Unsolicited Result Codes in the TA when TA-TE link is reserved (e.g. on-line data mode) and flush them to the TE after reservation; otherwise forward them directly to the TE
3	:	forward +CIEV Unsolicited Result Codes directly to the TE; when TA is in on-line data mode each +CIEV URC is stored in a buffer; once the ME goes into command mode (after +++ was entered), all URCs stored in the buffer will be output

Name	Type	Default	Description
<keyp>	integer	0	keypad event reporting

Value:

0	:	No keypad event reporting

Name	Type	Default	Description
<disp>	integer	0	display event reporting

Value:

0	:	no display event reporting

Name	Type	Default	Description
<ind>	integer	0	indicator event reporting

Values:

0	:	no indicator event reporting
2	:	indicator event reporting

Name	Type	Default	Description
<bfr>	integer	0	TA buffer clearing

Values:

0	:	TA buffer of unsolicited result codes is cleared when <mode> 1..3 is entered

| | 1 | : | TA buffer of unsolicited result codes is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes) |

ℹ️ Sending of URCs in the case of key pressings or display changes are currently not implemented.

ℹ️ After **+CMER** has been switched on with e.g. **AT+CMER=2,0,0,2** command (i.e. **<bfr>** is 0), URCs for all registered indicators will be issued only first time, if previous **<mode>** was 0, for backward compatibility. Values shown by the indicators will be current indicators values, not buffered ones. Subsequent **+CMER** commands with **<mode>** different from 0 and **<bfr>** equal to 0 will not flush the codes, even if **<mode>** was set again to 0 before. To flush the codes, **<bfr>** must be set to 1.

ℹ️ Although it is possible to issue the command when SIM PIN is pending, it will answer **ERROR** if "message" or "smsfull" indicators are enabled in **+CIND**, because with pending PIN it is not possible to give a correct indication about SMS status. To issue the command when SIM PIN is pending you have to disable "message" and "smsfull" indicators in **+CIND** first.

AT+CMER?

Read command returns the current setting of parameters, in the format:

+CMER: <mode>,<keyp>,<disp>,<ind>,<bfr>

AT+CMER=?

Test command returns the range of supported values for parameters **<mode>, <keyp>, <disp>, <ind>, <bfr>,** in the format:

+CMER: (list of supported **<mode>s**),(list of supported **<keyp>s**), (list of supported **<disp>s**),(list of supported **<ind>s**),(list of supported **<bfr>s**)

3.2.11.33. AT+CACM - Accumulated Call Meter

This command resets the Advice of Charge related Accumulated Call Meter (ACM) value in SIM card or in the active application in the UICC.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CACM=[<pwd>]

Set command resets the Advice of Charge related accumulated call meter (ACM) value in SIM card or in the active application in the UICC. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is usually required to reset the value.

Parameter:

Name	Type	Default	Description
<pwd>	string	-	SIM PIN2

AT+CACM?

Read command returns the current value of ACM in the format:

+CACM: <acm>

Additional info:

▶▶ Response parameter

Name	Type	Default	Description
<acm>	string	-	accumulated call meter value; three bytes of the ACM value in hexadecimal format (e.g. "00001E" indicates decimal value 30)

ℹ The value <**acm**> is in home units; price per unit and currency are defined with command **+CPUC**.

AT+CACM=?

Test command returns the **OK** result code.

3.2.11.34. AT+CAMM - Accumulated Call Meter Maximum

This command sets the Advice of Charge related to accumulated call meter maximum (ACMmax) value stored in SIM.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Other	No	-	2

AT+CAMM=<acmmax>[,<pwd>]

Set command sets the Advice of Charge related accumulated call meter maximum value (ACMmax) stored in SIM. ACMmax contains the maximum number of home units allowed to be consumed by the subscriber. When ACM (refer **+CACM**) reaches ACMmax calls are prohibited. SIM PIN2 is usually required to set the value.

Parameters:

Name	Type	Default	Description
<acmmax>	string	-	accumulated call meter maximum value
<pwd>	string	-	SIM PIN2

ℹ️ Setting **<acmmax>** to 0 disables the feature.

AT+CAMM?

Read command returns the current value of ACMmax in the format:

+CAMM: <acmmax>

AT+CAMM=?

Test command returns the **OK** result code.

3.2.11.35. AT+CPUC - Price per Unit and Currency Table

This command sets the values of Price per Unit and Currency Table.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CPUC=<currency>,<ppu>[,<pwd>]

Set command sets the values of Advice of Charge related Price per Unit and Currency Table (PUCT) stored in SIM. The PUCT information can be used to convert the home units (as used in commands **+CAOC**, **+CACM** and **+CAMM**) into currency units. SIM PIN2 is usually required to set the parameters.

Parameters:

Name	Type	Default	Description
<currency>	string	-	three-character currency code (e.g. "GBP", "DEM", "USD"); character set as specified by command select TE character set **+CSCS**
<ppu>	string	-	price per unit; dot is used as a decimal separator (e.g. "2.66")
<pwd>	string	-	SIM PIN2

AT+CPUC?

Read command reports the current values of <**currency**> and <**ppu**> parameters in the format:

+CPUC: <currency>,<ppu>

AT+CPUC=?

Test command returns the **OK** result code.

3.2.11.36. AT+CCWE - Call Meter Maximum Event

This command is used to enable/disable sending of an unsolicited result code +CCWV.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CCWE=<mode>

Set command is used to enable/disable sending of an unsolicited result code **+CCWV** shortly before the ACM (Accumulated Call Meter) maximum value is reached. The warning is issued approximately when 30 seconds call time remains. It is also issued when starting a call if less than 30 seconds call time remains.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	Current enable mode of **+CCWE** URC

Values:

0 : Disable the call meter warning event

1 : Enable the call meter warning event

ℹ️ The set command will respond with an error if the Accumulated Call Meter service is not active in SIM.

AT+CCWE?

Read command reports the currently selected <**mode**> in the format:
+CCWE: <mode>

AT+CCWE=?

Test command reports the supported range of values for parameter <**mode**>.

3.2.11.37. AT+CSVM - Set Voice Mail Number

Command to set voice mail server number.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CSVM=<mode>[,<number>[,<type>]]

Set command is dummy. It only checks for parameters values validity; it does not send any actual write request to SIM to update voice mail number, nor sends any request to network to enable/disable voice mail.

Parameters:

Name	Type	Default	Description
<mode>	integer	1	enable/disable voice mail number

Values:

0 : disable the voice mail number

1 : enable the voice mail number

<number>	string	-	string type phone number of format specified by **<type>**
<type>	integer	129	type of address octet in integer format

Values:

129 : unknown type of number and ISDN/Telephony numbering plan

145 : international type of number and ISDN/Telephony numbering plan (contains the character "+")

AT+CSVM?

Read command returns the currently selected voice mail number and the status (i.e. enabled/disabled) in the format

+CSVM:<mode>,<number>,<type>

AT+CSVM=?

Test command reports the range for the parameters **<mode>** and **<type>**.

3.2.11.38. AT+CLAC - Available AT Commands

This command shows the available AT commands list.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CLAC

The execution command causes the ME to return one or more lines reporting the AT commands that are available to the user. The format is:

<ATcmd1>[<CR><LF><ATcmd2>[...]]

<**ATcmdn**> is the AT command.

AT+CLAC=?

Test command returns the OK result code.

3.2.11.39. AT#LANG - Select Language

Set command selects the currently used language for displaying different messages.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#LANG=<lan>

Parameter:

Name	Type	Default	Description
<lan>	string	en	selected language

Values:

en : English

it : Italian

de : German

AT#LANG?

Read command reports the currently selected **<lan>** in the format:
#LANG: <lan>

AT#LANG=?

Test command reports the supported range of values for parameter **<lan>**.

3.2.11.40. AT+CMEE - Report Mobile Equipment Error

The command enables the use of result code.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CMEE=[<n>]

Set command disables/enables the use of result code:

+CME ERROR: <err>

as an indication of an error relating to the **+Cxxx** command issued.

When enabled, device related errors cause the **+CME ERROR: <err>** final result code instead of the default **ERROR** final result code. **ERROR** is returned normally when the error message is related to syntax, invalid parameters or DTE functionality.

Parameter:

Name	Type	Default	Description
<n>	integer	0	enable flag

Values:

0 : disable

1 : enable and use numeric<err> values

2 : enable and use verbose <err> values

🛈 The detailed description of <**err**> is available in section "ME Error Result Code - +CME ERROR: <err>".

🛈 **+CMEE** has no effect on the final result code **+CMS**.

AT+CMEE?

Read command returns the current value of parameter <**n**> in the format:

+CMEE: <n>

AT+CMEE=?

Test command returns the supported values of parameter <**n**>.

3.2.11.41. AT#VCDISABLE - Disable Voice Call

The command used to disable the Voice Call.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#VCDISABLE=<type>

Set command set the incoming voice call function disable.

Parameter:

Name	Type	Default	Description
<type>	integer	N/A	Disable type

Values:

0 : Incoming call allowed.

1 : Ignore paging.

2 : Reject the voice call with cause code 88.

ⓘ The setting is saved in NVM, will affect after rebooting.

ⓘ When set **<type>** by 1, modem may not be able to distinguish clearly whether paging is for Voice Call at the time of receiving the Paging Message.

ⓘ Usually, default value is 0 in models support the voice function.

AT#VCDISABLE?

Read command read a current value.

#VCDISABLE: <type>

AT#VCDISABLE=?

Test command reports the supported range.

3.2.11.42. AT#PERSISTAPN - Preserve APN Profile during firmware upgrade

APN Persistence

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT#PERSISTAPN=<mode>

Set command determines whether to retain the APN profile. When a firmware download event occurs, the APN profile is backed up. If the backup APN profile exists when you download the firmware, restore the APN profile.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	mode for operation

Values:

0 : initialized with the APN profile specified by the network operator

1 : backup and restore the current APN profile

ℹ️ When this feature is set to enable, the set value is retained even if the changed firmware is changed.

ℹ️ It applies not only to downloading the firmware but also when changing the active carrier with the **AT#FIRMWARE** command.

AT#PERSISTAPN?

Read command returns "**OK**" string along with last accepted mode in the format:

#PERSISTAPN: <mode>

AT#PERSISTAPN=?

Test command reports the supported range of values.

3.2.11.43. AT+CSCS - Select TE Character Set

The command purpose is to set different character sets that are used by the device.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CSCS=[<chset>]

Set command sets the current character set used by the device.

Parameter:

Name	Type	Default	Description
<chset>	string	IRA	character set to be used by the device.

Values:

GSM	:	GSM default alphabet (3GPP TS 23.038).
IRA	:	international reference alphabet (ITU-T T.50).
8859-1	:	ISO 8859 Latin 1 character set.
PCCP437	:	PC character set Code Page 437.
UCS2	:	16-bit universal multiple-octet coded character set (ISO/IEC10646).

AT+CSCS?

Read command returns the current value of the active character set.

AT+CSCS=?

Test command returns the supported values for parameter <**chset**>.

3.2.11.44. AT+PACSP - Network Selection Menu Availability

This command returns the current value of the <mode> parameter which is PLMN mode bit in the CSP file with SIM.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+PACSP?

Read command returns the current value of the <**mode**> parameter in the format:

+PACSP<mode>

Additional info:

▶▶ Read command response parameter

Name	Type	Default	Description
<mode>	integer	N/A	returns the PLMN mode bit (in CSP file on the SIM)
	Values:		
	0	:	restriction of menu option for manual PLMN selection
	1	:	no restriction of menu option for Manual PLMN selection

ℹ️ It can support only AT&T specific module.

AT+PACSP=?

Test command returns the **OK** result code.

3.2.11.45. AT#USBCFG - USB Configuration

This command sets USB configuration on the modem device.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#USBCFG=\<mode\>

Set command sets the USB composition according to \<mode\> number given, where:

Parameter:

Name	Type	Default	Description
\<mode\>	integer	1	USB configuration mode.

Values:

0 : use 0x1052 composition file

1 : use 0x1050 composition file

2 : use 0x1051 composition file

3 : use 0x1053 composition file

Additional info:

▶▶ 0x1052: RNDIS + DIAG + ADB + NMEA + MODEM + MODEM + AUX
0x1050: DIAG + ADB + RmNet + NMEA + MODEM + MODEM + AUX
0x1051: DIAG + ADB + MBIM +| NMEA + MODEM + MODEM + AUX
0x1053: DIAG + ADB + ECM + NMEA + MODEM + MODEM + AUX

ℹ The modem device is reset automatically, and new USB composition applied from the next boot up time.

ℹ The value is stored in file system region when Set command executed and it is kept even on download case.

AT#USBCFG?

Read command returns the current composition set by number as detailed in the section above:

0x1052 composition file return 0

0x1050 composition file return 1

0x1051 composition file return 2

0x1053 composition file return 3

AT#USBCFG=?

Test command returns the list of supported values.

⬛ 🔴 This command is not supported by FT980-KS using dedicated 0x1054 PID and FD980m-KS using dedicated 0x1056 PID.

3.2.11.46. AT#USB3TUNE - Tune USB 3.0 PHY

This command is for tuning USB 3.0 PHY.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

➡️ **AT#USB3TUNE=\<emp>,\<drv>**

This command is for tuning USB 3.0 PHY.

Parameters:

Name	Type	Default	Description
\<emp>	integer	-	Adjusts the Tx output post cursor level. The value of this parameter should be one of below table.

Dec	De-emphasis(dB)	V_{de}/V_{pre}
0	0.0	100%
1	-0.2	98%
2	-0.4	95%
3	-0.6	93%
4	-0.9	91%
5	-1.1	88%
6	-1.3	86%
7	-1.6	84%
8	-1.8	81%
9	-2.1	79%
10	-2.3	77%
11	-2.6	74%
12 (default)	-2.9	72%
13	-3.2	70%
14	-3.5	67%
15	-3.8	65%
16	-4.1	63%
17	-4.4	60%
18	-4.8	58%
19	-5.1	55%
20	-5.5	53%
21	-5.9	51%
22	-6.3	48%
23	-6.7	46%
24	-7.2	44%
25	-7.7	41%
26	-8.2	39%
27	-8.7	37%
28	-9.3	34%
29	-9.9	32%
30	-10.5	30%
31	-11.3	27%

<drv>	integer	-	Select Tx drive level.

The value of this parameter should be one of below table.

Dec	Vp-p1 (mV)	% of V_{cca}
0	218.8	25%
1	239.9	27%
2	261.1	30%
3	282.3	32%
4	303.4	35%
5	324.6	37%
6	345.8	40%
7	366.9	42%
8	388.1	44%
9	409.3	47%
10	430.4	49%
11	451.6	52%
12	472.8	54%
13	494.0	56%
14	515.1	59%
15	536.3	61%
16	557.5	64%
17	578.6	66%
18	599.8	69%
19	621.0	71%
20	642.1	73%
21	663.3	76%
22	684.5	78%
23	705.6	81%
24	726.8	83%
25	748.0	85%
26	769.2	88%
27	790.3	90%
28	811.5	93%
29	832.7	95%
30	853.8	98%
31(default)	875.0	100%

Additional info:

▶▶ This tune data is going to be applied after target reboot.

ℹ 3. The setting is maintained for both firmware updates and firmware switches.
    4. Be careful to configure these values because configuring can make USB connection failed.

AT#USB3TUNE?
Read command reports the currently selected parameters in the format:
#USB3TUNE : <emp>,<drv>

AT#USB3TUNE=?

Reports the supported range of values for parameter(s) **<emp>** and **<drv>**.

#USB3TUNE: (0-31),(0-31)

3.2.11.47. AT#USBSWITCH - Switch USB Speed

This command is for switching USB speed between Super-speed and High-speed.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#USBSWITCH=<mode>

Switch USB configuration between Super-speed and High-speed mode.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	USB mode

Values:

0 : Auto (Support all speeds)

1 : Support only High-speed

🛈 Manually reboot is required after changing USB configuration.
The setting be kept for both firmware update and firmware switch.

🛈 After **AT#REBOOT** or **AT#SHDN** command is issued, a serial port opened in host should be closed because a Yellow Bang error appears once on Windows OS.

AT#USBSWITCH?

Read command reports the currently selected **<mode>** in the format:

#USBSWITCH: <mode>

AT#USBSWITCH=?

Test command reports the supported range of values for parameters **<mode>**.

3.2.11.48. AT#USBDMOFF - Disable of DIAG channel on USB

This command enable/disable DIAG channel of USB composition.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#USBDMOFF=<disable>,<seccode>
Configure DIAG channel of USB composition.

Parameters:

Name	Type	Default	Description
<disable>	integer	0	disable / enable DIAG channel
	Values:		
	0	:	Enable DIAG channel
	1	:	Disable DIAG channel
<seccode>	string	-	Security Code, must be "Tws!l1"

ℹ QPST can't detect DIAG channel in disabling case.

AT#USBDMOFF?
Reports the current configured values.

AT#USBDMOFF=?
Returns the list of supported values.

</> Examples for this command

- Disable DIAG
  AT#USBDMOFF=1,"Tws!l1"
  OK

- Enable DIAG
  AT#USBDMOFF=0,"Tws!l1"
  OK

3.2.11.49. AT#RESETINFO - Read reason for most recent devices reset or power-down

This command used to get RESET INFO that has reason for most recent devices reset or power-down.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#RESETINFO?

Read command reports most recent reset reason in the following format

#RESETINFO: <type>,<source>

Parameter:
<type> - type of reset or power down
0 – unknown
1 – warm
2 – hard
3 – crash
4 – power

<source> - entity which initiated the reset or power down
0 -- unknown
1 -- user requested (AT#REBOOT, Firmware download - including host-initiated image switching)
2 -- Not supported - hardware switch (W_DISABLE)
3 -- temperature critical
4 -- voltage critical
5 -- Not supported - configuration update (SIM-based image switching)
6 -- Not supported - LWM2M (Light Weight M2M client (internal process for LWM2M))
7 -- Not supported - OMA-DM
8 -- Not supported - FOTA

AT#RESETINFO=?

Test command returns OK result code.

AT#RESETINFO
#RESETINFO: 2,1

OK

3.2.11.50. AT&V2 - Display Last Connection Statistics

The command displays last connection statistics.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT&V2
Execution command returns the last connection statistics and connection failure reason.

Example of connection statistics get with no connection and no error.

- **AT&V2**

  TOTAL CONNECTION TIME   : **0:00:00**
  CONNECTION FAILURE REASON   : **powered off**

  OK

3.2.11.51. AT#CGMM - Request Model Identification

This command returns the device model identification.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CGMM
Execution command returns the device model identification code, with command echo.

AT#CGMM
#CGMM: <code>
OK

AT#CGMM=?
Test command returns **OK** result code.

3.2.11.52. AT&V0 - Display Current Configuration and Profile

The command displays current modem configuration and profile.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT&V0

Execution command returns all the modem configuration parameters settings.

ℹ This command is the same as **&V**, it is included only for backwards compatibility.

ℹ The row of information about CTS (C106) OPTIONS is in the output of **&V0** only for compatibility reasons and represents only a dummy value.

3.2.11.53. AT#FWSWITCH - Set Active Firmware Image

Set active modem firmware image and network configuration

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#FWSWITCH=<config_num>[,<modem_fw>]
Set command allows to active the specified modem FW image and network configuration.

Parameters:

Name	Type	Default	Description
<config_num>	integer	N/A	network configuration to be activated
		Values:	

0	:	Rest of World. Generic GCF Config; Default Config	
1	:	North America. Generic PTCRB Config	
10	:	North America. AT&T Network Conifg	
11	:	North America. T-Mobie Netowrk Config	
12	:	North America. Verizon Wireless Network Config	
20	:	Korea. SK Telecom Network Config	
21	:	Korea. SK Telecom Dongle Network Config	
30	:	Japan. NTT Docomo Network Config	
31	:	Japan. KDDI Network Config	
40	:	Australia. Telstra Network Config	
50	:	Latin America. Anatel Network Config	

Name	Type	Default	Description
<modem_fw>	integer	N/A	modem FW image to be activated. If <modem_fw> is not specified, a current <modem_fw> will be configured.

Values:

0	:	M0 modem FW
1	:	M1 modem FW

Additional info:

▶▶ Execution command lists the supported network configuration in string format as below
AT#FWSWITCH
#FWSWITCH: <config_num>,<config name string>,<config version string>
...
#FWSWITCH: <config_num>,<config name string>,<config version string>

OK

> ℹ️ This AT command performs a system reboot.

> ℹ️ A current activated <config_num> and <modem_fw> maintained, even if new firmware updated.

AT#FWSWITCH?
Read command reports the current activated configuration in the following format
#FWSWITCH: <config_num>,<modem_fw>

AT#FWSWITCH=?
Test command reports the range of supported values for parameters <config_num>,<modem_fw>

Example 1. switch to AT&T config in the M1 modem FW from GCF Generic config in the M0 modem FW

- Example 1
  // Query current FW switch config
  AT#FWSWITCH?
  #FWSWITCH: 0,0
  OK

  // Switch to AT&T network config on M1 modem FW
  AT#FWSWITCH=10,1
  OK

  // Show the supported network config list
  AT#FWSWITCH
  #FWSWITCH: 0,"Generic GCF",P0H.000520
  #FWSWITCH: 1,"Generic PTCRB",P0H.010530
  #FWSWITCH: 10,"AT&T",P0H.100570
  ...
  #FWSWITCH: 40,"Telstra",P0H.400160

  OK

3.2.11.54. AT#FWAUTOSIM - Automatic Carrier Switch By SIM

This command is the functionality for automatic carrier switch by SIM.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#FWAUTOSIM=<mode>

Set command sets automatic carrier switch enable mode by SIM.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	automatic carrier switch mode by SIM

Values:

0 : Disable automatic carrier switch by SIM

1 : Enable automatic carrier switch by SIM

2 : Enable one-shot automatic carrier switch by SIM

ℹ️ If automatic carrier switch mode is enabled, the **#FWSWITCH** command will return **ERROR**.

AT#FWAUTOSIM?

Read command reports the current stored <**mode**>.

#FWAUTOSIM: <mode>

Additional info:

▶▶ automatic carrier switch mode by SIM

Name	Type	Default	Description
<mode>	integer	N/A	automatic carrier switch mode by SIM

Values:

0 : Disable automatic carrier switch by SIM

1 : Enable automatic carrier switch by SIM

2 : Enable one-shot automatic carrier switch by SIM

3 : Waiting enable one-shot automatic carrier switch by SIM

AT#FWAUTOSIM=?

Test command reports the supported range of values for parameter <**mode**>.

#FWAUTOSIM: (0-2)

3.2.11.55. AT#FWPLS - Firmware PLMN ID List

This command allows the customer to read/add/remove the list of PLMN IDs for automatic carrier switch by SIM.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#FWPLS=<mode>[,<carrier_index>[,<sub_carrier_index>[,<mcc_mnc>]]]
Execution command reads/adds/removes the list of PLMN IDs for automatic carrier switch by SIM.

Parameters:

Name	Type	Default	Description
<mode>	integer	N/A	access mode
			Values:
			0 : read
			1 : add
			2 : remove
<carrier_index>	integer	-	carrier index; refer the **<config_num>** parameter of **#FWSWITCH**.
<sub_carrier_index>	integer	0	sub carrier index
			Values:
			0 : main carrier of <carrier_index>
			else : sub carrier of <carrier_index>
<mcc_mnc>	integer	-	MCC/MNC; 5 or 6 digits

Additional info:

▶▶ If <**mode**> is 0, the response format is:
#FWPLS: <carrier_index>,<carrier_name>
#FWPLS: <mcc_mnc*1*>, <access_type>
...
#FWPLS: <mcc_mnc*n*>, <access_type>

Name	Type	Default	Description
<carrier_name>	string	-	carrier name
<access_type>	integer	N/A	access type
			Values:
			0 : read only (pre-defined MCC/MNC)
			1 : read/write (user-defined MCC/MNC)

ℹ️ If <**mode**> is 0 and <**carrier_index**> is omitted, the PLMN of all carriers is shown.
If <**mode**> is 2 and <**mcc_mnc**> is set, the MCC/MNC is removed in selected carrier list.
If <**mode**> is 2 and <**mcc_mnc**> is unset, the selected carrier list is deleted.

AT#FWPLS?

Read command returns the loaded carrier information in the format:

<**carrier_index** *1*>:<**carrier_name**>
...
<**carrier_index** *n*>:<**carrier_name**>

AT#FWPLS=?

Test command reports the supported range of values for parameters <**mode**>, <**carrier_index**>, <**sub_carrier_index**>, and the maximum length of <**mcc_mnc**>.

```
AT#FWPLS=0,12
#FWPLS: 12, VERIZON
#FWPLS: 310590, 0
#FWPLS: 310890, 0
#FWPLS: 311480, 0
#FWPLS: 311270, 0
#FWPLS: 312770, 0

OK
AT#FWPLS=1,12,0,123123
OK
AT#FWPLS=0,12
#FWPLS: 12, VERIZON
#FWPLS: 310590, 0
#FWPLS: 310890, 0
#FWPLS: 311480, 0
#FWPLS: 311270, 0
#FWPLS: 312770, 0
#FWPLS: 123123, 1

OK
AT#FWPLS=2,12,0,123123
OK
AT#FWPLS=0,12
#FWPLS: 12, VERIZON
#FWPLS: 310590, 0
#FWPLS: 310890, 0
#FWPLS: 311480, 0
#FWPLS: 311270, 0
#FWPLS: 312770, 0

OK
```

3.2.11.56. AT#CQI - HSDPA Channel Quality Indication

This command returns the channel quality indication of the <mode> parameter which is PLMN mode bit in the CSP file with SIM.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CQI

Execution command indicates channel quality indication in the form:

#CQI: <cqi>,<nr5g_cqi>

Additional info:

▶▶ CQI values:

Name	Type	Default	Description
<cqi>	integer	N/A	Channel Quality indication
	Values:		
	0÷30	:	The value range for WCDMA
	0÷15	:	The value range for LTE
	31	:	Unknown or not detectable
<nr5g_cqi>	integer	N/A	Channel Quality indication for NR5G
	Values:		
	0÷15	:	The value range for NR5G
	31	:	Unknown or not detectable

ⓘ The **<cqi>** value is able to show 0-31 when UE get the WCDMA system. The **<cqi>** value is able to show 0-15,31 when UE get the LTE system.

AT#CQI=?

Test command returns the supported range of values of the parameter **<cqi>** and **<nr5g_cqi>.**

ⓘ The UE supports the WCDMA on the "RW modem FW" and "NTT Docomo Config" only. Otherwise the UE doesn't support the WCDMA.

3.2.11.57. AT#PDPAUTH - PDP Authentication Parameters

This set command specifies PDP authentication parameters values for a PDP context identified by the (local) context identification parameter <**cid**>.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT#PDPAUTH=<cid>,<auth_type>,[<username>,[<password>]]

Set command specifies PDP authentication parameters values for a PDP context identified by the (local) context identification parameter **<cid>**.

Parameters:

Name	Type	Default	Description
<cid>	integer	N/A	context identifier
			Value:
	1÷max	:	specifies a particular PDP context definition. The value of max is returned by the Test command.
<auth_type>	integer	0	authentication type
			Values:
	0	:	no authentication
	1	:	PAP authentication
	2	:	CHAP authentication
<username>	string	-	supplied by network provider. Required for **<auth_type> = 1 and 2**
<password>	string	-	supplied by network provider. Required for **<auth_type> = 1 and 2.**

AT#PDPAUTH?

Read command returns the PDP authentication parameters, excluding <password>, set for every PDP, in the format:

#PDPAUTH: <cid1>,<auth_type1>,<username1><CR><LF>

...
 #PDPAUTH:<cidmax>,<auth_typemax>,<usernamemax><CR><LF>]]

AT#PDPAUTH=?

Test command reports the supported range of values for parameters **<cid>** and **<auth_type>** and the maximum allowed length of the string parameters **<password>** and **<username>.**

3.2.11.58. AT#LOOPBACKMODECFG - Set the loopback mode configuration

Loopback mode test

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#LOOPBACKMODECFG=<mode>[,<dl_replicate_cnt>]

Set command configures the internal loopback mode.

Parameters:

Name	Type	Default	Description
<mode>	integer	0	mode for operation
			Values:
			0 : loopback mode disabled; it does not require <dl_replicate_cnt>
			1 : loopback mode enabled
<dl_replicate_cnt>	integer	N/A	number of times in which each packet needs to be replicated in the direction of DL
			Value:
			1÷25 : It is used to amplify DL data rate by max 25 times of UL data speed.

🛈 Need to power cycle the unit for the setting to take effect.

🛈 If the device needs a firmware change, change the <mode> of parameter to 0 and download it.

AT#LOOPBACKMODECFG?

Read command reports current configuration.

AT#LOOPBACKMODECFG=?

Test command reports the range of supported values for parameters.

</> Amplify 7x DL data rate of UL data speed in loopback mode:
AT#LOOPBACKMODECFG=1,25
OK
AT#REBOOT
OK

3.2.11.59. AT+IMEISV - Request IMEI and Software Version Number

This command returns the International Mobile Station Equipment Identity and Software Version Number.

3GPP TS 23.003

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+IMEISV

Execution command returns the International Mobile Station Equipment Identity and Software Version Number, identified as the IMEISV of the module.

Additional info:

▶▶ The IMEISV is composed of the following elements (each element shall consist of decimal digits only):

- Type Allocation Code (TAC). Its length is 8 digits.

- Serial Number (SNR) is an individual serial number uniquely identifying each equipment within each TAC. Its length is 6 digits.

- Software Version Number (SVN) identifies the software version number of the mobile equipment. Its length is 2 digits.
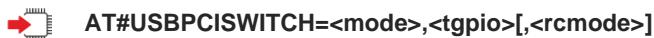
AT+IMEISV=?

Test command returns **OK** result code.

3.2.11.60. AT#USBPCISWITCH - Switching between USB and PCIe for Network Interface

Switch physical interface between USB and PCIe-EP.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#USBPCISWITCH=\<mode\>,\<tgpio\>[,\<rcmode\>]
Set this feature with enable/disable, TGPIO number and PCIe-RC mode.

Parameters:

Name	Type	Default	Description
\<mode\>	integer	0	Enable or disable this feature

Values:

0 : Disable switching feature

1 : Enable switching feature

Name	Type	Default	Description
\<tgpio\>	integer	N/A	TGPIO number in enable case. This parameter could be skipped in disable case. Only TGPIO_05 is allowed.

Value:

5 : TGPIO_05

Name	Type	Default	Description
\<rcmode\>	integer	N/A	PCIe-RC mode when the network interface path is selected to USB. If this parameter is skipped with enabling, this field is set to 2.

Values:

0 : PCIe-RC is enabled

2 : PCIe isn't used

Additional info:

▶▶ This feature requires a power cycle for an activation.

AT#USBPCISWITCH?
Get the current configurations.

AT#USBPCISWITCH=?
Return the range of each parameter.

 ⓘ Even If the PCIe is selected for the network interface, other functions for DUN and debugging are provided over USB.

ⓘ This command is only supported for FN980.

ⓘ When a TGPIO is selected for this function, the TGPIO is configured as an ALT9 function in #GPIO command.

</> Examples for this command

- Disable this feature
  AT#USBPCISWITCH=0
  OK

- Enable this feature with 05 TGPIO
  AT#USBPCISWITCH=1,5
  OK
  AT#REBOOT
  OK

- Enable this feature with 05 TGPIO and enabling PCIe-RC
  AT#USBPCISWITCH=1,5,0
  OK
  AT#REBOOT
  OK

- Enable this feature with 05 TGPIO and disabling PCIe
  AT#USBPCISWITCH=1,5,2
  OK
  AT#REBOOT
  OK

3.2.12. S Parameters

3.2.12.1. ATS0 - Number of Rings to Auto Answer

The command controls the automatic answering feature of the DCE.

ITU-T Recommendation V.25 ter
3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS0=<n>

Set command sets the number of rings required before device automatically answers an incoming call.

Parameter:

Name	Type	Default	Description
<n>	integer	0	Number of rings

Values:

0 : auto answer disabled

1÷255 : number of rings required before automatic answer. The DCE answers when the incoming call indication (ring) has occurred the number of times indicated by the value.

ⓘ Data only products ignore command setting and auto answer is disabled if incoming call is a voice call.

ATS0?

Read command returns the current value of **S0** parameter.

3.2.12.2. ATS1 - Ring Counter

S1 is incremented each time the device detects the ring signal of an incoming call. **S1** is cleared as soon as no ring occur.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS1

ⓘ The form **ATS1** has no effect, returns **OK** result code.

ATS1?
Read command returns **S1** value.

3.2.12.3. ATS2 - Escape Character

The command manages the ASCII character used as escape character.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS2=<char>

Set command sets the ASCII character to be used as escape character.

Parameter:

Name	Type	Default	Description
<char>	integer	43	escape character decimal ASCII
	Value:		
	43 :	factory default value is '+'	

ℹ️ The escape sequence consists of three escape characters preceded and followed by **n** ms of idle (see **S12** to set **n**).

ℹ️ This command only supports 43 for **<char>** parameter.

ATS2?

Read command returns the current value of **S2** parameter.

ℹ️ The format of the numbers in output is always 3 digits, left-filled with 0s.

3.2.12.4. ATS3 - Command Line Termination Character

The command manages the character configured as command line terminator.

ITU-T Recommendation V.25 ter
3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS3=<char>

Set command sets the value of the character either recognized by the device as command line terminator and generated by the device as part of the header, trailer, and terminator for result codes and information text, along with **S4** parameter.

Parameter:

Name	Type	Default	Description
<char>	integer	13	command line termination character (decimal ASCII)
	Value:		
	0÷127	:	command line termination character

ℹ The "previous" value of **S3** is used to determine the command line termination character for entering the command line containing the **S3** setting command. However, the result code issued shall use the "new" value of **S3** (as set during the processing of the command line)

ATS3?

Read command returns the current value of **S3** parameter.

ℹ The format of the numbers in output is always 3 digits, left-filled with 0s

3.2.12.5. ATS4 - Response Formatting Character

The command manages the character generated by the device as part of the header, trailer, and terminator for result codes and information text.

ITU-T Recommendation V.25 ter
3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS4=<char>

Set command sets the value of the character generated by the device as part of the header, trailer, and terminator for result codes and information text, along with the **S3** parameter.

Parameter:

Name	Type	Default	Description
<char>	integer	10	response formatting character (decimal ASCII)
	Value:		
	0÷127	:	response formatting character

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

ATS4?

Read command returns the current value of **S4** parameter.

ⓘ The format of the numbers in output is always 3 digits, left-filled with 0s.

3.2.12.6. ATS5 - Command Line Editing Character

The command manages the value of the character recognized by the DCE as a request to delete from the command line the immediately preceding character.

ITU-T Recommendation V.25 ter
3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS5=<char>

Set command sets the value of the character recognized by the device as a request to delete from the command line the immediately preceding character.

Parameter:

Name	Type	Default	Description
<char>	integer	8	command line editing character (decimal ASCII)
	Value:		
	0÷127	:	command line editing character

ATS5?

Read command returns the current value of **S5** parameter.

ℹ️ The format of the numbers in output is always 3 digits, left-filled with 0s.

3.2.12.7. ATS7 - Connection Completion Time-Out

This set command specifies the amount of time that the DCE shall allow between either answering a call (automatically or by the **ATA** command) or completion of signaling of call addressing information to network (dialing), and establishment of a connection with the remote DCE. If no connection is established during this time, the DCE disconnects from the line and returns a result code indicating the cause of the disconnection.

ITU-T Recommendation V.25 ter
3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS7=<tout>

Set command sets the amount of time, in seconds, that the device shall allow between either answering a call(automatically or by A command) or completion of signaling of call addressing information to network (dialing), and establishment of a connection with the remote device.

Parameter:

Name	Type	Default	Description
<tout>	integer	60	defines time interval expressed in seconds
	Value:		
	1÷255	:	available range

ATS7?

Read command returns the current value of **S7** parameter.

ℹ The format of the numbers in output is always 3 digits, left-filled with 0s.

3.2.12.8. ATS25 - Delay to DTR Off

The command manages the amount of time that the device will ignore the **DTR**.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS25=<time>

Set command defines the amount of time, in hundredths of second, that the device will ignore the **DTR** for taking the action specified by command **&D**.

Parameter:

Name	Type	Default	Description
<time>	integer	5	expressed in hundredths of a second
	Value:		
	0÷255	:	expressed in hundredths of a second

🛈 The delay is effective only if its value is greater than 5. To be recognized as valid, the **DTR** transition must be greater than **S25**. Low values could require a transition increased of a factor 1.5 to be correctly handled (e.g., to be sure that **S25=5** works, use a **DTR** toggle of 75ms to be detected).

🛈 In power saving (e.g. **+CFUN=5** with **DTR** low) **DTR** must be off at least 3 seconds for taking the action specified by command **&D**, independently of **S25** parameter.

ATS25?

Read command returns the current value of **S25** parameter.

🛈 The format of the numbers in output is always 3 digits, left-filled with 0s.

3.2.12.9. AT&V1 - S Registers Display

The command displays the S registers values.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT&V1

Execution command returns the S registers values in both decimal and hexadecimal format. The response is in the form:

REG (S register)	DEC (value in dec. notation)	HEX (value in hex notation)
<reg0>	<dec>	<hex>
<reg1>	<dec>	<hex>
...	...	...
<regN>	<dec>	<hex>

Here is a generic example showing the format.
AT&V1

```
REG  DEC  HEX
000  000  000
001  000  000
002  043  02B
003  013  00D
004  010  00A
005  008  008
007  060  03C
012  050  032
...  ...  ...
...  ...  ...

OK
```

3.2.12.10. ATS12 - Escape Prompt Delay

The command manages the prompt delay between two different escape characters.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS12=<time>

Set command sets:

5. the minimum period, before receipt of the first character of the three escape character sequence, during which no other character has to be detected in order to accept it as valid first character;
6. the maximum period allowed between receipt of first or second character of the three escape character sequence and receipt of the next;
7. the minimum period, after receipt of the last character of the three escape character sequence, during which no other character has to be detected in order to accept the escape sequence as a valid one.

Parameter:

Name	Type	Default	Description
<time>	integer	50	delay expressed in fiftieth of a second
	Value:		
	20÷255	:	expressed in fiftieth of a second

ⓘ The minimum period **S12** has to pass after **CONNECT** result code too, before a received character is accepted as valid first character of the three escape character sequence.

ATS12?

Read command returns the current value of **S12** parameter.

ⓘ The format of the numbers in output is always 3 digits, left-filled with 0s

3.2.12.11. ATS10 - Carrier Off with Firm Time

The command is available only for backward compatibility

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATS10=<n>

Set command has no effect and is available only for backward compatibility with landline modems.

Parameter:

Name	Type	Default	Description
<n>	integer	N/A	dummy

Value:

1÷255 : dummy parameter

3.2.12.12. AT&V3 - Extended S Registers Display

The command displays the extended S registers values.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT&V3

Execution command returns the extended S registers values in both decimal and hexadecimal format. The response is in the form as shown in **AT&V1** command.

Here is a generic example showing the format.
AT&V3

```
REG  DEC  HEX
000  000  000
001  000  000
002  043  02B
003  013  00D
004  010  00A
005  008  008
007  060  03C
012  050  032
025  005  005
...  ...  ...
...  ...  ...

OK
```

3.2.13. DTE - Modem Interface Control

3.2.13.1. ATE - Command Echo

This command allows to enable or disable the command echo.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATE[<n>]

The execution command allows to enable/disable the command echo.

Parameter:

Name	Type	Default	Description
<n>	integer	1	Configuration value

Values:

0 : disables command echo

1 : enables command echo, hence command sent to the device are echoed back to the DTE before the response is given.

ⓘ   If parameter is omitted, the command has the same behavior of **ATE0**

3.2.13.2. ATQ - Quiet Result Codes

This command allows to enable or disable the result code.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATQ[<n>]

Set command enables or disables the result codes.

Parameter:

Name	Type	Default	Description
<n>	integer	0	enables/disables result codes

Values:

0 : enables result codes

1 : disables result codes. The commands entered after ATQ1 do not return the result code.

2 : disables result codes (only for backward compatibility). The commands entered after ATQ2 do not return the result code.

ℹ️ If parameter is omitted, the command has the same behavior of **ATQ0.**

After issuing **ATQ0** the **OK** result code is returned
AT+CGACT=?
+CGACT: (0-1)
OK

After issuing **ATQ1** or **ATQ2** the **OK** result code is not returned.
AT+CGACT=?
+CGACT: (0-1)

3.2.13.3. ATV - Response Format

This command allows to set format of information responses and result codes.

[1] ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

ATV[<n>]

Set command determines the contents of the header and trailer transmitted with result codes and information responses. It also determines if result codes are transmitted in a numeric form or an alphanumeric form (according to [1]).

Parameter:

Name	Type	Default	Description
<n>	integer	1	format of information responses and result codes. See Additional info section.

Values:

0 : limited headers and trailers and numeric format of result codes

1 : full headers and trailers and verbose format of result codes

Additional info:

<n>=0	
information responses	**<text><CR><LF>**
result codes	**<numericCode><CR>**

<n>=1	
information responses	**<CR><LF>** **<text><CR><LF>**
result codes	**<CR><LF>** **<verboseCode><CR><LF>**

ⓘ the **<text>** portion of information responses is not affected by this setting.

ⓘ if parameter is omitted, the command has the same behavior of **ATV0**

3.2.13.4. ATI - Identification Information

This command returns identification information.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

ATI[<n>]

Execution command returns product information.

Parameter:

Name	Type	Default	Description
<n>	integer	0	information request

Values:

    0 :   numerical identifier

    1 :   module checksum

    2 :   checksum check result

    3 :   manufacturer

    4 :   product name

    5 :   DOB version

ℹ️ If parameter is omitted, the command has the same behavior of **ATI0**

3.2.13.5. AT&C - Data Carrier Detect (DCD) Control

This command controls the DCD output behavior.

ITU-T Recommendation V25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT&C[<n>]

Set command controls the DCD output behavior of the serial port.

Parameter:

Name	Type	Default	Description
<n>	integer	1	DCD output behavior

Values:

0 : DCD remains always High

1 : DCD follows the Carrier detect status: if carrier is detected DCD goes High, otherwise DCD is Low

2 : DCD is always High except for 1 sec "wink" when a data call is disconnected

If parameter is omitted, the command has the same behavior of **AT&C0**.

3.2.13.6. AT&D - Data Terminal Ready (DTR) Control

This set command configures the behavior of the module according to the DTR control line transitions.

ITU-T Recommendation V25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT&D[<n>]

Set command configures the module behavior relative to the DTR signal transitions.

Parameter:

Name	Type	Default	Description
<n>	integer	0	defines the module behavior according to the DTR control line transitions

Values:

0 : DTR transitions are ignored by the module

1 : DTR drop from active to inactive: Change to command mode while retaining the connected data call

2 : DTR drop from active to inactive: Disconnect data call, change to command mode. During the inactive state of DTR auto answer is off

ℹ️ If parameter is omitted, the command has the same behavior of **AT&D0**.

ℹ️ URC message is sent only if DTR is ON, otherwise, URC message discarded.

3.2.13.7. AT\Q - Standard Flow Control

This command controls the RS232 flow control behavior.

ITU-T Recommendation V25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT\Q[<n>]

Set command controls the RS232 flow control behavior.

Parameter:

Name	Type	Default	Description
<n>	integer	0	RS232 flow control behavior

Values:

0 : no flow control

3 : hardware bi-directional flow control (both RTS/CTS active) (factory default)

This command has no effect on USB interface. It's only used for UART interface.

3.2.13.8. AT&K - Flow Control

Flow Control settings.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT&K[<n>]

Set command controls the serial port flow control behavior.

Parameter:

Name	Type	Default	Description
<n>	integer	3	flow control behavior

Values:

0 : no flow control

3 : hardware bi-directional flow control (both RTS/CTS active)

ℹ If parameter is omitted, the command has the same behavior as **AT&K0**

ℹ **&K** has no Read Command. To verify the current setting of **&K**, simply check the settings of the active profile issuing **AT&V**.

ℹ It has no effect and is included only for backward compatibility with legacy modems.

3.2.13.9. AT&S - Data Set Ready (DSR) Control

Set DSR behavior on serial port

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT&S[<n>]

Set command controls DSR behavior on serial port

Parameter:

Name	Type	Default	Description
<n>	integer	3	Configuration parameter

Values:

0 : Always High

1 : Follows carrier status

2 : High on DATA mode, Low on AT command mode

3 : Follows DTR status

ⓘ If parameter is omitted, the command has the same behavior of **AT&S0**.

ⓘ DSR behavior with AT&S1 work as DCD behavior with AT&C1.

3.2.13.10. AT+IPR - UART DCE Interface Data Rate Speed

The command sets the speed of the DTE serial port.

[1] Hardware User's Guide of the used module
[2] ITU-T Recommendation V25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+IPR=<rate>

Set command specifies the **DTE** speed on UART interface;

Parameter:

Name	Type	Default	Description
<rate>	integer	115200	speed of the serial port expressed in bit per second

Values:

300	:	bps
600	:	bps
1200	:	bps
2400	:	bps
4800	:	bps
9600	:	bps
19200	:	bps
38400	:	bps
57600	:	bps
115200	:	bps
230400	:	bps
921600	:	bps
2900000	:	bps
3000000	:	bps
3200000	:	bps
4000000	:	bps

AT+IPR?

Read command returns the current value of **<rate>** parameter.

AT+IPR=?

Test command returns the list of supported auto detectable **<rate>** values and the list of fixed-only **<rate>** values in the format:

+IPR:(list of supported auto detectable <rate> values), (list of fixed-only <rate> values)

This command has no effect on **USB** interface; the DCE sends the **OK** result but the settings has no effect on serial interface

</>Test command example
AT+IPR=?
+IPR:
(),(300,600,1200,2400,4800,9600,19200,38400,57600,115200,230400,921600,2000000,2900000,3200000
0,3200000,3686400,4000000)
OK

3.2.13.11. AT+IFC - DTE-Modem Local Flow Control

This set command selects the flow control of the serial port in both directions.

ITU-T Recommendation V25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+IFC=<byDTE>,<byDCE>

Set command selects the flow control behavior of the serial port in both directions: from DTE to modem (<byDTE> option)and from modem to DTE (<byDCE>)

Parameters:

Name	Type	Default	Description
<byDTE>	integer	2	specifies the method used by the DTE to control the flow of data received from the device (DCE)
			Values:
		0 :	no flow control
		2 :	flow control by RTS control line (C105, Request to Send)
<byDCE>	integer	2	specifies the method used by the device (DCE) to control the flow of data received from the DTE
			Values:
		0 :	no flow control
		2 :	flow control by CTS control line (C105, Clear to Send)

ℹ️ The only possible commands are **AT+IFC=0,0** and **AT+IFC=2,2**.

AT+IFC?

Read command returns active flow control settings.

ℹ️ AT&K is also used to set the flow control and it has the same effect with this command if flow control behavior had been set with AT&K command, The changed setting value by AT&K will return

AT+IFC=?

Test command returns all supported values of the parameters **<byDTE>** and **<byDCE>**.

This command has no effect on USB interface. It's only for UART interface

3.2.13.12. AT+ICF - DTE-Modem Character Framing

This set command defines the asynchronous character framing.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+ICF=<format>[,<parity>]

Set command defines the asynchronous character framing to be used when autobauding is disabled.

Parameters:

Name	Type	Default	Description
<format>	string	3	sets the number of Data bits and Stop bits. Only the **<format>=3** is supported.
			Value:
			3 : 8 Data, 1 Stop
<parity>	string	0	This parameter is used for the backward compatibility. It's no meaningful.
			Values:
			0 : odd
			1 : even

AT+ICF?

Read command returns current settings for parameters **<format>** and **<parity>**.

AT+ICF=?

Test command returns the ranges of values for the parameters **<format>** and **<parity>**.

This command has no effect on USB interface. It's used only for UART interface.

AT+ICF=3
OK

AT+ICF=?
+ICF: (3),(0,1)

OK

3.2.13.13. ATX - Extended Result Codes

This command allows to select the subset of result code messages.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

ATX[<n>]

Set command selects the subset of result code messages the modem uses to reply to the DTE upon AT commands execution.

Parameter:

Name	Type	Default	Description
<n>	integer	1	configuration value

Values:

0 : when entering in dial mode a CONNECT result code is relayed; see Additional info.

1÷4 : when entering in dial mode a CONNECT <text> result code is relayed, see Additional info.

Additional info:

▶▶ **<n>=0**
OK, **CONNECT**, **RING**, **NO CARRIER**, **ERROR**, **NO ANSWER** result codes are enabled. Dial tone and busy detection (**NO DIALTONE** and **BUSY** result codes) are disabled.

<n>=1Ã·4
all the remaining result codes are enabled.

ℹ When the **<n>** parameter is omitted, the command acts like **ATX0**.

3.2.13.14. AT#NOPT - Notification Port

Set notification(URC) message port

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT#NOPT=<num>

Set command specifies the port output notification (URC) messages

Parameter:

Name	Type	Default	Description
<num>	integer	0	Notification(URC) port

Values:

0 : All Ports; URC messages are sent to all ports

1 : Telit USB Modem 1 Port

2 : Telit USB Modem 2 Port

3 : Telit USB Aux port

ⓘ URC messages sent out only on the configured ports by this command

ⓘ DTE must enable DTR line to get URC messages on Telit USB ports, otherwise URC message will be discarded.

AT#NOPT?

Read command reports the current notification port.

AT#NOPT=?

Test command reports the available range of values for parameter **<num>.**

3.2.13.15. AT#NOPTEXT - Notification Port Extension

Set notification extension port

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT#NOPTEXT=<noptext_enable>[,<port1_enable>[,<port2_enable>[,<port3_enable>]]]

Set command specified the port output notification (URC) messages

This command is extended from AT#NOPT command.

Unlike AT#NOPT, this command allow to enable URC message on multiple ports

Parameters:

Name	Type	Default	Description
<noptext_enable>	integer	0	enable #NOPTEXT
	Values:		
	0	:	Disable #NOPTEXT command set
	1	:	Enable #NOPTEXT command set
<port1_enable>	integer	N/A	enable port1 - Telit USB Modem 1 port
	Values:		
	0	:	disable URC message on port1
	1	:	enable URC message on port1
<port2_enable>	integer	N/A	enable port2 - Telit USB Modem 2 port
	Values:		
	0	:	disable URC message on port2
	1	:	enable URC message on port2
<port3_enable>	string	N/A	enable port3 - Telit USB AUX port
	Values:		
	0	:	disable URC message on port3
	1	:	enable URC message on port3

ℹ️ if <noptext_enable> is enable, #NOPT's setting value ignored and URC message port specified by #NOPTEXT setting value.

AT#NOPTEXT?

Read command show current <mode> on all notification(URC) port in the following format

#NOPTEXT: <noptext_enable>,<port1_enable>,<port2_enable>,<port3_enable>

AT#NOPTEXT=?

Test command returns the list of supported values in the following format

#NOPTEXT: (0,1),(<port1_descr>,(0,1)),(<port2_descr>,(0,1)),...

<port_descr>:

1. "USB_MDM1" - Telit USB Modem 1 Port
2. "USB_MDM2" - Telit USB Modem 2 Port
3. "USB_AUX" - Telit USB Aux Port

> ℹ️ DTE must enable DTR line to get URC messages on Telit USB ports, otherwise URC message will be discarded

---

</> This command enable URC message on "Telit USB Modem1 Port" and "Telit USB Modem2 Port"

- AT#NOPTEXT=1,1,1,0
  OK

3.2.13.16. AT\R - Ring (RI) Control

This command allows the user to control the **RING** output pin behaviour.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT\R[<n>]

Set command controls the **RING** output pin behaviour.

Parameter:

Name	Type	Default	Description
<n>	integer	1	**RING** pin behaviour

Values:

0 : RING on during ringing and further connection

1 : RING on during ringing

2 : RING follows the ring signal

ℹ If the parameter is omitted, the command has the same behaviour of **AT\R0.**

ℹ To check the ring option status use the **&V** command.

3.2.14. Call (Voice and Data) Control

3.2.14.1. ATH - Hang Up/Disconnect the Current Call

This execution command hangs up/disconnects the current voice/data call or dial-up.

ITU-T Recommendation V.25 ter

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

ATH

> When a data call or a dial-up is active the device is in on-line mode hence, to execute **ATH** command the device must be previously turned in command mode using the escape sequence or, if **&D1** option is active, tying Low the DTR pin.

3.2.14.2.   ATA - Answer Incoming call

The command is used to answer to an incoming call if automatic answer is disabled.

ITU-T Recommendation V.25 ter
3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

ATA

Execution command informs the DCE that answer sequence must be started if automatic answer is disabled.

ⓘ   This command must be the last in the command line and must be followed immediately by a <**CR**> character.

ⓘ   Data only products do not start the call and command answer is **ERROR** if a voice call is requested.

3.2.14.3. ATD - Dialup Connection

This command establishes a Mobile Originated call to the destination phone number.

ITU-T Recommendation V.25 ter
3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	Yes	-	2

ATD

The **ATD** execution command can assume different formats, which are described in the following Additional info section.

Additional info:

▶▶ **ATD<number>[;]**

If ";" character is present, a voice call is performed using the phone number given as parameter.

Name	Type	Default	Description
<number>	string	-	phone number to be dialed
			Accepted characters are 0-9 and *,#,"A", "B", "C", "D","+". For backwards compatibility with landline modems, modifiers "T", "P", "R", ",", "W", "!", "@" are accepted, but have no effect.

▶▶ **ATD><str>[;]**

If ";" character is present, a voice call is performed using the phone number identified by an alphanumeric field. All available memories are scanned to find out the field.

Name	Type	Default	Description
<str>	string	-	is an alphanumeric field identifying the phone number. The characters must be enclosed in quotation marks. The parameter is case sensitive. Use **+CSCS** command to select the character set.

▶▶ **ATD><mem><n>[;]**

If ";" character is present, a voice call is performed using the phone number stored in the selected phonebook memory storage and in the selected entry location. Use **+CPBS=?** command to get all the available memories.

Name	Type	Default	Description
<mem>	string	N/A	identifies the phonebook memory storage
	Value:		

		SM	:	SIM/UICC phonebook

<n>	integer	-	entry location. It must be in the range of the available locations in the used memory.

▶▶ **ATD><n>[;]**

If ";" character is present, a voice call is performed using a phone number on entry location **<n>** of the active phonebook memory storage (see **+CPBS**).

Name	Type	Default	Description
<n>	integer	-	entry location of the active phonebook

▶▶ **ATD<number><modifier>[;]**

If ";" character is present, a voice call is performed overriding the CLIR supplementary service subscription default value, or checking the CUG supplementary service information for the current call according to the modifier.

Name	Type	Default	Description
<number>	integer	-	phone number to be dialed
<modifier>	string	N/A	causes the call overrides the CLIR supplementary service subscription default value, or checks the CUG supplementary service information

Values:

I	:	invocation, restrict CLI presentation
i	:	suppression, allow CLI presentation
G	:	refer to +CCUG command
g	:	refer to +CCUG command

▶▶ **ATD*<gprs_sc>[*<addr>][*[<L2P>][*[<cid>]]]]#**

This command is specific for GPRS functionality, and causes the MT to perform whatever actions are necessary to establish communication between the TE and the external PDN.

Name	Type	Default	Description
<gprs_sc>	integer	N/A	is the GPRS Service Code, which identifies a request to use the GPRS communication

Value:

99	:	GPRS Service Code

<addr>	string	-	identifies the called party in the address space applicable to the PDP.
<L2P>	string	-	for communications software that does not support arbitrary characters in the dial string, the following numeric equivalents shall be used: 1 is equivalent to PPP.
<cid>	integer	-	PDP context definition, see **+CGDCONT** command

- Dial the phone number stored in the SIM phonebook at entry 6. The call is a data or voice call according to the mode set by **+FCLASS** command.

  ATD>SM6
  OK

- Dial the phone number stored in the active phonebook at entry 6. The ";" character is used, therefore the call is a voice call.

  ATD>6;
  OK

- Dial the phone number corresponding to the alphanumeric field "Name". The alphanumeric field is searched in all available memories. The ";" character is used, therefore the call is a voice call.

  ATD>"Name";
  OK

3.3. Network

3.3.1. AT#LTEDS - Current Network status in E-UTRAN

This command is used to read the current network status in E-UTRAN

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#LTEDS

Execution command reports the information about E-UTRAN network status.

#LTEDS: <EARFCN(DL/UL)>,<BAND>,<BW>,<PLMN>,<TAC>,<CELL(Physical Cell ID)>,
<ESMCAUSE>,<DRX>,<RSRP>,<RSRQ>,<RSSI>,<L2W>,<RI>,<CQI>,<STATUS>,<SUBSTATUS>,
<RRC>,<SVC>,<SINR>,<TXPWR>,<TMSI>,<IP>,<AVGRSRP>,<ANTBAR>,<MCS>,<MOD(DL/UL)>,
<BLER(DL/UL)>

Additional info:

Parameters	Description
EARFCN(DL/UL)	E-UTRAN Absolute Radio Frequency Channel Number
BAND	Band Class
BW	Band Width
PLMN	Public Land Mobile Network
TAC	Tracking Area Code
CELL(Physical Cell ID)	CELL ID (Physical Cell ID)
ESMCAUSE	ESM Cause
DRX	Discontinuous Reception
RSRP	Reference Signal Received Power
RSRQ	Received Signal Received Quality
RSSI	Received Signal Strength Indicator
L2W	Cell reselection from E-UTRAN to WCDMA
RI	Rank Indicator
CQI	Channel Quality Indicator
STATUS	Service Status/EMM Status
SUBSTATUS	Sub State of EMM-DEREGISTERED, EMM-REGISTERED and EMM-REGISTERED-INITIATED
RRC	Radio Resource Control
SVC	Service Domain
SINR	Signal to noise ratio
TXPWR	Tx Power
TMSI	Temporary Mobile Subscriber Identity
IP	Public IP Address
AVGRSRP	Average of RSRP
ANTBAR	Antenna Bar Number
MCS	Modulation and coding scheme
MOD(DL/UL)	Modulation
BLER(DL/UL)	Block error rate

Cell ID(Physical Cell ID) : eNB ID-Cell ID(Physical Cell ID)

Service Status
0 : "No_SRV"
1 : "LIMITED"
2 : "SRV"

3 : "LIMITED_REGION"
4 : "PWR_SAVE"

ℹ️ EMM Status
0 : "NULL"
1 : "DEREGISTERD"
2 : "REG_INIT"
3 : "REGISTRED"
4 : "TAU_INIT"
5 : "SVC_REQ_INIT"
6 : "DEREGINIT"
7 : "INVALID"

ℹ️ Sub Status
-This parameter depend on the EMM Status is "DEREGISTERD".
0 : "NO_IMSI"
//EMM_DEREGISTERED_NO_IMSI,
1 : "PLMN_SRCH"
//EMM_DEREGISTERED_PLMN_SEARCH,
2 : "ATT_NEED"
//EMM_DEREGISTERED_ATTACH_NEEDED,
3 : "NO_CELL"
//EMM_DEREGISTERED_NO_CELL_AVAILABLE,
4 : "ACC2ATT"
//EMM_DEREGISTERED_ATTEMPTING_TO_ATTACH,
5 : "NORMAL"
//EMM_DEREGISTERED_NORMAL_SERVICE,
6 : "LTD_SVC"
//EMM_DEREGISTERED_LIMITED_SERVICE
7 : "PDN_CONN_REQ"
//EMM_DEGEGISTERED_WAITING_PDN_CONN_REQ

-This parameter depend on the EMM Status is "REGISTERED".
0 : "NORMAL"
//EMM_REGISTERED_NORMAL_SERVICE
1 : "UDT_NEED"
//EMM_REGISTERED_UPDATE_NEEDED
2 : "ACC2UPD"
//EMM_REGISTERED_ATTEMPTING_TO_UPDATE
3 : "NO_CELL"
//EMM_REGISTERED_NO_CELL_AVAILABLE
4 : "PLMN_SRCH"
//EMM_REGISTERED_PLMN_SEARCH
5 : "LTD_SVC"
//EMM_REGISTERED_LIMITED_SERVICE
6 : "ACC2UPDMM"
//EMM_REGISTERED_ATTEMPTING_TO_UPDATE_MM
7 : "IMSI_DET"
//EMM_REGISTERED_IMSI_DETACH_INITIATED

8 : "WAIT4ESM_ISR"
//EMM_REGISTERED_WAITING_FOR_ESM_ISR_STATUS

-This parameter depend on the EMM Status is "REG_INIT".
0 : "WAIT4NW_REP"
//EMM_WATING_FOR_NW_RESPONSE
1 : "WAIT4ESM_REP"
//EMM_WAITING_FOR_ESM_RESPONSE

ⓘ RRC
0 : IDLE_STATE
1 : WAITING_FOR_RRC_CONFIRMATION_STATE
2 : CONNECTED_STATE
3 : RELEASING_RRC_CONNECTION_STATE

ⓘ SVC
0 : NO_SVC
1 : CS_ONLY
2 : PS_ONLY
3 : CS_PS

ⓘ BLER(DL/UL) doesn't support

ⓘ IP is only displayed for profile 1

3.3.2. AT+CNUM - Subscriber Number

This command returns the MSISDN (if the phone number of the device has been stored in the SIM card).

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CNUM

Execution command returns the MSISDN (if the phone number of the device has been stored in the SIM card) in the following format:

+CNUM: <alpha>,<number>,<type>[<CR><LF>
+CNUM: <alpha>,<number>,<type>[...]]

The parameters are described in the Additional info section.

Additional info:

▶▶ List of the parameters meaning.

Name	Type	Default	Description
<alpha>	string	-	alphanumeric string associated to **<number>**; The character set depends on the value set with **+CSCS**.
<number>	string	-	numeric string containing the phone number in the format **<type>**
<type>	integer	N/A	type of number
	Values:		
	129	:	national numbering scheme
	145	:	international numbering scheme (contains the character "+")

AT+CNUM=?

Test command returns the **OK** result code.

3.3.3. AT+COPN - Read Operator Names

This command read operator names.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+COPN

Execution command returns the list of operator names from the ME in the format:

+COPN: <numeric1>,<alpha1>[<CR><LF>
+COPN: <numeric2>,<alpha2>[...]]

The parameters are described in the Additional info section.

Additional info:

▶▶ List of the parameters meaning.

Name	Type	Default	Description
<numericn>	string	-	operator in numeric format, see **+COPS**.
<alphan>	string	-	operator in long alphanumeric format, see **+COPS**.

ℹ Each operator code **<numericn>** that has an alphanumeric equivalent **<alphan>** in the ME memory is returned.

ℹ Because **<alphan>** display to depend on character set (**+CSCS**), **<alphan>** may not be displayed properly.

AT+COPN=?

Test command returns the **OK** result code.

3.3.4.   AT+CREG - Network Registration Status

The command enables/disables the network registration unsolicited result code (URC) and selects its presentation format.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CREG=[<mode>]

Set command enables/disables the network registration unsolicited result code and selects one of the two available formats:

short format: **+CREG: <stat>**
long format: **+CREG: <stat>[,<lac>,<ci>[,<AcT>]]**

The parameter meanings are shown in Unsolicited code value section.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	enables/disables the network registration unsolicited result code and selects one of the two formats: shot or long format.
			8. URC short format is displayed every time there is a change in the network registration status
			9. URC long format is displayed every time there is a change of the network cell

Values:

0 : disable the network registration unsolicited result code

1 : enable the network registration unsolicited result code, and selects the short format

2 : enable the network registration unsolicited result code, and selects the long format (includes the network cell identification data)

Unsolicited fields:

Name	Type	Description
<stat>	integer	network registration status of the module

Values:

0 : not registered, terminal is not currently searching a new operator to register to

1 : registered, home network

2 : not registered, but terminal is currently searching a new operator to register to

3 : registration denied

4 : unknown

5 : registered, roaming

\<lac>	string	the parameter reports:
		10. Local Area Code when \<**AcT**>=0
		11. Tracking Area Code when \<**AcT**>=7
\<ci>	string	Cell Id for the currently registered on cell
\<AcT>	integer	access technology of the registered network
		Values:
		0 : GSM
		2 : UTRAN
		3 : GSM w/EGPRS (see NOTE 3)
		4 : UTRAN w/HSDPA (see NOTE 4)
		5 : UTRAN w/HSUPA (see NOTE 4)
		6 : UTRAN w/HSDPA and HSUPA (see NOTE 4)
		7 : E-UTRAN
		13 : E-UTRA-NR dual connectivity(see NOTE 8)

🛈   \<**lac**>, \<**ci**> and \<**AcT**> network information is reported by URC only if \<**mode**>=2, and the module is registered on some network cell.

🛈   NOTE 3: 3GPP TS 44.018 [156] specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

🛈   NOTE 4: 3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

🛈   NOTE 8: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is supporting dual connectivity of E-UTRA with NR and is connected to an EPS core.

AT+CREG?

Read command returns the current value of \<**mode**>, the registration status \<**stat**>, and the network information (\<**lac**>, \<**ci**> and \<**AcT**>) according to the used \<**mode**> parameter value.

+CREG: \<mode>,\<stat>[,\<lac>,\<ci>[,\<AcT>]]

\<lac>, \<ci>, and **\<AcT>** network information is reported only if \<**mode**>=2 and the module is registered on some network cell.

AT+CREG=?

Test command returns supported values for parameter \<**mode**>.

Check the registration status of the module.
AT+CREG?
+CREG: 0,2
OK
The module is in network searching state

...

...
Check again module status
AT+CREG?
+CREG: 0,1
OK
The module is registered

3.3.5.   AT+CLCK - Facility Lock/Unlock

This command is used to lock, unlock, or interrogate a MT or a network facility.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]]
Set command is used to lock, unlock, or interrogate a MT or a network facility.

Parameters:

Name	Type	Default	Description
<fac>	string	N/A	facility

Values:

"AB" : All Barring services (applicable only for <mode>=0)

"AC" : All inComing barring services (applicable only for <mode>=0)

"AG" : All outGoing barring services (applicable only for <mode>=0)

"AI" : BAIC (Barr All Incoming Calls)

"AO" : BAOC (Barr All Outgoing Calls)

"IR" : BIC-Roam (Barr Incoming Calls when Roaming outside the home country)

"OI" : BOIC (Barr Outgoing International Calls)

"OX" : BOIC-exHC (Barr Outgoing International Calls except to Home Country)

"SC" : SIM (lock SIM/UICC card installed in the currently selected card slot) (SIM/UICC asks password in MT power-up and when this lock command issued)

"FD" : SIM card or active application in the UICC (GSM or USIM) fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as <passwd>)

"PN" : Network Personalization

"PU" : network sUbset Personalization

"PP" : service Provider Personalization

"PC" : Corporate Personalization

"PF" : lock Phone to the very First inserted SIM/UICC card (also referred in the present document as PHFSIM) (MT asks password when other than the first SIM/UICC card is inserted)

Name	Type	Default	Description
<mode>	integer	N/A	defines the operation to be done on the facility

Values:

0 : unlock

1 : lock

	2	:	query status
\<passwd\>	string	-	shall be the same as password specified for the facility from the MT user interface or with command Change Password **+CPWD**
\<class\>	integer	7	a sum of integers each representing a class of information 1: voice(telephony) 2: data 4: fax (facsimile services) 8: short message service 16: data circuit sync 32: data circuit async 64: dedicated packet access 128: dedicated PAD access

Value:

    1÷255 :   1..255

Additional info:

▶▶   When \<**mode**\>=2 and command is successful:
    +CLCK: \<status\>[,\<class1\>[\<CR\>\<LF\>
    +CLCK: \<status\>,\<class2\>[...]]

Name	Type	Default	Description
\<status\>	integer	N/A	the current status of the facility

Values:

    0 :   not active
    1 :   active

?▯   **AT+CLCK=?**

Test command reports all the facilities supported by the device.

</>   Querying such a facility returns an output on three rows, the first for voice, the second for data, the third for fax:

    AT+CLCK ="AO",2
    +CLCK: \<status\>,1
    +CLCK: \<status\>,2
    +CLCK: \<status\>,4
    OK

3.3.6. AT+CPWD - Change Facility Password

This command is used to change the password for the facility lock function defined by command Facility Lock **+CLCK**.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Other	Yes	-	2

AT+CPWD=<fac>,<oldpwd>,<newpwd>

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

Parameters:

Name	Type	Default	Description
<fac>	string	N/A	facility
	Values:		
	"AB"	:	All Barring services
	"AC"	:	All inComing barring services
	"AG"	:	All outGoing barring services
	"AI"	:	BAIC (Barr All Incoming Calls)
	"AO"	:	BAOC (Barr All Outgoing Calls)
	"IR"	:	BIC-Roam (Barr Incoming Calls when Roaming outside the home country)
	"OI"	:	BOIC (Barr Outgoing International Calls)
	"OX"	:	BOIC-exHC (Barr Outgoing International Calls except to Home Country)
	"SC"	:	SIM (PIN request)
	"P2"	:	SIM PIN2
	"PN"	:	Network Personalization
	"PU"	:	network sUbset Personalization
	"PP"	:	service Provider Personalization
	"PC"	:	Corporate Personalization
	"PF"	:	lock Phone to the very First inserted SIM/UICC card (also referred in the present document as PHFSIM) (MT asks password when other than the first SIM/UICC card is inserted)
<oldpwd>	string	-	It shall be the same as password specified for the facility from the MT user interface or with command Change Password **+CPWD**.
<newpwd>	string	-	new password; maximum length of password can be determined with **<pwdlength>**

AT+CPWD=?

Test command returns a list of pairs (**<fac>**,**<pwdlength>**) which present the available facilities and the maximum length of their password.

Additional info:

▶▶ the available facilities and the maximum length of their password

Name	Type	Default	Description
<fac>	string	-	facility
<pwdlength>	integer	-	maximum length of the password for the facility

3.3.7. AT+CLIR - Calling Line Identification Restriction

The command manages the CLIR service.

3GPP TS 27.007
3GPP TS 22.081

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CLIR=[<n>]

Set command overrides the CLIR subscription when temporary mode is provisioned as a default adjustment for all following outgoing calls. This adjustment can be revoked by using the opposite command. This command refers to CLIR service (see 3GPP TS 22.081), that allows a calling subscriber to enable or disable the presentation of the Calling Line Identification (CLI, i.e., the phone number of the caller) to the called party when originating a call.

This command sets the default behavior of the device in all outgoing calls.

Parameter:

Name	Type	Default	Description
<n>	integer	0	setting of CLIR service

Values:

0 : CLIR facility according to CLIR service network status

1 : CLIR facility active (CLI not sent)

2 : CLIR facility not active (CLI sent)

AT+CLIR?

Read command gives the default adjustment for all outgoing calls (**<n>**) and also triggers an interrogation of the provision status of the CLIR service (**<m>**), in the form
+CLIR: <n>,<m>

Additional info:

▶▶

Name	Type	Default	Description
<n>	integer	0	facility status in the Mobile

Values:

0 : CLIR facility according to CLIR service network status

1 : CLIR facility active (CLI not sent)

2 : CLIR facility not active (CLI sent)

<m>	integer	0	facility status in the Network

Values:

    0   :   CLIR service not provisioned

    1   :   CLIR service provisioned permanently

    2   :   unknown (e.g. no network present)

    3   :   CLI temporary mode presentation restricted

    4   :   CLI temporary mode presentation allowed

AT+CLIR=?

Test command reports the supported values of parameter <**n**>

3.3.8.   AT+COLP - Connected Line Identification Presentation

This command enables/disables the presentation of the COL at the TE.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+COLP=[<n>]

Set command enables/disables the presentation of the COL at the TE.
When enabled (and called subscriber allows), the following intermediate result code is returned from TA to TE before any **+CR** or ITU T Recommendation V.250 responses:

+COLP: <number>,<type>

Parameter:

Name	Type	Default	Description
<n>	integer	0	enable/disable COL indication

Values:

0 :   disable COL indication

1 :   enable COL indication

Additional info:

▶▶ This command refers to the GSM/UMTS supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated call.

It has no effect on the execution of the supplementary service COLR in the network.

Unsolicited fields:

Name	Type	Description
<number>	string	string type phone number of format specified by **<type>**
<type>	integer	type of address octet in integer format

Values:

129 :   unknown type of number and ISDN/Telephony numbering plan

145 :   international type of number and ISDN/Telephony numbering plan (contains the character "+")

ⓘ If COL information is needed, it is recommended to set **<mode>** to 1 in **#DIALMODE** command, in order to have network information available for display before returning to command mode.

AT+COLP?

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

+COLP: <n>,<m>

Additional info:

▶▶ where

Name	Type	Default	Description
<n>	integer	N/A	COL presentation enabled/disabled
	Values:		
	0	:	COL presentation disabled
	1	:	COL presentation enabled
<m>	integer	N/A	status of the COLP service on the GSM network
	Values:		
	0	:	COLP not provisioned
	1	:	COLP provisioned
	2	:	unknown (e.g. no network is present)

ℹ This command issues a status request to the network, hence it may take a few seconds to give the answer due to the time needed to exchange data with it.

AT+COLP=?

Test command returns the range for the parameter <n>.

3.3.9. AT+CCFC - Call Forwarding Number And Condition

This command controls the call forwarding supplementary service.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CCFC=<reason>,<cmd>[,<number>[,<type>[,<class>[,<time>]]]]

The execution command controls the call forwarding supplementary service. Registration, erasure, activation, deactivation, and status query are supported.

Parameters:

Name	Type	Default	Description
<reason>	integer	0	reason of call forwarding
		Values:	
	0	:	unconditional
	1	:	mobile busy
	2	:	no reply
	3	:	not reachable
	4	:	all calls (not with query command)
	5	:	all conditional calls (not with query command)
<cmd>	integer	0	command parameter
		Values:	
	0	:	disable
	1	:	enable
	2	:	query status
	3	:	registration
	4	:	erasure
<number>	string	-	string type phone number of forwarding address in format specified by **<type>** parameter
<type>	integer	129	type of address octet in integer format
		Values:	
	129	:	National numbering scheme
	145	:	International numbering scheme (contains the character "+")
<class>	integer	7	sum of integers each representing a class of information which the command refers to; default 7 (voice + data + fax)
			12. **1** voice(telephony)
			13. **2** data
			14. **4** fax (facsimile services)
			15. **8** short message service
			16. **16** data circuit sync

17.	**32**	data circuit async	
18.	**64**	dedicated packet access	
19.	**128**	dedicated PAD access	

Value:

0÷255 : class of information

\<time\>	integer	20	time in seconds to wait before call is forwarded; it is valid only when **\<reason\>** "no reply" is enabled (**\<cmd\>**=1) or queried (**\<cmd\>**=2)

Value:

1÷30 : automatically rounded to a multiple of 5 seconds

Additional info:

▶▶ when **\<cmd\>**=2 and command successful, it returns:

+CCFC: \<status\>,\<class₁\>[,\<number\>,\<type\>[,,,\<time\>]][\<CR\>\<LF\>
+CCFC: \<status\>,\<class₂\>[,\<number\>,\<type\>[,,,\<time\>]][...]]

Name	Type	Default	Description
\<status\>	integer	0	status of the network service
			Values:
			0 : not active
			1 : active
\<time\>	string	-	it is returned only when **\<reason\>**=2 ("no reply") and **\<cmd\>**=2.

🛈 When querying the status of a network service (**\<cmd\>**=2) the response line for 'not active' case (**\<status\>**=0) should be returned only if service is not active for any **\<class\>**.

?▢ **AT+CCFC=?**
Test command reports supported values for the parameter **\<reason\>**.

3.3.10.   AT+CCWA - Call Waiting

This command allows control of the supplementary service Call Waiting. Activation, deactivation and status query are supported.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CCWA=[<n>[,<cmd>[,<class>]]]

Set command allows to enable/disable of the presentation of the URC to the TE when call waiting service is enabled; it also permits to activate, deactivate and query the status of the call waiting service.

The URC has the following format:

+CCWA: <number>,<type>,<class>[,<alpha>][,<cli_validity>]

Parameters:

Name	Type	Default	Description
<n>	integer	0	Enables/disables the presentation of an unsolicited result code
			Values:
			0 : disable
			1 : enable
<cmd>	integer	0	Enables/disables or queries the service at network level
			Values:
			0 : disable
			1 : enable
			2 : query status
<class>	integer	7	sum of integers each representing a class of information which the command refers to; default is 7 (voice + data + fax)
			20. **1** voice(telephony)
			21. **2** data
			22. **4** fax (facsimile services)
			23. **8** short message service
			24. **16** data circuit sync
			25. **32** data circuit async
			26. **64** dedicated packet access
			27. **128** dedicated PAD access
			Value:
			1÷255 : class of information

Unsolicited fields:

Name	Type	Description
<number>	string	Phone number of calling address in format specified by <type>

\<type\>	integer	Type of address in integer format
\<class\>	integer	See before
\<alpha\>	string	Alphanumeric representation of \<number\> corresponding to the entry found in phonebook; used character set should be the one selected with **+CSCS**.
\<cli_validity\>	integer	This parameter can provide details why **\<number\>** does not contain a calling party BCD number.

Values:

0 : CLI valid

1 : CLI has been withheld by the originator

2 : CLI is not available due to interworking problems or limitations of originating network

ⓘ The response to the query command is in the format:

+CCWA: \<status\>,\<class$_1$\>[\<CR\>\<LF\>
+CCWA: \<status\>,\<class$_2$\>[...]]

where

\<status\> represents the status of the service:
0 - inactive
1 - active

\<class$_n$\> - same as **\<class\>**

ⓘ If parameter **\<cmd\>** is omitted then network is not interrogated.

ⓘ In the query command the class parameter must not be issued.

ⓘ The difference between call waiting report disabling (**AT+CCWA = 0,1,7**) and call waiting service disabling (**AT+CCWA = 0,0,7**) is that in the first case the call waiting indication is sent to the device by network but this last one does not report it to the modem; instead in the second case the call waiting indication is not generated by the network. Hence the device results busy to the third party in the second case, while in the first case a ringing indication is sent to the third party.

ⓘ The command **AT+CCWA=1,0** has no effect and is a non sense, then must not be issued.

◄▭ **AT+CCWA?**

Read command reports the current value of the parameter **\<n\>** in the format

+CCWA: \<n\>

AT+CCWA=?

Test command reports the supported values for the parameter **<n>**.

3.3.11. AT+CHLD - Call Holding Services

The command controls the network call hold service.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CHLD=[<n>]

Set command controls the network call hold service. With this service it is e.g. possible to disconnect temporarily a call and keep it suspended while it is retained by the network, or make a multiparty connection.

Parameter:

Name	Type	Default	Description
<n>	integer	N/A	the parameter is used to release, activate or add an held call

Values:

0 : releases all held calls, or sets the UDUB (User Determined User Busy) indication for a waiting call.

1 : releases all active calls (if any exist), and accepts the other (held or waiting) call

1X : releases a specific active call X

2 : places all active calls (if any exist) on hold and accepts the other (held or waiting) call.

2X : places all active calls on hold except call X with which communication shall be supported

3 : adds an held call to the conversation

4 : connects the two calls and disconnects the subscriber from both calls (Explicit Call Transfer (ECT))

ⓘ "X" is the numbering (starting with 1) of the call given by the sequence of setting up or receiving the calls (active, held or waiting) as seen by the served subscriber. Calls hold their number until they are released. New calls take the lowest available number.

ⓘ Where both a held and a waiting call exist, the above procedures apply to the waiting call (i.e. not to the held call) in conflicting situation.

ⓘ The command is only applicable to voice calls.

ⓘ For VoLTE,
28.   conference call <n>=2X and <n>=4 parameter not supported.
29.   while no active or held calls option <n>=3 starts conference call to conference server without participants.

AT+CHLD=?

Test command returns the list of supported values of parameter <**n**>.

3.3.12. AT+CTFR - Call Deflection

This command is used to request a service that causes an incoming alerting call to be forwarded to a specified number.

3GPP TS 22.072

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CTFR=<number>[,<type>]

Set command is used to request a service that causes an incoming alerting call to be forwarded to a specified number. This is based on the GSM/UMTS supplementary service CD (Call Deflection, refer 3GPP TS 22.072).

Parameters:

Name	Type	Default	Description
<number>	string	-	string type phone number of format specified by **<type>**
<type>	integer	145	type of address octet in integer format

Values:

145 : default value when dialing string includes international access code character "+"

129 : default value when dialing string doesn't include international access code character "+"

🛈 The interaction of this command with other commands based on other GSM/UMTS supplementary services is described on GSM/UMTS standard.

🛈 Call Deflection is only applicable to an incoming voice call

AT+CTFR=?

Test command tests for command existence

3.3.13. AT+CUSD - Unstructured Supplementary Service Data

Set command allows control of the Unstructured Supplementary Service Data (USSD 3GPP TS 22.090).

3GPP TS 27.007
3GPP TS 22.090
3GPP TS 23.038

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CUSD=[<n>[,<str>[,<dcs>]]]

The unsolicited result code enabled by parameter <n> is in the format:

+CUSD: <m>[,<str>,<dcs>]

Parameters:

Name	Type	Default	Description
<n>	integer	0	disable/enable the presentation of an unsolicited result code
			Values:
		0 :	disable the result code presentation
		1 :	enable the result code presentation
		2 :	cancel an ongoing USSD session (not applicable to read command response)
<str>	string	-	USSD-string (when **<str>** parameter is not given, network is not interrogated)
		30.	If <dcs> indicates that GSM338 default alphabet is used ME/TA converts GSM alphabet into current TE character set (see **+CSCS**).
		31.	If <dcs> indicates that 8-bit data coding scheme is used: 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).
<dcs>	integer	-	3GPP TS 23.038 Cell Broadcast Data Coding Scheme in integer format (default is 0).

Unsolicited field:

Name	Type	Description
<m>	integer	Status service value
		Values:
	0 :	no further user action required (network initiated USSD-Notify, or no further information needed after mobile initiated operation)

1	:	further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation)
2	:	USSD terminated by the network
3	:	other local client has responded
4	:	operation not supported
5	:	network time out

AT+CUSD?

Read command reports the current value of the parameter **<n>**

AT+CUSD=?

Test command reports the supported values for the parameter **<n>**

3.3.14. AT+CAOC - Advice of Charge

This command allows the user to get information about the cost of calls and to enable an unsolicited event reporting of the Current Call Meter (CCM) information.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CAOC=<mode>

Set command refers to the Advice of Charge supplementary services that enable subscriber to get information about the cost of calls; the command also includes the possibility to enable an unsolicited event reporting of the Current Call Meter (CCM) information.

Parameter:

Name	Type	Default	Description
<mode>	integer	N/A	mode of presentation of CCM information

Values:

0 : query CCM value

1 : disables unsolicited CCM reporting

2 : enables unsolicited CCM reporting

Additional info:

▶▶ If **AT+CAOC**=0 is issued, the current CCM value is shown in the format:

+CAOC: <ccm>
where:
<**ccm**> - current call meter in home units, string type: three bytes of the CCM value in hexadecimal format (e.g. "00001E" indicates decimal value 30)

Unsolicited field:

Name	Type	Description
<ccm>	hex	The unsolicited result code enabled by parameter <**mode**> is in the format: **+CCCM: <ccm>**
		where: <**ccm**> - current call meter in home units, string type: three bytes of the CCM value in hexadecimal format (e.g. "00001E" indicates decimal value 30)

ⓘ The unsolicited result code **+CCCM** is sent when the CCM value changes, but not more than every 10 seconds.

AT+CAOC?

Read command reports the value of parameter <mode> in the format:
+CAOC: <mode>

AT+CAOC=?

Test command reports the supported values for <**mode**> parameter.

> ℹ **+CAOC** command returns an estimate of the cost of the current call only, produced by the MS and based on the information provided by either AoCI or AOCC supplementary services; it is not stored in the SIM.

3.3.15.   AT+CLCC - List Current Calls

This command returns the list of current calls and their characteristics

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CLCC

Execution command returns the list of current calls and their characteristics in the format:

**[+CLCC:<id₁>,<dir>,<stat>,<mode>,<mpty>,<number>,<type>,<alpha>[<CR><LF>
+CLCC:<id₂>,<dir>,<stat>,<mode>,<mpty>,<number>,<type>,<alpha>[...]]]**

The parameters are described in the Additional info section.

Additional info:

▶▶ List of the parameters meaning.

Name	Type	Default	Description
<idn>	integer	-	call identification number
<dir>	integer	N/A	call direction
			Values:
	0	:	mobile originated call
	1	:	mobile terminated call
<stat>	integer	N/A	state of the call
			Values:
	0	:	active
	1	:	held
	2	:	dialing (MO call)
	3	:	alerting (MO call)
	4	:	incoming (MT call)
	5	:	waiting (MT call)
<mode>	integer	N/A	call type
			Values:
	0	:	voice
	1	:	data
	2	:	fax (not supported by LTE)
	9	:	unknown
<mpty>	integer	N/A	multiparty call flag

Values:

- 0 : call is not one of multiparty (conference) call parties
- 1 : call is one of multiparty (conference) call parties

`<number>`	string	-	phone number in format specified by `<type>`
`<type>`	integer	N/A	type of phone number octet in integer format (refer to 3GPP 24.008)

Values:

- 128 : both the type of number and the numbering plan are unknown
- 129 : national numbering scheme
- 145 : international numbering scheme (contains the character "+")
- 161 : national type of number and ISDN/Telephony numbering plan

`<alpha>`	string	-	alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set should be the one selected with **+CSCS**

ℹ️ If no call is active then only **OK** message is sent. This command is useful in conjunction with command **+CHLD** to know the various call status for call holding

ℹ️ For VOLTE,
32. conference call participant's numbers start with "sip:" or "tel:", for example: sip:+12125551212

❓🔲 **AT+CLCC=?**

Test command returns **OK** result code

3.3.16.   AT+CSSN - SS Notification

The command refers to supplementary service related network initiated notifications.

- 3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CSSN=[<n>[,<m>]]

Set command enables/disables the presentation of notification result codes from **TA** to **TE**.

Parameters:

Name	Type	Default	Description
<n>	integer	0	Set **+CSSI** result code presentation status When <n>=1 and a supplementary service notification is received after a mobile originated call setup, an unsolicited code is sent to **TE** before any other **MO** call setup result codes **+CSSI: <code1>**
			Values:
	0	:	disable
	1	:	enable
<m>	integer	0	Sets the **+CSSU** result code presentation status When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, an unsolicited result code is sent to **TE** **+CSSU: <code2>**
			Values:
	0	:	disable
	1	:	enable

Unsolicited fields:

Name	Type	Description
<code1>	integer	**+CSSI** supplementary service notification.
		Values:
	0	:	unconditional call forwarding is active
	1	:	some of the conditional call forwardings are active
	2	:	call has been forwarded
	3	:	call is waiting
	5	:	outgoing calls are barred
	6	:	incoming calls are barred
<code2>	integer	**+CSSU** supplementary service notification.

Values:

0	:	this is a forwarded call (MT call setup)
2	:	call has been put on hold (during a voice call)
3	:	call has been retrieved (during a voice call)
10	:	additional incoming call forwarded

AT+CSSN?

Read command reports the current value of the parameters.

AT+CSSN=?

Test command reports the supported range of values for parameters <**n**>, <**m**>.

3.3.17.   AT+CCUG - Closed User Group

This command allows control of the Closed User Group supplementary service.

3GPP TS 27.007
3GPP TS 22.085

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CCUG=[<n>[,<index>[,<info>]]]

Set command enables the served subscriber to select a CUG index, to suppress the Outgoing Access (OA), and to suppress the preferential CUG.

Parameters:

Name	Type	Default	Description
<n>	integer	0	enables/disables the CUG temporary mode
	Values:		
	0	:	disable CUG temporary mode
	1	:	enable CUG temporary mode
<index>	integer	10	Closed Used Group index
	Values:		
	0÷9	:	CUG index
	10	:	no index (preferred CUG taken from subscriber data)
<info>	integer	0	information added to the CUG
	Values:		
	0	:	no information
	1	:	suppress Outgoing Access (OA)
	2	:	suppress preferential CUG
	3	:	suppress OA and preferential CUG

AT+CCUG?

Read command reports the current value of the parameters in the format

+CCUG: <n>,<index>,<info>

AT+CCUG=?

Test command returns the **OK** result code

3.3.18. AT+CPOL - Preferred Operator List

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

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CPOL=[<index>] [,<format>[,<oper>[,<GSM_AcT>,<GSM_Compact_AcT>, <UTRAN_AcT>,<E_UTRAN_AcTn>]]]
Execution command writes an entry in the SIM list of preferred operators.

Parameters:

Name	Type	Default	Description
<index>	integer	N/A	The order number of operator in the SIM preferred operators.
			Value:
			1÷n : order number in the list
<format>	integer	N/A	
			Values:
			0 : Long format alphanumeric <oper>
			1 : Short format alphanumeric <oper>
			2 : Numeric <oper>
<oper>	string	-	**<format>** indicates if the format is alphanumeric or numeric
<GSM_AcT>	integer	N/A	GSM access technology.
			Values:
			0 : access technology not selected
			1 : access technology selected
<GSM_Compact_AcT>	integer	N/A	GSM compact access technology
			Values:
			0 : access technology not selected
			1 : access technology selected
<UTRAN_AcT>	integer	N/A	UTRA access technology
			Values:
			0 : access technology not selected
			1 : access technology selected
<E_UTRAN_AcTn>	integer	N/A	E-UTRAN access technology

Values:

0 : access technology not selected

1 : access technology selected

🛈 If **<index>** given but **<oper>** left out, the entry deleted.
If **<oper>** given but **<index>** left out, **<oper>** put in the next free location.
If only **<format>** given, the format of the **<oper>** in the read command changes.

🛈 The user controlled PLMN could not be read/wrote/returned values and range on some SIM like AT&T when it set to CPLS 0 because the EF_PLMNwACT field does not exit.

🛈 The module which does not have the GSM access technology cannot support **<GSM_AcT>** and **<GSM_Compact_AcT>**.

AT+CPOL?

Read command returns all used entries from the SIM list of preferred operators.

AT+CPOL=?

Test command returns the whole **<index>** range supported by the SIM and the range for the parameter **<format>**

3.3.19. AT#CODECINFO - Codec Information

This command returns information about the channels codecs.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT#CODECINFO[=<format>[,<mode>]]

This command is a set or an execution command. It enables/disables unsolicited channel codec information reports, or returns the channel codec info, in both case according to the specified format.

Set command format:
AT#CODECINFO=<format>,<mode>
Execution command format:
AT#CODECINFO

Parameters:

Name	Type	Default	Description
<format>	integer	0	select the return information format: numeric or textual

Values:

    0 : numeric format, see info section

    1 : textual format, see info section

Name	Type	Default	Description
<mode>	integer	0	enable/disable unsolicited channels codecs information

Values:

    0 : disable the URC of the channels codecs information, see info section

    1 : enable the URC of the channels codecs information only if the codec changes, see info section

    2 : enable the short URC of the channels codecs information only if the codec changes, see info section

Additional info:

▶▶   <mode>=1, the URC of the channels codecs information is displayed according to the <format> parameter value:

    if <format>=0, the URC is:
    #CODECINFO: <codec_used>,<codec_set>
    if <format>=1, the URC is:
    #CODECINFO: <codec_used>,<codec_set1>[,<codec_set2>[..[,codec_setn]]]

▶▶   <mode>=2 the short URC of the channels codecs information is displayed as shown below:

    #CODECINFO: <codec_used>
    The <codec_used> format dependes on the <format> parameter value.

▶▶ Execution command (**AT#CODECINFO<CR>**) returns immediately channels codecs
information according to the previous setting of <**format**> parameter.

if <**format**>=0, the return message is:
#CODECINFO: <codec_used>,<codec_set>
if <**format**>=1, the return message is:
#CODECINFO: <codec_used>,<codec_set1>[,<codec_set2>[..[,codec_setn]]]
The parameters and their format is described in the Unsolicited code values section.

Unsolicited fields:

Name	Type	Description
<codec_used>	string	<format>=0, <codec_used> is displayed in numeric format
		Values:
		0 : no TCH
		1 : full rate speech 1 on TCH
		2 : full rate speech 2 on TCH
		4 : half rate speech 1 on TCH
		8 : full rate speech 3 – AMR on TCH
		16 : half rate speech 3 – AMR on TCH
		128 : full data 9.6
		129 : full data 4.8
		130 : full data 2.4
		131 : half data 4.8
		132 : half data 2.4
		133 : full data 14.4
		134 : full rate AMR wide band
		135 : UMTS AMR version 2
		136 : UMTS AMR wide band
<codec_set>	string	<format>=0, <codec_set> is displayed in numeric format. It is the sum of integers each representing a specific channel codec.
		channel codec:
		1 - FR, full rate mode enabled
		2 - EFR, enhanced full rate mode enabled
		4 - HR, half rate mode enabled
		8 - FAMR, AMR full rate mode enabled
		16 - HAMR, AMR half rate mode enabled
		32 - FR-AMR-WB, full rate AMR wide band
		64 - UMTS-AMR-V2, UMTS AMR version 2
		128 - UMTS-AMR-WB, UMTS AMR wide band
		Value:
		1..255 : sum of integers each representing a specific channel codec

<codec_used>	string	**<format>**=1, **<codec_used>** is displayed in textual format

Values:

None	:	no TCH
FR	:	full rate speech 1 on TCH
EFR	:	full rate speech 2 on TCH
HR	:	half rate speech 1 on TCH
FAMR	:	full rate speech 3 – AMR on TCH
HAMR	:	half rate speech 3 – AMR on TCH
FD96	:	full data 9.6
FD48	:	full data 4.8
FD24	:	full data 2.4
HD48	:	half data 4.8
HD24	:	half data 2.4
FD144	:	full data 14.4
FAWB	:	full rate AMR wide band
UAMR2	:	UMTS AMR version 2
UAWB	:	UMTS AMR wide band

<codec_setn>	string	**<format>**=1, **<codec_setn>** are displayed in textual format

Values:

FR	:	full rate mode enabled
EFR	:	enhanced full rate mode enabled
HR	:	half rate mode enabled
FAMR	:	AMR full rate mode enabled
HAMR	:	AMR half rate mode enabled
FAWB	:	full rate AMR wide band
UAMR2	:	UMTS AMR version 2
UAWB	:	UMTS AMR wide band

ⓘ The command refers to codec information in speech call, and to channel mode in data call.

ⓘ If **AT#CODEC=0**, the reported channels codecs set, for **<format>**=0, is 255 (all codecs).

AT#CODECINFO?
Read command reports <f**ormat**> and **<mode>** parameter values in the format:

#CODECINFO: <format>,<mode>

AT#CODECINFO=?

Test command returns the range of supported <**format**> and <**mode**> parameters values.

3.3.20. AT+CPLS - Selection of Preferred PLMN List

The command is used to select a list of preferred PLMNs in the SIM/USIM card.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CPLS=<list>

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

Parameter:

Name	Type	Default	Description
<list>	integer	0	PLMNs list selector

Values:

0 : User controlled PLMN selector with Access Technology EFPLMNwAcT, if not found in the SIM/UICC then PLMN preferred list EFPLMNsel (this file is only available in SIM card or GSM application selected in UICC)

1 : Operator controlled PLMN selector with Access Technology EFOPLMNwAcT

2 : HPLMN selector with Access Technology EFHPLMNwAcT

ℹ️ The value set by command is directly stored in NVM and doesn't depend on the specific CMUX instance.

AT+CPLS?

Read command returns the selected PLMN selector **<list>** from the SIM/USIM.

AT+CPLS=?

Test command returns the whole index range supported **<list>s** by the SIM/USIM.

3.3.21.   AT+CSQ - Signal Quality

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

3GPP TS 27.007
3GPP TS 25.133

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CSQ

See Additional info sections.

Additional info:

▶▶ <u>3G Networks</u>

The execution command returns the following message:
+CSQ: <rssi>,<ecio>

Name	Type	Default	Description
<rssi>	integer	N/A	measurements of the radio signal power, expressed in dBm, are mapped to <**rssi**> as shown below
	Values:		
	0	:	-113 dBm or less
	1	:	-111 dBm
	2÷30	:	-109 dBm ... -53 dBm; 2 dBm per step
	31	:	-51 dBm or greater
	99	:	not known or not detectable
<ecio>	integer	N/A	Chip energy per total wideband power in dBm. For <ecio> levels are mapped to range 0...7.
	Values:		
	0	:	-1…0
	1	:	-5…-2
	2	:	-8…-6
	3	:	-11…-9
	4	:	-15…-12
	5	:	-18…-16
	6	:	-22…-19
	7	:	-24...-23
	99	:	not known or not detectable

►► <u>4G Networks</u>

The execution command returns the following message:
+CSQ: <rssi>,<rsrq>

Name	Type	Default	Description
<rssi>	integer	N/A	Received Signal Strength Indication. For **<rssi>** to be compliant with 3GPP TS27.007 specification, levels are mapped to range 0...31.

Values:

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

Name	Type	Default	Description
<rsrq>	integer	N/A	Reference Signal Received Quality. For <rsrq> levels are mapped to range 0...7.

Values:

0	:	-4...-3 dBm
1	:	-6...-5 dBm
2	:	-8...-7 dBm
3	:	-10...-9 dBm
4	:	-13...-11 dBm
5	:	-15...-14 dBm
6	:	-17...-16 dBm
7	:	-19...-18 dBm
99	:	not known or not detectable

ℹ For UMTS, the current radio signal strength indicates CPICH RSCP in levels.

ℹ For UMTS, radio signal quality CPIC Ec/Io range -24dB to 0dB is scaled to 0 to 7.

AT+CSQ=?
Test command returns values supported as compound values.

3.3.22. AT#SERVINFO - Serving Cell Information

This command reports information about the serving cell.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

➡️ **AT#SERVINFO**

Execution command reports information about serving cell. The information and the format of the returned message depends on the network type.

WCDMA network
#SERVINFO: <UARFCN>, <dBM>, <NetNameAsc>,<NetCode>,<PSC>,<LAC>,<DRX>,<SD>,<RSCP>, <NOM>,<RAC>

LTE network
#SERVINFO: <EARFCN>,<dBM>,[<NetNameAsc>],<NetCode>,<CID>,<TAC>,<DRX>,<SD>,<RSRP>

LTE network with NR (ENDC)
#SERVINFO: <EARFCN>,<dBM>,[<NetNameAsc>],<NetCode>,<CID>,<TAC>,<DRX>,<SD>,<RSRP>,<NR_CH>,< NR_ULCH><NR_RSSI>,<NR_RSRP>,<NR_RSRQ>

NR (SA)
#SERVINFO: <NR_CH>,<NR_ULCH><NR_RSSI>,<NR_RSRP>,<NR_RSRQ>

The parameters are described in the Additional info sections.

Additional info:

▶▶ Parameters meaning.

Name	Type	Default	Description
<NetNameAsc>	string	-	operator name, quoted string or "" if network name is unknown.
<NetCode>	hex	-	country code and operator code.
<LAC>	integer	-	Localization Area Code
<dBM>	integer	-	received signal strength in dBm
<UARFCN>	integer	-	UMTS ARFCN of the serving cell
<PSC>	integer	-	Primary Synchronization Code

▶▶ Parameters meaning.

Name	Type	Default	Description
<NOM>	string	N/A	Network Operator Mode.
			Values:

I	:	Network Mode I	
II	:	Network Mode II	
III	:	Network Mode III	

\<RAC\>	integer	-	Routing Area Color Code.

▶▶ Parameters meaning.

Name	Type	Default	Description
\<DRX\>	integer	-	Discontinuous reception cycle length.
\<SD\>	integer	N/A	Service Domain
	Values:		
	0 :	No Service	
	1 :	CS only	
	2 :	PS only	
	3 :	CS & PS	
\<RSCP\>	integer	-	Received Signal Code Power in dBm.
\<EARFCN\>	integer	-	LTE Assigned Radio Channel
\<CID\>	integer	-	Cell Identifier
\<TAC\>	integer	-	Tracking Area Code
\<RSRP\>	integer	-	Reference Signal Received Power
\<NR_CH\>	integer	-	NR DL active channel
\<NR_ULCH\>	integer	-	NR UL active channel
\<NR_RSSI\>	integer	-	NR received signal strength in dBm
\<NR_RSRP\>	integer	-	NR Reference Signal Received Power
\<NR_RSRQ\>	string	-	NR Reference Signal Received Quality

AT#SERVINFO=?
Test command returns **OK** result code.

3.3.23.   AT#BCCHLOCK - Lock to Single BCCH ARFCN

This command enables/disable the single BCCH ARFCN locking.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

➡️ **AT#BCCHLOCK=<LockedBcch>[,<LockedUarfcn>[,<LockedPsc>[,<LockedEarfcn>[,<LockedPci>]]]]**

This command allows to set the single BCCH ARFCN(also UARFCN and EARFCN) the device must be locked to, selectable within those allowed for the specific product.

Parameters:

Name	Type	Default	Description
<LockedBcch>	integer	1024	enable/disable 2G BCCH locking
			Values:
		1024	: disable
		0÷124	: enable on GSM 900MHz
		975÷1023	: enable on GSM 900MHz
		512÷885	: enable on DCS 1800MHz
		128÷251	: enable on GSM 850MHz
		512÷810	: enable on PCS 1900MHz
<LockedUarfcn>	integer	0	enable/disable 3G BCCH locking
			Values:
		0	: disable
		712÷10838	: enable on downlink UARFCN in UMTS supported bands (some values in range 712-10838 are not supported according to product band configuration).
<LockedPsc>	integer	65535	enable/disable 3G BCCH locking Primary Scrambling Code selection
			Values:
		65535	: disable
		0÷511	: Primary Scrambling Code
<LockedEarfcn>	integer	0	A number in the range 0-68935 representing the earfcn to search. An value of 0 will remove the earfcn restriction and any associated Physical Cell ID lock.
			Values:
		0	: disable
		0÷68935	: enable on downlink EARFCN in LTE supported bands (some values in range 0-68935 are not supported according to product band configuration).
<LockedPci>	hex	0	E-UTRAN physical cell ID in hexadecimal format. Valid range 0 - 1F7. If the value 0 of <LockedEarfcn> is input, this value would be 0.

Values:

0	:	Physical cell id
0÷1F7	:	Physical cell id

🛈 The values set by command are directly stored in NVM and need to be reboot for lock and unlock function.

🛈 Note that the use of **<LockedPsc>** must be used with **<LockedUarfcn>** and never use **<LockedPsc>** alone. In other words, if **<LockedUarfcn>** is 0, **<LockedPsc>** must not have a specific value other than 65535. If you set **<LockedPsc>** alone, the problems of 3G search or attach procedure should be happened. However, make it to 65535(disable) alone is possible regardless of **<LockedUarfcn>.**

🛈 It is not possible to lock to a 2G BCCH and a 3G BCCH at the same time.

🛈 If selected locked 3G BCCH is not available, the module will be out of GSM/GPRS/UMTS network service even for emergency calls and will not select an alternative BCCH.

🛈 If selected locked 2G BCCH is not in power scan list, the locking function does not work and normal cell selection is performed.

🛈 If selected locked BCCH is available but the module is not allowed to register to the corresponding PLMN, the module will be able to perform only emergency calls and will not select an alternative BCCH.

🛈 If selected locked 2G/3G BCCH is available, the module, in idle and in GPRS/UMTS data transfer, will not perform reselection to another cell/ARFCN or UARFCN.

🛈 If selected locked 2G BCCH is available, the module, in GSM data transfer (voice call, data call, sms), will not perform handover to another cell.

🛈 If selected locked 3G BCCH is available, the module, in UMTS connection, will not perform handover to another cell/UARFCN.

🛈 If locked 3G BCCH is set through **<LockedUarfcn>**, the 3G rat is fixed. It means **+WS46** cannot be used for moving another RAT. If **<LockedUarfcn>** is set to 0(disable), the **+WS46** would return to the previously value.

🛈 **#BCCHLOCK** setting implies a RAT selection, that is why it is not recommended to use this command together with **+WS46**.

🛈 **#BCCHLOCK** setting has higher priority than PLMN selection, that is why it is not recommended to use this command together with manual PLMN selection **+COPS=1**.

🛈 In the situation that LTE locked function is used so certain frequency and PCI should be fixed, if the handover event comes down from the network or it is in poor signal strength environment, the RLF may occur continuously. Also, event if reselection event is happened on itself, it cannot move another cells or frequencies. So, this function should be used carefully.

🛈 The locking PSC feature related on **<LockedPsc>** is not supported on this module.

AT#BCCHLOCK?

Read command reports the currently stored parameter
<LockedBcch>,<LockedUarfcn>,<LockedPsc>,<LockedEarfcn> and **<LockedPci>** in the format:

#BCCHLOCK: **<LockedBcch>,<LockedUarfcn>,<LockedPsc>,<LockedEarfcn>,<LockedPci>**

> 🛈 If **<LockedEarfcn>** is set to 0, the related EFS would be removed so **<LockedPci>** always returned 0 even if its value was input.

AT#BCCHLOCK=?

Test command reports the supported range of values for parameter **<LockedBcch>,<LockedUarfcn>,<LockedPsc>,<LockedEarfcn>** and **<LockedPci>**.

3.3.24.   AT#CODEC - GSM and UMTS Audio Codec

GSM and UMTS audio codec mode settings

🎯   3GPP TS 24.008

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Common profile	No	-	2

➡️   **AT#CODEC=[<codec>]**

Set command sets the GSM and UMTS audio codec mode.

Parameter:

Name	Type	Default	Description
<codec>	integer	0	0 = all the codec modes are enabled
			1-255: sum of integers each representing a specific codec mode as follows
			33. 1 = FR, full rate mode enabled
			34. 2 = EFR, enhanced full rate mode enabled
			35. 4 = HR, half rate mode enabled
			36. 8 = AMR-FR, AMR full rate mode enabled
			37. 16 = AMR-HR, AMR half rate mode enabled
			38. 32 = FAWB, full rate AMR wide band
			39. 64 = UAMR2, UMTS AMR version 2
			40. 128 = UAWB, UMTS AMR wide band

Value:

   0÷255   :   codec modes setting

ℹ️   Full rate mode is added by default to any setting in the SETUP message (as specified in 3GPP TS 24.008), but the call drops if the network assigned codec mode has not been selected by the user.

ℹ️   **AT#CODEC=4** and **AT#CODEC=16** are not recommended; better using **AT#CODEC=5** and **AT#CODEC=24** respectively

ℹ️   The setting 0 is equivalent to the setting 255.

⬅️   **AT#CODEC?**

Read command returns current audio codec mode in the format:

#CODEC: <codec>

❓   **AT#CODEC=?**

Test command returns the range of available values for parameter <codec>

- **AT#CODEC=14**
  OK

  sets the codec modes HR (4), EFR (2) and AMR-FR (8)

3.3.25.   AT#BND - Select Band

This command selects RF bands

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

➡️ **AT#BND=<GSM_band>[,<UMTS_band>[,<LTE_band>[,<LTE_band_ext>[,<NSA_NR5G_band_1_64>[,<NSA_NR5G_band_65_128>[,<NSA_NR5G_band_257_320>[,<SA_NR5G_band_1_64>[,<SA_NR5G_band_65_128>[,<SA_NR5G_band_257_320>]]]]]]]]]**

Set command selects the current WCDMA, LTE and NR5G bands.

Parameters:

Name	Type	Default	Description
<GSM_band>	integer	0	GSM band selection.

Values:

0	:	GSM 900MHz + DCS 1800MHz
1	:	GSM 900MHz + PCS 1900MHz
2	:	GSM 850MHz + DCS 1800MHz
3	:	GSM 850MHz + PCS 1900MHz
4	:	GSM 900MHz + DCS 1800MHz + PCS 1900MHz
5	:	GSM 850MHz + GSM 900MHz + DCS 1800MHz + PCS 1900MHz

<UMTS_band>	integer	N/A	WCDMA band selection.

Values:

0	:	2100MHz (FDD I)
1	:	1900MHz (FDD II)
2	:	850MHz (FDD V)
3	:	2100MHz (FDD I) + 1900MHz (FDD II) + 850MHz (FDD V)
4	:	1900MHz (FDD II) + 850MHz (FDD V)
5	:	900MHz (FDD VIII)
6	:	2100MHz (FDD I) + 900MHz (FDD VIII)
7	:	1700MHz (FDD IV)
8	:	2100MHz (FDD I) + 850MHz (FDD V)
9	:	2100MHz (FDD I) + 900MHz (FDD VIII) + 850MHz (FDD V)
10	:	1900MHz (FDD II) + 1700MHz (FDD IV) + 850MHz (FDD V)
11	:	2100MHz (FDD I) + 1900MHz (FDD II) + 1700MHz (FDD IV) + 850MHz (FDD V) + 900MHz (FDD VIII)
12	:	2100MHz (FDD I) + 1800MHz (FDD III) + 850MHz (FDD V) + 900MHz (FDD VIII)
13	:	1800MHz (FDD III)

	14	:	2100MHz (FDD I) + 1800MHz (FDD III) + 850MHz (FDD V)
	15	:	1800MHz (FDD III) + 850MHz (FDD V)
	16	:	2100MHz (FDD I) + 1900MHz (FDD II) + 1800MHz (FDD III) + 1700MHz (FDD IV) + 850MHz (FDD V) + 900MHz (FDD VIII)
	17	:	2100MHz (FDD I) + 1900MHz (FDD II) + 900MHz (FDD VIII)
	18	:	2100MHz (FDD I) + 1900MHz (FDD II) + 1700MHz (FDD IV) + 850MHz (FDD V) + 900MHz (FDD VIII) + JAPAN1800(FDD IX) + JAPAN800(FDD XIX)
	19	:	2100MHz (FDD I) + 1900MHz (FDD II) + 1700MHz (FDD IV) + 850MHz (FDD V) + JAPAN850MHz (FDD VI) + 900MHz (FDD VIII) + JAPAN1800(FDD IX) + JAPAN800(FDD XIX)
	20	:	2100MHz (FDD I) + 1900MHz (FDD II) + 1800MHz (FDD III) + 1700MHz (FDD IV)
	21	:	2100MHz (FDD I) + 1900MHz (FDD II) + 1800MHz (FDD III) + 1700MHz (FDD IV) + 850MHz (FDD V) + JAPAN850MHz (FDD VI) + 900MHz (FDD VIII) + JAPAN1800(FDD IX) + JAPAN800(FDD XIX)

<LTE_band>	hex	N/A	Indicates the LTE supported bands expressed as the sum of Band number (1+2+8 ...) calculated as shown in the table (mask of 64 bits):

Band number(Hex)	Band i
0	disable
1	B1
2	B2
4	B3
8	B4
...	...
80000000	B32
...	...
800000000000	B48

Value:

0÷A7E2BB0F38DF : range of the sum of Band number (1+2+4 ...)

<LTE_band_ext>	hex	N/A	Indicates the LTE supported bands from B65 expressed as the sum of Band number (1+2+8 ...) calculated as shown in the table (mask of 64 bits):

Band number(Hex)	Band i
0	disable
2	B66
40	B71

Value:

0÷42 : range of the sum of Band number (2+40)

<NSA_NR5G_band_1_64>	hex	N/A	Indicates the NSA NR5G supported bands expressed as the sum of Band

number (1+2+8 ...) calculated as shown in the table (mask of 64 bits):

Band number(Hex)	Band i
0	disable
1	n1
2	n2
4	n3
8	n4
...	...
80000000	n32
...	...
800000000000	n48

Value:

0÷81A0090808D7 : range of the sum of Band number (1+2+4 ...)

<NSA_NR5G_band_65_128>	hex	N/A	Indicates the NSA NR5G supported bands from B65expressed as the sum of Band number (1+2+8 ...) calculated as shown in the table (mask of 64 bits):

Band number(Hex)	Band i
0	disable
2	n66
40	n71
1000	n77
2000	n78
4000	n79

Value:

0÷7042 : range of the sum of Band number (2+40+1000 ...)

<NSA_NR5G_band_257_320>	hex	N/A	Indicates the NSA NR5G supported bands from B257 expressed as the sum of Band number (1+2+8 ...) calculated as shown in the table (mask of 64 bits):

Band number(Hex)	Band i
0	disable
1	n257
2	n258
8	n260
10	n261

Value:

0÷1B : range of the sum of Band number (1+2...)

<SA_NR5G_band_1_64>	hex	0	Indicates the SA NR5G supported bands expressed as the sum of Band number (1+2+8 ...) calculated as shown in the table (mask of 64 bits):

Band number(Hex)	Band i

0	disable
1	n1
2	n2
4	n3
8	n4
...	...
80000000	n32
...	...
800000000000	n48

Values:

0÷10009000047   :   range of the sum of Band number (1+2+4 ...)

0   :   Not support

<SA_NR5G_band_65_128>	hex	N/A	Indicates the SA NR5G supported bands from B65expressed as the sum of Band number (1+2+8 ...) calculated as shown in the table (mask of 64 bits):

Band number(Hex)	Band i
0	disable
2	n66
40	n71
1000	n77
2000	n78
4000	n79

Value:

0÷6042   :   range of the sum of Band number (2+40+1000 ...)

<SA_NR5G_band_257_320>	hex	0	It cannot be used by default because solution provider did not support yet.
			Indicates the SA NR5G supported bands from B257 expressed as the sum of Band number (1+2+8 ...) calculated as shown in the table (mask of 64 bits):

Band number(Hex)	Band i
0	disable
1	n257
2	n258
8	n260
10	n261

Value:

0   :   Not support

Additional info:

▶▶ The NR5G FR2 bands, **<NSA_NR5G_band_257_320>,** follows the QTM antenna identity.

QTM antenna	Supported mmwave band
QTM 525-2	n257, n258
QTM 525-5	n258, n260, n261

QTM 527-1	n260, n261
QTM 527-2	n257, n258, n261
None	Not supported

ℹ This setting is maintained even after power off. **<GSM_band>, <UMTS_band>** parameters are decimal value.
<LTE_band>,<LTE_band_ext>,<NSA_NR5G_band_1_64>,<NSA_NR5G_band_65_128>,<NSA _NR5G_band_257_320>,<SA_NR5G_band_1_64>,<SA_NR5G_band_65_128> and **<SA_NR5G_band_257_320>** parameters are hex format value and band set should be entered in HEX format without "0x".

ℹ The **<LTE_band>** and **<LTE_band_ext>** cannot be set to 0 at the same time.

ℹ If the one of NR5G bands is changed, the reboot process have to be needed for proper band search behavior.

ℹ The NR5G bands cannot be set to 0 at the same time.

ℹ This module use fixed unused value 0 for **<GSM_band>** parameter. For any variants which cannot support WCDMA, the **<UMTS_band>** is fixed unused value 0.

ℹ Supported band for each network provider.

<GCF>
5G FR1 NSA : 1,2,3,5,7,8,12,20,25,28,38,40,41,48,66,71,77,78,79
5G FR2 NSA : Depends on the MMW antenna.
5G FR1 SA : Not supported by default, but N1,2,3,7,25,28,41,66,71,78 and 79 can be enabled through #BND command.
5G FR2 SA : Not supported by default because it cannot be supported by solution provider.
LTE : 1,2,3,4,5,7,8,12,13,14,17,18,19,20,25,26,28,29,30,32,34,38,39,40,41,42,43,46,48,66,71
WCDMA : 1,2,3,4,5,6,8,9,19
GSM : Not Supported

<NTT>
5G FR1 NSA : 2,5,7,12,20,25,38,40,48,66,71,77,78,79 (N1,3,8,28 and 41 are not supported by default, but it can be enabled through #BND command)
5G FR2 NSA : Depends on the MMW antenna.
5G FR1 SA : Not supported by default, but N1,2,3,7,25,28,41,66,71,78 and 79 can be enabled through #BND command.
5G FR2 SA : Not supported by default because it cannot be supported by solution provider.
LTE : 1,2,3,4,5,7,8,12,13,14,17,18,19,20,25,26,28,29,30,32,34,38,39,40,41,42,43,46,48,66,71
WCDMA : 1,2,3,4,5,6,8,9,19
GSM : Not Supported

<TELSTRA>
5G FR1 NSA : 2,5,8,12,20,25,38,40,41,48,66,71,77,78,79 (N1,3,7 and 28 are not supported by default, but it can be enabled through #BND command)
5G FR2 NSA : Depends on the MMW antenna.
5G FR1 SA : Not supported by default, but N1,2,3,7,25,28,41,66,71,78 and 79 can be enabled through #BND command.
5G FR2 SA : Not supported by default because it cannot be supported by solution provider.
LTE : 1,2,3,4,5,7,8,12,13,14,17,18,19,20,25,26,28,29,30,32,34,38,39,40,41,42,43,46,48,66,71

WCDMA : 1,2,3,4,5,6,8,9,19

GSM : Not Supported

<KDDI>

5G FR1 NSA : 78 (N1,2,3,5,7,8,12,20,25,28,38,40,41,48,66,71,77,79 are not supported by default, but it can be enabled through #BND command)

5G FR2 NSA : Depends on the MMW antenna.

5G FR1 SA : Not supported by default, but N1,2,3,7,25,28,41,66,71,78 and 79 can be enabled through #BND command.

5G FR2 SA : Not supported by default because it cannot be supported by solution provider.

LTE : 1,3,18,26,28,41,42 (B2,4,5,7,8,12,13,14,17,19,20,25,29,30,32,34,38,39,40,43,46,48,66,71 are not supported by default, but it can be enabled through #BND command)

WCDMA : 1,2,3,4,5,6,8,9,19

GSM : Not Supported

<VZW, SPRINT>

5G FR1 NSA : 1,2,3,5,7,8,12,20,25,28,38,40,41,48,66,71,77,78,79

5G FR2 NSA : Depends on the MMW antenna.

5G FR1 SA : Not supported by default, but N1,2,3,7,25,28,41,66,71,78 and 79 can be enabled through #BND command.

5G FR2 SA : Not supported by default because it cannot be supported by solution provider.

LTE : 1,2,3,4,5,7,8,12,13,14,18,19,20,25,26,28,29,30,32,34,38,39,40,41,42,43,46,48,66,71

WCDMA : Not Supported

GSM : Not Supported

<PTCRB/TMO>

5G FR1 NSA : 1,2,3,5,7,8,12,20,25,28,38,40,41,48,66,71,77,78,79

5G FR2 NSA : Depends on the MMW antenna.

5G FR1 SA : Not supported by default, but N1,2,3,7,25,28,41,66,71,78 and 79 can be enabled through #BND command.

5G FR2 SA : Not supported by default because it cannot be supported by solution provider.

LTE : 1,2,3,4,5,7,8,12,13,14,18,19,20,25,26,28,29,30,32,34,38,39,40,41,42,43,46,48,66,71

WCDMA : Not Supported

GSM : Not Supported

<ATT>

5G FR1 NSA : 2,5,12,66,77

5G FR2 NSA : Depends on the MMW antenna.

5G FR1 SA : Not supported by default, but N1,2,3,7,25,28,41,66,71,78 and 79 can be enabled through #BND command.

5G FR2 SA : Not supported by default because it cannot be supported by solution provider.

LTE : 2,4,5,12,14,26,29,30,46,48,66 (B1,3,7,8,13,18,19,20,25,28,32,34,38,39,40,41,42,43,71 are not supported by default, but they can be enabled through #BND command)

WCDMA : Not Supported

GSM : Not Supported

<ANATEL>

5G FR1 NSA : 1,2,3,5,7,8,12,20,25,28,38,40,41,48,66,71,77,78,79

5G FR2 NSA : Depends on the MMW antenna.

5G FR1 SA : Not supported by default, but N1,2,3,7,25,28,41,66,71,78 and 79 can be enabled through #BND command.

5G FR2 SA : Not supported by default because it cannot be supported by solution provider.
LTE : 1,2,3,4,5,7,8,12,13,14,18,19,20,25,26,28,29,30,32,34,38,40,41,42,43,46,48,66,71
WCDMA : Not Supported
GSM : Not Supported

<SKT/SKTD>
5G FR1 NSA : 78
5G FR2 NSA : Depends on the MMW antenna and only 257 band can be supported.
5G FR1 SA : 78
5G FR2 SA : Not supported by default because it cannot be supported by solution provider.
LTE : 1,3,5,7,8
WCDMA : Not Supported
GSM : Not Supported

ℹ️ Although the FT980-KS module is a SKT variant, it supports only LTE bands 1, 3, 5 and 7.

AT#BND?
Read command returns the current selected band in the format:
**#BND:
<band>,<UMTS_band>,<LTE_band>,<LTE_band_ext>,<NSA_NR5G_band_1_64>,<NSA_NR5G_band_65_128>,<NSA_NR5G_band_257_320>,<SA_NR5G_band_1_64>,<SA_NR5G_band_65_128>,<SA_NR5G_band_257_320>**

AT#BND=?
Test command returns the supported range of values of parameters **<band>, <UMTS_band><LTE_band>,<LTE_band_ext>,<NSA_NR5G_band_1_64>,<NSA_NR5G_band_65_128>,<NSA_NR5G_band_257_320>,<SA_NR5G_band_1_64>,<SA_NR5G_band_65_128>** and **<SA_NR5G_band_257_320>**.

</> Test command
AT#BND=?
#BND: (0),(0-21),(A7E2BB0F38DF),(42),(81A0090808D7),(7042),(3),(10009000047),(6042),(0)

OK

Read command
AT#BND?
#BND: 0,21,A7E2BB0F38DF,42,81A0090808D7,7042,3,0,0,0

OK

Read command indicates the supported bands.

3.3.26.   AT+CEMODE - Set Mode of Operation for EPS

This command used to configure the mode of operation for EPS.

3GPP TS 24.301

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT+CEMODE=[<mode>]

This set command configures the mode of operation for EPS.

Parameter:

Name	Type	Default	Description
<mode>	integer	1	mode of operation. The default value depends on product.
			UE modes of operation can be found in 3GPP TS 24.301. Other values are reserved and will result in an **ERROR** response to the set command.

Values:

0 : PS mode 2 of operation

1 : CS/PS mode 1 of operation

2 : CS/PS mode 2 of operation

3 : PS mode 1 of operation

> ℹ The default value of parameter <mode> is 2 in FT980-KS.

AT+CEMODE?

Read command returns the current value of parameter **<mode>** in the format:
+CEMODE: < mode >

> ℹ The read command will return right values after set command, but effectively the mode of operation changes after power cycle.

AT+CEMODE=?

Test command returns the supported range of values of parameters **<mode>**.

Set EPS mode
AT+CEMODE=1
OK

Check EPS mode
AT+CEMODE?
+CEMODE: 1
OK

3.3.27. AT+CEUS - UE's usage setting for EPS and 5GS

This command sets the UE's usage setting for EPS and 5GS.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT+CEUS=[<setting>]

Set command is used to set the UE to operate according to the specified UE's usage setting for EPS (see **3GPP TS 24.301**) and 5GS (see **3GPP TS 24.501**).

Parameter:

Name	Type	Default	Description
<setting>	integer	N/A	indicates the usage setting of the UE

Values:

0 : voice centric

1 : data centric

AT+CEUS?

Read command returns the usage setting value

+CEUS: <setting>

AT+CEUS=?

Test command returns supported values for parameter **<setting>**.

3.3.28. AT+CPNER - Primary Notification Event Reporting

This command enables/disables reporting of primary notification events received from the network.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CPNER=[<reporting>]

This command enables/disables reporting of primary notification events with the following unsolicited result code.

+CPNERU: <message_identifier>,<serial_number>,<warning_type>

Primary notification events used for public warning systems like *ETWS* (*Earthquake and Tsunami Warning Systems*).

Parameter:

Name	Type	Default	Description
<reporting>	integer	1	Controlling reporting of primary notification events.

Values:

0 : Disable primary notification events.

1 : Enable reporting of primary notification events without security information, unsolicited result code(default)

Unsolicited fields:

Name	Type	Description
<message_identifier>	string	string type in hexadecimal character format. The parameter contains the message identifier (2 bytes) of the primary notification.
<serial_number>	string	string type in hexadecimal character format. The parameter contains the serial number (2 bytes) of the primary notification.
<warning_type>	string	string type in hexadecimal character format. The parameter contains the warning type (2 bytes) of the primary notification.

AT+CPNER?

Read command reports the current value of the parameter.

AT+CPNER=?

Test command returns supported of parameter.

```
AT+CPNER?
+CPNER: 1
OK
```

3.3.29. AT+CESQ - Extended Signal Quality

Execution command returns received signal quality parameters.

[1] 3GPP TS 27.007
[2] 3GPP TS 45.008
[3] 3GPP TS 25.133
[4] 3GPP TS 26.133
[5] 3GPP TS 38.133

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CESQ

Execution command reports received signal quality parameters in the form:

+CESQ: <rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp>,<ss_rsrq>,<ss_rsrp>,<ss_sinr>

Additional info:

▶▶

Name	Type	Default	Description
<rxlev>	integer	N/A	Received signal strength level (see 3GPP TS 45.008 subclause 8.1.4)
	Values:		
	0	:	rssi < -110 dBm
	1	:	-110 dBm ≤ rssi < -109 dBm
	2	:	-109 dBm ≤ rssi < -108 dBm
	...	:	...
	61	:	- 50 dBm ≤ rssi < - 49 dBm
	62	:	- 49 dBm ≤ rssi < -48 dBm
	63	:	- 48 dBm ≤ rssi
	99	:	not known or not detectable or if the current serving cell is not a GERAN cell
<ber>	integer	N/A	Channel bit error rate (in percent)
	Values:		
	0÷7	:	as RXQUAL values, see 3GPP TS 45.008 subclause 8.2.4
	99	:	not known or not detectable or if the current serving cell is not a GERAN cell
<rscp>	integer	N/A	Received signal code power (see 3GPP TS 25.133 subclause 9.1.1.3 and 3GPP TS 25.123 subclause 9.1.1.1.3)

Values:

0	:	rscp < -120 dB
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, not detectable or if the current serving cell is not a UTRA cell

<ecno>	integer	N/A	Ratio of the received energy per PN chip to the total received power spectral density (see 3GPP TS 25.133 subclause).

Values:

0	:	Ec/Io < -24 dBm
1	:	-24 dBm ≤ Ec/Io < -23.5 dBm
2	:	-23.5 dBm dBm ≤ Ec/Io < -23 dBm
...	:	...
47	:	-1 dBm ≤ Ec/Io < -0.5 dBm
48	:	-0.5 dBm ≤ Ec/Io < 0 dBm
49	:	0 dBm ≤ Ec/Io
255	:	not known, not detectable or if the current serving cell is not a UTRA cell

<rsrq>	integer	0	reference signal received quality (see 3Gpp TS 36.133 subclause 9.1.7)

Values:

0	:	rsrq < -19.5 dBm
1	:	-19.5 dBm ≤ rsrq < -19 dBm
2	:	-19 dBm ≤ rsrq < -18.5 dBm
...	:	...
32	:	-4 dBm ≤ rsrq < -3.5 dBm
33	:	-3.5 dBm ≤ rsrq < -3 dBm
34	:	-3 dBm ≤ rsrq
255	:	not known, not detectable or if the current serving cell is not a EUTRA cell

<rsrp>	integer	0	reference signal received power (see 3Gpp TS 36.133 subclause 9.1.4)

Values:

0	:	rsrp < -140 dBm
1	:	-140 dBm ≤ rsrp < -139 dBm

2	:	-139 dBm ≤ rsrp < -138 dBm	
...	:	...	
95	:	-46 dBm ≤ rsrp < -45 dBm	
96	:	-45 dBm ≤ rsrp < -44 dBm	
97	:	-44 dBm ≤ rsrp	
255	:	not known, not detectable or if the current serving cell is not a EUTRA cell	
<ss_rsrq>	integer	0	synchronization signal based reference signal received quality (see 3GPP TS 38.133 [169] subclause 10.1.11)
Values:			
0	:	ss_rsrq < -43 dB	
1	:	-43 dB ≤ ss_rsrq < -42.5 dB	
2	:	-42.5 dB ≤ ss_rsrq < -42 dB	
...	:	...	
124	:	18.5 dB ≤ ss_rsrq < 19 dB	
125	:	19 dB ≤ ss_rsrq < 19.5 dB	
126	:	19.5 dB ≤ ss_rsrq < 20 dB	
255	:	not known or not detectable	
<ss_rsrp>	integer	0	synchronization signal based reference signal received power (see 3GPP TS 38.133 [169] subclause 10.1.6)
Values:			
0	:	ss_rsrp < -156 dBm	
1	:	-156 dBm ≤ ss_rsrp < -155 dBm	
2	:	-155 dBm ≤ ss_rsrp < -154 dBm	
...	:	...	
125	:	-32 dBm ≤ ss_rsrp < -31 dBm	
126	:	-31 dBm ≤ ss_rsrp	
255	:	not known or not detectable	
<ss_sinr>	integer	0	synchronization signal based signal to noise and interference ratio (see 3GPP TS 38.133 [169] subclause 10.1.16)
Values:			
0	:	ss_sinr < -23 dB	
1	:	-23 dB ≤ ss_sinr < -22.5 dB	
2	:	-22.5 dB ≤ ss_sinr < -22 dB	
...	:	...	
125	:	39 dB ≤ ss_sinr < 39.5 dBm	
126	:	39.5 dB ≤ ss_sinr < 40 dB	

127	:	40 dB ≤ ss_sinr
255	:	not known or not detectable

🛈 This project does not support the GSM access technology.

?▢ **AT+CESQ=?**
Test command returns values supported as compound values.

3.3.30. AT#ENS - Enhanced Network Selection

Set command is used to activate the Enhanced Network Selection (ENS) functionality.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#ENS=[<mode>]

Set command is used to activate the ENS functionality

Parameter:

Name	Type	Default	Description
<mode>	integer	0	ENS functionality
	Values:		
	0	:	Disable ENS functionality
	1	:	Enable ENS functionality

ℹ️ If AT#ENS=1 has been issued, the following values will be automatically set and also at every next power-up:
41. All bands are enabled
42. SIM Application Toolkit enabled on user interface 0 if not previously enabled on a different user interface (AT#STIA-2)

ℹ️ The default value is 1 on the ATT mode(variant) only.

AT#ENS?

Read command reports whether the ENS functionality is currently enabled or not, in the format:

#ENS: <mode>

AT#ENS=?

Test command reports the available range of values for parameter **<mode>**

3.3.31. AT#EONS - Enable URC of Enhanced Operator Name String

This command is used to set URC and activation feature of EONS.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#EONS=<ena>

Set command enables URC & feature of EONS. Unsolicited result code (URC) available format:

#EONS: <net>

Parameter:

Name	Type	Default	Description
<ena>	integer	0	-

Values:

0	:	Disable URC & feature of EONS
1	:	Enable URC & feature of EONS

Unsolicited field:

Name	Type	Description
<net>	string	Alpha tag of network name. Name string can be any network name as well as EONS and sent by its priority. The following order of priority for which "name source" is to use used: Values: 1:EF-SPN 2:EF-OPL and EF-PNN 3:CPHS Operator Name String 4:Name Information received by the NITZ service 5:Any name stored internal to the ME 6:Displaying the broadcast MCC-MNC

AT#EONS?

Read command returns the current selected parameter in the format:

#EONS: <ena>[,<net>]

> ℹ️ Name string is shown only when network service is available.

AT#EONS=?

Test command returns the supported range of values of parameters **<ena>**.

3.3.32. AT+WS46 - PCCA STD-101 Select Wireless Network

This command selects the cellular network (Wireless Data Service, WDS).

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT+WS46=[<n>]

Set command selects the cellular network (Wireless Data Service, WDS) to operate with the **TA** (WDS-Side Stack Selection).

Parameter:

Name	Type	Default	Description
<n>	integer	38	WDS-Side Stack to be used by the **TA**.

Values:

22 : UTRAN only

28 : E-UTRAN only

31 : UTRAN and E-UTRAN

36 : NG-RAN only

37 : NG-RAN and E-UTRAN

38 : NG-RAN, E-UTRAN and UTRAN

40 : NG-RAN and UTRAN

ℹ️ **<n>** parameter setting is stored in NVM.

ℹ️ Available **<n>** parameters in PTCRB/ATT/TMO/VZW/ANATEL : 28,**37**(default:37)
Available **<n>** parameters in SKT/SKT_DG : 22,28,31,36-**38**,40(default:38)
Available **<n>** parameters in others : 22,28,31,37,**38**(default:38)

AT+WS46?

Read command reports the currently selected cellular network, in the format:

+ WS46: <n>

AT+WS46=?

Test command reports the range for the parameter **<n>**.

3.3.33.   AT+CEREG - EPS Network Registration Status

This command monitors the Evolved Packet System (EPS) network registration status in LTE.

[1] 3GPP TS 24.008
[2] 3GPP TS 24.301
[3] 3GPP TS 25.331

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CEREG=[<mode>]

Set command enables/disables the EPS network registration unsolicited result code (URC) in LTE, and selects one of the available formats:

short format: **+CEREG: <stat>**
long format: **+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>]]**

<tac>, **<ci>,** and **<AcT>** are reported by the command only if available.

In case of error, possible response(s): **+CME ERROR: <err>**

Parameter:

Name	Type	Default	Description
<mode>	integer	0	enables/disables the network registration unsolicited result code (URC), and selects one of the available formats.
			The following events triggers the URC:
			43. URC short format is displayed every time there is a change in the EPS network registration status
			44. URC long format is displayed every time there is a change of network cell in LTE

Values:

0 : disable the network registration unsolicited result code

1 : enable the network registration unsolicited result code, and select the short format

2 : enable the network registration unsolicited result code, and selects the long format (includes the network cell identification data)

Unsolicited fields:

Name	Type	Description
<stat>	integer	EPS registration status
		Values:
		0 : not registered, terminal is not currently searching a new operator to register to
		1 : registered, home network
		2 : not registered, but terminal is currently searching a new operator to register to

	3	:	registration denied
	4	:	unknown. Example, out of LTE coverage
	5	:	registered, roaming
	6	:	registered for "SMS only", home network (not applicable)
	7	:	registered for "SMS only", roaming (not applicable).
	8	:	attached for emergency bearer services only. 3GPP TS 24.008 [8] and 3GPP TS 24.301 [83] specify the condition when the MS is considered as attached for emergency bearer services. (not applicable).
	9	:	registered for "CSFB not preferred", home network (not applicable).
	10	:	registered for "CSFB not preferred", roaming (not applicable).
<tac>	string		tracking area code (two bytes) in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	string		LTE cell ID (four bytes) in hexadecimal format
<AcT>	integer		indicates the access technology of the serving cell.
	Values:		
	0	:	GSM (not applicable)
	1	:	GSM Compact (not applicable)
	2	:	UTRAN (not applicable)
	3	:	GSM w/EGPRS (not applicable)
	4	:	UTRAN w/HSDPA (not applicable)
	5	:	UTRAN w/HSUPA (not applicable)
	6	:	UTRAN w/HSDPA and HSUPA (not applicable)
	7	:	E-UTRAN
	13	:	E-UTRA-NR dual connectivity (see NOTE 8)

ℹ NOTE 8: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is supporting dual connectivity of E-UTRA with NR and is connected to an EPS core.

AT+CEREG?

Read command returns the current value of <**mode**>, the registration status <**stat**>, and the information <**tac**>, <**ci**>, <**AcT**> according to the current <**mode**> parameter value.

+CEREG: <mode>,<stat>[,[<tac>],[<ci>],[<AcT>]]

ℹ <**tac**>, <**ci**> and <**AcT**> are reported only if <**mode**>=2 and the mobile is registered on some network cell.

AT+CEREG=?

Test command returns supported values for parameter <**mode**>.

3.3.34. AT+C5GREG - 5GS Network Registration Status

This command monitors the 5GS network registration status in NR.

3GPP TS 38.331

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+C5GREG=[<mode>]

Set command enables/disables the 5GS network registration unsolicited result code (URC) in NR, and selects one of the available formats:

short format: **+C5GREG: <stat>**
long format: **+C5GREG:**
<stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]]

<tac>, **<ci>**, and **<AcT>**,**<Allowed_NSSAI_length>**,**<Allowed_NSSAI>** are reported by the command only if available.

In case of error, possible response(s): **+CME ERROR: <err>**

Parameter:

Name	Type	Default	Description
<mode>	integer	0	enables/disables the network registration unsolicited result code (URC), and selects one of the available formats.
			The following events triggers the URC:
			45. URC short format is displayed every time there is a change in the 5GS network registration status
			46. URC long format is displayed every time there is a change of network cell in NR

Values:

0 : disable the network registration unsolicited result code

1 : enable the network registration unsolicited result code, and select the short format - TBD

2 : enable the network registration unsolicited result code, and selects the long format (includes the network cell identification data) - TBD

Unsolicited fields:

Name	Type	Description
<stat>	integer	5GS registration status
		Values:
		0 : not registered, terminal is not currently searching a new operator to register to
		1 : registered, home network

		2	:	not registered, but terminal is currently searching a new operator to register to
		3	:	registration denied
		4	:	unknown. (e.g. out of NR coverage)
		5	:	registered, roaming
		6	:	registered for "SMS only", home network (not applicable)
		7	:	registered for "SMS only", roaming (not applicable)
		8	:	attached for emergency bearer services only. 3GPP TS 24.008 and 3GPP TS 24.301 specify the condition when the MS is considered as attached for emergency bearer services (not applicable)
		9	:	registered for "CSFB not preferred", home network (not applicable)
		10	:	registered for "CSFB not preferred", roaming (not applicable)
<tac>	string	tracking area code (two bytes) in hexadecimal format (e.g. "00C3" equals 195 in decimal)		
<ci>	string	NR cell ID (four bytes) in hexadecimal format		
<AcT>	integer	indicates the access technology of the serving cell		
		Values:		
		0	:	GSM(not applicable)
		1	:	GSM Compact (not applicable)
		2	:	UTRAN (not applicable)
		3	:	GSM w/EGPRS (not applicable)
		4	:	UTRAN w/HSDPA (not applicable)
		5	:	UTRAN w/HSUPA (not applicable)
		6	:	UTRAN w/HSDPA and HSUPA (not applicable)
		7	:	E-UTRAN(not applicable)
		11	:	NR connected to a 5GCN
		12	:	NG-RAN (not applicable)
		13	:	E-UTRA-NR dual connectivity (see NOTE 8) (not applicable)
<Allowed_NSSAI_length>	integer	Indicates the number of octets of the **<Allowed_NSSAI>** information element		
<Allowed_NSSAI>	string	Dependent of the form, the string can be separated by dot(s), semicolon(s). This parameter indicates the list of allowed S-NSSAIs received from the network. The **<Allowed_NSSAI>** is coded as a list of **<S-NSSAI>**s separated by colons. Refer parameter **<S-NSSAI>** in subclause 10.1.1. This parameter shall not be subject to conventional character conversion as per **+CSCS**.		

ℹ️ Supported kind of <AcT>s are not determined yet and it will be determined by Solution provider later.

NOTE 8: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is supporting dual connectivity of E-UTRA with NR and is connected to an EPS core.

AT+C5GREG?

Read command returns the current value of **<mode>**, the registration status **<stat>**, and the information **<tac>**, **<ci>**, **<AcT>**, **<Allowed_NSSAI_length>**, **<Allowed_NSSAI>** according to the current **<mode>** parameter value.

+C5GREG:
<mode>,<stat>[,[<tac>],[<ci>],[<AcT>][,<Allowed_NSSAI_length>],[Allowed_NSSAI>]]

ℹ️ **<tac>**, **<ci>** and **<AcT>**,**<Allowed_NSSAI_length>**,**<Allowed_NSSAI>** are reported only if **<mode>**=2 and the mobile is registered on some network cell.

AT+C5GREG=?

Test command returns supported values for parameter **<mode>**.

3.3.35. AT+CEN - Reading and reporting of emergency numbers

This command allows for reading and dynamical reporting of emergency numbers as received from the network.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CEN=[<reporting>]

Set command enables reporting of new emergency numbers received from the network

Parameter:

Name	Type	Default	Description
<reporting>	integer	0	Enable/disable reporting

Values:

0 : Disable reporting

1 : Enable reporting

AT+CEN?

Read command returns one line of intermediate result code **+CEN1: <reporting>,<mcc>** with the current **<reporting>** setting and the Mobile Country Code **<mcc>**. Then follows zero or more occurrences of the emergency numbers with intermediate result code **+CEN2: <cat>,<number>**:

+CEN1: <reporting>[,<mcc>,<mnc>]
<CR><LF>[+CEN2: <cat>,<number>
[<CR><LF>+CEN2: <cat>,<number>
[...]]]

Additional info:

▶▶ where:

Name	Type	Default	Description
<reporting>	integer	-	as above
<mcc>	string	-	A three-digit value indicating mobile country code
<mnc>	string	-	A three-digit value indicating mobile network code
<cat>	string	-	Emergency Service Category Value
<number>	string	-	Representing an emergency number from the list

AT+CEN=?

Test command reports the supported range of values for parameter **<reporting>**.

3.3.36. AT#RFSTS - Read Current Network Status

Command reads current network status.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

➡ **AT#RFSTS**

Execution command returns the current network status. The format of the returned message is according to the network on which the module is registered.

WCDMA network
#RFSTS:
<PLMN>,<UARFCN>,<PSC>,<Ec/Io>,<RSCP>,<RSSI>,<LAC>,<RAC>,[<TXPWR>],<DRX>,<MM>,<RRC>,<NOM>,<BLER>,<CID>,<IMSI>,<NetNameAsc>,<SD>,<nAST>[,<nUARFCN>,<nPSC>,<nEc/Io>]

Parameters	Description
<PLMN>	Country code and operator code (MCC, MNC)
<UARFCN>	UMTS Assigned Radio Channel
<PSC>	Active PSC(Primary Synchronization Code)
<Ec/Io>	Active Ec/Io(chip energy per total wideband power in dBm)
<RSCP>	Active RSCP (Received Signal Code Power in dBm)
<RSSI>	Received Signal Strength Indication
<LAC>	Localization Area Code
<RAC>	Routing Area Code
<TXPWR>	Tx Power
<DRX>	Discontinuous reception cycle Length(cycle length : display using ms)
<MM>	Mobility Management
<RRC>	Radio Resource Control
<NOM>	Network Operator Mode
<BLER>	Block Error Rate(005 means 0.5 %)
<CID>	Cell ID(Hexadecimal character format).
<IMSI>	International Mobile Station ID
<NetNameAsc>	Operation Name, Quoted string type
<SD>	Service Domain (0 : No Service, 1 : CS only, 2 : PS only, 3 : CS+PS)
<nAST>	Number of Active Set(Maximum 6)
<nUARFCN>	UARFCN of n th active set
<nPSC>	PSC of n th active set
<nEc/Io>	Ec/Io of n th active Set

Parameter/values	Description
<MM>	Mobility Management state (for debug purpose only)
0	NULL
3	LOCATION UPDATING INITIATED
5	WAIT FOR OUTGOING MM CONNECTION
6	CONNECTION ACTIVE
7	IMSI DETACH INITIATED
8	PROCESS CM SERVICE PROMPT
9	WAIT FOR NETWORK COMMAND
10	LOCATION UPDATE REJECTED
13	WAIT FOR RR CONNECTION LOCATION UPDATE
14	WAIT FOR RR CONNECTION MM
15	WAIT FOR RR CONNECTION IMSI DETACH
17	WAIT FOR REESTABLISHMENT

18	WAIT FOR RR ACTIVE
19	IDLE
20	WAIT FOR ADDITIONAL OUTGOING MM CONNECTION
21	CONNECTION ACTIVE GROUP TRANSMIT
22	WAIT RR CONNECTION GROUP TRANSMIT
23	LOCATION UPDATING PENDING
24	IMSI DETACH PENDING
25	RR CONNECTION RELEASE NOT ALLOWED
255	UNKNOWN

Parameter/values	Description
<RR>	Radio Resource state (for debug purpose only)
0	INACTIVE
1	GOING_ACTIVE
2	GOING_INACTIVE
3	CELL_SELECTION
4	PLMN_LIST_SEARCH
5	IDLE
6	CELL_RESELECTION
7	CONNECTION_PENDING
8	CELL_REESTABLISH
9	DATA_TRANSFER
10	NO_CHANNELS
11	CONNECTION_RELEASE
12	EARLY_CAMPED_WAIT_FOR_SI
13	W2G_INTERRAT_HANDOVER_PROGRESS
14	W2G_INTERRAT_RESELECTION_PROGRESS
15	W2G_INTERRAT_CC_ORDER_PROGRESS
16	G2W_INTERRAT_RESELECTION_PROGRESS
17	WAIT_FOR_EARLY_PSCAN
18	GRR
19	G2W_INTERRAT_HANDOVER_PROGRESS
21	W2G_SERVICE_REDIRECTION_IN_PROGRESS
22	RESET
29	FEMTO
30	X2G_RESEL
31	X2G_RESEL_ABORTED
32	X2G_REDIR
33	G2X_REDIR
34	X2G_CGI
35	X2G_CCO_FAILED
36	X2G_CCO_ABORTED
37	X2G_CCO_FAILED_ABORTED
40	RR_CELL_SELECTED_ACQUIRE_SI
41	RR_STATE_MAX

Parameters	Descriptions
<RRC>	Radio Resource Control state for 3G (for debug purpose only)
0	IDLE
2	CELL FACH
3	CELL DCH
4	CELL PCH
5	URA PCH

Parameters	Descriptions
<RRC>	Radio Resource Control state for 4G (for debug purpose only)
0	IDLE
2	CELL DCH

LTE network
#RFSTS:<PLMN>,<EARFCN>,<RSRP>,<RSSI>,<RSRQ>,<TAC>,<RAC>,[<TXPWR>],<DRX>,<MM>,<RRC>,<CID>,<IMSI>,[<NetNameAsc>],<SD>,<ABND>

Parameters	Description
<PLMN>	Country code and operator code(MCC, MNC)
<EARFCN>	E-UTRA Assigned Radio Channel
<RSRP>	Reference Signal Received Power
<RSSI>	Received Signal Strength Indication
<RSRQ>	Reference Signal Received Quality
<TAC>	Tracking Area Code
<RAC>	Routing Area Code
<TXPWR>	Tx Power (In traffic only)
<DRX>	Discontinuous reception cycle Length (cycle length in ms)

Parameter/values	Description
<MM>	Mobility Management state (for debug purpose only)
0	NULL
1	DEREGISTERED
2	REGISTRATION INITIATED
3	REGISTERED
4	TRACKING AREA UPDATE INITIATED
5	SERVICE REQUEST INITIATED
6	DEREGISTRATION INITIATED

Parameters	Description
<RRC>	Radio Resource state (for debug purpose only; see above)
<CID>	Cell ID

Parameter/values	Description
<IMSI>	International Mobile Station ID**<SD>** - Service Domain
0	No Service
1	CS only
2	PS only
3	CS+PS

Parameter/values	Description
<NetNameAsc>	Operation Name, Quoted string type or "" if network name is unknown
<SD>	Service Domain (0: No Service, 1: CS only, 2: PS only, 3: CS+PS)

Parameters/values	Description
<ABND>	Active Band
1..63	According to 3GPP TS 36.101

LTE network with NR (ENDC)
#RFSTS:<PLMN>,<EARFCN>,<RSRP>,<RSSI>,<RSRQ>,<TAC>,<RAC>,[<TXPWR>],<DRX>,<MM>,<RRC>,<CID>,<IMSI>,[<NetNameAsc>],<SD>,<ABND>,<NR_CH>,<NR_ULCH>,<NR_RSRP>,<NR_RSSI>,<NR_RSRQ>,<NR_BAND>,<NR_BW>,<NR_ULBW>,<NR_TXPWR>

<u>NR (SA)</u>
#RFSTS:<PLMN>,<NR_CH>,<NR_ULCH>,<NR_RSRP>,<NR_RSSI>,<NR_RSRQ>,<NR_BAND>,<NR_BW>,<NR_ULBW>,<NR_TXPWR>

Parameters	Description
<PLMN>	Country code and operator code(MCC, MNC)
<EARFCN>	E-UTRA Assigned Radio Channel
<RSRP>	Reference Signal Received Power
<RSSI>	Received Signal Strength Indication
<RSRQ>	Reference Signal Received Quality
<TAC>	Tracking Area Code
<RAC>	Routing Area Code
<TXPWR>	Tx Power (In traffic only)
<DRX>	Discontinuous reception cycle Length (cycle length in ms)

Parameter/values	Description
<MM>	Mobility Management state (for debug purpose only)
0	NULL
1	DEREGISTERED
2	REGISTRATION INITIATED
3	REGISTERED
4	TRACKING AREA UPDATE INITIATED
5	SERVICE REQUEST INITIATED
6	DEREGISTRATION INITIATED

Parameters	Description
<RRC>	Radio Resource state (for debug purpose only; see above)
<CID>	Cell ID

Parameter/values	Description
<IMSI>	International Mobile Station ID<SD> - Service Domain
0	No Service
1	CS only
2	PS only
3	CS+PS

Parameter/values	Description
<NetNameAsc>	Operation Name, Quoted string type or "" if network name is unknown
<SD>	Service Domain (0: No Service, 1: CS only, 2: PS only, 3: CS+PS)

Parameters/values	Description
<ABND>	Active Band
1..63	According to 3GPP TS 36.101

Parameters/values	Description
<NR_CH>	NR DL active channel
<NR_ULCH>	NR UL active channel
<NR_RSRP>	NR Reference Signal Received Power
<NR_RSSI>	NR received signal strength in dBm
<NR_RSRQ>	NR Reference Signal Received Quality
<NR_BAND>	NR active band
<NR_BW>	NR DL bandwidth
<NR_ULBW>	NR UL bandwidth
<NR_TXPWR>	NR Tx Power (In traffic only)

ℹ️ The **<NR_TXPWR>** of NR information is still unimplemented so it is always reported 0.

AT#RFSTS=?

Test command tests for command existence.

3.3.37.　AT+C5GNSSAI - 5GS NSSAI setting

This command enables the update of the default configured NSSAI stored at the MT.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+C5GNSSAI=<defult_configured_nssai_lngth>,<default_configured_nssai>

The set command enables updating the default configured NSSAI stored at the MT.

If <default_configured_nssai_length> has a value of zero and <default_configured_nssai> consists of an empty string, the default configured NSSAI stored at the MT, if any, shall be deleted by the MT.

Parameters:

Name	Type	Default	Description
<defult_configured_nssai_lngth>	integer	-	indicates the length in octets of the default configured NSSAI to be stored at the MT
<default_configured_nssai>	string	-	string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI to be stored by the MT. The <default_configured_nssai> is coded as a list of <S-NSSAI>s separated by colons. If the value is an empty string (""), no default configured NSSAI is stored at the MT.

AT+C5GNSSAI?

The read command returns the current parameter values.

+C5GNSSAI: [<default_configured_nssai_length>,<default_configured_nssai>]

AT+C5GNSSAI=?

The test command returns the values supported as compound values.

Command is supported only in 5G NR mode

3.3.38. AT+C5GNSSAIRDP - 5GS NSSAI read dynamic parameters

The execution command returns the default configured NSSAI, rejected NSSAI for 3GPP access and rejected NSSAI for non-3GPP access stored at the MT, if any, as well as the configured NSSAI, allowed NSSAI for 3GPP access and allowed NSSAI for non-3GPP access stored at the MT, if any for the PLMN identified by <plmn_id>.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+C5GNSSAIRDP[=<nssai_type>[,<plmn_id>]]

The set or execution command returns the default configured NSSAI, rejected NSSAI for 3GPP access and rejected NSSAI

for non-3GPP access stored at the MT, if any, as well as the configured NSSAI, allowed NSSAI for 3GPP access and

allowed NSSAI for non-3GPP access stored at the MT, if any for the PLMN identified by <plmn_id>.

[+**C5GNSSAIRDP**:
[<default_configured_nssai_length>,<default_configured_nssai>[,<rejected_nssai_3gpp_length>,<rejected_nssai_3gpp>[,<rejected_nssai_non3gpp_length>,<rejected_nssai_non3gpp>]]]
[<CR><LF>+C5GNSSAIRDP:
<plmn_id>[,<configured_nssai_length>,<configured_nssai>[,<allowed_nssai_3gpp_length>,<allowed_nssai_3gpp>,<allowed_nssai_non3gpp_length>,<allowed_nssai_non3gpp>]]
[<CR><LF>+C5GNSSAIRDP:
<plmn_id>[,<configured_nssai_length>,<configured_nssai>[,<allowed_nssai_3gpp_length>,<allowed_nssai_3gpp>,<allowed_nssai_non3gpp_length>,<allowed_nssai_non3gpp>]]
[...]]]]

Parameters:

Name	Type	Default	Description
<nssai_type>	integer	0	specifies the type of NSSAI to be returned

Values:

0 : return stored default configured NSSAI only

1 : return stored default configured NSSAI and rejected NSSAI(s)

2 : return stored default configured NSSAI, rejected NSSAI(s) and configured NSSAI(s)

3 : return stored default configured NSSAI, rejected NSSAI(s), configured NSSAI(s) and allowed NSSAI(s)

Name	Type	Default	Description
<plmn_id>	string	-	indicates the MCC and MNC of the PLMN to which the NSSAI information applies.

Additional info:

▶▶ Other defined values that were displayed by set or execution command

Name	Type	Default	Description
<default_configured_nssai_lngth>	integer	-	indicates the length in octets of the default configured NSSAI stored at the MT.
<default_configured_nssai>	string	-	Dependent of the form, the string can be separated by

			dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI stored at the MT for the PLMN. The <default_configured_nssai> is coded as a list of <S-NSSAI>s separated by colons.
<rejected_nssai_3gpp_length>	integer	-	indicates the length in octets of the rejected NSSAI associated with 3GPP access stored at the MT for the serving PLMN.
<rejected_nssai_3gpp>	string	-	Dependent of the form, the string can be separated by dot(s), colon(s) and hash(es). This parameter indicates the list of rejected S-NSSAIs associated with 3GPP access stored at the MT for the serving PLMN. The <rejected_NSSAI_3gpp> is coded as a list of rejected S-NSSAIs separated by colon. The rejected S-NSSAI has one of the forms: sst#cause only slice/service type (SST) and reject cause are present sst.sd#cause SST and slice differentiator (SD) and reject cause are present
<rejected_nssai_non3gpp_length>	integer	-	indicates the length in octets of the rejected NSSAI associated with non-3GPP access stored at the MT for the serving PLMN.
<rejected_nssai_non3gpp>	string	-	Dependent of the form, the string can be separated by dot(s), colon(s) and hash(es). This parameter indicates the list of rejected S-NSSAIs associated with non-3GPP access stored at the MT for the serving PLMN. The <rejected_NSSAI_non3gpp> is coded as a list of rejected S-NSSAIs separated by colon. The rejected S-NSSAI has one of the forms: sst#cause only slice/service type (SST) and reject cause are present sst.sd#cause SST and slice differentiator (SD) and reject cause are present
<configured_nssai_length>	integer	-	indicates the length in octets of the configured NSSAI stored at the MT for the PLMN identified by <plmn_id>

<configured_nssai>	string	-	Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of configured S-NSSAIs stored at the MT for the PLMN identified by <plmn_id>. The <configured_nssai> is coded as a list of <S-NSSAI>s separated by colons.
<allowed_nssai_3gpp_length>	integer	-	indicates the length in octets of the allowed NSSAI associated with 3GPP access stored at the MT for the PLMN identified by <plmn_id>.
<allowed_nssai_3gpp>	string	-	Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs associated with 3GPP access stored at the MT for the PLMN identified by <plmn_id>. The <allowed_nssai_3gpp> is coded as a list of <S-NSSAI>s separated by colons.
<allowed_nssai_non3gpp_length>	integer	-	indicates the length in octets of the allowed NSSAI associated with non-3GPP access stored at the MT for the PLMN identified by <plmn_id>.
<allowed_nssai_non3gpp>	string	-	Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs associated with non-3GPP access stored at the MT for the PLMN identified by <plmn_id>. The <allowed_nssai_non3gpp> is coded as a list of <S-NSSAI>s separated by colons.

ℹ️ If the parameter <plmn_id> is omitted, the NSSAIs for all PLMNs for which the MT has stored NSSAI information are returned.

AT+C5GNSSAIRDP=?

The test command returns the values supported as compound values.

Command is supported only in 5G NR mode

3.3.39. AT#5GCTL - Control the 5G bands

This command used to control the enable/disable the 5G bands like NSA FR1/FR2 and SA FR1/FR2.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#5GCTL=<5g_mode>

Set command enable/disable the 5G bands with **<5g_mode>**.

Parameter:

Name	Type	Default	Description
<5g_mode>	integer	-	If the 5G bands like NSA FR1/FR2 and SA FR1/FR2 is selected, it returns OK result. Power-cycle (reboot) action will be performed, automatically. Parameter: **<5g_mode>**

	NSA FR1	NSA FR2	SA FR1	SA FR2
1				O
2			O	
3			O	O
4		O		
5		O		O
6		O	O	
7		O	O	O
8	O			
9	O			O
10	O		O	
11	O		O	O
12	O	O		
13	O	O		O
14	O	O	O	
15	O	O	O	O

(O: Enable, Blank: Disable)

> ⓘ The ERROR will be returned when module which cannot support FR2 try to input **<5g_mode>** includes FR2 enabled value.

> ⓘ Currently, the FN980m module does not support SA FR2, so when it input **<5g_mode>** containing SA FR2, an ERROR occurs.

> ⓘ If the value of the band to be enabled is 0, default value would be written. On the other hand, if there is a specific value in the band to be enabled, the default value is not written and skipped.

ℹ **<5g_mode>** 1,3,5,7,9,11,13 and 15 are not supported because SA FR2 is not supported on the solution provider's latest version. These values will be enabled when solution provider support it.

AT#5GCTL?
Read command reports the currently selected **<5g_mode>**
parameter in the format:
#5GCTL: <5g_mode>

AT#5GCTL=?
Test command reports the supported range of values for parameters
<5g_mode>.

3.3.40.   AT#USRMMWS - User MMWAVE Selection

This command select a QTM id for user calibration data.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#USRMMWS=[<qtm_id>]

This command set the QTM id to apply user calibration data.

Parameter:

Name	Type	Default	Description
<qtm_id>	integer	N/A	MMWAVE QTM Identity

Values:

525   :   QTM 525-2 and 525-5

527   :   QTM 527-1 and 527-2

ℹ **<qtm_id>** parameter setting is stored in NVM.

ℹ Before writing the user's calibration data, the **<qtm_id>** value have to be set.

AT#USRMMWS?

Read command reports the currently **<qtm_id>** in the format:

#USRMMWS: <qtm_id>

ℹ If **<qtm_id>** is not set, **<qtm_id>** has a value of 0.

AT#USRMMWS=?

Test command reports supported range of values for parameters **<qtm_id>**.

📝 This command can be executed only in modules that support a mmwave.

```
AT#USRMMWS=?
#USRMMWS: (525,527)

OK
AT#USRMMWS=527
OK
AT#USRMMWS?
#USRMMWS: 527

OK
```

3.3.41. AT#USRMMWW - User MMWAVE Write

This command write user calibration data to user folder.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#USRMMWW=<cal_file_name>,<size>

Set command write a user calibration file, **<cal_file_name>**, in the user folder. The file should be sent using RAW ASCII file transfer after command line is terminated with <**CR**>, the module prompts the following five-character sequence:

<CR>,<LF>,<greater_than><greater_than><greater_than> (see IRA 13, 10, 62, 62, 62)

then a file sized <**size**> bytes should be entered from user.

The operations complete when all bytes are received. If writing ends successfully the response is **OK**, otherwise, an error code is reported.

Parameters:

Name	Type	Default	Description
<cal_file_name>	integer	N/A	MMWAVE calibration file name
	Value:		
	29640÷30030	:	MMWAVE calibration file number
<size>	integer	-	file size in bytes

ⓘ The range that can be written depends on the QTM ID which selected by **#USRMMWS**.
<None>
Nothing
<QTM 525>
cal_file_name:
29640,29652,29770,30000,30001,30002,30003,30013,30014,30015,30030
size: 1-16548
<QTM 527>
cal_file_name: 29640,29652,30000,30002,30003,30013,30014,30015,30030
size: 1-77316

ⓘ The user must know the **<size>** of the MMWAVE calibration file to be written.

ⓘ A tool such as Tera Term should be used, and "binary option" must be checked when sending file.

AT#USRMMWW=?

Test command reports supported range of values for parameters **<cal_file_name>** and **<size>**.

This command can be executed only in modules that support a mmwave.

```
AT#USRMMWW=?
#USRMMWW: (29640,29652,30000,30002,30003,30013,30014,30015,30030)

OK
AT#USRMMWW=29640,5
>>>
OK
AT#USRMMWL
#USRMMWL: <.>
#USRMMWL: <..>
#USRMMWL: "00029640",5
#USRMMWL: free bytes: 1908736

OK
```

3.3.42.   AT#USRMMWR - User MMWAVE Read

This command reports the content of a user calibration file stored in user folder.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#USRMMWR=[<cal_file_name>]

Set command reads the content of a user mmwave calibration file, **<cal_file_name>**, stored in the user folder written by **#USRMMWW**. After command line is terminated with **<CR>**, the module prompts the following five-character sequence:

<CR><LF><less_than><less_than><less_than> (see IRA 13, 10, 60, 60, 60)

followed by the file content.

Parameter:

Name	Type	Default	Description
<cal_file_name>	integer	N/A	MMWAVE calibration file name
	Value:		
	29640÷30030	:	MMWAVE calibration file number

> **ⓘ** The range that can be read depends on the QTM ID which selected by **#USRMMWS**.
> <None>
> Nothing
> <QTM 525>
> 29640,29652,29770,30000,30001,30002,30003,30013,30014,30015,30030
> <QTM 527>
> 29640,29652,30000,30002,30003,30013,30014,30015,30030

AT#USRMMWR=?

Test command reports supported range of values for parameters **<cal_file_name>**.

> This command can be executed only in modules that support a mmwave.

</> AT#USRMMWL
#USRMMWL: <.>
#USRMMWL: <..>
#USRMMWL: "00029640",5
#USRMMWL: "00030030",1251
#USRMMWL: free bytes: 1904640

OK
AT#USRMMWR=30030
<<<VTNV
xì©¤klSuï£·uí□†é‰¦X/?ì¶ˆ?
ThLt
xëŸ¿];;?????í†ˆM0AEí• Q7??bJ??Q&
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U?4`??-\ì¯ˆ??éš£?ì¬—N6?åº• ? g?
OK

3.3.43.   AT#USRMMWD - User MMWAVE Delete

This command allows to delete a file in user folder.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#USRMMWD=[<cal_file_name>]

Set command allows to delete the **<cal_file_name>** file for a user folder.

Parameter:

Name	Type	Default	Description
<cal_file_name>	string	N/A	MMWAVE user calibration file name
	Values:		
	0	:	Delete all the user calibration file
	29640÷30030	:	Calibration file number

> 🛈 The range that can be deleted depends on the QTM ID which selected by **#USRMMWS**.
> <None>
> 0
> <QTM 525>
> 0,29640,29652,29770,30000,30001,30002,30003,30013,30014,30015,30030
> <QTM 527>
> 0,29640,29652,30000,30002,30003,30013,30014,30015,30030

AT#USRMMWD=?

Test command reports supported range of values for parameters **<cal_file_name>**.

> 📝 This command can be executed only in modules that support a mmwave.

```
AT#USRMMWL
#USRMMWL: <.>
#USRMMWL: <..>
#USRMMWL: "00029640",5
#USRMMWL: "00029652",17
#USRMMWL: "00030000",14729
#USRMMWL: "00030002",10271
#USRMMWL: "00030003",96
#USRMMWL: "00030013",76952
#USRMMWL: "00030014",12724
#USRMMWL: "00030015",12724
#USRMMWL: "00030030",1251
#USRMMWL: free bytes: 1761280

OK
AT#USRMMWD=29640
OK
AT#USRMMWL
#USRMMWL: <.>
#USRMMWL: <..>
#USRMMWL: "00029652",17
#USRMMWL: "00030000",14729
#USRMMWL: "00030002",10271
#USRMMWL: "00030003",96
#USRMMWL: "00030013",76952
#USRMMWL: "00030014",12724
#USRMMWL: "00030015",12724
#USRMMWL: "00030030",1251
#USRMMWL: free bytes: 1761280

OK
AT#USRMMWD=0
OK
AT#USRMMWL
#USRMMWL: <.>
#USRMMWL: <..>
#USRMMWL: free bytes: 1908736

OK
```

3.3.44. AT#USRMMWL - User MMWAVE List

This command list files and directories inside the user folder.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#USRMMWL

Execution command reports the list of directories and files stored in user folder. At the end of the reports, the available free memory is shown in the current drive. The report is in the format:

[<CR><LF>#USRMMWL: <.>
<CR><LF>#USRMMWL: <..>]
[<CR><LF>#**USRMMWL**: <dir_name$_1$>**...**
[<CR><LF>#USRMMWL: <dir_name$_n$>]]
[<CR><LF>#**USRMMWL**: <file_name$_1$>,<size$_1$>**...**
[<CR><LF>#USRMMWL: <file_name$_n$>,<size$_n$>]]
<CR><LF>#USRMMWL: free bytes: <free_mem>

Additional info:

▶▶ Response parameters:

Name	Type	Default	Description
<dir_name>	string	-	directory name, string type delimited by < and > (max 255 characters, case sensitive)
<file_name>	string	-	file name, quoted sting type (max 255 characters, case sensitive)
<size>	integer	-	size of file in bytes
<free_mem>	integer	-	size of available free memory in the current drive in bytes
<.>	string	-	current directory
<..>	string	-	upper directory

AT#USRMMWL=?

Test command returns **OK** result code.

This command can be executed only in modules that support a mmwave.

```
AT#USRMMWL
#USRMMWL: <.>
#USRMMWL: <..>
#USRMMWL: "00029640",5
#USRMMWL: "00029652",17
#USRMMWL: "00030000",14729
#USRMMWL: "00030002",10271
#USRMMWL: "00030003",96
#USRMMWL: "00030013",76952
#USRMMWL: "00030014",12724
#USRMMWL: "00030015",12724
#USRMMWL: "00030030",1251
#USRMMWL: free bytes: 1761280

OK
AT#USRMMWL=?
OK
```

3.3.45. AT#USRMMWC - User MMWAVE Control

This command control user calibration data.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#USRMMWC=[<usr_data_control>]

Set command control the user calibration data with **<usr_data_control>**.

Parameter:

Name	Type	Default	Description
<usr_data_control>	integer	N/A	Control the mmwave user calibration data.

Values:

0 : Move/Overwrite user calibration data to RFNV folder

1 : Backup user RFNV files which were moved from user folder to ICO

2 : Restore user backup files from ICO

3 : Delete user backup files from ICO

AT#USRMMWC=?

Test command reports supported range of values for parameters **<usr_data_control>**.

This command can be executed only in modules that support a mmwave.

AT#USRMMWC=?
#USRMMWC: (0-3)

OK
AT#USRMMWC=0
OK
AT#USRMMWC=1
OK
AT#USRMMWC=2
OK
AT#USRMMWC=3
OK

3.3.46.   AT#MONI - Cell Monitor

This command is both a set and an execution command.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT#MONI[=[<number>]]

Set command sets one cell out of seven, in a neighbor list of the serving cell including it, from which extract WCDMA/LTE/NR related information.

After entering the set command, enter the execution command **AT#MONI**<CR> to get the WCDMA/LTE/NR related information for the selected cell and dedicated channel (if exists) in the format shown, for each network, in the Additional info section.

Parameter:

Name	Type	Default	Description
<number>	integer	-	the parameter meaning depends on the network, see Additional info section.

Additional info:

▶▶   WCDMA network

Name	Type	Default	Description
<number>	integer	0	WCDMA network

Values:

0 : it is the active set

1 : it is the candidate set

2 : it is the synchronized neighbor set

3 : it is the asynchronized neighbor set

4 : it is the ranked neighbor set(cells which are not suitable cells to camp on)

5,6 : it is not available

7 : it is a special request to obtain information from the whole set of detected cells in the neighbor list of the serving cell

▶▶   LTE network

Name	Type	Default	Description
<number>	integer	0	LTE network

Values:

0 : it is the serving cell

1 : it is the intra-frequency cells

2	:	it is the inter-frequency cells
3	:	it is the WCDMA neighbor cells
4	:	it is the GSM neighbor cells
5÷7	:	it is not available

▶▶ issuing **AT#MONI**<CR> indicates the following WCDMA/LTE-related information for selected cell and dedicated channel(if exists).

If the last setting done by **#MONI** is in the range [0..6], the output format is as follows:

a) When extracting data for the serving cell and the network name is known the format is:

<u>WCDMA network</u>
#MONI: <netname> PSC:<psc> RSCP:<rscp> LAC:<lac> Id:<id> Eclo:<ecio> UARFCN:<uarfcn> PWR:<dBm>dbm DRX:<drx> SCR:<scr>

<u>LTE network</u>
#MONI: <netmame> RSRP:<rsrp> RSRQ:<rsrq> TAC:<tac> Id:<id> EARFCN:<earfcn> PWR:<dBm>dbm DRX:<drx>

<u>LTE network with NR (ENDC)</u>
#MONI: <netmame> RSRP:<rsrp> RSRQ:<rsrq> TAC:<tac> Id:<id> EARFCN:<earfcn> PWR:<dBm>dbm DRX:<drx> NR_BAND:<nr_band> NR_BW:<nr_bandwidth> NR_ULBW:<nr_ul_bandwidth> NR_CH:<nr_channel> NR_ULCH:<nr_ul_channel> NR_PWR:<nr_rssi>dbm NR_RSRP:<nr_rsrp> NR_RSRQ:<nr_rsrq> NR_PCI:<nr_pci> NR_SINR:<nr_sinr> NR_STATE:<nr_state> NR_TXPWR:<nr_txpwr> NR_DLMOD:<nr_dl_mod> NR_ULMOD:<nr_ul_mod>

<u>NR (SA)</u>
#MONI: <netmame> NR_BAND:<nr_band> NR_BW:<nr_bandwidth> NR_ULBW:<nr_ul_bandwidth> NR_CH:<nr_channel> NR_ULCH:<nr_ul_channel> NR_PWR:<nr_rssi>dbm NR_RSRP:<nr_rsrp> NR_RSRQ:<nr_rsrq> NR_PCI:<nr_pci> NR_SINR:<nr_sinr> NR_STATE:<nr_state> NR_TXPWR:<nr_txpwr> NR_DLMOD:<nr_dl_mod> NR_ULMOD:<nr_ul_mod>

b) When the network name is unknown, the format is:

<u>WCDMA network</u>
#MONI: Cc:<cc> Nc:<nc> PSC:<psc> RSCP:<rscp> LAC:<lac> Id:<id> Eclo:<ecio> UARFCN:<uarfcn> PWR:<dBm>dbm DRX:<drx> SCR:<scr>

<u>LTE network</u>
#MONI: Cc:<cc> Nc:<nc> RSRP:<rsrp> RSRQ:<rsrq> TAC:<tac> Id:<id> EARFCN:<earfcn> PWR:<dBm>dbm DRX:<drx>

<u>LTE network with NR (ENDC)</u>
#MONI: Cc:<cc> Nc:<nc> RSRP:<rsrp> RSRQ:<rsrq> TAC:<tac> Id:<id> EARFCN:<earfcn> PWR:<dBm>dbm DRX:<drx> NR_BAND:<nr_band> NR_BW:<nr_bandwidth> NR_ULBW:<nr_ul_bandwidth> NR_CH:<nr_channel> NR_ULCH:<nr_ul_channel> NR_PWR:<nr_rssi>dbm NR_RSRP:<nr_rsrp> NR_RSRQ:<nr_rsrq> NR_PCI:<nr_pci> NR_SINR:<nr_sinr> NR_STATE:<nr_state> NR_TXPWR:<nr_txpwr> NR_DLMOD:<nr_dl_mod> NR_ULMOD:<nr_ul_mod>

LTE network with NR (SA)

**#MONI: Cc:<cc> Nc:<nc> NR_BAND:<nr_band> NR_BW:<nr_bandwidth>
NR_ULBW:<nr_ul_bandwidth> NR_CH:<nr_channel> NR_ULCH:<nr_ul_channel>
NR_PWR:<nr_rssi>dbm NR_RSRP:<nr_rsrp> NR_RSRQ:<nr_rsrq> NR_PCI:<nr_pci>
NR_SINR:<nr_sinr> NR_STATE:<nr_state> NR_TXPWR:<nr_txpwr>
NR_DLMOD:<nr_dl_mod> NR_ULMOD:<nr_ul_mod>**

c) When extracting data for an adjacent cell, the format is:

WCDMA network

#MONI: PSC:<psc> RSCP:<rscp> Eclo:<ecio> UARFCN:<uarfcn> SCR:<scr>

LTE network
(E-UTRAN intra-frequency and inter-frequency cells)
#MONI: RSRP:<rsrp> RSRQ:<rsrq> Id:<id> EARFCN:<earfcn> PWR:<dBm>dbm

LTE network with NR (ENDC)

**#MONI: RSRP:<rsrp> RSRQ:<rsrq> Id:<id> EARFCN:<earfcn> PWR:<dBm>dbm
NR_BAND:<nr_band> NR_BW:<nr_bandwidth> NR_ULBW:<nr_ul_bandwidth>
NR_CH:<nr_channel> NR_ULCH:<nr_ul_channel> NR_PWR:<nr_rssi>dbm
NR_RSRP:<nr_rsrp> NR_RSRQ:<nr_rsrq> NR_PCI:<nr_pci> NR_SINR:<nr_sinr>
NR_STATE:<nr_state> NR_TXPWR:<nr_txpwr> NR_DLMOD:<nr_dl_mod>
NR_ULMOD:<nr_ul_mod>**

LTE network with NR (SA)

**#MONI: RSRP:<rsrp> RSRQ:<rsrq> Id:<id> EARFCN:<earfcn> PWR:<dBm>dbm
NR_BAND:<nr_band> NR_BW:<nr_bandwidth> NR_ULBW:<nr_ul_bandwidth>
NR_CH:<nr_channel> NR_ULCH:<nr_ul_channel> NR_PWR:<nr_rssi>dbm
NR_RSRP:<nr_rsrp> NR_RSRQ:<nr_rsrq> NR_PCI:<nr_pci> NR_SINR:<nr_sinr>
NR_STATE:<nr_state> NR_TXPWR:<nr_txpwr> NR_DLMOD:<nr_dl_mod>
NR_ULMOD:<nr_ul_mod>**

Name	Type	Default	Description
<netname>	string	-	name of network operator
<cc>	string	-	country code
<nc>	string	-	network operator code
<lac>	string	-	localization area code
<id>	integer	-	cell identifier
<uarfcn>	integer	-	UMTS assigned radio channel
<dBm>	integer	-	received signal strength in dBm.
<rscp>	integer	-	Received Signal Code Power in dBm.
<ecio>	integer	-	chip energy per total wideband power in dBm
<drx>	integer	-	Discontinuous reception cycle length
<psc>	integer	-	primary synchronisation code
<rsrp>	integer	-	Reference Signal Received Power
<rsrq>	integer	-	Reference Signal Received Quality

<tac>	integer	-	Tracking Area Code
<rsrp>	integer	-	Reference Signal Received Power
<earfcn>	integer	-	E-UTRA Assigned Radio Channel
<scr>	integer	-	Scrambling code
<nr_band>	integer	-	NR active band
<nr_bandwidth>	integer	-	NR DL bandwidth
<nr_ul_bandwidth>	integer	-	NR UL bandwidth
<nr_channel>	integer	-	NR DL active channel
<nr_ul_channel>	integer	-	NR UL active channel
<nr_rssi>	integer	-	NR received signal strength in dBm
<nr_rsrp>	integer	-	NR Reference Signal Received Power
<nr_rsrq>	integer	-	NR Reference Signal Received Quality
<nr_pci>	integer	-	NR physical cell id
<nr_sinr>	integer	-	NR measured SINR
<nr_state>	integer	N/A	NR state

Values:

0 : init

1 : idle

2 : connected

<nr_txpwr>	integer	-	NR Tx Power (In traffic only)
<nr_dlmod>	integer	N/A	Downlink modulation

Values:

0 : BPSK

1 : QPSK

2 : 16QAM

3 : 64QAM

4 : 256QAM

5 : Unknown

<nr_ulmod>	integer	N/A	Uplink modulation

Values:

0 : BPSK

1 : QPSK

2 : 16QAM

3 : 64QAM

4 : 256QAM

5 : Unknown

ℹ️ If the last setting done by #MONI is 7, the execution command produces a table-like formatted output, as follows:

<u>WCDMA network</u>

a) First row reports a set of information for the serving cell:

#MONI: <netname> PSC:<psc> RSCP:<rscp> LAC:<lac> Id:<id>Eclo:<ecio> UARFCN:<uarfcn> PWR:<dBm> DRX:<drx> SCR:<scr>

b) the other rows report a set of information for all detected neighbour cells:

#MONI: PSC:<psc> RSCP:<rscp> Eclo:<ecio> UARFCN:<uarfcn> SCR:<scr>

See above for parameters description.

ℹ️ When AT#MONI=7 is the last setting entered, the execution command **AT#MONI**<CR> reports the information previously listed for each of the cells in the neighbor of the serving cell. The information is formatting in a sequence of <CR><LF>-terminated strings.

ℹ️ The **<nr_txpwr>,<nr_dlmod>** and **<nr_ulmod>** of NR information is still unimplemented they always report 0.

ℹ️ The NR information is not affected by **<number>**.

❓🔲 **AT#MONI=?**

Test command reports the maximum number of cells, in a neighbor of the serving cell excluding it, from which we can extract WCDMA/LTE related information, along with the ordinal number of the current selected cell, in the format:

#MONI: (<MaxCellNo>,<CellSet>)

where:
<MaxCellNo> - maximum number of cells, in a neighbour of the serving cell and excluding it, from which we can extract GSM-related information. This value is always 6.
<CellSet> - the last setting done with command #MONI.

Additional info:

▶▶ Parameters meaning.

Name	Type	Default	Description
<MaxCellNo>	integer	-	maximum number of cells in a neighbor of the serving cell and excluding it from which we can extract WCDMA/LTE related information. This value is always **6**.
<CellSet>	integer	-	last setting done with command **#MONI**.

3.3.47. AT#ICMCONNECT - Control Data call DISCONNECT/CONNECTADD/DELETE

This command establishes data call for Multiple PDN

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT#ICMCONNECT=<cmd>,<pdn>,<userIpType>[,<cid0>[,<cid1>]]

This command establishes data call, referring to the PDP profile specified by the Cid and makes it possible that ECM/RNDIS could bind the activated data service and have access to external internet.

Parameters:

Name	Type	Default	Description
<cmd>	string	N/A	Command
			Values:
			DIS : disconnect
			CON : connect
			DEL : delete PDN
			ADD : add PDN
			SET : set PDN
<pdn>	integer	N/A	PDN profile index. In the case of add PDN (i.e. **<cmd>** is "ADD"), the set value of **<pdn>** will be ignored, which means no matter what the input value is, the PDN will be added in numerical order if the command executed successfully.
			Value:
			1÷4 : PDN index
<userIpType>	integer	4	user IP type
			Values:
			4 : IPv4
			6 : IPv6
			10 : ipv4v6 (option used only if the <cmd> is "ADD" or "SET")
<cid0>	integer	N/A	PDP context identification (see **+CGDCONT** command). **<cid0>** represent the cid with IPV4 type when **<cmd>** is "ADD" or "SET" with 5 arguments. If **<cmd>** is "CON" or "SET" with 4 arguments, **<cid0>** represent the cid with the input **<userIpType>** IP type.
			Value:
			1÷max : max is where the value of max is returned by the Test command
<cid1>	integer	N/A	PDP context identification with IPV6 type (see **+CGDCONT** command), valid only if **<cmd>** is "ADD" or "SET" with 5 arguments.

Value:

    1÷max   :   max is where the value of max is returned by the Test command

---

ℹ This command activates a specified PDP context, so all necessary operations have to be done before issuing the command like registering to network and configuring PDP profiles.

ℹ The "OK" result code does not guarantee that data is connected successfully. It is recommended that User should verify the status of connection by issuing read command.

ℹ Error is returned if cid profile is not valid or already used by other PDN index while adding PDN profile. Refer to +CDGCONT to set cid profile.

ℹ When the IPV4 or IPV6 data call already established for the specific PDN, if user want to change the cid profile which mapping to this PDN, we recommend to disconnect the data call first and then change the PDN by "SET" command option.

ℹ If VLAN interface is defined in the VLAN list and has been mapped to the corresponding PDN, VLAN interface could be brought up by using this AT command. It is possible to bring up multiple network interfaces simultaneously which consist of both ECM/RNDIS primary interface and VLAN interfaces over the ECM/RNDIS. The multiple interfaces come to have dedicated data paths to each APN defined by the corresponding cid.

AT#ICMCONNECT?

Read command returns the session state in the following format:

Additional info:

▶▶ **#ICMCONNECT: <pdn>,<cid0>,<ipv4State>,<cid1>,<ipv6State>**
      #ICMCONNECT: <pdn>,<cid0>,<ipv4State>,<cid1>,<ipv6State>
      OK

Name	Type	Default	Description
<cid0>	integer	N/A	IPV4 cid

Value:

    1÷max   :   max is where the value of max is returned by the Test command

Name	Type	Default	Description
<ipv4State>	integer	N/A	IPv4 connection state

Values:

    0   :   disconnected

    1   :   connected

    -1   :   Invalid CID

Name	Type	Default	Description
<cid1>	integer	N/A	IPV6 CID

Value:

	1÷max	:	max is where the value of max is returned by the Test command		
<ipv6State>	integer		N/A	IPV6 state	

Values:

   0 :   disconnected

   1 :   connected

  -1 :   Invalid CID

AT#ICMCONNECT=?

Test command returns the range of supported values for all the parameters. Note that the range of **<cid0>** and **<cid1>** will following the setting of **+CGDCONT** command.

AT#ICMCONNECT=?

#ICMCONNECT: ("DIS","CON","DEL","ADD","SET"),(1-1),(4,6,10),(1-1),(1-1)

OK

> ℹ Note that the valid **<pdn>** range will be returned by test command.

```
//Check the default value
AT# ICMCONNECT?
#ICMCONNECT: 1,1,0,1,0
OK
//Check the range of supported values
AT#ICMCONNECT=?
#ICMCONNECT: ("DIS","CON","DEL","ADD","SET"),(1-1),(4,6,10),(1-1),(1-1)
OK
//Add a cid
AT+CGDCONT=1,"IPV4V6","APN1"
OK
//Add the second cid
AT+CGDCONT=2,"IPV4V6","APN2"
OK
//Cid is added successfully by checking with Test command
AT#ICMCONNECT=?
#ICMCONNECT: ("DIS","CON","DEL","ADD","SET"),(1-1),(4,6,10),(1-2),(1-2)
OK
//Add the second PDN profile with cid 2
AT#ICMCONNECT=add,1,10,2,2
OK
//PDN is added successfully
AT#ICMCONNECT?
#ICMCONNECT: 1,1,0,1,0
#ICMCONNECT: 2,2,0,2,0
OK
//Establish data call for IPV4
AT#ICMCONNECT=con,1,4
OK
//Check the status
AT#ICMCONNECT?
#ICMCONNECT: 1,1,1,1,0
#ICMCONNECT: 2,2,0,2,0
OK
//Disconnect IPV4 data call
AT#ICMCONNECT=dis,1,4
OK
//Establish data call for IPV6
AT#ICMCONNECT=con,1,6
OK
//Disconnect IPV6 data call
AT#ICMCONNECT=dis,1,6
OK
//Delete the added PDN:
AT#ICMCONNECT=del,2
OK
//PDN is deleted successfully
AT#ICMCONNECT?
#ICMCONNECT: 1,1,0,1,0
 OK
```

3.3.48. AT#LTECAT - LTE Category Setting

This command selects the LTE category.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#LTECAT=<category>

Set command sets the specific LTE category.

Parameter:

Name	Type	Default	Description
<category>	integer	N/A	LTE category
	Values:		
	4 :	LTE Caterory 4	
	6 :	LTE Caterory 6	
	12 :	LTE Caterory 12	

ⓘ <**category**> is saved in NVM.

ⓘ FN980/FN980m/FT980-KS supports UE CAT12 which is MAX CAT20 DL+ MAX CAT18 UL.

AT#LTECAT?

Read command returns the LTECAT current setting, in the format:

#LTECAT: <category>

AT#LTECAT=?

Test command reports the supported range of values for parameters <**category**>.

3.3.49.   AT#FDOR - Fast Dormancy

This command triggers fast dormancy; if all conditions are passed successful SCRI will be send towards the network.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT#FDOR=<mode>[,<FDDelayTimer>[,<SCRITimer>]]

Set command triggers fast dormancy; if all conditions are passed successfully, SCRI will be sent towards the network. SCRI will be sent as a one shot or according to the specified delay timer expiry, depending on the mode selected.

The Fast Dormancy feature is WCDMA only feature and not present in LTE. Therefore, it can be set in WCMDA online mode.

Parameters:

Name	Type	Default	Description
<mode>	integer	2	Selection for the supported configurations for Fast Dormancy.
			Values:
	1	:	indicate application driven (1 shot) Fast Dormancy to modem.
	2	:	switch ON autonomous Fast Dormancy (AFD).
	3	:	switch OFF autonomous Fast Dormancy (AFD).
<FDDelayTimer>	integer	6	(maximum timer) will be started when the network re-establishes the radio bearer due to some incoming data. After this timer expiry, Data activity will be checked. If there is data activity within this time period, no action will be taken. If there is no data activity, the signalling connection release request will be sent to network.
			Value:
	1÷60	:	integer value in seconds.
<SCRITimer>	integer	0	The timer is used for fast dormancy inhibit timer in NAS/UAS to adapt to network operator requirements. The timer value is stored persistently. A timer value of 0 means that the timer is not used.
			Values:
	0	:	used a T323 Timer value in SIB1
	1÷120	:	integer value in seconds

Additional info:

▶▶ the reject cause from lower layers is reported by the unsolicited indication
#FDOR: <cause>

Name	Type	Default	Description
<cause>	integer	N/A	reject cause

Value:

6	:	Reject when Network deactivated FD, by not sending timer T323 in SIB1.

🛈 When **<mode>** is 2, **<FDDelayTimer>** timer value becomes effective and monitor user plane data at the moment of expiry. Default timer value is 6 sec.

AT#FDOR?

Read command returns **OK** string along with last accepted mode and timer values, in the format:

#FDOR: <mode>,< FDDelayTimer >,< SCRITimer>

AT#FDOR=?

Test command returns **OK** string along with supported modes and timer values.

3.3.50. AT+RSRP - Read RSRP measurement value

Additional AT&T specific AT command used for certification tests.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+RSRP?

Read command reports the RSRP measurement info in the format:

**+RSRP: <cellID1>,<EARFCN1>,<RSRP1>[,<cellID2>,<EARFCN2>,<RSRP2>[,...
[,<cellIDn>,<EARFCNn>,<RSRPn>]]]**

Additional info:

▶▶ Here are the parameters meaning:

Name	Type	Default	Description
<cellIDx>	integer	-	physical cell id (3 digits)
<EARFCNx>	integer	-	EARFCN for the given cell
<RSRPx>	integer	-	RSRP value in dBm

AT+RSRP=?

Test command returns the **OK** result code.

3.3.51.   AT+RSRQ - Read RSRQ measurement value

Additional AT&T specific AT command used for certification tests.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+RSRQ?

Read command reports the RSRQ measurement info in the format:

**+RSRQ: <cellID1>,<EARFCN1>,<RSRQ1>[,<cellID2>,<EARFCN2>,<RSRQ2>[,...
[,<cellIDn>,<EARFCNn>,<RSRQn>]]]**

Additional info:

▶▶   Here are the parameters meaning:

Name	Type	Default	Description
<cellIDx>	integer	-	physical cell id (3 digits)
<EARFCNx>	integer	-	EARFCN for the given cell
<RSRQx>	integer	-	RSRQ measured value

AT+RSRQ=?

Test command returns the **OK** result code.

3.3.52. AT+RSCP - Read RSCP measurement value

Additional AT&T specific AT command used for certification tests.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+RSCP?

Read command reports the RSCP measurement info in the format:

**+RSCP: <psc1>,<UARFCN1>,<RSCP1>[,<psc2>,<UARFCN2>,<RSCP2>[,...
[,<pscn>,<UARFCNn>,<RSCPn>]]]**

Additional info:

▶▶ Here are the parameters meaning:

Name	Type	Default	Description
<pscx>	integer	-	Primary scrambling code (3 digits)
<UARFCNx>	integer	-	UARFCN for the given cell
<RSCPx>	integer	-	RSCP value in dBm

AT+RSCP=?

Test command returns the **OK** result code.

3.3.53. AT+ECNO - Read ECNO measurement value

Additional AT&T specific AT command used for certification tests.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+ECNO?

Read command reports the ECNO measurement info in the format:

+ECNO: <psc1>,<UARFCN1>,<ECNO1>[,<psc2>,<UARFCN2>,<ECNO2>[,...
[,<pscn>,<UARFCNn>,<**ECNO**n>]]]

Additional info:

▶▶ Here are the parameters meaning:

Name	Type	Default	Description
<pscx>	integer	-	Primary scrambling code (3 digits)
<UARFCNx>	integer	-	UARFCN for the given cell
<ECNOx>	integer	-	ECNO value in dBm

AT+ECNO=?

Test command returns the **OK** result code.

3.3.54.   AT+COLR - Connected Line Identification Restriction status

This command refers to the GSM/UMTS supplementary service COLR (Connected Line Identification Restriction) that enables a called subscriber to restrict the possibility of presentation of connected line identity (COL) to the calling party after receiving a mobile terminated call

[1] 3GPP TS 22.081

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+COLR

The command displays the status of the COL presentation in the network. It has no effect on the execution of the supplementary service COLR in the network.

Execution command triggers an interrogation of the activation status of the COLR service according to standard [1]. The command returns the COLR service status in the format:

+COLR: <m>

The <m> parameter is described in Additional info section.

Additional info:

▶▶   Here is the meaning of the <m> parameter returned by the command.

Name	Type	Default	Description
<m>	integer	0	subscriber COLR service status.

Values:

0   :   COLR not provisioned

1   :   COLR provisioned

2   :   unknown (example: no network, etc.)

ⓘ   Activation, deactivation, registration and erasure of the supplementary service COLR are not applicable.

AT+COLR=?

Test command tests for command existence

3.3.55. AT+CDIP - Called line identification presentation

This command enables/disables the presentation of the CLI at the TE.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CDIP

Set command enables/disables the presentation of the CLI (called line identifications) at the TE.

This command related to a network service that provides "multiple called numbers (called line identifications) service" to an MT. This command enables a called subscriber to get the called line identification of the called party when receiving a mobile terminated call.

When the presentation of the called line identification at the TE is enabled, the below URC is returned after every **RING** (or **+CRING: <type>**; refer subclause "Cellular result codes +CRC") result code sent from TA to TE. It is manufacturer specific if this response used when normal voice call answered.

+CDIP:<number>,<type>[,<subaddr>,<satype>]

Unsolicited fields:

Name	Type	Description
<n>	integer	parameter sets/shows the result code presentation status to the TE
		Values:
		0 : disable
		1 : enable
<number>	string	phone number of format specified by **<type>**
<type>	string	type of address octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.7)
<subaddr>	string	string type subaddress of format specified by **<satype>**
<satype>	string	type of subaddress octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.8)

AT+CDIP?

Read command gives the status of **<n>** and also triggers an interrogation of the provision status of the "multiple called numbers" service.

+CDIP: <n>,<m>

Additional info:

▶▶ where

Name	Type	Default	Description
<n>	integer	N/A	parameter sets/shows the result code presentation status to the TE

Values:

    0 : disable

    1 : enable

<m>	integer	0	parameter shows the subscriber "multiple called numbers" service status in the network

Values:

    0 : "multiple called numbers service" is not provisioned

    1 : "multiple called numbers service" is provisioned

    2 : unknown (e.g. no network, etc.)

?⬚ **AT+CDIP=?**

Test command returns the range for the parameter **<n>**.

3.3.56. AT+CLIP - Calling Line Identification Presentation

This command enables/disables the presentation of the CLI (Calling Line Identity).

3GPP TS 27.007
3GPP TS 22.081

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CLIP=[<enable>]

Set command refers to the supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. If enabled the device reports after each **RING** the response:

+CLIP: <number>,<type>,"",128,<alpha>,<CLI_validity>

Parameter:

Name	Type	Default	Description
<enable>	integer	0	enables/disables CLI indication. The command changes only the report behavior of the device, it does not change CLI supplementary service setting on the network.

Values:

0 : disable

1 : enable

Unsolicited fields:

Name	Type	Description
<number>	string	phone number of format specified by **<type>**
<type>	integer	type of address octet
		Values:
		128 : both the type of number and the numbering plan are unknown
		129 : unknown type of number and ISDN/Telephony numbering plan
		145 : international type of number and ISDN/Telephony numbering plan (contains the character "+")
		161 : national type of number and ISDN/Telephony numbering plan
<alpha>	string	alphanumeric representation of <**number**> corresponding to the entry found in phonebook; used character set should be the one selected with command **+CSCS**
<CLI_validity>	integer	validity of CLIP
		Values:
		0 : CLI valid

| | 1 | : | CLI has been withheld by the originator |
| | 2 | : | CLI is not available due to interworking problems or limitation or originating network |

ℹ in the **+CLIP:** response they are currently not reported either the *subaddress* information (it's always "" after the 2nd comma) and the *subaddress type* information (it's always 128 after the 3rd comma).

AT+CLIP?

Read command returns the presentation status of the CLI in the format:

+CLIP: <enable>,<status>

Additional info:

▶▶ Parameters:

Name	Type	Default	Description
<enable>	integer	N/A	status of the local setting
			Values:
	0	:	CLI presentation disabled
	1	:	CLI presentation enabled
<status>	integer	N/A	status of the CLIP service on the network
			Values:
	0	:	CLIP not provisioned
	1	:	CLIP provisioned
	2	:	unknown (e.g. no network is present)

ℹ Read command issues a status request to the network, hence it may take a few seconds to give the answer due to the time needed to exchange data with it.

AT+CLIP=?

Test command returns the supported values of parameter <**enable**>.

3.3.57.   AT+VZWRSRP - Read RSRP Values

Additional Verizon Wireless specific AT command used for certification tests.

➡️ LTE AT commands for Test automation REQ_FEB2014

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+VZWRSRP?

Read command reports the **RSRP** info in the format:

**+VZWRSRP:<cellID1>,<EARFCN1>,<RSRP1>[,<cellID2>,<EARFCN2>,<RSRP2>[,...
[,<cellIDn>,<EARFCNn>,<RSRPn>]]]**

Additional info:

▶▶ Here are the parameters meaning:

Name	Type	Default	Description
<cellIDx>	integer	-	physical cell id (3 digits)
<EARFCNx>	integer	-	EARFCN for the given cell
<RSRPx>	integer	-	RSRP value in dBm/15kHz

AT+VZWRSRP=?

Test command returns the **OK** result code.

3.3.58. AT+VZWRSRQ - Read RSRQ Values

Additional Verizon Wireless specific AT command used for certification tests.

LTE AT commands for Test automation REQ_FEB2014

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+VZWRSRQ?

Read command reports the **RSRQ** info in the format:

**+VZWRSRQ:<cellID1>,<EARFCN1>,<RSRQ1>[,<cellID2>,<EARFCN2>,<RSRQ2>[,...
[,<cellIDn>,<EARFCNn>,<RSRQn>]]]**

Additional info:

▶▶ Here are the parameters meaning:

Name	Type	Default	Description
<cellIDx>	string	-	physical cell id (3 digits)
<EARFCNx>	integer	-	EARFCN for the given cell
<RSRQx>	string	-	RSRQ value

AT+VZWRSRQ=?

Test command returns the **OK** result code.

3.3.59. AT#5GLINKSTAT - 5G Link state

This command is used to read 5G RRC link state and related parameters which are RestrictDCNR and upperlayerindication.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#5GLINKSTAT?

Read command reports the parameters which are description as below.

Additional info:

▶▶ AT#5GLINKSTAT: <restrict_dcnr>, <sib2_upr_ind>, <rrc_link_state>

Name	Type	Default	Description
<restrict_dcnr>	integer	N/A	The value of parameter for RestrictDCNR
	Values:		
	0	:	FALSE
	1	:	TRUE
<sib2_upr_ind>	integer	N/A	The value of parameter for Upperlayerindication
	Values:		
	0	:	FALSE
	1	:	TRUE
<rrc_link_state>	integer	N/A	5G RRC link state
	Values:		
	0	:	IDLE
	1	:	LTE Only Connected
	2	:	5G Connected

AT#5GLINKSTAT=?

Test command reports the supported range of values

Additional info:

▶▶ #5GLINKSTAT: (0,1), (0,1), (0-2)

3.3.60. AT#BNDPRI - Set the band priority list for LTE

This command sets the desired band priority list

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#BNDPRI=<bnd1>,<bnd2>

This command allows to set for band priority list according to each network provider.

Parameters:

Name	Type	Default	Description
<bnd1>	integer	-	1st band on the desired band priority list
<bnd2>	integer	-	2nd band on the desired band priority list

The <bnd1> and <bnd2> supports band3 and band5 only.

AT#BNDPRI?

Read command reports the current stored parameter:
#BNDPRI: <bnd1>,<bnd2>

AT#BNDPRI=?

Test command returns reports the supported range of value for parameter:

EFS file location is /nv/item_files/modem/lte/rrc/efs/band_priority_list_v2

at#bndpri=3,5
band searching is 3 -> 5.
at#bndpri=5,3
band searching is 5 -> 3.

3.3.61. AT+COPS - Operator Selection

The command selects a network operator and registers the module.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	Yes	-	2

AT+COPS=[<mode>[,<format>[,<oper>[,<AcT>]]]]

The set command attempts to select a network operator and registers the module on the just chosen operator; the selection can be automatic or manual.

Parameters:

Name	Type	Default	Description
<mode>	integer	0	defines the operator selection: automatic or manual.

Values:

0 : automatic selection, the parameter <oper> is ignored

1 : manual selection, the parameter <oper> must be present

2 : deregister from network. The module is unregistered until a +COPS with <mode>=0, 1 or 4 is issued

3 : set only <format> parameter, the parameter <oper> is ignored

4 : manual/automatic, <oper> parameter must be present. If manual selection fails, the module will tray automatic mode (<mode>=0)

Name	Type	Default	Description
<format>	integer	0	specifies the operator name format, see **<oper>** parameter

Values:

0 : alphanumeric long form (max length 16 digits)

1 : alphanumeric short form

2 : numeric 5 or 6 digits [country code (3) + network code (2 or 3)]

Name	Type	Default	Description
<oper>	mixed	-	network operator in format defined by **<format>** parameter
<AcT>	integer	N/A	access technology selected

Values:

0 : GSM

2 : UTRAN

7 : E-UTRAN

12 : NG-RAN

13 : E-UTRA-NR dual connectivity (see NOTE 6)

ℹ️ <mode> parameter setting is stored in NVM and available at next reboot. <mode>=3 is not saved.

If <mode>=1 or 4, the selected network is stored in NVM too and is available at next reboot (this will happen also after inserting another SIM).

ℹ️ <format> parameter setting is never stored in NVM.

ℹ️ If **AT+COPS=0** is issued after the switch-on, it causes a new attempt to select a network operator and registers the module on the selected operator.

ℹ️ NOTE 6: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is supporting dual connectivity of E-UTRA with NR and is connected to an EPS core.

AT+COPS?

Read command returns current value of **<mode>**, **<format>**, **<oper>** and **<AcT>** in format **<format>**. If no operator is selected, **<format>**, **<oper>** and **<AcT>** are omitted.

+COPS: <mode>[, <format>, <oper>,< AcT>]

Additional info:

▶▶ If the module is deregistered, <**format**>, <**oper**>, and <**AcT**> parameters are omitted and all of these parameters have the same type as set command except <**AcT**>.

Name	Type	Default	Description
<AcT>	integer	N/A	access technology selected

Values:

0	:	GSM
2	:	UTRAN
3	:	GSM w/EGPRS (see NOTE 1)
4	:	UTRAN w/HSDPA (see NOTE 2)
5	:	UTRAN w/HSUPA (see NOTE 2)
6	:	UTRAN w/HSDPA and HSUPA (see NOTE 2)
7	:	E-UTRAN
11	:	NR connected to a 5GCN (see NOTE 5)
12	:	NG-RAN
13	:	E-UTRA-NR dual connectivity (see NOTE 6)

ℹ️ NOTE 1: 3GPP TS 44.018 [156] specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

ℹ️ NOTE 2: 3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

🛈 NOTE 5: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is connected to a 5G CN. This value is not applicable in set command.

🛈 NOTE 6: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is supporting dual connectivity of E-UTRA with NR and is connected to an EPS core.

AT+COPS=?

Test command returns a list of quadruplets, each representing an operator present in the network. The quadruplets list is ended with the range values of the **<mode>** and **<formats>** parameters.

The quadruplets in the list are closed between round brackets, separated by commas, the **<oper>** parameter is returned in both formats.

+COPS: [quadruplets list **(<stat>,<oper** (in <format>=0)**>,,<oper** (in <format>=2)**>,< act>),
(<stat>,<oper** (in <format>=0)**>,,<oper** (in <format>=2)**>,< act>), ...]**
[,,(range of **<mode>),(**range of **<format>)]**

<**stat**> parameter is described in the Additional info section.

Additional info:

▶▶ Meaning of the <**stat**> parameter.

Name	Type	Default	Description
<stat>	integer	N/A	operator availability
	Values:		
	0 : unknown		
	1 : available		
	2 : current		
	3 : forbidden		

🛈 Since with this command a network scan is done, this command may require some seconds before the output is given.

🛈 <AcT> can be displayed 7(E-UTRAN) although module registered at E-UTRA-NR dual connectivity(13) because the master node is eNB and core is EPC for ENDC and it is Solution provider implementation.

3.3.62. AT#ICMAUTOCONN - Set Datacall Auto connection mode

This command is intended to setup data call automatically to external internet through RNDIS or ECM when device boots up and get available system.

But user or network vender wants to use then will open it.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT#ICMAUTOCONN=<pdn>,<auto_connect>

This command is intended to setup data call automatically to external internet through RNDIS or ECM when device boots up and get available system.

Parameters:

Name	Type	Default	Description
<pdn>	integer	N/A	PDN index
	Value:		
	1÷4	:	disable auto connection
<auto_connect>	integer	N/A	Enable/Disable Auto connection
	Values:		
	0	:	Disable Auto connection
	1	:	Enable Auto connection

ℹ️ Device does not try to connect when set to enable auto connection. It is applied after connect manually or next booting time.

Note: this command activates a context, so all necessary setup has to be done before it (registration, APN).

AT#ICMAUTOCONN?

Read command returns the session state in the following format:

Additional info:

▶▶ **# ICMAUTOCONN: <state>**

...
OK

Name	Type	Default	Description
<pdn>	integer	N/A	PDN index
	Value:		
	1÷4	:	PDN index
<auto_connection>	integer	N/A	auto connection status

Values:

0 : Disabled

1 : Enabled

? **AT#ICMAUTOCONN=?**

Test command returns the range of supported values for all the parameters.

3.4. SMS & CB

3.4.1. AT+CSMS - Select Message Service

This command selects messaging service type.

3GPP TS 27.005
3GPP TS 23.040
3GPP TS 23.041

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CSMS=<service>

Set command selects messaging service <**service**>. It returns the types of messages supported by the ME:

+CSMS: <mt>,<mo>,<bm>

For parameters meaning see Additional info section.

Parameter:

Name	Type	Default	Description
<service>	integer	0	Select Message Service

Values:

0 : 3GPP TS 23.040 and 3GPP TS 23.041. The syntax of SMS AT commands is compatible with 3GPP TS 27.005

1 : 3GPP TS 23.040 and 3GPP TS 23.041. The syntax of SMS AT commands is compatible with 3GPP TS 27.005. The requirement of <service> setting 1 is mentioned under corresponding command descriptions

Additional info:

▶▶ Parameters meaning of the returned message.

Name	Type	Default	Description
<mt>	integer	0	mobile terminated messages support

Values:

0 : type not supported

1 : type supported

| **<mo>** | integer | 0 | mobile originated messages support |

Values:

0 : type not supported

	1	:	type supported
<bm>	integer	0	broadcast type messages support
	Values:		
	0	:	type not supported
	1	:	type supported

ⓘ Setting of <**service**> will not be stored automatically.

AT+CSMS?

Read command reports current service setting along with supported message types in the format:

+CSMS: <service>, <mt>, <mo>, <bm>

AT+CSMS=?

Test command reports the supported value of the parameter <**service**>.

3.4.2. AT+CPMS - Preferred Message Storage

The command selects the memory storage used by SMs (Short Messages).

🎯 3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CPMS=<memr>[,<memw>[,<mems>]]
For 3GPP format SMS (see **#SMSFORMAT**), set command selects memory storage **<memr>**, **<memw>** and **<mems>** to be used for reading, writing, sending and storing SMs. Set command is as below:
AT+CPMS=<memr>[,<memw>[,<mems>]]

The command returns the memory storage status in the format:
+CPMS: <usedr>,<totalr>,<usedw>,<totalw>,<useds>,<totals>

For 3GPP2 format SMS (see **#SMSFORMAT**), set command selects memory storage **<memr>**, **<memw>** to be used for reading, writing, sending and storing SMS. Set command is as below:
AT+CPMS=<memr>[,<memw>]

The command returns the memory storage status in the format:
+CPMS: <usedr>,<totalr>,<usedw>,<totalw>

The returned parameters are described in the Additional info section.

Parameters:

Name	Type	Default	Description
<memr>	string	SM	memory from which messages are read and deleted
			Note: "ME" will be set as default if SIM storage is not supported

Values:

SM	:	SIM SMS memory storage
ME	:	SMS memory storage in Flash
SR	:	Status report storage (in SIM EF-SMSR file exists, otherwise in the RAM non-volatile memory)

Name	Type	Default	Description
<memw>	string	SM	memory to which writing and sending operations are made
			Note: "ME" will be set as default if SIM storage is not supported

Values:

SM	:	SIM SMS memory storage
ME	:	SMS memory storage in Flash

Name	Type	Default	Description
<mems>	string	SM	memory to which received SMs are preferred to be stored
			Note: "ME" will be set as default if SIM storage is not supported

Values:

SM : SIM SMS memory storage

ME : SMS memory storage in Flash

Additional info:

▶▶ Here is the meaning of the parameters returned by the command.

Name	Type	Default	Description
<usedr>	integer	-	number of SMs stored in **<memr>**
<totalr>	integer	-	max number of SMs that **<memr>** can contain
<usedw>	integer	-	number of SMs stored in **<memw>**
<totalw>	integer	-	max number of SMs that **<memw>** can contain
<useds>	integer	-	number of SMs stored in **<mems>**
<totals>	integer	-	max number of SMs that **<memw>** can contain

ℹ For 3GPP format SMS, "SR" non-volatile memory is cleared when another SIM card is inserted. It is kept, even after a reset, while the same SIM card is inserted.

AT+CPMS?

Read command reports the message storage status.
3GPP format SMS:
+CPMS:<memr>,<usedr>,<totalr>,<memw>,<usedw>,<totalw>,<mems>, <useds>,<totals>

3GPP2 format SMS:
+CPMS: <memr>,<usedr>,<totalr>,<memw>,<usedw>,<totalw>

The parameters are described in previous sections.

AT+CPMS=?

For 3GPP format SMS, test command reports the supported values for parameters <**memr**>, <**memw**> and <**mems**>.

For 3GPP2 format SMS, test command reports the supported values for parameters **<memr>**, **<memw>**

Example for 3GPP format SMS:

```
AT+CPMS="SM","ME","SM"
+CPMS: 1,20,27, 50,1,20
OK
```

```
AT+CPMS?
+CPMS: "SM",1,20,"ME",27, 50,"SM",1,20
OK
```
You have 1 out of 20 SMS SIM positions occupied

Example for 3GPP2 format SMS:

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

```
AT+CPMS?
+CPMS: "ME",5,99, "ME",5,99
OK
```

```
AT+CPMS="ME", "ME"
+CPMS: 5,99,5,99
OK
```

```
AT+CPMS?
+CPMS: "ME",5,99, "ME",5,99
OK
```

```
AT+CPMS="SM", "SM"
+CPMS: 2,20,2,20
OK
```

```
AT+CPMS?
+CPMS: "SM",2,20,"SM",2,20
OK
```

3.4.3. AT+CMGF - Message Format

Selects the format of SMS messages to be used in following SMS commands.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CMGF=[<mode>]

Set command selects the format of SMS messages used with send, list, read and write commands.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	format to use for SMS operations

Values:

0 : PDU mode

1 : text mode

AT+CMGF?

Read command reports the current value of the parameter **<mode>** in the format:

+CMGF: <mode>

AT+CMGF=?

Test command returns the supported values of parameter **<mode>**.

3.4.4. AT+CSCA - Service Center Address

This command allows to set the Service Center Address for SMS transmissions.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Other	No	-	2

AT+CSCA=<number>[,<type>]

Set command sets the Service Center Address to be used for mobile originated SMS transmissions

Parameters:

Name	Type	Default	Description
<number>	string	-	String type phone number of forwarding address in format specified by <**type**> parameter
<type>	integer	N/A	The type of number; For Verizon FW, the range of <**type**> is 0 - 255.
	Values:		
	129	:	National numbering scheme
	145	:	International numbering scheme (contains the character "+")

AT+CSCA?

Read command reports the current value of the SCA in the format:

+CSCA: <number>,<type>

ℹ If SCA is not present the device reports an error message.

AT+CSCA=?

Test command returns the **OK** result code.

ℹ To use the SM service, is mandatory to set a Service Center Address at which service requests will be directed.

ℹ In Text mode, this 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 the <**pdu**> parameter equals zero.

ℹ The current settings are stored through **+CSAS**.

```
AT+CSCA="821029190903",145
OK

AT+CSCA?
+CSCA: "+821029190903",145
OK
```

3.4.5.   AT+CSMP - Set Text Mode Parameters

This command is used to select values for additional parameters for storing and sending SMS when the text mode is used (**AT+CMGF=1**).

> 3GPP TS 27.005
> 3GPP TS 03.40/23.040
> 3GPP TS 03.38/23.038

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Other	No	-	2

AT+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]]

Set command is used to select values for additional parameters for storing and sending 3GPP format SMS when the text mode is used (**AT+CMGF=1**).

For 3GPP2 format SMS, please refer to the additional information.

Parameters:

Name	Type	Default	Description
<fo>	integer	17	first octet of SMS-SUBMIT or SMS-DELIVER PDU, as described in 3GPP TS 23.040
			bit 0/1 = Message Type Indicator **bit 2** = Reject Duplicates **bit 3/4** = Validity Period Format **bit 5** = Status Report Request **bit 6** = User Data Header Indicator **bit 7** = Reply Path
	Value:		
	0÷255	:	mask
<vp>	mixed	167	Validity Period, the format depends on Validity Period Format in <fo>, as described in 3GPP TS 23.040:
			bit 0/1 = Message Type Indicator **bit 2** = Reject Duplicates **bit 3/4** = Validity Period Format **bit 5** = Status Report Request **bit 6** = User Data Header Indicator **bit 7** = Reply Path
	Value:		
	0÷255	:	range for Validity Period in relative format
<pid>	integer	0	TP-Protocol-Identifier, as described in 3GPP TS 23.40
	Value:		
	0÷255	:	described in 3GPP TS 23.40
<dcs>	integer	0	SMS Data Coding Scheme, as described in 3GPP TS 23.038
	Value:		
	0÷255	:	described in 3GPP TS 23.038

Additional info:

▶▶ Set command is used to select values for additional parameters for storing and sending 3GPP2 format SMS when the text mode is used (**AT+CMGF=1, AT#SMSFORMAT=1**).

AT+CSMP=[<callback_addr>[,<tele_id >[,<priority>[,<enc_type >]]]]

Name	Type	Default	Description
<callback_addr>	string	-	Callback address; Maximum length is 20 characters. Note: Initially, this parameter is null. Some carrier networks discard SMS's without a callback number. Therefore, we recommend that customer setup callback number using **AT+CSMP** command.
<tele_id>	integer	4098	Teleservice ID
			Values:
		4097 :	page
		4098 :	SMS message
		4101 :	EMS message(concatenated)
<priority>	integer	0	Priority
			Values:
		0 :	Normal
		1 :	High
<enc_type>	integer	2	data coding scheme
			Values:
		0 :	8-bit Octet
		2 :	7-bit ASCII
		4 :	16-bit Unicode
		9 :	GSM 7bit

ⓘ In the parameter <**fo**>: only the following values are supported for Message Type Indicator:
[00] - SMS-DELIVER
[01] - SMS-SUBMIT

ⓘ In the parameter <**fo**>: user is not responsible for setting **bit 2** and **bit 6**, if set, they will have no meaning.

ⓘ In the parameter <**vp**>: the *absolute format* is a quoted time-string type (see **+CCLK**).

ⓘ The current settings are stored through **+CSAS**.

ⓘ **<vp>**, **<pid>** and **<dcs>** default values are loaded from first SIM SMS Parameters profile, if present. If it is not present, then the default values are those above indicated.

AT+CSMP?

Read command for 3GPP format SMS (see **#SMSFORMAT**) returns the current setting in the format:

+CSMP: <fo>,<vp>,<pid>,<dcs>

Read command for 3GPP2 format SMS (see **#SMSFORMAT**) returns the current setting in the format:
+CSMP: < callback_addr >,<tele_id >,< priority >,< enc_type >

AT+CSMP=?

Test command returns the **OK** result code.

Set the parameters for an outgoing 3GPP format message with 24 hours of validity period and default properties:
AT+CSMP=17,167,0,0
OK

Set the parameters for an outgoing 3GPP2 format message:
AT+CSMP=?
OK

AT+CSMP?
+CSMP: "",4098,0,2
OK

AT+CSMP="1234567890",4097,1,2
OK

AT+CSMP?
+CSMP: "1234567890",4097,1,2
OK

3.4.6. AT+CSDH - Show Text Mode Parameters

This command controls whether detailed header information is shown in text mode.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CSDH=[<show>]

Set command controls whether detailed header information is shown in text mode (**AT+CMGF=1**) result codes.

Parameter:

Name	Type	Default	Description
<show>	integer	0	control the display of the result codes.

Values:

0 : see Additional info section

1 : show the values in result codes

Additional info:

▶▶ If <show>=0

do not show header values defined in commands **+CSCA** and **+CSMP** (<sca>,<tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <tooa> in **+CMT**, **+CMGL**, **+CMGR** result codes for SMS-DELIVERs and SMS-SUBMITs in text mode.

For SMS-COMMANDs in **+CMGR** result code do not show <pid>, <mn>, <da>, <toda>, <length> or <cdata>

AT+CSDH?

Read command reports the current setting in the format:

+CSDH: <show>

AT+CSDH=?

Test command reports the supported range of values for parameter <**show**>.

3.4.7. AT+CSCB - Select Cell Broadcast

The command selects which types of Cell Broadcast Messages are to be received by the device.

3GPP TS 27.005
3GPP TS 23.041
3GPP TS 23.038

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Other	No	-	2

AT+CSCB=[<mode>[,<mids>[,<dcss>]]]

Set command selects which types of Cell Broadcast Messages are to be received by the device

Parameters:

Name	Type	Default	Description
<mode>	integer	0	select which types of Cell Broadcast messages are to be received

Values:

0 : the message types defined by <mids> and <dcss> are accepted

1 : the message types defined by <mids> and <dcss> are rejected

<mids>	string	-	message Identifiers: all different possible combinations of the CBM message identifiers; default is empty string ("").
<dcss>	string	-	Data Coding Schemes: all different possible combinations of CBM data coding schemes; default is empty string ("").

ⓘ The current settings are stored also by **+CSAS** command

AT+CSCB?

Read command reports the current value of parameters **<mode>**, **<mids>** and **<dcss>**.

AT+CSCB=?

Test command returns the range of values for parameter **<mode>**.

</> Select a range
AT+CSCB=0,"0,1,300-315,450","0-3"
OK

3.4.8. AT+CSAS - Save Settings

Execution command saves settings which have been made by the **+CSCA**, **+CSMP** and **+CSCB** commands in local non-volatile memory.

For 3GPP2 format SMS (see **#SMSFORMAT**), only **+CSMP** settings will be saved.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CSAS=<profile>

Parameter:

Name	Type	Default	Description
<profile>	integer	0	Index of the profile where the settings are saved

Values:

0 : it saves the settings to NVM

1÷n : SIM profile number; the value of n depends on the SIM and its max is 3.

ℹ️ If parameter is omitted the settings are saved in the non-volatile memory (profile 0).

ℹ️ Certain settings may not be supported by the SIM and therefore they are always saved to NVM, regardless the value of **<profile>**.

ℹ️ For 3GPP2 format SMS (see **#SMSFORMAT**), store the settings to SIM is not supported, only NVM profile 0-1 are supported.

AT+CSAS=?
Test command returns the possible range of values for the parameter <**profile**>.

3.4.9.   AT+CRES - Restore Settings

Execution command restores message service settings saved by **+CSAS** command from either NVM or SIM.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CRES[=[<profile>]]

Parameter:

Name	Type	Default	Description
<profile>	integer	N/A	Defines which message service profiles to restore.

Values:

0   :   restores message service settings from NVM

1÷n   :   restores message service settings from SIM. The value of n depends on the SIM and its max is 3.

ⓘ   If parameter is omitted the command restores message service settings from NVM (profile 0).

ⓘ   Certain settings may not be supported by the SIM and therefore they are always restored from NVM, regardless the value of <profile>.

ⓘ   For 3GPP2 format SMS (see **#SMSFORMAT**), restore the settings from SIM is not supported, only NVM profile 0-1 are supported.

AT+CRES=?

Test command returns the possible range of values for the parameter <**profile**>.

3.4.10.   AT+CMMS - More Message to Send

Set command controls the continuity of SMS relay protocol link. When feature is enabled (and supported by network) multiple messages can be sent much faster as link is kept open.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CMMS=[<n>]

Parameter:

Name	Type	Default	Description
<n>	integer	0	enables/disables the relay protocol link continuity.

Values:

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 5 seconds, then the link is closed and the parameter <n> is automatically reset to 0

2 : enable (if the time between the response of the latest message send command and the next send command exceeds 5 seconds, the link is closed but the parameter <n> remains set to 2)

> ℹ️ Entering **AT+CMMS=** returns **OK** but has no effect.

AT+CMMS?

Read command reports the current value of the parameter **<n>** in the format:

+CMMS: <n>

AT+CMMS=?

Test command returns the range of supported **<n>**.

3.4.11.   AT+CGSMS - Select Service for MO SMS Messages

Set command is used to specify the service or service preference that the MT will use to send MO SMS messages.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGSMS=[<service>]

Parameter:

Name	Type	Default	Description
<service>	integer	1	indicates the service or service preference to be used

Values:

0 : GPRS

1 : circuit switched

2 : GPRS preferred. Use circuit switched if SMS via GPRS service not available or GPRS not registered.

3 : circuit switched preferred. Use GPRS if SMS via circuit switched not available.

> Entering **AT+CGSMS=** returns **OK** but has no effect.

AT+CGSMS?

The read command returns the currently selected service or service preference in the format:

+CGSMS: <service>

AT+CGSMS=?

Test command reports the supported list of currently available <**service**>.

> The <**service**> value is saved on NVM as global parameter.

3.4.12. AT+CNMI - New Message Indications to Terminal Equipment

This command sets the parameters for receiving SMS messages.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]
Set command selects the behavior of the device on how the receiving of new messages from the network is indicated to the DTE.

Set command for 3GPP format SMS (see **#SMSFORMAT**):
AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]

Set command for 3GPP2 format SMS (see **#SMSFORMAT**):
AT+CNMI=[<mt>]

Parameters:

Name	Type	Default	Description
<mode>	integer	0	unsolicited result codes buffering option.

Values:

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, otherwise forward them directly to the TE.

2 : Buffer unsolicited result codes in the TA in case the DTE is busy and flush them to the TE after reservation. Otherwise forward them directly to the TE.

3 : If <mt> is set to 1, the hardware ring line enabled for 1 second when a SMS is received while the module is in online data mode. (If ring supported)

Name	Type	Default	Description
<mt>	integer	0	result code indication reporting for SMS-DELIVER.

Values:

0 : No SMS-DELIVER indications are routed to the TE and message is stored.

1 : If SMS-DELIVER is stored into ME/TA, indication of the memory location is routed to the TE using the URC described in Additional info section (3GPP format SMS). 3GPP2 format SMS will be indicated with +CMTI format.

2 : SMS-DELIVERs (except class 2 messages and messages in the message waiting indication group) are routed directly to the TE using the URC described in the Additional info section (3GPP format SMS). 3GPP2 format SMS will be indicated with +CMT format.

	3	:	Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1 (3GPP format SMS)).	
<bm>			integer	0	broadcast reporting option

Values:

0	:	Cell Broadcast Messages are not sent to the DTE
2	:	New Cell Broadcast Messages are sent to the DTE with the URC described in Additional info section.

<ds>			integer	0	SMS-STATUS-REPORTs reporting option

Values:

0	:	status report receiving is not reported to the DTE and is not stored
1	:	the status report is sent to the DTE with the URC described in the Additional info section.
2	:	if a status report is stored, then the unsolicited result code, described in Additional info section, is sent.

<bfr>			integer	0	buffered result codes handling method

Values:

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

Additional info:

▶▶For both 3GPP and 3GPP2 format SMS, when **<mt>**=1:

+CMTI: <mems>,<index>

▶▶For 3GPP format SMS, when **<mt>**=2:

<u>PDU mode</u>
+CMT: <alpha>,<length><CR><LF><PDU>

<u>TEXT mode</u>
**+CMT:<oa>,<alpha>,<scts>*[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]*<CR><LF>
<data>**

The parameters written in italics will be present depending on **+CSDH** last setting.

Class 2 messages and messages in the message waiting indication group (stored message) result in indication as defined in **<mt>**=1.

Acknowledge for the received SMS-DELIVER SM is sent to network immediately when **+CSMS <service>** is set to '0' or when **+CSMS <service>** is set to '1', acknowledge is sent via **+CNMA** command during predefine time-out, an error is sent to network in case timeout expire, next **+CMT** response is depend on acknowledge of current received **+CMT** response in case **+CSMS <service>** parameter set to '1'.

▶▶For 3GPP2 format SMS, when **<mt>**=2:

PDU mode
+CMT: ,<length><CR><LF><PDU>

TEXT mode
+CMT: <orig_num>,<callback>,<date>*[,<tooa>,<tele_id>,<priority>,<enc_type>,<udh>,<length>]*<CR><LF><data>

▶▶**<bm>**=2:

PDU mode
+CBM: <length><CR><LF><PDU>

Text mode
+CBM:<sn>,<mid>,<dcs>,<pag>,<pags><CR><LF><data>

▶▶**<ds>**=1:

PDU mode
+CDS: <length><CR><LF><PDU>

TEXT mode
+CDS: <fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st>

Acknowledge for the received SMS-STATUS-REPORT SM is sent to network immediately when **+CSMS <service>** is set to '0' or when **+CSMS <service>** is set to '1', acknowledge is sent via **+CNMA** command during pre-defined timeout, an error is sent to network in case timeout expire, next **+CDS** response is depend on acknowledge of current received **+CDS** response in case **+CSMS <service>** parameter set to '1'.

▶▶**<ds>**=2:

+CDSI: <mems>,<index>

Unsolicited fields:

Name	Type	Description

<mems>	string	memory storage where the new message is stored: "SM", "ME".
<index>	integer	location on the memory where SMS is stored.
<alpha>	string	alphanumeric representation of originator/destination number corresponding to the entry found in MT phonebook; used character set should be the one selected with command **+CSCS**.
<length>	integer	PDU length

<PDU>	string	PDU message
		
		For 3GPP2 format SMS in PDU mode, please refer to below information for the detail.
		<pdu>: <orig_num><date><tele_id><priority><enc_type><udh><length><data>
		
		where:
		<orig_num> : <addr_len><tooa><address>
		<addr_len> : Octets length of address field(1 Octet : <tooa> and <address>).
		<tooa> : Type of address(1 Octet).
		<addres> : Address digits with representation of semi-octets.
		<date> : Serivce center time stamp (6 Octets : YYMMDDHHMMSS).
		<tele_id> : Teleservice ID (2 Octets).
		<priority> : Priority(1 Octet).
		<enc_type> : Encoding type(1 Octet).
		<udh> : User data header (1 Octet).
		<length> : Refer to below **Note** (1 Octet).
		<data> : User data of message.
		
		Note:
		If user data header**<udh>** is present,
		  If encoding type is 7bit ASCII,
		    <length> value is the sum of the number of septets in user data and the number of septets in user data header (including any padding).
		  Otherwise,
		    <length> value is the sum of the number of octets in user data and the number of octets in user data header.
		If user data header**<udh>** is not present,
		  If encoding type is 7bit ASCII,
		    <length> value is the number of septets in user data.
		  Otherwise,
		    <length> value is the number of octets in user data.

<oa>	string	originating address, string type converted in the currently selected character set (see **+CSCS**)
<alpha>	string	alphanumeric representation of **<oa>**; used character set should be the one selected with command **+CSCS**.
<scts>	string	arrival time of the message to the SC
<tooa>	integer	type of number **<oa>** Values:

		129 : number in national format
		145 : number in international format (contains the "+")
<fo>	string	first octet of message PDU, see 3GPP TS 03.40/23.040
<pid>	string	Protocol Identifier
<dcs>	string	Data Coding Scheme
<sca>	string	Service Centre address, string type, converted in the currently selected character set (see **+CSCS**)
<tosca>	integer	type of number <**sca**>
		Values:
		129 : number in national format
		145 : number in international format (contains the "+")
<length>	integer	text length
<data>	string	TP-User-Data
		* If <**dcs**> indicates that GSM 03.38 default alphabet is used and <**fo**> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set (bit 6 of <**fo**> is 0), each character of GSM alphabet will be converted into current TE character set (see **+CSCS**).
		* If <**dcs**> indicates that 8-bit or UCS2 data coding scheme is used or <**fo**> indicates that GSM 03.40 TP-User-Data-Header-Indication is set (bit 6 of <**fo**> is 1), each 8-bit octet will be converted into two IRA character long hexadecimal number (e.g. octet 0x2A will be converted as two characters 0x32 0x41).
		Class 2 messages and messages in the "store" message waiting indication group result in indication as defined in <**mt**>=1.
<sn>	integer	message serial number
<mid>	integer	message ID
<dcs>	string	Data Coding Scheme
<pag>	integer	page number
<pags>	integer	total number of pages of the message
<data>	string	CBM Content of Message
		* If <**dcs**> indicates that GSM 03.38 default alphabet is used, each character of GSM alphabet will be converted into current TE character set (see **+CSCS**)
		* If <**dcs**> indicates that 8-bit or UCS2 data coding scheme is used, each 8-bit octet will be converted into two IRA character long hexadecimal number (e.g. octet 0x2A will be converted as two characters 0x32 0x41)
<mr>	integer	message reference number; 3GPP TS 23.040 TP-Message-Reference in integer format
<ra>	string	recipient address, string type, represented in the currently selected character set (see **+CSCS**)

<tora>	integer	type of number **<ra>** Values: 129 : number in national format 145 : number in international format (contains the "+")
<scts>	string	arrival time of the message to the SC
<dt>	string	sending time of the message
<st>	string	message status as coded in the PDU
<orig_num>	string	Origination number (only for 3GPP2 format SMS)
<callback>	string	Callback number (only for 3GPP2 format SMS)
<date>	string	Received date in form as "YYYYMMDDHHMMSS" (only for 3GPP2 format SMS)
<tooa>	integer	Type of **<orig_num>** (only for 3GPP2 format SMS)
<tele_id>	integer	Teleservice ID (only for 3GPP2 format SMS) Values: 4097 : page 4098 : SMS message 4099 : voice mail notification 4101 : EMS message(concatenated) 262144 : voice mail notification
<priority>	integer	Priority (only for 3GPP2 format SMS) Values: 0 : Normal 1 : High
<enc_type>	integer	Encoding type of message (only for 3GPP2 format SMS) Values: 0 : 8-bit Octet 2 : 7-bit ASCII 4 : 16-bit Unicode 9 : GSM 7bit
<udh>	integer	User data header (only for 3GPP2 format SMS) Values: 0 : Not present the user data header 1 : Present the user data header
<length>	integer	Length of message (only for 3GPP2 format SMS)
<data>	string	Message data (Indicates the new voice mail count, if <tele_id> is voice mail notification) (only for 3GPP2 format SMS)

ℹ️ DTR signal is ignored, hence the indication is sent even if the DTE is inactive (DTR signal is Low). In this case the unsolicited result code may be lost so if MODULE remains active while DTE is not, at DTE startup is suggested to check whether new messages have reached the device meanwhile with command **AT+CMGL=0** that lists the new messages received.

ℹ️ For 3GPP2 format SMS, regardless of <**mt**>, a message is saved in SMS memory storage.

AT+CNMI?

Read command returns the current parameter settings for **+CNMI** command in the form:
+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr>

AT+CNMI=?

Test command reports the supported range of values for the **+CNMI** command parameters

- Example for 3GPP format SMS

  AT+CMGF=1
  OK
  AT+CNMI=1,2,0,1,0
  OK

  Received message from network
  +CMT: "+821020955219",,"07/07/26,20:09:07+36"
  TEST MESSAGE

- Example for 3GPP2 format SMS

  AT+CNMI=?
  +CNMI: (0-2)
  OK

  AT+CNMI=1
  OK

  AT+CNMI?
  +CNMI: 1
  OK

  Received message from network
  +CMTI:"ME",98

  AT+CNMI=2
  OK

  AT+CNMI?
  +CNMI: 2
  OK

  Received message from network
  +CMT: "My Number","My Number",20141023165007,129,4098,0,2,0,8
  TEST SMS

3.4.13. AT+CMGL - List Messages

This command is used to list the messages.

3GPP TS 27.005
3GPP TS 23.040
3GPP TS 23.038

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CMGL[=<stat>]

Execution command reports the list of all the messages with status value **<stat>** stored into **<memr>** message storage (**<memr>** is the message storage for read and delete SMs as last settings of command **+CPMS**).

Parameter:

Name	Type	Default	Description
<stat>	mixed	-	**<stat>** parameter type and the command output depend on the last settings of the **+CMGF** command (message format to be used). There are two modes: - PDU mode - Text mode See the following Additional info sections.

Additional info:

▶▶When message format is PDU mode, the **<stat>** parameter is:

Name	Type	Default	Description
<stat>	integer	N/A	status value

Values:

0 : new message

1 : read message

2 : stored message not sent yet

3 : stored message already sent

4 : all messages

▶▶In case of 3GPP PDU mode the representation format (see **+CMGF, #SMSFORMAT**) is:

+CMGL: <index>,<stat>,<alpha>,<length><CR><LF><pdu>[<CR><LF>
+CMGL: <index>,<stat>,<alpha>,<length><CR><LF><pdu>[...]]

Name	Type	Default	Description
\<index\>	integer	-	message position in the storage list.
\<stat\>	integer	-	message status. See the above **\<stat\>** parameter description.
\<alpha\>	string	-	String type alphanumeric representation of **\<da\>** or **\<oa\>**, corresponding to an entry found in the phonebook; used character set is the one selected with command **+CSCS**.
\<length\>	integer	-	PDU length in bytes
\<pdu\>	string	-	message in PDU format, according to 3GPP TS 23.040

▶▶In case of 3GPP2 PDU mode the representation format of each message (see **+CMGF, #SMSFORMAT**) is:

+CMGL: \<index\>,\<stat\>,"",\<length\>\<CR\>\<LF\>\<pdu\>

Case of received message from base station:
\<PDU\>: \<orig_num\>\<date\>\<tele_id\>\<priority\>\<enc_type\>\<udh\>\<length\>\<data\>

Case of sending message to base station:
\<PDU\>: \<da\>\<callback\>\<tele_id\>\<priority\>\<enc_type\>\<udh\>\<length\>\<data\>

Name	Type	Default	Description
\<index\>	integer	-	message position in the memory storage list
\<stat\>	integer	-	status of the message
\<length\>	integer	-	length of the PDU in bytes
\<pdu\>	string	-	message in PDU format
\<orig_num\>	hex	N/A	**\<addr_len\>\<tooa\>\<address\>**
			Values:
			addr_len : Octets length of address field (1 Octet : \<tooa\> and \<address\>)
			tooa : Type of address (1 Octet)
			addres : Address digits with representation of semi-octets
\<da\>	hex	N/A	**\<addr_len\>\<toda\>\<address\>**
			Values:
			addr_len : Octets length of address field (1 Octet : \<toda\> and \<address\>)
			toda : Type of address (1 Octet)
			address : Address digits with representation of semi-octets
\<callback\>	hex	N/A	**\<addr_len\>\<toca\>\<address\>**
			Values:
			addr_len : Octets length of address field (1 Octet : \<toca\> and \<address\>)
			toca : Type of address (1 Octet)
			address : Address digits with representation of semi-octets
\<date\>	hex	-	Service center time stamp (6 Octets: YYMMDDHHMMSS)

<tele_id>	hex	-	Teleservice ID (2 Octets)
<priority>	hex	-	Priority (1 Octet)
<enc_type>	hex	-	Encoding type (1 Octet)
<udh>	string	-	User data header (1 Octet)
<length>	hex	-	1 Octet in the PDU data
			If user data header**<udh>** is present,
			If encoding type is 7bit ASCII,
			<length> value is the sum of the number of septets in user data and the number of septets in user data header (including any padding).
			Otherwise,
			<length> value is the sum of the number of octets in user data and the number of octets in user data header.
			If user data header**<udh>** is not present,
			If encoding type is 7bit ASCII,
			<length> value is the number of septets in user data.
			Otherwise,
			<length> value is the number of octets in user data.
<data>	hex	-	User data of message

▶▶When message format is TEXT mode, the <**stat**> parameter is:

Name	Type	Default	Description
<stat>	string	N/A	status value

Values:

"REC UNREAD"	:	new message
"REC READ"	:	read message
"STO UNSENT"	:	stored message not sent yet
"STO SENT"	:	stored message already sent
"ALL"	:	all messages

▶▶In case of 3GPP TEXT mode (see **#SMSFORMAT**), the representation format for stored messages (either sent or unsent) or received messages (either read or unread, not message delivery confirm) is:

**+CMGL: <index>,<stat>,<oa/da>,<alpha>,<scts>*[,<tooa/toda>,<length>]*<CR><LF>
<data>[<CR><LF>
+CMGL: <index>,<stat>,<oa/da>,<alpha>,<scts>*[,<tooa/toda>,<length>]*<CR><LF> <data>[...]]**

The information written in italics will be present depending on **+CSDH** last setting.

Name	Type	Default	Description
<index>	integer	-	message position in the storage list.

<stat>	string	-	message status. See the above **<stat>** parameter description.
<oa/da>	string	-	originator/destination address, represented in the currently selected character set (see **+CSCS**).
<alpha>	string	-	The alphanumeric representation of **<da>** or **<oa>**, corresponding to an entry found in the phonebook; used character set is the one selected with command **+CSCS**.
<scts>	string	-	TP-Service Centre Time Stamp in Time String Format.
<tooa/toda>	integer	N/A	type of number **<oa/da>** For Verizon FW, the range of **<tooa/toda>** is 0 - 255.

Values:

    129   :   number in national format

    145   :   number in international format (contains the "+")

<length>	integer	-	text length
<data>	string	-	TP-User-Data If **<dcs>** indicates that 3GPP TS 23.038 default alphabet is used, each character of GSM alphabet will be converted into current TE character set (see **+CSCS**) If **<dcs>** indicates that 8-bit or UCS2 data coding scheme is used, each 8-bit octet will be converted into two IRA character long hexadecimal number (e.g. octet 0x2A will be converted as two characters 0x32 0x41) If **<fo>** indicates that a UDH is present each 8-bit octet will be converted into two IRA character long hexadecimal number. The **<length>** indicates text length in characters without UDH length.

▶▶In case of 3GPP TEXT mode (see **#SMSFORMAT**), the representation format for delivery confirm messages is:

+CMGL: <index>,<stat>,<fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st>[<CR><LF>
+CMGL: <index>,<stat>,<fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st>[...]]

Name	Type	Default	Description
<index>	integer	-	message position in the storage list.
<stat>	string	-	Message status. See the last **<stat>** parameter description.
<fo>	integer	-	first octet of the message PDU
<mr>	integer	-	message reference number; 3GPP TS 23.040 TP-Message-Reference in integer format
<ra>	string	-	recipient address, represented in the currently selected character set (see **+CSCS**)
<tora>	string	-	type of number **<ra>**
<scts>	string	-	arrival time of the message to the SC
<dt>	string	-	sending time of the message

<st>	integer	-	message status as coded in the PDU

▶▶In case of 3GPP2 TEXT mode (see **#SMSFORMAT**), each message to be listed is represented in the format (the information written in italics will be present depending on **+CSDH** last setting):

If there is at least a **Received** message to be listed the representation format is:
+CMGL:
<index>,<stat>,<orig_num>,<callback>,<date>*[,<tooa>,<tele_id>,<priority>,<enc_type>,<udh>
,<length>]***<CR><LF> <data>**

If there is at least a **Sent** or an **Unsent** message to be listed the representation format is:
+CMGL:
<index>,<stat>,<da>,<callback>,*[,<toda>,<tele_id>,<priority>,<enc_type>,<udh>,<length>]***<C
R><LF><data>**

Name	Type	Default	Description
<orig_num>	string	-	origination number
<callback>	string	-	callback number
<date>	string	-	received date in form as "YYYYMMDDHHMMSS"
<tooa>	string	-	type of **<orig_num>**
<toda>	string	-	type of **<da>**
<tele_id>	string	N/A	teleservice ID
			Values:
	4097	:	page
	4098	:	SMS message
	4099	:	voice mail notification
	4101	:	EMS message(concatenated)
	262144	:	voice mail notification
<priority>	integer	N/A	priority
			Values:
	0	:	Normal
	1	:	Interactive
	2	:	Urgent
	3	:	Emergency
<enc_type>	integer	N/A	encoding type of message
			Values:
	0	:	8-bit Octet
	2	:	7-bit ASCII
	4	:	16-bit Unicode
	9	:	GSM 7bit
<udh>	integer	N/A	user data header

Values:

	0	:	Not present the user data header
	1	:	Present the user data header
\<length\>	integer	-	length of message
\<data\>	string	-	message data. (Indicates the new voice mail count, if \<tele_id\> is voice mail notification)

ℹ️ If parameter is omitted the command returns the list of SMS with **"REC UNREAD"** status.

ℹ️ The order in which the messages are reported by **+CMGL** corresponds to their position in the memory storage.

ℹ️ If a message is present when +CMGL="ALL" is used it will be changed status from **REC UNREAD** to **REC READ**.

?🔲 AT+CMGL=?

Test command returns a list of supported \<**stat**\>s.

Examples for 3GPP2 format SMS.

- PDU mode:

Case of received message from base station:
AT+CMGL=1
+CMGL: 13,1,"",51
06811041394306141023155820100202020024C3870E1C3870E1C3870E1C3870E1C387
0E1C3870E1C3870E1C3870E10
OK

06	<addr_len: 6byte>
81	<type_addr: 129>
1041394306	<Origination number: 0114933460>
141023155820	<Date: 14/10/23,15:58:20>
1002	<Teleservice_id: 4098(decimal)>
02	<priority: urgent >
02	<encoding_type: 7-bit ASCII >
00	<udh: Not present user data header >
24	<data_len: 36>

C3870E1C3870E1C3870E1C3870E1C3870E1C3870E1C3870E1C3870E1C3870E10
<user_data: aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa>

Else:
AT+CMGL=2
+CMGL: 31,2,"",23
07801091346554F307801091346554F310020000000A61616161616161616161
OK

07	<addr_len: 7byte>
81	<type_addr:129>
1091346554F3	<Destination_addr: 01194356453>
07	<addr_len: 7byte>
81	<type_addr:129>
1096224658F1	<Callback_Number: 01692264851>
1002	<Teleservice_id: 4098(decimal)>
00	<priority: normal >
00	<encoding_type: 8-bit Octet >
00	<udh: Not present user data header >
0A	<data_len: 10>

6161616161616161616161 <data: aaaaaaaaaa>

AT+CMGF=0
OK

AT+CMGF?
+CMGF: 0
OK

AT+CMGL=?
+CMGL: (0-4)
OK

AT+CMGL=4

+CMGL: 0,2,"",19
068110413943060681104139430610020000006313233343536
+CMGL: 1,2,"",22
06811041394306068110413943061002000000009313233343536363737
+CMGL: 2,2,"",25
0681104139430606811041394306100200000000C31313232333434343434
+CMGL: 3,2,"",28
0681104139430606811041394306100200000000F61666661736465656565656565656565
OK

- Text Mode:

    AT+CMGF=1
    OK

    AT+CMGF?
    +CMGF: 1
    OK

    AT+CMGL=?
    +CMGL: ("REC UNREAD","REC READ","STO UNSENT","STO SENT","ALL")
    OK

    AT+CMGL="ALL"
    +CMGL: 0,"STO UNSENT","My Number","My Number",
    123456
    +CMGL: 1, "STO UNSENT","My Number","My Number",
    123456677
    +CMGL: 2, "STO UNSENT","My Number","My Number",
    112234444444
    +CMGL: 3, "STO UNSENT","My Number","My Number",
    affasdeeeeeeeee
    OK

3.4.14.   AT+CMGR - Read Message

This command is used to read a message.

3GPP TS 27.005
3GPP TS 23.040
3GPP TS 23.038

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CMGR=<index>

Execution command reports the message with location value <**index**> from <**memr**> message storage (<**memr**> is the message storage for read and delete SMs as last settings of command **+CPMS**).

Parameter:

Name	Type	Default	Description
<index>	integer	-	message index. The command output depends on the last settings of command **+CMGF** (message format to be used). There are two modes: - PDU mode - Text mode See the following Additional info sections.

Additional info:

▶▶ In case of 3GPP PDU mode (see **#SMSFORMAT**), if there is a message in location <**index**>, the output has the following format:

+CMGR: <stat>,<alpha>,<length><CR><LF><pdu>

Name	Type	Default	Description
<stat>	integer	N/A	status of the message
	Values:		
	0	:	new message
	1	:	read message
	2	:	stored message not yet sent
	3	:	stored message already sent
<alpha>	string	-	string type alphanumeric representation of <**da**> or <**oa**>, corresponding to an entry found in the phonebook; used character set is the one selected with command **+CSCS**
<length>	integer	-	PDU length in bytes
<PDU>	string	-	message in PDU format, according to 3GPP TS 23.040

▶▶In case of 3GPP2 PDU mode (see **#SMSFORMAT**), if there is a message in location <**index**>, the output has the following format:

+CMGR: <stat>,"",<length><CR><LF><PDU>

Case of received message from base station:
<PDU>: <orig_num><date><tele_id><priority><enc_type><udh><length><data>

Case of sending message to base station:
<PDU>: <da><callback><tele_id><priority><enc_type><udh><length><data>

Name	Type	Default	Description
<stat>	integer	N/A	status of the message
			Values:
			0 : new message
			1 : read message
			2 : stored message not yet sent
			3 : stored message already sent
<length>	integer	-	length of the PDU in bytes
<pdu>	string	-	message in PDU format
<orig_num>	hex	N/A	**<addr_len><tooa><address>**
			Values:
			addr_len : Octets length of address field (1 Octet : <tooa> and <address>)
			tooa : Type of address (1 Octet)
			address : Address digits with representation of semi-octets
<da>	hex	N/A	**<addr_len><toda><address>**
			Values:
			addr_len : Octets length of address field (1 Octet : <toda> and <address>)
			toda : Type of address (1 Octet)
			address : Address digits with representation of semi-octets
<callback>	hex	N/A	**<addr_len><toca><address>**
			Values:
			addr_len : Octets length of address field (1 Octet : <toca> and <address>)
			toca : Type of address (1 Octet)
			address : Address digits with representation of semi-octets
<date>	hex	-	Service center time stamp (6 Octets: YYMMDDHHMMSS)
<tele_id>	hex	-	Teleservice ID (2 Octets)
<priority>	hex	-	Priority (1 Octet)
<enc_type>	hex	-	Encoding type (1 Octet)

<udh>	hex	-	User data header (1 Octet)
<length>	hex	-	1 octet in the PDU data
			If user data header**<udh>** is present,
			If encoding type is 7bit ASCII,
			<length> value is the sum of the number of septets in user data and the number of septets in user data header (including any padding).
			Otherwise,
			<length> value is the sum of the number of octets in user data and the number of octets in user data header.
			If user data header**<udh>** is not present,
			If encoding type is 7bit ASCII,
			<length> value is the number of septets in user data.
			Otherwise,
			<length> value is the number of octets in user data.
<data>	hex	-	User data of message

▶▶In case of 3GPP Text mode (see **#SMSFORMAT**), if there is a received message in location <**index**>, the output has the following format (the information written in italics will be present depending on **+CSDH** last setting):

+CMGR:<stat>,<oa>,<alpha>,<scts>
***[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]*<CR><LF><data>**

In case of Text mode, if there is either a sent or an unsent message in location <**index**> the output format is:

+CMGR:<stat>,<da>,<alpha>
***[,<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]*<CR><LF><data>**

In case of Text mode, if there is a Message Delivery Confirm message in location <**index**> the output format is:

+CMGR: <stat>,<fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st>

Name	Type	Default	Description
<stat>	string	N/A	status of the message
	Values:		
	"REC UNREAD"	:	new received message
	"REC READ"	:	received message read
	"STO UNSENT"	:	message stored not yet sent
	"STO SENT"	:	message stored already sent
<fo>	integer	-	first octet of the message PDU
<mr>	integer	-	message reference number; 3GPP TS 23.040 TP-Message-Reference in integer format
<ra>	string	-	recipient address, represented in the currently selected character set (see **+CSCS**)

<tora>	string	N/A	type of number <**ra**>
			For Verizon FW, the range of <tooa> is 0 - 255.
	Values:		
	129	:	number in national format
	145	:	number in international format (contains the "+")
<scts>	string	-	arrival time of the message to the SC
<dt>	string	-	sending time of the message
<st>	integer	-	message status as coded in the PDU
<pid>	integer	-	Protocol Identifier
<dcs>	integer	-	Data Coding Scheme
<vp>	mixed	-	Validity Period; its format depends on SMS-SUBMIT <**fo**> setting (see **+CPMS**):
			1. Not present: if <**fo**> tells that Validity Period Format is not present
			2. Integer: if <**fo**> tells that Validity Period Format is relative
			3. Quoted time-string type: if <**fo**> tells that Validity Period Format is absolute
			4. Quoted hexadecimal representation of 7 octets: if <**fo**> tells that Validity Period Format is enhanced
<oa>	string	-	Originator address, represented in the currently selected character set (see **+CSCS**).
<da>	string	-	Destination address, represented in the currently selected character set (see **+CSCS**).
<alpha>	string	-	The alphanumeric representation of <**da**> or <**oa**>, corresponding to an entry found in the phonebook; used character set is the one selected with command **+CSCS**.
<sca>	string	-	Service Centre Address
<tooa>	integer	N/A	type of number of <**oa**>
			For Verizon FW, the range of <tooa> is 0 - 255.
	Values:		
	129	:	number in national format
	145	:	number in international format (contains the "+")
<toda>	integer	N/A	type of number of <**da**>
			For Verizon FW, the range of <tooa> is 0 - 255.
	Values:		
	129	:	number in national format
	145	:	number in international format (contains the "+")
<tosca>	integer	-	type of number of <**sca**>
			For Verizon FW, the range of <tooa> is 0 - 255.
<length>	integer	N/A	text length

Values:

129	:	number in national format
145	:	number in international format (contains the "+")

<data>	string	-	TP-User-Data
			If <**dcs**> indicates that 3GPP TS 23.038 default alphabet is used, each character of GSM alphabet will be converted into current TE character set (see **+CSCS**)
			If <**dcs**> indicates that 8-bit or UCS2 data coding scheme is used, each 8-bit octet will be converted into two IRA character long hexadecimal number (e.g. octet 0x2A will be converted as two characters 0x32 0x41)
			If <**fo**> indicates that a UDH is present each 8-bit octet will be converted into two IRA character long hexadecimal number. The <**length**> indicates text length in characters without UDH length.

▶▶In case of 3GPP2 Text mode (see **#SMSFORMAT**), output format for messages (the information written in *italics* will be present depending on **+CSDH** last setting)*:*

Output format for message **Delivery** message is:
+CMGR:
<stat>,<orig_num>,<callback>,<date>*[,<tooa>,<tele_id>,<priority>,<enc_type>,<udh>,<length>]*<CR><LF><data>

If there is either a **Sent** or an **Unsent** message in location <index> the output format is:
+CMGR:
<stat>,<da>,<callback>,*[,<toda>,<tele_id>,<priority>,<enc_type>,<udh>,<length>]*<CR><LF><data>

Name	Type	Default	Description
<stat>	string	N/A	status of the message
		Values:	
	"REC UNREAD"	:	new received message unread
	"REC READ"	:	received message read
	"STO UNSENT"	:	message stored not yet sent
	"STO SENT"	:	message stored already sent
<orig_num>	string	-	Origination number
<callback>	string	-	Callback number
<date>	string	-	Received date in form as "YYYYMMDDHHMMSS"
<tooa/toda>	integer	-	Type of **<orig_num>**/**<da>**.
<tele_id>	integer	N/A	Teleservice ID
		Values:	
	4097	:	page
	4098	:	SMS message

	4099	:	voice mail notification
	4101	:	EMS message(concatenated)
	262144	:	voice mail notification
<priority>	integer	N/A	Priority
	Values:		
	0	:	Normal
	1	:	High
<enc_type>	integer	N/A	Encoding type of message
	Values:		
	0	:	8-bit Octet
	2	:	7-bit ASCII
	4	:	16-bit Unicode
	9	:	GSM 7bit
<udh>	integer	N/A	User data header
	Values:		
	0	:	Not present the user data header
	1	:	Present the user data header
<length>	integer	-	Length of message
<data>	string	-	Message data. (Indicates the new voice mail count, if <tele_id> is voice mail notification)

> ℹ️ Both in PDU and Text Mode, if status of the message was 'received unread' before reading, then status in the storage changes to 'received read'.

? ▢ AT+CMGR=?

Test command returns the **OK** result code

</> Examples for 3GPP2 format SMS.

- PDU Mode:

Case of received message from base station:
AT+CMGR=29
+CMGR: 1,"",51
0681104139430614102315582010020202 0024C3870E1C3870E1C3870E1C3870E1C3870E1C387
0E1C3870E1C3870E1C3870E10
OK

06	\<addr_len: 6byte>
81	\<type_addr: 129>
1041394306	\<Origination number: 0114933460>
141023155820	\<Date: 14/10/23,15:58:20>
1002	\<Teleservice_id: 4098(decimal)>
02	\<priority: urgent >
02	\<encoding_type: 7-bit ASCII >
00	\<udh: Not present user data header >
24	\<data_len: 36 >

C3870E1C3870E1C3870E1C3870E1C3870E1C3870E1C3870E1C3870E10
\<user_data: aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa>

Else:
AT+CMGR=31
+CMGR: 2,"",23
07801091346554F307801091346554F310020000000A61616161616161616161
OK

07	\<addr_len: 7byte>
81	\<type_addr:129>
1091346554F3	\<Destination_addr: 01194356453>
07	\<addr_len: 7byte>
81	\<type_addr:129>
1096224658F1	\<Callback_Number: 01692264851>
1002	\<Teleservice_id: 4098(decimal)>
00	\<priority: normal >
00	\<encoding_type: 8-bit Octet >
00	\<udh: Not present user data header >
0A	\<data_len: 10>
61616161616161616161	\<data: aaaaaaaaaa>

- Text Mode:

AT+CSDH=1
OK
AT+CMGR=1
+CMGR: "REC READ", "0114933460", "01149334690", 20140109180259, 129, 4098,0,2,0,12
TEST MESSAGE
OK
AT+CMGR=4
+CMGR: "STO UNSENT","0114933460","0114933460",,129,4098,0,0,0,12
TEST MESSAGE
OK

3.4.15.   AT+CNMA - New Message Acknowledgement

This command is used to confirm the correct reception of a new message.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CNMA

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

Acknowledge with **+CNMA** is possible only if the **+CSMS** parameter is set to 1 (**+CSMS=1**) when a **+CMT** or **+CDS** indication is shown.

If no acknowledgement is given within the network timeout (17 seconds), an **RP-ERROR** is sent to the network, the <**mt**> and <**ds**> parameters of the **+CNMI** command are then reset to zero (do not show new message indication).

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

The AT command syntax and functionalities are different between SMS PDU Mode and SMS Text Mode, as explained in Additional info sections.

Additional info:

▶▶   PDU Mode

AT+CNMA[=<n>[,<length>[<CR>PDU is given<ctrl-Z/ESC>]]]

Either positive (**RP-ACK**) or negative (**RP-ERROR**) acknowledgement to the network is possible. Parameter <**n**> defines which one will be sent. Optionally (when <**length**> is greater than zero) an acknowledgement TPDU (**SMS-DELIVER-REPORT** for **RP-ACK** or **RP-ERROR**) may be sent to the network. The entering of PDU is done similarly as specified in command Send Message **+CMGS**, except that the SMSC address field is not present.

Name	Type	Default	Description
<n>	integer	N/A	type of acknowledgement in PDU mode
	Values:		
	0	:	send RP-ACK without PDU (same as TEXT mode)
	1	:	send RP-ACK with optional PDU message
	2	:	send RP-ERROR with optional PDU message
<length>	integer	-	length of the PDU message

▶▶   Text Mode

AT+CNMA

Only positive acknowledgement to network (**RP-ACK**) is possible.

AT+CNMA=?

Test command returned information are different between SMS PDU Mode and SMS Text Mode, as explained below.

Additional info:

▶▶ PDU Mode

Test command returns the possible range of values for the parameter <**n**>.

▶▶ Text Mode

Test command returns the **OK** result code.

ℹ️ In case that a directly routed message must be buffered in ME/TA (possible when **+CNMI** parameter <**mode**> equals 0 or 2) or AT interpreter remains too long in a state where result codes cannot be sent to TE (e.g. user is entering a message using **+CMGS**), acknowledgement (RP-ACK) is sent to the network without waiting **+CNMA** command from TE.

</>
- PDU Mode

  AT+CSMS=1
  +CSMS: 1,1,1
  OK

  Set PDU mode.
  AT+CMGF=0
  OK

  AT+CNMI=2,2,0,0,0
  OK

  Message is received from network.
  +CMT: "",70
  068160005854260004809806000F170110370537284...

  Send positive acknowledgement to the network.
  AT+CNMA=0
  OK

  Message is received from network.
  +CMT: "",70
  068160005854260004809806000F170110370537284...

  Send negative acknowledgment (Unspecified error) to the network.
  AT+CNMA=2,3<CR>
  > 00FF00 <Ctrl-Z>
  OK

- Text Mode

  AT+CSMS=1
  +CSMS: 1,1,1
  OK

  Set Text mode.
  AT+CMGF=1
  OK

  AT+CNMI=2,2,0,0,0
  OK

  Message is received from network.
  +CMT: "+821020955219",,"07/07/26,20:09:07+36"
  TEST MESSAGE

  Send positive acknowledgement to the network.
  AT+CNMA
  OK

3.4.16.   AT+CMGS - Send Short Message

The command is related to sending short messages.

3GPP TS 27.005
3GPP TS 23.040
3GPP TS 23.038

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CMGS

Execution command sends a short message to the network. It can have two syntax formats according to the SMS format: PDU or Text mode (see **+CMGF** command). If short message is successfully sent to the network, the result is shown with the following URC:

+CMGS: <mr>[,<scts>]

Additional info:

▶▶ In PDU mode the **+CMGS** command has the following syntax:

AT+CMGS=<length>

After command line is terminated with <CR>, the module responds sending a four-character sequence prompt:

<CR><LF><greater_than><space> (IRA 13, 10, 62, 32)

and waits for the specified number of bytes. the PDU shall be hexadecimal format (each octet of the PDU is given as two IRA character long hexadecimal number) and given in one line.

To send the message issue Ctrl-Z char (0x1A hex). To exit without sending the message issue ESC char (0x1B hex).

Name	Type	Default	Description
<length>	integer	N/A	3GPP format SMS (see #SMSFORMAT):
			length in bytes of the PDU to be sent (excluding the SMSC address octets)
			or 3GPP2 format SMS (see #SMSFORMAT):
			length of the PDU to be sent in bytes (excluding the Destination Address octets)
	Values:		
	7÷164	:	number of bytes for 3GPP format SMS
	5÷183	:	or number of bytes for 3GPP2 format SMS

▶▶ In 3GPP Text mode (see **#SMSFORMAT**) the **+CMGS** command has the following syntax:

AT+CMGS=<da>[,<toda>]

After command line is terminated with <CR>, the module responds sending a four-character sequence prompt:

<CR><LF><greater_than><space> (IRA 13, 10, 62, 32)

After this prompt, you can enter text that should be formatted as follows:

a) If current <**dcs**> (see **+CSMP**) indicates that GSM03.38 default alphabet is used and current <**fo**> (see **+CSMP**) indicates that 3GPP TS 23.040 TP-User-Data-Header-Indication is not set, then ME/TA converts the entered text into GSM alphabet, according to 3GPP TS 27.005, Annex A; backspace can be used to delete last character and carriage returns can be used; after every <CR> entered by the user the sequence <CR><LF><**greater_than**><space> is sent to the TE.

b) If current <**dcs**> (see **+CSMP**) indicates that 8-bit or UCS2 data coding scheme is used or current <**fo**> (see **+CSMP**) indicates that 3GPP TS 23.040 TP-User-Data-Header-Indication is set, the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet (e.g. the 'asterisk' will be entered as 2A (IRA50 and IRA65) and this will be converted to an octet with integer value 0x2A).

To send the message issue Ctrl-Z char (0x1A hex). To exit without sending the message issue ESC char (0x1B hex).

Name	Type	Default	Description
<da>	string	-	destination address, string type represented in the currently selected character set (see **+CSCS**).
<toda>	string	129	type of destination address For Verizon FW, the range of <**toda**> is 0 - 255.

Values:

129 : number in national format

145 : number in international format (contains the "+")

▶▶ In 3GPP2 Text mode (see **#SMSFORMAT**) the **+CMGS** command has the following syntax:

AT+CMGS=<da>[,<toda>]
To send the message issue **Ctrl-Z** char (**0x1A** hex).
To exit without sending the message issue **ESC** char (**0x1B** hex).

Name	Type	Default	Description
<da>	string	-	destination address, string type represented in the currently selected character set (see **+CSCS**);

			ASCII characters in the set (0 9), #,*; Maximum length is 20 characters.
<toda>	integer	129	type of destination address

Values:

129	:	number in national format
145	:	number in international format (contains the "+")

Unsolicited fields:

Name	Type	Description
<mr>	integer	TP-Message-Reference number as per 3GPP TS 23.040
<scts>	string	TP-Service Centre Time Stamp in Time String Format. **<scts>** is returned when **+CSMS** <service> value is 1 and network supports. Note: this field only for 3GPP format SMS

ⓘ The DCD signal shall be in ON state while data is entered. The echoing of data is controlled by echo command **E.**

ⓘ in 3GPP PDU mode (see **#SMSFORMAT**): when the length of the SMSC address equals 0, then the SMSC address set with command **+CSCA** is used; in this case the SMSC Type of Address octet shall not be present in the data.

ⓘ To ensure that during the command execution, which may take several seconds, no other SIM interacting commands issued, care must take.

ⓘ If message sending fails for some reason, then an error code is reported.

ⓘ For 3GPP format SMS, it is possible to send a concatenation of at most 10 SMs; the maximum number of chars depends on the **<dcs>**: 1520 chars if 3GPP TS 23.038 default alphabet is used, 1330 chars if 8-bit is used, 660 chars if UCS2 is used.

For 3GPP2 format SMS, it is possible to send a concatenation of at most 10 SMs in Verizon Network. For sending a concatenation message, the teleservice ID should be set to 4101 and the data coding scheme should be set to 9.

ⓘ Send a 3GPP format SMS can be aborted.

AT+CMGS=?

Test command returns the **OK** result code.

To avoid malfunctions it is suggested to wait for the **+CMGS: <mr>** or **+CMS ERROR: <err>** response before issuing further commands.

- Examples for 3GPP FORMAT SMS

  <u>PDU mode</u>
  AT+CMGF=0

  AT+CMGS=18
  > 08812801009901025911550781102090551 2F90000A704F4F29C0E
  +CMGS: 124
  OK

  <u>Text mode</u>
  AT+CMGF=1
  OK

  AT+CSMP=17,167,0,0
  OK

  AT+CMGS="01090255219",129
  >TEST MESSAGE
  +CMGS:125
  OK

- Examples for 3GPP2 FORMAT SMS

  <u>PDU mode</u>
  AT+CMGF=0
  OK

  AT+CMGS=36
  >07811091346554F307811096224658F11002000000166262626262626262626262626262626262626262626262626262
  +CMGS: 4
  OK

07	<addr_len: 7byte>
81	<type_addr: 129>
1091346554F3	<Destination_address:01194356453>
07	<addr_len: 7byte>
81	<type_addr: 129>
1096224658F1	<callback_address:01692264851>
1002	<Teleservice_id: 4098(decimal)>
00	<priority: normal >
00	<encoding_type: octet >
00	<udh: Not present user data header >
16	<data_len: 22>
6262626262626262626262626262626262626262626262	<user_data: bbbbbbbbbbbbbbbbbbbbbb>

  AT+CMGS=32
  >07811091346554F307811091346554F3100202020014C3870E1C3870E1C387162C58B162C58B1620
  +CMGS: 3
  OK

07	\<addr_len: 7byte\>
81	\<type_addr: 129\>
1091346554F3	\<destination_address:01194356453\>
07	\<addr_len: 7byte\>
81	\<type_addr: 129\>
1091346554F3	\<callback_address: 01194356453\>
1002	\<Teleservice_id: 4098(decimal)\>
02	\<priority: ungent \>
02	\<encoding_type: 7-bit ASCII \>
00	\<udh: Not present user data header \>
14	\<data_len: 20\>
C3870E1C3870E1C387162C58B162C58B1620	\<user_data: aaaaaaaaaabbbbbbbbbb\>

If user data header\<udh\> is present,
  If encoding type is 7bit ASCII,
    \<data_len\> value is the sum of the number of septets in user data and the number of septets in user data header (including any padding).
  Otherwise,
    \<data_len\> value is the sum of the number of octets in user data and the number of octets in user data header.
If user data header\<udh\> is not present,
  If encoding type is 7bit ASCII,
    \<data_len\> value is the number of septets in user data.
  Otherwise,
    \<data_len\> value is the number of octets in user data.

Text mode
AT+CMGF=1
OK

AT+CMGS="9194547830"
> Test SMS
+CMGS: 1
OK

3.4.17. AT+CMSS - Send Message from Storage

This command sends to the network a message which is already stored in the **<memw>** storage.

🎯 3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CMSS=<index>[,<da>[,<toda>]]

Execution command sends to the network a message which is already stored in the **<memw>** storage (see **+CPMS**) at the location **<index>**.

Parameters:

Name	Type	Default	Description
<index>	string	-	location value in the message storage **<memw>** of the message to send
<da>	string	-	destination address, string type represented in the currently selected character set (see **+CSCS**); if it is given it shall be used instead of the one stored with the message.
<toda>	integer	N/A	type of destination address For Verizon FW, the range of **<toda>** is 0 - 255 (3GPP format).

Values:

129 : number in national format

145 : number in international format (contains the "+")

Additional info:

▶▶ If message is successfully sent to the network, then the result is sent in the format:
+CMSS: <mr>

Name	Type	Default	Description
<mr>	integer	-	message reference number

▶▶ If message sending fails for some reason, an error code is reported:
+CMS ERROR:<err>

ℹ To store a message in the **<memw>** storage see command **+CMGW**.

ℹ Care must be taken to ensure that during the command execution, which may take several seconds, no other SIM interacting commands are issued.

ℹ Send a 3GPP format SMS can be aborted.

AT+CMSS=?

Test command returns the **OK** result code.

To avoid malfunctions is suggested to wait for the **+CMSS: <mr>** or **+CMS ERROR: <err>** response before issuing further commands.

3.4.18.   AT+CMGW - Write Short Message to Memory

The command is related to writing short messages.

3GPP TS 27.005
3GPP TS 23.040
3GPP TS 23.038

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CMGW

Execution command writes a new short message in the **<memw>** memory storage (see **+CPMS**). It can have two syntax formats according to the SMS format: PDU or Text mode (see **+CMGF** command). If short message is successfully written the following URC is displayed:

+CMGW: <index>

Additional info:

▶▶ In 3GPP/3GPP2 PDU mode (see **#SMSFORMAT**) the **+CMGW** command has the following syntax:

AT+CMGW=<length>[,<stat>]

After command line is terminated with <CR>, the module responds sending a four-character sequence prompt:

<CR><LF><greater_than><space> (IRA 13, 10, 62, 32)

and waits for the specified number of bytes.
To write the message issue Ctrl-Z char (0x1A hex). To exit without sending the message issue ESC char (0x1B hex).

Name	Type	Default	Description
<length>	integer	N/A	3GPP format SMS (see #SMSFORMAT): length in bytes of the PDU to be written
			or 3GPP2 format SMS (see #SMSFORMAT): length of the PDU to be sent in bytes (excluding the Destination Address octets)
	Values:		
	7÷164	:	number of bytes for 3GPP format SMS
	5÷183	:	or number of bytes for 3GPP2 format SMS
<stat>	integer	N/A	message status
	Values:		

0	:	new message (received unread message; default for DELIVER messages (3GPP TS 23.040 SMS-DELIVER messages))
1	:	read message
2	:	stored message not sent yet (default for SUBMIT messages (3GPP TS 23.040 SMS-SUBMIT messages))
3	:	stored message already sent

<data>	hex	-	PDU bytes, given in online mode

▶▶ In 3GPP Text mode (see **#SMSFORMAT**) the **+CMGW** command has the following syntax:

AT+CMGW[=<da>[,<toda>[,<stat>]]]

After command line is terminated with <CR>, the module responds sending a four-character sequence prompt:

<CR><LF><greater_than><space> (IRA 13, 10, 62, 32)

After this prompt, you can enter text that should be formatted as follows:

a) If current **<dcs>** (see **+CSMP**) indicates that GSM03.38/23.038 default alphabet is used and current **<fo>** (see **+CSMP**) indicates that 3GPP TS 03.40/23.040 TP-User-Data-Header-Indication is not set, then ME/TA converts the entered text into GSM alphabet, according to 3GPP TS 27.005, Annex A; backspace can be used to delete last character and carriage returns can be used.

b) If current **<dcs>** (see **+CSMP**) indicates that 8-bit or UCS2 data coding scheme is used or current **<fo>** (see **+CSMP**) indicates that 3GPP TS 23.040 TP-User-Data-Header-Indication is set, the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet (e.g. the 'asterisk' will be entered as 2A (IRA50 and IRA65) and this will be converted to an octet with integer value 0x2A).

The command waits for the specified number of bytes.

To write the message issue Ctrl-Z char (0x1A hex). To exit without writing the message issue ESC char (0x1B hex).

Name	Type	Default	Description
<da>	string	-	destination address, string type represented in the currently selected character set (see **+CSCS**).
<toda>	integer	N/A	type of destination address
			For Verizon FW, the range of **<toda>** is 0 - 255.
	Values:		
	129	:	number in national format
	145	:	number in international format (contains the "+")
<stat>	string	"STO UNSENT"	message status
	Values:		

"REC UNREAD"	:	new received message unread
"REC READ"	:	received message read
"STO UNSENT"	:	message stored not yet sent
"STO SENT"	:	message stored already sent

▶▶ In 3GPP2 Text mode (see **#SMSFORMAT**) the **+CMGW** command has the following syntax:

AT+CMGW[=<da>[,<toda>[,<stat>]]]

After command line is terminated with **<CR>**, the device responds sending a four character sequence prompt:
<CR><LF><greater_than><space> (IRA 13, 10, 62, 32)
To write the message issue **Ctrl-Z** char (**0x1A** hex).
To exit without writing the message issue **ESC** char (**0x1B** hex).

Name	Type	Default	Description
<da>	string	-	destination address, string type represented in the currently selected character set (see **+CSCS**); ASCII characters in the set (0 9), #,*; Maximum length is 20 characters.
<toda>	integer	N/A	type of destination address
		Values:	
	129	:	number in national format
	145	:	number in international format (contains the "+")
<stat>	string	"STO UNSENT"	message status
		Values:	
	"REC UNREAD"	:	new received message unread
	"REC READ"	:	received message read
	"STO UNSENT"	:	message stored not yet sent
	"STO SENT"	:	message stored already sent

Unsolicited field:

Name	Type	Description
<index>	integer	message location index in the memory **<memw>** (see **+CPMS**). If message storing fails for some reason, an error code is reported.

ℹ The DCD signal shall be in ON state while **<data>** is entered. The echoing of **<data>** is controlled by echo command **E.**

In 3GPP PDU mode, not only SUBMIT messages can be stored in SIM, but also DELIVER and STATUS REPORT messages (3GPP TS 23.040 SMS-STATUS-REPORT messages). SUBMIT messages can only be stored with status 2 or 3; DELIVER and STATUS REPORT messages can only be stored with status 0 or 1.

Care must be taken to ensure that during the command execution, which may take several seconds, no other SIM interacting commands are issued.

In text mode, not only SUBMIT messages can be stored in SIM, but also DELIVER messages.

For 3GPP format SMS, the type of saved message depends upon the current **<fo>** parameter (see **+CSMP**). For a DELIVER message, current <**vp**> parameter (see **+CSMP**) is used to set the message Service Centre Time Stamp <**scts**>, so it must be an absolute time string, e.g. "09/01/12,11:15:00+04".

SUBMIT messages can only be stored with status "STO UNSENT" or "STO SENT"; DELIVER messages can only be stored with status "REC UNREAD" or "REC READ".

If message writing fails for some reason, then an error code is reported.

For 3GPP format SMS, it is possible to save a concatenation of at most 10 SMS; the maximum number of chars depends on the **<dcs>**: 1520 chars if 3GPP TS 23.038 default alphabet is used, 1330 chars if 8-bit is used, 660 chars if UCS2 is used.

For 3GPP2 format SMS, it is possible to save a concatenation of at most 10 SMS if the operator is Verizon. For saving a concatenation message, the teleservice ID should be set to 4101 and the data coding scheme should be set to 9.

AT+CMGW=?

Test command returns the **OK** result code.

To avoid malfunctions it is suggested to wait for the **+CMGW: <index>** or **+CMS ERROR: <err>** response before issuing further commands.

- Examples for 3GPP Format SMS

    <u>PDU mode</u>
    AT+CMGF=0
    OK

    AT+CMGW=18
    > 08812801009901025911550781102090551 2F90000A704F4F29C0E
    +CMGW: 29
    OK

    <u>Text mode</u>
    AT+CMGF=1
    OK

    AT+CSMP=17,167,0,0
    OK

    AT+CSCA="821029190903",145
    OK

    AT+CMGW="0165872928"
    > test message...
    +CMGW: 28
    OK

- Examples for 3GPP2 Format SMS

    <u>PDU mode</u>
    AT+CMGF=0
    OK

    AT+CMGW=36
    >07811091346554F307811096224658F11002000000166262626262626262626262626262626262
    6262626262
    +CMGW: 4
    OK

07	<addr_len: 7byte>
81	<type_addr: 129>
1091346554F3	<Destination_address: 01194356453>
07	<addr_len: 7byte>
81	<type_addr: 129>
1096224658F1	<callback_address: 01692264851>
1002	<Teleservice_id: 4098(decimal)>
00	<priority: normal >
00	<encoding_type: octet >
00	<udh: Not present user data header >
16	<data_len: 22>
6262626262626262626262626262626262626262626262	<user_data: bbbbbbbbbbbbbbbbbbbbbb>

    Note:
    If user data header**<udh>** is present,

If encoding type is 7bit ASCII,

   <data_len> value is the sum of the number of septets in user data and the number of septets in user data header (including any padding).

  Otherwise,

   <data_len> value is the sum of the number of octets in user data and the number of octets in user data header.

If user data header**<udh>** is not present,

  If encoding type is 7bit ASCII,

   <data_len> value is the number of septets in user data.

  Otherwise,

   <data_len> value is the number of octets in user data.

<u>Text mode</u>
AT+CMGW=?
OK

AT+CMGF=1
OK

AT+CMGW
> Test message
> Ctrl+Z must be used to write message
+CMGW: 1
OK

AT+CMGW="9194397977"
> Test SMS
+CMGW: 2
OK

AT+CMGW="9194397977",129
> Test SMS
+CMGW: 3
OK

3.4.19. AT+CMGD - Delete Message

This command allows to delete from memory messages.

3GPP TS 27.005

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CMGD=<index>[,<delflag>]

Execution command deletes SMS message(s) from a selected memory storage. Storage is selected by command **+CPMS**.

Parameters:

Name	Type	Default	Description
<index>	integer	-	Message index in the selected storage; it can have values form 1 to N, where N depends on the available space in the selected storage (see **+CPMS**)
<delflag>	integer	0	Type of multiple message deletion

Values:

0 : delete message specified in <index>

1 : delete all read messages from selected storage, leaving unread messages and stored mobile originated messages (whether sent or not) untouched

2 : delete all read messages from selected storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched

3 : delete all read messages from selected storage, sent and unsent mobile originated messages, leaving unread messages untouched

4 : delete all messages from selected storage.

🛈 If **<delflag>** is present and not set to 0 then, if **<index>** is greater than 0, **<index>** is ignored and the command follows the rules for **<delflag>** shown above.

🛈 In case of Verizon FW, delete an empty slot with specified **<index>** will return +CMS ERROR: 321 or ERROR.

AT+CMGD=?

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

AT+CMGD=?
+CMGD: (1,2,3,6,7,17,18,19,20,37,38,39,47),(0-4)
OK

3.4.20.   AT#SMSFORMAT - Select 3GPP or 3GPP2 Format for MO SMS

This command selects the 3GPP or 3GPP2 format for MO SMS.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT#SMSFORMAT=[<mode>]

Set command selects the 3GPP or 3GPP2 format for MO SMS.

Parameter:

Name	Type	Default	Description
<mode>	integer	N/A	MO SMS format

Values:

    0 : 3GPP format (factory default)

    1 : 3GPP2 format

AT#SMSFORMAT?

Read command reports the current setting of parameter <**mode**>, in the format:

#SMSFORMAT: <mode>

AT#SMSFORMAT=?

Test command returns the supported range of values for parameter <**mode**>.

3.4.21.   AT#ISMSCFG - SMS Transport Configuration

This command changes the configuration parameter for outgoing SMS.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#ISMSCFG=[<mode>]

Set command changes the configuration parameter for outgoing SMS, which will be used to route the outgoing SMS either over CPS or over IMS (IP Multimedia Core Network Subsystem).

Parameter:

Name	Type	Default	Description
<mode>	integer	1	mode to invoke SMS service

Values:

0   :   SMS service is not to be invoked over the IP networks

1   :   SMS service is preferred to be invoked over the IP networks

AT#ISMSCFG?

Read command returns the current domain selected to route the outgoing SMS in the format:

#ISMSCFG: <mode>

AT#ISMSCFG=?

Test command returns the supported range of values for parameter <**mode**>, in the format:

#ISMSCFG: (list of supported **<mode>**s)

3.4.22. AT+C5GSMS - 5GS access selection preference for MO SMS

5GS access selection preference for MO SMS

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+C5GSMS=[<access_pref>]
The set command is used to specify the access preference that the MT will use to send MO SMS over NAS messages in 5GS.

Parameter:

Name	Type	Default	Description
<access_pref>	integer	0	indicates the access preference to use to send MO SMS over NAS messages.

Values:

0 : 3GPP access preferred, non-3GPP access is used if 3GPP access is not available

1 : non-3GPP access preferred, 3GPP access is used if non-3GPP access is not available

AT+C5GSMS?
The read command returns the currently selected access preference.
+C5GSMS: <access_pref>

AT+C5GSMS=?
The test command returns the supported access preferences as a compound value.

3.4.23.   AT+C5GUSMS - 5GS use of SMS over NAS

5GS use of SMS over NAS

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+C5GUSMS=[<n>[,<sms_requested>]]

The set command enables the UE to request the use of SMS over NAS in 5GS or to request stopping the use of SMS over NAS in 5GS

Parameters:

Name	Type	Default	Description
<n>	integer	0	enable/disable unsolicited result code.
			Values:
	0	:	no change in current setting of <n>
	1	:	disable unsolicited result code +C5GUSMS: <sms_available>,<sms_allowed>
	2	:	enable unsolicited result code +C5GUSMS: <sms_available>,<sms_allowed>
<sms_requested>	integer	0	indicates the UE's request for SMS over NAS in 5GS.
			Values:
	0	:	triggers the UE to request the use of SMS over NAS in 5GS
	1	:	triggers the UE to request stopping the use of SMS over NAS in 5GS

Additional info:

▶▶ The set command controls the presentation of the unsolicited result code **+C5GUSMS: <sms_available>,<sms_allowed>** when **<n>=2** and SMS over NAS in 5GS allowed status information or SMS over NAS in 5GS availability status information is received from the network, for the UE (see 3GPP TS 24.501 [161] subclauses 5.4.4.3, 5.5.1.2.4 and 5.5.1.3.4).

AT+C5GUSMS?

The read command returns the current SMS over NAS in 5GS availability status for the UE and the current SMS over NAS in 5GS allowed status for the UE.

Additional info:

▶▶ **+C5GUSMS: <sms_available>,<sms_allowed>**

Name	Type	Default	Description

<sms_available>	integer	N/A	indicates the current SMS over NAS in 5GS availability status for the UE in the network

Values:

0 : indicates that the SMS over NAS in 5GS availability status for the UE is unknown

1 : indicates that SMS over NAS in 5GS is not available in the network for the UE (see 3GPP TS 24.501 [161] subclause 5.4.4.3)

2 : indicates that SMS over NAS in 5GS is available in the network for the UE (see 3GPP TS 24.501 [161] subclause 5.4.4.3)

<sms_allowed>	integer	N/A	indicates the current SMS over NAS in 5GS allowed status for UE in the network.

Values:

0 : indicates that SMS over NAS in 5GS allowed status for the UE is unknown

1 : indicates that the UE is not allowed by the network to use SMS over NAS in 5GS (see 3GPP TS 24.501 [161] subclauses 5.4.4.3, 5.5.1.2.4 and 5.5.1.3.4)

2 : indicates that the UE is allowed by the network to use SMS over NAS in 5GS (see 3GPP TS 24.501 [161] subclauses 5.5.1.2.4 and 5.5.1.3.4)

AT+C5GUSMS=?

The test command returns the values supported as compound values.

3.5. Time & Alarm

3.5.1. AT+CCLK - Clock Management

The command is related to real time clock management.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT+CCLK=<time>

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

Parameter:

Name	Type	Default	Description
<time>	string	N/A	Current time as quoted string in the format: **"yy/MM/dd,hh:mm:ss±zz"**

Values:

yy	:	year (two last digits are mandatory), range is 00..99
MM	:	month (two digits are mandatory), range is 01..12
dd	:	day (two digits are mandatory) The range for dd(day) depends either on the month and on the year it refers to. Available ranges are: (01..28) (01..29) (01..30) (01..31). Trying to enter an out of range value will raise an ERROR message.
hh	:	hour (two digits are mandatory), range is 00..23
mm	:	minute (two digits are mandatory), range is 00..59
ss	:	seconds (two digits are mandatory), range is 00..59
±zz	:	time zone (indicates the difference, expressed in quarter of an hour, between the local time and GMT; two digits are mandatory), range is -96...+96

AT+CCLK?

Read command returns the current setting **<time>** of the real-time clock, in the format:

+CCLK: <time>

> The three last characters of **<time>**, i.e. the time zone information, are returned by **AT+CCLK?** only if the **#NITZ** URC *'extended'* format has been enabled (see **#NITZ**).

AT+CCLK=?

Test command returns the **OK** result code.

Set date and time:
AT+CCLK="02/09/07,22:30:00+00"
OK

Read date and time:
AT+CCLK?
+CCLK: "02/09/07,22:30:25"
OK

3.5.2.   AT#UPTIME - System Up Time

This command returns elapsed time from system up.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#UPTIME=<format>

This command returns elapsed time from system up according to format setting.

Parameter:

Name	Type	Default	Description
<format>	integer	N/A	time format

Values:

0   :   sec unit

1   :   time unit

AT#UPTIME=?

Test command return all support value of the parameters **<format>**.

3.5.3. AT+CSDF - Setting Date Format

This command sets the date format of the date information presented to the user.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CSDF=[<mode>[,<auxmode>]]

This command sets the date format of the date information presented to the user, which is specified by use of the **<mode>** parameter. The **<mode>** affects the date format on the phone display and doesn't affect the date format of the AT command serial interface, so it has no effect on our device.

The command also sets the date format of the TE-TA interface, which is specified by use of the **<auxmode>** parameter (i.e., the **<auxmode>** affects the <**time**> of **+CCLK**).

Parameters:

Name	Type	Default	Description
<mode>	integer	1	phone display data format.
	Values:		
	1 : DD-MMM-YYYY		
	2 : DD-MM-YY		
	3 : MM/DD/YY		
	4 : DD/MM/YY		
	5 : DD.MM.YY		
	6 : YYMMDD		
	7 : YY-MM-DD		
<auxmode>	integer	1	TE-TA interface data format.
	Values:		
	1 : yy/MM/dd		
	2 : yyyy/MM/dd		

> The **<time>** format of **+CCLK** and **+CALA** is:
> 47. "yy/MM/dd,hh:mm:ss+zz" when **<auxmode>**=1
> 48. "yyyy/MM/dd,hh:mm:ss+zz" when **<auxmode>**=2

> If the parameters are omitted (**AT+CSDF=**), then this command sets the default value of **<mode>**.

AT+CSDF?

Read command reports the currently selected **<mode>** and **<auxmode>** in the format:

+CSDF: <mode>,<auxmode>

AT+CSDF=?

Test command reports the supported range of values for parameters **<mode>** and **<auxmode>**.

- **AT+CSDF?**
  +CSDF: 1,1
  OK

  AT+CCLK?
  +CCLK: "00/01/02,03:42:08+00"
  OK

- **AT+CSDF=1,2**
  OK

  AT+CCLK?
  +CCLK: "2000/01/02,03:42:23+00"
  OK

3.5.4. AT+CTZR - Time Zone Reporting

This command enables and disables the time zone change event reporting.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CTZR=<reporting>

Set command permits to enable/disable the time zone change event reporting.

If the reporting is enabled and whenever the time zone is changed, the MT returns the unsolicited result code:

<reporting> : 1
+CTZV: <tz>

<reporting> : 2
+CTZV: <tz>,<dst>,[<time>]

Parameter:

Name	Type	Default	Description
<reporting>	integer	0	enable/disable the time zone change event reporting.

Values:

0 : Disable time zone change event reporting

1 : Enable time zone change event reporting

2 : Enable extended time zone change event reporting

Unsolicited fields:

Name	Type	Description
<tz>	string	New time zone.
<dst>	integer	Daylight Saving Time

Values:

0 : <tz> includes no adjustment for Daylight Saving Time

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

2 : <tz> includes +2 hours (equals 8 quarters in <tz>) adjustment for daylight saving time

Name	Type	Description
<time>	string	string type value representing the local time. The format is "YYYY/MM/DD,hh:mm:ss". This parameter can be provided by the network.

AT+CTZR?

Read command reports the currently selected **<reporting>** in the format:

+CTZR: <reporting>

AT+CTZR=?

Test command reports the supported range of values for parameter **<reporting>**

3.5.5. AT+CTZU - Automatic Time Zone Update

Set command enables/disables the automatic time zone update via NITZ.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CTZU=<onoff>

Parameter:

Name	Type	Default	Description
<onoff>	integer	0	enables/disables the automatic time zone update via NITZ

Values:

0 : disable

1 : enable

ℹ The command **+CTZU** is the ETSI standard equivalent of Telit custom command **#NITZ** (for the date and time update functionality).

ℹ Despite of the name, the command **+CTZU** enables automatic update of the date and time set by **+CCLK** command (not only time zone). This happens when a Network Identity and Time Zone (NITZ) message is sent by the network.

If the automatic date and time update functionality has been enabled by **+CTZU** or **#NITZ** (or both), NITZ message will cause a date and time update.

AT+CTZU?

Read command reports the current setting of <**onoff**> in the format:

+CTZU: <onoff>

AT+CTZU=?

Test command returns the supported values of parameter <**onoff**>.

3.5.6.   AT+CSTF - Setting Time Format

Set command sets the time format of the time information presented to the user.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CSTF=[<mode>]

This command sets the time format of the time information presented to the user, which is specified by use of the **<mode>** parameter. The **<mode>** affects the time format on the phone display and doesn't affect the time format of the AT command serial interface, so it not actually not used.

Parameter:

Name	Type	Default	Description
<mode>	integer	1	phone display time format

Values:

1 : [hh]:[mm] (24 hour clock)

2 : [hh]:[mm] (a.m./p.m.)

ℹ Entering **AT+CSTF=** returns **OK** but has no effect.

AT+CSTF?

Read command reports the currently selected <mode> in the format:

+CSTF: <**mode**>.

AT+CSTF=?

Test command reports the supported range of values for parameter <**mode**>.

3.5.7. AT#NITZ - Network Identity and Time Zone

This command handles Network Identity and Time Zone.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT#NITZ=[<val>[,<mode>]]

Set command enables/disables the automatic date/time updating and the Full Network Name applying. It enables also the **#NITZ** URC in the format:

#NITZ: <datetime>

and permits to change its format.

Parameters:

Name	Type	Default	Description
<val>	integer	7	identifies the functionalities to enable. The **<val>** parameter is a sum of integer values, where every value corresponds to a functionality:
			49. 1 - enables automatic date/time updating
			50. 2 - enables Full Network Name applying
			51. 4 - sets the **#NITZ** URC 'extended' format (see **<datetime>** below)
			52. 8 - sets the **#NITZ** URC 'extended' format with Daylight Saving Time (DST) support (see **<datetime>** below)
			Values:
		0	: disables every functionality
		1÷15	: sum of integer values
<mode>	integer	0	enables/disables the **#NITZ** URC
			Values:
		0	: disables the URC
		1	: enables the URC

Unsolicited field:

Name	Type	Description
<datetime>	string	string format depends on parameter <val>
		53. **"yy/MM/dd,hh:mm:ss"** - *'basic'* format, if **<val>** is in (0..3)
		54. **"yy/MM/dd,hh:mm:ss±zz"** - *'extended'* format, if **<val>** is in (4..7)
		55. **"yy/MM/dd,hh:mm:ss±zz,d"** - *'extended'* format with DST support, if **<val>** is in (8..15)
		For the meaning of the **<datetime>** subfields, please check **+CCLK** and **#CCLK** commands

ℹ️ If the DST information isn't sent by the network, then the <**datetime**> parameter will have the format **"yy/MM/dd,hh:mm:ss±zz"**.

ℹ️ Date and time information can be sent by the network after GSM registration or after PS attach.

AT#NITZ?

Read command reports whether

56. automatic date/time updating
57. Full Network Name applying
58. **#NITZ** URC (as well as its format)

are currently enabled or not in the format:

#NITZ: <val>,<mode>

AT#NITZ=?

Test command returns supported values of parameters <**val**> and <**mode**>.

3.6. Phonebook

3.6.1. AT+CPBS - Select Phonebook Memory Storage

This command selects phonebook memory storage, which is used by other phonebook commands.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CPBS=<storage>[,<password>]

Set command selects phonebook memory storage, which is used by other phonebook commands.

Parameters:

Name	Type	Default	Description
<storage>	string	"SM"	the phonebook memory storage

Values:

"SM" : SIM phonebook

"FD" : SIM fixed dialing-phonebook (FDN) (only phase 2/2+ SIM)

"LD" : SIM last-dialing-phonebook (+CPBF is not applicable for this storage)

"MC" : device missed (unanswered received) calls list (+CPBF is not applicable for this storage)

"RC" : ME received calls list (+CPBF is not applicable for this storage)

"MB" : mailbox numbers stored on SIM; it is possible to select this storage only if the mailbox service is provided by the SIM (see #MBN)

"DC" : ME last-dialing-phonebook (+CPBF is not applicable for this storage)

"ME" : ME phonebook

"EN" : SIM emergency numbers phonebook (+CPBW and +CPBF not applicable for this storage)

"ON" : SIM own numbers (MSISDNs) phonebook (+CPBF is not applicable for this storage)

"SD" : SIM Service Dialing Numbers (SDN) phonebook (+CPBW is not applicable for this storage)

<password>	string	-	the PIN2-code required when selecting PIN2-code locked <**storage**>s above "FD"; If <**password**> parameter is given, PIN2 will be verified, even if it is not required, i.e. PIN2 is verified even if it has already been inserted and verified during current session.

ℹ️ If "SM" is the currently selected phonebook, selecting "FD" phonebook with **AT+CPBS="FD"** command simply selects the FDN as the phonebook upon which all subsequent **+CPBW**, **+CPBF** and **+CPBR** commands act. The command does not deactivate "SM" phonebook and does not activate FDN.

AT+CPBS?

Read command returns currently selected memory <**storage**>, number of used locations <**used**> and total number of locations <**total**> in the memory, in the format:

+CPBS: <storage>,<used>,<total>

ℹ️ For <**storage**>="MC": if there are more than one missed call from the same number the read command will return only the last call.

AT+CPBS=?

Test command returns the supported range of values for the parameter <**storage**>.

Current phonebook storage is SIM.
AT+CPBS="SM"
OK
AT+CPBR=1
+CPBR: 1,"0105872928",129,"James"
OK

3.6.2. AT+CPBR - Read Phonebook Entries

The command reads phonebook entries.

🎯 3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CPBR=<index1>[,<index2>]

Execution command returns phonebook entries in location number range **<index1>**...**<index2>** from the current phonebook memory storage selected with **+CPBS**. If <**index2**> is left out, only location <**index1**> is returned.

The response format is:
[+CPBR:<index1>,<number>,<type>,<text>[,<group>][,<adnumber>][,<adtype>][,<secondtext>][,<email>]]

...

[<CR><LF>+CPBR:<index2>,<number>,<type>,<text>[,<group>][,<adnumber>] [,<adtype>][,<secondtext>][,<email>]]]

Parameters:

Name	Type	Default	Description
<index1>	integer	-	value in the range of location numbers of the currently selected phonebook memory (see **+CPBS**)
<index2>	integer	-	value in the range of location numbers of the currently selected phonebook memory (see **+CPBS**)

Additional info:

▶▶ response parameters

Name	Type	Default	Description
<indexn>	integer	-	the location numbers of phonebook memory
<number>	string	-	phone number of format <**type**>
<type>	integer	N/A	type of address octet
			Values:
			129 : national numbering scheme
			145 : international numbering scheme (contains the character "+")
<text>	string	-	the alphanumeric text associated with the number; character set as specified by command select TE character set **+CSCS**
<group>	string	-	indicating a group the entry may belong to; character set as specified by command select TE character set **+CSCS**

\<adnumber\>	string	-	an additional phone number of format **\<adtype\>**
\<adtype\>	integer	-	type of address octet
\<secondtext\>	string	-	second text field associated with the number; character set as specified by command select TE character set **+CSCS**
\<email\>	string	-	email field; character set as specified by command select TE character set **+CSCS**

ℹ️ If "MC" is the currently selected phonebook memory storage, a sequence of missed calls coming from the same number will be saved as one missed call and **+CPBR** will show just one line of information.

ℹ️ If all queried locations are empty (but available), no information text lines may be returned. If listing fails in an MT error, **+CME ERROR: \<err\>** is returned.

AT+CPBR=?

Test command returns location range supported by the current storage as a compound value and the maximum lengths of \<**number**\>, \<**text**\>, \<**group**\>, \<**secondtext**\> and \<**email**\>, in the format:

+CPBR: (\<minIndex\> - \<maxIndex\>),\<nlength\>,\<tlength\>,\<glength\>,\<slength\>,\<elength\>

Additional info:

▶▶ response parameters

Name	Type	Default	Description
\<minIndex\>	integer	-	the minimum \<**index**\> number
\<maxIndex\>	integer	-	the maximum \<**index**\> number
\<nlength\>	integer	-	the maximum length of field \<**number**\>
\<tlength\>	integer	-	the maximum length of field \<**text**\>
\<glength\>	integer	-	the maximum length of field \<**group**\>
\<slength\>	integer	-	the maximum length of field \<**secondtext**\>
\<elength\>	integer	-	the maximum length of field \<**email**\>

ℹ️ The value of \<nlength\> could vary, depending on the availability of Extension service, in the following situations:
1. if "SM" memory storage has been selected (see **+CPBS**) and the SIM supports the Extension1 service
2. if "FD" memory storage has been selected (see **+CPBS**) and the SIM supports the Extension2 service
3. if "MB" memory storage has been selected (see **+CPBS**) and the SIM supports the Extension6 service

Remember to select the PB storage with **+CPBS** command before issuing PB commands.

```
AT+CPBS="ME"
OK
AT+CPBS?
+CPBS: "ME",1,100

OK
AT+CPBR=?
+CPBR: (1-100),40,255

OK
AT+CPBR=1
+CPBR: 1,"01048771234",129,"James"

OK
```

3.6.3.   AT+CPBF - Find Phonebook Entries

This command search phonebook record from the current phonebook memory storage selected with **+CPBS**.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Other	No	-	2

AT+CPBF=<findtext>

Execution command returns phonebook entries (from the current phonebook memory storage selected with **+CPBS**) which alphanumeric field start with string <**findtext**>.

Parameter:

Name	Type	Default	Description
<findtext>	string	-	string to be searched among the phonebook entries; character set as specified by command select TE character set **+CSCS**

Additional info:

▶▶ This command returns the response in the following format:

[+CPBF:<index1>,<number>,<type>,<text>[,<group>][,<adnumber>] [,<adtype>][,<secondtext>][,<email>]<CR><LF>
+CPBF:<index2>,<number>,<type>,<text>[,<group>][,<adnumber>] [,<adtype>][,<secondtext>][,<email>][...]]]

Name	Type	Default	Description
<indexn>	integer	-	the location number of the phonebook entry
<number>	string	-	phone number of format <**type**>
<type>	integer	N/A	type of address octet
	Values:		
	129	:	national numbering scheme
	145	:	international numbering scheme (contains the character "+")
<text>	string	-	the alphanumeric text associated with the number; character set as specified by command select TE character set **+CSCS**
<group>	string	-	a group the entry may belong to; character set as specified by command select TE character set **+CSCS**
<adnumber>	string	-	an additional number of format <**adtype**>
<adtype>	integer	-	type of address octet
<secondtext>	string	-	a second text field associated with the number; character set as specified by command select TE character set **+CSCS**

\<email\>	string	-	an email field; character set as specified by command select TE character set **+CSCS**

ℹ **+CPBF** is not applicable if the current selected storage (see **+CPBS**) is either "MC", "RC" or "LD".

ℹ If \<**findtext**\>="", the command returns all the phonebook records.

ℹ If no PB records satisfy the search criteria, then an **ERROR** message is reported.

AT+CPBF=?

Test command returns the maximum lengths of \<**number**\>, \<**text**\>, \<**group**\>, \<**secondtext**\> and \<**email**\>, in the format:

+CPBF: \<nlength\>,\<tlength\>,\<glength\>,\<slength\>,\<elength\>

Additional info:

▶▶ response parameters

Name	Type	Default	Description
\<nlength\>	integer	-	the maximum length of field \<**number**\>
\<tlength\>	integer	-	the maximum length of field \<**text**\>
\<glength\>	integer	-	the maximum length of field \<**group**\>
\<slength\>	integer	-	the maximum length of field \<**secondtext**\>
\<elength\>	integer	-	the maximum length of field \<**email**\>

ℹ The value of \<**nlength**\> could vary, depending on the availability of Extension service, in the following situations:
1. if "SM" memory storage has been selected (see **+CPBS**) and the SIM supports the **Extension1** service
2. if "FD" memory storage has been selected (see **+CPBS**) and the SIM supports the **Extension2** service
3. if "MB" memory storage has been selected (see **+CPBS**) and the SIM supports the **Extension6** service

Remember to select the PB storage with **+CPBS** command before issuing PB commands.

Selecting phonebook
AT+CPBS="ME"
OK

Searching for string "J"
AT+CPBF="J"
+CPBF: 1,"01048771234",129,"James"
+CPBF: 2,"0169998888",129,"Jane"
OK

Searching for everything in phone book, and finding all entries
AT+CPBF=""
+CPBF: 1,"01048771234",129,"James"
+CPBF: 2,"0169998888",129,"Jane"
+CPBF: 7,"0115556666",129,"Juliet"
+CPBF: 5,"0181111234",129,"Kevin"
OK

3.6.4. AT+CPBW - Write Phonebook Entry

This command writes phonebook entry in the current phonebook memory.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Other	No	-	2

AT+CPBW=[<index>][,<number>[,<type>[,<text>[,<group>[,<adnumber>[,<adtype> [,<secondtext>[,<email>]]]]]]]]

Execution command writes phonebook entry in location number **<index>** in the current phonebook memory storage selected with **+CPBS**.

Parameters:

Name	Type	Default	Description
<index>	integer	-	the location numbers of phonebook memory
<number>	string	-	phone number in the format **<type>**
<type>	integer	129	type of address octet
	Values:		
	129	:	national numbering scheme
	145	:	international numbering scheme (contains the character "+")
<text>	string	-	the alphanumeric text associated with the number; character set as specified by command select TE character set **+CSCS**
<group>	string	-	a group the entry may belong to; character set as specified by command select TE character set **+CSCS**
<adnumber>	string	-	an additional number of format **<adtype>**
<adtype>	integer	-	type of address octet
<secondtext>	string	-	a second text field associated with the number; character set as specified by command select TE character set **+CSCS**
<email>	string	-	email field; character set as specified by command select TE character set **+CSCS**

ⓘ   If record number <**index**> already exists, it will be overwritten.

ⓘ   If either <**number**>, <**type**> and <**text**> are omitted, the phonebook entry in location <**index**> is deleted.

ⓘ   If either "LD", "MC" or "RC" memory storage has been selected (see **+CPBS**) it is possible just to delete the phonebook entry in location <**index**>, therefore parameters <**number**>, <**type**> and <**text**> must be omitted.

ⓘ   If <**index**> is omitted or <**index**>=0, the number <**number**> is stored in the first free phonebook location.
    AT+CPBW=0,"+39040X192YZ1",129,"Text"

AT+CPBW=,"+39040X192YZ1",129,"Text"

? **AT+CPBW=?**

Test command returns location range supported by the current storage and types of address as compound values, the maximum length of <**number**> field, supported number formats of the storage, the maximum length of <**text**> field, the maximum length of <**group**>, the maximum length of <**secondtext**> and the maximum length of <**email**>. The format is:

+CPBW: (list of supported <**index**>s)**,<nlength>,**(list of supported <**type**>s)**,<tlength>, <glength>,<slength>,<elength>**

Additional info:

▶▶ response fields

Name	Type	Default	Description
<**nlength**>	integer	-	the maximum length of field <**number**>
<**tlength**>	integer	-	the maximum length of field <**text**>
<**glength**>	integer	-	the maximum length of field <**group**>
<**slength**>	integer	-	the maximum length of field <**secondtext**>
<**elength**>	integer	-	the maximum length of field <**email**>

ℹ The value of <nlength> could vary, depending on the availability of Extension service, in the following situations:
1. if "SM" memory storage has been selected (see **+CPBS**) and the SIM supports the **Extension1** service
2. if "FD" memory storage has been selected (see **+CPBS**) and the SIM supports the **Extension2** service
3. if "MB" memory storage has been selected (see **+CPBS**) and the SIM supports the **Extension6** service

---

Remember to select the PB storage with **+CPBS** command before issuing PB commands.

</> **AT+CPBW=?**
+CPBW: (1-100),40,(129, 145),255
OK
AT+CPBW=6,"18651896699",129,"John"
OK

3.6.5. AT#CPBGR - Read Group Entries

This command returns Grouping information Alpha String (GAS) USIM file entries.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT#CPBGR=<indexFirst>[,<indexLast>]

Set command returns Grouping information Alpha String (GAS) USIM file entries in location number range **<indexFirst>**...**<indexLast>**. If <**indexLast**> is omitted, only location <**indexFirst**> is returned. The response, for each location, is a string. This string is a name used for a group the ADN entries can belong to.

The response format is:

[#CPBGR: <index1>,<text1>[<CR><LF>
#CPBGR: <index2>,<text2>[…]]]

Parameters:

Name	Type	Default	Description
<indexFirst>	integer	NA	first location to be read
	Value:		
	minIndex÷maxIndex	:	range of location numbers of GAS, where "minIndex" and "maxIndex" can be obtained by issuing the test command
<indexLast>	integer	NA	last location to be read
	Value:		
	minIndex÷maxIndex	:	range of location numbers of GAS, where "minIndex" and "maxIndex" can be obtained by issuing the test command

Additional info:

▶▶ Response parameters:

Name	Type	Default	Description
<index>	integer	N/A	location number of the GAS entry
	Value:		
	indexFirst÷indexLast	:	range of location numbers of GAS returned in the response
<text>	string	-	alphanumeric text associated to the entry

AT#CPBGR=?

Test command returns the supported values of the parameters <**index**$_n$> and the maximum length of <**text**$_n$> field, in the format:

#CPBGR: (**<minIndex>** - **<maxIndex>**),**<tlength>**

Additional info:

▶▶ Parameters:

Name	Type	Default	Description
<minIndex>	integer	-	minimum **<index>** number
<maxIndex>	integer	-	maximum **<index>** number
<tlength>	integer	-	maximum **<text>** field length

3.6.6. AT#CPBGW - Write Group Entry

Set command writes the name of a phonebook group <**text**> in the Grouping information Alpha String (GAS) USIM file in a specified location number <**index**>.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT#CPBGW=<index>,<text>

Parameters:

Name	Type	Default	Description
<index>	integer	-	number of the record in the GAS file to be written; value ranges from 1 to the number of records of the GAS file, that varies from USIM to USIM
<text>	string	-	text to be stored in the record

> If record number <**index**> already exists, it will be overwritten

AT#CPBGW=?

Test command returns location range supported by the current storage as a compound value, and maximum length of <**text**> field. The format is:

+CPBGW: (list of supported **<index>s**),**<tlength>**

Additional info:

▶▶ Parameter:

Name	Type	Default	Description
<tlength>	integer	-	maximum length of field <**text**> in bytes; actual maximum number of characters that can be stored depends upon <**text**> coding (see **+CSCS**)

3.7. Packet Domain

3.7.1. AT+CGCLASS - GPRS Mobile Station Class

This command sets the GPRS class.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGCLASS=[<class>]

Set command sets the GPRS class according to **<class>** parameter.

Parameter:

Name	Type	Default	Description
<class>	string	"A"	GPRS class

Values:

"A" : Class-A mode of operation (A/Gb mode), or CS/PS mode of operation (Iu mode) (factory default)

"B" : Class-B mode of operation (A/Gb mode), or CS/PS mode of operation (Iu mode)

"CG" : Class-C mode of operation in PS only mode (A/Gb mode), or PS mode of operation (Iu mode)

"CC" : Class-C mode of operation in CS only mode (A/Gb mode), or CS (Iu mode)

AT+CGCLASS?

Read command returns the mode of operation set by the TE, in the format:

+CGLASS: <class>

AT+CGCLASS=?

Test command reports the range for the parameter **<class>**.

3.7.2. AT+CGQREQ - Quality of Service Profile (Requested)

Set command allows to specify a Quality of Service Profile (requested) that is used when the terminal sends an Activate PDP Context Request message to the network. It specifies a profile for the context identified by the (local) context identification parameter, <cid>.

3GPP TS 27.007
3GPP TS 03.060
3GPP TS 23.060

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGQREQ=[<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]]

Parameters:

Name	Type	Default	Description
<cid>	integer	-	PDP context identification (see **+CGDCONT** command).
<precedence>	integer	0	precedence class
			Value:
			0÷max : use test command to know the values range
<delay>	integer	0	delay class
			Value:
			0÷max : use test command to know the values range
<reliability>	integer	0	reliability class
			Value:
			0÷max : use test command to know the values range
<peak>	integer	0	peak throughput class
			Value:
			0÷max : use test command to know the values range
<mean>	integer	0	mean throughput class
			Value:
			0÷max : use test command to know the values range

ⓘ If a value is omitted for a particular class then this class, is not checked

ⓘ **AT+CGQREQ=<cid>** is a special set command syntax that delates the PDP context identified by <cid> index.

AT+CGQREQ?

Read command returns the current settings for each defined context in the format:

+CGQREQ:<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>[<CR><LF>
+CGQREQ:<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>[...]]

🛈 If no PDP context has been defined, it has no effect and **OK** result code is returned.

AT+CGQREQ=?

Test command returns as a compound value the type of the current PDP context and the supported values for the sub parameters in the format:

+CGQREQ: <PDP_Type>,
(list of supported **<precedence>s),(**list of supported **<delay>s),**
(list of supported **<reliability>s),(**list of supported **<peak>s),**
(list of supported **<mean>s)**

Additional info:

▶▶ PDP type meaning.

Name	Type	Default	Description
<PDP_Type>	string	-	specifies the type of packet data protocol (see **+CGDCONT** command)

</>
```
AT+CGQREQ?
+CGQREQ: 1,0,0,3,0,0
OK

AT+CGQREQ=1,0,0,3,0,0
OK

AT+CGQREQ=?
+CGQREQ: "IP",(0-3),(0-4),(0-5),(0-9),(0-18,31)
+CGQREQ: "PPP",(0-3),(0-4),(0-5),(0-9),(0-18,31)
+CGQREQ: "IPV6",(0-3),(0-4),(0-5),(0-9),(0-18,31)
OK
```

3.7.3. AT+CGDCONT - Define PDP Context

Define PDP Context.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGDCONT=[<cid>[,<PDP_type>[,<APN>[,<PDP_address>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<emergencyInd>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<Local_Addr_Ind>[,<Non-IP_MTU_discovery>[,<Reliable_Data_Service>[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>[,<RQoS_ind>[,<MH6-PDU>[,<Always-on_req>]]]]]]]]]]]]]]]]]]]]]]

Set command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, **<cid>**.

Parameters:

Name	Type	Default	Description
<cid>	integer	N/A	PDP Context Identifier specifies a PDP context definition. 1..max - where the value of max is returned by the Test command.
			Value:
			1÷max : max value is returned by the test command.
<PDP_type>	string	N/A	Packet Data Protocol type specifies the type of packet data protocol
			Values:
			"IP" : Internet Protocol
			"PPP" : Point to Point Protocol
			"IPV6" : Internet Protocol version 6
			"IPV4V6" : Virtual introduced to handle dual IP stack UE capability.
<APN>	string	-	(Access Point Name) a string parameter which is a logical name that is used to select the GGSN or the external packet data network. If the value is empty ("") or omitted, then the subscription value will be requested.
<d_comp>	integer	0	Numeric parameter that controls PDP data compression.
			Values:
			0 : compression off
			1 : compression on
			2 : V.42bis
			3 : V.44

<h_comp>	integer	0	controls PDP header compression.

Values:

0	:	compression off
1	:	compression on
2	:	RFC1144 (applicable for SNDCP only)
3	:	RFC2507
4	:	RFC3095 (applicable for PDCP only)

<IPv4AddrAlloc>	integer	0	a numeric parameter that controls how the MT/TA requests to get the IPv4 address information.

Values:

0	:	IPv4 Address Allocation through NAS Signaling
1	:	IPv4 Address Allocated through DHCP

<emergencyInd>	integer	0	a numeric parameter used to indicate whether the PDP context is for emergency bearer services or not.

Values:

0	:	PDP context is not for emergency bearer services (default)
1	:	PDP context is for emergency bearer services

<P-CSCF_discovery>	integer	0	a numeric parameter influences how the MT/TA requests to get the P-CSCF address, see 3GPP TS 24.229 [89] annex B and annex L.

Values:

0	:	Preference of P-CSCF address discovery not influenced by +CGDCONT
1	:	Preference of P-CSCF address discovery through NAS Signalling

<IM_CN_Signalling_Flag_Ind>	integer	0	a numeric parameter used to indicate to the network whether the PDP context is for IM CN subsystem-related signalling only or not.

Values:

0	:	UE indicates that the PDP context is not for IM CN subsystem-related signalling only
1	:	UE indicates that the PDP context is for IM CN subsystem-related signalling only

<NSLPI>	integer	0	indicates the NAS signalling priority requested for this PDP context

Values:

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

	1 :	indicates that this PDP context is to be activated with the value for the low priority indicator set to "MS is not configured for NAS signalling low priority".	
<securePCO>	integer	0	Specifies if security protected transmission of PCO is requested or not (applicable for EPS only)
	Values:		
	0 :	Security protected transmission of PCO is not requested	
	1 :	Security protected transmission of PCO is requested	
<IPv4_MTU_discovery>	integer	0	influences how the MT/TA requests to get the IPv4 MTU size
	Values:		
	0 :	Preference of IPv4 MTU size discovery not influenced by +CGDCONT	
	1 :	Preference of IPv4 MTU size discovery through NAS signalling	
<Local_Addr_Ind>	integer	0	indicates to the network whether or not the MS supports local IP address in TFTs
	Values:		
	0 :	indicates that the MS does not support local IP address in TFTs	
	1 :	indicates that the MS supports local IP address in TFTs	
<Non-IP_MTU_discovery>	integer	0	influences how the MT/TA requests to get the Non-IP MTU size
	Values:		
	0 :	Preference of Non-IP MTU size discovery not influenced by +CGDCONT	
	1 :	Preference of Non-IP MTU size discovery through NAS signalling	
<Reliable_Data_Service>	integer	0	indicates whether the UE is using Reliable Data Service for a PDN connection or not
	Values:		
	0 :	Reliable Data Service is not being used for the PDN connection	
	1 :	Reliable Data Service is being used for the PDN connection	
<SSC_mode>	integer	0	indicates the session and service continuity (SSC) mode for the PDU session in 5GS
	Values:		

	0	:	indicates that the PDU session is associated with SSC mode 1
	1	:	indicates that the PDU session is associated with SSC mode 2
<S-NSSAI>	string	-	hexadecimal character format.
			Dependent of the form, the string can be separated by dot(s) and semicolon(s). The S-NSSAI is associated with the PDU session for identifying a network slice in 5GS.
			sst: only slice/service type (SST) is present sst;mapped_sst: SST and mapped configured SST are present sst.sd: SST and slice differentiator (SD) are present sst.sd;mapped_sst: SST, SD and mapped configured SST are present sst.sd;mapped_sst.mapped_sd: SST, SD, mapped configured SST and mapped configured SD are present
<Pref_access_type>	integer	0	indicates the preferred access type for the PDU session in 5GS
	Values:		
	0	:	indicates that the preferred access type is 3GPP access
	1	:	indicates that the preferred access type is non-3GPP access
<RQoS_ind>	integer	0	indicates whether the UE supports reflective QoS for the PDU session
	Values:		
	0	:	indicates that reflective QoS is not supported for the PDU session
	1	:	indicates that reflective QoS is supported for the PDU session
<MH6-PDU>	integer	0	indicates whether the UE supports IPv6 multi-homing for the PDU session
	Values:		
	0	:	indicates that IPv6 multi-homing is not supported for the PDU session
	1	:	indicates that IPv6 multi-homing is supported for the PDU session
<Always-on_req>	integer	0	cates whether the UE requests to establish the PDU session as an always-on PDU session
	Values:		
	0	:	always-on PDU session is not requested
	1	:	always-on PDU session is requested

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

but if <cid> is already configured as default attach profile or embedded profile or tethered profile, it will be re-defined automatically with default values.

ⓘ Only IP, IPV6 and IPV4V6 values are supported for EPS(LTE) services.

ⓘ For EPS(LTE) <PDP_addr> is omitted.

ⓘ if <emergencyInd> is enabled, this profile can not be used attached profile.

ⓘ The following parameters are supported to input some value. Other parameters that not supported should be NULL value.

<cid>, <PDP_type>, <APN>, <PDP_address>, <d_comp>, <h_comp>, <IPv4AddrAlloc>, <emergencyInd>, <SSC_mode>, <S-NSSAI>, <Always-on_req>

Ex) <SSC_mode>

AT+CGDCONT=42,"IP","test","",0,0,0,1,,,,,,,,**0**

AT+CGDCONT?

Read command returns the current settings for each defined context in the format:

**+CGDCONT:
<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<emergencyInd>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<Local_Addr_Ind>[,<Non-IP_MTU_discovery>[,<Reliable_Data_Service>[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>[,<RQoS_ind>[,<MH6-PDU>[,<Always-on_req>]]]]]]]]]]]]]]]][<CR><LF>
+CGDCONT:
<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<emergencyInd>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<Local_Addr_Ind>[,<Non-IP_MTU_discovery>[,<Reliable_Data_Service>[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>[,<RQoS_ind>[,<MH6-PDU>[,<Always-on_req>]]]]]]]]]]]]]]]][<CR><LF>**

AT+CGDCONT=?

Test command returns values supported as a compound value.

</> **AT+CGDCONT=1,"IP","APN","10.10.10.10",0,0,0,0,0.0
OK**

**AT+CGDCONT?
+CGDCONT: 1,"IP","APN","10.10.10.10",0,0,0,0,,,,,,,,,"",,,,0**

OK

3.7.4. AT+CGCONTRDP - PDP Context Read Dynamic Parameters

The execution command returns the relevant information for a PDP Context established by the network.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGCONTRDP[=<cid>]

The execution command returns the relevant information on a PDP Context established by the network with the context identifier <**cid**>. If the parameter <**cid**> is omitted, the information for all established PDP contexts is returned. The response message has the following format:

**+CGCONTRDP:<cid>,<bearerId>,<apn>[,<ip&subnet>[,<gw_addr>[,<DNS_prim>
[,<DNS_sec>[, <P_CSCF_prim>[,<P_CSCF_sec>]]]]]][<CR><LF>
+CGCONTRDP:<cid>,<bearerId>,<apn>[, <ip&subnet_mask>[,<gw_addr>[,<DNS_prim>
[,<DNS_sec>[, <P_CSCF_prim>[,<P_CSCF_sec>]]]]]] [...]]**

If the context cannot be found an **ERROR** response is returned.

The response message parameters are described in the Additional info section.

Parameter:

Name	Type	Default	Description
<cid>	integer	-	identifies a non secondary PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

Additional info:

▶▶ List of the meaning of the response message parameters.

Name	Type	Default	Description
<berrerId>	integer	-	identifies the bearer, EPS Bearer in EPS and NSAPI in UMTS/GPRS.
<apn>	string	-	logical name used to select the GGSN or the external packet data network.
<ip&subnet>	string	-	IP address and subnet mask of the MT. The string is given as dot-separated numeric (0-255) parameters on the form. For more information, see next Additional info section.
<gw_addr>	string	-	Gateway address of the MT. The string is given as dot-separated numeric (0-255) parameters.
<DNS_prim>	string	-	IP address of the primary DNS Server.
<DNS_sec>	string	-	IP address of the secondary DNS Server.
<P_CSCF_prim>	string	-	IP address of the primary P-CSCF Server.
<P_CSCF_sec>	string	-	IP address of the secondary P-CSCF Server.

▶▶ Referring to **<ip&subnet>** parameter:

the string is given as dot-separated numeric (0-255) parameters. The format is:

<u>for IPv4:</u>
"a1.a2.a3.a4.m1.m2.m3.m4"

<u>for IPv6:</u>
"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.
m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12. m13.m14.m15.m16"

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

🛈 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.

🛈 If the MT 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.

AT+CGCONTRDP=?

Return the list of <**cid**>s associated with active contexts.

AT+CGACT=1,1
OK

AT+CGCONTRDP=?
+CGCONTRDP: (1)

OK

AT+CGCONTRDP =1
+CGCONTRDP: 1,5,lte.ktfwing.com,"10.52.202.76",,"211.219.86.1","168.126.63.1"

OK

3.7.5.   AT+CGQMIN - Quality of Service Profile (Minimum Acceptable)

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

3GPP TS 27.007
3GPP TS 03.060
3GPP TS 23.060

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGQMIN=[<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]]

Parameters:

Name	Type	Default	Description
<cid>	integer	-	PDP context identification (see **+CGDCONT** command)
<precedence>	integer	0	precedence class
	Value:		
	0÷max	:	use test command to know the values range
<delay>	integer	0	delay class
	Value:		
	0÷max	:	use test command to know the values range
<reliability>	integer	0	reliability class
	Value:		
	0÷max	:	use test command to know the values range
<peak>	integer	0	peak throughput class
	Value:		
	0÷max	:	use test command to know the values range
<mean>	integer	0	mean throughput class
	Value:		
	0÷max	:	use test command to know the values range

ⓘ   If a value is omitted for a class, then this class is not checked.

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

AT+CGQMIN?

Read command returns the current settings for each defined context in the format:

+CGQMIN: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>[<CR><LF>
+CGQMIN: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>[...]]

ℹ️ If no PDP context has been defined, it has no effect and **OK** result code is returned

AT+CGQMIN=?

Test command returns as a compound value the type of the current PDP context and the supported values for the sub parameters in the format:

+CGQMIN: <PDP_Type>,
(list of supported **<precedence>s),(**list of supported **<delay>s),**
(list of supported **<reliability>s),(**list of supported **<peak>s),**
(list of supported **<mean>s)**

Additional info:

▶▶ PDP type meaning.

Name	Type	Default	Description
<PDP_Type>	string	-	specifies the type of packet data protocol, see **+CGDCONT** command
			Only the "IP" **<PDP_Type>** is currently supported.

3.7.6.   AT+CGEQREQ - 3G Quality of Service Profile (Requested)

The command allows to specify a 3G quality of service profile for the context identified by the context identification parameter.

• 3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGEQREQ[<cid>[,<trafficClass>[,<maxBitRateUL>[,<maxBitRateDL>[,<guarBitRateUL>[,<guarBitRateDL>[,<deliverOrder>[,<maxSDUsize>[,<SDUerrRatio>[,<resBitErrRatio>[,<delErrSDUs>[,<tranDelay>[,<traffHandPrio>[,<sourStatiDesc>[,<signInd>]]]]]]]]]]]]]]]

The set command allows to specify a 3G quality of service profile for the context identified by the(local) context identification parameter **<cid>** which is used when the MT sends an Activate PDP Context Request message to the network.

Parameters:

Name	Type	Default	Description
<cid>	integer	-	PDP context identification (see **+CGDCONT** command).
<trafficClass>	integer	4	traffic class
			Values:
			0 : conversational
			1 : streaming
			2 : interactive
			3 : background
			4 : subscribed value
<maxBitRateUL>	integer	0	maximum bitrate up link (kbits/s). This parameter should be provided if the **<trafficClass>** is specified as conversational or streaming.
			Values:
			0 : subscribed value
			1÷568 : kbits/s
			576÷11520 : kbits/s
<maxBitRateDL>	integer	0	maximum bitrate down link (kbits/s). This parameter should be provided if the **<trafficClass>** is specified as conversational or streaming.
			Values:
			0 : subscribed value
			1÷568 : kbits/s
			576÷8640 : kbits/s
			8700÷42200 : kbits/s

<guarBitRateUL>	integer	0	guaranteed bitrate up link(kbits/s). This parameter should be provided if the <**trafficClass**> is specified as conversational or streaming.

Values:

0	:	subscribed value
1÷568	:	kbits/s
576÷8640	:	kbits/s
8700÷42200	:	kbits/s

<guarBitRateDL>	integer	0	guaranteed bitrate down link(kbits/s). This parameter should be provided if the <**trafficClass**> is specified as conversational or streaming.

Values:

0	:	subscribed value
1÷568	:	kbits/s
576÷8640	:	kbits/s
8700÷42200	:	kbits/s

<deliverOrder>	integer	2	SDU delivery order

Values:

0	:	disable
1	:	enable
2	:	subscribed value

<maxSDUsize>	integer	0	maximum SDU size in octets

Values:

0	:	subscribed value
10÷1500	:	size in octets
1502	:	size in octets
1510	:	size in octets
1520	:	size in octets

<SDUerrRatio>	string	0E0	SDU error ratio

mEe means m*10-e, e.g 1E2 means 1*10-2

Values:

0E0	:	0*10-0
1E1	:	1*10-1
1E2	:	1*10-2
7E3	:	7*10-3
1E3	:	1*10-3
1E4	:	1*10-4
1E5	:	1*10-5
1E6	:	1*10-6

\<resBitErrRatio\>	string	0E0	residual bitt error ratio
			mEe means m*10-e, e.g. 1E2 mean 1*10-2
	Values:		
	0E0	:	0*10-0
	5E2	:	5*10-2
	1E2	:	1*10-2
	5E3	:	5*10-3
	4E3	:	4*10-3
	1E3	:	1*10-3
	1E4	:	1*10-4
	1E5	:	1*10-5
	1E6	:	1*10-6
	6E8	:	6*10-8
\<delErrSDUs\>	integer	3	delivery of erroneous SDUs
	Values:		
	0	:	disable
	1	:	enable
	2	:	no detect
	3	:	subscribed value
\<tranDelay\>	integer	0	transfer delay (milliseconds)
	Values:		
	0	:	subscribed value
	10÷150	:	delay (milliseconds)
	200÷950	:	delay (milliseconds)
	1000÷4000	:	delay (milliseconds)
\<traffHandPrio\>	integer	0	traffic handling priority
	Values:		
	0	:	subscribed value
	1÷3	:	priority level
\<sourStatiDesc\>	integer	0	characteristics of the source of the submitted SDUs for a PDP context. This parameter should be provided if the **\<trafficClass\>** is specified as conversational or streaming
	Values:		
	0	:	characteristics of SDUs is unknown
	1	:	characteristics of SDUs corresponds to a speech source
\<signInd\>	integer	0	signalling content of submitted SDUs for a PDP context. This parameter should be provided if the **\<trafficClass\>** is specified as interactive.

Values:

0 : PDP context is not optimized for signalling

1 : PDP context is optimized for signalling <PDP_type> (see +CGDCONT command)

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

🛈 The set command can modify the 2G QoS according to standard [2], see +CGQREQ command.

AT+CGEQREQ?

Read command returns the current settings for each defined context in the format:

[+CGEQREQ: <cid>,<trafficClass>,<maximumBitrateUl>, <maximumBitrateDl>,<guaranteedBitrateUl>,<guaranteedBitrateDl>, <deliveryOrder>,<maximumSduSize>,<sduErrorRatio>, <residualBitErrorRatio>,<deliveryErroneousSdus>,<transferDelay>, <trafficHandlingPriority>,<sourceStatisticsDescriptor>, <signallingIndication><CR><LF>]

If no PDP context has been defined it has no effect, and **OK** result code is returned.

AT+CGEQREQ=?

Test command returns as a compound value the type of the current PDP context and the supported values for the sub-parameters in the format:

+CGQEQREQ: <pdpType>, (list of supported <trafficClass>s), (list of supported <maximumBitrateUl>s), (list of supported <maximumBitrateDl>s), (list of supported <guaranteedBitrateUl>s), (list of supported <guaranteedBitrateDl>s), (list of supported <deliveryOrder>s), (list of supported <maximumSduSize>s), (list of supported <sduErrorRatio>s), (list of supported <residualBitErrorRatio>s), (list of supported <deliveryErroneousSdus>s), (list of supported <transferDelay>s), (list of supported <trafficHandlingPriority>s), (list of supported <sourceStatisticsDescriptor>s), (list of supported <signallingIndication>s)

Additional info:

▶▶ PDP type

Name	Type	Default	Description
<pdpType>	string	-	specifies the type of packet data protocol (see **+CGDCONT** command)

3.7.7. AT+CGEQNEG - 3G Quality of Service Profile (Negotiated)

This command allows the TE to retrieve the negotiated 3G quality of service returned in the Activate PDP Context Accept/Modify message.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGEQNEG=[<cid>[,<cid>[,…]]]

Set command returns the negotiated 3G QoS profile for the specified context identifiers, **<cid>**s. The QoS profile consists of a number of parameters, each of which may have a separate value.

+CGEQNEG: <cid>, <Traffic class>, <Maximum bitrate UL> ,<Maximum bitrate DL>, <Guaranteed bitrate UL>, <Guaranteed bitrate DL>, <Delivery order>, <Maximum SDU size>, <SDU error ratio>, <Residual bit error ratio>, <Delivery of erroneous SDUs>, <Transfer delay>, <Traffic handling priority>[<CR><LF>

+CGEQNEG: <cid>, <Traffic class>, <Maximum bitrate UL>, <Maximum bitrate DL>, <Guaranteed bitrate UL>, <Guaranteed bitrate DL>, <Delivery order>, <Maximum SDU size>, <SDU error ratio>, <Residual bit error ratio>, <Delivery of erroneous SDUs>, <Transfer delay>, <Traffic handling priority>[...]]

Parameters:

Name	Type	Default	Description
<cid>	integer	-	PDP context identification (see **+CGDCONT** command)

AT+CGEQNEG=?

Test command returns a list of **<cid>**s associated with active contexts.

AT+CGEQREQ?
+CGEQREQ: 1,4,0,0,0,0,2,0,"0E0","0E0",3,0,0,0,0

OK

AT+CGACT=1,1
OK

AT+CGEQNEG=?
+CGEQNEG: (1)

OK

AT+CGEQNEG=1
+CGEQNEG: 1,3,128,384,0,0,2,1500,"1E4","1E5",3,0,1,0,0

 OK

3.7.8. AT+CGPADDR - Show PDP Address

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

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CGPADDR=[<cid>[,...]]

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

Parameter:

Name	Type	Default	Description
<cid>	integer	-	specifies a PDP context definition, see **+CGDCONT** command. If no **<cid>** specified, the addresses for all defined contexts are returned.

Additional info:

▶▶ The command returns a row of information for every <**cid**> whose context has been defined. No row is returned for a <**cid**> whose context has not been defined. Here is the response format:

+CGPADDR: <cid>,<PDP_addr><CR><LF>
+CGPADDR: <cid>,<PDP_addr><CR><LF>
...

Name	Type	Default	Description
<PDP_addr>	string	-	identifies the terminal in an address space applicable to the PDP. The address may be static or dynamic:
			4. for a static address, it will be the one set by the **+CGDCONT** command when the context was defined
			5. 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_addr>** is omitted if none is available

AT+CGPADDR=?

Test command returns a list of defined <**cid**>s.

```
AT+CGACT=1,3
OK

AT+CGACT?
+CGACT: 1,0
+CGACT: 2,0
+CGACT: 3,1

OK

AT+CGPADDR=3
+CGPADDR: 3,"xxx.yyy.zzz.www"

OK

AT+CGPADDR=?
+CGPADDR: (3)

 OK
```

3.7.9. AT+CGCMOD - Modify PDP Context

The execution command is used to modify the specified PDP context(s) with respect to QoS profiles and TFTs.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CGCMOD=[<cid_n>[,...]]

After command has completed, the MT returns to V.250 online data state. If the requested modification for any specified context cannot be achieved, an **ERROR** or **+CME: ERROR** response is returned. Extended error responses are enabled by the **+CMEE** command.

For EPS, the modification request for an EPS bearer resource will be answered by the network by an EPS bearer Modification request. The request must be accepted by the MT before the PDP context effectively changed.

Parameter:

Name	Type	Default	Description
<cid_n>	integer	-	generic PDP context identifier.

ℹ️ If no parameters are specified (no **<cid_n>** specified), the command modifies all active contexts.

AT+CGCMOD=?

Test command returns a list of <**cid_n**>s associated with active contexts.

+CGCMOD: (list of <cid_n>s associated with active contexts)

3.7.10. AT+CGEQMIN - 3G Quality of Service Profile (Minimum Acceptable)

This command sets the 3G Quality of Service parameters for the context identified by the context identification parameter.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

➡️ **AT+CGEQMIN[<cid>[,<trafficClass>[,<maxBitRateUL>[,<maxBitRateDL>[,<guarBitRateUL> [,<guarBitRateDL>[,<deliverOrder>[,<maxSDUsize>[,<SDUerrRatio> [,<resBitErrRatio>[,<delErrSDUs>[,<tranDelay>[,<traffHandPrio> [,<sourStatiDesc>[,<signInd>]]]]]]]]]]]]]]]**

Set command allows specifying a 3G quality of service profile for the context identified by the (local) context identification parameter <cid> which is checked by the MT against the negotiated profile returned in the Activate/Modify PDP Context Accept Message.

Parameters:

Name	Type	Default	Description
<cid>	integer	-	PDP context identification (see +CGDCONT command).
<trafficClass>	integer	4	Select traffic class.
			Values:
	0	:	Conversational
	1	:	Streaming
	2	:	Interactive
	3	:	Background
	4	:	subscribed value
<maxBitRateUL>	integer	0	Configure Maximum bitrate Up Link (kbits/s).
			Values:
	0	:	subscribed value
	1÷568	:	kbits/s
	576÷11520	:	kbits/s
<maxBitRateDL>	integer	0	Configure Maximum bitrate down Link (kbits/s).
			Values:
	0	:	subscribed value
	1÷568	:	kbits/s
	576÷8640	:	kbits/s
	8700÷42200	:	kbits/s
<guarBitRateUL>	integer	0	Configure the guaranteed bitrate up link(kbits/s).
			Values:
	0	:	subscribed value
	1÷568	:	kbits/s
	576÷8640	:	kbits/s

		8700÷42200	:	kbits/s
<guarBitRateDL>	integer	0		Configure the guaranteed bitrate down link(kbits/s).
	Values:			
	0		:	subscribed value
	1÷568		:	kbits/s
	576÷8640		:	kbits/s
	8700÷42200		:	kbits/s
<deliverOrder>	integer	2		SDU Delivery order.
	Values:			
	0	:	No (for default value)	
	1	:	Yes - SDU	
	2	:	subscribed value	
<maxSDUsize>	integer	0		Maximum SDU size in octets.
	Values:			
	0	:	subscribed value	
	10÷1500	:	Size in octets	
	1502	:	Size in octets	
	1510	:	Size in octets	
	1520	:	Size in octets	
<SDUerrRatio>	string	0E0		SDU error ratio. mEe mean m*10-e, for example 1E2 mean 1*10-2
	Values:			
	0E0	:	means 0*10-0	
	1E1	:	means 1*10-1	
	1E2	:	means 1*10-2	
	7E3	:	means 7*10-3	
	1E3	:	means 1*10-3	
	1E4	:	means 1*10-4	
	1E5	:	means 1*10-5	
	1E6	:	means 1*10-6	
<resBitErrRatio>	string	0E0		Residual bit error ratio mEe mean m*10-e , for example 1E2 mean 1*10-2
	Values:			
	0E0	:	means 0*10-0	
	5E2	:	means 5*10-2	
	1E2	:	means 1*10-2	
	5E3	:	means 5*10-3	
	4E3	:	means 4*10-3	

	1E3	:	means 1*10-3
	1E4	:	means 1*10-4
	1E5	:	means 1*10-5
	1E6	:	means 1*10-6
	6E8	:	means 6*10-8

<delErrSDUs>	integer	0	Delivery of erroneous SDUs.

Values:

0	:	no (default value)
1	:	yes
2	:	no detect
3	:	subscribed value

<tranDelay>	integer	0	Transfer delay (milliseconds)

Values:

0	:	subscribed value
10÷150	:	Delay (milliseconds)
200÷950	:	Delay (milliseconds)
1000÷4000	:	Delay (milliseconds)

<traffHandPrio>	integer	0	Traffic handling priority

Values:

0	:	subscribed value
1÷3	:	priority level

<sourStatiDesc>	integer	0	Characteristics of the source of the submitted SDUs for a PDP context. This parameter should be provided if the <**Traffic Class**> is specified as conversational or streaming

Values:

0	:	Characteristics of SDUs is unknown
1	:	Characteristics of SDUs corresponds to a speech source

<signInd>	integer	0	Signalling content of submitted SDUs for a PDP context. This parameter should be provided if the <**TrafficClass**> is specified as interactive

Values:

0	:	PDP context is not optimized for signalling
1	:	PDP context is optimized for signalling

ⓘ A special form of the Set command, **+CGEQMIN=<cid>** causes the requested profile for context number **<cid>** to become undefined.
The current settings are stored in NVM.
Set command can modify the 2G QoS according to 3GPP 23.107 (see **+CGQMIN**).

AT+CGEQMIN?

Read command returns the current settings for each defined context in the format:

**[+CGEQMIN:
<cid>,<trafficClass>,<maxBitRateUL>,<maxBitRateDL>,<guarBitRateUL>,<guarBitRateDL>,<deliverOrder>,<maxSDUsize>,<SDUerrRatio>,<resBitErrRatio>,<delErrSDUs>,<tranDelay>,<traffHandPrio>,<sourStatiDesc>,<signInd><CR><LF>] [+CGEQMIN:...]**

If no PDP context has been defined, it has no effect and **OK** result code is returned.

Parameters are described as for the set command except the parameters described in Additional info section.

AT+CGEQMIN=?

Test command returns as a compound value the type of the current PDP context and the supported values for the sub-parameters in the format:

+CGQMIN:<PDP_Type>,
(list of supported <**traffClass**>s),(list of supported <**maxBitRateUL**>s),
(list of supported <**maxBitRateDL**>s),(list of supported <**guarBitRateUL**>s),
(list of supported <**guarBitRateDL**>s),(list of supported <**deliverOrder**>s),
(list of supported<**maxSDUsize**>s),(list of supported<**SDUerrRatio**>s),
(list of supported<**resBitErrRatio**>s),(list of supported <**delErrSDUs**>s),
(list of supported <**tranDelay**>s),(list of supported <**traffHandPrio**>s),
(list of supported<**sourStatiDesc**>s), (list of supported <**signInd**>s)

<**PDP_Type**> parameter specifies the Packet Data Protocol type, see **+CGDCONT** command.

Only the "IP" Packet Data Protocol type is supported.

3.7.11.   AT+CGEQOS - Define EPS Quality of Service

The command specifies the EPS Quality of Service parameters.

[1] 3GPP TS 23.203
[2] 3GPP TS 24.301

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGEQOS=[<cid>[,<QCI> [,<DL_GBR>,<UL_GBR> [,<DL_MBR>,<UL_MBR>]]]]

Set command specifies the EPS Quality of Service parameters.

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

Parameters:

Name	Type	Default	Description
<cid>	integer	-	it specifies a particular EPS Traffic Flows definition in EPS
<QCI>	integer	9	it specifies a class of EPS QoS, see standard [1].
	Values:		
	0	:	QCI is selected by network
	1÷4	:	value range for guaranteed bit rate Traffic Flows
	5÷9	:	value range for non-guaranteed bit rate Traffic Flows
<DL_GBR>	integer	-	it indicates DL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI, see standard [2].
<UL_GBR>	integer	-	indicates UL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI, see standard [2].
<DL_MBR>	integer	-	it indicates DL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI, see standard [2].
<UL_MBR>	integer	-	it indicates UL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI, see standard [2].

Additional info:

▶▶   Possible Response(s):
  +CME ERROR: <err>

AT+CGEQOS?

Read command returns the current settings for each defined QoS.

**+CGEQOS: <cid>,
<QCI>,[<DL_GBR>,<UL_GBR>],[<DL_MBR>,<UL_MBR>][<CR>>LF>+CGEQOS: <cid>,
<QCI>,[<DL_GBR>,<UL_GBR>],[<DL_MBR>,<UL_MBR>][...]]**

? **AT+CGEQOS=?**

Test command returns the ranges of the supported parameters:

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

3.7.12.   AT+CGPIAF - Printing IP Address Format

This command selects the printout format of the IPv6 address.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CGPIAF=[<IPv6_AddressFormat>[,<IPv6_SubnetNotation>[,<IPv6_LeadingZeros>[,<Pv6_CompressZeros>]]]]

Parameters:

Name	Type	Default	Description
<IPv6_AddressFormat>	integer	0	selects the IPv6 address format. Relevant for all AT command parameters that can hold an IPv6 address.
			Values:
	0	:	use IPv4-like dot-notation. IP addresses, and subnetwork mask if applicable, are dot-separated.
	1	:	use IPv6-like colon-notation. IP address, and subnetwork mask if applicable and when given explicitly, are separated by a space.
<IPv6_SubnetNotation>	integer	0	selects the subnet-notation for remote address and subnet mask. Setting does not apply if IPv6 address format **<IPv6_AddressFormat>=0**.
			Values:
	0	:	both IP address, and subnet mask are started explicitly, separated by a space.
	1	:	the printout format is applying /(forward slash) subnet-prefix Classless Inter-Domain Routing (CIDR) notation.
<IPv6_LeadingZeros>	integer	0	selects whether leading zeros are omitted or not. Setting does not apply if IPv6 address format **<IPv6_AddressFormat>=0**.
			Values:
	0	:	leading zeros are omitted.
	1	:	leading zeros are included.
<Pv6_CompressZeros>	integer	0	selects whether 1-n instances of 16-bit- zero values are replaced by only "::". This applies only once. Setting does not apply if IPv6 address format **<IPv6_AddressFormat>=0**.
			Values:
	0	:	no zero compression.
	1	:	use zero compression.

AT+CGPIAF?

Read command returns the current parameter setting.

AT+CGPIAF=?

Test command returns values supported as compound values.

AT+CGPIAF=0,0,0,0
OK

AT+CGACT=1,1
OK

AT+CGPADDR =
+CGPADDR: 1,"252.1.171.171.205.205.239.224.0.0.0.0.0.0.0.1"

OK

AT+CGPIAF=1,0,0,0
OK

AT+CGACT=1,1
OK

AT+CGPADDR =
+CGPADDR: 1,"FC01:ABAB:CDCD:EFE0:0:0:0:1"

OK

3.7.13.   AT+CGEREP - Packet Domain Event Reporting

This command enables or disables the presentation of unsolicited result codes.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT+CGEREP=[<mode>[,<bfr>]]

Set command enables/disables sending of unsolicited result codes in case of certain events occurring in the module or in the network. The URC formats and related events are shown in the Additional info sections.

Parameters:

Name	Type	Default	Description
<mode>	integer	0	controls the processing of URCs specified with this command.

Values:

0 : buffer unsolicited result codes in the TA. If TA result code buffer is full, the oldest one can be discarded. No codes are forwarded to the TE.

1 : discard 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 when TA-TE link becomes available; otherwise forward them directly to the TE.

Name	Type	Default	Description
<bfr>	integer	0	controls the effect on buffered codes when **<mode>** 1 or 2 is entered.

Values:

0 : TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered.

1 : TA 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)

Additional info:

▶▶ A network request for PDP context activation occurred when the TA was unable to report it to the TE with a **+CRING** unsolicited result code and was automatically rejected.

+CGEV: REJECT <PDP_type>, <PDP_addr>

▶▶ The network has requested a context reactivation. The **<cid>** that was used to reactivate the context is provided if known to **TA**.

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

▶▶ The network has forced a context deactivation. The **<cid>** that was used to activate the context is provided if known to TA.

+CGEV: NW_DEACT <PDP_type>, <PDP_addr>, [<cid>]

▶▶ The mobile equipment has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.

+CGEV: ME_DETACH

▶▶ The network has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.

+CGEV: NW_DETACH

▶▶ The mobile equipment has forced a change of MS class. The highest available class is reported (see **+CGCLASS**).

+CGEV: ME CLASS <class>

Unsolicited fields:

Name	Type	Description
<PDP_type>	string	Packet Data Protocol type, which specifies the type of packet data protocol
<PDP_addr>	string	identifies the terminal in the address space applicable to the PDP
<cid>	integer	PDP Context Identifier

AT+CGEREP?
Read command returns the current **<mode>** and **<bfr>** settings, in the format:

+CGEREP: <mode>,<bfr>

AT+CGEREP=?
Test command reports the supported range of values for the **+CGEREP** command parameters.

3.7.14. AT+CGATT - PS Attach or Detach

This execution command is used to register (attach) the terminal to or deregister (detach) the terminal from the Packet Domain service.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CGATT=<state>

Parameter:

Name	Type	Default	Description
<state>	integer	N/A	state of PS attachment

Values:

0 : detached

1 : attached

AT+CGATT?
Read command returns the current PS state in the format:
+CGATT: <state>

AT+CGATT=?
Test command returns the values range of the <**state**> parameter.

```
AT+CGATT?
+CGATT: 0
OK

AT+CGATT=?
+CGATT: (0,1)
OK

AT+CGATT=1
OK
```

3.7.15.   AT+CGTFT - Traffic Flow Template

This command allows the TE to specify a Packet Filter - PF for a Traffic Flow Template - TFT that is used in the GGSN in UMTS/GPRS and Packet GW in EPS for routing of packets onto different QoS flows towards the TE.

3GPP TS 27.007
3GPP TS 03.60/23.060

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGTFT=[<cid>[,<packet filter identifier>[,<evaluation precedence index>[,<source address and subnet mask>[,<prot num(ipv4)/next hdr(ipv6)>[,<destination port range>[,<source port range>[,<ipsec sec param index (spi)>[,<tos(ipv4) TP class(ipv6)&mask>[,<flow label (ipv6)>]]]]]]]]]]

The concept further described in the 3GPP TS 23.060 [47]. A TFT consists of from one and up to 16 Packet Filters, each identified by a unique <packet filter identifier>. A Packet Filter also has an <evaluation precedence index> that is unique within all TFTs associated with all PDP contexts that are associated with the same PDP address.

The set command specifies a Packet Filter that whom added to the TFT stored in the MT and used for the context identified by the (local) context identification parameter, <cid>. The specified TFT will be stored in the GGSN in UMTS/GPRS and Packet GW in EPS only at activation or MS-initiated modification of the related context. Since this is the same parameter that is used in the +**CGDCONT** and +**CGDSCONT** commands, the +**CGTFT** command is effectively an extension to these commands. The Packet Filters consist of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +**CGTFT= <cid>** causes all of the Packet Filters in the TFT for context number

<cid> to become undefined. At any time there may exist only one PDP context with no associated TFT amongst all

PDP contexts associated to one PDP address. At an attempt to delete a TFT, which would violate this rule, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +**CMEE** command.

Possible Response(s):
OK
ERROR

Parameters:

Name	Type	Default	Description
<cid>	integer	-	a numeric parameter which specifies a particular PDP context definition (see the +**CGDCONT** and +**CGDSCONT** commands). The following parameters are defined in 3GPP TS 23.060 [47]:
<packet filter identifier>	integer	-	The value range is from 1 to 16.
<evaluation precedence index>	integer	-	The value range is from 0 to 255.

<source address and subnet mask>	string	-	The string is given as dot-separated numeric (0-255) parameters on the form: "a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or "a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16", for IPv6.
<prot num(ipv4)/ next hdr(ipv6)>	integer	-	The value range is from 0 to 255.
<destination port range>	string	-	The string is given as dot-separated numeric (0-65535) parameters on the form "f.t".
<source port range>	string	-	The string is given as dot-separated numeric (0-65535) parameters on the form "f.t".
<ipsec sec param index (spi)>	integer	-	The value is in hexadecimal format. The value range is from 0 to FFFFFFFF.
<tos(ipv4) TP class(ipv6) &mask>	string	-	The string is given as dot-separated numeric (0-255) parameters on the form "t.m".
<flow label (ipv6)>	integer	-	The numeric value is in hexadecimal format. The value range is from 0 to FFFFF. Valid for IPv6 only.

Additional info:

▶▶ Some of the above listed attributes may coexist in a Packet Filter while others mutually exclude each other, the possible combinations are shown in 3GPP TS 23.060 [47].

AT+CGTFT?

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

AT+CGTFT: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask /traffic class (ipv6) and mask>, <flow label (ipv6)> [<CR><LF>+CGTFT: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label (ipv6)> [...]]

AT+CGTFT=?

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

AT+CGTFT: <PDP_type>, (list of supported <packet filter identifier>s), (list of supported <evaluation precedence index>s), (list of supported <source address and subnet mask>s), (list of supported <protocol number (ipv4) / next header (ipv6)>s), (list of supported <destination port range>s), (list of supported <source port range>s), (list of supported <ipsec security parameter index (spi)>s), (list of supported <type of service (tos) (ipv4) and mask / traffic class(ipv6) and mask>s), (list of supported

<flow label (ipv6)>s) [<CR><LF>+CGTFT: <PDP_type>, (list of supported <packet filter identifier>s), (list of supported <evaluation precedence index>s), (list of supported <source address and subnet mask>s),(list of supported <protocol number (ipv4) / next header (ipv6)>s), (list of supported <destination port range>s), (list of supported <source port range>s), (list of supported <ipsec security parameter index (spi)>s),(list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>s), (list of supported <flow label (ipv6)>s) [...]]

    ⓘ   The possible combinations listed on 3GPP TS 23.060 [47].

3.7.16. AT+CGEQOSRDP - EPS Quality of Service Read Dynamic Parameters

The command returns the parameters related to the Quality of Service.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CGEQOSRDP=[<cid>]

The execution command returns the Quality of Service parameters **<QCI>, [<DL_GBR>** and **<UL_GBR>]** and

[<DL_MBR> and <UL_MBR>] of the active secondary or non secondary PDP context associated to the provided context identifier **<cid>**.

If the parameter **<cid>** is omitted, the Quality of Service parameters for all secondary or non secondary active PDP contexts are returned.

Parameter:

Name	Type	Default	Description
<cid>	integer	-	it specifies a particular Traffic Flows definition in EPS and a PDN connection definition in UMTS/GPRS.

Additional info:

▶▶ **Possible Response(s):**

+CGEQOSRDP:<cid>,<QCI>,[<DL_GBR>,<UL_GBR>],[<DL_MBR>,<UL_MBR>][<CR>>LF>
+CGEQOSRDP:<cid>,<QCI>,[<DL_GBR>,<UL_GBR>],[<DL_MBR>,<UL_MBR>][...]]

▶▶ **Defined values:**

Name	Type	Default	Description
<QCI>	integer	-	specifies a class of EPS QoS. (see 3GPP TS 23.203 [85])0 QCI is selected by network [1..4] value range for guaranteed bit rate Traffic Flows [5..9] value range for non-guaranteed bit rate Traffic Flows.
<DL_GBR>	integer	-	indicates DL GBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])
<UL_GBR>	integer	-	indicates UL GBR in case of GBR QCI. The value is in kbit/s. This parameter omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])
<DL_MBR>	integer	-	indicates DL MBR in case of GBR QCI. The value is in kbit/s. This parameter omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])
<UL_MBR>	integer	-	indicates UL MBR in case of GBR QCI. The value is in kbit/s. This parameter omitted for a non-GBR QCI. (see 3GPP TS 24.301 [83])

AT+CGEQOSRDP=?

+CGEQOSRDP: (list of <cid>s associated with secondary or non secondary active contexts)
Parameters of both network and MT/TA initiated PDP contexts returned.

3.7.17. AT+CGTFTRDP - Traffic Flow Template Read Dynamic Parameters

This command returns the relevant information about Traffic Flow Template of <**cid**> together with the additional network assigned values when established by the network.

3GPP TS 27.007; 3GPP TS 03.60/23.060

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CGTFTRDP=[<cid>]

The execution command returns the relevant information about Traffic Flow Template for an active secondary or non secondary PDP context specified by <**cid**> together with the additional network assigned values when established by the network.

If the parameter <**cid**> is omitted, the Traffic Flow Templates for all active secondary and non secondary PDP contexts are returned.

Parameters of both network and MT/TA initiated PDP contexts returned.

Possible Response(s):

+CGTFTRDP: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header(ipv6)>,<destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label ipv6)>, <direction>, <NW packet filter Identifier>[<CR><LF>

+CGTFTRDP: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label (ipv6)>, <direction>,<NW packet filter Identifier> [...]]

Parameter:

Name	Type	Default	Description
<cid>	integer	-	a numeric parameter which specifies a particular PDP context definition or Traffic Flows definition.

Additional info:

▶▶List of the meaning of the response message parameters.

Name	Type	Default	Description
<packet filter identifier>	integer	N/A	packet filter identifier
	Value:		
	1÷16	:	supported range
<evaluation preced	integer	N/A	evaluation precedence index

ence index>			
	Value:		
	0÷255	:	supported range
<source address and subnet mask>	string	-	source address and subnet mask
			The string is given as dot-separated numeric (0-255) parameters on the form:
			"a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 **or**
			"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16" for IPv6.
<protocol number/next header>	string	N/A	protocol number for ipv4 or next header for ipv6
	Value:		
	0÷255	:	supported range
<destination port range>	string	-	The string is given as dot-separated numeric (0-65535) parameters on the form "f.t"
<source port range>	string	-	The string is given as dot-separated numeric (0-65535) parameters on the form "f.t"
<ipsec spi>	hex	N/A	ipsec security parameter index (spi) in hexadecimal format
	Value:		
	00000000÷FFFFFFFF	:	supported range
<tos/traffic class and mask>	string	-	type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask
			The string given as dot-separated numeric (0-255) parameters on the form "t.m"
<flow label (ipv6)>	hex	N/A	valid for IPv6 only
	Value:		
	00000÷FFFFF	:	supported range
<direction>	string	N/A	specifies the transmission direction in which the Packet Filter shall be applied
	Values:		
	0	:	Pre Release 7 TFT Filter (see 3GPP TS 24.008, table 10.5.162)
	1	:	Uplink

| | 2 | : | Downlink |
| | 3 | : | Bidirectional (Used for Uplink and Downlink) |

\<NW packet filter Identifier\>	integer	N/A	in EPS the value is assigned by the network when established
	Value:		
	1÷16	:	supported range

ℹ️ Some of the above listed attributes can coexist in a Packet Filter while others mutually exclude each other. The possible combinations listed on 3GPP TS 23.060 [47].

❓ AT+CGTFTRDP=?

+CGTFTRDP: (list of \<cid\>s associated with active secondary or non secondary contexts)

📝 Some of the above listed attributes can coexist in a Packet Filter while others mutually exclude each

other. The possible combinations listed on 3GPP TS 23.060 [47].

3.7.18. AT+CGACT - PDP Context Activate or Deactivate

This command activates or deactivates the specified PDP context(s).

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CGACT=[<state>[,<cid>[,<cid>][,...]]]]

Parameters:

Name	Type	Default	Description
<state>	integer	N/A	activate/deactivate the PDP context
	Values:		
	0	:	deactivate
	1	:	activate
<cid>	integer	-	specifies a PDP context definition (see **+CGDCONT** command)

ℹ️ if no **<cid>**s are specified, the activation form of the command activates the first three defined contexts. The deactivation form deactivates all the active contexts.

AT+CGACT?

Read command returns the current activation state for all the defined PDP contexts in the format:
+CGACT: <cid>,<state>[<CR><LF>
+CGACT: <cid>,<state>[...]]

AT+CGACT=?

Test command reports information on the supported PDP context activation states **<state>.**

</>
```
AT+CGACT=1,1
OK

AT+CGACT?
+CGACT: 1,1

OK
```

3.7.19.   AT+CGDSCONT - Define Secondary PDP Context

Define secondary PDP Context.

[1] 3GPP TS 44.065
[2] 3GPP TS 25.323
[3] RFC1144
[4] RFC2507
[5] RFC3095

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT+CGDSCONT=[<cid>,<p_cid>[,<d_comp>[,<h_comp>[,<IM_CN_Signalling_Flag_Ind>]]]]
Set command specifies PDP context parameter values for a Secondary PDP context identified by
the (local) context Identification parameter, **<cid>**.

Parameters:

Name	Type	Default	Description
<cid>	integer	-	specifies a particular PDP Context Identifier, see +**CGDCONT** command.
<p_cid>	integer	-	specifies a particular PDP context definition which has been specified by use of the +**CGDCONT** command. The parameter is local to the TE-MT interface.
<d_comp>	integer	0	controls PDP data compression (applicable for SNDCPonly) (refer 3GPP TS 44.065 [61])
	Values:		
	0	:	off (default if value is omitted)
	1	:	on (manufacturer preferred compression)
	2	:	V.42 bis
	3	:	V.44
<h_comp>	integer	0	controls PDP header compression (refer 3GPP TS 44.065 [61] and 3GPP TS 25.323 [62]).
	Values:		
	0	:	off (default if value is omitted)
	1	:	on (manufacturer preferred compression)
	2	:	RFC1144 (applicable for SNDCP only)
	3	:	RFC2507
	4	:	RFC3095 (applicable for PDCP only)
<IM_CN_Signalling_Flag_Ind>	integer	N/A	indicates to the network whether the PDP context is for IM CN subsystem-related signalling only or not.

Values:

    0 : UE indicates that the PDP context is not for IM CN subsystem-related signalling only

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

AT+CGDSCONT?

The read command returns the current settings for each defined context in the format:

+CGDSCONT: \<cid\>,\<p_cid\>,\<d_comp\>,\<h_comp\>,\<IM_CN_Signalling_Flag_Ind\>[\<CR\>\<LF\>
+CGDSCONT: \<cid\>,\<p_cid\>,\<d_comp\>,\<h_comp\>,\<IM_CN_Signalling_Flag_Ind\> [...]]

AT+CGDSCONT=?

Test command returns the supported range of values of parameters.

3.7.20. AT+CGSCONTRDP - Secondary PDP Context Read Dynamic Parameters

This command returns parameters for a given **<cid>**.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CGSCONTRDP[=<cid>]

The execution command returns **<p_cid>** and **<bearer_id>** parameters for a given **<cid>**. If the context cannot be found an **ERROR** response is returned. If the parameter **<cid>** is omitted, the **<cid>**, **<p_cid>** and **<bearer_id>** are returned for all established PDP contexts. Format of the returned message:

+CGSCONTRDP:<cid>,<p_cid>,<bearer_id>[<CR><LF>
+CGSCONTRDP: <cid>, <p_cid>,<bearer_id> [...]]

Parameter:

Name	Type	Default	Description
<cid>	integer	-	specifies a particular PDP context or Traffic Flows definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.

Additional info:

▶▶ Here is the list of the parameters meanings returned by the **+CGSCONTRDP** command.

Name	Type	Default	Description
<p_cid>	integer	-	specifies a particular PDP context definition or default EPS context Identifier which has been specified by use of the **+CGDCONT** command. The parameter is local to the TE-MT interface.
<bearer_id>	integer	-	identifies the bearer, EPS Bearer in EPS and NSAPI in GPRS.

AT+CGSCONTRDP=?

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

+CGSCONTRDP: (list of <cid>s associated with active contexts)

ℹ️ Parameters for network-initiated PDP contexts returned as well. The dynamic part of the PDP context will only exist if established by the network.

3.7.21. AT+CGREG - GPRS Network Registration Status

Set command controls the presentation of the **+CGREG:** unsolicited result code

3GPP TS 27.007
3GPP TS 24.008

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CGREG=[<mode>]

Set command enables/disables the **+CGREG:** unsolicited result code, and selects one of the available formats:

short format:
+CGREG:<stat>
long format:
+CGREG:<stat>[,<lac>,<ci>[,<AcT>,<rac>]]

Parameter:

Name	Type	Default	Description
<mode>	integer	0	enables/disables the network registration unsolicited result code (URC), and selects one of the available formats.
			The following events triggers the URC:
			6. URC short format is displayed every time there is a change in the network registration status
			7. URC long format is displayed, according to **<mode>** value, every time there is a change of the network cell.

Values:

0 : disable the network registration unsolicited result code

1 : enable the network registration unsolicited result code, and selects the short format

2 : enable the network registration unsolicited result code, and selects the long format (includes the network cell identification data)

Unsolicited fields:

Name	Type	Description
<stat>	integer	registration status of the module

Values:

0 : not registered, terminal is not currently searching a new operator to register to

1 : registered, home network

2 : not registered, but terminal is currently searching a new operator to register to

3 : registration denied

		4 : unknown
		5 : registered, roaming
\<lac\>	string	the parameter reports:
		8. Local Area Code when **\<AcT\>**=0 or 2
		9. Tracking Area Code when **\<AcT\>**=7
\<ci\>	string	cell ID in hexadecimal format
\<AcT\>	integer	access technology of the registered network.
		Values:
		0 : GSM
		2 : UTRAN
		3 : GSM w/EGPRS (see NOTE 3)
		4 : UTRAN w/HSDPA (see NOTE 4)
		5 : UTRAN w/HSUPA (see NOTE 4)
		6 : UTRAN w/HSDPA and HSUPA (see NOTE 4)
		7 : E-UTRAN
\<rac\>	string	routing area code (one byte) in hexadecimal format

ⓘ **\<lac\>**, **\<ci\>**, **\<AcT\>**, and **\<rac\>** network information is reported by URC only if \<**mode**\>=2, and the module is registered on some network cell.
\<lac\> and **\<rac\>** values will change **\<tac\>** and **\<mme_code\>** values in LTE.

ⓘ NOTE 3: 3GPP TS 44.018 [156] specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

ⓘ NOTE 4: 3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

AT+CGREG?

Read command returns the current value of \<**mode**\>, the registration status \<**stat**\>, and the network information (**\<lac\>**, **\<ci\>**, **\<AcT\>**, and **\<rac\>**) according to the used \<**mode**\> parameter value.

+CGREG: \<mode\>,\<stat\>[,\<lac\>,\<ci\>[,\<AcT\>,\<rac\>]]

\<lac\>, **\<ci\>**, **\<AcT\>**, and **\<rac\>** network information is reported only if \<**mode**\>=2 or 4 and the module is registered on some network cell.
\<lac\> and\<rac\> values will change \<tac\> and \<mme_code\> values in LTE.

AT+CGREG=?

Test command returns supported values for parameter \<**mode**\>.

3.7.22. AT#SINGLEAPNSWITCH - set APN param change

This command sets APN param change.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#SINGLEAPNSWITCH=<mode>

If it is enabled and an APN network identifier or APN-related parameter is updated, Modem can re-activate PDN context with changed APN if there are no application working on the activated PDN context and APN name is changed. If the PDN context is for LTE attach, UE will attempt to reattach with changed APN. In other systems, this command works as if it is disabled.

If it is disabled, the changed APN will go into effect at the moment when the PDN context is deactivated and then re-activated. Power recycling is one of operations that will have new APN activated.

Parameter:

Name	Type	Default	Description
<mode>	integer	1	Set enable or disable
	Values:		
	0 : Disable		
	1 : Enable		

AT#SINGLEAPNSWITCH?

Read command reports current configuration.

AT#SINGLEAPNSWITCH=?

Test command reports the supported range of values.

3.8.   SIM

3.8.1.   AT+CPIN - Enter the PIN

The command sends to the device a password which is necessary before it can be operated.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT+CPIN=<pin>[,<newpin>]

Set command sends to the device a password which is necessary before it can be operated (SIM PIN, SIM PUK, PH-SIM PIN, etc.). If the PIN required is SIM PUK or SIM PUK2, the **<newpin>** is required. The **<newpin>** will replace the old pin in the SIM.

Parameters:

Name	Type	Default	Description
<pin>	string	-	PIN required or old PIN if the command is used to change the SIM PIN
<newpin>	string	-	new PIN that will replace old pin

AT+CPIN?

Read command reports the PIN/PUK/PUK2 request status of the device in the form:

+CPIN: <code>

Additional info:

▶▶   Parameters:

Name	Type	Default	Description
<code>	string	N/A	PIN/PUK/PUK2 request status code

Values:

READY	:	ME is not pending for any password
SIM PIN	:	ME is waiting SIM PIN to be given
SIM PUK	:	ME is waiting SIM PUK to be given
PH-SIM PIN	:	ME is waiting phone-to-SIM card password to be given
PH-FSIM PIN	:	ME is waiting phone-to-very first SIM card password to be given
PH-FSIM PUK	:	ME is waiting phone-to-very first SIM card unblocking password to be given
SIM PIN2	:	ME is waiting SIM PIN2 to be given; this <code> is returned only when the last executed command

		resulted in PIN2 authentication failure (i.e. +CME ERROR: 17)
SIM PUK2	:	ME is waiting SIM PUK2 to be given; this <code> is returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR: 18)
PH-NET PIN	:	ME is waiting network personalization password to be given
PH-NET PUK	:	ME is waiting network personalization unblocking password to be given
PH-NETSUB PIN	:	ME is waiting network subset personalization password to be given
PH-NETSUB PUK	:	ME is waiting network subset personalization unblocking password to be given
PH-SP PIN	:	ME is waiting service provider personalization password to be given
PH-SP PUK	:	ME is waiting service provider personalization unblocking password to be given
PH-CORP PIN	:	ME is waiting corporate personalization password to be given
PH-CORP PUK	:	ME is waiting corporate personalization unblocking password to be given

ℹ️ Pin pending status at startup depends on PIN facility setting; to change or query the default power up setting use the command **AT+CLCK**.

AT+CPIN=?

Test command returns **OK** result code.

AT+CMEE=1
OK

AT+CPIN?
+CME ERROR: 10   //error: you have to insert the SIM

AT+CPIN?
+CPIN: READY   //you inserted the SIM and module is not waiting for PIN
OK

3.8.2. AT+CPINR - Remaining PIN Retries

This command returns the number of remaining PIN retries for the MT passwords.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CPINR[=[<sel_code>]]

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

The intermediate response format is:

+CPINR: <code>,<retries>,<default_retries>

Parameter:

Name	Type	Default	Description
<sel_code>	string	-	These values are strings and shall be indicated within double quotes. It is optional to support wildcard match by '*', meaning match any (sub-)string.

Additional info:

► One line with one intermediate result code is returned for every **<code>** selected by **<sel_code>**.

Name	Type	Default	Description
<code>	string	-	type of PIN
<retries>	integer	-	number of remaining retries per PIN
<default_retries>	integer	-	number of default/initial retries per PIN

AT+CPINR=?

Test command returns the **OK** result code.

```
AT+CPINR="SIM*"
+CPINR: SIM PIN,3,3
+CPINR: SIM PUK,10,10
+CPINR: SIM PIN2,0,3
+CPINR: SIM PUK2,2,10

OK
AT+CPINR="*SIM*"
+CPINR: SIM PIN,3,3
+CPINR: SIM PUK,10,10
+CPINR: SIM PIN2,0,3
+CPINR: SIM PUK2,2,10
+CPINR: PH-FSIM PIN,10,10
+CPINR: PH-FSIM PUK,0,0

OK
```

3.8.3. AT+ICCID - Read ICCID

Execution command reads on SIM the Integrated Circuit Card Identification (ICCID). It is the card identification number that provides a unique identification number for the SIM.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+ICCID
The command returns the following message:

+ICCID: <ICCID>

AT+ICCID=?
Test command returns the **OK** result code.

AT+ICCID
+ICCID: 89861109091740011006

OK

3.8.4. AT+CIMI - International Mobile Subscriber Identity (IMSI)

This command returns the International Mobile Subscriber Identity (IMSI).

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CIMI

Execution command returns the value of the International Mobile Subscriber Identity stored in the SIM without command echo.

ℹ️ If the SIM is not inserted, the command returns **ERROR**.

AT+CIMI=?

Test command returns **OK** result code.

AT+CIMI
22201701202507
OK

3.8.5. AT+CRSM - Restricted SIM access

The command transmits to the UICC some specific commands and their required parameters.

3GPP TS 11.11/51.011
3GPP TS 27.007
ETSI TS 102 221

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CRSM=<command>[,<fileId>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]

Set command transmits to the MT the SIM <**command**> and its required parameters. The MT handles internally all SIM-MT interface locking and file selection routines. As response to the command, MT sends the actual SIM information parameters and response data. The response of the command is in the format:

+CRSM: <sw1>,<sw2>[,<response>]

For parameters meanings see Additional info section.

Parameters:

Name	Type	Default	Description
<command>	integer	N/A	command passed on by the MT to the SIM
	Values:		
	176	:	READ BINARY
	178	:	READ RECORD
	192	:	GET RESPONSE
	214	:	UPDATE BINARY
	220	:	UPDATE RECORD
	242	:	STATUS
<fileId>	integer	-	identifier of an elementary data file on SIM. Mandatory for every command except STATUS.
<P1>	integer	N/A	parameter passed on by the MT to the SIM. It is mandatory for every command except GET RESPONSE and STATUS.
	Value:		
	0÷255	:	parameter passed on by the MT to the SIM
<P2>	integer	N/A	parameter passed on by the MT to the SIM. It is mandatory for every command except GET RESPONSE and STATUS.
	Value:		
	0÷255	:	parameter passed on by the MT to the SIM
<P3>	integer	N/A	parameter passed on by the MT to the SIM. It is mandatory for every command except GET RESPONSE and STATUS.

Value:

	0÷255	:	parameter passed on by the MT to the SIM
<data>	string	-	information which shall be written to the SIM (hexadecimal character format).
<pathid>	string	-	contains the path of an elementary file on the SIM/UICC in hexadecimal format. This shall only be used in the mode "select by path from MF" (e.g. "7F205F70").

Additional info:

▶▶ Response data fields:

Name	Type	Default	Description
<sw1>	integer	-	information from the SIM about the execution of the actual command (successful or failed)
<sw2>	integer	-	information from the SIM about the execution of the actual command (successful or failed)
<response>	hex	-	response of a successful completion of the command previously issued (hexadecimal character format). STATUS and GET RESPONSE return data, which gives information about the current elementary data field. This information includes the type of file and its size. After READ BINARY, READ RECORD or RETRIEVE DATA command the requested data will be returned. **<response>** is not returned after a successful UPDATE BINARY, UPDATE RECORD or SET DATA command.

🛈 Use only decimal numbers for parameters <**command**>, <**fileid**>, <**P1**>, <**P2**> and <**P3**>.

?▯ **AT+CRSM=?**

Test command returns the **OK** result code.

Read binary, ICCID(2FE2)

AT+CRSM=176,12258,0,0,10
+CRSM: 144,0,982850702001107686F4
OK

Read record, ADN(6F3A)

AT+CRSM=178,28474,1,4,40
+CRSM: 144,0,42434A554EFFFFFFFFFFFFFFFFFFFFFFFF06811056789282FFFFFFFFFFFFFF
OK

Update Binary, KcGPRS(6F52)

AT+CRSM=214,28539,0,0,8,C69018C7958C87
+CRSM: 144,0
OK

Update Record, ADN(6F3A)

AT+CRSM=220,28474,9,4,30,657469FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFF
+CRSM: 144,0
OK

Status, FPLMN(6F7B)

AT+CRSM=242,28539
+CRSM:144,0,623C820238218410A0000000871002FFFFFFFF89040300FFA51180013181030
10A3282011E8304000030E08A01058B032F0609C6099001C0830101830181
OK

Get Response, MSISDN(6F40)

AT+CRSM=192,28480
+CRSM:
144,0,621E8205422100260283026**F40A5039201008A01058B036F06058002004C8800**
OK

3.8.6.   AT+CSIM - Generic SIM Access

This command sends a generic command to the UICC.

[1] 3GPP TS 11.11
[2] 3GPP TS 31.101
[3] 3GPP TS 31.102

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CSIM=<length>,<command>

Set command transmits to the MT the <**command**>, it then shall send as it is to the UICC. As response to the command, MT sends back the actual UICC <**response**> to the TA as it is. The response message of the command is in the format:

+CSIM: <length>,<response>

Error case:
+CME ERROR: <err>

The response messages parameters are described in the Additional info section.

Parameters:

Name	Type	Default	Description
<length>	integer	-	characters number of the <command> sent to UICC (two times the actual length of the command)
<command>	string	-	command passed on by the MT to the UICC in the format as described in standard [1] or [2] (hexadecimal character format, refer to **+CSCS**)

Additional info:

▶▶ List of the meaning of the response messages parameters.

Name	Type	Default	Description
<length>	integer	-	characters number of the <response> sent to TE (two times the actual length of the response)
<response>	string	-	response to the command passed on by the UICC to the TE in the format as described in standard [1] or [2] (hexadecimal character format)
<err>	string	-	error values (numeric format followed by verbose format)

AT+CSIM=?

Test command returns the **OK** result code.

AT+CSIM=<lock>

This special form of the command has no effect and is kept only for backward compatibility.

Parameters:
<**lock**>=1 locking of the interface
<**lock**>=0 unlocking of the interface

- 2G SIM, see standard [1]:
  STATUS
  AT+CSIM=10,A0F2000016
  +CSIM:48,"000002A87F200200000000000099300220800838A838A9000"
  OK

  SELECT EF 6F07
  AT+CSIM=14,A0A40000026F07
  +CSIM: 4,"9F0F"
  OK

  GET RESPONSE
  AT+CSIM=10,A0C000000F
  +CSIM: 34,"000000096F0704001A001A010200009000"
  OK

  SELECT EF 6F30
  AT+CSIM=14,A0A40000026F30
  +CSIM: 4,"9F0F"
  OK

  READ BINARY
  AT+CSIM=10,A0B00000FC
  +CSIM:508,"FFFFFF13008313009013005413003013006513003813008013018013
  00011311091301301300981300771300591300431300811300951301401300231 3
  0016330420130041FFFFFFFFFFFF21436542F41922F28822F201FFFFFFFFFFFF
  FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
  FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
  FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
  FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
  FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
  FFFFFFFFFFFFFFFFFFFF9000"
  OK

3.8.7.   AT+CCHO - Open Logical Channel

Open Logical Channel

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CCHO=\<dfname>

Execution 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 **\<sessionId>** as the response. The ME shall restrict the communication between the TE and the UICC to this logical channel.

The response message of the command is in the format:
+CCHO: \<sessionId>

The **\<sessionId>** is described in the Additional info section.

Error case:
+CME ERROR: \<err>

Parameter:

Name	Type	Default	Description
\<dfname>	string	-	all selectable applications in the UICC are referenced by a DF name coded on 1 to 16 bytes

Additional info:

▶▶   Response parameter

Name	Type	Default	Description
\<sessionId>	integer	-	a session Id to be used in order to target a specific application on the smart card (e.g. (U)SIM, WIM, ISIM) using logical channels mechanism

ℹ The logical channel number is contained in the CLASS byte of an APDU command, thus implicitly contained in all APDU commands sent to a UICC. In this case it will be up to the MT to manage the logical channel part of the APDU CLASS byte and to ensure that the chosen logical channel is relevant to the **\<sessionId>** indicated in the AT command.

ℹ This **\<sessionId>** is to be used when sending commands with Generic UICC Logical Channel access **+CGLA** commands.

AT+CCHO=?

Test command returns the **OK** result code.

3.8.8. AT+CCHC - Close Logical Channel

Close Logical Channel

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CCHC=<sessionId>

Execution command asks the ME to close a communication session with the active UICC. The ME shall close 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.

Error case:
+CME ERROR: <err>

Parameter:

Name	Type	Default	Description
<sessionId>	integer	-	a session Id to be used in order to target a specific application on the smart card (e.g. (U)SIM, WIM, ISIM) using logical channels mechanism

AT+CCHC=?

Test command returns the **OK** result code.

3.8.9. AT+CGLA - Generic UICC Logical Channel Access

This command is used to control the currently selected UICC on the TE.

3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CGLA=\<sessionId>,\<length>,\<command>

Set command transmits to the MT the **\<command>** it then shall send as it is to the selected UICC. In the same manner the UICC **\<response>** shall be sent back by the MT to the TA as it is. This command allows a direct control of the currently selected UICC by a distant application on the TE. The TE shall then take care of processing the received UICC information.

The response of the command is in the format:

+CGLA: \<length>,\<response>

Error case:
+CME ERROR: \<err>

The response messages parameters are described in the Additional info section.

Parameters:

Name	Type	Default	Description
\<sessionId>	integer	-	the identifier of the session to be used in order 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	-	length of the characters that are sent to TE in **\<command>** (two times the actual length of the command)
\<command>	string	-	command passed on by the MT to the UICC in the format as described in 3GPP TS 31.101 (hexadecimal character format; refer **+CSCS**).

Additional info:

▶▶ List of the meaning of the response messages parameters.

Name	Type	Default	Description
\<length>	integer	-	length of the characters that are sent to TE in the **\<response>** (two times the actual length of the response)
\<response>	string	-	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; refer **+CSCS**).

<err>	string	-	error values (numeric format followed by verbose format)

AT+CGLA=?

Test command returns the **OK** result code.

3.8.10. AT+CUAD - UICC Application Discovery

This command asks the MT to discover what applications are available for selection on the UICC.

> 3GPP TS 27.007
> ETSI TS 102.221

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT+CUAD

This command asks the MT to discover what applications are available for selection on the UICC. The ME shall access and read the EF_{DIR} file in the UICC and return the values that are stored in the records.

Response syntax:
+CUAD: <response>

The parameter is described in the Additional info section.

Additional info:

▶▶ the parameter meaning

Name	Type	Default	Description
<response>	string	-	the content of the EF_{DIR}; hexadecimal character format

AT+CUAD=?

Test command returns the **OK** result code.

3.8.11. AT#QSS - Query SIM Status

Query SIM Status.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT#QSS=<mode>

Set command enables/disables the query SIM status unsolicited indication in the ME. The format of the unsolicited indication is the following:

#QSS: <status>,<active_slot>

Parameter:

Name	Type	Default	Description
<mode>	integer	0	type of the notification

Values:

0 : disabled; It is only possible to query the current SIM status through read command.

1 : enabled; The ME informs SIM status change through the basic unsolicited indication where <status> range is 0...1.

2 : enabled; The ME informs SIM status change through the basic unsolicited indication where <status> range is 0...3.

Unsolicited fields:

Name	Type	Description
<status>	integer	current SIM status

Values:

0 : SIM not inserted

1 : SIM inserted

2 : SIM inserted and PIN unlocked

3 : SIM inserted and READY (SMS and Phonebook access are possible)

<active_slot>	integer	current active SIM slot

Values:

0 : SIM slot1

1 : SIM slot2

ℹ️ It is strongly suggested to set **<mode>**=2 and save the value in the user profile, then power off the module. The proper SIM status will be available at the next power on.

AT#QSS?

Read command reports whether the unsolicited indication **#QSS** is currently enabled or not, along with the SIM status, in the format:

#QSS: <mode>,<status>,<active_slot>

AT#QSS=?

Test command returns the supported range of values for parameter <**mode**>.

If AT#SIMDET=0,
AT#QSS?
#QSS:0,1,0
OK

If AT#SIMDET=1,
AT#QSS?
#QSS: 0,1,1
OK

3.8.12.   AT#SIMDET - SIM Detection Mode

This command specifies the SIM detection mode.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Common profile	No	-	2

AT#SIMDET=<mode>

Set command specifies the SIM detection mode.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	SIM detection mode

Values:

0 :   switch to SIM slot1

1 :   switch to SIM slot2

AT#SIMDET?

Read command returns the currently selected SIM detection mode in the format:

#SIMDET: <mode>,<simin>

Additional info:

▶▶   Response parameters

Name	Type	Default	Description
<mode>	integer	-	SIM detection mode
<simin>	integer	N/A	SIMIN pin real status

Values:

0 :   SIM is not inserted

1 :   SIM is inserted

ⓘ   If no SIMIN pin supported in product, <**simin**> will always be '0'.

AT#SIMDET=?

Test command reports the supported range of values for parameter <**mode**>.

3.8.13.   AT+CSUS - Set card slot

This command selects the SIM card installed in the indicated card slot.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT+CSUS=<slot>

Set command directs the MT to select the SIM card installed in the indicated card slot.

Parameter:

Name	Type	Default	Description
<slot>	integer	0	Slot information
	Values:		
	0 : Slot 0		
	1 : Slot 1		

AT+CSUS?

Read command returns the currently selected card slot.
AT+CSUS?
+CSUS: <slot>
OK

AT+CSUS=?

Test command reports the supported range of values for parameters **<slot>.**

3.8.14.   AT#SIMSELECT - SIM Slot Switch

SIM Slot Switch

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#SIMSELECT=<slot>

Set command selects to activate one of the two SIM slots to support Dual SIM Single Standby (DSSS).

Parameter:

Name	Type	Default	Description
<slot>	integer	1	SIM slot
	Values:		
	1 : SIM slot 1		
	2 : SIM slot 2		

> To select SIM slot 2 on LE910Cx series, SIM slot 2 must be activated by **AT#ENSIM2** command (**AT#ENSIM2=1**).

AT#SIMSELECT?

Read command reports the activate SIM slot, in the format:

#SIMSELECT: <slot>

AT#SIMSELECT=?

Test command reports the supported range of values for parameter <**slot**>.

3.8.15. AT#SIMPR - SIM Presence Status

This command enables/disables the SIM presence status unsolicited indication.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT#SIMPR=<mode>

Set command enables/disables the SIM presence status unsolicited indication in the ME. If notification is enabled, the ME informs the SIM status change through the following URC:

#SIMPR: <active_SIM>,<status>

Parameter:

Name	Type	Default	Description
<mode>	integer	0	type of the notification

Values:

0 : disabled; It's possible only to query the current SIM status through read command.

1 : enabled; The ME informs the active SIM status change through the unsolicited indication.

Unsolicited fields:

Name	Type	Description
<active_SIM>	integer	current active SIM slot

Values:

0 : SIM slot1

1 : SIM slot2

Name	Type	Description
<status>	integer	current SIM status

Values:

0 : SIM not inserted

1 : SIM inserted

AT#SIMPR?

Read command reports the SIM presence status, both SIM slot1 and slot2, in the following format:

#SIMPR: <mode>,0,<status><CR><LF>
#SIMPR: <mode>,1,<status>

AT#SIMPR=?

Test command reports the range for the parameter <**mode**>.

If no SIMIN pin supported in product, **<status>** will always be '0'.

If SIMIN pin are supported and SIM are inserted in both SIM slot1 and slot2,
AT#SIMPR?
#SIMPR: 0,0,1
#SIMPR: 0,1,1

OK

3.8.16.   AT#HSEN - Hot-Swap Enable

This command enables/disables the hot-swap function on SIM slot.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#HSEN=<mode>,<slot>

Set command enables/disables the hot-swap function on SIM slot.

Parameters:

Name	Type	Default	Description
<mode>	integer	0	hot-swap mode
	Values:		
	0	:	disable
	1	:	enable
<slot>	integer	N/A	SIM slot
	Values:		
	0	:	SIM slot1
	1	:	SIM slot2

> For PTCRB/GCF certification on the FN980 model, the default value of <**mode**> is 1 when **AT#FWSWITCH** is 0 or 1.
> Please set as disable if you want not to use this feature.

> If SIMIN pin is not connected, <**mode**> should be set to 0.

AT#HSEN?

Read command reports the hot-swap status on SIM slot, in the format:

#HSEN: <mode>,0<CR><LF>
#HSEN: <mode>,1

AT#HSEN=?

Test command reports the supported range of values for parameter <**mode**> and <**slot**>.

> If SIMIN pin is not connected, the hot-swap function cannot be supported.

SIMIN pin is connected and SIM is inserted in SIM slot1.
AT#HSEN?
#HSEN: 0,0
#HSEN: 0,1
OK
AT#SIMPR?
#SIMPR: 1,0,1
#SIMPR: 1,1,0
OK

Enable the hot-swap function of SIM slot1.
AT#HSEN=1,0
OK
AT#REBOOT
OK
AT#HSEN?
#HSEN: 1,0
#HSEN: 0,1
OK

Remove SIM card on SIM slot 1.
#SIMPR: 0,0

Insert SIM card on SIM slot 1.
#SIMPR: 0,1

3.8.17. AT#SIMINCFG - SIMIN Pin Configuration

This command configures the SIM detection mode on the SIMIN pin.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#SIMINCFG=<SIM_id>,<SIMIN_det_mode>

Set command sets the SIM detection mode on the SIMIN pin to detect the presence of a SIM.

Parameters:

Name	Type	Default	Description
<SIM_id>	integer	N/A	SIM slot index

Values:

1 : SIM slot1

2 : SIM slot2

Name	Type	Default	Description
<SIMIN_det_mode>	integer	1	status of SIMIN pin for SIM detection

Values:

0 : SIMIN pin LOW means SIM inserted, HIGH means SIM removed (for normal SIM holder).

1 : SIMIN pin LOW means SIM removed, HIGH means SIM inserted (for micro SIM holder)

AT#SIMINCFG?

Read command reports the detection mode of the configured SIMIN pin in the format:

#SIMINCFG: 1,<SIMIN_det_mode><CR><LF>
#SIMINCFG: 2,<SIMIN_det_mode>

AT#SIMINCFG=?

Test command reports supported values of parameters **<SIM_id>** and **<SIMIN_det_mode>**.

> If SIMIN pin is not connected, the hot-swap function cannot be supported.

SIM is inserted in card slot1. The SIMIN is GND when SIM is inserted.
AT#SIMINCFG=1,0
OK
AT#SIMINCFG=2,0
OK
AT#REBOOT
OK
AT#SIMPR?
#SIMPR: 0,0,1
#SIMPR: 0,1,0
OK

Remove SIM in card slot1.
AT#SIMPR?
#SIMPR: 0,0,0
#SIMPR: 0,1,0
OK

SIM is inserted in card slot1. The SIMIN is GND when SIM is not inserted.
AT#SIMINCFG=1,1
OK
AT#SIMINCFG=2,1
OK
AT#REBOOT
OK
AT#SIMPR?
#SIMPR: 0,0,1
#SIMPR: 0,1,0
OK

Remove SIM in card slot1.
AT#SIMPR?
#SIMPR: 0,0,0
#SIMPR: 0,1,0
OK

3.8.18. AT+CSUPI - Request 5G subscription permanent identifier

Request 5G subscription permanent identifier.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT+CSUPI

Execution command causes the TA to return **<SUPI>**, which is intended to permit the TE to identify the individual USIM card or active application in the UICC which is attached to 5G MT.

Additional info:

▶▶ The command returns the following message:
<SUPI>

Name	Type	Default	Description
<SUPI>	string	-	5G subscription permanent identifier (string without double quotes).

AT+CSUPI=?

Test command returns the **OK** result code.

3.8.19. AT#ESIMUPN - Updates the nickname

This command updates the nickname of the requested profile.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT#ESIMUPN=\<slot\>,\<profile_id\>,\<nickname\>

Set command updates the nickname of the requested profile. If the nickname is missing or has zero length, the nickname is removed from profile.

Parameters:

Name	Type	Default	Description
\<slot\>	integer	N/A	Slot information
	Values:		
	1 :	Slot 1	
	2 :	Slot 2	
\<profile_id\>	integer	N/A	Profile ID information
	Values:		
	1 :	profile 1	
	2 :	profile 2	
	3 :	profile 3	
	4 :	profile 4	
	5 :	profile 5	
	6 :	profile 6	
	7 :	profile 7	
	8 :	profile 8	
\<nickname\>	string	-	Nickname information, supported 0 ~ 64 character string.

AT#ESIMUPN=?

Test command reports the supported range of values for parameters **\<slot\>**,**\<profile_id\>**.

3.8.20. AT#ESIMPFINFO - Provides the profile data

This command provides the profile data for the profile ID.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT#ESIMPFINFO=<slot>,<profile_id>

Set command provides the profile data for the profile ID in request.

Parameters:

Name	Type	Default	Description
<slot>	integer	N/A	Slot information
	Values:		
	1 :	Slot 1	
	2 :	Slot 2	
<profile_id>	integer	N/A	Profile ID information
	Values:		
	1 :	profile 1	
	2 :	profile 2	
	3 :	profile 3	
	4 :	profile 4	
	5 :	profile 5	
	6 :	profile 6	
	7 :	profile 7	
	8 :	profile 8	

Additional info:

▶▶ Response:

#ESIMPFINFO:
<iccid>,<profile_state>,<profile_nickname>,<profile_spn>,<profile_name>,<profile_class>,<profile_rules>

Name	Type	Default	Description
<iccid>	integer	-	Card identification number
<profile_state>	integer	N/A	Profile state information
	Values:		
	0 :	inactive profile	
	1 :	active profile	
<profile_nickname>	string	-	Nickname of profile
<profile_spn>	string	-	The profile service provider

<profile_name>	string	-	Name of profile
<profile_class>	integer	N/A	Profile class information

Values:

0	:	Test profile
1	:	Provisioning profile
2	:	Operational profile

<profile_rules>	integer	-	Indicates the profile policy rules applicable for this profile. If this parameter is missing, it indicates there is no profile policy rule associated with this profile.

AT#ESIMPFINFO=?

Test command reports the supported range of values for parameters **<slot>**,**<profile_id>**

3.8.21.   AT#ESIMPF - Manage the profiles

This command queries, switches or deletes the profiles supported by the card.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT#ESIMPF=<mode>,<slot>[,<profile_id>[,<enable_profile>]]

Set command queries, switches or deletes the profiles supported by the card. The response contains a list of profiles supported by the card and profile information of the currently active profile.

Parameters:

Name	Type	Default	Description
<mode>	integer	N/A	mode information
	Values:		
	0	:	queries the profiles
	1	:	switches the profiles
	2	:	deletes the profiles
<slot>	string	N/A	Slot information
	Values:		
	1	:	Slot 1
	2	:	Slot 2
<profile_id>	integer	N/A	profile ID information
	Values:		
	1	:	profile 1
	2	:	profile 2
	3	:	profile 3
	4	:	profile 4
	5	:	profile 5
	6	:	profile 6
	7	:	profile 7
	8	:	profile 8
<enable_profile>	integer	N/A	Profile enable or not
	Values:		
	0	:	disable the profile
	1	:	enable the profile

Additional info:

▶▶ If you want queries the profile, only two parameters **<mode>** and **<slot>** are needed. The return value is as follow.
Response about queries the profile:

#ESIMPF: <profile_id>,<profile_type>

Name	Type	Default	Description
<profile_type>	integer	N/A	Profile type information

Values:

0 : Profile type regular

1 : Profile type emergency

▶▶ If you want deletes the profile, only three parameters **<mode>**, **<slot>** and **<profile_id>** are needed. The return value is OK or ERROR.

▶▶ If you want switches the profile, all parameters are needed. The return value is OK or ERROR.

AT#ESIMPF=?

Test command reports the supported range of values for parameters **<mode>**,**<slot>**,**<profile_id>**,**<enable_profile>**

Profile query:
AT#ESIMPF=0,1
#ESIMPF: 1,0
#ESIMPF: 2,0
OK
Switches the profile:
AT#ESIMPF=1,1,2,1
OK
Deletes the profile:
AT#ESIMPF=2,1,1
OK

3.8.22. AT#ESIMADDPF - Allows download a new profile

This command allows the eUICC card to download a new profile based on the activation code and confirmation code provided.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#ESIMADDPF=<slot>,<act_code>[,<conf_code>[,<user_consent>]]

Set command allows the eUICC card to download a new profile based on the activation code and confirmation code provided.

Indication during profile download:

#ESIMADDPF:
<slot>,<status>[,<error_cause>,<percentage>,<pp_rule>,<user_consent_needed>]

Parameters:

Name	Type	Default	Description
<slot>	integer	1	Slot information
	Values:		
	1	:	Slot 1
	2	:	Slot 2
<act_code>	string	-	Indicated the activation code required for downloading a profile.
<conf_code>	string	-	Indicated the confirmation code required for downloading a profile.
<user_consent>	integer	0	Indicates whether the control point is able to support a request for consent from the user.
	Values:		
	0	:	User consent not supported
	1	:	User consent supported

Unsolicited fields:

Name	Type	Description
<slot>	integer	Slot information
<status>	integer	Indicates the status of profile download and install.
		Values:
		1 : Profile download error
		2 : Profile download in progress with download percentage.
		3 : Profile download is complete, and installation is in progress.
		4 : Profile installation is complete.
		5 : User consent is required for proceeding with download/installation of profile.
<error_cause>	integer	Indicates the cause of the download error.

Values:

1	:	Profile download generic error.
2	:	Profile download error from the SIM card.
3	:	Profile download error from the network.
4	:	Profile download error no memory on terminal.
5	:	Profile download error unsupported profile class.
6	:	Profile download error profile policy rules not allowed.

\<percentage\>	integer	Percentage of download/installation done.
\<pp_rule\>	integer	Indicates the profile policy rules for this profile.
\<user_consent_needed\>	integer	Indicates whether user consent is required or not.

AT#ESIMADDPF=?

Test command reports the supported range of values for parameters **\<slot\>**,**\<user_consent\>**

3.8.23.   AT#ESIMID - Provides the EUICC ID

This command provides the unique ID number for the eUICC card present in the slot.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#ESIMID=<slot>

Set command provides the unique ID number for the eUICC card present in the slot.

Parameter:

Name	Type	Default	Description
<slot>	integer	N/A	Slot for which the EID is requested
	Values:		
	1 : Slot 1		
	2 : Slot 2		

Additional info:

▶▶   Response:
#ESIMID: <eid_value>

Name	Type	Default	Description
<eid_value>	hex	-	The EID value

AT#ESIMID=?

Test command reports the supported range of values for parameters **<slot>**

3.8.24. AT#ESIMGETADDR - Configures the default SM-DP+ address

This command configures the default SM-DP+ address on the eUICC.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT#ESIMGETADDR=<slot>[,<default_smdp_addr>]

Set command configures the default SM-DP+ address on the eUICC.

Parameters:

Name	Type	Default	Description
<slot>	integer	-	Slot information
<default_smdp_addr>	string	-	Support 0 ~ 255 character string. Indicates the address that must be configured on the eUICC as the default SM-DP+ address.

Additional info:

▶▶ If **<default_smdp_addr>** is set to 0, the command removes the default SM-DP+ address from the eUICC

▶▶ If the Default SM-DP+ Address is missing, the command retrieves the default SM-DS address configured on the eUICC. It can also return the default SM-DP+ address if it is configured on the eUICC.
Response:
#ESIMGETADDR: <default_smds_address>,<default_smdp_addr>

Name	Type	Default	Description
<default_smds_address>	string	-	default SM-DS address

AT#ESIMGETADDR=?

Test command reports the supported range of values for parameters **<slot>**

3.8.25. AT#ESIMPFUC - Provides the user consent

This command provides the user consent to the service which is required for proceeding with the profile download/installation operation after receiving a UIM_ADD_PROFILE_IND indication with status set to UIM_PROFILE_USER_CONSENT_REQUIRED.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#ESIMPFUC=<slot>,<user_consent>

Set command provides the user consent to the service which is required for proceeding with the profile download/installation operation after receiving a UIM_ADD_PROFILE_IND indication with status set to UIM_PROFILE_USER_CONSENT_REQUIRED.

Parameters:

Name	Type	Default	Description
<slot>	integer	N/A	Slot information
			Values:
	1 : Slot 1		
	2 : Slot 2		
<user_consent>	integer	N/A	User consent information
			Values:
	0 : Not OK for profile operation		
	1 : OK for profile operation		

AT#ESIMPFUC=?

Test command reports the supported range of values for parameters **<slot>,<user_consent>**

3.8.26.   AT#ESIMCAP - Sets or gets the terminal capability

This command allows the client to set the contents of the TERMINAL CAPABILITY command that is sent to the card as part of card initialization procedure.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT#ESIMCAP=<slot>[,<tag>,<value>,<remove_tlv>]

Set command allows the client to set the contents of the TERMINAL CAPABILITY command that is sent to the card as part of card initialization procedure. The configuration set by this command is applicable only from the next card initialization.

Parameters:

Name	Type	Default	Description
<slot>	integer	N/A	Slot information
			Values:
	1 :	Slot 1	
	2 :	Slot 2	
<tag>	integer	N/A	Terminal capability tag, according to ETSI TS 102.221. The service allows the client to update only certain tags including
			Values:
	82 :	additional interface support	
	83 :	eUICC-related capabilities	
<value>	integer	-	Value of the terminal capability.
<remove_tlv>	integer	N/A	Indicates whether this TLV should be removed from the terminal capability that is sent to the card. When this is set to TRUE, the value field is ignored.
			Values:
	0 :	not remove the terminal capability	
	1 :	remove the terminal capability, the value field is ignored	

Additional info:

▶▶   In case **<tag>** is '82':

Name	Type	Default	Description
<value>	integer	N/A	Value of the terminal capability.
	Values:		
	0 :	UICC-CLF interface according to ETSI TS 102.613 not supported	
	1 :	UICC-CLF interface according to ETSI TS 102.613 supported	

▶▶ In case **<tag>** is '83':

Name	Type	Default	Description
<value>	integer	N/A	unsigned Integer used as a bit field, according to GSMA SGP.22 0 … 255 - used as a bit field: **bit1:** 0 - Local User Interface in the Device (LUId) not supported 1 - Local User Interface in the Device (LUId) supported **bit2:** 0 - Local Profile Download in the Device (LPDd) not supported 1 - Local Profile Download in the Device (LPDd) supported **bit3:** 0 - Local Discovery Service in the Device (LDSd) not supported 1 - Local Discovery Service in the Device (LDSd) supported **bit4**: 0 - LUIe based on SCWS not supported 1 - LUIe based on SCWS supported **bit5 to 8**: reserved for future.

Value:

    0÷255   :   eUICC-related capabilities

▶▶ If there is only **<slot>** parameter in set command, this command returns Terminal Capability set in card as follows:
Response:
#ESIMCAP: <terminal_cap_len>,< tag >,<value>,<tag>,<value> ……

Name	Type	Default	Description
<terminal_cap_len>	integer	-	number of sets of **<tag>** and **<value>**
<tag>	integer	N/A	Terminal capability tag, according to ETSI TS 102.221. The service allows the client to update only certain tags including.

Values:

    80   :   Terminal power supply

    81   :   Extended logical channels terminal support

    82   :   additional interface support

    83   :   eUICC-related capabilities

Name	Type	Default	Description
<value>	mixed	-	In case **<tag>** is '80': **<value>** - Hex value, within the constructed TLV object.

First byte - Actual used supply voltage class

Second byte - Maximum available power supply of the terminal ('0A' to '3C')

Third byte - Actual used clock frequency ('0A' to 'FF')

In case **<tag>** is '81':

<value> - The extended logical channels terminal support TLV with zero length. In order to allow future extension of this TLV.

? AT#ESIMCAP=?

Test command reports the supported range of values for parameters **<slot>**,**<tag>**,**<remove_tlv>**.

3.8.27. AT#ESIMMEMRST - Resets the eUICC card

This command resets the eUICC card present on given slot based on the provided option.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#ESIMMEMRST=<slot>,<option_1>,<option_2>,<option_3>

Set command resets the eUICC card present on given slot based on the provided option. If two or more options are set, the action is taken for all those set options.

Parameters:

Name	Type	Default	Description
<slot>	integer	N/A	Slot information
	Values:		
	1 : Slot 1		
	2 : Slot 2		
<option_1>	integer	N/A	Option 1
	Values:		
	0 : do not action		
	1 : delete all the test profiles		
<option_2>	integer	N/A	Option 2
	Values:		
	0 : do not action		
	1 : delete all operational profiles		
<option_3>	integer	N/A	Option 3
	Values:		
	0 : do not action		
	1 : reset the default SM-DP+ address		

AT#ESIMMEMRST=?

Test command reports the supported range of values for parameters **<slot>**,**<option_1>**,**<option_2>** and **<option_3>**

3.9. SIM Toolkit

3.9.1. AT#STIA - SIM/USIM Toolkit Interface Action

The SIM/USIM Application Toolkit (SAT/USAT) provides an interface to the applications existing in the SIM/USIM device. The module must support the mechanisms required by the SIM/USIM applications.

[1] 3GPP TS 23.038
[2] 3GPP TS 31.111
[3] Telit SIM/USIM Application Toolkit Application Note

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Specific profile	No	-	2

AT#STIA=[<mode>[,<timeout>]]

Set command is used to enable/disable the SIM/USIM Application Toolkit (SAT/USAT). In addition, the command can enable the URCs sending.

Parameters:

Name	Type	Default	Description
<mode>	integer	1	enables/disables SAT/USAT.
			In addition, <**mode**> parameter enables the:
			- **#STN** URCs notifying the user that the SIM/USIM application has issued a proactive command. Some proactive commands require a user response.
			- **#STN** URCs that are the SIM/USIM device responses concerning actions initiated by the user, refer to Additional info section.
			If <**mode**>=2, the URC format depends on the <**cmdType**> as described in the Additional info sections. For <**cmdType**>, and all other URC parameters refer to **#STGI** command. The <**mode**> parameter values are listed below.

Values:

0	:	disable SAT/USAT
1	:	enable SAT/USAT without #STN URC
2	:	enable SAT/USAT and extended #STN URC
3	:	enable SAT/USAT and reduced #STN URC
17	:	enable SAT/USAT without #STN URC and the alphabet used
18	:	enable SAT/USAT, extended #STN URC, and the alphabet used
19	:	enable SAT/USAT, reduced #STN URC, and the alphabet used
33	:	enable SAT/USAT without #STN URC and the UCS2 alphabet used
34	:	enable SAT/USAT, extended #STN URC, and the UCS2 alphabet used
35	:	enable SAT/USAT, reduced #STN URC, and the UCS2 alphabet used

Name	Type	Default	Description
<timeout>	integer	2	When an ongoing proactive command, requiring a user response, is not answered before <**timeout**> minutes, it is automatically aborted. In this case, the terminal response from the module is either "ME currently unable to process

command" or, if applicable, "No response from user". In addition, the following URC is sent on the AT interface. For parameter meaning of the URC refer to Unsolicited fields section.

#STN:<cmdTerminateValue>

Value:

1,2   :   timeout expressed in minutes

Additional info:

▶▶   <**mode**>=3, the URC has the following reduced format:
     #STN: <cmdType>

▶▶   <**mode**>=2, and <**cmdType**>=1 (REFRESH), the URC has the following extended format:
     #STN: 1,<refreshType>

▶▶   <**mode**>=2, and <**cmdType**>=5 (SET UP EVENT LIST), the URC has the following extended format:
     #STN: 5[,<eventListMask>]

▶▶   <**mode**>=2, and <**cmdType**>=16 (SET UP CALL), the URC has the following extended format:
     #STN: 16,<cmdDetails>,[<confirmationText>],<calledNumber>

▶▶   <**mode**>=2, and one of the following proactive command:
     <**cmdType**>=17 (SEND SS)
     <**cmdType**>=18 (SEND USSD)
     <**cmdType**>=19 (SEND SHORT MESSAGE)
     <**cmdType**>=20 (SEND DTMF)
     <**cmdType**>=32 (PLAY TONE)
     <**cmdType**>=64 (OPEN CHANNEL)
     <**cmdType**>=65 (CLOSE CHANNEL)
     <**cmdType**>=66 (RECEIVE DATA)
     <**cmdType**>=67 (SEND DATA)

     the URC has the following extended format:
     #STN: <cmdType>[,<alphaIdentifier>]
     If <**cmdType**>=19 (SEND SHORT MESSAGE) fails, the **#STN: 119** URC is sent to the module.

▶▶   <**mode**>=2, and <**cmdType**>=33 (DISPLAY TEXT), the URC is sent if allowed by SIM/USIM, the extended format is:
     #STN: 33[,<cmdDetails>[,<alphaIdentifier>]]
     If bit 7 of <**cmdDetails**>=1, the response with the **#STSR** command is required.

▶▶ <**mode**>=2, and <**cmdType**>=34 (GET INKEY), the URC has the following extended format:
#STN: 34,<cmdDetails>,<text>

▶▶ <**mode**>=2, and <**cmdType**>=35 (GET INPUT), the URC has the following extended format:
#STN: 35,<cmdDetails>,<text>,<responseMin>,<responseMax>[,<defaultText>]

▶▶ <**mode**>=2, and <**cmdType**>=36 (SELECT ITEM), the URC has the following extended format:
the first line of output is:
#STN: 36,<cmdDetails>,<numOfItem>[,<titleText>]<CR><LF>
one line follows for every item, repeated <**numOfItems**> times:
#STN: 36,<itemId>,<itemText>[,<nextActionId>]

▶▶ <**mode**>=2, and <**cmdType**>=37 (SET UP MENU), the URC has the following extended format:
the first line of output is:
#STN: 37,<cmdDetails>,<numOfItem>,<titleText><CR><LF>
one line follows for every item, repeated for <**numOfItems**>:
#STN: 37,<itemId>,<itemText>[,<nextActionId>]

▶▶ <**mode**>=2, and <**cmdType**>=40 (SET UP IDLE MODE TEXT), the URC has the following extended format:
#STN: 40[,<idleModeTextString>]

▶▶ This Additional info section deals with the action initiated by the user (no proactive commands activated by the SIM/USIM device).
If the call control or SMS control facility present in the SIM/USIM device is activated, when the user application makes an outgoing call, or sends a SS or USSD, or a SMS, the following **#STN** URC could be sent to indicate whether the outgoing call has been accepted, rejected or modified by the SIM, or if the SMS service center address or destination has been changed. For parameters meaning refer to Unsolicited fields section.
#STN:
<cmdControlResponse>,<Result>[,<alphaIdentifier>[,<Number>[,<MODestAddr>]]]

Unsolicited fields:

Name	Type	Description
<cmdTerminateValue>	integer	is defined as <**cmdType**> + terminate offset. Terminate offset = 100

\<cmdControlResponse\>	integer	response of the SIM/USIM device	
		Values:	
		150	: SMS control response
		160	: call/SS/USSD response
\<Result\>	integer	identify the result of the Call or SMS control performed by SIM/USIM device	
		Values:	
		0	: Call/SMS not allowed
		1	: Call/SMS allowed
		2	: Call/SMS allowed with modification
\<alphaIdentifier\>	string	optional text provided by the SIM/USIM device in ASCII format	
\<Number\>	string	Called number, Service Center Address or SS String in ASCII format	
\<MODestAddr\>	string	MO destination address in ASCII format	

🛈 The settings are saved on user profile and available on following reboot. SIM/USIM Toolkit activation/deactivation is only performed at power on according to the saved setting.

🛈 If **AT#ENS=1**, the \<**mode**\> parameter is set to 2.

🛈 Just one instance at a time, the one which first issued **AT#STIA=\<mode\>** (with \<**mode**\> not equal to 0), is allowed to issue SAT/USAT commands, and this is valid till the same instance issues **AT#STIA=0**. After reboot, SAT/USAT can be used on another instance.

🛈 A typical SAT/USAT session on AT interface starts after an **#STN: 37** unsolicited code is received, if enabled (see above). At that point usually an **AT#STGI=37** command is issued (see **#STGI**), and after the SAT main menu has been displayed on TE an **AT#STSR=37,0,x** command is issued to select an item in the menu (see **#STSR**).

◀ **AT#STIA?**

Read command can be used to get information about the SAT/USAT interface. The message format is:

#STIA: \<state\>,\<mode\>,\<timeout\>,\<SatProfile\>

Additional info:

▶▶ Returned parameters.

Name	Type	Default	Description
\<state\>	integer	0	state of the sending of the SET UP MENU proactive command (37)
		Values:	
		0	: SIM/USIM has not sent the SET UP MENU proactive command (37)

	1 :	SIM/USIM has sent the SET UP MENU proactive command (37)	
<mode>	integer	-	refer to Set section
<timeout>	integer	-	refer to Set section
<SatProfile>	string	-	SAT/USAT Terminal Profile. Is the list of SIM/USIM Application Toolkit facilities supported by the ME. The profile cannot be changed by the TA.

> ℹ️ In SAT/USAT applications an SMS message is usually sent to the network provider containing service requests, e.g. to send the latest news. The provider returns a message with the requested information. Before activating SAT/USAT, it is recommended to set the SMS text mode with the **AT+CMGF=1** command and enable URC for incoming SMS messages with **+CNMI** command.

AT#STIA=?

Test command returns the range of available values for the parameters <**mode**> and <**timeout**>.

3.9.2. AT#STGI - SIM Toolkit Get Information

This command interfaces to the SIM/USIM Application Toolkit to get information on the ongoing proactive command.

3GPP TS 31.111
Telit SIM/USIM Application Toolkit Application Note

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#STGI=[<cmdType>]

Set command gets parameters of the ongoing proactive command. The command can be used after the reception of the **#STN: <cmdType>** URC. If no proactive command is ongoing, it returns an **ERROR** message.

Parameter:

Name	Type	Default	Description
<cmdType>	integer	N/A	proactive command code. For each proactive command listed below, the response format is described in the Additional info sections.

Values:

1	:	REFRESH
5	:	SET UP EVENT LIST
16	:	SET UP CALL
17	:	SEND SS
18	:	SEND USSD
19	:	SEND SHORT MESSAGE
20	:	SEND DTMF
32	:	PLAY TONE
33	:	DISPLAY TEXT
34	:	GET INKEY
35	:	GET INPUT
36	:	SELECT ITEM
37	:	SET UP MENU
40	:	SET UP IDLE MODE TEXT

Additional info:

▶▶ **<cmdType>**=1 (REFRESH)
the response format:
#STGI: 1,<refreshType>

Name	Type	Default	Description

\<refreshType\>	integer	N/A	identifies the refresh type

Values:

    0   :   SIM Initialization and Full File Change Notification

    1   :   File Change Notification

    2   :   SIM Initialization and File Change Notification

    3   :   SIM Initialization

    4   :   SIM Reset

    5   :   NAA Application Reset

    6   :   NAA Session Reset

    7   :   Steering of Roaming

    8   :   Steering of Roaming WLAN

►► **\<cmdType\>**=5 (SET UP EVENT LIST)
the response format:
#STGI: 5,\<eventListMask\>

Name	Type	Default	Description
\<eventListMask\>	hex	N/A	identifies the list of events to monitor.
			The \<**eventListMask**\> (two bytes long) is a bit mask where each bit, when set, indicates that the corresponding event must be monitored (e.g. if \<**eventListMask**\> is 0x0001, it means that MT call must be monitored).
			bit 0 = MT call
			bit 1 = Call connected
			bit 2 = Call disconnected
			bit 3 = Location status
			bit 4 = User activity
			bit 5 = Idle screen available
			bit 6 = Card reader status (if class "a" is supported)
			bit 7 = Language selection
			bit 8 = Browser Termination (if class "c" is supported)
			bit 9 = Data available (if class "e" is supported)
			bit 10 = Channel status (if class "e" is supported)
			bits 11 - 15 = reserved for future use

Value:

    0x0001÷0x01FF   :   mask

►► **\<cmdType\>**=16 (SET UP CALL)
the response format:

#STGI: 16,<cmdDetails>,[<confirmationText>],<calledNumber>

Name	Type	Default	Description
<cmdDetails>	integer	N/A	identifies the command details

Values:

0	:	set up call, but only if not currently busy on another call
1	:	set up call, but only if not currently busy on another call, with redial
2	:	set up call, putting all other calls (if any) on hold
3	:	set up call, putting all other calls (if any) on hold, with redial
4	:	set up call, disconnecting all other calls (if any)
5	:	set up call, disconnecting all other calls (if any), with redial

Name	Type	Default	Description
<confirmationText>	string	-	string for user confirmation stage
<calledNumber>	string	-	string containing called numbers

►► This section is dedicated to the following proactive commands:
<cmdType>=17 (SEND SS)
<cmdType>=18 (SEND USSD)
<cmdType>=19 (SEND SHORT MESSAGE)
<cmdType>=20 (SEND DTMF)
<cmdType>=32 (PLAY TONE)
the response format:
#STGI: <cmdType>[,<alphaIdentifier>]

Name	Type	Default	Description
<alphaIdentifier>	string	-	optional text provided by the SIM/USIM device in ASCII format

►► **<cmdType>**=33 (DISPLAY TEXT)
the response format:
#STGI: 33,<cmdDetails>[,<text>]

Name	Type	Default	Description
<cmdDetails>	hex	N/A	a bit mask where each bit position, according to its value, has a specific meaning**:**
			bit 0: 0 - normal priority 1 - high priority
			bits 1-6: reserved for future use
			bit 7: 0 - clear message after a delay 1 - wait for user to clear message

	Value:		
	0x00÷0xFF	:	mask
<text>	string	-	text provided by the SIM/USIM device in ASCII format

▶▶ **<cmdType>**=34 (GET INKEY)
the response format:
#STGI: 34,<cmdDetails>,<text>

Name	Type	Default	Description
<cmdDetails>	hex	N/A	a bit mask where each bit position, according to its value, has a specific meaning**:**
			bit 0: 0 - digits only (0-9, *, # and +) 1 - alphabet set
			bit 1: 0 - SMS default alphabet (GSM character set) 1 - UCS2 alphabet
			bit 2: 0 - character sets defined by bit 0 and bit 1 are enabled 1 - character sets defined by bit 0 and bit 1 are disabled and the "Yes/No" response is requested
			bits 3-6: 0
			bit 7: 0 - no help information available 1 - help information available
	Value:		
	0x00÷0x87	:	mask
<text>	string	-	string as prompt for test

▶▶ **<cmdType>**=35 (GET INPUT)
the response format:
#STGI: 35,<cmdDetails>,<text>,<responseMin>,<responseMax>[,<defaultText>]

Name	Type	Default	Description
<cmdDetails>	hex	N/A	a bit mask where each bit position, according to its value, has a specific meaning**:**
			bit 0: 0 - digits only (0-9, *, #, and +) 1 - alphabet set
			bit 1: 0 - SMS default alphabet (GSM character set) 1 - UCS2 alphabet
			bit 2: 0 - ME may echo user input on the display 1 - user input shall not be revealed in any way. Hidden entry mode is only available when

using digit input. In hidden entry mode only characters ('0'-'9', '*' and '#') are allowed.

bit 3:
0 - user input to be in unpacked format
1 - user input to be in SMS packed format

bits 4-6:
0

bit 7:
0 - no help information available
1 - help information available

Value:

0x00÷0x8F : mask

Name	Type	Default	Description
<text>	string	-	string as prompt for text
<responseMin>	integer	N/A	minimum number of characters of the user input
			Value:
			0÷255 : minimum length of user input.
<responseMax>	integer	N/A	maximum number of characters of the user input.
			Value:
			0÷255 : maximum length of user input
<defaultText>	string	-	string supplied as default response text

▶▶ <**cmdType**>=36 (SELECT ITEM)

the response format:

the first line of output is:

#STGI: 36,<cmdDetails>,<numOfItem>[,<titleText>]<CR><LF>

one line follows for every item, repeated <**numOfItems**> times:

#STGI: 36,<itemId>,<itemText>[,<nextActionId>]

Name	Type	Default	Description
<cmdDetails>	hex	N/A	a bit mask where each bit position, according to its value, has a specific meaning**:**
			bit 0: 0 - presentation type is not specified 1 - presentation type is specified in bit 1
			bit 1: 0 - presentation as a choice of data values if bit 0 = 1 1 - presentation as a choice of navigation options if bit 0 is 1
			bit 2: 0 - no selection preference 1 - selection using soft key preferred
			bits 3-6: 0

Name	Type	Default	Description
			Value:
			0x00÷0x87 : mask
\<numOfItems>	integer	-	number of items in the list
\<titleText>	string	-	menu title string
\<itemId>	integer	N/A	item identifier
			Value:
			1÷numOfItems : item identifier range
\<itemText>	string	-	item title string
\<nextActionId>	integer	-	is the code of next proactive command to be issued upon execution of the menu item. If \<**nextActionId**>=0, no next action information available.

▶▶ \<**cmdType**>=37 (SET UP MENU)
the response format:
the first line of output is:
#STGI: 37,\<cmdDetails>,\<numOfItem>,\<titleText><CR><LF>
one line follows for every item, repeated for \<**numOfItems**>:
#STGI: 37,\<itemId>,\<itemText>[,\<nextActionId>]

Name	Type	Default	Description
\<cmdDetails>	hex	N/A	a bit mask where each bit position, according to its value, has a specific meaning**:** **bit 0**: 0 - no selection preference 1 - selection using soft key preferred **bit 1-6**: 0 **bit 7**: 0 - no help information available 1 - help information available
			Value:
			0x00÷0x81 : mask
\<numOfItems>	integer	-	number of items in the list
\<titleText>	string	-	menu title string
\<itemId>	integer	N/A	item identifier
			Value:
			1÷numOfItems : item identifier range
\<itemText>	string	-	item title

Name	Type	Default	Description
<nextActionId>	integer	-	numerical code of next proactive command type to be issued upon execution of the menu item. If **<nextActionId>**=0, no next action information available.

▶▶ **<cmdType>**=40 (SET UP IDLE MODE TEXT)

the response format:

#STGI: 40,<idleModeTextString>

Name	Type	Default	Description
<idleModeTextString>	string	-	text provided by the SIM/USIM device in ASCII format

ℹ The proactive commands are only those command types that use the AT interface. SAT/USAT commands which are not using the AT interface (not MMI related SAT commands, e.g. PROVIDE LOCAL INFORMATION) are executed without sending any indication to the user.

AT#STGI?

Read command returns the ongoing proactive command and the SAT/USAT state. The message format is:

#STGI: <state>,<cmdType>

Additional info:

▶▶ Returned parameters:

Name	Type	Default	Description
<state>	integer	-	state of the sending of the SET UP MENU proactive command (37), refer to **AT#STIA?** command
<cmdType>	integer	-	ongoing proactive command code

AT#STGI=?

Test command returns the supported values of parameters <**state**> and <**cmdType**>.

A typical SAT/USAT session, running on AT interface, starts when the user receives the **#STN: 37** URC. The unsolicited result code must be previously enabled by the **#STIA** command. The **#STN: 37** notifies the user that the main menu of the SIM/USIM Application has been sent to TA, and TA has stored the just received menu. Later, at any time, you can type in the **AT#STGI=37** command to display the main menu of the SIM/USIM Application on TE.

Upon receiving the **#STGI** response, you must enter the **#STSR** command to confirm the execution of the proactive command and provide any required user response. In this case, you must enter the **AT#STSR=37,0,x** command to select the **x** item of the SIM/USIM Application menu.

The **#STN: 237** URC indicates that the main menu of the SIM/USIM Application has been removed from TA, and it is no longer available. In this case, **AT#STGI=37** command returns **ERROR** message.

3.9.3.   AT#STSR - SIM Toolkit Send Response

This command allows the user to provide a response to confirm the execution of the ongoing proactive command.

3GPP TS 31.111
Telit SIM/USIM Toolkit Application Note

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT#STSR=[<cmdType>[,<userAction>[,<data>]]]

Set command allows the user to provide a response action to the ongoing proactive command when the action is required by the command itself.

Parameters:

Name	Type	Default	Description
<cmdType>	integer	-	proactive command code, refer to **#STGI** command to have information on the **<cmdType>**
<userAction>	integer	0	identify the user action

Values:

0 : the user accepts the ongoing proactive command

16 : proactive SIM/USIM session terminated by user

17 : backward move in the proactive SIM/USIM session requested by the user

18 : no response from user

19 : help information required by the user

20 : USSD/SS Transaction terminated by user

32 : TA currently unable to process command

34 : user has denied SIM/USIM call setup request

35 : user cleared down SIM/USIM call before connection or network release

<data>	string	-	data entered by user, see Additional info section

Additional info:

▶▶ **<data>** parameter is used according to **<cmdType>**, and when **<userAction>**=0:

▶▶ **<cmdType>**=34 (GET INKEY)

<data> contains the key pressed by the user. The character set is selected by **+CSCS** command.

If the ongoing proactive command requires to the user a binary choice (yes/no), the valid content of **<data>** is:

- "Y" or "y" (positive answer) and "N" or "n" (negative answer) for "IRA", "8859-1", "PCCP437" character sets

- "0079" or "0059" (positive answer) and "006E" or "004E" (negative answer) for UCS2 alphabet

The ongoing proactive command to require a binary choice sets bit 2 of the **<cmdDetails>** parameter to 1, see **#STGI** command.

▶▶ **<cmdType>**=35 (GET INPUT).
<data> contains the string of characters entered by the user.

▶▶ **<cmdType>**=36 (SELECT ITEM).
<data> contains the item identifier selected by the user.

ⓘ **<userAction>**=0 is used, for example, to
- accept a call when the ongoing proactive command is SET UP CALL, **<cmdType>**=16
- start a connection when the ongoing proactive command is OPEN CHANNEL, **<cmdType>**=64

ⓘ Use of icons is not supported. All icon related actions will respond with no icon available.

AT#STSR?

Read command returns the ongoing proactive command and the SAT/USAT interface state. The format message is:
#STSR: <state>,<cmdType>

If there is no ongoing proactive command, an **ERROR** message is returned.

Additional info:

▶▶ Returned parameters.

Name	Type	Default	Description
<state>	integer	-	state of the sending of the SET UP MENU proactive command (37), refer to **AT#STIA?** command
<cmdType>	integer	-	proactive command code, refer to **#STGI** command to have information on the **<cmdType>**

AT#STSR=?

Test command returns the range for the parameters **<state>** and **<cmdType>**.

3.9.4. AT#SDM - Set SIM Toolkit Display Mode

This command is used to set normal/high priority standby display mode.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#SDM=<priority>

Set command sets to normal/high priority standby display mode.

Parameter:

Name	Type	Default	Description
<priority>	integer	0	priority
	Values:		
	0 : normal		
	1 : high		

AT#SDM?

Read command returns the current value of the <**priority**> parameter.

AT#SDM=?

Test command returns the range of values for parameter <**priority**>.

3.9.5. AT#STIME - Set SIM Toolkit timeout value

This command sets the timeout value for STK timeout test of GCF/PTCRB.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Common profile	No	-	2

AT#STIME=[<mode>]

Set command sets a unit of STK timeout value.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	a unit of STK timeout value

Values:

0 : in minute

1 : in second

AT#STIME?

Read command returns the current **<mode>**.

AT#STIME=?

Test command returns the supported range of values for parameter **<mode>**.

AT#STIA command is not set to a second unit. When you test "No response from user" and "timeout" of STK test, you must change to a second unit to timeout value of STK.

Set STK timeout value to a second unit.
AT#STIME=1
OK

Timeout value is 30 second
AT#STIA=2,30
OK

Set STK timeout value to a minute unit.
AT#STIME=0
OK

Timeout value is 1 minute
AT#STIA=2,1
OK

3.9.6. AT#STKENV - Send SIM Toolkit Envelop Command

This command set envelope command send to the UICC when the UE has successfully accepted the list of events of SIM application toolkit.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	No	No	-	2

AT#STKENV=<cmd_id>

Execution command sends Envelop command to UICC.

Parameter:

Name	Type	Default	Description
<cmd_id>	integer	N/A	command type

Values:

1 : menu selection

2 : language selection

3 : user activity

4 : Idle screen available

AT#STKENV=?

Test command returns the **OK** result code.

```
#STN: 05,03
AT#STKENV=3
OK
```

3.10. Audio

3.10.1. Digital Voice Interface

3.10.1.1. AT#DVI - Digital Voiceband Interface

Digital Voiceband Interface handling.

[1] Hardware User's Guide of the used module

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Common profile	No	-	2

AT#DVI=<mode>[,<dviport>,<clockmode>]

Set command enables/disables the Digital Voiceband Interface, see documents [1].

Parameters:

Name	Type	Default	Description
<mode>	integer	1	Enables/disables the DVI

Values:

0 : disable DVI; audio is forwarded to the analog line; DVI pins should be Not Connected/or Tri-State

1 : Enable DVI: audio is forwarded to the DVI block

<dviport>	integer	2	Select DVI port

Value:

2 : DVI port 2 will be used

<clockmode>	integer	1	Select DVI clock mode

Values:

0 : DVI slave

1 : DVI master

- **#DVI** parameters are saved in the extended profile.
- On **<mode>** 0 supported by "DVI master" only.
- The **<dviport>** parameter have no effect and is included only for backward compatibility.
- On Active/MT/MO Voice Call return Error.
- If Voice/VoLTE call are not supported in module the command will return error.

AT#DVI?

Read command reports last setting, in the format:

#DVI: <mode>,<dviport>,<clockmode>.

AT#DVI=?

Test command reports the range of supported values for parameters **<mode>**,**<dviport>** and **<clockmode>**.

Configure DVI as master on DVI Port #2.
AT#DVI=1,2,1
OK

3.10.1.2. AT#DVICLK - Digital Voiceband Interface Clock

The command configures the DVI clock signal.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

AT#DVICLK=<clock>[,<samplerate>]

Set command configures and activates the DVICLK clock signal and the Digital Voiceband Interface.

Parameters:

Name	Type	Default	Description
<clock>	integer	0	DVI Clock

Values:

0	:	Disable (factory default)
128	:	DVI Clock activated at 128 KHz
256	:	DVI Clock activated at 256 KHz
512	:	DVI Clock activated at 512 KHz
1024	:	DVI Clock activated at 1024 KHz
2048	:	DVI Clock activated at 2048 KHz
4096	:	DVI Clock activated at 4096 KHz

Name	Type	Default	Description
<samplerate>	integer	0	sample rate

Values:

0	:	audio scheduler sample rate 8KHz
1	:	audio scheduler sample rate 16KHz

- On Active/MT/MO Voice Call return Error.
- Clock 4096KHz don't supported with Sample Rate 8KHz
- If Voice/VoLTE call are not supported in module the command will return error.

AT#DVICLK?

Read command reports last setting, in the format:

#DVICLK: <clock>,<samplerate>

AT#DVICLK=?

Test command reports the range of parameter **<clk>** and **<samplerate>**.

3.11. Power Down

3.11.1. AT#REBOOT - Module Reboot

Immediate module reboot.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#REBOOT

Execution command reboots immediately the unit.
It can be used to reboot the system after a remote update of the script in order to have the new one running.

> **ℹ** If **#REBOOT** follows an AT command that stores some parameters in NVM, it is recommended to insert a delay of at least 5 seconds before to issue **#REBOOT**, to permit the complete NVM storing.

> **ℹ** **#REBOOT** is an obsolete AT command; please refer to **#ENHRST** to perform a module reboot.

AT#REBOOT=?

Test command returns **OK** result code.

</>
- Reboot the module
  AT#REBOOT
  OK
  (the module reboots)

3.11.2. AT#ENHRST - Periodic Reset

Enable or Disable the one shot or periodic unit reset

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#ENHRST=<mode>[,<delay>]

Set commands enables/disables the unit reset after the specified <**delay**> in minutes

Parameters:

Name	Type	Default	Description
<mode>	integer	0	Enable\Disable mode
		Values:	
	0	:	disables the unit reset
	1	:	enables the unit reset only one time (one shot reset)
	2	:	enables periodically unit reset
<delay>	integer	-	time interval in minutes after that the unit reboots; numeric value in minutes

ℹ️ Not available setting <**delay**> to 0 with <**mode**>=2. When the command is set with <**mode**>=2, it could take more time than the <**delay**> value due to booting time.

ℹ️ The settings are saved automatically only if old or new <**mode**> value is 2, i.e. unit set in periodic reset mode. Therefore, any change from 0 to 1 or conversely is not stored.

⚠️ The command **AT#ENHRST=1,0** causes the immediate module reboot. If it follows an AT command that stores some parameters in NVM, it is strongly recommended to insert a delay of at least 5 sec before issuing it, to permit the complete NVM storing process.

AT#ENHRST?

Read command reports the current parameter settings in the following format:
#EHNRST: <mode>[,<delay>,<remainTime>]

Additional info:

▶▶ Read command parameter for <**mode**> is 1 or 2.

Name	Type	Default	Description
<remainTime>	integer	-	time remaining before next reset

AT#ENHRST=?

Test command reports supported range of values for parameters <**mode**> and <**delay**>.

Example of **#ENHRST** usage and expected unit behavior.

- **AT#ENHRST=1,60**

  ...

  Module reboots after 60 minutes

- **AT#ENHRST=1,0**

  Module reboots immediately

- **AT#ENHRST=2,60**

  ...

  Module reboots after 60 minutes and indefinitely after every following power on

3.11.3. AT#SHDN - Software Shutdown

Software Shutdown

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#SHDN

Execution command causes device detachment from the network and shut down.

Before definitive shut down an **OK** response is returned.

> After the issuing of this command any previous activity is terminated and the device will not respond to any further command.

AT#SHDN=?

Test command returns the **OK** result code.

> If hardware pin FULL_CARD_POWER_OFF_N is maintained to High, module will turn on automatically after shutdown.

3.11.4.   AT#FASTSHDN - Fast Shutdown Configuration

This command can be used as a set command to configure a GPIO pin performing a fast shutdown when on it is forced a High to Low or Low to High level transition. Or can be used as an execute command to force immediately a fast shutdown.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#FASTSHDN[=<enable>[,<GPIO>[,<trigger>]]]
Set command to configure fast power down. Module enters power off autonomously if fast power down is enabled and GPIO event is triggered after modem boot done.

Parameters:

Name	Type	Default	Description
<enable>	integer	0	enable/disable the fast shutdown execution via a GPIO pin.
			Values:
		0 :	disabled
		1 :	enabled
<GPIO>	integer	-	GPIO number used to execute the fast shutdown. Can check the available GPIO range from **#FASTSHDN=?** command.
			This parameter is no meaning when **<mode>** is 0.
<trigger>	integer	0	GPIO trigger level used for fast shutdown execution.
			This parameter is no meaning when **<mode>** is 0.
			Values:
		0 :	execute fast shutdown when the selected GPIO pin goes from High to Low level
		1 :	execute fast shutdown when the selected GPIO pin goes from Low to High level

Additional info:

▶▶   The execution command **AT#FASTSHDN** forces the module to execute immediately the fast shutdown regardless of the fast shutdown configuration.

🛈   Depending on **<trigger>**, the selected **<GPIO>** pin is automatically configured as below.
<trigger> = 0, **<GPIO>** pin set as Pull-up
           1, **<GPIO>** pin set as Pull-down

🛈   Configuration values are stored on module and will keep on next power cycle.

AT#FASTSHDN?
Read command reports the currently selected configuration in the format:
#FASTSHDN: <enable>,<GPIO>[,<trigger>]

AT#FASTSHDN=?

Test command returns the supported range of values for all the parameters.

Enable fast shutdown on GPIO_05
AT#FASTSHDN=1,5
OK

AT#FASTSHDN?
#FASTSHDN: 1,5

OK

Force immediate fast shutdown
AT#FASTSHDN
OK

3.12. HW and Radio Control

3.12.1. AT#DPRLIST - TX Dynamic Power Reduction List

This command is the functionality for TX Dynamic Power Reduction LIST.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#DPRLIST=<rat>,<bnd>,<pwr_level>

This command support TX DPR(Dynamic Power Reduction) list.

Parameters:
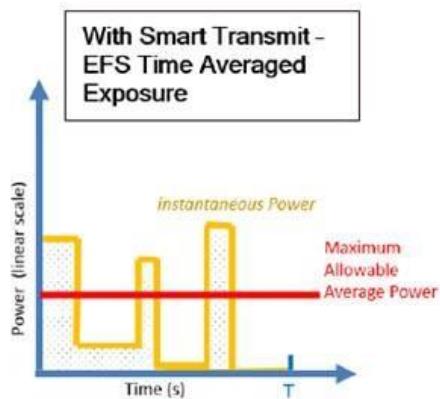
Name	Type	Default	Description
<rat>	string	N/A	supported RAT
	Values:		
	UMTS	:	UMTS Radio Access Technology
	LTE	:	LTE Radio Access Technology
	NR5G	:	NR Radio Access Technology
<bnd>	integer	N/A	supported band
	Values:		
	1÷19	:	Band for UMTS
	1÷71	:	Band for LTE
	1÷79	:	Band for NR5G
	257	:	NR5G MMWAVE band 257
	258	:	NR5G MMWAVE band 258
	260	:	NR5G MMWAVE band 260
	261	:	NR5G MMWAVE band 261
<pwr_level>	string	0	power backoff level
	Values:		
	0÷19	:	power backoff level
	0	:	TX default power (default: 21 dbm)
	1	:	TX power 20.5 dbm
	2	:	TX power 20 dbm
	3	:	TX power 19.5 dbm
	4	:	TX power 19 dbm
	5	:	TX power 18.5 dbm
	6	:	TX power 18 dbm
	7	:	TX power 17.5 dbm
	8	:	TX power 17 dbm

9	:	TX power 16.5 dbm
10	:	TX power 16 dbm
11	:	TX power 15.5 dbm
12	:	TX power 15 dbm
13	:	TX power 14.5 dbm
14	:	TX power 14 dbm
15	:	TX power 13.5 dbm
16	:	TX power 13 dbm
17	:	TX power 12.5 dbm
18	:	TX power 12 dbm
19	:	TX power 11.5 dbm
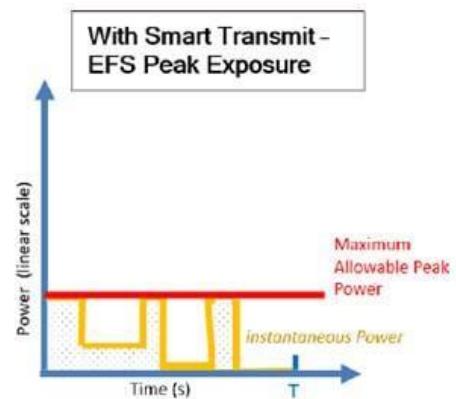
> ℹ **<rat>,<bnd>,<pwr_level>** parameter setting is stored in NVM.

> ℹ Tx power value base on the Fx980 product, so OEM need to set and check the proper value base on the OEM product.

> ℹ If try to input an unsupported band, an ERROR will be returned.

> ℹ The DPR function of MMWAVE band are not supported now even if they can set.

> ℹ In the table below, MCC operates according to the power reduction behavior.
> If the MCC that is not in the table operates as peak exposure.

MCC	Country	Power Reduction Behavior
310-316	USA	Time Averaged Exposure
302	Canada	Time Averaged Exposure
334	Mexico	Peak Exposure
404-405	India	Peak Exposure
440	Japan	Time Averaged Exposure
450	South Korea	Peak Exposure
460	China	Peak Exposure
505	Australia/NZ	Peak Exposure
525	Singapore	Peak Exposure
724	Brazil	Peak Exposure
901	EU	Time Averaged Exposure

1. With Smart Transmit – EFS Time Averaged Exposure

2. With Smart Transmit – EFS Peak Exposure

ℹ Only FN980 module currently can operate DPR function.

← AT#DPRLIST?

Read command reports the currently written **<rat>,<bnd>** and **<pwr_level>** in the format:
#DPRLIST: <rat>,<bnd>,<pwr_level>

ℹ This command reads only values whose **<pwr_level>** is not 0.

?□ AT#DPRLIST=?

Test command reports the supported range of values for parameter **<rat>,<bnd>** and **<pwr_level>.**

3.12.2. AT#DPRCTL - TX Dynamic Power Reduction Control

This command is the functionality for TX Dynamic Power Reduction control.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#DPRCTL=<mode>

This command control the TX DPR(Dynamic Power Reduction).

Parameter:

Name	Type	Default	Description
<mode>	integer	0	Control the DPR

Values:

0	:	DPR disabled
1	:	DPR enabled regardless of DPR PIN
2	:	DPR enabled depends on DPR PIN
0÷2	:	mode of control DPR

🛈 The **<mode>** parameter setting is stored in NVM.

🛈 The control of TDD DPR depends on TDD pattern(uplink-downlink configurations, 3GPP TS 36.211). The TDD pattern 1 is used for SDX55.

🛈 If **<mode>** is set to a value different from the previous value, a reboot process is required.

🛈 **<mode>** availablity like below. Another SDX 55 module can not set **<mode>** 2 because HW is different from FN980m so DPR PIN cannot be used.
FN980 : 0,1,2
FN980m + mmwave configuration(X) : 0,1,2
FN980m + mmwave configuration(O): 0
Another SDX55 module + mmwave configuration(X): 0,1
Another SDX55 module + mmwave configuration(O): 0

🛈 The DPR function for MMWAVE is not supported.

AT#DPRCTL?

Read command reports the currently written **<mode>** in the format:

#DPRCTL: <mode>

AT#DPRCTL=?

Test command reports the supported range of values for parameter **<mode>.**

3.12.3. AT#MACADDR - Configure MAC Address

Configure hardware MAC address for each network interface.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#MACADDR=<type>,<macaddr>
Configure MAC address for each network interface.

Parameters:

Name	Type	Default	Description
<type>	integer	N/A	Network Interface Type.
			Value:
			0 : Ethernet Interface
<macaddr>	string	-	MAC Address, this parameter should include double quotes("").
			e.g. "xx:xx:xx:xx:xx:xx"

> This SET command require manual power cycle (e.g. AT#REBOOT).

> Network interfaces supporting this command for each product.
> FN980m: None
> FT980-KS/FT980: Ethernet

AT#MACADDR?
Read MAC Addresses configured currently for all network interfaces.

AT#MACADDR=?
Returns the list of the supported values.

Example of this command.
- AT#MACADDR=0,"00:21:7E:00:00:00"
  OK

3.12.4. AT#I2CDIS - I2C disable

This command is used to disable I2C.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#I2CDIS=<mode>

Set command enable/disable the I2C.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	mode
	Values:		

0 : enable I2C

1 : disable I2C

ⓘ   The setting is saved in system and available on following reboot

AT#I2CDIS?

Read command reports the currently selected **<mode>** in the format:
#I2CDIS: <mode>

AT#I2CDIS=?

Test command returns the supported range of values of parameter **<mode>**.

3.12.5. AT+CBC - Battery Charge

This command allows to read the current Battery Charge status.

• 3GPP TS 27.007

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT+CBC

Execution command returns the current Battery Charge status.

Additional info:

▶▶ Battery Charge status is shown in the format:
+CBC: <bcs>,<bcl>

Name	Type	Default	Description
<bcs>	integer	N/A	battery status

Values:

0 : ME is powered by the battery

1 : ME has a battery connected, and charger pin is being powered

2 : ME does not have a battery connected

3 : Recognized power fault, calls inhibited

Name	Type	Default	Description
<bcl>	integer	N/A	battery charge level, only if **<bcs>**=0

Values:

0 : battery is exhausted, or ME does not have a battery connected

25 : battery charge remained is estimated to be 25%

50 : battery charge remained is estimated to be 50%

75 : battery charge remained is estimated to be 75%

100 : battery is fully charged

ⓘ **<bcs>**=1 indicates that the battery charger supply is inserted and the battery is being recharged if necessary with it. Supply for ME operations is taken anyway from VBATT pins.

ⓘ Without battery/power connected on VBATT pins or during a power fault the unit is not working, therefore values <bcs>=2 and <bcs>=3 will never appear.

ⓘ <bcl> indicates battery charge level only if battery is connected and charger is not connected.

AT+CBC=?

Test command returns parameter values supported as a compound value.

📝 ℹ️ The ME does not make differences between being powered by a battery or by a power supply on the VBATT pins, so it is not possible to distinguish between these two cases.

</> **AT+CBC**
+CBC: 0,75
OK

3.12.6. AT#GPIO - General Purpose Input/Output Pin Control

Set the value of the GPIO(general purpose input/output) pins.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT#GPIO=<pin>,<mode>[,<dir>[,<save>]]

Execution command sets the value or reads current state of the GPIO(general purpose input/output) pin.

Parameters:

Name	Type	Default	Description
<pin>	integer	-	GPIO pin number. The supported range is hardware dependent. Use AT#GPIO=? test command to know available range.
<mode>	integer	4	sets GPIO pin configuration, its action depends on **<dir>** value. Refer to Additional info sections.

Values:

- 0 : set GPIO pin to 0(Low) if <dir>=1(Output), otherwise has no meaning
- 1 : set GPIO pin to 1(High) if <dir>=1(Output), otherwise has no meaning
- 2 : reports current direction and value of GPIO pin
- 3 : set internal pull-up if <dir>=0(Input), otherwise has no meaning
- 4 : set internal pull-down if <dir>=0(Input), otherwise has no meaning
- 5 : set internal no-pull if <dir>=0(Input), otherwise has no meaning

Name	Type	Default	Description
<dir>	integer	0	sets the GPIO pin in input or output. Refer to Additional info sections.

Values:

- 0 : pin set as input
- 1 : pin set as output

Name	Type	Default	Description
<save>	integer	0	GPIO pin save configuration.

Values:

- 0 : GPIO pin configuration is not saved
- 1 : GPIO pin configuration is saved

Additional info:

▶▶ When **<mode>**=2, reports current direction and value of **<pin>** in the below format and in this mode, **<dir>** and **<save>** can be omitted.

#GPIO: <dir>,<stat>[,<mode>]

Name	Type	Description
<dir>	integer	current direction of the selected GPIO**<pin>**. 0 : GPIO is input 1 : GPIO is output

		2 - 10 : GPIO is assigned as Alternate function

\<stat\>	integer	the parameter can be:
		    logic value read from GPIO**\<pin\>** in the case the pin **\<dir\>** is set to input.
		    logic value present in output of the GPIO**\<pin\>** in the case the pin **\<dir\>** is currently set to output.
		    no meaning value for the pin GPIO**\<pin\>** in the case the pin **\<dir\>** is set to alternate function.

\<mode\>	integer	shown if GPIO**\<pin\>** is input:
		    3 : internal pull-up
		    4 : internal pull-down
		    5 : internal no-pull

▶▶ **\<dir\>** values from 2 to 10 means the GPIO is assigned as alternate function respectively from ALT1 to ALT9.

ALTx	Function associated to ALTx
ALT1 (**\<dir\>**=2)	reserved
ALT2 (**\<dir\>**=3)	the GPIO is assigned as DVI for Audio
ALT3 (**\<dir\>**=4)	the GPIO is mapped to **#TEMPSENS**
ALT4 (**\<dir\>**=5)	the GPIO is mapped to **#FASTSHDN**
ALT5 (**\<dir\>**=6)	the GPIO is mapped to **#SHDNIND**
ALT6 (**\<dir\>**=7)	the GPIO is assigned as Dying Gasp trigger pin
ALT7 (**\<dir\>**=8)	the GPIO is assigned as I2C
ALT8 (**\<dir\>**=9)	the GPIO is assigned as DPR(Dynamic power reduction) pin
ALT9 (**\<dir\>**=10)	the GPIO is mapped to **#USBPCISWITCH**

ⓘ While using the pins in the alternate function, the GPIO read/write access to that pin is not accessible and must be avoided.

AT#GPIO?
Read command reports the current direction and value of all GPIO pins, in the format:
#GPIO: \<dir\>,\<stat\>[\<CR\>\<LF\>#GPIO: \<dir\>,\<stat\>[...]]

If **\<mode\>**=3, 4 or 5, the output format is:
#GPIO: \<dir\>,\<stat\>,\<mode\>[\<CR\>\<LF\>#GPIO: \<dir\>,\<stat\>,\<mode\>[...]]

AT#GPIO=?
Test command reports the supported range of values of the command parameters
\<pin\>, **\<mode\>**, **\<dir\>** and **\<save\>**.

Check the available values ranges
AT#GPIO=?
#GPIO: (1-6),(0-5),(0-1),(0,1)

OK

Set GPIO_03 as output, and set logical value HIGH
AT#GPIO=3,1,1
OK

Set GPIO_04 as output, value HIGH a save setting
AT#GPIO=4,1,1,1
OK

Report GPIO_03 state
AT#GPIO=3,2
#GPIO: 1,1

OK

Read command
AT#GPIO?
#GPIO: 1,1   **//** GPIO_01 is output, value is HIGH
#GPIO: 0,0,4   // GPIO_02 is input with internal pull down
#GPIO: 1,1
#GPIO: 0,0,4
#GPIO: 0,1,3   // GPIO_05 is input with internal pull up, value is HIGH
#GPIO: 1,0   **//** GPIO_06 is output, value is LOW

OK

3.12.7. AT#WWANLED - WWLAN_LED GPIO Setting

This command is used to set GPIO for WWLAN LED.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#WWANLED=<mode>,<status>[,<on_duration>[,<off_duration>]]
Set command sets the behavior of the WWLAN_LED GPIO.

Parameters:

Name	Type	Default	Description
<mode>	integer	N/A	Modem status desired WWLAN_LED blink.
			Values:
			0 : Low power mode
			1 : Offline
			2 : No service
			3 : In Service, Roaming
			4 : Data Active
<status>	integer	0	On/Off WWLAN_LED blink pattern for selected **<mode>**.
			Values:
			0 : Off mode
			1 : On mode
<on_duration>	integer	0	The duration of period in which WWLAN_LED signal is tied to Low for selected **<mode>**
			Value:
			0÷100 : In tenth of seconds
<off_duration>	integer	0	The duration of period in which WWLAN_LED signal is tied to High for selected **<mode>**.
			Value:
			0÷100 : In tenth of seconds

🛈 The value of 0 means "deactivate" in the **<on_duration>** and **<off_duration>**. Therefore, the value 0 can be used for this LED always on/off.

🛈 The following table shows factory default setting

Low Power Mode	OFF - Dark
Offline	OFF - Dark
No Service	OFF - Dark
In Service	OFF - Dark
Data Active	OFF - Dark

Roaming : Blinking ON 5s, OFF 200ms.

ℹ️ The blink pattern of roaming is fixed and it cannot be modified. However, the roaming status also set to disabled as a factory default setting and it will be activated when "In Service" mode's status is on.

ℹ️ Current consumption could increase depends on LED scenario.

AT#WWANLED?

Read command returns the WWLAN_LED GPIO current setting, in the format:

#WWANLED:<mode0>,<status0>,<on_duration0>,<off_duration0><CR><LF>
...
#WWANLED:<mode4>,<status4>,<on_duration4>,<off_duration4>

AT#WWANLED=?

Test command reports the supported range of values for parameters
<**mode**>,<**status**>,<**on_duration**> and <**off_duration**>.

```
AT#WWANLED=0,0,0,0
OK
: Set always off the LED when low power mode
AT#WWANLED=2,1,1,0
OK
: Set always on the LED when no service mode
AT#WWANLED=3,1,10,10
OK
: Set Blinking the LED when in service mode
```

3.12.8.   AT#I2CWR - Write to I2C

This command is used to send data to an I2C peripheral connected to module.

[1] Hardware User's Guide of the used module

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#I2CWR=<sdaPin>,<sclPin>,<deviceId>,<registerId>,<len>

Execution command sends data to an I2C peripheral connected to module GPIOs. After the writing activity has been accomplished, the GPIOs will not be restored to the original setting. Use **#GPIO** command to see the status of the used GPIOs. To have information on GPIO pins refer to document [1].

Parameters:

Name	Type	Default	Description
<sdaPin>	integer	-	GPIO number for SDA. To know the range use **#I2CWR** test command.
<sclPin>	integer	-	GPIO number for SCL. To know the range use **#I2CWR** test command.
<deviceId>	hex	N/A	address of the I2C device (7 bits). The Least Significant Bit is used for read/write command, it doesn't matter if the LSB is set to 0 or 1.
			Address must be written in hexadecimal form without 0x.
			Value:
			0÷3FF : addressing range extended to 10 bit
<registerId>	hex	N/A	register to write data to
			Value:
			0÷FF : value must be written in hexadecimal form without 0x
<len>	integer	N/A	number of data to send
			Value:
			1÷254 : number of data to send

Additional info:

▶▶ After entering the command, the module returns the prompt ">" and waits for the data to send. To complete the operation, send **Ctrl-Z** char (**0x1A** hex); to exit without writing the message send **ESC** char (**0x1B** hex). Data must be written in hexadecimal form.

If data are successfully sent, the response is **OK**, otherwise an error code is reported.

AT#I2CWR=?

Test command returns the range of available values for parameters <**sdaPin**>, <**sclPin**>, <**deviceId**>, <**registerId**>, <**len**>.

Set GPIO_9 as SDA, and GPIO_10 as SCL. Device I2C address is 0x20; 0x10 is the address of the first register where to write I2C data; 14 data bytes will be written starting from register 0x10.

AT#I2CWR=9,10,20,10,14
> 00112233445566778899AABBCCDD<ctrl-z>
OK

3.12.9.   AT#I2CRD - Read from I2C

This command is used to read data from an I2C peripheral connected to module.

[1] Hardware User's Guide of the used module

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#I2CRD=<sdaPin>,<sclPin>,<deviceId>,<registerId>,<len>
Execution command reads data from an I2C peripheral connected to module GPIOs. After the reading activity has been accomplished, the GPIOs will not be restored to the original setting. Use **#GPIO** command to see the status of the used GPIOs. To have information on GPIO pins refer to document [1].

Parameters:

Name	Type	Default	Description
<sdaPin>	integer	-	GPIO number for SDA. To know the range use **#I2CRD** test command.
<sclPin>	integer	-	GPIO number for SCL. To know the range use **#I2CRD** test command.
<deviceId>	hex	N/A	address of the I2C device (7 bits). The Least Significant Bit is used for read/write command, it doesn't matter if the LSB is set to 0 or 1. Address must be written in hexadecimal form without 0x.
			Value:
			0÷3FF : addressing range extended to 10 bit
<registerId>	hex	N/A	Register to read data from
			Value:
			0÷FE : value must be written in hexadecimal form without 0x
<len>	integer	N/A	Number of data to receive
			- Data Read from I2C will be dumped in hexadecimal format
			- If data requested are more than data available in the device, dummy data (normally 0x00 or 0xff) will be dumped
			Value:
			1÷254 : number of data to receive

AT#I2CRD=?
Test command returns the range of available values for parameters <**sdaPin**>, <**sclPin**>, <**deviceId**>, <**registerId**>, <**len**>.

Read 12 bytes from I2C device with address 0x20, starting from register address 0x10. SDA is mapped on GPIO_9, SCL is mapped on GPIO_10.

AT#I2CRD=9,10,20,10,12
#I2CRD: 00112233445566778899AABBCC
OK

3.12.10.   AT#RXDIV - Enable RX Diversity and Set DARP

This command enables the RX Diversity and sets DARP.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#RXDIV=<DIV_enable>[,<DARP_mode>]

Set command enables/disables the RX Diversity and sets DARP.

Parameters:

Name	Type	Default	Description
<DIV_enable>	integer	1	enable/disable the RX Diversity
	Values:		
	0	:	disable
	1	:	enable
<DARP_mode>	integer	0	select DARP mode
	Values:		
	0	:	DARP not supported
	1	:	DARP phase 1

> ℹ The values set by command are available at next power-on.

> ℹ The values set by command are directly stored in NVM.

> ℹ The FN980m module does NOT support GSM tech, so DARP mode is not support.

> ℹ Case of #RXTOGGLE already set "1", #RXDIV don't set "1" (Error return).

AT#RXDIV?

Read command reports the currently selected **<DIV_enable>** and **<DARP_mode>** parameters in the format:
#RXDIV: <DIV_enable>,<DARP_mode>

AT#RXDIV=?

Test command reports the supported values of parameters **<DIV_enable>** and **<DARP_mode>**.

3.12.11. AT#LRXDIV - Enable LTE RX Diversity

This command enables LTE RX Diversity and moves the LTE-RX receiver.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#LRXDIV=<Ldiv_enable>

Set command enables/disables the LTE RX Diversity and sets moves the LTE-RX receiver from the main antenna to the diversity antenna.

Parameter:

Name	Type	Default	Description
<Ldiv_enable>	integer	1	enable/disable the specific antenna for LTE Rx diversity

Values:

0 : enables the only Rx0 antenna. (Only use Rx0)

1 : enables the ALL LTE Rx. (Factory default)

2 : enables the only Rx1 antenna. (only use Rx1)

3 : enables the only Rx2 antenna. (only use Rx2)

4 : enables the only Rx3 antenna. (only use Rx3)

Additional info:

▶▶
10. RX0 (Main Antenna is PRI0 or PRI1),
11. RX1 (Diversity Antenna is DIV0 or DIV1)
12. RX2, RX3 (LTE band 2,4,25,41,66 support)

▶▶
13. Antenna of PRI1 and DIV1 using the LTE B7, 30, 32, 38, 40, 41, 42, 43, 46, 48
14. 4 RX support band: LTE B2, 4, 25, 41, 66

▶▶

	#LRXDIV=0	#LRXDIV=1	#LRXDIV=2	#LRXDIV=3	#LRXDIV=4
RX0	Enable	Enable	Disable	Disable	Disable
RX1	Disable	Enable	Enable	Disable	Disable
RX2	Disable	Enable	Disable	Enable	Disable
RX3	Disable	Enable	Disable	Disable	Enable
TX	Enable	Enable	Enable	Enable	Enable

15. #LRXDIV = 0: Use RX0 for TX and only RX0 enables for RX
16. #LRXDIV = 1: Use RX0 for TX and all RX paths enable for RX
17. #LRXDIV = 2: Use RX0 for only TX and only RX1 enables for RX
18. #LRXDIV = 3: Use RX0 for only TX and only RX2 enables for RX
19. #LRXDIV = 4: Use RX0 for only TX and only RX3 enables for RX

ℹ️ The value set by command operate both real time and power cycle.

ℹ️ For switch back all enable rx path, modem should reboot.

ℹ️ This command only have to use for the purpose of test.

ℹ️ Ensure that the call is connected and that all chains are running before triggering any of commands.

AT#LRXDIV?
Read command reports the currently selected **<Ldiv_enable>** parameters in the format:

#LRXDIV: <Ldiv_enable>

AT#LRXDIV=?
Test command reports the supported range of values for parameter **<Ldiv_enable>**.

</> For real time operation:
AT#LRXDIV?
#LRXDIV: 1 (RX0, RX1, RX2 and RX3 enable)
AT#LRXDIV=0 (RX0 enable only)
AT#LRXDIV=2 (RX1 enable only)
AT#LRXDIV=3 (RX2 enable only)
AT#LRXDIV=4 (RX3 enable only)

AT#LRXDIV=1 (Set to RX0, RX1, RX2 and RX3 enable)
AT#REBOOT (for RX0, RX1, RX2 and RX3 enable)

After rebooting, operation
AT#LRXDIV?
#LRXDIV: 1 (RX0, RX1, RX2 and RX3 enable)

3.12.12. AT#TEMPSENS - Temperature Monitor

This command used to set an operation of the module temperature monitor.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#TEMPSENS=<mod>[,<interval>[,<action>,<low_temp>,<high_temp>[,<gpio>]]]
Set command sets the operation of the module temperature monitor.

Parameters:

Name	Type	Default	Description
<mod>	integer	0	temperature monitor mode
			Values:
	0	:	disables the periodic reporting
	1	:	enables the periodic reporting
	2	:	instantaneous reporting of the module temperature
<interval>	integer	0	duration in seconds of the interval between next measurement. It has meaning only if **<mod>** is 1.
			Value:
	1÷60	:	measurement interval in seconds
<action>	integer	N/A	bit 0 - it enables the presentation of the temperature monitor URC periodically. Default value if **<action>** is not specified.
			bit 1 - it enables the presentation of the temperature notification URC, whenever the module internal temperature reaches either **<low_temp>** or **<high_temp>** levels.
			bit 2 - Output pin **<gpio>** is tied HIGH when set temperature bounds are reached; when the temperature is back to normal the output pin **<gpio>** is tied LOW. It is mandatory to set the **<gpio>** parameter too to set this **<action>**.
			Value:
	1÷7	:	bit calculation of actions
<low_temp>	integer	N/A	temperature lower bound in Celsius Degrees.
			Value:
	-40÷0	:	temperature lower bound in Celsius Degrees
<high_temp>	integer	N/A	temperature upper bound in Celsius Degrees
			Value:
	0÷100	:	temperature upper bound in Celsius Degrees
<gpio>	integer	-	GPIO number. Use test command to know available range. This parameter is required only if **<action>=4, 5, 6** or **7**.

Additional info:

▶▶ when **<mode>**=2, the unsolicited message is in the format:
#TEMPSENS: <sensor>,<value>

where:
<sensor> - temperature sensor name
<value> - actual temperature expressed in Celsius degrees

▶▶ the notification message is in the format:
#TEMPNOTI: <level>,<value>

where:
<level> - threshold level
-1 - module temperature is under **<low_temp>**
0 - normal temperature
1 - module temperature is upper **<high_temp>**

ℹ️ **<low_temp>** and **<high_temp>** values are TSENS criteria.

⚠️ The module cannot enter sleep while **<mod>**=1.

AT#TEMPSENS?
Read command reports the current parameter settings in the format:
#TEMPSENS: **<mod>,<interval>[,<action>,<low_temp>,<high_temp>,[<gpio>]]**

AT#TEMPSENS=?
Test command reports supported range of values for parameters
<mod>,<interval>,<action>,<low_temp>,<high_temp> and **<gpio>**.

</> • AT#TEMPSENS=2
#TEMPSENS: TSENS3,37
#TEMPSENS: PA_THERM1,33
OK

3.12.13. AT#TMLVL - Thermal Mitigation Level

Report Thermal Mitigation Level

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#TMLVL=<device_id>

Reports a current thermal mitigation level of specific **<device_id>**.

Parameter:

Name	Type	Default	Description
<device_id>	integer	N/A	Device to get level of mitigation. The report message is in the format: **#TMLVL: <level>** Where: **<level>** - thermal mitigation level 0 - normal 1 - level1 2 - level2 3 - level3

Values:

    1 :   Thermal mitigation device MODEM

    2 :   Thermal mitigation device PA

    3 :   Thermal mitigation device PA_FR1

    4 :   Thermal mitigation device MMW0

AT#TMLVL?

Reports a current thermal mitigation level of all devices in the format:
#TMLVL: MODEM,<level>
#TMLVL: PA,<level>
#TMLVL: PA_FR1,<level>
#TMLVL: MMW0,<level>
OK

AT#TMLVL=?

Returns the supported range of values for parameter **<device_id>.**

Examples for set and read sections.

- AT#TMLVL=2
  #TMLVL: 1
  OK

- AT#TMLVL?
  #TMLVL: MODEM,1
  #TMLVL: PA,1
  OK

3.12.14.　AT#CAINFO - Show LTE CA Information

This command indicates the LTE and NR carrier aggregation information of PCC and SCC

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

◄ **AT#CAINFO?**

Read command extract carrier aggregation information for PCC and SCC which includes LTE/NR related information.

Additional info:

▶▶<On 2CA: PCC + SCC>

#CAINFO:
<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

<On 2CA: PCC + ENDC>

#CAINFO:
<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>

ENDC:
<nr_band>,<nr_bandwidth>,<nr_ul_bandwidth>,<nr_channel>,<nr_ul_channel>,<nr_rssi>,<nr_rsrp>,<nr_rsrq>,<nr_pci>,<nr_sinr>,<nr_state>,<nr_txpwr>,<nr_dl_mod>,<nr_ul_mod>

<On 3CA: PCC + SCC + SCC>

#CAINFO:
<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

<On 3CA: PCC + SCC + ENDC>

#CAINFO:
<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

ENDC:
<nr_band>,<nr_bandwidth>,<nr_ul_bandwidth>,<nr_channel>,<nr_ul_channel>,<nr_rssi>,<nr_rsrp>,<nr_rsrq>,<nr_pci>,<nr_sinr>,<nr_state>,<nr_txpwr>,<nr_dl_mod>,<nr_ul_mod>

<On 4CA: PCC + SCC + SCC + SCC>

#CAINFO:
<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

<On 4CA: PCC + SCC + SCC + ENDC>

#CAINFO:

<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

ENDC:

<nr_band>,<nr_bandwidth>,<nr_ul_bandwidth>,<nr_channel>,<nr_ul_channel>,<nr_rssi>,<nr_rsrp>,<nr_rsrq>,<nr_pci>,<nr_sinr>,<nr_state>,<nr_txpwr>,<nr_dl_mod>,<nr_ul_mod>

<On 5CA: PCC + SCC + SCC + SCC + SCC>

#CAINFO:

<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

<On 5CA: PCC + SCC + SCC + SCC + ENDC>

#CAINFO:

<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

ENDC:

<nr_band>,<nr_bandwidth>,<nr_ul_bandwidth>,<nr_channel>,<nr_ul_channel>,<nr_rssi>,<nr_rsrp>,<nr_rsrq>,<nr_pci>,<nr_sinr>,<nr_state>,<nr_txpwr>,<nr_dl_mod>,<nr_ul_mod>

<On 6CA: PCC + SCC + SCC + SCC + SCC + SCC>

#CAINFO:

<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

<On 6CA: PCC + SCC + SCC + SCC + SCC + ENDC>

#CAINFO:

<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

ENDC: <nr_band>,<nr_bandwidth>,<nr_ul_bandwidth>,<nr_channel>,<nr_ul_channel>,<nr_rssi>,<nr_rsrp>,<nr_rsrq>,<nr_pci>,<nr_sinr>,<nr_state>,<nr_txpwr>,<nr_dl_mod>,<nr_ul_mod>

<On 7CA: PCC + SCC + SCC + SCC + SCC + SCC + SCC>

#CAINFO:
<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<tac>,<tx_power>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>,<band_class>,<rx_channel>,<dl_bw>,<pci>,<rsrp>,<rssi>,<rsrq>,<sinr>,<state>,<uplink_modulation>,<downlink_modulation>

Name	Type	Default	Description
<band_class>	integer	N/A	LTE band class
	Values:		
	120	:	BAND 1
	121	:	BAND 2
	122	:	BAND 3
	123	:	BAND 4
	124	:	BAND 5
	125	:	BAND 6
	126	:	BAND 7
	127	:	BAND 8
	128	:	BAND 9
	129	:	BAND 10
	130	:	BAND 11
	131	:	BAND 12
	132	:	BAND 13
	133	:	BAND 14
	134	:	BAND 17
	135	:	BAND 33
	136	:	BAND 34
	137	:	BAND 35
	138	:	BAND 36
	139	:	BAND 37
	140	:	BAND 38
	141	:	BAND 39
	142	:	BAND 40
	143	:	BAND 18
	144	:	BAND 19
	145	:	BAND 20

	146	:	BAND 21
	147	:	BAND 24
	148	:	BAND 25
	149	:	BAND 41
	150	:	BAND 42
	151	:	BAND 43
	152	:	BAND 23
	153	:	BAND 26
	154	:	BAND 32
	155	:	BAND 125
	156	:	BAND 126
	157	:	BAND 127
	158	:	BAND 28
	159	:	BAND 29
	160	:	BAND 30
	161	:	BAND 66
	162	:	BAND 250
	163	:	BAND 46
	166	:	BAND 71
	167	:	BAND 47
	168	:	BAND 48
<rx_channel>	integer	N/A	E-UTRA absolute radio frequency channel number of the serving cell
	Value:		
	0÷68935	:	Channel
<dl_bw>	integer	N/A	Bandwidth
	Values:		
	0	:	1.4 MHz bandwidth
	1	:	3 MHz bandwidth
	2	:	5 MHz bandwidth
	3	:	10 MHz bandwidth
	4	:	15 MHz bandwidth
	5	:	20 MHz bandwidth
<pci>	integer	N/A	Physical Cell Id
	Value:		
	0÷503	:	Cell ID
<rsrp>	string	N/A	Current RSRP
	Value:		

	-44÷-140	:	dbm
\<rssi\>	string	N/A	Current RSSI
	Value:		
	0÷-120	:	dbm
\<rsrq\>	string	N/A	Current RSRQ
	Value:		
	-3÷-20	:	dbm
\<sinr\>	string	N/A	Measured SINR. This value is mapped to dB.
			0 = -20dB
			1 = -19.8dB
			...
			249 = 29.8dB
			250 = 30dB
	Value:		
	0÷250	:	SINR
\<tac\>	string	-	Tracking area code information for LTE
\<tx_power\>	string	N/A	Current uplink TX power. The tx_power value is only meaningful when the device is in traffic. When there is no traffic, tx_power is "0".
	Value:		
	-50÷33	:	When there is no traffic, tx_power is "0"
\<state\>	integer	N/A	Current SCC state
	Values:		
	0	:	INIT
	1	:	CONFIGURED
	2	:	ACTIVE
\<uplink_modulation\>	integer	N/A	Uplink Modulation
	Values:		
	0	:	BPSK
	1	:	QPSK
	2	:	16QAM
	3	:	64QAM
	4	:	256QAM
	5	:	UNKOWN
\<downlink_modulation\>	integer	N/A	Downlink Modulation
	Values:		
	0	:	BPSK

		1	:	QPSK
		2	:	16QAM
		3	:	64QAM
		4	:	256QAM
		5	:	UNKOWN
<nr_band>	integer	-		NR active band.
<nr_bandwidth>	integer	-		NR DL bandwidth.
<nr_ul_bandwidth>	integer	-		NR UL bandwidth.
<nr_channel>	integer	-		NR DL active channel.
<nr_ul_channel>	integer	-		NR UL active channel.
<nr_rssi>	integer	-		NR received signal strength in dBm.
<nr_rsrp>	integer	-		NR Reference Signal Received Power.
<nr_rsrq>	integer	-		NR Reference Signal Received Quality.
<nr_pci>	integer	-		NR physical cell id.
<nr_sinr>	integer	-		NR measured SINR.
<nr_state>	integer	N/A		NR state.

Values:

0	:	Init
1	:	Configured
2	:	Active

<nr_txpwr>	integer	-		NR Tx Power (In traffic only).
<nr_dlmod>	integer	N/A		NR Downlink modulation.

Values:

0	:	BPSK
1	:	QPSK
2	:	16QAM
3	:	64QAM
4	:	256QAM
5	:	Unknown

<nr_ulmod>	integer	N/A		NR Uplink modulation.

Values:

0	:	BPSK
1	:	QPSK
2	:	16QAM
3	:	64QAM
4	:	256QAM
5	:	Unknown

ⓘ The first block from **<band_class>** to **<downlink_modulation>** is PCC information. The next information block which are from **<band_class>** to **<downlink_modulation>** is information of SCC. Additional SCC information could add in the rear of first SCC. If the LTE information of SCC is not valid, it always returns 0. If it acquires the UMTS or GSM technology, this command will display "**ERROR**".

ⓘ The first block from **<nr_band>** to **<nr_ul_mod>** is ENDC information. The next information block which are from **<nr_band>** to **<nr_ul_mod>** is information of second ENDC information. Additional ENDC information could add in the rear of first ENDC. If the ENDC information is not valid, it always returns 0. If it acquires the UMTS or GSM technology, this command will display "**ERROR**".

ⓘ The FN980m module can support 7CA with only LTE cells. If there are NR cells in carrier aggregation (ENDC), it supports maximum 6CA with one NR cell.

ⓘ The **<nr_txpwr>,<nr_dl_mod>** and **<nr_ul_mod>** of NR information is still unimplemented they always report 0.

❓ **AT#CAINFO=?**

Test command returns **OK**

3.12.15.   AT#TESTMODE - Test Mode Configuration

Set module in test mode for configuring and testing the POWER level.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#TESTMODE=<cmd>

The command allows setting module in not signaling mode. The functionality has to be first activated by sending **AT#TESTMODE="TM"** and **AT#TESTMODE=**"INIT4G" , which set the module in Test Mode. Only after this set, **AT#TESTMODE** can be used with the other allowed commands. To exit from Test Mode and go back to Operative Mode, the command **AT#TESTMODE=**"OM" must be sent.

Parameters:

Name	Type	Default	Description
<cmd>	string	N/A	Current command as quoted string in the format: **"<cmd>"**

Values:

"TM"	:	Forces the module in Test Mode.
"OM"	:	Forces the module in Operative Mode.
"TCH"	:	Starts the non-stop module transmission.
"ESC"	:	Exits the current non-stop sequence (stop TX transmission) and disable RX chain.

Name	Type	Default	Description
<cmd>	string	N/A	Current command as quoted string in the format: "<cmd>" 4G commands

Values:

"SETLTEBAND"	:	Sets the LTE band
"LTXBW"	:	Sets TX bandwidth (Default: 10MHz)
"LRXBW"	:	Sets RX bandwidth (Default: 10MHz)
"CH"	:	Sets the EUARFCN
"LTXWAVEFORM"	:	Sets the WAVEFORM transmission
"LPASTATE"	:	Sets the PA STATE to high gain state
"LPABIASSET"	:	Sets the PA BIAS
"LTXGAIN"	:	Refer to Note 14
"LNA4G"	:	Sets 4G LNA GAIN STATE
"PRXRL4G"	:	Reads the 4G RX power level of primary path for selected channel. Refer to Note 16.
"DRXRL4G"	:	Reads the 4G RX power level of diversity path for selected channel. Refer to Note 16.
"MIMO1RL4G"	:	Reads the 4G RX power level of MIMO primary path for selected channel. Refer to Note 16.
"MIMO2RL4G"	:	Reads the 4G RX power level of MIMO diversity path for selected channel. Refer to Note 16.

	"MIMOSET"	:	Sets for MIMO RX path. Refer to Note 18.
	"MIMOTDD"	:	Sets for MIMO TDD bands. Refer to Note 18.
<cmd>	string	N/A	Current command as quoted string in the format: "<cmd>**"** 3G commands

Values:

"SETWCDMABAND"	:	Sets the WCDMA band
"CH"	:	Sets the UARFCN
"WTXWAVEFORM"	:	Sets the WAVEFORM transmission
"WPASET"	:	Sets the PA high gain
"WPABIASSET"	:	Sets the PA BIAS
"TXPDM "	:	Sets the value for desired TX power strength. Refer to Note 15
"LNA 3G"	:	Sets 3G LNA Gain state. <LNA GAIN STATE> value must set 0.
"RL3G"	:	Provide the 3G Rx power level for selected channel. Refer to the Note 16.

<cmd>	string	N/A	Current command as quoted string in the format: "<cmd>**"** GNSS command

Values:

"GNSS"	:	Start GNSS RF receive path test for L1 Band.
"GNSSL5"	:	Start GNSS RF receive path test for L5 Band.

<cmd>	string	N/A	Current command as quoted string in the format: "<cmd>**"** NR sub 6 commands

Values:

"SETSUB6BAND"	:	Sets the 5G sub6 band
"FREQ"	:	Sets the Frequency
"PRXRLSUB6"	:	Reads the NR sub6 RX power level of primary path for selected frequency. Refer to Note 21.
"DRXRLSUB6"	:	Reads the NR sub6 RX power level of diversity path for selected frequency. Refer to Note 21.
"MIMO1RLSUB6"	:	Reads the NR sub6 RX power level of MIMO primary path for selected channel. Refer to Note 21.
"MIMO2RLSUB6"	:	Reads the NR sub6 RX power level of MIMO diversity path for selected channel. Refer to Note 21.
"MIMOSETSUB6"	:	Sets for MIMO RX path of NR sub6. Refer to Note 19.
"STXGAIN"	:	Refer to Note 20.
"SUB6TX1SET"	:	Refer to Note 20.
"STX1GAIN"	:	Refer to Note 20.

<cmd>	string	N/A	Current command as quoted string in the format: "<cmd>**"** NR mmWave commands

Values:

"SETMMWBAND"	:	Sets the 5G mmWave band
"SETMMWBID"	:	Sets the 5G mmWave beam ID
"SETMMWMBID"	:	Sets the 5G mmWave beam ID of MIMO
"MMWCH"	:	Sets the point channel
"MMWTXGAIN"	:	Refer to Note 22.
"MMWRXCHK"	:	Reads the NR mmWave RX power level for selected point channel.
"MMWTXOFF"	:	Release the settings of TX.
"MMWDROP"	:	Release the whole settings of mmWave for test.

Additional info:

▶▶ Recommend **"CH<EARFCN UL>"**

LTE Band	EARFCN UL	Recommend
1	18000 ~ 18599	18300
2	18600 ~ 19199	18900
3	19200 ~ 19949	19575
4	19950 ~ 20399	20175
5	20400 ~ 20649	20525
7	20750 ~ 21449	21100
8	21450 ~ 21799	21625
12	23010 ~ 23179	23095
13	23180 ~ 23279	23230
14	23280 ~ 23379	23330
17	23730 ~ 23849	23790
18	23850 ~ 23999	23925
19	24000 ~ 24149	24075
20	24150 ~ 24449	24300
25	26040 ~ 26689	26365
26	26690 ~ 27039	26865
28	27210 ~ 27659	27435
29(Rx only)	9660 ~ 9769	9715
30	27660 ~ 27759	27710
32(Rx only)	9920 ~ 10359	10140
34	36200 ~ 36349	36275
38	37750 ~ 38249	38000
39	38250 ~ 38649	38450
40	38650 ~ 39649	39150
41	39650 ~ 41589	40620
42	41590 ~ 43589	42590
43	43590 ~ 45589	46090
46(Rx only)	46790 ~ 54539	50665
48	55240 ~ 59089	55990
66	131972~132671	132322
71	133122~133471	133297

Recommend **"TXGAIN_IDX"** value

MODEL	BAND	TXGAIN _IDX	TX Power
FN980m	1	57	23dBm
	2	61	
	3	59	

4	59	
5	53	
7	61	
8	53	
12	53	
13	53	
14	53	
17	53	
18	53	
19	53	
20	55	
25	63	
26	53	
28	57	
29	NA (Rx only)	
30	63	
32	NA (Rx only)	
34	55	
38	46	
39	61	
40	51	
41	44	
42	59	
43	59	
46	NA (Rx only)	
48	57	
66	59	
71	56	

Recommend "**CH <CARFCN>**"

Band(3G)	UARFCN UL	recommend
1	9612 ~ 9888	9750
2	9262 ~ 9538	9400
4	1312 ~ 1513	1413
5	4132 ~ 4233	4183
8	2712 ~ 2863	2788
9	8762 ~ 8912	8837
19	312 ~ 363	338

Recommend "**TXPDM**" value.

MODEL	BAND	TXPDM	TX POWER
FN980m	1	53	23dBm
	2	59	
	4	61	
	5	49	
	8	49	
	9	63	
	19	49	

Recommend "**FREQ <FREQ_DL>**"

NR SUB6 Band	FREQ DL(kHz)	Recommend
1	2110000 ~ 2170000	2140000
2	1930000 ~ 1990000	1960000
3	1805000 ~ 1880000	1842500
5	869000 ~ 894000	881500

7	2620000 ~ 2690000	2655000
8	925000 ~ 960000	942500
12	729000 ~ 746000	737500
20	791000 ~ 821000	806000
25	1930000 ~ 1995000	1962500
28	758000 ~ 803000	780500
38	2570000 ~ 2620000	2595000
40	2300000 ~ 2400000	2350000
41	2496000 ~ 2690000	2593000
48	3550000 ~ 3700000	3625000
66	2110000 ~ 2200000	2155000
71	617000 ~ 652000	634500
77	3300000 ~ 4200000	3750000
78	3300000 ~ 3800000	3550000
79	4400000 ~ 5000000	4700000

Recommend "**STXGAIN <TXGAIN>**" and "**STX1GAIN <TXGAIN>**"

MODEL	NR SUB6 Band	TXGAIN	TX1GAIN	TX POWER
FN980m	1	58	75	23dBm
	2	60	72	
	3	58	68	
	5	54	54	
	7	50	60	
	12	54	NA	
	20	57	NA	
	25	67	NA	
	28	57	NA	
	38	48	NA	
	40	53	NA	
	41	50	NA	
	48	61	NA	
	66	62	69	
	71	56	NA	
	77	60	60	
	78	60	60	
	79	60	70	

Recommend "**MMWCH <NR-ARFCN>**"

NR mmWave Band	NR-ARFCN	Recommend
N257	2054167 - 2104165	2086707
N258	2016667 - 2070831	2044541
N260	2229167 - 2279165	2254959
N261	2070833 - 2084999	2078709

Recommend "**BID_IDX**" and "**MBID_IDX**" value for **QTM525**

BAND	BID_IDX	MBID_IDX	Recommend
N257	0 - 63	128 - 191	TBD
N258	0 - 63	128 - 191	
N260	0 - 63	128 - 191	
N261	0 - 63	128 - 191	

Recommend "**MMWTXGAIN_IDX**" value for **QTM525**

BAND	MMWTXGAIN _IDX	TX Power

N257	210 - 240	21 - 24 dBm
N258	210 - 240	
N260	210 - 240	
N261	210 - 240	

▶▶ Recommend GNSS test sequence is below :

Check the GNSS Antenna Port type (See **AT$GPSANTPORT**) in L1 Band case

AT$GPSANTPORT?
$GPSANTPORT: 3

OK

For dedicated GNSS connector

- **AT$GPSANTPORT=2**

For shared Diversity/GNSS connector

- **AT$GPSANTPORT=1**

Note: After testing, the default value should be restored.

Use either the dedicated GNSS connector or the shared Diversity/GNSS connector.

To test the GNSS receive path:

CW Signal generator setup:

For L1 Band,

Frequency=1575.52 MHz (1575.42 MHz + 100KHz offset)

For L5 Band,

Frequency=1176.55 MHz (1176.45 MHz + 100KHz offset)

CW Level= -110dBm

Test the signal C/No level at the GNSS receiver:

- **AT#TESTMODE=**"TM**"**

For L1 Band case,

- **AT#TESTMODE=**"GNSS**"**

- Repeat **AT#TESTMODE=**"GNSS**"** five to ten times to ensure the measurements are repeatable and stable.

For L5 Band case,

- **AT#TESTMODE=**"GNSSL5**"**

- Repeat **AT#TESTMODE=**"GNSSL5**"** five to ten times to ensure the measurements are repeatable and stable.

- **AT#TESTMODE=**"OM**"**

The response to **AT#TESTMODE=**"GNSS**"** and **AT#TESTMODE=**"GNSSL5**"** for a good connection should show C/No within 60dB +/- 5dB and Freq (frequency offset) within 100000 Hz +/- 3150 Hz.

ℹ Bands support varies depending on the product

ℹ Note 1: This command should be checked individually.

ℹ Note 2: FN980m 3G Supported bands - WCDMA 1,2,4,5,8,9,19.

ℹ Note 3: FN980m 4G Supported bands - LTE: FDD 1,2,3,4,5,7,8,12,13,14,17,18,19,20,25,26,28,29,30,32,66,71. / TDD 34,38,39,40,41,42,46,48.

ℹ Note 4: In Test Mode, the other AT commands don't use.

- Note 5: The Test Mode Status is stored in NVM

- Note 6: "TM" command only can set on the Online mode.

- Note 7: Must issuing #TESTMODE according to recommended test sequence.

- Note 8: In case of "RL3G" command, we only guarantee readable RX -60dBm , because chipset has limitation.

- Note 9: In case of "PRXRL4G" and "DRXRL4G" command, we only guarantee readable RX -60dBm , because chipset has limitation.

- Note 10: In case of 4G, Signal generator CW(unmodulated) signal must be set Frequency to "Fc + 500kHz"
  500kHz offset from center frequency should be set to avoid DC(0 Hz).

- Note 11: In case of 3G, Signal generator CW(unmodulated)signal must be set Frequency to "Fc + 200kHz"
  200kHz offset from center frequency should be set to avoid DC(0 Hz)

- Note 12: After One band check is finished, must set the "ESC" and "OM"

- Note 13: After #TESTMODE command process finish, modem must reboot.

- Note 14 : TXGAIN_IDX and TX1GAIN_IDX range is around 53~75(FDD) or 44~70(TDD) for 23dBm and some deviation for each module.

- Note 15 : TXPDM range is around 38~65 for 23dBm and some deviation for each module.

- Note 16 : PRXRL4G, DRXRL4G, MIMO1RL4G, MIMO2RL4G, and RL3G have a difference +/- 5dBm based on input RX power.

- Note 17: Customer should consider the UL EARFCN settings base on the BW 10MHz.(Refer to the 3GPP TS 36.508)

- Note 18: FN980m 4G MIMO Supported bands - LTE: FDD 1,2,3,4,7,25,30,32,66,71. / TDD 34,38,39,40,41,46.

- Note 19: NR Sub6 MIMO Supported bands - N1, N2, N3, N7, N38, N40, N41, N48, N66, N77, N78, N79.

- Note 20 : STXGAIN_IDX range is around 45~65 for 23 dBm and some deviation for each module.

- Note 21 : PRXRLSUB6, DRXRLSUB6, MIMO1RLSUB6, and MIMO2RLSUB6 have a difference +/- 7dBm based on input RX power.

- Note 22 : MTXGAIN_IDX range is around 210~240 for 23dBm and some deviation for each module.

- Note 23 : Bandwidth of LTE and NR5G(Sub6, mmWave) is fixed.
  LTE bandwidth: 10MHz.
  NR5G sub6 bandwidth: 20MHz.
  NR5G mmWave bandwidth: 100MHz.

- Note 24: In NR5G SUB6 TX case, SETSUB6TXWF range is 0(CW) to 1(PUSCH: Default). In case of CW, signal must be set Frequency to "Fc + 2500kHz"

🛈 Note 25: In NR5G SUB6 RX case, Signal generator CW(unmodulated)signal must be set Frequency to "Fc + 2500kHz"

2500kHz offset from center frequency should be set to avoid DC(0 Hz)

AT#TESTMODE?

Read command reports the currently selected **<command>** in the format:

#TESTMODE: <testModeStatus>

Additional info:

▶▶ Parameter meaning:

Name	Type	Default	Description
<testModeStatus>	integer	0	status

Values:

0 : module is in Operative Mode

1 : module is in Test Mode

AT#TESTMODE=?

Test command returns the **OK** result code

1. Recommend 4G TX test sequence is below :

Spectrum analyzer setup:
Frequency=1747.6MHz
RBW=1MHz
Span=100MHz
Manual Attenuation = 30dB
Ref level Offset = depends on a cable loss
Use the trigger video to fix the measurement
Use the peak search marker

LTE band 3 and set EARFCN = 19575,
LTXGAIN = 39 and TX max power level about +23dBm.
- AT#TESTMODE="TM"
- AT#TESTMODE="SETLTEBAND 3"
- AT#TESTMODE="LTXBW"
- AT#TESTMODE="LRXBW"
- AT#TESTMODE="CH 19575"
- AT#TESTMODE="TCH"
- AT#TESTMODE="LTXWAVEFORM"
- AT#TESTMODE="LPASET"
- AT#TESTMODE="LPABIASSET"
- AT#TESTMODE="LTXGAIN 39"
- AT#TESTMODE="ESC"
- AT#TESTMODE="OM"
- AT#REBOOT

2. Recommend 4G RX test sequence is below :

[FDD LTE Band]
Signal generator setup:
Frequency = 1842.5MHz + 500KHz offset
Level = -60dBm
CW is sent (RF on, MOD off)
Offset = depends on a cable loss

LTE band3 and set EARFCN = 19575,
- AT#TESTMODE="TM"
- AT#TESTMODE="SETLTEBAND 3"
- AT#TESTMODE="LTXBW"
- AT#TESTMODE="LRXBW"
- AT#TESTMODE="CH 19575"
- AT#TESTMODE="LNA4G"
- AT#TESTMODE="PRXRL4G" -> for check primary antenna path.
    PRXRL4G: -60 -> Return the 4G RX Level of primary antenna path
- AT#TESTMODE="DRXRL4G" -> for check secondary antenna path.
    DRXRL4G: -60 -> Return the 4G RX Level of secondary antenna path
- AT#TESTMODE="MIMOSET"
- AT#TESTMODE="MIMO1RL4G"
    MPRXRL4G: -60 -> Return the 4G RX Level of MIMO primary antenna path
- AT#TESTMODE="MIMO2RL4G"
    MDRXRL4G: -60 -> Return the 4G RX Level of MIMO secondary antenna path
- AT#TESTMODE="ESC"

- AT#TESTMODE="OM"
- AT#REBOOT

[TDD LTE BAND]
Signal generator setup:
Frequency = 2595MHz + 500KHz offset
Level = -60dBm
CW is sent (RF on, MOD off)
Offset = depends on a cable loss

LTE band38 and set EARFCN = 38000,
- AT#TESTMODE="TM"
- AT#TESTMODE="SETLTEBAND 38"
- AT#TESTMODE="LTXBW"
- AT#TESTMODE="LRXBW"
- AT#TESTMODE="CH 38000"
- AT#TESTMODE="LNA4G"
- AT#TESTMODE="PRXRL4G" -> for check primary antenna path.
    PRXRL4G: -60 -> Return the 4G RX Level of primary antenna path
- AT#TESTMODE="DRXRL4G" -> for check secondary antenna path.
    DRXRL4G: -60 -> Return the 4G RX Level of secondary antenna path
- AT#TESTMODE="ESC"
- AT#TESTMODE="MIMOTDD"
- AT#TESTMODE="MIMOSET"
- AT#TESTMODE="MIMO1RL4G"
    MPRXRL4G: -60 -> Return the 4G RX Level of MIMO primary antenna path
- AT#TESTMODE="MIMO2RL4G"
    MDRXRL4G: -60 -> Return the 4G RX Level of MIMO secondary antenna path
- AT#TESTMODE="ESC"
- AT#TESTMODE="OM"
- AT#REBOOT

3. **Recommend 3G TX test sequence is below :**
    Spectrum analyser setup:
    Frequency=1950MHz
    RBW=1MHz
    Span=100MHz
    Manual Attenuation = 30dB
    Ref level Offset = depends on a cable loss
    Use the trigger video to fix the measurement
    Use the peak search marker

3G band 1 and set UARFCN = 9750,
3G TXPDM = 49 and TX max power level about +23dBm.
- AT#TESTMODE="TM"
- AT#TESTMODE="SETWCDMABAND 1"
- AT#TESTMODE="CH 9750"
- AT#TESTMODE="TCH"
- AT#TESTMODE="WTXWAVEFORM"
- AT#TESTMODE="WPASET"
- AT#TESTMODE="WPABIASSET"

- AT#TESTMODE="TXPDM 49"
- AT#TESTMODE="ESC"
- AT#TESTMODE="OM"
- AT#REBOOT

4. Recommend 3G RX test sequence is below :

Signal generator setup:
Frequency = 2140MHz+200kHz offset
Level = -60dBm
CW is sent (RF on, MOD off)
Offset = depends on a cable loss

3G band 1 and set EARFCN = 9750,
- AT#TESTMODE="TM"
- AT#TESTMODE="SETWCDMABAND 1"
- AT#TESTMODE="CH 9750"
- AT#TESTMODE="LNA3G 0"
- AT#TESTMODE="RL3G" -> for check primary antenna path.
    RL3G: -60
- AT#TESTMODE="ESC"
- AT#TESTMODE="OM"
- AT#REBOOT

5. Recommend NR SUB6 TX test sequence is below :

Spectrum analyzer setup:
Frequency=1950MHz
RBW=1MHz
Span=100MHz
Manual Attenuation = 30dB
Ref level Offset = depends on a cable loss
Use the trigger video to fix the measurement
Use the peak search marker

NR SUB6 band 1 and set FREQ = 2140000(kHz),
STXGAIN = 58 and TX max power level about +23dBm.
- AT#TESTMODE="TM"
- AT#TESTMODE="SETSUB6BAND 1"
- AT#TESTMODE="FREQ 2140000"
- AT#TESTMODE="TCH"
- AT#TESTMODE="STXGAIN 58"
- AT#TESTMODE="ESC"
- AT#TESTMODE="SUB6TX1SET" -> If the bands available use TX1.
- AT#TESTMODE="TCH" -> If the bands available use TX1.
- AT#TESTMODE="STX1GAIN 58" -> If the bands available use TX1.
- AT#TESTMODE="ESC"
- AT#TESTMODE="OM"
- AT#REBOOT

6. Recommend NR SUB 6 RX test sequence is below :

Signal generator setup:
Frequency = 2140 MHz offset

Level = -60dBm

CW is sent (RF on, MOD off)

Offset = depends on a cable loss

NR SUB 6 band1 and set FREQ = 2140,
- AT#TESTMODE="TM"
- AT#TESTMODE="SETSUB6BAND 1"
- AT#TESTMODE="FREQ 2140000"
- AT#TESTMODE="PRXRLSUB6" -> for check primary antenna path.
    PRXRLSUB6: -60 -> Return the NR SUB 6 RX Level of primary antenna path.
- AT#TESTMODE="DRXRLSUB6" -> for check secondary antenna path..
    DRXRLSUB6: -60 -> Return the NR SUB 6 RX Level of secondary antenna path.
- AT#TESTMODE="MIMOSETSUB6"
- AT#TESTMODE="MIMO1RLSUB6"
    MPRXRLSUB6: -60 -> Return the NR SUB 6 RX Level of MIMO primary antenna path.
- AT#TESTMODE="MIMO2RL4G"
    MDRXRLSUB6: -60 -> Return the NR SUB 6 RX Level of MIMO secondary antenna path.
- AT#TESTMODE="ESC"
- AT#TESTMODE="OM"
- AT#REBOOT

7. Recommend NR mmWave test sequence is below :
- AT#TESTMODE="TM"
- AT#TESTMODE="SETMMWBAND 257"
- AT#TESTMODE="SETMMWBID 54
- AT#TESTMODE="SETMMWMBID 180"
- AT#TESTMODE="MMWCH 2086707" <- Input Point A Channel
- AT#TESTMODE="MMWTXGAIN 230" -> 230 means 23 dBm
- AT#TESTMODE="MMWTXOFF" <- Release the settings of TX
- AT#TESTMODE="MMWRXCHK"
    RXRLMMW: -84 -> Return the NR mmWave RX Level
- AT#TESTMODE="MMWDROP" -> Release whole settings of mmWave for test
- AT#TESTMODE="ESC"
- AT#TESTMODE="OM"
- AT#REBOOT

3.12.16. AT#LAPS - LTE Antenna Ports Signals

This command returns LTE antenna ports signal for RSRP and RSRQ.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#LAPS

Execution command indicates RSRP and RSRQ signals in LTE separated antenna ports.

#LAPS: <rsrp_0>,<rsrq_0>,<rsrp_1>,<rsrq_1>[,<rsrp_2>,<rsrq_2>,<rsrp_3>,<rsrq_3>]

Additional info:

▶▶

Name	Type	Default	Description
<rsrp_0>	integer	-	Reference Signal Received Power of RX path 0 Primary Antenna 0 or 1 : It depends on specific band
<rsrq_0>	integer	-	Reference Signal Received Quality of RX path 0 Primary Antenna 0 or 1 : It depends on specific band
<rsrp_1>	integer	-	Reference Signal Received Power of RX path 1 Secondary Antenna 0 or 1 : It depends on specific band
<rsrq_1>	integer	-	Reference Signal Received Quality of RX path 1 Secondary Antenna 0 or 1 : It depends on specific band
<rsrp_2>	integer	-	Reference Signal Received Power of RX path 2 Primary Antenna 0 or 1 : It depends on specific band
<rsrq_2>	integer	-	Reference Signal Received Quality of RX path 2 Primary Antenna 0 or 1 : It depends on specific band
<rsrp_3>	integer	-	Reference Signal Received Power of RX path 3 Secondary Antenna 0 or 1 : It depends on specific band
<rsrq_3>	integer	-	Reference Signal Received Quality of RX path 3 Secondary Antenna 0 or 1 : It depends on specific band

🛈 Current reference signal receive power in dBm. (-44 - -140)

🛈 The value set by command operate after mode reboot. (-3 - -20)

ⓘ Please refer to HW USER GUIDE for detailed information of antenna ports.

AT#LAPS?

Read command operates as execution command.

ⓘ This command type needs for backward compatibility.

AT#LAPS=?

Test command returns OK.

Please refer to H/W user guide to get the LTE antenna ports information.

For case of 4x4 using B41:
RF path 0: Primary Antenna 1
RF path 1: Secondary Antenna 1
RF path 2: Primary Antenna 0
RF path 3: Secondary Antenna 0

For the other 4x4 capable bands:
RF path 0: Primary Antenna 0
RF path 1: Secondary Antenna 0
RF path 2: Primary Antenna 1
RF path 3: Secondary Antenna 1

3.12.17. AT#LCFC - LTE Carrier Aggregation Frequencies and Combinations

Command reads LTE Carrier Aggregation Frequencies and Combinations.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#LCFC

Execution command indicates supported CA frequencies and Combinations of current mode(variant).

#LCFC: <mode>,<freq>,<combo>

Additional info:

▶▶

Name	Type	Default	Description
<mode>	integer	N/A	Current mode(variant)
	Values:		
	0	:	mode is GENERIC
	1	:	mode is ATT
	2	:	mode is VZW
	3	:	mode is EU
	4	:	mode is SPRINT
	5	:	mode is TMUS
	6	:	mode is SKT
	7	:	mode is NTT
	8	:	mode is KDDI
	9	:	mode is TELSTRA
	10	:	mode is ANATEL
<freq>	string	N/A	Supported frequencies
	Values:		
	1 (2100)	:	LTE Band 1
	2 (1900)	:	LTE Band 2
	3 (1800)	:	LTE Band 3
	4 (1700)	:	LTE Band 4
	5 (850)	:	LTE Band 5
	7 (2600)	:	LTE Band 7
	8 (900)	:	LTE Band 8
	12 (700a)	:	LTE Band 12

13 (700c)	:	LTE Band 13	
14 (700ps)	:	LTE Band 14	
17 (700b)	:	LTE Band 17	
18 (800)	:	LTE Band 18	
19 (800)	:	LTE Band 19	
20 (800)	:	LTE Band 20	
25 (1900)	:	LTE Band 25	
26 (850)	:	LTE Band 26	
28 (700)	:	LTE Band 28	
29 (700d)	:	LTE Band 29	
30 (2300)	:	LTE Band 30	
32 (1500)	:	LTE Band 32	
34 (TD2000)	:	LTE Band 34	
38 (TD2600)	:	LTE Band 38	
39 (TD1900)	:	LTE Band 39	
40 (TD2300)	:	LTE Band 40	
41 (TD2500)	:	LTE Band 41	
42 (TD3500)	:	LTE Band 42	
43 (TD3700)	:	LTE Band 43	
46 (TD Unlicensed)	:	LTE Band 46	
48 (TD3600)	:	LTE Band 48	
66 (1700)	:	LTE Band 66	
71 (600)	:	LTE Band 71	

<combo>	string	-	Supported combinations

?▢ **AT#LCFC=?**

Test command returns the **OK** result code.

3.12.18. AT#CACTL - LTE Carrier Aggregation enable and disable

This command is able to set enable/disable the LTE carrier aggregation.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#CACTL=\<mode>

Set command enable/disable the LTE Carrier Aggregation.

Parameter:

Name	Type	Default	Description
\<mode>	integer	1	
	Values:		
	0 : CA disable		
	1 : CA enable		

> The value set by command operate after mode reboot.

AT#CACTL?

Read command reports the current selected \<mode> in the format:

#CACTL: \<mode>

AT#CACTL=?

Test command reports the supported range of values.

</> For carrier aggregation disable
AT#CACTL=0
AT#REBOOT

For carrier aggregation enable
AT#CACTL=1
AT#REBOOT

3.12.19. AT#SHDNIND - Shutdown Indication

This command used to enable/disable shutdown GPIO indicator.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#SHDNIND=<enable>[,<gpio>]

Set command enable/disables shutdown GPIO indicator. Shutdown GPIO indicator acts as a notification to host with translation to low when the modem is finished a shutdown process and power removal is possible.

Parameters:

Name	Type	Default	Description
<enable>	integer	0	enable/disable shutdown GPIO indicator
			Values:
	0 :		disable
	1 :		enable indicator when shut down
	2 :		enable indicator when fast shutdown
	3 :		enable indicator when shut down and fast shutdown
<gpio>	integer	-	GPIO number will be used for indicator. Use **AT#SHDNIND=?** test command to know available range. This parameter is no meaning when **<enable>** is 0.

Additional info:

▶▶ shutdown indication GPIO also acts as BOOT_OK pin. this pin translates to high when module enters idle state after booting.

ⓘ don't need to set **<gpio>** when disable indicator using **<enable>** is 0.

⚠ the stored configuration is maintained even when firmware update or switching.

AT#SHDNIND?

Read command reports a current configuration in the format:
#SHDNIND: <enable>,<gpio>

ⓘ **<gpio>** shown as '0' when shutdown indicator is disabled.

AT#SHDNIND=?

Test command returns the supported range of values for parameter **<enable>** and **<gpio>.**

- AT#SHDNIND=3,3
  OK

- AT#SHDNIND?
  #SHDNIND: 3,3
  OK

3.12.20.　AT#RXTOGGLE - Swap RX from Main to Diversity

This command swaps the receiver from the main antenna to the diversity antenna.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#RXTOGGLE=<TOGGLE_enable>

Parameter:

Name	Type	Default	Description
<TOGGLE_enable>	integer	0	toggle between normal to diversity antenna

Values:

0 : set the RX to the main antenna

1 : set the RX to the diversity antenna

ℹ Please disable usage of two antennas (AT#RXDIV=0) before swap antennas.

ℹ Case of Diversity receiver path(RD) already set(#RXDIV=1), #RXTOGGLE command don't set "1"(Error return).

ℹ The values set by command are directly stored in NVM.

ℹ They are available at next power on.(Solution provider's Limitation.)

AT#RXTOGGLE?

Read command reports the currently selected **<TOGGLE_enable>** in the format:
#RXTOGGLE: <TOGGLE_enable>

AT#RXTOGGLE=?

Test command reports the supported range of values.

```
AT#RXDIV?
#RXDIV: 1,1
AT#RXTOGGLE=1 (When RXDIV=1, RXTOGGLE command return ERROR.)
ERROR
AT#RXDIV=0    disable the RX Diversity
OK
AT#RXTOGGLE=1   set the RX to the diversity antenna
OK
AT#REBOOT reboot the module
OK
AT+COPS=0   register to the 3G network
OK
AT+CREG=1   enable network registration unsolicited result code
OK
AT+CREG?   read <mode> and <stat> parameters
+CREG: 1,1
OK
```

3.12.21. AT#CBC - Battery and Charger Status

This command returns the current Battery and Charger state.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CBC

Execution command returns the current Battery and Charger state. The response is in the format:

#CBC: <ChargerState>,<BatteryVoltage>

Additional info:

▶▶   The response has its fields described below.

Name	Type	Default	Description
<ChargerState>	integer	0	Battery charger state
			Values:
			0 : charger not connected
			1 : charger connected and charging
			2 : charger connected and charge completed
<BatteryVoltage>	integer	-	battery voltage in units of 10 mV: it is the real battery voltage only if charger is not connected; if the charger is connected this value depends on the charger voltage

AT#CBC=?

Test command returns the **OK** result code.

3.12.22.   AT#4RXDIS - Enable or Disable for 4RX

This command is the functionality for 4RX disable.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#4RXDIS=\<mode\>

This command enable or disable the 4RX.

Parameter:

Name	Type	Default	Description
\<mode\>	integer	0	

Values:

0 : 4RX enable

1 : 4RX disable

> ℹ The value set by command operate after mode reboot.

> ℹ This Command add or remove below efs file.
> /nv/item_files/modem/lte/rrc/cap/lte_feature_disable

> ℹ 4RX supported bands are TBD.

AT#4RXDIS?

Read command reports the currently \<mode\> in the format:

#4RXDIS: \<mode\>

AT#4RXDIS=?

Test command reports the supported range of values.

```
AT#4RXDIS?
#4RXDIS: 0
//Modem supports 4RX.

#4RXDIS: 1
//Modem doesn't support 4RX, only support 2RX.
```

3.13. Easy Scan

3.13.1. AT#CSURV - Network Survey

The command allows to perform a network survey through band channels.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CSURV[=[<s>,<e>]]

Execution command allows to perform a quick survey through channels belonging to the band selected by last **#BND** command issue, starting from channel <s> to channel <e>. Issuing **AT#CSURV<CR>**, a full band scan is performed.

After issuing the command the device responds with the string:

Network survey started...

After a while, a list of network survey information text lines, one for each received BCCH-carrier, is reported.

Parameters:

Name	Type	Default	Description
<s>	integer	-	starting channel
<e>	integer	-	ending channel

Additional info:

▶▶ 2G Network survey information text lines:

(For BCCH-Carrier)
arfcn: <arfcn> bsic: <bsic> rxLev: <rxLev> ber: <ber> mcc: <mcc> mnc: <mnc> lac: <lac> cellId: <cellId> cellStatus: <cellStatus> numArfcn: <numArfcn> arfcn: [<arfcn1> ..[<arfcn64>]] [numChannels: <numChannels> array: [<ba1> ..[<ba32>]] [pbcch: <pbcch> [nom: <nom> rac: <rac> spgc: <spgc> pat: <pat> nco: <nco> t3168: <t3168> t3192: <t3192> drxmax: <drxmax> ctrlAck: <ctrlAck> bsCVmax: <bsCVmax> alpha: <alpha> pcMeasCh: <pcMeasCh>]]] <CR><LF><CR><LF><CR><LF>

(For non BCCH-Carrier)
arfcn: <arfcn> rxLev: <rxLev>

Name	Type	Default	Description
<arfcn>	integer	-	C0 carrier assigned radio channel (BCCH - Broadcast Control Channel).
<bsic>	integer	-	base station identification code
<rxLev>	integer	-	decimal number; it is the reception level (in dBm).
<ber>	integer	-	decimal number; it is the bit error rate (in %).
<mcc>	hex	-	hexadecimal 3-digits number; it is the mobile country code.

<mnc>	hex	-	hexadecimal 2/3 digits number; it is the mobile network code.
<lac>	mixed	-	location area code
<cellId>	mixed	-	cell identifier
<cellStatus>	string	N/A	string type; it is the cell status

Values:

CELL_SUITABLE	:	the cell is a suitable cell.
CELL_LOW_PRIORITY	:	the cell is low priority based on the received system information.
CELL_FORBIDDEN	:	the cell is forbidden.
CELL_BARRED	:	the cell is barred based on the received system information.
CELL_LOW_LEVEL	:	the cell <rxLev> is low.
CELL_OTHER	:	none of the above (e.g. exclusion timer running, no BCCH available, etc.).

<numArfcn>	integer	-	number of valid channels in the Cell Channel Description.
<arfcnn>	integer	-	arfcn of a valid channel in the Cell Channel Description (***n*** is in the range **1..<numArfcn>**)
<numChannels>	integer	-	decimal number; it is the number of valid channels in the BCCH Allocation list;
<ban>	integer	-	decimal number; it is the arfcn of a valid channel in the BA list (***n*** is in the range **1..<numChannels>**)
<pbcch>	integer	N/A	packet broadcast control channel.

Values:

0	:	pbcch not activated on the cell
1	:	pbcch activated on the cell

<nom>	integer	-	network operation mode
<rac>	integer	-	routing area code
<spgc>	integer	N/A	SPLIT_PG_CYCLE support.

Values:

0	:	SPLIT_PG_CYCLE is not supported on CCCH on this cell
1	:	SPLIT_PG_CYCLE is supported on CCCH on this cell

<pat>	integer	-	priority access threshold
<nco>	integer	-	network control order
<t3168>	integer	-	timer 3168
<t3192>	integer	-	timer 3192
<drxmax>	integer	-	discontinuous reception max time (in seconds)
<ctrlAck>	integer	-	packed control ack

Name	Type	Default	Description
<bsCVmax>	integer	-	blocked sequence countdown max value
<alpha>	integer	-	alpha parameter for power control
<pcMeasCh>	integer	N/A	type of channel which shall be used for downlink measurements for power control.

Values:

0 : BCCH

1 : PDCH

▶▶ 3G Network survey information text lines:

uarfcn: <uarfcn> rxLev: <rxLev> mcc: <mcc> mnc: <mnc> scr code: <scrcode> cellId: <cellId> lac: <lac> cellStatus: <cellStatus> rscp: <rscp> ecio: <ecio> <CR><LF><CR><LF><CR><LF>

Name	Type	Default	Description
<uarfcn>	integer	-	The carrier frequency is designated by the UTRA Absolute Radio Frequency Channel Number.
<rxLev>	integer	-	decimal number; it is the reception level (in dBm).
<mcc>	hex	-	hexadecimal 3-digits number; it is the mobile country code.
<mnc>	hex	-	hexadecimal 2/3 digits number; it is the mobile network code.
<scrcode>	integer	-	decimal number; it is the scrambling code.
<cellId>	mixed	-	cell identifier
<lac>	mixed	-	location area code
<cellStatus>	string	N/A	string type; it is the cell status

Values:

CELL_SUITABLE	:	the cell is a suitable cell.
CELL_LOW_PRIORITY	:	the cell is low priority based on the received system information.
CELL_FORBIDDEN	:	the cell is forbidden.
CELL_BARRED	:	the cell is barred based on the received system information.
CELL_LOW_LEVEL	:	the cell <rxLev> is low.
CELL_OTHER	:	none of the above (e.g. exclusion timer running, no BCCH available, etc.).

Name	Type	Default	Description
<rscp>	integer	-	decimal number; it is the received signal code power (in dBm)
<ecio>	integer	-	decimal number; it is the chip energy per total wideband power (in dBm

▶▶ 4G Network survey information text lines:

Currently work only if module camped on LTE cell.

For serving cell:
earfcn: <earfcn> rxLev: <rxLev> mcc: <mcc> mnc: <mnc> cellId: <cellId> tac: <tac>

For neighbor cell:
earfcn: <earfcn> rxLev: <rxLev> cellId: <cellId>

Name	Type	Default	Description
<earfcn>	integer	-	E-UTRA Assigned Radio Channel
<rxLev>	integer	-	decimal number; it is the reception level (in dBm)
<mcc>	hex	-	hexadecimal 3-digits number; it is the mobile country code
<mnc>	hex	-	hexadecimal 2/3 digits number; it is the mobile network code
<cellId>	mixed	-	cell identifier
<tac>	mixed	-	Tracking Area Code

ℹ The command is executed within max. 2 minute.

</> AT#CSURV

Network survey started ...

earfcn: 2500 rxLev: -45 mcc: 450 mnc: 05 cellId: 273 tac: 12556

earfcn: 2500 rxLev: -55 cellId: 64

earfcn: 1350 rxLev: -71 cellId: 64

earfcn: 1350 rxLev: -71 cellId: 99

earfcn: 1350 rxLev: -71 cellId: 256

uarfcn: 10737 rxLev: -57 mcc: 450 mnc: 05 scr code: 224 cellId: 63808804 lac: 8673
cellStatus: CELL_SUITABLE rscp: -60 ecio: -3.5

uarfcn: 10836 rxLev: -66 mcc: 450 mnc: 08 scr code: 1488 cellId: 14909569 lac: 7170
cellStatus: CELL_FORBIDDEN rscp: -69 ecio: -3.5

Network survey ended

OK

3.13.2. AT#CSURVC - Network Survey (Numeric Format)

This command allows to perform a network survey through band channels with output in numeric format.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#CSURVC[=[<s>,<e>]]

Execution command allows to perform a quick survey through channels belonging to the band selected by last **#BND** command issue, starting from channel **<s>** to channel **<e>**.
Issuing **AT#CSURVC<CR>**, a full band scan is performed.

After issuing the command the device responds with the string:

Network survey started...

After a while, a list of network survey information text lines, one for each received BCCH-carrier, is reported.

Parameters:

Name	Type	Default	Description
<s>	integer	-	starting channel
<e>	integer	-	ending channel

Additional info:

▶▶ 2G Network survey information text lines:

(For BCCH-Carrier)
arfcn: <arfcn> bsic: <bsic> rxLev: <rxLev> ber: <ber> mcc: <mcc> mnc: <mnc> lac: <lac> cellId: <cellId> cellStatus: <cellStatus> numArfcn: <numArfcn> arfcn: [<arfcn1> ..[<arfcn64>]] [numChannels: <numChannels> array: [<ba1> ..[<ba32>]] [pbcch: <pbcch> [nom: <nom> rac: <rac> spgc: <spgc> pat: <pat> nco: <nco> t3168: <t3168> t3192: <t3192> drxmax: <drxmax> ctrlAck: <ctrlAck> bsCVmax: <bsCVmax> alpha: <alpha> pcMeasCh: <pcMeasCh>]]] <CR><LF><CR><LF><CR><LF>

(For non BCCH-Carrier)
arfcn: <arfcn> rxLev: <rxLev>

Name	Type	Default	Description
<arfcn>	integer	-	C0 carrier assigned radio channel (BCCH - Broadcast Control Channel).
<bsic>	integer	-	base station identification code
<rxLev>	integer	-	decimal number; it is the reception level (in dBm).
<ber>	integer	-	decimal number; it is the bit error rate (in %).
<mcc>	hex	-	hexadecimal 3-digits number; it is the mobile country code.

<mnc>	hex	-	hexadecimal 2-digits/3-digits number; it is the mobile network code.
<lac>	mixed	-	location area code
<cellId>	mixed	-	cell identifier
<cellStat>	string	N/A	string type; it is the cell status

Values:

0	:	the cell is a suitable cell (CELL_SUITABLE).
1	:	the cell is low priority based on the received system information (CELL_LOW_PRIORITY).
2	:	the cell is forbidden (CELL_FORBIDDEN).
3	:	the cell is barred based on the received system information (CELL_BARRED).
4	:	the cell <rxLev> is low (CELL_LOW_LEVEL).
5	:	none of the above (e.g. exclusion timer running, no BCCH available, etc.) (CELL_OTHER).

<numArfcn>	integer	-	number of valid channels in the Cell Channel Description.
<arfcnn>	integer	-	arfcn of a valid channel in the Cell Channel Description (*n* is in the range **1..<numArfcn>**)
<numChannels>	integer	-	decimal number; it is the number of valid channels in the BCCH Allocation list
<ban>	integer	-	decimal number; it is the arfcn of a valid channel in the BA list (*n* is in the range **1..<numChannels>**)
<pbcch>	integer	N/A	packet broadcast control channel.

Values:

0	:	pbcch not activated on the cell
1	:	pbcch activated on the cell

<nom>	integer	-	network operation mode
<rac>	integer	-	routing area code
<spgc>	integer	N/A	SPLIT_PG_CYCLE support

Values:

0	:	SPLIT_PG_CYCLE is not supported on CCCH on this cell
1	:	SPLIT_PG_CYCLE is supported on CCCH on this cell

<pat>	integer	-	priority access threshold
<nco>	integer	-	network control order.
<t3168>	integer	-	timer 3168
<t3192>	integer	-	timer 3192
<drxmax>	integer	-	discontinuous reception max time (in seconds)
<ctrlAck>	integer	-	packed control ack.
<bsCVmax>	integer	-	blocked sequence countdown max value.

Name	Type	Default	Description
<alpha>	integer	-	alpha parameter for power control.
<pcMeasCh>	integer	N/A	type of channel which shall be used for downlink measurements for power control.

Values:

    0 : BCCH

    1 : PDCH

▶▶ 3G Network survey information text lines:
<uarfcn>,<rxLev>,<mcc>,<mnc>,<scrcode>,<cellId>,<lac>,<cellStatus>,<rscp>,<ecio>
<CR><LF><CR><LF><CR><LF>

Name	Type	Default	Description
<uarfcn>	integer	-	the cell carrier frequency designated by UTRA Absolute Radio Frequency Channel Number
<rxLev>	integer	-	decimal number; it is the reception level (in dBm)
<mcc>	hex	-	hexadecimal 3-digits number; it is the mobile country code
<mnc>	hex	-	hexadecimal 2-digits/3-digits number; it is the mobile network code
<scrcode>	integer	-	decimal number; it is the scrambling code
<cellId>	integer	-	cell identifier
<lac>	integer	-	location area code
<cellStatus>	string	N/A	string type; it is the cell status

Values:

    0 : the cell is a suitable cell (CELL_SUITABLE).

    1 : the cell is low priority based on the received system information (CELL_LOW_PRIORITY).

    2 : the cell is forbidden (CELL_FORBIDDEN).

    3 : the cell is barred based on the received system information (CELL_BARRED).

    4 : the cell <rxLev> is low (CELL_LOW_LEVEL).

    5 : none of the above (e.g. exclusion timer running, no BCCH available,etc.) (CELL_OTHER).

Name	Type	Default	Description
<rscp>	integer	-	decimal number; it is the RSCP level (in dBm)
<ecio>	integer	-	decimal number; it is the EC/IO ratio level (in dB)

▶▶ 4G Network survey information text lines:
Currently work only if module camped on LTE cell.

For serving cell:
<earfcn>,<rxLev>,<mcc>,<mnc>,<cellId>,<tac>

For neighbor cell:
<earfcn>,<rxLev>,<cellId>

Name	Type	Default	Description
<earfcn>	integer	-	E-UTRA Assigned Radio Channel.
<rxLev>	integer	-	decimal number; it is the reception level (in dBm)
<mcc>	hex	-	hexadecimal 3-digits number; it is the mobile country code
<mnc>	hex	-	hexadecimal 2/3 digits number; it is the mobile network code
<cellId>	mixed	-	cell identifier
<tac>	mixed	-	Tracking Area Code

ℹ The command is executed within max. 2 minute.

ℹ The information provided by **#CSURVC** is the same as that provided by **#CSURV**. The difference is that the output of **#CSURVC** is in numeric format only.

</> AT#CSURVC

Network survey started ...

2500,-45,450,05,273,12556

2500,-54,64

2500,-54,99

1350,-71,64

1350,-71,99

1350,-71,256

10836,-66,450,08,1488,14909569,7170,2,-69,-3.5

10737,-60,450,05,224,63808804,8673,0,-64,-4.0

Network survey ended

OK

3.14. IoT Portal

3.14.1. AT#LWM2MSKIP - No Starting any LwM2M Client

The set command enables/disables the LwM2M Client startup in the module.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT#LWM2MSKIP=<enable>

Parameter:

Name	Type	Default	Description
<enable>	integer	0	enables or disables the "skipping client startup" modality

Values:

0 : skip is disable, thus all the LwM2M clients shall start

1 : skip is enabled, thus all the LwM2M clients shall not start

ℹ Please notice that this command is not intended to give the user the possibility to control the LwM2M client starting. It has been introduced mainly to allow a fast way to enable/disable it in case of demo, module certifications and similar.

ℹ The set command reboots the module to make the change immediately effective.

ℹ The reboot is requested even if the skip is being applied on a module already set to skip the LwM2M client starting, or, in opposite way, if the skip is disabled on a module already set to this value.

AT#LWM2MSKIP?

Read command reports the current values of parameters in the format:
#LWM2MSKIP: <enable>

AT#LWM2MSKIP=?

Test command reports the supported range of values for all the parameters.

```
// verify the supported range of values
AT#LWM2MSKIP=?
#LWM2MSKIP: (0,1)
OK
// verify the currently set value
AT#LWM2MSKIP?
#LWM2MSKIP: 0
OK
// set to disable lwm2m client, will reboot automatically
AT#LWM2MSKIP=1
OK
```

3.14.2. AT+ODIS - Commands for Saving and Retrieving the Odis Parameters

This command allows the end-user to handle the Host ODIS parameters. In case of AT&T LwM2M agent up and running, the command is executed internally to the LwM2M client, updating this client about the values change (i.e.: the server will be notified about this change if the observation on these items is active).

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Required	Auto	No	-	2

➡️ **AT+ODIS=<instance>,<hostUniqueDevId>,<hostManufacturer>,<hostModel>,<hostSwVersion>**

Parameters:

Name	Type	Default	Description
<instance>	integer	N/A	Instance number
			Values:
			0 : Instance #0
			1 : Instance #1
<hostUniqueDevId>	string	-	contains a string, between double quotes, with the host unique device identifier
			HUID0, default value
<hostManufacturer>	string	-	contains a string, between double quotes, with the host manufacturer identifier.
			HMAN0, default value
<hostModel>	string	-	contains a string, between double quotes, with the host model identifier.
			HMOD0, default value
<hostSwVersion>	string	-	contains a string, between double quotes, with the host software version identifier.
			HSW0, default value

ⓘ The odis setting requires all the odis values to be set each time the command is issued, therefore, to change only one odis parameters it is recommended to read all the values first, and then compose the command input string accordingly.

ⓘ Since the odis items are 4, it is quite unlikely but possible that some the storing of some of them fails. In this case, the new values, where succeeded, are kept. An advice is that, in case of storing failure, the +ODIS? command is used to verify what are the odis items changed, if any.

◀️ **AT+ODIS?**

Read command reports the current odis values in the format:
+ODIS: <instance#0>,<hostManufacturer#0>,<hostModel#0>,<hostSwVersion#0>
+ODIS: <instance#1>,<hostManufacturer#1>,<hostModel#1>,<hostSwVersion#1>

ⓘ As per AT&T specification, the **<hostUniqueDevId>** odis parameter could be set but it cannot be read by AT commands.

? AT+ODIS=?

Test command reports the supported range of values for all parameters

```
AT+ODIS?
+ODIS: 0,"HMAN0","HMOD0","HSW0"
+ODIS: 1,"HMAN1","HMOD1","HSW1"
OK

AT+ODIS=0,"HUID12","HMAN34","HMOD56","HSW78"
OK

AT+ODIS?
+ODIS: 0,"HMAN34","HMOD56","HSW78"
+ODIS: 1,"HMAN1","HMOD1","HSW1"
OK
```

3.15. FOTA & OMA

3.15.1. FOTA Legacy

3.15.1.1. AT#OTAUPW - OTA Delta Write

Execution command starts injection of a delta file into the device.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#OTAUPW[=<size>]

This command will only write the file to the device to be ready for installation.

In order to install the delta file, you have to send the command **#OTAUP**.

You can send **#OTAUPW** with or without <size> parameter.

Once received the command **#OTAUPW**, the device prints the "**CONNECT**" reply wait for data to received.

Send escape sequence **+++** to end data transmission (which will result in **OK** response)

If <size> parameter value was specified, the command will report **OK** once all size is received.

Parameter:

Name	Type	Default	Description
<size>	integer	-	size in bytes of data to be injected

AT#OTAUPW=?

Test command returns **OK** result code**.**

```
// Send the command #OTAUPW to start the
// injection of the Delta FW into module's
// flash memory
AT#OTAUPW
CONNECT
// Send the Delta FW to the module via
// user's USB/SERIAL interface
// remind to use hardware flow control while
// sending the file
// Once the sending of the file has been
// terminated, close the connection through
// the escape sequence (+++).
+++
OK
```

3.15.2. OMA-DM

3.15.2.1. AT#HOSTODIS - Host ODIS Parameters Management

The command manages the Host Odis parameters related to AT&T OMA LwM2M Client.

[1] <CDR-DVM-4543> of AT&T, revision 19.2

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#HOSTODIS=<Param>,<Action>[,<Value>[,<Instance>]]
The set command allows the end-user to handle the Host Odis parameters for AT&T OMA LwM2M client

Parameters:

Name	Type	Default	Description
<Param>	integer	N/A	selects the specific item on which work.
			Values:
	0	:	Host Manufacturer name
	1	:	Host model Name
	2	:	Host Software application version
	3	:	Host Device Unique ID
<Action>	integer	N/A	selects the action to be performed on the item selected by **<Param>**
			Values:
	0	:	"SET" action
	1	:	"GET" action
	2	:	"RESET" action
<Value>	string	-	contains a string, between double quotes, with data to be set. Maximum string length is 64 characters. It is valid only if **<Action>** = 0 ("SET" action)
<Instance>	integer	0	instance number
			Value:
	0,1	:	allowed values

ⓘ Host Manufacturer, Host Model and Host Software application version do not change after an OTA firmware upgrade

ⓘ "GET" action is not allowed on Host Device Unique ID.

ⓘ Default values, according to specification [1], are:
Instance 0:

20. HUID0 (for Host Device Unique ID)
21. HMAN0 (for Host Manufacturer)
22. HMOD0 (for Host Model)
23. HSW0 (for Host Software version)

Instance 1:

24. HUID1 (for Host Device Unique ID)
25. HMAN1 (for Host Manufacturer)
26. HMOD1 (for Host Model)
27. HSW1 (for Host Software version)

AT#HOSTODIS=?

Test command returns the supported values ranges of the parameters.

Get the currently set values (i.e.: Host Model)
AT#HOSTODIS=1,1
#HOSTODIS:"HMOD1"
OK

Set a new Host Model value
AT#HOSTODIS=1,0,"Model #4 - 2nd version"
OK

Get the currently set value
AT#HOSTODIS=1,1
#HOSTODIS: 0,"Model #4 - 2nd version"
OK

Reset the Model value
AT#HOSTODIS=1,2
OK

Get again the currently set value
AT#HOSTODIS=1,1
#HOSTODIS:"HMOD1"
OK

3.16. GNSS

3.16.1. GNSS Configuration

3.16.1.1. AT$GPSNVRAM - Delete GNSS NVRAM Parameters

Delete GPS NVRAM parameters

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT$GPSNVRAM=<bitField>,<action>

Execution command is used to delete the GPS information stored in NVRAM.

Parameters:

Name	Type	Default	Description
<bitField>	integer	15	The assistance data mask for the type(s) of GPS data to read/delete with the following meaning: 1: Ephemeris 2: Location 4: Time 8: Almanac
			Value:
			1÷15 : data mask value
<action>	integer	0	command action
			Value:
			0 : delete data described in bitfield

AT$GPSNVRAM?

Read command reports the current value of the <**bitField**> parameter, in the format:

$GPSNVRAM: <bitField>

AT$GPSNVRAM=?

Test command returns the supported range of values for parameters <**bitField**> and <**action**>.

The current setting is stored through **$GPSSAV** command.

AT$GPSNVRAM=15,0
OK

3.16.1.2. AT$LCSSLP - Update SLP Address

Update the SLP address.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$LCSSLP=<slp_address_type>[,<slp_address>[,<slp_port_number>]]
Set command allows to update the SLP address and SLP port number.

Parameters:

Name	Type	Default	Description
<slp_address_type>	integer	2	SLP address type
			Values:
			0 : IPv4
			1 : FQDN
			2 : IMSI
			3 : IPv6 (if the IPv6 is supported)
<slp_address>	string	-	SLP address in FQDN format or IPv4/IPv6 format
<slp_port_number>	integer	-	SLP port number. Default value is 7275.

ℹ️ If <**slp_address_type**> is 0, 1 or 3, then <**slp_address**> is a mandatory.

ℹ️ If <**slp_address_type**> is 2, then <**slp_address**> and <**slp_port_number**> are not required.

AT$LCSSLP?
Read command returns the current SLP address.

AT$LCSSLP=?
Test command returns the supported values of parameter <**slp_address_type**>.

3.16.1.3. AT$LCSTER - Update Terminal Information

This command updates the terminal information like IMSI, MSISDN or IPv4/IPv6 address.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT$LCSTER=<id_type>[,<id_value>[,<pref_pos_mode>[,<tls_mode>]]]

Set command updates the terminal information like IMSI, MSISDN or IPv4/IPv6 address.

Parameters:

Name	Type	Default	Description
<id_type>	integer	1	a number which can have any of the following values
			Values:
			0 : MSIDSN
			1 : IMSI
			2 : IPv4 address
			3 : IPv6 address (if IPv6 is supported)
			4 : Invalid
<id_value>	string	-	as defined in **<id_type>**
<pref_pos_mode>	integer	0	preferred position mode
			Values:
			0 : default position mode
			1 : none preferred position mode
<tls_mode>	integer	1	indicates if TLS mode should/should not be used by the SET
			Values:
			0 : non-TLS mode
			1 : TLS mode

> The following parameters are included only for backward compatibility and have no effect. <**id_type**>, <**id_value**> and <**pref_pos_mode**>

> If **<id_type>** is MSISDN ,IPv4 address or IPv6 address, then **<id_value>** shall be entered.

3.16.1.4. AT$LCSLRMT - Mobile Terminated Location Request (MT-LR)

The network can request the current location of a target MS. This command allows to enable the unsolicited response that inform that an MT incoming call is arrived.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$LCSLRMT=<mode>

Set command is used to enable/disable unsolicited response. The URC format is:

$LCSLRMT: <TransportProtocol>,<NotifType>,<LocEstimateType>,<ClientId>, <ClientNameEncodingType>,<ClientNameType>,<ClientName>,<RequestorIdEncodingType>, <RequestorIdType>,<RequestorId>,<Codeword>,<ServiceTypeId>,<ReqId>

Parameter:

Name	Type	Default	Description
<mode>	integer	1	enable\disable unsolicited
	Values:		
	0	:	disable unsolicited
	1	:	enable unsolicited

Unsolicited fields:

Name	Type	Description
<TransportProtocol>	integer	Transport protocol used
		Values:
		0 : C-Plane Protocol
		1 : SUPL Protocol
		2 : Invalid
<NotifType>	integer	Notify type
		Values:
		0 : Notify
		1 : Verify request (no response will be treated as permission granted, see $LCSLRV)
		2 : Verify request (no response will be treated as permission denied, see $LCSLRV)
<LocEstimateType>	integer	Location estimate type
		Values:
		0 : Current location
		1 : Current or Last Location Known
		2 : Initial location
<RequestorIdEncodingtype>	integer	Client Identification
		Values:

	0 :	UCS2
	1 :	GSM default format
	2 :	UTF-8 format
	3 :	invalid format

<ClientNameEncodingType>	integer	Encoding type of the Client Name
		Values:
	0 :	UCS2
	1 :	GSM default format
	2 :	UTF-8 format
	3 :	invalid format
<ClientNameType>	integer	Type of Client Name
		Values:
	0 :	logical name
	1 :	email-address
	2 :	MSISDN
	3 :	URL of client
	4 :	SIP URL
	5 :	MIN
	6 :	MDN
	7 :	IMS Public Identity
	8 :	invalid type
<RequestorIdType>	integer	Type of the Requestor Id
		Values:
	0 :	logical name
	1 :	email-address
	2 :	MSISDN
	3 :	URL of client
	4 :	SIP URL
	5 :	MIN
	6 :	MDN
	7 :	IMS Public Identity
	8 :	invalid type
<ClientName>	string	Name of Client displayed as per data coding scheme
<RequestorId>	string	Requestor Id displayed as per data coding scheme
<CodeWord>	string	Codeword displayed as per data coding scheme
<ServiceTypeId>	integer	Id of service Type (0-127)
<ReqId>	integer	Identification of the request

<Reqld> uniquely identifies the MT-LR sent by the network and the same <reqid> shall be used in **$LCSLRV** command in case the **<Notif_type>** is of type "Verify request".

AT$LCSLRMT?

Read command returns the current value of parameter **<mode>**.

AT$LCSLRMT=?

Test command returns the range of values for parameter **<mode>**.

3.16.1.5. AT$LTC - LCS Certificate

This command is used to pass the security objects (e.g. certificate, key) to the Transport Layer Security Protocol, via binary string.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$LTC=<string>,<total_message_length>,<seq_no>,<security_object_type>

Set command is used to pass the security objects (e.g. certificate, key) to the Transport Layer Security Protocol (binary string). The certificate shall be in hexadecimal format (each octet of the certificate is given as two IRA character long hexadecimal number).

Parameters:

Name	Type	Default	Description
<string>	string	-	string certificate segment. The maximum value of accepted characters is 300 characters per segment.
<total_message_length>	integer	N/A	total certificate size to be received
			Value:
			1÷4096 : overall number of Certificate characters
<seq_no>	integer	N/A	sequence number of the segment
			Value:
			1÷13 : sequence number
<security_object_type>	integer	0	security object typology.
			Value:
			0 : Root Certificate

ℹ️ Execution command deletes the certificates stored in NVM.

AT$LTC?

Read command provides the first 300 characters of each valid certificate stored in NVM in the format:
$LTC: <string>,<total_message_length>,1,<security_object_type>

If no certificate is stored, the read command provides:
$LTC: "",0,1,<security_object_type>

AT$LTC=?

Test command returns the range of values for parameters **<total_message_length>**, **<seq_no>** and **<security_object_type>**.

The last two certificates are stored in NVM.

3.16.1.6. AT$GPSQOS - GPS Quality of Service

This command configures the GPS Quality of Service.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

➡️ **AT$GPSQOS=[<horiz_accuracy>[,<vertic_accuracy>[,<rsp_time>[,<age_of_location_info>[,<location_type>[,<nav_profile>[,<velocity_request>]]]]]]]**

Set command used to set the GPS Quality of Service (QoS).

Parameters:

Name	Type	Default	Description
<horiz_accuracy>	integer	1800000	horizontal accuracy (in meter)

Values:

0÷50	:	50m; 0 is highest accuracy.
51÷500	:	500m
501÷1800000	:	1km; 1800000 is lowest accuracy

Name	Type	Default	Description
<vertic_accuracy>	integer	990	vertical accuracy

Value:

0÷990	:	0 is highest accuracy, 990 is lowest accuracy (in meters)

Name	Type	Default	Description
<rsp_time>	integer	14400	response time

Value:

0÷14400	:	0 is the low delay and 14400 is the highest delay in seconds

Name	Type	Default	Description
<age_of_location_info>	integer	0	maximum age of location

Value:

0÷1966020	:	Value 0 means that stored location information should not be used. Value 1966020 indicates the maximum tolerable age of the stored location information. The valid range of interval for SUPL (Transport protocol) is [0 - 65535] seconds & [0 - 1966020] seconds for C-plane (Transport protocol).

Name	Type	Default	Description
<location_type>	integer	0	type of location required. Used only in case of C-Plane

Values:

	0 : Current Location			
	1 : Current or Last known location			
	2 : Invalid Location, indicates that this parameter shall not be used			
\<nav_profile\>	integer		0	navigation profile
	Values:			
	0 : Car navigation profile			
	1 : Personal profile			
	2 : Low speed profile			
	3 : Invalid profile, indicates that this parameter shall not be used			
\<velocity_request\>	integer		1	velocity information is needed.
	Values:			
	0 : FALSE			
	1 : TRUE; It is always supported with TRUE.			

🛈 The following parameters are included only for backward compatibility and have no effect.
\<vertic_accuracy\>, **\<age_of_location_info\>**, **\<location_type\>**, **\<nav_profile\>**, and **\<velocity_request\>**

🛈 The **\<rsp_time\>** is supported as 0-255. If **\<rsp_time\>** is bigger than 255 seconds, the value is supported as the highest 255 seconds.

AT$GPSQOS?

Read command returns the current QoS values, in the format:

AT$GPSQOS:
\<horiz_accuracy\>,\<vertic_accuracy\>,\<rsp_time\>,\<age_of_location_info\>,\<location_type\>,\<nav_profile\>,\<velocity_request\>

AT$GPSQOS=?

Test command returns the list of supported QoS values for each field.

$GPSQOS: (0-1800000),(0-990),(0-14400),(0-1966020),(0-2),(0-3),(0,1)

The current setting is stored through **$GPSSAV**.

```
AT$GPSQOS=1800000,990,150,0,0,0
OK
```

3.16.1.7.   AT$GPSSTOP - Stop Location Service Request

This command is used to stop location service request.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

➡️ **AT$GPSSTOP=<abort_cause>**

Set command stops the Receiver in Autonomous or A-GPS mode initiated through **$GPSSLSR** set command.

Parameter:

Name	Type	Default	Description
<abort_cause>	integer	1	set abort cause

Values:

0 :   user denies the request

1 :   unspecified cause for abort

2 :   cause Invalid

ℹ️ The **<abort_cause>** can be recovered by **$GPSRST**.

ℹ️ The current setting is stored through **$GPSSAV**.

ℹ️ The **<abort_cause>** option isn't supported. It has no effect and is included only for backward compatibility.

⬅️ **AT$GPSSTOP?**

Read command returns the current value of parameter <**abort_cause**>.

❓ **AT$GPSSTOP=?**

Test command returns **OK** result code.

3.16.1.8. AT$GPSSLSR - Start Location Service Request

This command configures the GPS Start Location Service Request.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

➡️ **AT$GPSSLSR=<transport_protocol>[,<pos_mode>[,<client_id>,<clientid_type>[,<mlc_number>,<mlcnumber_type>[,<interval>[,<service_type_id>[,<pseudonym_indicator>]]]]]]**

Execution command used to start the Receiver in Autonomous or A-GPS mode.

Parameters:

Name	Type	Default	Description
<transport_protocol>	integer	2	Configure transport protocol.
	Values:		
	0 :	CPlane	
	1 :	SUPL	
	2 :	Invalid	
<pos_mode>	integer	3	Configure MS Based mode.
	Values:		
	0 :	Pure MS Assisted - Location estimate from the network (MS Assisted mode)	
	1 :	MS Based - Assistance Data from the network (MS Based mode)	
	2 :	Not supported	
	3 :	Autonomous – Autonomous GPS mode of operation	
<client_id>	string	-	String parameter containing the ID of the LCS-Client to which the location estimate is to be transferred. Max length is 64 bytes.
<clientid_type>	integer	N/A	Configure client ID type.
	Values:		
	0 :	MSISDN	
	1 :	Invalid	
<mlc_number>	string	-	String parameter containing the address of the GMLC through which the location estimate is to be sent to the LCS-Client.
<mlcnumber_type>	integer	N/A	Configure mlc type.
	Values:		
	0 :	MSISDN	
	1 :	Invalid	
<interval>	integer	1	Configure interval period.
	Value:		

	0÷7200	:	GPS reporting period in seconds (will be sent unsolicited). if the value is 0 then a single shot NMEA Message will be provided Any value different from 0 sets the period (in seconds) between each NMEA Sentence.
<service_type_id>	integer	255	Configure service type id.
	Value:		
	0÷255	:	where 255 indicates that this parameter shall not be used
<pseudonym_indicator>	integer	N/A	Enable/disable display user name.
	Values:		
	0	:	display user name at the external client
	1	:	display user name as anonymous at the external client

Additional info:

▶▶ If C-PLANE or SUPL session is not successfully completed, it will be stopped, and unsolicited indication reports the error cause in the following formats:

$GPSSLSR: C-PLANE ERROR,<error_code>
or
$GPSSLSR: SUPL ERROR,<error_code>

<error_code>	
1	Session failed.
2	Fix request failed because the session timed out.
3	Fix request failed due to bad parameters in the request.
4	Fix request failed because the phone is offline.
5	Fix request failed because the engine is locked.

ℹ If **<pos_mode>** is Autonomous, the **<transport_protocol>** should be invalid.

If **<transport_protocol>** is C-plane and **<pos_mode>** is Pure MS Assisted, then **<interval>** should be 0 (or omitted).

ℹ If **<interval>** is not set, it is assumed to be 0.

The Unsolicited NMEA sentences have to be enabled with the commands **$GPSNMUN**.

ℹ The following parameters are included only for backward compatibility and have no effect.
<client_id>, **<clientid_type>**, **<mlc_number>**, **<mlcnumber_type>**, **<service_type_id>** and **<pseudonym_indicator>**

◀ **AT$GPSSLSR?**

Read command returns the current settings, in the format:

**$GPSSLSR: <transport_protocol>[,<pos_mode
>[,<client_id>,<clientid_type>[,<mlc_number>,<mlcnumber_type>[,<
interval>[,<service_type_id>[,<pseudonym_indicator>]]]]]]**

AT$GPSSLSR=?

Test command returns the list of supported SLSR values for each field.

$GPSSLSR: (0-2),(0-3),(64),(0,1),(64),(0,1),(0-7200),(0-255),(0,1)

The current setting is stored through **$GPSSAV**.

AT$GPSSLSR= 2,3,,,,,1
OK

3.16.1.9. AT$LCSLRV - Location Request Verification

Location request verification

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$LCSLRV=<permission>,<reqid>

Set command is used to verify a location request coming from the network. The verification is sent back to the network with request id.

Parameters:

Name	Type	Default	Description
<permission>	integer	0	set the permission
			Values:
			0 : permission denied
			1 : permission granted
<reqid>	string	-	uniquely identifies the MT-LR sent by the network

AT$LCSLRV=?

Test command returns the range of values for parameter <**permission**>.

The <**reqid**> must use the identical value as <**reqid**> of following **$LCSLRMT** (see **$LCSLRMT**).

3.16.1.10. AT$GPSAPN - Set GPS APN Profile

This command sets the GPS APN profile.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$GPSAPN=\<profile\>[,\<pdptype\>,\<apnname\>]

Set command sets the GPS APN profile.

Parameters:

Name	Type	Default	Description
\<profile\>	integer	0	GPS APN profile type
			Value:
			0 : SUPL APN profile
\<pdptype\>	integer	N/A	GPS APN PDP type
			Values:
			0 : IPV4
			1 : IPV6
			2 : IPV4V6
\<apnname\>	string	-	GPS APN name; The maximum length is 100.

AT$GPSAPN?

Read command returns the current GPS APN profile in the format:

$GPSAPN: \<profile\>,\<pdptype\>,\<apnname\>

AT$GPSAPN=?

Test command returns the supported range of parameters **\<profile\>** and **\<pdptype\>** and the maximum length of **\<apnname\>** in the format:

$GPSAPN: (the supported range of **\<profile\>**),(the supported range of \<pdptype\>),**\<apnname_length\>**

Additional info:

▶▶ response fields

Name	Type	Default	Description
\<apnname_length\>	integer	-	the maximum length of field **\<apnname\>**

If the parameter <**profile**> only exists, the profile is deleted.

The GPS APN profile for SUPL session should be defined with same APN of **+CGDCONT** command. (See **+CGDCONT**)

3.16.1.11. AT$AGPSEN - Set GNSS capability supporting to module

This command set GNSS capability supporting to module.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$AGPSEN=<mode>

Set command sets GPS/A-GPS/A-GLOASS capability supporting on the module.

Parameter:

Name	Type	Default	Description
<mode>	integer	1	GNSS capability

Values:

0	:	Standalone GPS only
1	:	Full GPS capability (Standalone GPS, A-GPS)
2	:	Full GPS (Standalone GPS, A-GPS) and A-GLONASS capability
3	:	Not support GPS

The default value depends on operator.
For Fx980 series,
28.   Generic : **2**
29.   Others : **1**

AT$AGPSEN?

Read command returns the currently selected GNSS capability in the format:

$AGPSEN: <mode>

AT$AGPSEN=?

Test command reports the supported range of values for parameter(s) **<mode>**.

$AGPSEN: (the supported range of <mode>)

3.16.1.12. AT$LCSLPP - Set Configuration Information for LPP Protocol

This command sets the configuration information for LPP Protocol.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$LCSLPP=<mode>

Set command sets the configuration information for LPP (LTE Poisoning Protocol).

Parameter:

Name	Type	Default	Description
<mode>	integer	N/A	configuration for LPP

Values:

0 : RRLP in LTE

1 : LPP user plane in LTE

2 : LPP control plane in LTE

3 : LPP UP/CP in LTE

> The default value depends on operator.
> For LM9x0 series,
> 30.   VZW / T-Mobile: **3**
> 31.   Others: **2**
> For Fx980 series,
> 32.   Generic / VZW / T-Mobile / NTT / TELSTRA: **3**
> 33.   KDDI : **1**
> 34.   Others: **2**

AT$LCSLPP?

Read command returns the currently selected configuration for LPP protocol in the format:

$LCSLPP: <mode>

AT$LCSLPP=?

Test command reports the supported range of values for parameter(s) <**mode**>.

$LCSLPP: (the supported range of <mode>)

3.16.1.13. AT$LCSAGLO - Selection of Positioning protocols for A-GLONASS

This command set selection of positioning protocols (RRLP, RRC, LPP) for A-GLONASS.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

➡️ **AT$LCSAGLO=<mask>**

Set command sets the selection of positioning protocols for A-GLONASS.

Parameter:

Name	Type	Default	Description
<mask>	integer	0	protocol mask of A-GLONASS
			0: Not selected
			1: RRC control plane (In case AT&T, Default)
			2: RRLP user plane
			4: LPP user plane
			8: LPP control plane

Value:

0÷15 : protocol mask of A-GLONASS

ℹ️ The default value depends on operator.
   For LM9x0 / LE910Cx series,
35. AT&T : **1**
36. Others : **0**
   For Fx980 series,
37. AT&T : **1**
38. Generic : **15**
39. Others: **0**

⬅️ **AT$LCSAGLO?**

Read command returns the currently selected protocol mask of A-GLONASS in the format:

$LCSAGLO: <mask>

❓ **AT$LCSAGLO=?**

Test command reports the supported range of values for parameter(s) **<mask>**.

$LCSAGLO: (the supported range of <mask>)

This command is only applicable for A-GLONASS capable setting. (see **$AGPSEN**)

The <**mask**> 4 and 8 must be set in the LPP configuration for this to take effect. (see **$LCSLPP**)

3.16.1.14. AT#LOCAUTOSTART - GNSS Auto Start Configuration

This command is related to GNSS auto start configuration.

80624ST11005A_FN980m_QMI_Command_Reference_Guide_Preliminary_Draft.docx
- 40. QMI_GMS_LOC_GET_AUTO_START
- 41. QMI_GMS_LOC_SET_AUTO_START

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#LOCAUTOSTART=<function>,<fix_type>,<max_time>,<max_dist>,<fix_rate>

Set command sets the GNSS auto start configuration.

Parameters:

Name	Type	Default	Description
<function>	integer	2	setting to indicate when modem should start an automatic
			Values:
	0	:	disable
	1	:	AT bootup
	2	:	when NMEA port is opened (Default with OEM PRI setting)
<fix_type>	string	4	type of GNSS fix
			Values:
	1	:	default engine mode
	2	:	MS-based
	3	:	MS-assisted
	4	:	Standalone (Default with OEM PRI setting)
<max_time>	integer	255	maximum time allowed for the receiver to get a fix in seconds
			Value:
	1÷255	:	Default with OEM PRI setting: 255
<max_dist>	string	1000	maximum uncertainty of a fix measured by distance in meters
			Value:
	1÷4294967280	:	Default with OEM PRI setting: 1000
<fix_rate>	string	1	time between fixes in seconds
			Value:
	1÷65535	:	Default with OEM PRI setting: 1

ℹ️ This settings affect the current GNSS settings.
42. **<fix_type>**: **<transport_protocol>** and **<pos_mode>** of **$GPSSLSR**
43. **<fix_rate>**: **<interval>** of **$GPSSLSR**
44. **<max_time>**: **<rsp_time>** of **$GPSQOS**
45. **<max_dist>**: **<horiz_accuracy>** of **$GPSQOS**

ℹ️ The Defaults or parameters are values after applying OEM PRI setting.

⬅️ **AT#LOCAUTOSTART?**

Read command returns the current GNSS Auto Start setting, in the format:

#LOCAUTOSTART: <function>,<fix_type>,<max_time>,<max_dist>,<fix_rate>

Default response without OEM PRI settings:
#LOCAUTOSTART: 255,,,,

Additional info:

▶▶ where

Name	Type	Default	Description
<function>	integer	255	setting to indicate when modem should start an automatic
	Values:		
	0	:	disable
	1	:	AT bootup
	2	:	when NMEA port is opened
	255	:	not reported by modem (Default without OEM PRI setting)

❓ **AT#LOCAUTOSTART=?**

Test command returns the supported range of values for parameters **<function>**, **<fix_type>**, **<max_time>**, **<max_dist>** and **<fix_rate>**.

3.16.1.15. AT#LOCNMEATYPE - NMEA Type Configuration

This command is related to NMEA type setting.

> 80624ST11005A_FN980m_QMI_Command_Reference_Guide_Preliminary_Draft.docx
> 46.   QMI_GMS_LOC_SET_NMEA_TYPE

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#LOCNMEATYPE=<nmea_mode_ind>[,<nmea_type>]
Set command sets the NMEA type configuration.

Parameters:

Name	Type	Default	Description
<nmea_mode_ind>	integer	N/A	Execute the Location Fix start or stop. Indicate whether NMEA port is opened or not
			Values:
			0 : NMEA streaming stop
			1 : NMEA streaming start
<nmea_type>	integer	N/A	Set NMEA type mask to modem
			Values:
			0 : Disable NMEA type
			1÷134020607 : NMEA type mask

Additional info:

▶▶ the bit mask values of <nmea_type> :
   default with OEM PRI setting : 134020607
   default without OEM PRI setting : 0
   47.   0x00000001 - Enable GPGGA type
   48.   0x00000002 - Enable GPRMC type
   49.   0x00000004 - Enable GPGSV type
   50.   0x00000008 - Enable GPGSA type
   51.   0x00000010 - Enable GPVTG type
   52.   0x00000020 - Enable GPGLL type
   53.   0x00000040 - Enable GLGSV type
   54.   0x00000080 - Enable GNGSA type
   55.   0x00000100 - Enable GNGNS type
   56.   0x00000400 - Enable GARMC type
   57.   0x00000800 - Enable GAGSV type
   58.   0x00001000 - Enable GAGSA type
   59.   0x00002000 - Enable GAVTG type
   60.   0x00004000 - Enable GAGGA type
   61.   0x00008000 - Enable BDGSV type
   62.   0x00040000 - Enable GPGNS type
   63.   0x00080000 - Enable GLGNS type
   64.   0x00100000 - Enable GNGSV type
   65.   0x00200000 - Enable GAGNS type

66. 0x00400000 - Enable BDGSA type
67. 0x00800000 - Enable BDRMC type
68. 0x01000000 - Enable BDVTG type
69. 0x02000000 - Enable BDGGA type
70. 0x04000000 - Enable BDGNS type

ℹ For **<nmea_mode_ind>** value, each value means the following description,
71. NMEA streaming start: GPS engine start location fix and start to stream out NMEA sentences.
72. NMEA streaming stop: GPS engine stop location fix and stop NMEA streaming.

ℹ The current setting **<nmea_type>** is stored in NVM.

ℹ The Default of **<nmea_type>** is value after applying OEM PRI setting.

ℹ If **$GPSNMUN** or **$GPSNMUNEX** command is already used, the user should avoid using this command because this setting have an effect on **$GPSNMUN** and **$GPSNMUNEX** operation.

AT#LOCNMEATYPE?

Read command returns the current NMEA type configuration, in the format:

#LOCNMEATYPE: <nmea_type>

AT#LOCNMEATYPE=?

Test command reports the supported range of values for parameters **<nmea_mode_ind>** and **<nmea_type>**.

3.16.1.16. AT$XTRAEN - GpsOneXTRA feature control

This command enables/disables the GpsOneXTRA Feature.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$XTRAEN=<mode>

Execution command set to control the GpsOneXTRA feature.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	Control GpsOneXTRA feature.
			Values:

  0 : Disable GpsOneXTRA feature
  1 : Enable GpsOneXTRA feature

AT$XTRAEN?

Read command returns the values of saved GpsOneXTRA feature <**mode**>.
$XTRAEN: <mode>

AT$XTRAEN=?

Test command returns the supported range of values of parameters <**mode**>
$XTRAEN: (0,1)

New setting is applicable across device power cycles.

The current setting is stored in NVM.

If gpsOneXTRA feature is enabled, the unintentional data usage can be occurred. Please set as disable if you want not to use this feature.

In case Fx980 series,

If gpsOneXTRA feature is enabled, the following describes only the general behaviors of XTRA client.

An XTRA file contains orbit predictions for constellations, which are valid up to **7 days**. With valid XTRA data present, a GNSS engine on modem can eliminate the need for GNSS navigation data demodulation over the air and reduce the time required for generating a position fix.

1) XTRA data download

- XTRA data downloading **always requires data service**. The pending XTRA data download is resumed after data connection is available.

2) XTRA data download Initiation

- After power-up: XTRA client initiates XTRA data download after power-up and data service is connected.

- On-demand: When the modem requests for XTRA data download, XTRA client initiates XTRA data download.

3) Download throttle mechanism

- The maximum number of downloads per UTC day are **three**. After this download limit is reached, no download request is accepted on that day

• The following describes only the gpsOneXTRA behaviors for Fx980 series.
    - Enable gpsOneXTRA Feature.
        AT$XTRAEN?
        $XTRAEN: 0

        OK

        AT$XTRAEN=1
        OK
        AT#REBOOT
        OK
        AT$XTRAEN?
        $XTRAEN: 1

        OK
    - Enable Data connection (See #ICMCONNECT)
        AT+CGDCONT?
        +CGDCONT:
        1,"IPV4V6","lte.sktelecom.com","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0,,,,,,,,,"",,,,0

        OK

        AT#ICMCONNECT="CON",1,4
        OK
        AT#ICMCONNECT="CON",1,6
        OK
        AT#ICMCONNECT?
        #ICMCONNECT: 1,1,1,1,1

        OK
    - Check the standalone GNSS mode.
        AT$GPSSLSR?
        $GPSSLSR: 2,3,,,,,1,255

        OK
    - On-demand Trigger with cold start for example.
        AT$GPSR=1
        OK
        AT$GPSP=1
        OK
    - After few seconds, the GNSS SVs information from XTRA Data download is displayed
    on NMEA stream and can get a fix soon.
        AT$GPSNMUN?
        $GPSNMUN: 2,1,1,1,1,1,1

        OK

        $GPGSA,A,1,,,,,,,,,,,,,,,,*32
        $GPVTG,,T,,M,,N,,K,N*2C
        $GPRMC,,V,,,,,,,,,,N,V*29
        $GPGGA,,,,,,0,,,,,,,,,*66
        $GPGLL,,,,,,V,N*64
        $GPGSA,A,1,,,,,,,,,,,,,,,,*32
        $GPVTG,,T,,M,,N,,K,N*2C
        $GPRMC,,V,,,,,,,,,,N,V*29
        $GPGGA,,,,,,0,,,,,,,,,*66
        $GPGLL,,,,,,V,N*64
        $GPGSV,3,1,12,16,58,274,34,31,56,085,38,03,08,261,,04,36,306,,1*64
        $GPGSV,3,2,12,08,00,000,,09,07,322,,18,11,099,,22,02,237,,1*6E
        $GPGSV,3,3,12,26,71,345,,27,27,194,,29,22,042,,32,08,160,,1*68
        $GPGSA,A,1,,,,,,,,,,,,,,,,*32
        $GPVTG,,T,,M,,N,,K,N*2C
        $GPRMC,,V,,,,,,,,,,N,V*29
        $GPGGA,,,,,,0,,,,,,,,,*66

```
$GPGLL,,,,,,V,N*64
$GPGSV,3,1,12,04,36,306,31,16,58,274,34,26,71,345,37,31,56,085,39,1*6D
$GPGSV,3,2,12,03,08,261,,08,00,000,,09,07,322,,18,11,099,,1*64
$GPGSV,3,3,12,22,02,237,,27,27,194,,29,22,042,,32,08,160,,1*6C
$GPGSA,A,1,,,,,,,,,,,,,,*32
$GPVTG,,T,,M,,N,,K,N*2C
$GPRMC,,V,,,,,,,,,,N,V*29
$GPGGA,,,,,,0,,,,,,,,*66
$GPGLL,,,,,,V,N*64
$GPGSV,3,1,12,04,36,306,34,16,58,274,34,26,71,345,38,31,56,085,40,1*69
$GPGSV,3,2,12,03,08,261,,08,00,000,,09,07,322,,18,11,099,,1*64
$GPGSV,3,3,12,22,02,237,,27,27,194,,29,22,042,,32,08,160,,1*6C
$GPGSA,A,3,04,16,26,31,,,,,,,,4.1,2.1,3.5,1*2A
$GPVTG,203.1,T,203.1,M,23.1,N,42.7,K,A*22
$GPRMC,013356.18,A,3731.301587,N,12655.781339,E,23.1,203.1,080421,6.0,W,A,V*63
$GPGGA,013356.18,3731.301587,N,12655.781339,E,1,04,2.1,92.1,M,18.0,M,,*5F
$GPGLL,3731.301587,N,12655.781339,E,013356.18,A,A*6E
```

3.16.2.   GNSS Receiver

3.16.2.1. AT$GPSRST - Restore Default GNSS Parameters

This command resets the GNSS parameters to "Factory Default" configuration.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$GPSRST

Execution command resets the GNSS parameters to "Factory Default" configuration and stores them in the NVM of the device.

AT$GPSRST=?

Test command returns the **OK** result code.

If the GPS controller is powered up (see **$GPSP**), the GNSS controller is powered down because the GNSS parameters should be reset with "Factory Default".

3.16.2.2. AT$GPSSAV - Save GNSS Parameters Configuration

This command stores the current GNSS parameters in the NVM of the device.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT$GPSSAV
Execution command stores the current GNSS parameters in the NVM of the device.

AT$GPSSAV=?
Test command returns the **OK** result code.

3.16.2.3. AT$GPSP - GNSS Positioning Session Control

This command controls the GNSS positioning session.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT$GPSP=<status>

The set command allows to control the GNSS positioning session.

Parameter:

Name	Type	Default	Description
<status>	integer	0	GNSS positioning session status

Values:

0 : Stop GNSS positioning session

1 : Start GNSS positioning session

ℹ This command only controls the started GNSS positioning session from **$GPSP** and **$GPSSLSR**. The GNSS positioning sessions of other Service(IMS, MDT or UIM) cannot be controlled.

ℹ The Start GNSS positioning session clears GNSS memory and then powers up the GNSS receiver if it powers down. The GNSS data cleaning is performed on the base of the current value of the <**reset_type**> parameter (see **$GPSR**).

ℹ The GNSS operation mode of Start GNSS positioning session is performed on the base of the current values of **$GPSSLSR** configuration (see **$GPSSLSR**).

ℹ The **$GPSP** and **$GPSSLSR** cannot be used at same time.

AT$GPSP?

The read command reports the current value of the <**status**> parameter, in the format:
$GPSP: <status>
Where:
<**status**> - GNSS positioning session status
0 - GNSS positioning session is not working
1 - GNSS positioning session is working

AT$GPSP=?

The test command reports the supported values range for parameter **<status>**.
$GPSP: (0,1)

📝 The current <**status**> value is stored through **$GPSSAV** command.

Start GNSS positioning session.

AT$GPSP=1
OK

Stop GNSS positioning session.

AT$GPSP=0
OK

3.16.3. GNSS General Management

3.16.3.1. AT$GNSSCONF - Configuration of the GNSS receiver

This command is used to configure the capabilities of the GNSS receiver.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$GNSSCONF=<combination>[,<worldwide>]

Set command configures the capabilities of the GNSS receiver.

Parameters:

Name	Type	Default	Description
<combination>	integer	9	GNSS configuration

Values:

- 0 : GPS Only
- 1 : GPS + GLONASS
- 2 : GPS + GALILEO
- 3 : GPS + GLONASS + GALILEO
- 4 : GPS + GLONASS + BEIDOU
- 5 : GPS + BEIDOU + GALILEO
- 6 : GPS + GLONASS + BEIDOU + GALILEO
- 7 : GPS + GLONASS + QZSS
- 8 : GPS + GLONASS + BEIDOU + QZSS
- 9 : GPS + GLONASS + BEIDOU + GALILEO + QZSS

Name	Type	Default	Description
<worldwide>	integer	0	Applicable area The BEIDOU, GALILEO and QZSS are only applicable for this option.

Values:

- 0 : Outside of the United States
- 1 : Worldwide (For test/debug purposes)

AT$GNSSCONF?

Read command returns the currently selected GNSS configuration in the format:

$GNSSCONF: <combination>,<worldwide>

AT$GNSSCONF=?

Test command reports the supported range of values for parameter(s) **<combination>** and **<worldwide>**.

$GNSSCONF: (the supported range of <combination>),(the supported range of <worldwide>)

The <**worldwide**> option isn't supported. It has no effect and is included only for backward compatibility.

If the <**worldwide**> value is 1 (Worldwide) from **$GNSSCONF** setting, Set command returns **ERROR**.

3.16.3.2. AT$GPSR - Reset the GNSS Controller

This command resets the GNSS controller.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Other	No	-	2

AT$GPSR=<resetType>

Set command allows to reset the GNSS controller.

Parameter:

Name	Type	Default	Description
<resetType>	integer	3	set the type of GNSS controller reset.

Values:

0   :   Factory Reset: this option clears all the GNSS memory including Clock Drift.

1   :   Coldstart (No Almanac, No Ephemeris): this option clears all data that is currently stored in the internal memory of the GNSS receiver including Position, Almanac, Ephemeris and Time. The stored Clock Drift is retained.

2   :   Warmstart (No ephemeris): this option clears all initialization data in the GNSS receiver and subsequently reloads the data that is currently displayed in the Receiver Initialization Setup screen. The Almanac is retained but the Ephemeris is cleared.

3   :   Hotstart (with stored Almanac and Ephemeris): the GNSS receiver restarts by using all data that is currently stored in the internal memory of the GNSS receiver: validated Ephemeris and Almanac.

ℹ   **Factory Reset** performs the same operation as **Coldstart**.

ℹ   **<resetType>** sets the kind of start when GNSS is activated through **$GPSP** command.

AT$GPSR?

Read command returns the currently used reset type, in the format:

$GPSR: <resetType>

AT$GPSR=?

Test command reports the range of supported values for parameter <**resetType**>.

The current setting is stored through **$GPSSAV** command.

Factory reset
AT$GPSR=0
OK

3.16.3.3. AT$GPSLOCK - GNSS Lock Mode

This command is used to configure the GNSS lock mode.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$GPSLOCK=<mode>

Set command sets the GNSS lock mode.

Parameter:

Name	Type	Default	Description
<mode>	integer	0	Lock Mode

Values:

0 : GNSS Unlock

1 : Mobile-Initiated (MI) session is locked

2 : Mobile-Terminated (MT) session is locked

3 : Except for an emergency call, all (MI and MT) is locked

ⓘ The default value depends on operator.
For Fx980 series,
- SKT: 3 (Some GNSS commands return ERROR. If GNSS fix should be used, please set 0 value to work GNSS)
- Others: 0

AT$GPSLOCK?

Read command returns the currently selected lock mode in the format:

$GPSLOCK: <mode>

AT$GPSLOCK=?

Test command reports the supported range of values for parameter(s) <**mode**>.

$GPSLOCK: (the supported range of <mode>)

📝 During an emergency call, an MT session will always be permitted irrespective of the setting.

3.16.3.4. AT$GPSANTPORT - Configuration of GNSS Antenna Port Type

This command is used to configure to control switch between GPS and AUX port.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$GPSANTPORT=<type>

Set command selects to configure GNSS antenna port type.

Parameter:

Name	Type	Default	Description
<type>	integer	2	Enabled Port type

Values:

- 0 : Disable GNSS on AUX port and GNSS port. (GNSS off)
- 1 : Enable GNSS on AUX port and disable GNSS on GNSS port. (passive antenna on Aux port)
- 2 : Enable GNSS on GNSS port and disable GNSS on AUX port; DC-Bias off. (passive antenna on GNSS port)
- 3 : Enable GNSS on GNSS port and disable GNSS on AUX port; DC-Bias on. (active antenna on GNSS port)
- 4 : Enable GNSS on GNSS port and disable GNSS on AUX port; High Gain Mode, DC-Bias on. (active antenna on GNSS port, High Gain)

AT$GPSANTPORT?

Read command returns the currently selected port type in the format:

$GPSANTPORT: <type>

AT$GPSANTPORT=?

Test command reports the supported range of values for parameter(s) **<type>**.

$GPSANTPORT: (the supported range of <type>)

3.16.3.5. AT$GNSSMBCFG - GNSS Multi-band Configuration

This command set the GNSS Multi-band configuration.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT$GNSSMBCFG=<mode>

Execution command set the GNSS Multi-band configuration.

Parameter:

Name	Type	Default	Description
<mode>	integer	1	GNSS Multi-band Configuration

Values:

0 : Disable

1 : Enable

2 : Forced enable

1. <**mode**> is **0** - Disable
   - GPS L5, GAL E5a and BDS B2a are disabled.
2. <**mode**> is **1** - Enable
   - GPS L5, GAL E5a and BDS B2a are enabled.
   - GNSS multi-band signal tracking is conditional engaged.
3. <**mode**> is **2** - Forced Enable
   - GPS L5, GAL E5a and BDS B2a are enabled.
   - Enables GNSS multi-band signal tracking always and prevents engagement of DPO(Dynamic Power Optimization).

AT$GNSSMBCFG?

Read command returns the current GNSS Multi-band Configuration in the format:
$GNSSMBCFG: <mode>
where:
<mode> - GNSS Multi-band Configuration

AT$GNSSMBCFG=?

Test command reports the supported range of values for parameter(s) **<mode>**.
$GNSSMBCFG: (the supported range of <mode>)

New setting is applicable across device power cycles.

The current setting is stored in NVM.

3.16.4. GNSS Positioning Information

3.16.4.1. AT$GPSNMUN - Unsolicited NMEA Data Configuration

Unsolicited NMEA data configuration

NMEA 0183 Standard

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT$GPSNMUN=<enable>[,<GGA>,<GLL>,<GSA>,<GSV>,<RMC>,<VTG>]

Set command allows to activate an unsolicited GNSS data stream built with NMEA sentences on the standard serial port and defines which NMEA sentences will be available. Refer to document [1] to have information on the NMEA sentences contents and formats.

Parameters:

Name	Type	Default	Description
<enable>	integer	0	Enables unsolicited GNSS data stream and selects one of the available GNSS data stream format display. <enable> parameter is also used to disable the GNSS data stream. Here is the list of the <**enable**> values. See Additional info section to have information on GNSS data stream formats.
			Values:
	0	:	disable GNSS data stream
	1	:	enable the first GNSS data stream format
	2	:	enable the second GNSS data stream format
	3	:	enable the first GNSS data stream format, and reserve the AT interface port only for the GNSS data stream
<GGA>	integer	0	enables/disables the presence of the Global Positioning System Fix Data NMEA sentence (GGA) in the GNSS data stream.
			Values:
	0	:	disable
	1	:	enable
<GLL>	integer	0	enable/disable the presence of the Geographic Position - Latitude/Longitude NMEA sentence (GLL) in the GNSS data stream.
			Values:
	0	:	disable
	1	:	enable
<GSA>	integer	0	enable/disable the presence of the GNSS DOP and Active Satellites NMEA sentence (GSA) in the GNSS data stream.
			Values:

	0	:	disable	
	1	:	enable	
\<GSV\>	integer	0		enable/disable the presence of the Satellites in View NMEA sentence (GSV) in the GNSS data stream.
	Values:			
	0	:	disable	
	1	:	enable	
\<RMC\>	integer	0		enable/disable the presence of the Recommended Minimum Specific GNSS Data NMEA sentence (RMC) in the GNSS data stream.
	Values:			
	0	:	disable	
	1	:	enable	
\<VTG\>	integer	0		enable/disable the presence of the GNSS Course Over Ground and Ground Speed NMEA sentence (VTG) in the GNSS data stream.
	Values:			
	0	:	disable	
	1	:	enable	

Additional info:

▶▶ **\<enable\>**=1, GNSS data stream format:
$GPSNMUN: \<NMEA SENTENCE 1\>\<CR\>\<LF\>
...
$GPSNMUN: \<NMEA SENTENCE N\>\<CR\>\<LF\>
...

▶▶ **\<enable\>**=2, GNSS data stream format:
\<NMEA SENTENCE 1\>\<CR\>\<LF\>
...
\<NMEA SENTENCE N\>\<CR\>\<LF\>
...

▶▶ **\<enable\>**=3, in this case, the AT interface port is dedicated to NMEA sentences, it is not possible to send AT commands. Use the escape sequence "+++" to return in command mode. GNSS data stream format:
\<NMEA SENTENCE 1\>\<CR\>\<LF\>
...
\<NMEA SENTENCE N\>\<CR\>\<LF\>
...

ℹ️ If the **<enable>** is 3, it can activate the NMEA unsolicited streaming both the current dedicated port and NMEA port. This **<enable>** option isn't stored in NVM.

AT$GPSNMUN?
Read command returns whether the unsolicited GNSS data stream is currently enabled or not, along with the current NMEA mask configuration, in the format:
$GPSNMUN: <enable>,<GGA>,<GLL>,<GSA>,<GSV>,<RMC>,<VTG>

AT$GPSNMUN=?
Test command returns the supported range of values for parameters:
<enable>,<GGA>,<GLL>,<GSA>,<GSV>,<RMC>,<VTG>

ℹ️ The storage of **$GPSNMUN** setting value is following,

Setting saved
Auto

The current setting is stored in NVM.

ℹ️ If **#LOCNMEATYPE** command is already used, the user should avoid using this command because this setting have an effect on **#LOCNMEATYPE** operation.

</> Set the GSA as available sentence in the unsolicited message
AT$GPSNMUN=1,0,0,1,0,0,0
OK

Turn-off the unsolicited mode
AT$GPSNMUN=0
OK

Read the current NMEA mask configuration:
AT$GPSNMUN?
$GPSNMUN: 1,0,0,1,0,0,0
OK

The unsolicited message will be:
$GPSNMUN: $GPGSA,A,3,23,20,24,07,13,04,02,,,,,,2.4,1.6,1.8*3C

3.16.4.2. AT$GPSACP - Get Acquired GNSS Position

This command returns information about the last GNSS position.

NMEA 0183 Standard

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT$GPSACP

Execution command returns information about the last GNSS position in the format:

$GPSACP: <UTC>,<latitude>,<longitude>,<hdop>,<altitude>,<fix>,<cog>,<spkm>,<spkn>, <date>,<nsat>

Additional info:

▶▶ Meanings of the parameters returned by the command.

Name	Type	Default	Description
<UTC>	string	-	UTC time (hhmmss.sss) referred to GGA sentence
<latitude>	string	-	latitude in the format ddmm.mmmmmm N/S (referred to GGA sentence) where: dd: 00..90, degrees mm.mmmmmm: 00.000000..59.999999, minutes N/S: North/South
<longitude>	string	-	longitude in the format dddmm.mmmmmm E/W (referred to GGA sentence) where: ddd: 000..180, degrees mm.mmmmmm: 00.000000..59.999999, minutes E/W: East/West
<hdop>	string	-	horizontal dilution of precision (referred to GGA sentence)
<altitude>	string	-	altitude - mean-sea-level (geoid) in meters (referred to GGA sentence)
<fix>	integer	N/A	fix type
			Values:
			0 : invalid fix
			1 : invalid fix
			2 : 2D fix
			3 : 3D fix
<cog>	string	-	course over ground (degrees, True) (referred to VTG sentence) in the format ddd.mm

where:

ddd: 000..360, degrees

mm: 00..59, minutes

\<spkm\>	string	-	speed over ground (km/hr) (referred to VTG sentence)
\<spkn\>	string	-	speed over ground (knots) (referred to VTG sentence)
\<date\>	string	-	date of fix (referred to RMC sentence) in the format ddmmyy
			where:
			dd: 01..31, day
			mm: 01..12, month
			yy: 00..99, year 2000 to 2099
\<nsat\>	integer	N/A	total number of GNSS satellites in use (referred to GNS sentence)
	Value:		
	0÷99	:	total number of GNSS satellites in use

AT$GPSACP?

Read command has the same behavior as the execution command.

AT$GPSACP=?

Test command returns the **OK** result code.

AT$GPSP?
$GPSP: 0

when module is down there no acquired position
AT$GPSACP
$GPSACP:
OK
AT$GPSP=1
OK
Until first fix is received, the command will display no fix GNSS position
AT$GPSACP
$GPSACP: ,,,,,1,,,,,,
OK
Once fix has been received the command will display actual GNSS position
AT$GPSACP
$GPSACP: 002518.000,3731.303660N,12655.781816E,0.8,73.1,3,0.0,0.0,0.0,290819,18
OK

3.16.4.3. AT$GPSNMUNEX - Unsolicited NMEA Extended Data Configuration

This command permits to activate an unsolicited streaming of GNSS data.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT$GPSNMUNEX=<GNGNS>,<GNGSA>,<GLGSV>

Set command permits to activate an unsolicited streaming of GNSS data (in NMEA extended format) through the NMEA port and defines which NMEA extended sentences will be available.

Parameters:

Name	Type	Default	Description
<GNGNS>	integer	0	Fix data of GNSS receivers
	Values:		
	0 :	disable	
	1 :	enable	
<GNGSA>	integer	0	DOP and active satellites of GNSS
	Values:		
	0 :	disable	
	1 :	enable	
<GLGSV>	integer	0	GLONASS satellites in view
	Values:		
	0 :	disable	
	1 :	enable	

The storage of **$GPSNMUNEX** setting value is following,

Setting saved
Auto

The current setting is stored in NVM.

AT$GPSNMUNEX?

Read command returns the NMEA extended sentences availability status, in the format:

$GPSNMUNEX: <GNGNS>,<GNGSA>,<GLGSV>

AT$GPSNMUNEX=?

Test command returns the supported range of values for parameters:
<GNGNS>,<GNGSA>,<GLGSV>

> ℹ The NMEA extended data is displayed on NMEA port depending on **$GPSNMUN** setting.
>
> ℹ If **#LOCNMEATYPE** command is already used, the user should avoid using this command because this setting have an effect on **#LOCNMEATYPE** operation.

AT$GPSNMUNEX=1,0,0
OK

These set the GNGNS as available sentence in the unsolicited message.
AT$GPSNMUNEX?
$GPSNMUNEX: 1,0,0
OK

Give the current frame selected (GNGNS)
The unsolicited message will be:
$GNGNS,010304.00,3731.304375,N,12655.784627,E,AAANA,17,0.8,67.6,18.0,,,V*57

3.17. PSM (Power Saving Mode)

3.17.1. AT#PSMWDISACFG - Power Saving mode configuration

Power Saving mode configuration command.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#PSMWDISACFG=<mode>

Set command Power Saving mode

Parameter:

Name	Type	Default	Description
<mode>	integer	0	Power Saving Mode

Values:

- 0 : Low Power Mode (both RX/TX disable) (factory default)
- 1 : power saving which watch W_DISABLE_N pin
- 2 : ignore on W_DISABLE_N pin
- 10 : enable dying gasp with W_DISABLE_N pin (activated when translates from high to low)

🛈 After the command issued, the modem will reset

🛈 The setting is maintained for both firmware updates and firmware switches.

🛈 USB suspend mode is not supported (Qualcomm limitation)

AT#PSMWDISACFG?

Display current mode

AT#PSMWDISACFG=?

Test command reports the supported mode

</>
- AT#PSMWDISACFG=1
  OK

- AT#PSMWDISACFG?
  #PSMWDISACFG: 1
  OK

- AT#PSMWDISACFG=?
  #PSMWDISACFG: (0-2,10)
  OK

3.17.2. AT#PSMEVTCFG - Wake Up Event configuration

This command is used to set event for wake up from Power saving mode

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#PSMEVTCFG=<SMS>,<NO_SERVICE>[,<VOICE>]

Set command enable/disable each wake up event

Parameters:

Name	Type	Default	Description
<SMS>	integer	0	SMS
	Values:		
	0 : disable		
	1 : enable		
<NO_SERVICE>	integer	0	Network de-registration
	Values:		
	0 : disable		
	1 : enable		
<VOICE>	integer	0	Voice CALL
	Values:		
	0 : disable		
	1 : enable		

🛈 Voice call event is only available with VOICE call support models

AT#PSMEVTCFG?

Display current wake up event configurations mask

AT#PSMEVTCFG=?

Test command reports the supported wake up event

```
•   AT#PSMEVTCFG = 1,1
    OK

•   AT#PSMEVTCFG?
    #PSMEVTCFG = 1,1
    OK

•   AT#PSMEVTCFG=?
    #PSMEVTCFG: (0,1),(0,1)
     OK
```

3.17.3. AT#PSMWAKENCFG - WAKE_N pin configuration command

This command is used to set WAKE_N pin configuration.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#PSMWAKENCFG=\<n>,\<tring>,\<tpause>

Set command WAKEN_N ping configuration

Parameters:

Name	Type	Default	Description
\<n>	integer	3	number of waken_n
			Value:
			1÷5 : number of waken_n
\<tring>	integer	100	number of wake_n pin duration
			Value:
			0÷5000 : number of wake_n pin duration
\<tpause>	integer	100	time of pause of the wake_n pin duration
			Value:
			0÷5000 : time of pause of the waken_n pin duration

ℹ Note 1: the time duration is in milliseconds
Note 2: if WAKE_N pin configuration changes, reboot of the modem required.

AT#PSMWAKENCFG?

display current wake up event configuration mask

3.17.4.   AT#PSMEVT - Get Wake up events

This command is used to display last wake up event information.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#PSMEVT

Execution command which display wake up event.
This command display source mask, last event source, and last event source timestamp.

> **i** Note: Time stamp is based on epoch time and micro seconds.

AT#PSMEVT=?

Test command returns the OK result.

```
SMS event received at 1516708576002437 epoch time
(Tuesday, January 23, 2018 11:56:16.002 AM)
AT#PSMEVT
#PSMEVT: 0x00000001,0x00000001,1516708576002437
 OK
```

3.18. IMS

3.18.1. AT+CIREG - IMS registration state

This command controls the presentation of an unsolicited result code.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Specific profile	No	-	2

AT+CIREG=[<mode>]

Set command controls the presentation of an unsolicited result code when there is a change in the MT's IMS registration information.

Unsolicited result code has the following format:

+CIREGU: <reg_info>[,<ext_info>]

Parameter:

Name	Type	Default	Description
<mode>	integer	0	Enables or disables reporting of changes in the MT's IMS registration information.

Values:

0 : disable reporting (default)

1 : enable reporting (parameter <reg_info>)

2 : enable extended reporting (parameters <reg_info> and <ext_info>)

Unsolicited fields:

Name	Type	Description
<reg_info>	integer	Indicates the IMS registration status. The UE is seen as registered as long as one or more of its public user identities are registered with any of its contact addresses, see 3GPP TS 24.229.

Values:

0 : not registered.

1 : registered.

Name	Type	Description
<ext_info>	hex	The value range is from 1 to FFFFFFFF. It is a sum of hexadecimal values, each representing a particular IMS capability of the MT. The MT can have IMS capabilites not covered by the below list. This parameter is not present if the IMS registration status is "not registered".

Values:

1 : RTP-based transfer of voice according to MMTEL, see 3GPP TS 24.173. This functionality can not be indicated if the UE is not available for voice over PS, see 3GPP TS 24.229.

2 : RTP-based transfer of text according to MMTEL, see 3GPP TS 24.173.

4 : SMS using IMS functionality, see 3GPP TS 24.341.

| | 8 | : | RTP-based transfer of video according to MMTEL, see 3GPP TS 24.173. |

ℹ parameter **<mode>** is saved in profile.

AT+CIREG?

Read command reports the current state of IMS registration in the format:

+CIREG: <mode>,<reg_info>[,<ext_info>]

AT+CIREG=?

Test command returns the supported range of values for parameter **<mode>**.

3.19. Customization Feature AT Commands

3.19.1. AT#MIMOSTS - Display MIMO status of LTE and NR5G

This command is the indication for MIMO status of LTE and NR5G.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

AT#MIMOSTS
Execution command is used to display MIMO status of LTE and NR5G.
#MIMOSTS: <LTE>,<NR5G>

Parameter:
<LTE>
0: 1x1 SISO
1: 2x2 MIMO
2: 4x4 MIMO
99: Module does not attach to network.

<NR5G>
0: 1x1 SISO
1: 2x2 MIMO
2: 3x3 MIMO
3: 4x4 MIMO
99: Module does not attach to network.

AT#MIMOSTS?
Read command returns **ERROR**.

AT#MIMOSTS=?
Test command returns the **OK** result code.

<LTE only mode>
#MIMO: 2,99

<NSA mode>
#MIMO: 1,3

<SA mode>
#MIMO: 99,3

3.19.2. AT#GETCUSTFEAT - Get the Setting of Customization Feature

This command used to get the setting of customization feature.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#GETCUSTFEAT=<cust_id>

Parameter:

Name	Type	Default	Description
<cust_id>	string	N/A	String of customization feature

Values:

"AUDIS"	:	Audio disable
"DGACTION"	:	Dying gasp Action
"DGENABLE"	:	Dying gasp Enable
"GPSSEL"	:	GPS Antenna Select
"IPV6ENABLE"	:	Support IPV6 Data Connection

Additional info:

▶▶ The setting of the specified **<cust_id>** will be returned in the format:
#GETCUSTFEAT: <cust_id>,<cust_value>,<cust_attr>

Name	Type	Default	Description
<cust_id>	string	-	String of customization feature
<cust_value>	integer	-	Customization setting value.
			"AUDIS" - Audio disable
			0 - enable audio
			1 - disable audio (default)
			"DGACTION" - Dying gasp Action (same with #DGENABLE)
			0 - Disable sending both detach request and SMS
			1 - Enable only the SMS option (default)
			2 - Enable only sending detach request
			3 - Enable sending both SMS and detach request
			"DGENABLE" - Dying gasp Enable
			cust_value[0] - enable/disable dying gasp
			0: disable (default)
			1: enable
			cust_value[1] - GPIO number used for dying gasp event monitoring.
			cust_value[2] - GPIO trigger used for event

			0: activate dying gasp when GPIO translates from high to low (default)
			1: activate dying gasp when GPIO translates from low to high
			"GPSSEL" - GPS Antenna Select
			0 - Dedicated GPS Port
			1 - GPS Rx over AUX Port
			2 - GPS Rx over dedicated GPS port with no bias voltage applied.
			255 - Invalid data
			"IPV6ENABLE" - whether to support IPV6
			0 - disabled
			1 - enabled
<cust_attr>	integer	N/A	Customization setting attribute
	Values:		
	0	:	Customization setting attribute
	1	:	read/write

ℹ️ **<cust_id>** only supports upper case.

? AT#GETCUSTFEAT=?

Test command returns the supported customization features for parameter **<cust_id>**.

</>
AT#GETCUSTFEAT=?
#GETCUSTFEAT: ("AUDIS","DGACTION","DGENABLE","GPSSEL","IPV6ENABLE")

OK
AT#GETCUSTFEAT="IPV6ENABLE"
#GETCUSTFEAT: "IPV6ENABLE", 1, 1

OK
AT#GETCUSTFEAT="DGENABLE"
#GETCUSTFEAT="DGENABLE",000,1

OK

3.19.3. AT#SETCUSTFEAT - Set the Customization Feature

Set commands used to set the customization feature setting.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#SETCUSTFEAT=<cust_id>,<cust_value>

Parameters:

Name	Type	Default	Description
<cust_id>	string	N/A	String of customization feature
			Values:
			"AUDIS" : Audio Disable
			"DGACTION" : Dying Gasp Action
			"DGENABLE" : Dying Gasp Enable
			"GPSSEL" : GPS Antenna Select
			"IPV6ENABLE" : Support IPV6 Data Connection
<cust_value>	integer	-	Customization setting value.
			"AUDIS" - Audio Disable
			0 - enable audio
			1 - disable audio (default)
			"DGACTION" - Dying Gasp Action (same with #DGENABLE)
			0 - Disable sending both detach request and SMS
			1 - Enable only the SMS option (default)
			2 - Enable only sending detach request
			3 - Enable sending both SMS and detach request
			"DGENABLE" - Dying Gasp Enable
			cust_value[0] - enable/disable dying gasp
			0: disable (default)
			1: enable
			cust_value[1] - GPIO number used for dying gasp event monitoring. Available range is from '1'(GPIO_01) to '8'(GPIO_08).
			cust_value[2] - GPIO trigger used for event
			0: activate dying gasp when GPIO translates from high to low (default)
			1: activate dying gasp when GPIO translates from low to high
			"GPSSEL" - GPS Antenna Select
			0 - Dedicated GPS Port
			1 - GPS Rx over AUX Port
			2 - GPS Rx over dedicated GPS port with no bias voltage applied.

"IPV6ENABLE" - whether to support IPV6
  0 - disabled
  1 - enabled

ℹ️ **"GPSSEL"** configuration is stored in NVM.

ℹ️ The **"AUDIS"** setting is saved in system and available on following reboot, therefore manual reboot is required after changing **<cust_value>** of **"AUDIS"**.

ℹ️ The **"AUDIS"**setting is maintained even after power off.
  If in case audio is disabled('1'), DVI pins are assigned as GPIO pins (GPIO_05~GPIO_08).

ℹ️ **"DGACTION"** configuration is stored in NVM.

ℹ️ **"DGENABLE"** configuration is stored automatically.

ℹ️ **<cust_id>** only supports upper case.

?▢ **AT#SETCUSTFEAT=?**
Test command returns the supported customization features for parameter **<cust_id>**.

</> **AT#SETCUSTFEAT=?**
#SETCUSTFEAT: ("AUDIS","DGACTION","DGENABLE","GPSSEL","IPV6ENABLE")

OK
AT#SETCUSTFEAT="IPV6ENABLE",1
OK
AT#SETCUSTFEAT="DGENABLE",140
OK

3.19.4. AT#HPSSICFG - HPS SI service configuration

This command is for setting the configurations of HPS SI service.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#HPSSICFG=<enable>[,<duration>]
This command is for setting the configurations of HPS SI service.

Parameters:

Name	Type	Default	Description
<enable>	integer	0	Enable or disable HPS SI service
			Values:
			0 : Disable HPS SI service
			1 : Enable HPS SI service
<duration>	integer	10	Set the duration (in seconds) of SI service
			Value:
			0÷86400 : Duration range of SI service

AT#HPSSICFG?
Read command reports the currently selected parameters in the format:
#HPSSICFG=<enable>,<duration>

AT#HPSSICFG=?
Test command reports the supported range of values for parameter(s) **<enable> and <duration>.**

3.19.5.   AT#MMWANT - mmWAVE Antenna selection

Set mmWave antenna.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#MMWANT=<CFG>

The command allows setting antenna,**<CFG>**, for mmWave.

Parameter:

Name	Type	Default	Description
<CFG>	integer	0	

Values:

0 : Delete setting for mmWave antenna

1 : QTM 525-2

2 : QTM 525-5

3 : QTM 527-1

4 : QTM 527-2

🛈 The value set by command operate after mode reboot.

🛈 When it doesn't match the mmWave antenna which customer inserted and the set value, module goes to OFFLINE mode.

🛈 This Command add or remove specific efs files related with mmWave.

AT#MMWANT?

Read command reports the currently selected **<CFG>**,**<CAL_CUST_VER>** and **<MMWANT_ID>** in the format:
#MMWANT: <CFG>,<CAL_CUST_VER>,<MMWANT_ID>

Additional info:

▶▶ Read command reports the additional **<CAL_CUST_VER>**.

Name	Type	Default	Description
<CAL_CUST_VER>	integer	-	cal cust version for loading mmWave antenna.
<MMWANT_ID>	string	NONE	Identification for loading mmWave antenna.

Values:

NONE : No MMWAVE Antenna

QTM525-2 : QTM525-2 MMWAVE Antenna

QTM525-5 : QTM525-5 MMWAVE Antenna

| | QTM527-1 | : | QTM527-1 MMWAVE Antenna |
| | QTM527-2 | : | QTM527-2 MMWAVE Antenna |

> ℹ️ The **<CFG>** 5 indicate that user mmwave config is activated.

?⌷ AT#MMWANT=?

Test command reports the supported range of parameters values.

> 📝 This command can be executed only in modules that support a mmwave.

3.20. Dying GASP AT Commands

3.20.1. AT#DGCFG - Dying GASP Configuration

Set command sets the Dying GASP configuration.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#DGCFG=[<DestSMSNubmer>[,<DestSMSContent>]]

Parameters:

Name	Type	Default	Description
<DestSMSNubmer>	string	-	SMS Destination Number as string of 8bit ASCII; Characters with max 20 chars.
<DestSMSContent>	string	-	SMS Content as a string of 8bit ASCII text; Characters with max 160 chars.

ⓘ The current setting is stored in NVM.

AT#DGCFG?

Read command returns the current Dying GASP setting, in the format:
#DGCFG: <DestSMSNumber>,<DestSMSContent>

AT#DGCFG=?

Test command reports the supported range of values for parameters
<DestSMSNumber>,<DestSMSContent>.

3.20.2. AT#DGSTAT - Dying GASP Statistics Management

Set command sets to read/clear the Dying GASP Statistics.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	No	No	-	2

➡️ **AT#DGSTAT=<mode>**

Parameter:

Name	Type	Default	Description
<mode>	integer	N/A	Clear/read the Dying GASP Statistics

Values:

0 : Clear the Dying GASP Statistics

1 : Read the Dying GASP Statistics

Additional info:

▶▶ When <**mode**> is 1, returns information about the Dying GASP Statistics in the format:
#DGSTAT: <TimeStamp>,<SMSAttemptedFlag>

Name	Type	Default	Description
<TimeStamp>	string	-	Timestamp of the last time power loss was detected and Dying Gasp feature was triggered; UTC time in seconds since Jan 06, 1980 (GPS Epoch).
<SMSAttemptedFlag>	integer	N/A	Indicates whether device attempted to send SMS in the last power loss event; This only indicates device sent the SMS does not guarantee network delivery.

Values:

0 : SMS not attempted

1 : SMS attempted

⬅️ **AT#DGSTAT?**

Read command returns the current Dying GASP Statistics, in the format:
#DGSTAT: <TimeStamp>,<SMSAttemptedFlag>

❓ **AT#DGSTAT=?**

Test command reports the supported range of values for parameters **<mode>**

3.20.3. AT#DGENABLE - Dying GASP Enable/Disable SMS/Detach Request

Set command which can enable/disable module to send SMS/detach request in Dying Gasp.

SIM Presence	Setting saved	Can be aborted	MAX timeout	SELINT
Not required	Auto	No	-	2

AT#DGENABLE=[<Value>]

Parameter:

Name	Type	Default	Description
<Value>	integer	1	Enable/disable SMS/detach request

Values:

0 : Enable/disable SMS/detach request

1 : Enable only the SMS option

2 : Enable only sending detach request

3 : Enable sending both SMS and detach request

AT#DGENABLE?

Read command returns the current setting, in the format:
#DGENABLE: <Value>

AT#DGENABLE=?

Test command reports the supported range of values for parameters **<Value>.**

4. LIST OF ACRONYMS

Acronym	Meaning
ARFCN	Absolute Radio Frequency Channel Number
AT	Attention command
BA	BCCH Allocation
BCCH	Broadcast Control Channel
CA	Cell Allocation
CBM	Cell Broadcast Message
CBS	Cell Broadcast Service
CCM	Current Call Meter
CLIR	Calling Line Identification Restriction
CTS	Clear To Send
CUG	Closed User Group
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DCS	Digital Cellular System
DGPS	Differential GPS, the use of GPS measurements, which are differentially corrected
DNS	Domain Name System
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTR	Data Terminal Ready
GGA	GPS Fix data
GLL	Geographic Position – Latitude/Longitude
GLONASS	Global positioning system maintained by the Russian Space Forces
GMT	Greenwich Mean Time
GNSS	Any single or combined satellite navigation system (GPS, GLONASS and combined GPS/GLONASS)
GPRS	Global Packet Radio Service
GPS	Global Positioning System
GSA	GPS DOP and Active satellites
GSM	Global System Mobile
GSV	GPS satellites in view
HDLC	High Level Data Link Control
HDOP	Horizontal Dilution of Precision
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
IRA	International Reference Alphabet
IWF	Interworking Function
ME	Mobile Equipment
MO	Mobile Originated
MT	*either* Mobile Terminated *or* Mobile Terminal
NMEA	National Marine Electronics Association
NVM	Non-Volatile Memory
PCS	Personal Communication Service
PDP	Packet Data Protocol
PDU	Packet Data Unit
PIN	Personal Identification Number
PPP	Point to Point Protocol
PUK	Pin Unblocking Code
RLP	Radio Link Protocol
RMC	Recommended minimum Specific data
RTS	Request To Send
SAP	SIM Access Profile
SCA	Service Center Address
SMS	Short Message Service
SMSC	Short Message Service Center
SMTP	Simple Mail Transport Protocol
TA	Terminal Adapter
TCP	Transmission Control Protocol
TE	Terminal Equipment
UDP	User Datagram Protocol
USSD	Unstructured Supplementary Service Data
UTC	Coordinated Universal Time
VDOP	Vertical dilution of precision
VTG	Course over ground and ground speed
WAAS	Wide Area Augmentation System

5. DOCUMENT HISTORY

Revision	Date	Changes
Preliminary	2019-09-23	Initial version
Rev.1	2020-06-22	New: #BCCHLOCK, #CLEARFW, #DVI, #DVICLK, #FDOR, #HPSSICFG, #I2CDIS, #MACADDR, #OAP, #TMLVL, +CGDCONT, +ECNO, +RSCP, +RSRP, +RSRQ, +C5GSMS, +C5GUSMS, +CSUPI, +C5GNSSAI, +C5GNSSAIRDP Update: #ACTIVEFW, #BCCHLOCK, #BND, #CAINFO, #CQI, #DVICLK, #FIRMWARE, #GETFW, #I2CRD, #I2CWR, #ICMP, #LCFC, #LTECAT, #MONI, #PDPAUTH, #RFSTS, #SERVINFO, #SINGLEAPNSWITCH, #SINGLEAPNSWITCH, #TESTMODE, #TMLVL, $AGPSEN,#USBCFG, $LCSAGLO, $LCSLPP, +C5GREG, +C5GREG, +CEREG, +CFUN, +CGREG, +CLCC, +CLCK, +COPN, +COPS, +CREG, +CRSM, +CVHU, +WS46 Delete: #OAP, #SIMSELCT, $QCPBMPREF
Rev.2	2020-11-18	New: #5GCTL, #FWAUTOSIM, #FWPLS, #LOOPBACKMODECFG, #MMWANT, #USRMMWC, #USRMMWD, #USRMMWL, #USRMMWR, #USRMMWS, #USRMMWW, $GNSSMBCFG, +ODIS Update: #BND, #ICMAUTOCONN, #ICMCONNECT, #ISMSCFG, #LAPS, #MONI, #PSMWDISACFG, #RFSTS, #SERFINVO, #SHDNIND, #TESTMODE, $LCSLPP, +COPS, $LCSLRMT,+CMGR Delete: None
Rev.3	2021-01-14	New: #B30TXDIS, #ESIMADDPF, #ESIMCAP, #ESIMGETADDR, #ESIMID, #ESIMMEMRST, #ESIMPF, #ESIMPFINFO, #ESIMPFUC, #ESIMUPN, #MIMOSTS, #SDM, #STIME, #STKENV, $XTRAEN Update: #BND, #ENS, #HSEN, #ICMCONNECT, #LCFC, #MMWANT, #SMSFORMAT, #TESTMODE, #USBCFG, $GPSP, $GPSQOS, $LCSLPP, $LCSLRMT, +CMGR Delete: None
Rev.4	2021-06-17	New: #RESETINFO, #USBPCISWITCH, #LWM2MSKIP, #SELQTMANT, #DPRLIST, #DPRCTL Update: +WS46, #BND, #CAINFO, #FWPLS, #LCFC, #LOCNMEATYPE, #GPIO, $XTRAEN, $GPSLOCK, #TMLVL, #HSEN, #BND, +CPOL, +C5GREG, +COPS, +CGSN, +IMEISV, +CPWD, +CNMI, +CMGL, +CMGR, +CMGS, +CMGW,

Revision	Date	Changes
		#ESIMPFINFO, #ESIMCAP, #STIA, #STGI, #STSR, #USBCFG, #USBDMOFF, #USBPCISWITC, #MACADDR, #I2CWR, #I2CRD, #DVI, #DVICLK Delete: None
Rev.5	2021-06-24	New: None Update: #TESTMODE Delete: None

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