

SARA-N2 Modules

NB-IoT Modules

AT Commands Manual

Abstract

Description of standard and proprietary AT commands used with u-blox cellular modules.

Document Information

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Objective Specification

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Preface

Applicable products

This document applies to the following products:

Name	Type number	Modem version	Application version	PCN reference
SARA-N200	SARA-N200-01B-00	V100R100C10B656	N.A.	UBX-17013509
	SARA-N200-02B-00	V100R100C10B656	N.A.	UBX-17016302
SARA-N201	SARA-N201-01B-00	V100R100C10B656	N.A.	UBX-17013509
	SARA-N201-02B-00	V100R100C10B656	N.A.	UBX-17015830
SARA-N210	SARA-N210-01B-00	V100R100C10B656	N.A.	UBX-17013509
	SARA-N210-02B-00	V100R100C10B656	N.A.	UBX-17016302
SARA-N211	SARA-N211-02B-00	V100R100C10B656	N.A.	UBX-17016302
SARA-N280	SARA-N280-01B-00	V100R100C10B656	N.A.	UBX-17013509
	SARA-N280-02B-00	V100R100C10B656	N.A.	UBX-17016302

How to use this Manual

The u-blox Cellular Modules AT Commands Manual provides the necessary information to successfully design in and configure the applicable u-blox cellular modules.

This manual has a modular structure. It is not necessary to read it from the beginning to the end.

The following symbols are used to highlight important information within the manual:



An index finger points out key information pertaining to module integration and performance.



A warning symbol indicates actions that could negatively impact or damage the module.

Summary table

The summary table on the top of each command section is a quick reference for the user.

command_name						
Modules	TOBY-L2 MPC1-L2					
	LISA-U110 LISA-U120 LISA-U130 LISA-U2					
	LEON-G1 SARA-G3					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	-

It is composed by two sections:

- **Modules:** lists all the modules that support the command. The modules are grouped in rows by cellular standard (i.e. L for LTE high data rate (Cat 3 and above), R for LTE low data rate (Cat 1 and below), U for UMTS/HSPA, G for GSM/GPRS). In each row the modules are grouped by: form factor (i.e. SARA, LISA), platform technology (e.g. SARA-G), platform generation (e.g. SARA-G3), product name (e.g. SARA-G350) and ordering code (e.g. SARA-G350-00S). In example: if 'LISA-U2' is reported, the command applies to all the modules having LISA form factor, second chipset version provided with any release of firmware.
- **Attributes**
 - o **Syntax**
 - **full:** the command syntax is fully compatible among all the products listed in the "Modules" section
 - **partial:** the products support different syntaxes (usually backward compatible with respect to previous cellular standards)
 - o **PIN required**

- **Yes:** it is necessary to insert the PIN before the set and/or read command execution
- **No:** the PIN insertion is not needed to execute the command
- o **Settings saved**
 - **Profile:** the command setting can be saved in a personal profile as specified in [Chapter 1.2](#)
 - **NVM:** the command setting is saved in the non-volatile memory as specified in [Chapter 1.2](#)
 - **No:** the current command setting is volatile and cannot be saved
- o **Can be aborted**
 - **Yes:** the command execution can be aborted if a character is sent to the DCE during the command execution
 - **No:** the command cannot be aborted during the command execution
- o **Response time:** estimated maximum time to get the final result code for the AT command execution. More precisely, the command response time measures the time from the complete acquisition of the command line to the issuing of the command result code.

The response time specified in this manual is generally lower than the time measured by the application on the DTE, because the issuing of the command on the DTE is influenced by the AT interface characteristics (e.g. the synchronous/asynchronous transfer type, the selected baudrate, etc.), by power saving and flow control, which introduces a variable latency in the command acquisition by the DCE.

If the response time for a command is left blank (actually "-"), it is an "immediate" response. It means that the command is executed without asynchronous requests to the protocol stack or the internal applications, which usually require time to be answered: the command execution is synchronous, (implying that no long blocking processing is done) and lasts a negligible time (the command response is issued by the module in typically less than 10 ms, and in any case less than 1 s).
- o **Error reference:** reference to the error result codes listed in the [Appendix A](#)

u-blox Technical Documentation

As part of our commitment to customer support, u-blox maintains an extensive volume of technical documentation for our products. In addition to our product-specific technical data sheets, the following manuals are available to assist u-blox customers in product design and development.

AT Commands Manual: This document provides the description of the AT commands supported by u-blox cellular modules.

System Integration Manual: This document describes u-blox cellular modules from the hardware and the software point of view. It provides hardware design guidelines for the optimal integration of the cellular module in the application device and it provides information on how to set up production and final product tests on application devices integrating the cellular module.

Application Notes: These documents provide guidelines and information on specific u-blox cellular module hardware or software topics. See [Related documents](#) for application notes related to your cellular module.

Questions

If you have any questions about u-blox Cellular Hardware Integration, please:

- Read this manual carefully
- Contact our information service on our homepage www.u-blox.com
- Read the questions and answers on our FAQ database

Technical Support

Worldwide Web

Our website (www.u-blox.com) is a rich pool of information. Product information, technical documents and helpful FAQ can be accessed 24h a day.

By E-mail

If you have technical problems or cannot find the required information in the provided documents, contact the nearest of the Technical Support offices by email. Use our service pool email addresses rather than any personal email address of our staff. This makes sure that your request is processed as soon as possible. You will find the contact details at the end of the document.

Helpful Information when Contacting Technical Support

When contacting Technical Support please have the following information ready:

- Module type (e.g. SARA-G350-005-00) and firmware version (e.g. 08.49)
- Module configuration
- Clear description of your question or the problem
- A short description of the application
- Your complete contact details

Objective Specification

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1 AT command settings

u-blox cellular modules provide at least one physical serial interface, which is compliant to V.24ter [26]. At the module power on the module enters the command mode. For more details on command mode see the [Chapter 1.1](#).

For module and hyper terminal connection and settings see the corresponding evaluation kit user guide.

1.1 Definitions

In this document the following naming conventions are used:

- MT (Mobile Terminal) or DCE (Data Communications Equipment): u-blox cellular module
- TE (Terminal Equipment) or DTE (Data Terminal Equipment): terminal that issues the command to the module
- TA (Terminal Adaptor): the function, integrated in the MT, of supporting AT command interface according to the applicable standards
- ME (Mobile Equipment): equivalent to MT, it is used to refer to the device itself regardless of the inserted SIM card

The terms DCE and DTE are used in the serial interface context.



See the corresponding module data sheet for the list of available AT command interfaces.

The DCE/MT interface can operate in these modes:

- **Command mode:** the DCE waits for AT command instructions. The DCE interprets all the characters received as commands to execute. The DCE may send responses back to the DTE indicating the outcome of the command or further information without having received any commands by the DTE (e.g. unsolicited response code - URC). Any communication in the command mode (in both directions) is terminated by the command line termination character.
- **Data mode:** the DCE transfers data after having sent the "CONNECT" string; all the characters sent to the DCE are intended to be transmitted to the remote party. Any further characters received over the serial link are deemed to be from the remote party, and any characters sent are transmitted to the remote party. The DCE enters data mode immediately after it makes a Circuit Switched Data (CSD) or Packet Switched Data (PSD) connection.
- **Online command mode:** the DCE has a data connection established with a remote party, but treats signals from the DTE as command lines and sends back responses and unsolicited indications to the DTE.






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The data mode is not supported.

1.1.1 Command description

The AT commands configure and enable the cellular module functionalities according to 3GPP normative and u-blox specifications. The AT commands are issued to the module via a hyper terminal through a command line and are described in the following sections. A general description of each command is provided including the functionalities, the correct syntax to be provided by the TE/DTE, the allowed responses and an example. The command description defines each named parameter with its type, its range (valid / acceptable values), the default value (when available) and the factory-programmed value (when applicable).

For default value it is intended the value automatically set if the parameter is omitted and at the module power-on (if the command setting is not stored in NVM/profile). For factory-programmed value it is intended the value set at the module power-on when the setting is not modified respect with the manufacturer setting; it is valid for the commands that store the setting in NVM/profile.

The summary table on the top of each command section and the [Appendix B](#) lists all the u-blox cellular modules that support that command.

-  The example provided in the command description refers only to the handling provided by the command. It may be not valid for all the products which the document is applied to. The list of allowed values for a specific product is provided in the corresponding "Defined values" section.
-  In this document <CR><LF> are intentionally omitted in the command syntax.
-  If a parameter is omitted, no value will be inserted between the two commas indicating the interested parameter in the command line sent by the DTE.

1.1.2 Default values

If the command parameters are optional, they can be left out in the command line. If not otherwise specified, the default values are assumed as follows:

- For parameters of type Number, the default value is 0
- For parameters of type String, the default value is an empty string

1.1.3 Command line

The AT commands are typically issued to the cellular modules using a command line with the following generic syntax:

"AT"<command_name><string><S3_character>




Where:

- "AT": prefix to be set at the beginning of each command line
 - <command_name>: command name string; it can have a "+" character as prefix
 - <string>: string consisting of the parameters value following the syntax provided in this manual
- The following rules are used when describing the command syntax:

- o <...>: the name in angle brackets is a parameter. The brackets themselves do not appear in the command line
- o [...]: the square brackets represent the optional parameters of a command or an optional part of the DCE information text response. Brackets themselves do not appear in the command line. When a parameter is not given, the value will be set to the default value provided in the command description

Parameter types:

- o Number: positive and negative counting numbers, as well as zero {..., -2, -1, 0, 1, 2,...}.
- o String: sequence of characters enclosed within quotation marks (" ").

-  The maximum length of the command line is the maximum number of characters which can be accepted on a single command line (including the command line termination character).
-  The command line is not case sensitive unless autobauding is enabled; in this case the prefix "AT" must be typed either as "AT" or "at"; other combinations ("aT" or "Ta") are not allowed.
-  When writing or sending an SMS, Ctrl-Z or ESC terminates the command; <CR> is used between the two parts of the SMS (address and text).

More than one AT command can be entered on the same command line. The "AT" prefix must be provided only at the beginning of the command line. Each command must be separated by using a semicolon as delimiter only if the command has a "+" character as prefix.

Example: `ATI;+CGATT?;+COPS?<CR>`

If a command in the command line causes an error, or is not recognized as a valid command, then the execution is terminated, the remaining commands in the command line are ignored and an error result code is returned.

If all the commands are correctly executed, only the "OK" final result code of the last command is returned.

The serial interface driver generally does not allow a new command until the previous one has been terminated by "OK" final result code or by an error result code. In specific cases (see the abortability attribute), the command execution may be aborted if a character is sent to DCE before the command has ended.

1.2 Profiles

Several user settings may be stored in the cellular module's memory. Some are directly stored in the non volatile memory (NVM), while the others are organized into two personal profiles. The first profile is the default profile, whose data is by default loaded during the module's power on.

[Appendix B.2](#) lists the complete settings that can be directly stored in NVM and the corresponding commands.

Objective Specification

2 General operation

2.1 Start up and initialization

A complete start up can take place only with a SIM card with disabled PIN check.

2.2 AT commands types

2.2.1 Action command

An action command forces the DCE to print information text or execute a specific action for the command. A typical example of this command type is the provision of the factory-programmed settings of the DCE like manufacturer name, firmware version, etc.

2.2.2 Set command

A set command configures the preferred settings for the specified command. The set command is the only way to set the preferred settings in the DCE. For some commands it is possible to store the current settings in the profile or in the non volatile memory and retrieve them in another connection.

2.2.3 Read command

A read command provides the current setting of the command parameters. It is used to find out the current command configuration.

2.2.4 Test command

A test command provides the list of the values allowed by each parameter of the command.

2.2.5 Unsolicited Result Code (URC)

An unsolicited result code is a string message (provided by the DCE) that is not triggered as a information text response to a previous AT command and can be output, when enabled, at any time to inform the DTE of a specific event or status change.

The URC can have the same name of the command that enables it (e.g. `+CEREG`) or can be enabled by another command (e.g. the `+NPINGERR` URC is triggered by `AT+NPING` AT command).

2.2.6 Intermediate Result Code (IRC)

An intermediate result code is a string message (provided by the DCE) which provides to the DTE some information about the processing status of the pending AT command.

2.2.7 Reset reasons

If the applications core rebooted for any reason apart from either being power cycled or being externally reset, it will return the reason for the reboot before the greeting message.

The list of possible reboot reasons are:

- REBOOT_CAUSE_SECURITY_RESET_UNKNOWN
- REBOOT_CAUSE_SECURITY_SYSRESETREQ
- REBOOT_CAUSE_SECURITY_WATCHDOG
- REBOOT_CAUSE_SECURITY_SELF
- REBOOT_CAUSE_SECURITY_ALTBOOT
- REBOOT_CAUSE_SECURITY_REGIONS_UPDATED
- REBOOT_CAUSE_PROTOCOL_UNKNOWN
- REBOOT_CAUSE_PROTOCOL_SYSRESETREQ

- REBOOT_CAUSE_PROTOCOL_WATCHDOG
- REBOOT_CAUSE_PROTOCOL_MONITOR_REBOOT_REQ
- REBOOT_CAUSE_APPLICATION_UNKNOWN
- REBOOT_CAUSE_APPLICATION_SYSRESETREQ
- REBOOT_CAUSE_APPLICATION_WATCHDOG
- REBOOT_CAUSE_APPLICATION_AT
- REBOOT_CAUSE_UNKNOWN

Objective Specification

3 General

3.1 Manufacturer identification +CGMI

+CGMI						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

3.1.1 Description

Text string identifying the manufacturer.

3.1.2 Syntax

Type	Syntax	Response	Example
Action	AT+CGMI	<manufacturer> OK	u-blox OK
Test	AT+CGMI=?	OK	

3.1.3 Defined values

Parameter	Type	Description
<manufacturer>	String	Manufacturer name

3.2 Model identification +CGMM

+CGMM						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

3.2.1 Description

Text string identifying the model identification.

3.2.2 Syntax

Type	Syntax	Response	Example
Action	AT+CGMM	<model> OK	LISA-U200 OK
Test	AT+CGMM=?	OK	

3.2.3 Defined values

Parameter	Type	Description
<model>	String	Name of model

3.3 Firmware version identification +CGMR

+CGMR						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

3.3.1 Description

Returns the firmware version of the module.

3.3.2 Syntax

Type	Syntax	Response	Example
Action	AT+CGMR	<version> OK	11.40 OK
Test	AT+CGMR=?	OK	

3.3.3 Defined values

Parameter	Type	Description
<version>	String	Firmware version

3.4 IMEI identification +CGSN

+CGSN						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	No	No	No	-	+CME Error

3.4.1 Description

Returns the product serial number, the International Mobile Equipment Identity (IMEI) of the MT.

3.4.2 Syntax

Type	Syntax	Response	Example
Action	AT+CGSN[=<snt>]	<sn> OK	004999010640000 OK
Test	AT+CGSN=?	+CGSN: (list of supported <snt>s) OK	+CGSN: (0-3,255) OK

3.4.3 Defined values

Parameter	Type	Description
<sn>	String	Serial number, by default the IMEI
<snt>	Number	It indicates the requested serial number type. Depending on <snt> value, the <sn> parameter in the information text response provides different information: <ul style="list-style-type: none"> • 0: International Mobile station Equipment Identity (IMEI) • 1: International Mobile station Equipment Identity (IMEI) • 2: International Mobile station Equipment Identity and Software Version number (IMEISV) • 3: Software Version Number (SVN) • 255: IMEI (not including the spare digit), the check digit and the SVN

3.4.4 Notes

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- <snt>=0 provides the 128-bit UUID of the UE.
- <snt>=255 is not supported.
- The test command is not supported.

3.5 Identification information I

I						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	No	No	No	-	+CME Error

3.5.1 Description

Returns some module information as the module type number and some details about the firmware version.

The information text response of AT19 contains some details about the firmware:

- SARA-N2 - it contains the application version, protocol version and the security version of the module
It returns "Undefined" where not applicable.

3.5.2 Syntax

Type	Syntax	Response	Example
Action	Ordering code request AT[0]	<type_number> OK	AT10 SARA-G350-00S-00 OK
	Modem and application version request AT19	<modem_version>,<applications_version> OK	AT19 29.90,A01.00 OK
	Application protocol and security version request AT19	<applications_version>,<protocol_version>,<security_version> OK	AT19 A01.00,P01.00,S01.00 OK

3.5.3 Defined values

Parameter	Type	Description
<type_number>	String	Product type number
<modem_version>	String	Module modem version
<applications_version>	String	Module application version. Where not applicable the module provides "Undefined"
<protocol_version>	String	Module protocol version
<security_version>	String	Module security version

3.5.4 Notes

SARA-N2

- The modem and application version request is not available.

3.6 International mobile subscriber identification +CIMI

+CIMI						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	Yes	No	No	-	+CME Error

3.6.1 Description

Request the IMSI (International Mobile Subscriber Identity).

3.6.2 Syntax

Type	Syntax	Response	Example
Action	AT+CIMI	<IMSI>	222107701772423
		OK	OK
Test	AT+CIMI=?	OK	

3.6.3 Defined values

Parameter	Type	Description
<IMSI>	String	International Mobile Subscriber Identity

3.6.4 Notes

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- The IMSI may not be displayed for a few seconds after the module power-on as few seconds are needed for the USIM module initialization.

3.7 Card identification +CCID

+CCID						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

3.7.1 Description

Returns the ICCID (Integrated Circuit Card ID) of the SIM-card. ICCID is a serial number identifying the SIM.

3.7.2 Syntax

Type	Syntax	Response	Example
Action	AT+CCID	+CCID: <ICCID> OK	+CCID: 8939107800023416395 OK
Read	AT+CCID?	+CCID: <ICCID> OK	+CCID: 8939107900010087330 OK
Test	AT+CCID=?	OK	

3.7.3 Defined values

Parameter	Type	Description
<ICCID>	String	ICCID of the SIM card

3.7.4 Notes

- The command needs of the SIM to correctly work.

3.8 List all available AT commands +CLAC

+CLAC						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

3.8.1 Description

Causes the MT to return one or more lines of AT commands that are available for the DTE user. Each line contains one AT command.

3.8.2 Syntax

Type	Syntax	Response	Example
Action	AT+CLAC	<AT command 1> [<AT command 2> [...]] OK	
Test	AT+CLAC=?	OK	

3.8.3 Defined values

Parameter	Type	Description
<AT command>	String	AT command name

3.9 Manufacturer information validation +USETPARAM

+USETPARAM						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	<i>NVM</i>	No	-	<i>+CME Error</i>

3.9.1 Description

Stores some manufacturer information to the non-volatile memory (NVM).

 This manufacturer information is one time writable.

3.9.2 Syntax

Type	Syntax	Response	Example
Set	AT+USETPARAM=<type>,<string>	OK	AT+USETPARAM=0,"U-BLOX" OK

3.9.3 Defined values

Parameter	Type	Description
<type>	Number	Indicates the required information parameter type. Depending on the <type> value, the <string> parameter will be properly written in NVM: <ul style="list-style-type: none"> • 0: welcome note • 1: ordering code • 2: modem version • 3: application version • 4: protocol version • 5: security version • 6: firmware revision
<string>	String	String according to the <type> value. Only alphanumeric values are supported, the maximum length is 20 character bytes. By factory-programmed setting the NVM is empty.

4 Mobile equipment control and status

4.1 Module switch off +CPWROFF

+CPWROFF						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	< 40 s	+CME Error

4.1.1 Description

Switches off the MT. During shut-down current settings are saved in module's non-volatile memory.



Using this command can result in the following command line being ignored.



See the corresponding System Integration Manual for the timing and the electrical details of the module power-off sequence via the +CPWROFF command.

4.1.2 Syntax

Type	Syntax	Response	Example
Action	AT+CPWROFF	OK	
Test	AT+CPWROFF=?	OK	

4.2 Set module functionality +CFUN

+CFUN						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	No	No	No	Up to 3 min	+CME Error

4.2.1 Description

Selects the level of functionality <fun> in the MT.



If the syntax +CFUN=15 or +CFUN=16 (resets) or +CFUN=127 is used, the rest of the command line, placed after that, will be ignored.

4.2.2 Syntax

Type	Syntax	Response	Example
Set	AT+CFUN=<fun>[,<rst>]	OK	AT+CFUN=1 OK
Read	AT+CFUN?	+CFUN: <power_mode>,<STK_mode> OK	+CFUN: 1,0 OK
Test	AT+CFUN=?	+CFUN: (list of supported <fun>'s),(list of supported <rst>'s) OK	+CFUN: (0,1,4,6,7,8,15,16),(0-1) OK

4.2.3 Defined values

Parameter	Type	Description
<fun>	Number	Selected functionality: <ul style="list-style-type: none"> 0: sets the MT to minimum functionality (disable both transmit and receive RF circuits by deactivating both CS and PS services) 1 (factory-programmed value): sets the MT to full functionality, e.g. from airplane mode or minimum functionality

Parameter	Type	Description
		<ul style="list-style-type: none"> 4: disables both transmit and receive RF circuits by deactivating both CS and PS services and sets the MT into airplane mode. Airplane mode is persistent between power cycles triggered by +CFUN=16 or +CPWROFF where supported) 6: enables the SIM-toolkit interface in dedicated mode and fetching of proactive commands by SIM-APPL from the SIM-card 7 or 8: disables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card 9: enables the SIM-toolkit interface in raw mode and fetching of proactive commands by SIM-APPL from the SIM-card 15: MT silent reset (with detach from network and saving of NVM parameters), without reset of the SIM card 16: MT silent reset (with detach from network and saving of NVM parameters), with reset of the SIM card 19: sets the MT to minimum functionality by deactivating CS and PS services and the SIM card 127: sets the MT in a deep low power state "HALT" (with detach from the network and saving of the NVM parameters); the only way to wake up the module is a power cycle or a module reset
<rst>	Number	Reset mode. This parameter can be used only when <fun> is 1, 4 or 19. <ul style="list-style-type: none"> 0 (default value): do not reset the MT before setting it to the selected <fun> 1: performs a MT silent reset (with detach from network and saving of NVM parameters) with reset of the SIM card before setting it to the selected <fun>
<power_mode>	Number	<ul style="list-style-type: none"> 0: MT is switched on with minimum functionality 1: MT is switched on 4: MT is in "airplane mode" 19: MT is in minimum functionality with SIM deactivated
<STK_mode>	Number	<ul style="list-style-type: none"> 6: the SIM-toolkit interface in dedicated mode and fetching of proactive commands by SIM-APPL from the SIM-card are enabled 0, 7 or 8: the SIM-toolkit interface is disabled; fetching of proactive commands by SIM-APPL from the SIM-card is enabled 9: the SIM-toolkit interface in raw mode and fetching of proactive commands by SIM-APPL from the SIM-card are enabled

4.2.4 Notes

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- Only <fun>=0 and <fun>=1 are allowed.
- The <rst> parameter is not supported.

4.3 Indicator control +CIND

+CIND						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	No	No	No	-	+CME Error

4.3.1 Description

Provides indication states related to network status, battery information and so on.

The set command does not allow setting the values for those indications which are set according to module state (see <descr> parameter).

The list of indications for set and read commands follows the indexes reported in the <descr> parameter, so that the first <ind> corresponds to "battchg" and so on.

For more details see the 3GPP TS 27.007 [2].

4.3.2 Syntax

Type	Syntax	Response	Example
Set	AT+CIND=[<ind>[,<ind>[,...]]]	OK	AT+CIND=

Type	Syntax	Response	Example
			OK
Read	AT+CIND?	+CIND: <ind>[,<ind>[,...]] OK	+CIND: 5,0,0,0,0,0,0,0,0,0,0,0 OK
Test	AT+CIND=?	+CIND: (list of <descr>s) OK	+CIND: ("battchg", (0-5)), ("signal", (0-5)), ("service", (0,1)), ("sounder", (0,1)), ("message", (0,1)), ("call", (0,1)), ("roam", (0,1)), ("smsfull", (0,1)), ("gprs", (0-2)), ("callsetup", (0-3)), ("callheld", (0,1)), ("simind", (0-2)) OK

4.3.3 Defined values

Parameter	Type	Description
<ind>	Number	Range of corresponding <descr> used to identify the service when an unsolicited indication is provided
<descr>	String	Reserved by the norm and their <ind> ranges; it may have the values: <ul style="list-style-type: none"> • "battchg": battery charge level (0-5) • "signal": signal quality. See mapping in the note below • "service": network service availability <ul style="list-style-type: none"> o 0: not registered to any network o 1: registered to the network o 65535: indication not available • "sounder": sounder activity, indicating when the module is generating a sound <ul style="list-style-type: none"> o 0: no sound o 1: sound is generated • "message": unread message available in <mem1> storage <ul style="list-style-type: none"> o 0: no messages o 1: unread message available • "call": call in progress <ul style="list-style-type: none"> o 0: no call in progress o 1: call in progress • "roam": registration on a roaming network <ul style="list-style-type: none"> o 0: not in roaming or not registered o 1: roaming o 65535: indication not available • "smsfull": indication that an SMS has been rejected with the cause of SMS storage full <ul style="list-style-type: none"> o 0: SMS storage not full o 1: SMS storage full • "gprs": PS indication status: <ul style="list-style-type: none"> o 0: no PS available in the network o 1: PS available in the network but not registered o 2: registered to PS o 65535: indication not available • "callsetup": call set-up: <ul style="list-style-type: none"> o 0: no call set-up o 1: incoming call not accepted or rejected o 2: outgoing call in dialling state o 3: outgoing call in remote party alerting state • "callheld": call on hold: <ul style="list-style-type: none"> o 0: no calls on hold o 1: at least one call on hold • "simind": SIM detection <ul style="list-style-type: none"> o 0: no SIM detected o 1: SIM detected o 2: not available

4.3.4 Notes

- If the battery charging is not supported, "battchg" always returns 5 (full charge).
- The <descr> values cannot be changed with +CIND set.
- The following mapping of "signal" value to the power level exists:

"signal" value	Power level
0	(< -105 dBm or unknown)
1	(< -93 dBm)
2	(< -81 dBm)
3	(< -69 dBm)
4	(< -57 dBm)
5	(>= -57 dBm)

SARA-N2

- Only <descr>="battchg" is supported.

4.4 Clock +CCLK

+CCLK						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	parial	No	NVM	No	-	+CME Error

4.4.1 Description

Sets and reads the real-time clock of the MT.

4.4.2 Syntax

Type	Syntax	Response	Example
Set	AT+CCLK=<time>	OK	AT+CCLK="14/07/01,15:00:00+01" OK
Read	AT+CCLK?	+CCLK: <time> OK	+CCLK: "14/07/01,15:00:00+01" OK
Test	AT+CCLK=?	OK	

4.4.3 Defined values

Parameter	Type	Description
<time>	String	Format is "yy/MM/dd, hh:mm:ss+TZ". Characters indicate year, month, day, hours, minutes, seconds, time zone. The factory-programmed value is "04/01/01,00:00:00+00". Values prior to the factory-programmed value are not allowed.

4.4.4 Notes

- If the parameter value is out of range, then the error result code "+CME ERROR: operation not supported" will be provided (if +CMEE is set to 2).
- "TZ": The Time Zone information is represented by two digits. The value is updated during the registration procedure when the automatic time zone update is enabled (using +CTZU command) and the network supports the time zone information.
- The Time Zone information is expressed in steps of 15 minutes and it can assume a value in the range that goes from -96 to +96.

SARA-N2

- Time setting is not permanently stored in NVM.
- The set command is not supported.

4.5 Automatic time zone update +CTZU

+CTZU						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	Yes	<i>NVM</i>	No	-	<i>+CME Error</i>

4.5.1 Description

Configures the automatic time zone update via NITZ.



The Time Zone information is provided after the network registration (if the network supports the time zone information).

4.5.2 Syntax

Type	Syntax	Response	Example
Set	AT+CTZU=<on_off>	OK	AT+CTZU=1 OK
Read	AT+CTZU?	+CTZU: <on_off> OK	+CTZU: 0 OK
Test	AT+CTZU=?	+CTZU: (list of supported <on_off>s) OK	+CTZU: (0-1) OK

4.5.3 Defined values

Parameter	Type	Description
<on_off>	Number	Allowed values (see <i>Notes</i> for the factory-programmed value): <ul style="list-style-type: none"> 0: automatic time zone via NITZ disabled 1: automatic time zone update via NITZ enabled; if the network supports the service, the local time of the module is changed (not only time zone)

4.5.4 Notes

SARA-N2

- The factory-programmed value of the <on_off> parameter is 1.

4.6 Report mobile termination error +CMEE

+CMEE						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	<i>+CME Error</i>

4.6.1 Description

Configures the formatting of the result code +CME ERROR: <err> as an indication of an error relating to the functionality of the MT. When enabled, MT related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. The error result code is returned normally when an error is related to syntax, invalid parameters or MT functionality.

4.6.2 Syntax

Type	Syntax	Response	Example
Set	AT+CMEE=[<n>]	OK	AT+CMEE=2 OK
Read	AT+CMEE?	+CMEE: <n> OK	+CMEE: 0 OK
Test	AT+CMEE=?	+CMEE: (list of supported <n>s)	+CMEE: (0-2)

Type	Syntax	Response	Example
		OK	OK

4.6.3 Defined values

Parameter	Type	Description
<n>	Number	<ul style="list-style-type: none"> 0: +CME ERROR: <err> result code disabled and ERROR used 1: +CME ERROR: <err> result code enabled and numeric <err> values used 2: +CME ERROR: <err> result code enabled and verbose <err> values used

4.6.4 Notes

- When +CMEE=2 selected, the following convention is valid:
 - If the error result code is related to a parameter not covered by the GSM/ETSI or u-blox specification, the value <err>="operation not supported" shall be reported.
 - If the MT is in a state which does not allow performing the entered command, the value <err>="operation not allowed" shall be reported.

SARA-N2

- <n> = 2 is not supported.

4.7 Reboot +NRB

+NRB						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

4.7.1 Description

Reboots the module. There is a short delay after the command issuing before the module reboot that will be notified by an IRC. No further AT commands will be processed.

4.7.2 Syntax

Type	Syntax	Response	Example
Action	AT+NRB		
IRC		REBOOTING	REBOOTING

4.8 UE statistics +NUESTATS

+NUESTATS						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

4.8.1 Description

Returns the most recent operational statistics of the module. Depending on the <type> parameter the information text response provides different information as radio specific, block error rate or throughput information. All the data will be printed if <type>=ALL.

4.8.2 Syntax

Type	Syntax	Response	Example
Generic syntax			
Read	AT+NUESTATS[=<type>]	<param_1>,<param_2> OK	
Radio specific information			
Read	AT+NUESTATS[=RADIO]	Signal power: <power>	AT+NUESTATS

Type	Syntax	Response	Example
		Total power: <tot_power>	Signal power: -508
		TX power: <tx_power>	Total power: -500
		TX time: <tx_time>	TX power: -30
		RX time: <rx_time>	TX time: 2393
		Cell ID: <cell_ID>	RX time: 28903
		DL MCS: <dl_mcs>	Cell ID: 25
		UL MCS: <ul_mcs>	DL MCS: 5
		DCI MCS: <dc_i_mcs>	UL MCS: 5
		ECL: <ECL>	DCI MCS: 5
		SNR: <snr>	ECL:1
		EARFCN: <earfcn>	SNR:20
		PCI: <pci>	EARFCN:30
		RSRQ: <rsrq>	PCI:11
		OK	RSRQ:-125
			OK
Block error rate information			
Read	AT+NUESTATS=BLER	NUESTATS:BLER,<name>,<value> [.] NUESTATS:BLER,<name>,<value> OK	AT+NUESTATS=BLER NUESTATS:BLER,RLC UL BLER,10 NUESTATS:BLER,RLC DL BLER,5 NUESTATS:BLER,MAC UL BLER,8 NUESTATS:BLER,MAC DL BLER,3 NUESTATS:BLER,Total TX bytes,1080 NUESTATS:BLER,Total RX bytes,900 NUESTATS:BLER,Total TX blocks,80 NUESTATS:BLER,Total RX blocks,80 NUESTATS:BLER,Total RTX blocks,100 NUESTATS:BLER,Total ACK/NACK RX,100 OK
Throughput information			
Read	AT+NUESTATS=THP	NUESTATS:THP,<throughput_type>,<throughput> [.] NUESTATS:THP,<throughput_type>,<throughput> OK	AT+NUESTATS=THP NUESTATS:THP,RLC UL,100 NUESTATS:THP,RLC DL,98 NUESTATS:THP,MAC UL,103 NUESTATS:THP,MAC DL,100 OK
Test	AT+NUESTATS=?		AT+NUESTATS=? OK

4.8.3 Defined values

UE statistics <type>

Parameter	Type	Description
<type>	String	Type of data to be displayed as an unquoted string. Allowed values: <ul style="list-style-type: none"> RADIO (default value): radio specific information BLER: block error rate information THP: throughput information ALL: all information. The value of <type> output is the correct one for each data type.
<type>= RADIO		

Parameter	Type	Description
<power>	Number	NB-IoT signal power expressed in tenth of dBm
<tot_power>	Number	Total power within receive bandwidth expressed in tenth of dBm
<tx_power>	Number	TX power expressed in tenth of dBm
<tx_time>	Number	Elapsed TX time since last power on event expressed in milliseconds
<rx_time>	Number	Elapsed RX time since last power on event expressed in milliseconds
<cell_ID>	Number	Physical ID of the cell providing service to the module
<dl_mcs>	Number	Downlink Message Coding Scheme
<ul_mcs>	Number	Uplink Message Coding Scheme
<dci_mcs>	Number	DCI Message Coding Scheme
<ECL>	Number	Last ECL value
<snr>	Number	Last snr value
<earfcn>	Number	Last earfcn value
<pci>	Number	last pci value
<rsrq>	Number	Reference signal received quality expressed in tenth of dBm
<type>= BLER		
<name>	String	Allowed values: <ul style="list-style-type: none"> • RLC UL BLER: uplink block error rate of RLC layer • RLC DL BLER: downlink block error rate of RLC layer • MAC UL BLER: uplink block error rate of physical layer • MAC DL BLER: downlink block error rate of physical layer • Total TX bytes: total bytes transmitted • Total RX bytes: total bytes received • Total TX blocks: transmitted transport blocks • Total RX blocks: received transport blocks • Total RTX blocks: retransmitted transport blocks • Total ACK/NACK RX: total received ack/nack messages
<value>	Integer	The block error rate of RLC layer are expressed in percentage
<type>= THP		
<throughput_type>	Integer	Allowed values: <ul style="list-style-type: none"> • RLC UL: Uplink throughput of RLC layer • RLC DL: Downlink throughput of RLC layer • MAC UL: Uplink throughput of physical layer • MAC DL: Downlink throughput of physical layer
<throughput>	Integer	Throughput expressed in kb/s

4.9 Configure UE behaviour +NCONFIG

+NCONFIG						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

4.9.1 Description

Configures customizable aspects of the UE (e.g Auto Attach). It takes a function and a value that controls operation of that function.

4.9.2 Syntax

Type	Syntax	Response	Example
Set	AT+NCONFIG=<function>,<value>	OK	AT+NCONFIG=AUTOCONNECT,TRUE OK
Read	AT+NCONFIG?	+NCONFIG:<function>,<value> OK	+NCONFIG:AUTOCONNECT,TRUE OK
Test	AT+NCONFIG=?	+NCONFIG:(<function>,<value1>,<value2>))	+NCONFIG:(AUTOCONNECT,(FALSE,TRUE))

Type	Syntax	Response	Example
		OK	OK

4.9.3 Defined values

Parameter	Type	Description
<function>	String	<ul style="list-style-type: none"> AUTOCONNECT: control if the platform will automatically attempt to connect to the network after power-on or reboot. When enabled, will set <code>+CFUN=1</code> and read the PLMN from the SIM. It will use the APN provided by the network
<value>	String	<ul style="list-style-type: none"> TRUE FALSE

Objective Specification

5 Network service

5.1 Signal quality +CSQ

+CSQ						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

5.1.1 Description

Returns the Received Signal Strength Indication (RSSI) <rss> and <qual> from the MT.

In dedicated mode, during the radio channel reconfiguration (e.g. handover), invalid measurements may be returned for a short transitory because the MT must compute them on the newly assigned channel.

5.1.2 Syntax

Type	Syntax	Response	Example
Action	AT+CSQ	+CSQ: <rss>,<qual> OK	+CSQ: 2,5 OK
Test	AT+CSQ=?	+CSQ: (list of supported <rss>),(list of supported <qual>) OK	+CSQ: (0-31,99),(0-7,99) OK

5.1.3 Defined values

Parameter	Type	Description
<rss>	Number	The allowed range is 0-31 and 99. Remapped indication of the following parameters: <ul style="list-style-type: none"> the Received Signal Strength Indication (RSSI) in GSM RAT the Received Signal Code Power (RSCP) in UMTS RAT the Reference Signal Received Power (RSRP) in LTE RAT When the RF power level of the received signal is the highest possible, the value 31 is reported. When it is not known, not detectable or currently not available, 99 is returned.
<qual>	Number	The allowed range is 0-7 and 99. The information provided depends on the selected RAT: <ul style="list-style-type: none"> In 2G RAT CS dedicated and GPRS packet transfer mode indicates the Bit Error Rate (BER) as specified in 3GPP TS 45.008 [146] In 2G RAT EGPRS packet transfer mode indicates the Mean Bit Error Probability (BEP) of a radio block. 3GPP TS 45.008 [146] specifies the range 0-31 for the Mean BEP which is mapped to the range 0-7 of <qual> In UMTS RAT indicates the Energy per Chip/Noise (ECNO) ratio in dB levels of the current cell. 3GPP TS 25.133 [105] specifies the range 0-49 for EcNO which is mapped to the range 0-7 of <qual> In LTE RAT indicates the Reference Signal Received Quality (RSRQ). TS 36.133 [104] specifies the range 0-34 for RSRQ which is mapped to the range 0-7 of <qual> See Notes for the complete parameter mapping

5.1.4 Notes

<qual>	2G RAT CS and GPRS	2G RAT EGPRS	UMTS RAT	LTE RAT
0	BER < 0.2%	28 <= MEAN_BEP <= 31	ECNO_LEV >= 44	RSRQ_LEV < 5
1	0.2% < BER < 0.4%	24 <= MEAN_BEP <= 27	38 <= ECNO_LEV < 44	5 <= RSRQ_LEV < 10
2	0.4% < BER < 0.8%	20 <= MEAN_BEP <= 23	32 <= ECNO_LEV < 38	10 <= RSRQ_LEV < 14
3	0.8% < BER < 1.6%	16 <= MEAN_BEP <= 19	26 <= ECNO_LEV < 32	14 <= RSRQ_LEV < 18
4	1.6% < BER < 3.2%	12 <= MEAN_BEP <= 15	20 <= ECNO_LEV < 26	18 <= RSRQ_LEV < 22
5	3.2% < BER < 6.4%	8 <= MEAN_BEP <= 11	14 <= ECNO_LEV < 20	22 <= RSRQ_LEV < 26
6	6.4% < BER < 12.8%	4 <= MEAN_BEP <= 7	8 <= ECNO_LEV < 14	26 <= RSRQ_LEV < 30
7	BER > 12.8%	0 <= MEAN_BEP <= 3	ECNO_LEV < 8	RSRQ_LEV >= 30

<qual>	2G RAT CS and GPRS	2G RAT EGPRS	UMTS RAT	LTE RAT
99				Not known or not detectable

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- Only LTE RAT is supported.

5.2 Operator selection +COPS

+COPS						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	No	Profile	Yes	Up to 3 min	+CME Error

5.2.1 Description

Forces an attempt to select and register with the GSM/UMTS/LTE network operator, that can be chosen in the list of network operators returned by the test command. Through <mode> parameter the network selection can automatically be performed or forced by this command: the access technology is indicated in <AcT> parameter (where supported).

In manual PLMN selection mode, if the optional <AcT> parameter is not specified, the modules will select the default access technology with the following priority order: LTE, UMTS and GSM (not supported technologies will be ignored).



u-blox cellular modules are certified according to all the capabilities and options stated in the Protocol Implementation Conformance Statement document (PICS) of the module. The PICS, according to 3GPP TS 51.010-2 [83], 3GPP TS 34.121-2 [84], 3GPP TS 36.521-2 [114] and 3GPP TS 36.523-2 [115], is a statement of the implemented and supported capabilities and options of a device. If the user changes the command settings during the certification process, the PICS of the application device integrating a u-blox cellular module must be changed accordingly.

To be able to exploit all command functionalities, the SIM card verification is required. The command is accessible also without an inserted SIM. In this case the command AT+COPS=0 always returns an error result code because the network registration cannot be performed without the SIM, while the configuration (i.e. automatic registration) is correctly set. The set value can be checked with the command AT+COPS? or by verifying the active profile with AT&V (parameter <format> is then also visible).

The command handling depends on the <mode> parameter value:

- <mode>=0 and <mode>=1:** the AT command setting is immediately stored in the current activated profile. If the MT is set in automatic selection mode (<mode>= 0), only the mode will be saved. If the MT is set in manual mode (<mode>= 1), also the format (<format>) and operator (<oper>) will be stored in the profile.

If the set command with <mode>=0 is issued, a further set command with <mode>=0 is managed as a user reselection (see the 3GPP TS 23.122 [70]), i.e. the module triggers a search for the HPLMN or a higher order PLMN. This is useful when roaming in areas where the HPLMN or a higher order PLMN is available. If no HPLMN or higher order PLMN is found, the module remains in the state it was in prior to the search (e.g. camped and/or registered on the PLMN before the search).

The PLMN search cannot be performed in RRC connected state when the RAT is 3G or 4G, hence no PLMN list will be returned at the end of the PLMN scan attempt.



The manual PLMN selection mode can fail due to the MNO control on the network selection procedure via EF_{CSP} setting; for further details see [+PACSP](#).

5.2.2 Syntax

Type	Syntax	Response	Example
Set	AT+COPS=[<mode>[, <format>[,<oper>[, <AcT>]]]]	If <mode>=0, 1, 2, 3, 4: OK	AT+COPS=0,0 OK

Type	Syntax	Response	Example
		If <mode>=5 and on GSM networks:	AT+COPS=5
		[MCC:<MCC>, MNC:<MNC>, LAC:<LAC>, CI:<CI>, BSIC:<BSIC>, Arfcn:<Arfcn>, RxLev:<RxLev>	MCC:222, MNC: 88, LAC:55fa, CI:ffff, BSIC:3f, Arfcn:00104, RxLev:037
		[MCC:<MCC>, MNC:<MNC>, LAC:<LAC>, CI:<CI>, BSIC:<BSIC>, Arfcn:<Arfcn>, RxLev:<RxLev>	MCC:222, MNC: 10, LAC:4e54, CI:ffff, BSIC:32, Arfcn:00080, RxLev:032
		[...]]	...
		OK	MCC:222, MNC: 88, LAC:55fa, CI:1d39, BSIC:3d, Arfcn:00756, RxLev:005
			OK
		If <mode>=5 and on UMTS networks:	AT+COPS=5
		[MCC:<MCC>, MNC:<MNC>, LAC:<LAC>, RAC:<RAC>, CI:<CI>, DLF:<dl_frequency>, ULF:<ul_frequency>, SC:<SC>, RSCP LEV:<RSCP LEV>, ECNO LEV:<ecno_lev>	MCC:222, MNC:10, LAC:61ef, RAC:14, CI:07d2088, DLF:10788, ULF: 9838, SC:81, RSCP LEV:23, ECNO LEV:41
		[MCC:<MCC>, MNC:<MNC>, LAC:<LAC>, RAC:<RAC>, CI:<CI>, DLF:<dl_frequency>, ULF:<ul_frequency>, SC:<SC>, RSCP LEV:<rsrp_lev>, ECNO LEV:<ecno_lev>	MCC:222, MNC:10, LAC:61ef, RAC:14, CI:07d2085, DLF:10813, ULF: 9863, SC:81, RSCP LEV:26, ECNO LEV:41
		[...]]	...
		OK	MCC:222, MNC:01, LAC:ef8d, RAC:0, CI:52d36fb, DLF:10688, ULF: 9738, SC:285, RSCP LEV:16, ECNO LEV:32
			OK
		If <mode>=6 and on GSM networks:	AT+COPS=6
		[<AcT>,<MCC>,<MNC>,<LAC>,<CI>,<BSIC>,<Arfcn>,<RxLev>	0,222,88,55fa,ffff,3f,00104,037
		[<AcT>,<MCC>,<MNC>,<LAC>,<CI>,<BSIC>,<Arfcn>,<RxLev> [...]]	0,222,10,4e54,ffff,32,00080,032
		OK	...
			OK
		If <mode>=6 and on UMTS networks:	AT+COPS=6
		[<MCC>,<MNC>,<LAC>,<RAC>,<CI>,<dl_frequency>,<ul_frequency>,<SC>,<RSCP LEV>,<ecno_lev>	222,99,754f,2,03554d7,10713,9763,341,255,14
		[<MCC>,<MNC>,<LAC>,<RAC>,<CI>,<dl_frequency>,<ul_frequency>,<SC>,<RSCP LEV>,<ecno_lev>	222,01,ef8d,0,52d2647,10663,9713,453,4,23
		[...]]	...
		OK	OK
		If <mode>=8 and on GSM networks:	AT+COPS=8
		[MCC:<MCC>, MNC:<MNC>, LAC:<LAC>, CI:<CI>, BSIC:<BSIC>, Arfcn:<Arfcn>, RxLev:<RxLev>, TA:<TA>	MCC:222, MNC: 10, LAC:4e54, CI:12f1, BSIC:3f, Arfcn:00104, RxLev:037, TA:3
		[MCC:<MCC>, MNC:<MNC>, LAC:<LAC>, CI:<CI>, BSIC:<BSIC>, Arfcn:<Arfcn>, RxLev:<RxLev>, TA:<TA>	MCC:222, MNC: 10, LAC:4e54, CI:8841, BSIC:32, Arfcn:00080, RxLev:032, TA:5
		[...]]	MCC:222, MNC: 10, LAC:4e54, CI:1ef4, BSIC:31, Arfcn:00082, RxLev:022, TA:255
		OK	...
			MCC:222, MNC: 10, LAC:55fa, CI:1d39, BSIC:3d, Arfcn:00756, RxLev:005, TA:7
			OK
Read	AT+COPS?	+COPS: <mode>[,<format>,<oper>[,<AcT>]]	+COPS: 0,0,"vodafone IT"
		OK	OK

Type	Syntax	Response	Example
Test	AT+COPS=?	+COPS: [(<stat>, long <oper>, short <oper>, numeric <oper>[,<AcT>])[,<stat>, long <oper>, short <oper>, numeric <oper>[,<AcT>]),[...]], (list of supported <mode>s),(list of supported <format>s)	+COPS: (2,"vodafone IT","voda IT","22210"),(1,"SI vodafone","vodafone SI","29340"),(1,"I WIND","I WIND","22288"),(1,"I TIM","TIM","22201"),(1,"MOBITEL","MOBITEL","29341"),(0-4),(0-2)
		OK	OK

5.2.3 Defined values

Parameter	Type	Description
<mode>	Number	Is used to chose whether the network selection is automatically done by the MT or is forced by this command to the operator <oper> given in the format <format>: <ul style="list-style-type: none"> • 0 (default value and factory-programmed value): automatic (<oper> field is ignored) • 1: manual • 2: deregister from network • 3: set only <format> • 4: manual/automatic • 5: extended network search • 6: extended network search without the tags (e.g. MCC, RxLev will not be printed, see the syntax and the command example) • 8: network timing advance search
<format>	Number	<ul style="list-style-type: none"> • 0 (factory-programmed value): long alphanumeric <oper> • 1: short format alphanumeric <oper> • 2: numeric <oper>
<oper>	String	Given in format <format> this field may be up to 24 characters long for long alphanumeric format, up to 10 characters for short alphanumeric format and 5 or 6 characters long for numeric format (MCC/MNC codes). The factory-programmed value is FFFF (undefined).
<stat>	Number	<ul style="list-style-type: none"> • 0: unknown • 1: available • 2: current • 3: forbidden
<AcT>	Number	Indicates the radio access technology: <ul style="list-style-type: none"> • 0: GSM • 1: GSM COMPACT • 2: UTRAN • 3: GSM with EDGE availability • 4: UTRAN with HSDPA availability • 5: UTRAN with HSUPA availability • 6: UTRAN with HSDPA and HSUPA availability • 7: LTE
<TA>	Number	Timing Advance; the range is 0-63. If the information is not known or not detectable or currently not available, the value is 255.

5.2.4 Notes

- <format> and <oper> parameters are optional only if the value of <mode> parameter is 0, 2 or 3.
- If the antenna is not connected, then the information text response to the test command is: +COPS: ,, (0-4),(0-2)

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- <mode>=3, 4, 5, 6 and 8 are not supported.
- <AcT>=0, 1, 2, 3, 4, 5, 6 are not supported.
- <format>=0, 1 are not supported.

5.3 Signalling connection status +CSCON

+CSCON						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

5.3.1 Description

Returns details of the current terminal's perceived radio connection status (i.e. to the base-station). The set command configures the +CSCON URC. When enabled, the URC is sent from the MT at each change of the MT connection mode.



The state is only updated when radio events, such as send and receive, take place. This means that the current state may be out of data. The terminal may think it is "Connected" yet cannot currently use a base station due to a change in the link quality.

5.3.2 Syntax

Type	Syntax	Response	Example
Set	AT+CSCON=<n>	OK	AT+CSCON=1 OK
Read	AT+CSCON?	+CSCON: <n>,<mode> OK	+CSCON:1,1 OK
URC		+CSCON: <mode>	+CSCON: 0

5.3.3 Defined values

Parameter	Type	Description
<n>	Number	<ul style="list-style-type: none"> 0 (default value): +CSCON URC disabled 1: +CSCON URC enabled
<mode>	Number	Indicates the signalling connection status: <ul style="list-style-type: none"> 0: idle 1: connected

5.4 Supported bands configuration +NBAND

+NBAND						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

5.4.1 Description

Defines the set of bands to be used.

5.4.2 Syntax

Type	Syntax	Response	Example
Set	AT+NBAND=<n>[,<n>[,<n>[...]]]	OK	AT+NBAND=5,8 OK
Read	AT+NBAND?	+NBAND: <n>[,<n>[,<n>[...]]] OK	+NBAND:5,8 OK
Test	AT+NBAND=?	+NBAND: (<n>[,<n>[,<n>[...]]) OK	+NBAND:(5,8,20) OK

5.4.3 Defined values

Parameter	Type	Description
<n>	Number	Band expressed as a decimal number. The allowed values are 5, 8 and 20.

5.5 Specify search frequencies+NEARFCN

+NEARFCN						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

5.5.1 Description

Locks the module to a specific EUTRA Absolute Radio Frequency Channel Number (EARFCN) and optionally the desired Physical Cell ID (PCI).

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

5.5.2 Syntax

Type	Syntax	Response	Example
Generic syntax			
Set	AT+NEARFCN=<search_mode>,<param1>[,<param2>[,...]]	OK	
Locks the module to a specific EUTRA			
Set	AT+NEARFCN=<search_mode>,<earfcn>[,<pci>]	OK	AT+NEARFCN=0,10,ABCD OK
Test	AT+NEARFCN=?	OK	AT+NEARFCN=? OK

5.5.3 Defined values

Parameter	Type	Description
<search_mode>	Number	Specifies the type of search and defines the supplied parameters. Allowed value: <ul style="list-style-type: none"> 0: single point EARFCN search
<earfcn>	Number	Indicates the EARFCN to search; the range goes is 0-65535.
<pci>	String	Four byte E-UTRAN cell ID in hexadecimal format.

5.6 Extended discontinuous reception +UQDRX

+UQDRX						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

5.6.1 Description

Returns the extended DRX value assigned by the network.

5.6.2 Syntax

Type	Syntax	Response	Example
Read	AT+UQDRX?	+UQDRX: <eDRX>	+UQDRX: 2.24
Test	AT+UQDRX=?	+UQDRX: (range of <eDRX>)	+UQDRX: (1.28-10.24)

5.6.3 Defined values

Parameter	Type	Description
<eDRX>	Number	Extended discontinuous reception, ranges from 1.28 s to 10.24 s.

5.7 Network timers +UNTIMERS

+UNTIMERS						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

5.7.1 Description

Returns the value of these timers:

- Requested Active Time: it is the T3324 timer value, and represents the duration of the active mode before the UE enters Power Saving Mode
- Requested Periodic TAU: it is the T3412 timer value, which indicates the duration after which the UE periodically performs the Tracking Area Update procedure

5.7.2 Syntax

Type	Syntax	Response	Example
Read	AT+UNTIMERS?	+UNTIMERS: <Requested_Active_Time>,<Requested_Periodic_TAU> OK	+UNTIMERS: "01000100","00100100" OK
Test	AT+UNTIMERS=?	+UNTIMERS: (list of supported <Requested_Active_Time>s),(list of supported <Requested_Periodic_TAU>s) OK	+UNTIMERS: ("00000000"- "11111111"),("00000000"- "11111111") OK

5.7.3 Defined values

Parameter	Type	Description
<Requested_Active_Time>	String	T3324 value to be allocated to the UE, one byte in an 8-bit format. For the coding and the value range, see the GPRS Timer 2 IE in 3GPP TS 24.008 [12]
<Requested_Periodic_TAU>	String	T3412 value to be allocated to the UE in EUTRAN, one byte in an 8-bit format. For the coding and the value range, see the GPRS Timer 3 IE in 3GPP TS 24.008 [12]

6 SIM toolkit




6.1 Introduction

SIM Application Toolkit (STK) is the 3GPP standard feature that allows the Subscriber Identity Module (SIM) to handle the DCE, also by giving commands such as displaying menus and/or asking for user input, and control its access to the network.

Once the SIM toolkit interface has been enabled via [AT+CFUN](#) command, the DTE is notified SIM toolkit commands and events and can interact with the SIM through appropriate STK AT commands.

SIM toolkit processing supports two modes: dedicated and raw. In dedicated mode, the DTE is notified of STK commands and events after decoding; in raw mode the DTE receives the raw data as received from the SIM. Only one mode can be enabled and function at a time.

For more details on the command description and parameters, see 3GPP TS 51.014 [44].

-  The setup menu fetched from the SIM card may vary with the terminal profile supported by the MT, which is affected by the capabilities of the module itself (e.g. speech): this implies that different u-blox modules may display different setup menus with the same SIM card.
-  The commands in this section properly work only if the SIM toolkit interface has been activated by the DTE. Otherwise the SIM toolkit processing will be blocked.
-  If an AT command related to the dedicated mode is used when the raw mode is enabled (and vice versa), an error result code (" +CME ERROR: operation not allowed" if [+CMEE](#) is set to 2) is returned.

The STK commands related to the Bearer Independent Protocol, i.e. Open Channel, Close Channel, Receive Data, Send Data, Get Channel Status and the events Data Available and Channel Status, are autonomously managed by the device without the intervention from the TE, unless the dedicated mode is active and the Open Channel command requires the user intervention (see ETSI TS 102 223 [51]).

6.2 Bearer Independent Protocol status indication +UBIP

+UBIP						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	NVM	No	-	+CME Error

6.2.1 Description

Configures the Bearer Independent Protocol status indication, i.e. the +UUBIP URC presentation.

6.2.2 Syntax

Type	Syntax	Response	Example
Set	AT+UBIP=<mode>	OK	AT+UBIP=1 OK
Read	AT+UBIP?	+UBIP: <mode> OK	+UBIP: 0 OK
Test	AT+UBIP=?	+UBIP: (list of supported <mode>'s) OK	+UBIP: (0,1) OK
URC		+UUBIP: <ev_cmd>,<val>	+UUBIP: 10,261

6.2.3 Defined values

Parameter	Type	Description
<mode>	Number	Indicates whether the +UUBIP URC is enabled or not: <ul style="list-style-type: none"> • 0 (factory-programmed value): BIP status indication disabled

Parameter	Type	Description
		<ul style="list-style-type: none">• 1: BIP status indication enabled
<ev_cmd>	Number	Indicates the event download's tag or proactive command's tag. Allowed values: <ul style="list-style-type: none">• 10: Channel status event• 64: Open channel proactive command• 65: Close channel proactive command• 66: Receive data proactive command• 67: Send data proactive command
<val>	Number	Indicates the channel status (in case of the event download channel status) or result in case of a proactive command (see ETSI TS 102 223 [51])

Objective Specification

7 Packet switched data services

7.1 Introduction and common parameters definition

7.1.1 <APN>

The Access Point Name (APN) is a string parameter, which is a logical name, valid in the current PLMN's domain, used to select the GGSN (Gateway GPRS Support Node) or the external packet data network to be connected to. The APN can be omitted: this is the so-called "blank APN" setting that may be suggested by network operators (e.g. to roaming devices); in this case the APN string is not included in the message sent to the network.

An optional special code placed at the beginning of <APN> indicates the type of authentication handling between the module and the network and may be:

- CHAP: challenge handshake authentication protocol
- PAP: personal authentication protocol
- NOAUTH: authentication protocol not used
- code omitted: authentication protocol not used

An example for the usage of <APN> is:

```
AT+CGDCONT=1,"IP","CHAP:internet.t-d1.de"
```

 +CGDCONT?'s response does not include the PAP: and CHAP: prefixes in the APN string.

The maximum length of the parameter is 99 characters (the maximum length of coded APN is 100 octets, see 3GPP TS 23.003 [116], subclause 9.1).

7.1.2 <cid>

PDP context identifier. A numeric parameter specifying a particular PDP context definition. This parameter is valid only locally on the interface DTE-MT.

The maximum number of definable and active PDP contexts depend(s) on the product version:

Product	Max number of definable PDP contexts	Max number of active PDP contexts
SARA-N2	10	1

7.1.3 <d_comp>

Numeric parameter specifying the PDP data compression; it can have the values:

- 0 (default value): off
- 1: on (predefined compression type i.e. V.42bis data compression)
- 2 : V.42bis data compression

7.1.4 <Delivery_of_erroneous_SDUs>

Numeric parameter indicating whether SDUs (Service Data Unit) detected as erroneous shall be delivered or not (see the 3GPP TS 24.008 [12], subclause 10.5.6.5):

- 0: no
- 1: yes
- 2: no detect
- 3 (default value): subscribed value

7.1.5 <h_comp>

Numeric parameter specifying the PDP header compression; it can have the values:

- 0 (default value): off
- 1: on (predefined compression type, i.e. RFC1144)
- 2: RFC1144
- 3: RFC2507
- 4: RFC3095

7.1.6 <PDP_addr>

String parameter identifying the MT in the IP-address space applicable to the PDP service. If the value is null or omitted (dynamic IP addressing), then a value may be provided by the DTE during the PDP startup procedure or, failing that, a dynamic address will be requested via DHCP. It can be read with the command [AT+CGPADDR](#) or [AT+CGDCONT](#) read command.

To request a static IP address, a fixed IP address shall be specified for the <PDP_addr> parameter of the [+CGDCONT](#) set command and the user shall not rely on PPP negotiation via IPCP CONFREQ option.

Depending on the IP-version, the <PDP_addr> consists of 4 octets (IPv4) or 16 octets (IPv6):

- IPv4: "ddd.ddd.ddd.ddd"
- IPv4v6: "ddd.ddd.ddd.ddd ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd"
- IPv6: "ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd.ddd"



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The IP address is not enclosed within quotation marks.

7.1.7 <PDP_type>

The Packet Data Protocol (PDP) type is a string parameter which specifies the type of packet data protocol:

- "IP" (default value): Internet Protocol (IETF STD 5)
- "IPV4V6": virtual <PDP_type> introduced to handle dual IP stack UE capability (see the 3GPP TS 24.301 [87])
- "IPV6": Internet Protocol, version 6 (see RFC 2460)



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<PDP_type>="IPV4V6" and "IPV6" are not supported.

7.1.8 <state>

Indicates the state of GPRS attachment:

- 0: detached
- 1 (default value): attached

7.1.9 <IM_CN_Signalling_Flag_Ind>

Shows whether the PDP context is for IM CN subsystem-related signalling only or not:

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

7.2 PDP context definition +CGDCONT

+CGDCONT						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	Yes	NVM	No	-	+CME Error

7.2.1 Description

Defines the connection parameters for a PDP context, identified by the local context identification parameter <cid>. If the command is used only with parameter <cid>, the corresponding PDP context becomes undefined.

Each context is permanently stored so that its definition is persistent over power cycles.

The command is used to set up the PDP context parameters for an external context, i.e. a data connection using the external IP stack (e.g. Windows dial up) and PPP link over the serial interface.

7.2.2 Syntax

Type	Syntax	Response	Example
Set	AT+CGDCONT=[<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<emergency_indication>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>]]]]]]]]]]]	OK	IPv4 example AT+CGDCONT=1,"IP","APN_name", "1.2.3.4",0,0 OK IPv4v6 example AT+CGDCONT=1,"IPV4V6","APN", "0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0 OK IPv6 example AT+CGDCONT=1,"IPV6","APN", "0.0.0.0.0.0.0.0.0.0.0.0",0,0 OK
Read	AT+CGDCONT?	+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>,<emergency_indication>,<P-CSCF_discovery>,<IM_CN_Signalling_Flag_Ind>] OK	+CGDCONT: 1,"IP","web.omnitel.it", "91.80.140.199",0,0 OK
Test	AT+CGDCONT=?	+CGDCONT: (list of supported <cid>s),<PDP_type>,...,(list of supported <d_comp>s),(list of supported <h_comp>s)[,(list of supported <IPv4AllocAddr>),(list of supported <emergency_indication>),(list of supported <P-CSCF_discovery>),(list of supported <IM_CN_Signalling_Flag_Ind>)] OK	+CGDCONT: (1-3),"IP",...,(0-2),(0-4) OK

7.2.3 Defined values

Parameter	Type	Description
<cid>	Number	See <cid>
<PDP_type>	String	See <PDP_type>
<APN>	String	See <APN>
<PDP_addr>	Number	See <PDP_addr>
<d_comp>	Number	See <d_comp>
<h_comp>	Number	See <h_comp>
<IPv4AddrAlloc>	Number	Controls how the MT/TA requests to get the IPv4 address information: <ul style="list-style-type: none"> 0 (default value): IPv4 Address Allocation through NAS Signalling 1: IPv4 Address Allocated through DHCP
<emergency_indication>	Number	Indicates whether the PDP context is for emergency bearer services or not: <ul style="list-style-type: none"> 0 (default value): PDP context is not for emergency bearer services 1: PDP context is for emergency bearer services
<P-CSCF_discovery>	Number	Influences how the MT/TA requests to get the P-CSCF address, see 3GPP TS 24.229 [102] annex B and annex L: <ul style="list-style-type: none"> 0 (default value): preference of P-CSCF address discovery not influenced by +CGDCONT 1: preference of P-CSCF address discovery through NAS Signalling 2: preference of P-CSCF address discovery through DHCP
<IM_CN_Signalling_Flag_Ind>	Number	See <IM_CN_Signalling_Flag_Ind>

7.2.4 Notes

Additional examples:

Command	Response	Description
AT+CMEE=2	OK	Use verbose <err> values
AT+CGDCONT=?	+CGDCONT: (1-3),"IP",,,(0),(0-1) OK	Test command
AT+CGDCONT=4,"IP","internet"	+CME ERROR: operation not allowed	Define out of range PDP contexts
AT+CGDCONT=2,"IP","internet"	OK	Define allowed PDP contexts
AT+CGDCONT=1,"IP","STATREAL"	OK	Define allowed PDP contexts
AT+CGDCONT=3,"IP","PAP:tim.ibox.it"	OK	Define allowed PDP contexts
AT+CGDCONT=253,"IP","internet"	+CME ERROR: operation not allowed	Define out of range PDP contexts
AT+CGDCONT?	+CGDCONT: 2,"IP","internet","0.0.0.0",0,0 +CGDCONT: 1,"IP","STATREAL","0.0.0.0",0,0 +CGDCONT: 3,"IP","tim.ibox.it","0.0.0.0",0,0 OK	Read command

- If <APN> is not specified the value "apn" is assumed.
- To omit the APN, i.e. to use the so-called "blank APN" setting, leave undefined the PDP context associated to <cid>=1 and use it to dial up a PPP connection.

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- The context's setting is not permanently stored in NVM.
- <PDP_type>="IPV4V6" and "IPV6" are not supported.
- <PDP_addr>, <d_comp>, <h_comp>, <IPv4AddrAlloc>, <emergency_indication>, <P-CSCF_discovery>, <IM_CN_Signalling_Flag_Ind> parameters are not supported.
- <cid>=0 is read only and is only defined when AUTOCONNECT is enabled.

7.3 GPRS attach or detach +CGATT

+CGATT						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	Yes	No	Yes	Up to 3 min	+CME Error

7.3.1 Description

Register (attach) the MT to, or deregister (detach) the MT from the GPRS service. After this command the MT remains in AT command mode. If the MT is already in the requested state (attached or detached), the command is ignored and OK result code is returned. If the requested state cannot be reached, an error result code is returned. The command can be aborted if a character is sent to the DCE during the command execution. Any active PDP context will be automatically deactivated when the GPRS registration state changes to detached.



The deregistration action is carried out even if the command is aborted.



Unless the MS is detached from GPRS service due to a previously performed GPRS detach, the set command with <state>=1 triggers a user reselection. In this case a search for the HPLMN or a higher order PLMN is triggered (for more details see [+COPS](#) and 3GPP TS 23.122 [70]).

7.3.2 Syntax

Type	Syntax	Response	Example
Set	AT+CGATT=[<state>]	OK	AT+CGATT=1 OK
Read	AT+CGATT?	+CGATT: <state> OK	+CGATT: 1 OK

Type	Syntax	Response	Example
Test	AT+CGATT=?	+CGATT: (list of supported <state>s) OK	+CGATT: (0-1) OK

7.3.3 Defined values

Parameter	Type	Description
<state>	Number	See <state>

7.3.4 Notes

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- When <state> = 1 is selected, an automatic network registration (+COPS=0) is automatically triggered.

7.4 Show PDP address +CGPADDR

+CGPADDR						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	Yes	No	No	-	+CME Error

7.4.1 Description

Returns a list of PDP addresses for the specified context identifiers. Only defined PDP contexts are displayed.

If the <cid> parameter is omitted, the addresses for all defined contexts are returned.

7.4.2 Syntax

Type	Syntax	Response	Example
Set	AT+CGPADDR=[<cid>[,<cid> [...]]]	+CGPADDR: <cid>,<PDP_addr> [+CGPADDR: <cid>,<PDP_addr> [...]] OK	AT+CGPADDR=1 +CGPADDR: 1,"1.2.3.4" OK
Test	AT+CGPADDR=?	+CGPADDR: [(list of defined <cid>s)] OK	+CGPADDR: 1,3 OK

7.4.3 Defined values

Parameter	Type	Description
<cid>	Number	See <cid>
<PDP_addr>	Number	See <PDP_addr>

7.4.4 Notes

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- The IP address in <PDP_addr> parameter is not enclosed within quotation marks.
- Only the addresses in IPv4 format are allowed.
- When the AUTOCONNECT functionality is enabled by means of the +NCONFIG AT command <cid>=0 will not be listed until an IP address is acquired.

7.5 EPS network registration status +CEREG

+CEREG						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

7.5.1 Description

Controls the presentation of the network registration URC. The URC assumes a different syntax depending on the network and the `<n>` parameter:

- +CEREG: `<stat>` when `<n>=1` and there is a change in the MT's EPS network registration status in E-UTRAN
- +CEREG: `<stat>[,<tac>],[<ci>],[<AcT>]` when `<n>=2` and there is a change of the network cell in EUTRAN
- +CEREG: `<stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]` when `<n>=3` and the value of `<stat>` changes

The parameters `<AcT>`, `<tac>`, `<ci>`, `<cause_type>` and `<reject_cause>` are provided only if available.

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

7.5.2 Syntax

Type	Syntax	Response	Example
Set	AT+CEREG= <code><n></code>	OK	AT+CEREG=1 OK
Read	AT+CEREG?	+CEREG: <code><n>,<stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]</code> OK	+CEREG: 2,1,"3a9b","0000c33d",7 OK
Test	AT+CEREG=?	+CEREG: (list of supported <code><n></code> s) OK	+CEREG: (0-3) OK
URC		+CEREG: <code><stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]</code>	+CEREG: 1,"3a9b","0000c33d",7

7.5.3 Defined values

Parameter	Type	Description
<code><n></code>	Number	Mode configuration: <ul style="list-style-type: none"> • 0 (default value): network registration URC disabled • 1: network registration URC +CEREG: <code><stat></code> enabled • 2: network registration and location information URC +CEREG: <code><stat>[,<tac>],[<ci>],[<AcT>]</code> enabled • 3: network registration, location information and EMM cause value information URC +CEREG: <code><stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]</code> enabled
<code><stat></code>	Number	EPS registration status: <ul style="list-style-type: none"> • 0: not registered, the MT is not currently searching an operator to register to • 1: registered, home network • 2: not registered, but the MT is currently trying to attach or searching an operator to register to • 3: registration denied • 4: unknown (e.g. out of E-UTRAN coverage) • 5: registered, roaming • 8: attached for emergency bearer services only (see 3GPP TS 24.008 [12] and 3GPP TS 24.301 [87] that specify the condition when the MS is considered as attached for emergency bearer services)
<code><tac></code>	String	Two bytes tracking area code coded in hexadecimal format
<code><ci></code>	String	Four bytes E-UTRAN cell-id in hexadecimal format
<code><AcT></code>	Number	Access technology of the service cell:

Parameter	Type	Description
<cause_type>	Number	<ul style="list-style-type: none"> 7: E-UTRAN (see 3GPP TS 44.060 [88] that specifies the System Information messages which give the information about whether the serving cell supports EGPRS)
<reject_cause>	Number	<reject_cause> type: <ul style="list-style-type: none"> 0: indicates that <reject_cause> contains an EMM cause value, see 3GPP TS 24.301 [87] Annex A 1: indicates that <reject_cause> contains a manufacture-specific cause
<reject_cause>	Number	Cause of the failed registration. The value is of type as defined by <cause_type>

7.5.4 Notes

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- <n>= 3 is not supported.
- <stat>= 8 is not supported.

7.6 PDP Context Read Dynamic Parameters +CGCONTRDP

+CGCONTRDP						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	No	No	No	-	+CME Error

7.6.1 Description

Returns some relevant information for an active non secondary PDP context with the context identifier <cid>:

- SARA-N2 - <bearer_id>, <APN>, <IPv4_MTU>, <Non-IP_MTU>

The command syntax differs depending on the module series.



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

7.6.2 Syntax

Type	Syntax	Response	Example
SARA-N2 syntax			
Set	AT+CGCONTRDP[=<cid>]	+CGCONTRDP: <cid>,<bearer_id>, <APN>[,<IPv4_MTU>[,<Non-IP_MTU>]] [[.]] +CGCONTRDP: <cid>,<bearer_id>, <APN>[,<IPv4_MTU>[,<Non-IP_MTU>]] OK	+CGCONTRDP: 1,0,"web.omnitel.it", 128,128 OK
Test	AT+CGCONTRDP=?	+CGCONTRDP: (list of <cid>s associated with active non secondary contexts) OK	+CGCONTRDP: 1 OK

7.6.3 Defined values

Parameter	Type	Description
<cid>	Number	See <cid>
<APN>	String	See <APN>
<bearer_id>	Number	Identifies the bearer, i.e. the EPS bearer in EPS and the NSAPI in UMTS/GPRS. The range goes from 5 to 16
<local_addr_and_subnet_mask>	String	IP address and subnet mask of the MT. The string is given as dot-separated numeric (0-255) parameters on the form: <ul style="list-style-type: none"> "a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 "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

Parameter	Type	Description
<gw_addr>	String	Gateway Address of the MT. The string is given as dot-separated numeric (0-255) parameters.
<DNS_prim_addr>	String	IP address of the primary DNS server.
<DNS_sec_addr>	String	IP address of the secondary DNS server.
<P-CSCF_prim_addr>	String	IP address of the primary P-CSCF server.
<P-CSCF_sec_addr>	String	IP address of the secondary P-CSCF server.
<IM_CN_Signalling_Flag>	Number	See <IM_CN_Signalling_Flag_Ind>
<LIPA_indication>	Number	Indicates that the PDP context provides connectivity using a LIPA PDN connection. This parameter cannot be set by the TE: <ul style="list-style-type: none"> 0: indication not received that the PDP context provides connectivity using a LIPA PDN connection 1: indication received that the PDP context provides connectivity using a LIPA PDN connection
<IPv4_MTU>	Number	IPv4 MTU size in octets.
<Non-IP_MTU>	Number	Non-IP MTU size in octets.

7.7 Primary and secondary PDP contexts

A PDP context can be either **primary** or **secondary**. In LTE, PS data connections are referred to as EPS bearers: EPS bearers are conceptually equivalent to the legacy PDP contexts, which are often referred to for sake of simplicity. Similarly to a PDP context, the EPS bearer can be a default (primary) or dedicated (secondary) one. The initial EPS bearer established during LTE attach procedure is actually a default EPS bearer. A secondary PDP context uses the same IP address of a primary PDP context (the usual PDP context activated e.g. via dial-up). The Traffic Flow Filters for such secondary contexts shall be specified according to 3GPP TS 23.060 [10].

The typical usage of the secondary PDP contexts is in VoIP calls, where RTP (speech) packets are conveyed on one PDP context (e.g. the primary one) with a given QoS (e.g. low reliability) whereas SIP signalling is routed on a different PDP context (e.g. the secondary one, with the same IP address but different port numbers) with a more reliable QoS.

A Traffic Flow Template (i.e. a filter based on port number, specifying relative flow precedence) shall be configured for the secondary context to instruct the GGSN to route down-link packets onto different QoS flows towards the TE.

PDP context type	Activation procedure
Primary	Used to establish a logical connection through the network from the UE to the GGSN with a specifically negotiated Quality of Service (QoS). The UE initiates the PDP context activation: it changes the session management state to active, creates the PDP context, obtains the IP address and reserves radio resources. After the activation, the UE is able to send IP packets over the air interface.
Secondary	Used to establish a second PDP context with the same IP address and the same APN as the primary PDP context. The two contexts may have different QoS profiles, which makes the feature useful for applications that have different QoS requirements (e.g. IP multimedia); QoS is applied based on port number addressing.



On all other modules, at most 2 secondary PDP contexts may be associated to a primary PDP context and at most 2 secondary PDP contexts can be activated, since the maximum number of PDP contexts, both normal and secondary, is always 3.

8 System features





8.1 Firmware update Over AT (FOAT) +UFWUPD

+UFWUPD						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	No	No	No	-	FOAT Error

8.1.1 Description

Triggers the firmware update using the Xmodem or Xmodem-1k protocol.

The command syntax differs depending on the module series: see the corresponding subsection for the correct command handling.

-  The errors (data corruption, data loss, etc.) during the Update phase are internally handled by the Xmodem protocol itself; for more details about the error result codes, see [FOAT error result codes](#).
-  If no data comes to the module after having issued the AT+UFWUPD command, up to ten NACK are sent and then Firmware Update Mode is dropped out coming back to normal mode; the FW is unchanged and still useable (*ERROR1*).
-  NVM parameters and profiles (if affected by the update process) are set to the factory-programmed values.
-  For more details see u-blox Firmware Update Application Note [\[85\]](#).

8.1.2 Notes

- If <filetype>=2 make sure the file contains both the firmware and file system images.

8.2 Antenna detection +UANTR

+UANTR						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

8.2.1 Description

Measures the DC component of load of the cellular antenna (the GPS antenna is RFU). The antenna load is expressed in kOhm.

8.2.2 Syntax

Type	Syntax	Response	Example
Set	AT+UANTR=[<antenna_id>]	+UANTR: <antenna_id>,<antenna_load> OK	AT+UANTR=0 +UANTR: 0,10 OK
Test	AT+UANTR=?	+UANTR: (list of supported <antenna_id>s) OK	+UANTR: (0) OK

8.2.3 Defined values

Parameter	Type	Description
<antenna_id>	Number	Antenna identifier (optional parameter) <ul style="list-style-type: none"> • 0 (default value): cellular antenna

Parameter	Type	Description
<antenna_load>	Number	<ul style="list-style-type: none"> 1: GPS antenna (RFU) Measured value in kOhm of the antenna load with a resolution of 1 kOhm. The range goes from -1 to 53 (only integer values can be assumed), where: <ul style="list-style-type: none"> -1: open circuit 0: short circuit 1: 1 kOhm (minimum limit of the measurement range) ... 53: 53 kOhm (maximum limit of the measurement range)

8.2.4 Notes

- The load resistor values below the minimum limit of 1 kOhm are identified as short circuit (<antenna_load>=0), while values above the maximum limit of 53 kOhm are identified as open circuit (<antenna_load>=-1).
- The reported value could differ from the real resistance value of the diagnostic resistor mounted inside the antenna assembly due to antenna cable length, antenna cable capacity and the measurement method.

8.3 End user test +UTEST

+UTEST						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

8.3.1 Description

Enables the module testing about RF parts and all the digital pins.



The usage of this command shall be restricted to controlled (shielded chamber/box) environments and for test purpose only.



u-blox assumes no responsibilities for the inappropriate use of this command.

8.3.2 RF test description

Sets the module in non-signalling (or test) mode, or returns to signalling (or normal) mode.

In test/non-signalling mode the module switches off the 2G/3G/4G protocol stack for performing single tests which could not be performed during signalling mode.



Improper usage of this command on real network could disturb other users and the network itself.

When entering the test mode, it is possible to sequentially trigger the following actions for testing purposes:

- 2G transmission of GSM burst sequence on the desired channel and power level (only one time slot configuration is available)
- 2G transmission of 8-PSK modulation burst sequence on the desired channel and power level (only one time slot configuration is available)
- 3G transmission of WCDMA signal on the desired channel and power level
- 4G transmission of LTE SC-FDMA OFDM signal (5 MHz bandwidth) in the desired channel in FDD band and power level
- Receiving signal detection and RF level measurement on the desired 2G, 3G or 4G (LTE) channel
- Receiving signal detection at diversity or secondary antenna input and RF level measurement on the desired 2G, 3G or 4G (LTE) channel



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Only the receiving signal detection and RF level measurement is supported.

The command only accepts the parameters set supported by the specific module version. When an unsupported parameter is issued an error result code will be provided (" +CME ERROR: operation not supported" if +CME is set to 2).

The execution of these actions is performed in non-signalling mode. In non-signalling mode:

- The module only accepts +UTEST commands

In normal mode:

- The only allowed +UTEST command is the AT+UTEST=1 used to enable testing interface
- All other +UTEST commands return an error result code (" +CME ERROR: operation not allowed" if +CME is set to 2)

The module must not be registered with the network before entering the non-signalling mode, otherwise an error result code (" +CME ERROR: operation not allowed" if +CME is set to 2) is provided.

The +CME command can only be set in normal mode.

To return to the normal mode perform one of these actions:

- A module reset
- Power off the module
- Send AT+UTEST=0

When the module returns the normal mode, the network registration status stored in the profile will be restored.

See the End User Test Application Note [132] for further test command examples.

8.3.3 Syntax

Type	Syntax	Response	Example
Set	AT+UTEST=<mode>,[<par1>],[<par2>],[<par3>],[<par4>],[<par5>]	If <mode>=0 or 1	AT+UTEST=0
		OK	OK
		If <mode>=2 or 3	AT+UTEST=2,124,250
		+UTEST: [<par1>,<par2>],[<par3>,<par4>,<par5>],[<min>,<avg>,<max>]	+UTEST: 124,250,-80,-80,-80
		OK	OK
Read	AT+UTEST?	+UTEST: <mode>	+UTEST: 1
		OK	OK
Test	AT+UTEST=?	+UTEST: (list of supported <mode>s)	+UTEST: (0-3)
		OK	OK



8.3.4 Defined values

Parameter	Type	Description
<mode>	Number	Test mode setting: <ul style="list-style-type: none"> • 0: the module returns to the module normal mode • 1: the module enters non-signalling mode • 2: RX test mode (measuring the antenna level estimation of the received RF signal) • 3: TX test mode (GSMK/8-PSK burst or transmission in 3G bands)
<par1>..<par5>	Number	Parameters needed for RX and TX test mode as reported in the table below.

8.3.5 Notes

- **RX mode setting (<mode>=2)**

Parameter	Description	Range	Default	Notes
<par1>	Channel	0 ÷ 165535	32	RX channel 2G RAT: for 850, 900, 1800 bands the value corresponds to ARFCN while for 1900 band an offset of 32768 is added. <ul style="list-style-type: none"> o [0-124]: GSM 900 MHz

Parameter	Description	Range	Default	Notes
				<ul style="list-style-type: none"> o [128-251]: GSM 850 MHz o [512-885]: DCS 1800 MHz o [975-1023]: EGSM 900 MHz o [33280-33578]: PCS 1900 MHz (corresponding to ARFCN 512-810 range in band 1900) <p>RX channel 3G RAT: the value corresponds to UARFCN except for band 19 where an offset of 20000 is added, additional channels available in some 3G bands are not supported.</p> <ul style="list-style-type: none"> o [1537-1738]: band 4 (1700 MHz) o [2937-3088]: band 8 (900 MHz) o [4357-4458]: band 5 (850 MHz) o [4387-4413]: band 6 (800 MHz) o [20712-20763]: band 19 (800 MHz) o [9662-9938]: band 2 (1900 MHz) o [10562-10838]: band 1 (2100 MHz) <p>RX channel 4G RAT: the value corresponds to EARFCN with an offset of 100000.</p> <ul style="list-style-type: none"> o [101950-102399]: FDD band 4 (EARFCN range 1950 - 2399) o [105010-105179]: FDD band 12 (EARFCN range 5010 - 5179) o [105180-105279]: FDD band 13 (EARFCN range 5180 - 5279) o [101200-101949]: FDD band 3 (EARFCN range 1200 - 1949) o [102750-103449]: FDD band 7 (EARFCN range 2750 - 3449) o [106000-106149]: FDD band 19 (EARFCN range 6000 - 6149) o [106150-106449]: FDD band 20 (EARFCN range 6150 - 6449) o [109210-109659]: FDD band 28 (EARFCN range 9210 - 9659) o [100000-100599]: FDD band 1 (EARFCN range 0 - 599) o [100600-101199]: FDD band 2 (EARFCN range 600 - 1199) o [102400-102649]: FDD band 5 (EARFCN range 2400 - 2649) o [102650-102749]: FDD band 6 (EARFCN range 2650 - 2749) o [103450-103799]: FDD band 8 (EARFCN range 3450 - 3799) o [105730-105849]: FDD band 17 (EARFCN range 5730 - 5849) <p> The "+CME ERROR: operation not supported" error result code will be provided in these cases (if +CME is set to 2):</p> <ul style="list-style-type: none"> o A value not belonging to the above ranges is set o The RX channel parameter value belongs to a not supported RAT (2G or 3G or 4G RAT) or band
<par2>	Time	1 ÷ 600000	1000	Time interval for RX test expressed in ms
<par3>	Antenna diversity	0 ÷ 1	0	Receiver path: <ul style="list-style-type: none"> o 0: main / primary antenna o 1: diversity / secondary antenna <p>The parameter is available only if supported, otherwise an error result code will be provided (" +CME ERROR: operation not supported" if +CME is set to 2)</p>
<min>	Minimum antenna RF level estimation	-100 ÷ -20		Expressed in dBm, for 2G RAT <p> In 3G / 4G RAT the range goes from -90 to -20.</p>
<avg>	Average antenna RF level estimation	-100 ÷ -20		Expressed in dBm, for 2G RAT

Parameter	Description	Range	Default	Notes
				In 3G / 4G RAT the range goes from -90 to -20.
<max>	Maximum antenna RF level estimation	-100 ÷ -20		Expressed in dBm, for 2G RAT In 3G / 4G RAT the range goes from -90 to -20.

• **TX mode setting (<mode>=3)**

Parameter	Description	Range	Default	Notes
<par1>	Tx channel	0 ÷ 165535	32	<p>TX channel 2G RAT: for 850, 900, 1800 bands the value corresponds to ARFCN while for 1900 band an offset of 32768 is added.</p> <ul style="list-style-type: none"> o [0-124]: GSM 900 MHz o [128-251]: GSM 850 MHz o [512-885]: DCS 1800 MHz o [975-1023]: EGSM 900 MHz o [33280-33578]: PCS 1900 MHz (corresponding to ARFCN 512-810 range in band 1900) <p>TX channel 3G RAT: the value corresponds to UARFCN except for the band 19 where an offset of 20000 is added, additional channels available in some 3G bands are not supported.</p> <ul style="list-style-type: none"> o [1312-1513]: band 4 (1700 MHz) o [2712-2863]: band 8 (900 MHz) o [4132-4233]: band 5 (850 MHz) o [4162-4188]: band 6 (800 MHz) o [20312-20363]: band 19 (800 MHz) o [9262-9538]: band 2 (1900 MHz) o [9612-9888]: band 1 (2100 MHz) <p>TX channel 4G RAT: the value corresponds to EARFCN with an offset of 100000.</p> <ul style="list-style-type: none"> o [118000-118599]: FDD band 1 (EARFCN range 18000 - 18599) o [118600-119199]: FDD band 2 (EARFCN range 18600 - 19199) o [119950-120399]: FDD band 4 (EARFCN range 19950 - 20399) o [119200-119949]: FDD band 3 (EARFCN range 19200 - 19949) o [120400-120649]: FDD band 5 (EARFCN range 20400 - 20649) o [120650-120749]: FDD band 6 (EARFCN range 20650 - 20749) o [120750-121449]: FDD band 7 (EARFCN range 20750 - 21449) o [121450-121799]: FDD band 8 (EARFCN range 21450 - 21799) o [123010-123179]: FDD band 12 (EARFCN range 23010 - 23179) o [123180-123279]: FDD band 13 (EARFCN range 23180 - 23279) o [123730-123849]: FDD band 17 (EARFCN range 23730 - 23849) o [124000-124149]: FDD band 19 (EARFCN range 24000 - 24149) o [124150-124449]: FDD band 20 (EARFCN range 24150 - 24449) o [127210-127659]: FDD band 28 (EARFCN range 27210 - 27659) <p> The "+CME ERROR: operation not supported" error result code will be provided in these cases (if +CME is set to 2):</p> <ul style="list-style-type: none"> o A value not belonging to the above ranges is set

Parameter	Description	Range	Default	Notes
<par2>	Power control level	-56 ÷ 24	5	<p>o The TX channel parameter value belongs to a not supported RAT (2G or 3G or 4G RAT) or band</p> <p>For 2G RAT: PCL (power control level). The allowed values depend on the related <par1> value: lower numbers means higher power level.</p> <ul style="list-style-type: none"> o [0-19]: GSM 850 and 900, if <par2> is less than 5 the handling is the same for <par2>=5 o [0-15]: DCS 1800 and PCS 1900 <p>In case <par4> is set to 2 (8-PSK modulation) the range is as below. Other values are valid but behave as the indicated level:</p> <ul style="list-style-type: none"> o [0-19]: GSM 850 and 900 if <par2> is less than 8 the handling is the same for <par2>=8 o [0-15]: DCS 1800 and PCS 1900; if <par2> is less than 2 the handling is the same for <par2>=2 <p>For 3G RAT: absolute output power [dBm]</p> <ul style="list-style-type: none"> o [-56 ÷ 24] for all the bands <p>For 4G RAT: absolute output power [dBm]</p> <ul style="list-style-type: none"> o [-40 ÷ 24] for all the bands <p> Only the values indicated in the above ranges are valid, otherwise an error result code will be provided (" +CME ERROR: operation not supported" if +CME is set to 2).</p>
<par3>	Training sequence	0 ÷ 7	5	<p>Training sequence to be used (to be changed only in case of link with network simulator, else use default)</p> <p> In 3G / 4G RAT the values is unused.</p>
<par4>	Modulation mode	1 ÷ 2	1	<p>Modulation mode</p> <ul style="list-style-type: none"> o 1: GMSK normal modulation including the training sequence o 2: 8-PSK normal modulation including the training sequence <p> In 3G / 4G RAT the parameter is ignored.</p> <p> LTE SC-FDMA OFDM modulation (5 MHz bandwidth), FDD, is automatically set using for <par1> an EARFCN value.</p>
<par5>	Time	0 ÷ 600000	1000	<p>Time interval for TX test expressed in ms</p> <ul style="list-style-type: none"> o 0: burst sequence is continuously transmitted. In this case the command will immediately return the information text response. The command line will be immediately available for any +UTEST command. Provide AT+UTEST=1 command to stop the burst sequence transmission, any other +UTEST commands can be set and the current sequence transmission is stopped.

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- <par3> and <par4> parameters for Tx mode are not supported.
- <par3> parameter for Rx mode is not supported.
- Only LTE RAT is supported.

8.3.6 Examples

In *RX mode test command examples* the module provides the information text response after the timeout issued in the set command.

Command	Response	Description
AT+UTEST=2	+UTEST: 32,1000,-89,-88,-87 OK	<p>The module measures the antenna RX level at RX channel 32 band GSM 900 for 1 s interval.</p> <p> In the example -89,-88,-87 are the antenna RF level estimation: the numbers are just an example.</p>

Command	Response	Description
AT+UTEST=2,885,5000	+UTEST: 885,5000,-66,-65,-65 OK	The module measures the antenna RX level at RX channel 885 band DCS 1800 for 5 s interval.
AT+UTEST=2,10562,2000	+UTEST: 10562,2000,-60,-60,-59 OK	The module measures the antenna RX level at RX channel 10562 band B1 for 2 s interval on the main antenna path.
AT+UTEST=2,10562	+UTEST: 10562,1000,0,-85,-85,-85 OK	The module measures the antenna RX level at RX channel 10562 band B1 for 1 s interval on the main antenna path.
AT+UTEST=2,65,3000,0	+UTEST: 65,3000,0,-63,-62,-62 OK	The module measures the antenna RX level at RX channel 65 band GSM 900 for 3 s interval on the main antenna path.
AT+UTEST=2,4357,,1	+UTEST: 4357,1000,1,-51,-51,-51 OK	The module measures the antenna RX level at RX channel 4357 band B5 for 1 s interval on the diversity antenna path.
AT+UTEST=2,102174,500,0	+UTEST: 102174,500,0,-71,-70,-70 OK	The module measures the antenna RX level at RX channel 2174 band FDD 4 for 0.5 s interval on the primary antenna path.
AT+UTEST=2,105230,,1	+UTEST: 105230,1000,1,-72,-71,-70 OK	The module measures the antenna RX level at RX channel 5230 band FDD 13 for 1 s interval on the secondary antenna path.

Table 1: RX mode test command examples

Command	Response	Description
AT+UTEST=3,32,7,5	+UTEST: 32,7,5,1,1000 OK	The module will transmit for 1 s interval 1 slot burst sequence at TX channel 32 GSM 900 at PCL 5 using training sequence 5 and normal GMSK modulation.
AT+UTEST=3,65,8,,2,5000	+UTEST: 65,8,5,2,5000 OK	The module will transmit for 5 s interval 1 slot burst sequence at TX channel 65 GSM 900 at PCL 8 (gamma 6, 27 dBm) using training sequence 5 and normal 8-PSK modulation.
AT+UTEST=3,660,,,,0	+UTEST: 660,5,5,1,0 OK	The module will transmit continuously 1 slot burst sequence at TX channel 660 DCS 1800 at PCL 5 using training sequence 5 and normal GMSK modulation.
AT+UTEST=3,9612,22,,,2000	+UTEST: 9612,22,5,1,2000 OK	The module will transmit for 2 s interval at TX channel 9612 band B1 at 22 dBm power level using WCDMA modulation.
AT+UTEST=3,120399,15,,,3000	+UTEST: 120399,15,5,1,3000 OK	The module transmits for 3 s interval at TX channel 20399 band FDD 4 at 15 dBm power level using SC-FDMA OFDM modulation 5 MHz bandwidth.
AT+UTEST=3,123230,-10,,,0	+UTEST: 123230,-10,5,1,0 OK	The module continuously transmits at TX channel 23230 band FDD 13 at -10 dBm power level using SC-FDMA OFDM modulation 5 MHz bandwidth.

Table 2: TX mode test command examples

8.3.7 Digital pins testing description

Defines the commands to perform some verifications on all the digital pins of the u-blox cellular modules.

These pins can be considered as generic digital input / output pins; it is possible to configure one pin as a digital output with "high" logic level and then verify the voltage level present. Conversely, it is possible set a pin as a digital input, externally apply a "high" or "low" logic level and then check if the module is able to correctly measure the voltage level applied.

After the execution of the AT+UTEST=10,5 command, it is possible to externally apply a voltage level to the enabled input pins and / or measure the voltage level on the pins configured as digital input.



These commands are intended for production to check the correct digital pins behavior, detect possible soldering or functional problems and can be executed only in non-signalling mode (otherwise the "+CME ERROR: operation not allowed" (if +CME is set to 2) error result code is issued without performing any operations).



Do not exceed the values reported in the Generic Digital Interface section of the module data sheet when testing a pin as a digital input pin, since stressing the device above the listed ratings may cause a permanent damage of the module.



See the End User Test Application Note [132] and the corresponding module data sheet for the list of pins available for testing and their levels characteristics.

8.3.8 Syntax

Type	Syntax	Response	Example
Digital pins testing generic syntax			
Set	AT+UTEST=10,<op_code>[,<bit_padding>]<pin_seq>	OK	AT+UTEST=10,3,"0000001000000300" OK
Original configuration restoring			
Set	AT+UTEST=10,0	OK	AT+UTEST=10,0 OK
Pins set definition			
Set	AT+UTEST=10,2,<bit_padding>]<pin_seq>	OK	AT+UTEST=10,2,"0000000C300000003000" OK
Pins configuration			
Set	AT+UTEST=10,3,<bit_padding>]<pin_seq>	OK	AT+UTEST=10,3,"00000004200000001000" OK
Output pins definition			
Set	AT+UTEST=10,4,<bit_padding>]<pin_seq>	OK	AT+UTEST=10,4,"00000000100000002000" OK
Digital testing execution			
Set	AT+UTEST=10,5	OK	AT+UTEST=10,5 OK
Digital value measurement			
Set	AT+UTEST=10,6	<bit_padding>]<pin_seq> OK	AT+UTEST=10,6 00000004100000003000 OK
Read	AT+UTEST?	+UTEST: <mode> OK	+UTEST: 1 OK
Test	AT+UTEST=?	+UTEST: (list of supported <mode>s) OK	+UTEST: (0-3) OK

8.3.9 Defined values

Parameter	Type	Description
<op_code>	Number	Test mode setting: <ul style="list-style-type: none"> 0: exits the test interface and restore the pins to the original configuration 2: defines a set of pins that will be tested and initialize these pins to be ready for testing. The original pins configuration is kept for final restore. See the End User Test Application Note [132] for the list of pins available for testing. In the [<bit_padding>]<pin_seq> parameter use this notation to represent each module pin with its binary digit: <ul style="list-style-type: none"> 0: the pin will not be tested 1: the pin will be tested (as digital input or output) 3: configures the logical pins previously enabled for testing as output or input; the command has effect only if AT+UTEST=10,2 has been previously issued. In case a not enabled pin is set as digital input or output, the command does not return an error and the setting is not applied. In the [<bit_padding>]<pin_seq> parameter use this notation to represent each module pin with its binary digit:

Parameter	Type	Description
		<ul style="list-style-type: none"> o 0: the pin will be set as an output o 1: the pin will be set as an input • 4: configures the value of the output pins under testing; the command has effect only if AT+UTEST=10,3 has been previously issued; The command is not mandatory if there are not output pins to configure. In the [<bit_padding>]<pin_seq> parameter use this notation to represent each module pin with its binary digit: <ul style="list-style-type: none"> o 0: the pin will output a "low" logic level o 1: the pin will output a "high" logic level • 5: apply the setting change defined with <op_code>= 2 / 3 / 4 and triggers the execution of the digital testing. Digital testing of the pins is possible only after the execution of the AT+UTEST=10,5 command. • 6: returns the logic value of pins under testing (both input and output); in the [<bit_padding>]<pin_seq> parameter use this notation to represent each module pin with its binary digit: <ul style="list-style-type: none"> o 0: "low" logic digital level measured at the module pin o 1: "high" logic digital level measured at the module pin
[<bit_padding>]<pin_seq>	Number	Sequence of hexadecimal digits containing the pins information and the action to execute See the Notes and End User Test Application Note [132] for detailed number description

8.3.10 Notes

- Consider these steps to construct the [<bit_padding>]<pin_seq> sequence
 - o Consider the total number of module's pins available (76 pins for LISA-U2 series, 64 pins for SARA-U2 series, 92 pins, for TOBY-L2 series)
 - o See the End User Test Application Note [\[132\]](#) for the list of pins available for testing
 - o In case a non-testable pin is selected, the command does not return an error result code but the value is not considered and not applied.
 - o The status of the n-th pin will be represented by the corresponding n-th bit; see the <op_code> description for the notation of each mode setting
 - o Convert each group of four binary digits into its hexadecimal representation
 - o Add one 0 digit at the beginning of the sequence for TOBY-L2 and LISA-U2 series to complete the resulting sequence of hexadecimal values with 0 padding
- An example of AT commands sequence to test the digital pins is reported in [Table 3](#).

Command	Response	Description
AT+CMEE=2	OK	Enable the verbose error result code
AT+COPS=2	OK	Deregister the module from the network
AT+UTEST=1	OK	The module enters the test mode
AT+UTEST=10,2,"000007F400C000D83F00"	OK	The command puts the module in Interface initialised state; the command saves the pins status to restore it at the end of the test. Pins enabled for testing: DSR, RI, DCD, DTR, RTS, CTS, GPIO1, GPIO2, GPIO3, GPIO4, I2S1_RXD/GPIO6, I2S1_TXD/GPIO7, GPIO5, I2S1_CLK/GPIO8, I2S1_WA/GPIO9, SPI_SCLK/GPIO10, SPI_MOSI/GPIO11, SPI_MISO/GPIO12, SPI_SRDY/GPIO13, SPI_MRDIY/GPIO14
AT+UTEST=10,3,"00000494004000C01800"	OK	Pins configuration: <ul style="list-style-type: none"> o DTR, RTS, GPIO3, GPIO4, I2S1_RXD/GPIO6, GPIO5, I2S1_CLK/GPIO8, SPI_MOSI/GPIO11, SPI_MRDIY/GPIO14 as input o DSR, RI, DCD, CTS, GPIO1, GPIO2, I2S1_TXD/GPIO7, I2S1_WA/GPIO9, SPI_SCLK/GPIO10, SPI_MISO/GPIO12, SPI_SRDY/GPIO13 as output
AT+UTEST=10,4,"00000360008000182700"	OK	Digital logic value of the output pins: <ul style="list-style-type: none"> o DSR, RI, DCD, CTS, GPIO1, GPIO2, I2S1_TXD/GPIO7, I2S1_WA/GPIO9, SPI_SCLK/GPIO10, SPI_MISO/GPIO12, SPI_SRDY/GPIO13 set to "high".
AT+UTEST=10,5	OK	Configurations made by AT+UTEST=10,2; AT+UTEST=10,3 and AT+UTEST=10,4 are executed.

Command	Response	Description
AT+UTEST=10,6	000007F400C000D83F00 OK	Logic digital value measured at modules pins: o DSR, RI, DCD, DTR, RTS, CTS, GPIO1, GPIO2, GPIO3, GPIO4, I2S1_RXD/GPIO6, I2S1_TXD/GPIO7, GPIO5, I2S1_CLK/GPIO8, I2S1_WA/GPIO9, SPI_SCLK/GPIO10, SPI_MOSI/GPIO11, SPI_MISO/GPIO12, SPI_SRDY/GPIO13, SPI_MRDY/GPIO14: "high" level detected
AT+UTEST=0	OK	Module exits from the test mode and normal pins configurations is restored.

Table 3: Digital pins test command examples

- The digital pins can be configured as many times as needed by the testing process; AT+UTEST=10,2 command is not needed any more as the DUT is already in Interface initialised state:
- See the End User Test Application Note [132] for further test command examples.

8.4 RING line handling +URING

+URING						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	NVM	No	-	+CME Error

8.4.1 Description

Configures the RING line handling of the UART interface for other events besides the usual ones, that is the incoming call indication (RING) (linked to the "RING" URC) and the incoming SMS indication (linked to the +CMT and the +CMTI URCs).

The RING line will be asserted when one of the configured events will occur and it remains asserted for 1 s unless another configured event will happen (in this case the 1 s timer will be started again). Same behavior will be applied if the events are the incoming call or the incoming SMS.

8.4.2 Syntax

Type	Syntax	Response	Example
Set	AT+URING=<mode>	OK	AT+URING=1 OK
Read	AT+URING?	+URING: <mode> OK	+URING: 1 OK
Test	AT+URING=?	+URING: (list of the supported <mode>s) OK	+URING: (0-3) OK

8.4.3 Defined values

Parameter	Type	Description
<mode>	Number	Configures the RING line handling: <ul style="list-style-type: none"> 0 (factory-programmed value): feature disabled (RING line is asserted only on incoming call and incoming SMS) 1: RING line asserted for all the URCs 2: RING line asserted for all the incoming data (PPP, sockets in Direct Link mode, FTP in Direct Link mode) 3: RING line asserted for all URCs and all incoming data (PPP, sockets in Direct Link mode, FTP in Direct Link mode)

8.4.4 Notes

SARA-N2

- <mode>=2, 3 are not supported.

8.5 Debug logging level setting +NLOGLEVEL

+NLOGLEVEL						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

8.5.1 Description

Sets the logging level. The information text response to read command provides the setting of each logging level in separated lines.

8.5.2 Syntax

Type	Syntax	Response	Example
Set	AT+NLOGLEVEL=<core>,<level>	OK	AT+NLOGLEVEL=PROTOCOL,ERROR OK
Read	AT+NLOGLEVEL?	[+NLOGLEVEL:<core>,<level> [.]] OK	+NLOGLEVEL:PROTOCOL,ERROR +NLOGLEVEL:SECURITY,NONE +NLOGLEVEL:APPLICATION,WARNING OK
Test	AT+NLOGLEVEL=?	+NLOGLEVEL:(list of supported <core>s), (list of supported <level>s) OK	+NLOGLEVEL:(PROTOCOL,APPLICATION, SECURITY),(VERBOSE,NORMAL, WARNING,ERROR,NONE) OK

8.5.3 Defined values

Parameter	Type	Description
<level>	String	Required logging level. Allowed strings: <ul style="list-style-type: none"> • VERBOSE • NORMAL (default value) • WARNING • ERROR • NONE
<core>	String	Allowed strings: <ul style="list-style-type: none"> • PROTOCOL • SECURITY • APPLICATION

8.5.4 Notes

SARA-N2

- <core>= SECURITY and <core>= APPLICATION are not supported.

8.6 Power Saving Mode Setting +CPSMS

+CPSMS						
Modules	SARA-N200-02B SARA-N201-02B SARA-N210-02B SARA-N211 SARA-N280-02B					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

8.6.1 Description

Configures the UEs power saving mode (PSM) parameters. The command configures the PSM on the UE, as well as:

- the requested extended periodic TAU value in E-UTRAN
- the requested Active Time value

See the URCs provided by command **+CEREG** for the Active Time value and the extended periodic TAU value that are allocated to the UE by the network in E-UTRAN.

A special form of the command can be given as AT+CPSMS= (with all parameters omitted): the use of PSM will be disabled and data for all parameters in command +CPSMS will be removed or, if available, set to the fac.

8.6.2 Syntax

Type	Syntax	Response	Example
Set	AT+CPSMS=[<mode>[,<Requested_Periodic_TAU>[,<Requested_Active_Time>]]]	OK	AT+CPSMS=1,"01000100","00100100" OK
Read	AT+CPSMS?	+CPSMS: <mode>[,<Requested_Periodic_TAU>[,<Requested_Active_Time>] OK	+CPSMS: 1,"01000100","00100100" OK
Test	AT+CPSMS=?	+CPSMS: (list of supported <mode>s), (list of supported <Requested_Periodic_TAU>s),(list of supported <Requested_Active_Time>s) OK	+CPSMS: (0,1),("00000000"- "11111111"),("00000000"- "11111111") OK

8.6.3 Defined values

Parameter	Type	Description
<mode>	Number	Indication to disable or enable the use of PSM in the UE. Allowed values: <ul style="list-style-type: none"> 0 (default): disable the use of PSM 1: enable the use of PSM
<Requested_Periodic_TAU>	String	Requested extended periodic TAU (T3412) value to be allocated to the UE in E-UTRAN, one byte in an 8 bit format. The factory-programmed value is 54 m
<Requested_Active_Time>	String	Requested active time (T3324) value to be allocated to the UE, one byte in an 8 bit format. The factory-programmed value is 60 s

9 Internet protocol transport layer

9.1 Introduction

The maximum number of sockets that can be managed are 7.



The UDP protocol has not any flow control mechanism and packets might be lost in the following scenarios:

- No network signal is available
- Unreliable radio interface (e.g. mobility in GPRS, where cell reselections can lead to data loss, that can be contrasted with the usage of LLC ack reliability QoS parameter)



When both TCP and UDP socket are used at the same time at the maximum throughput (downlink and uplink at the maximum allowed baud rate) it is possible to lose some incoming UDP packets due to internal buffer limitation. A possible workaround is provided as follows:

- If it is possible, adopt an application layer UDP acknowledge system

9.2 IPv4/IPv6 addressing

9.2.1 Introduction

The section describes the IP addressing formats and IP address rules used by TCP/IP UDP/IP enabled applications.

9.2.2 IPv4

Format:

- 32 bits long in dot-decimal notation (without leading 0 notation).
- All the decimal numbers must be in range 0-255.
- The dot-octal notation is not supported.
- The dot-hexadecimal notation is not supported.

Examples:

IPv4 address	Remarks
254.254.254.254	Valid address
010.228.76.34	Invalid address; first decimal number prefixed with a leading zero
257.228.76.34	Invalid address; first decimal number greater than 255
0010.0344.0114.0042	Invalid address; dot-octal notation; decimals given as octal numbers
0x10.0xE4.0x4C.0x22	Invalid address; dot-hexadecimal notation; decimals given as hexadecimal numbers

Table 4: IPv4 address format examples

9.3 Create socket +NSOCR

+NSOCR						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

9.3.1 Description

Creates a socket on the UE. If the port is set, receiving is enabled and **+NSONMI** URCs will appear for any message that is received on that port. Only a socket with a specific protocol and port combination can be created otherwise an error result code is provided.

A maximum of 7 sockets are supported.

9.3.2 Syntax

Type	Syntax	Response	Example
Set	AT+NSOCR=<type>,<protocol>,<listen_port>,<receive_control>	<socket> OK	AT+NSOCR=DGRAM,17,42000,1 1 OK

9.3.3 Defined values

Parameter	Type	Description
<type>	String	Socket Type. Supported value is DGRAM.
<protocol>	Number	Standard internet protocol definition. Allowed value: <ul style="list-style-type: none"> 17: UDP
<listen_port>	Number	Local port that will be included in sent messages and on which messages will be received. The range goes from 0 to 65535.
<receive_control>	Number	Allowed values: <ul style="list-style-type: none"> 0: incoming messages will be ignored 1: incoming messages will trigger a +NSONMI URC
<socket>	Number	Socket identifier to be referenced by the other socket AT commands

9.3.4 Notes

SARA-N2

- A maximum of 7 sockets are supported

9.4 SendTo command (UDP only) +NSOST

+NSOST						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

9.4.1 Description

Sends a UDP datagram to the specified host port. It will return the socket identifier where the data was sent on, and the number of bytes of data sent. If the amount of data is larger than the largest datagram that can be sent, the information text response will provide the data quantity successfully sent.

9.4.2 Syntax

Type	Syntax	Response	Example
Action	AT+NSOST=<socket>,<remote_ip_address>,<remote_port>,<length>,<data>	<socket>,<sent_length> OK	AT+NSOST=1,192.158.5.1,1024,2,07FF 1,2 OK

9.4.3 Defined values

Parameter	Type	Description
<socket>	Number	Socket identifier returned by +NSOCR
<remote_ip_address>	String	Remote host IP address of the remote host in IPv4 format. IP addresses can be specified in decimal, octal or hexadecimal notation.
<remote_port>	Number	A number in the range 0-65535. Remote port the messages will be received on
<length>	Number	Size of the data to send. The maximum length 512 bytes
<data>	String	Data to be sent in hexadecimal format
<sent_length>	Number	Amount of data successfully sent

9.5 SendTo command with Flags (UDP only) +NSOSTF

+NSOSTF						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

9.5.1 Description

Sends a UDP datagram to the specified host:port and sets meta-data flags. It will return the socket identifier where the data was sent on, and the number of bytes of data sent. If the amount of data is larger than the largest datagram that can be sent, the information text response will provide the data quantity successfully sent.

9.5.2 Syntax

Type	Syntax	Response	Example
Action	AT+NSOSTF=<socket>,<remote_ip_address>,<remote_port>,<flag>,<length>,<data>	<socket>,<sent_length> OK	AT+NSOSTF=1,192.158.5.1,1024,0x100,2,07FF 1,2 OK

9.5.3 Defined values

Parameter	Type	Description
<socket>	Number	Socket identifier returned by +NSOCR
<remote_ip_address>	String	Remote host IP address of the remote host in IPv4 format. IP addresses can be specified in decimal, octal or hexadecimal format.
<remote_port>	Number	Remote port where the messages will be received on, in range 0-65535
<flag>	Number	Specifies the type of message transmission in hexadecimal format. Values of this argument are formed by logically OR'ing zero or more of the following flags: <ul style="list-style-type: none"> 0x000: No flags are set 0x100: Exception Message. Send message with high priority 0x200: Release Indicator. Indicate release after next message 0x400: Release Indicator. Indicate release after next message has been replied to
<length>	Number	Data size to send. The maximum length is 512 bytes
<data>	String	Data to be sent in hexadecimal format
<sent_length>	Number	Amount of data successfully sent

9.6 Received message indication +NSONMI

+NSONMI						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

9.6.1 Description

Notifies by means of a URC that data has been received on a socket and is ready to be read.

Returns the socket number and number of bytes of data available to read for the first message that is queued. The message received on the same socket will be queued, and it will be issued when the preceding message has been completely read.

9.6.2 Syntax

Type	Syntax	Response	Example
URC		+NSONMI:<socket>,<length>	+NSONMI:1,34

9.6.3 Defined values

Parameter	Type	Description
<socket>	Number	Socket identifier returned by +NSOCR
<length>	Number	Number of bytes to read from the specified socket

9.7 Receive command (UDP only) +NSORF

+NSORF						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

9.7.1 Description

Receives data on a socket. When data arrives a [+NSONMI](#) URC will be issued indicating the socket the message was received on and the amount of data. This command takes a length, which is the maximum amount of data that will be returned. If the requested length is larger than the actual size of the returned data, only the length of returned data is provided, and the remaining length is returned as 0. If the requested length is less than the amount of data returned, only the requested amount of data will be returned, plus an indication of the number of bytes remaining. Once a message has been fully read, a new [+NSONMI](#) URC will be sent if there is another message to process.

9.7.2 Syntax

Type	Syntax	Response	Example
Action	AT+NSORF=<socket>,<req_length>	<socket>,<ip_addr>,<port>,<length>,<data>,<remaining_length> OK	AT+NSORF=1,10 1,192.158.5.1,1024,5,"hello",0 OK

9.7.3 Defined values

Parameter	Type	Description
<socket>	Number	Socket identifier returned by +NSOCR
<req_length>	Number	Maximum amount of data to be returned as a decimal byte length
<ip_addr>	String	Remote host IP address
<port>	Number	Remote port the messages were sent from. A number in the range 0-65535
<length>	Number	Amount of data returned as a decimal byte length
<data>	Number	Data received in hexadecimal format
<remaining_length>	Number	Amount of data still to be read

9.8 Close socket +NSOCL

+NSOCL						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

9.8.1 Description

Close the specified socket. The pending messages to be read (if present) will be dropped. No further [+NSONMI](#) URCs will be generated. If the socket has already been closed, or was never created, an error result code will be issued.

9.8.2 Syntax

Type	Syntax	Response	Example
Set	AT+NSOCL=<socket>	OK	AT+NSOCL=1 OK

9.8.3 Defined values

Parameter	Type	Description
<socket>	Number	Socket identifier to be referenced by the other socket AT commands.

Objective Specification

10 Ping

10.1 IP network connectivity testing to a remote host +NPING

+NPING						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

10.1.1 Description

Sends an ICMP packet to the specified host address.

The set command initiates the sending of a PING packet to the specified address. This will either cause a packet to be returned if the remote system is connected and responding to PING packets, or no response will be received. Only a ping attempt is tried. If none of the packets receive a response within the timeout period, an error result code will be raised.

If a response is received, the +NPING URC will be issued. If no response is received the +NPINGERR URC will be issued providing the error cause.

10.1.2 Syntax

Type	Syntax	Response	Example
Set	AT+NPING=<remote_address>[,<p_size>[,<timeout>]]	OK	AT+NPING=192.168.1.1 OK
URC		+NPING:<retry_num>,<remote_address>,<ttl>,<rtt>	+NPING:1,192.168.1.1,20,50
URC		+NPINGERR: <err>	+NPINGERR:1

10.1.3 Defined values

Parameter	Type	Description
<remote_addr>	String	Address of system sending the message in IPv4 format. IP addresses can be specified in decimal, octal or hexadecimal notation.
<p_size>	Number	Size of echo packet payload in range 8-1460 bytes, default value is 8 bytes.
<timeout>	Number	Maximum time to wait for an echo reply response in range 10-60000 ms, default value is 10000 bytes.
<retry_num>	Number	Number of packets sent before a response is received.
<ttl>	Number	TTL in the response packet
<rtt>	Number	RTT value, the time elapsed in milliseconds before receiving the echo reply response from the remote host.
<err>	Number	Provides some information the failure of the ping request: <ul style="list-style-type: none"> 1: no response from remote host within timeout period 2: failed to send ping request

11 Datagram messages

These proprietary commands are used to send messages via Neul/Huawei IoT Platform. Messages wrapped in CoAP (Constrained Application Protocol) packets are transported over UDP sockets. Messages are queued on the module and are sent in order. Messages can be received by either polling the [+NMGR](#) AT command or by turning on the [+NNMI](#) URC.



Constrained Application Protocol is a specialized web transfer protocol for use with constrained nodes and constrained networks in the Internet of Things.



The [+NCDP](#) AT command specifies the Neul or Huawei IoT Platform.

11.1 Get message +NMGR

+NMGR						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

11.1.1 Description

Returns the oldest buffered message and deletes the messages from the buffer. If there are no messages then no information text response will be given.

If new message indications (by means of [+NNMI=1](#) AT command) is set then the received messages will not be available via this AT command.

11.1.2 Syntax

Type	Syntax	Response	Example
Action	AT+NMGR	<length>,<data> OK	AT+NMGR 3,AA11BB OK

11.1.3 Defined values

Parameter	Type	Description
<length>	Number	Number of bytes of the data in range 0-512
<data>	Number	Data to be transmitted in hexadecimal format

11.2 Send message +NMGS

+NMGS						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

11.2.1 Description

Sends a message from the terminal to the network via the CDP (Connected Device Platform) server.

11.2.2 Syntax

Type	Syntax	Response	Example
Set	AT+NMGS=<length>,<data>	OK	AT+NMGS=3,AA11BB OK

11.2.3 Defined values

Parameter	Type	Description
<length>	Number	Number of bytes of the data in range 0-512
<data>	Number	Data to be transmitted in hexadecimal format

11.3 New message indications +NNMI

+NNMI						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

11.3.1 Description

Sets or gets whether new message indications are sent. New message indications can be sent when a downstream message is received by the module.

If the indications are enabled, all currently buffered messages will be indicated by means of a URC.

11.3.2 Syntax

Type	Syntax	Response	Example
Set	AT+NNMI=<indication>	+NNMI:OK OK	AT+NNMI=1 +NNMI:OK OK
Read	AT+NNMI?	+NNMI:<indication> OK	AT+NNMI:2 OK
URC		<indication>=1 +NNMI: <length>,<data> <indication>=2 +NNMI	<indication>=1 +NNMI:5,48656C6C6F <indication>=2 +NNMI

11.3.3 Defined values

Parameter	Type	Description
<indication>	Number	Allowed values: <ul style="list-style-type: none"> 0 (default value): indications disabled 1: indications enabled including the received message 2: only the indications are enabled; retrieve the message by means of +NMGR AT command

11.4 Query received messages +NQMGR

+NQMGR						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

11.4.1 Description

Queries the status of the received downstream messages.

Messages are dropped by the module if the host does not read them out of the buffer fast enough. When messages are dropped the oldest messages are dropped first.

11.4.2 Syntax

Type	Syntax	Response	Example
Action	AT+NQMGR	BUFFERED=<buffered>,RECEIVED=<received>,DROPPED=<dropped>	BUFFERED=3,RECEIVED=34,DROPPED=0 OK

Type	Syntax	Response	Example
		OK	

11.4.3 Defined values

Parameter	Type	Description
<buffered>	Number	The number of messages waiting to be read in the downstream buffer
<received>	Number	Total number of messages received by the module since the module boot
<dropped>	Number	Number of messages dropped by the module since the module boot

11.5 Query sent messages +NQMGs

+NQMGs						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

11.5.1 Description

Returns the accumulated status of all the upstream messages sent to the CDP (Connected Device Platform) server since last boot up.

11.5.2 Syntax

Type	Syntax	Response	Example
Action	AT+NQMGs	PENDING=<pending>,SENT=<sent>, ERROR=<error> OK	PENDING=3,SENT=34,ERROR=0 OK

11.5.3 Defined values

Parameter	Type	Description
<pending>	Number	Number of messages waiting to be sent in the upstream buffer (if a network connection is not available)
<sent>	Number	Total number of messages sent by the module since the module power-on
<error>	Number	Number of messages not sent due to errors, since the module power-on

11.6 Send message indications +NSMI

+NSMI						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	full	No	No	No	-	+CME Error

11.6.1 Description

Enables and disables indications when an upstream message is sent.

If indications are turned on, the +NSMI URC will be issued when the datagram has been successfully sent and acknowledged by the network.

11.6.2 Syntax

Type	Syntax	Response	Example
Set	AT+NSMI=<indication>	+NSMI:OK OK	AT+NSMI=1 +NSMI:OK OK
Read	AT+NSMI?	+NSMI:<indication> OK	+NSMI:1 OK
URC		+NSMI:<status>	

11.6.3 Defined values

Parameter	Type	Description
<indication>	Number	<ul style="list-style-type: none"> 0 (default value): indications disabled 1: indications enabled
<status>	String	SENT

11.7 Neul CDP IP address +NCDP

+NCDP						
Modules	All products					
Attributes	Syntax	PIN required	Settings saved	Can be aborted	Response time	Error reference
	partial	No	NVM	No	-	+CME Error

11.7.1 Description

Configures the Neul CDP (Connected Device Platform) IP address. The internal network IP address of the CDP server is specific of the intended network configuration.



Connected Device Platform is an entity which is a part of the Huawei NB-IoT network infrastructure. It provides the necessary queuing function so that devices in the internet can communicate with IoT entities

11.7.2 Syntax

Type	Syntax	Response	Example
Set	AT+NCDP=<IPv4_address>[,<port>]	OK	AT+NCDP=10.105.7.75,5683 OK
Read	AT+NCDP?	AT+NCDP:<IPv4_address>,<port> OK	+NCDP:192.168.160.1,5683 OK

11.7.3 Defined values

Parameter	Type	Description
<IPv4_address>	String	CDP destination IPv4 address
<port>	Number	<ul style="list-style-type: none"> CDP destination port number If port 0 is provided, the default port (5683) will be used. If no port is specified the previously set port will be used. If no port is specified and no port was previously set, the default port will be used.

A Appendix: Error result codes

A.1 Mobile termination error result codes +CME ERROR

<err>	Meaning	Resulting from the following commands
0	Phone failure	undetermined
1	No connection to phone	
2	Phone-adaptor link reserved	
3	Operation not allowed	See the footnote ¹ , +CCLK
4	Operation not supported	See the footnote ¹ , +CCLK, +CMER and +UCIND
5	PH-SIM PIN required	See the footnote ¹
10	SIM not inserted	See the footnote ¹
11	SIM PIN required	See the footnote ¹
12	SIM PUK required	See the footnote ¹
13	SIM failure	See the footnote ¹
14	SIM busy	See the footnote ¹
15	SIM wrong	See the footnote ¹
16	Incorrect password	+CLCK, +CPWD, +CPIN, ATD*...#...
17	SIM PIN2 required	
18	SIM PUK2 required	
20	Memory full	+CPBW, +CPOL, +UPAR, +USAR, +UTGN
21	Invalid index	+CPBR, +CPBW
22	Not found	+COPS, +CHLD, +CGATT, ATD*...#...
23	Memory failure	+CSAS, +CRES, +CSGT
24	Text string too long	+CPBW, +CUSD
25	Invalid characters in text string	ATD*...#...
26	Dial string too long	ATD, +CPBW
27	Invalid characters in dial string	ATD, +CPBW, ...
30	No network service	ATD, +COPS, +CLIR, ...
31	Network timeout	ATD
32	Network not allowed - emergency calls only	
40	Network personalisation PIN required	
41	Network personalisation PUK required	
42	Network subset personalisation PIN required	
43	Network subset personalisation PUK required	
44	Service provider personalisation PIN required	
45	Service provider personalisation PUK required	
46	Corporate personalisation PIN required	
47	Corporate personalisation PUK required	
50	Incorrect parameters	+CIND, +CRSM
51	Command implemented but currently disabled	
52	Command aborted by user	
100	Unknown	
103	Illegal MS	+CGATT, +COPS
106	Illegal ME	+CGATT, +COPS
107	GPRS services not allowed	+CGATT
108	GPRS and non GPRS services not allowed	+CGATT

¹ +CACM, +CALA, +CALD, +CALM, +CAMP, +CAOC, +CBST, +CCFC, +CCUG, +CCWA, +CCWE, +CEER, +CFUN, +CGACT, +CGATT, +CGCLASS, +CGDATA, +CGDCONT, +CGEREP, +CGMI, +CGMM, +CGMR, +CGPADDR, +CGQMIN, +CGQREQ, +CGREG, +CGSMS, +CGSN, +CHLD, +CHUP, +CIMI, +CIND, +CLAC, +CLCC, +CLCK, +CLIP, +CLIR, +CLVL, +CMEE, +CMOD, +CMUT, +CMUX, +CNUM, +COLP, +COPS, +CPAS, +CPBF, +CPBR, +CPBS, +CPBW, +CPIN, +CPOL, +CPUC, +CPWD, +CR, +CRC, +CREG, +CRLP, +CRSL, +CRSM, +CSCS, +CSGT, +CSNS, +CSQ, +CSSN, +CSTA, +CTFR, +CTZR, +CTZU

<err>	Meaning	Resulting from the following commands
111	PLMN not allowed	+CGATT, +COPS
112	Location area not allowed	+CGATT, +COPS
113	Roaming not allowed in this location area	+CGATT, +COPS
126	Insufficient resources	
132	Service option not supported	+CGACT or other non-GPRS commands
133	Requested service option not subscribed	+CGACT or other non-GPRS commands
134	Service option temporarily out of order	+CGACT or other non-GPRS commands
135	NS-api already used	
140	Feature not supported	
141	Semantic error in the TFT operation	
142	Syntactical error in the TFT operation	
143	Unknown PDP context	
144	Semantic errors in packet filter(s)	
145	Syntactical errors in packet filter(s)	
146	PDP context without TFT already activated	
148	Unspecified GPRS error	all PS/GPRS related commands
149	PDP authentication failure	+CGACT
150	Invalid mobile class	all GPRS related commands
156	User Busy	+UI2CO, +UI2CW, +UI2CREGR, +UI2CR, +UI2CC
159	Uplink Busy/ Flow Control	
254	Invalid error mapping	
255	Internal 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	(U)SIM not inserted	
311	(U)SIM PIN required	
312	PH-(U)SIM PIN required	
313	(U)SIM failure	
314	(U)SIM busy	
315	(U)SIM wrong	
316	(U)SIM PUK required	
317	(U)SIM PIN2 required	
318	(U)SIM PUK2 required	
320	Memory failure	
321	Invalid memory index	
322	Memory full	
330	SMSC address unknown	
331	No network service	
332	Network timeout	
340	No +CNMA acknowledgement expected	
500	Unknown error	
701	Incorrect security code	
702	Max attempts reached	
1001	Unassigned (unallocated) number	
1003	No route to destination	
1006	Channel unacceptable	
1008	Operator determined barring	
1016	Normal call clearing	
1017	User busy	
1018	No user responding	
1019	User alerting, no answer	

<err>	Meaning	Resulting from the following commands
1021	Call rejected	
1022	Number changed	
1026	Non selected user clearing	
1027	Destination out of order	
1028	Invalid number format (incomplete number)	
1029	Facility rejected	
1030	Response to STATUS ENQUIRY	
1031	Normal, unspecified	
1034	No circuit/channel available	
1038	Network out of order	+COPS, +CGATT
1041	Temporary failure	+COPS, +CGATT
1042	Switching equipment congestion	+COPS, +CGATT
1043	Access information discarded	
1044	requested circuit/channel not available	
1047	Resources unavailable, unspecified	
1049	Quality of service unavailable	
1050	Requested facility not subscribed	
1055	Incoming calls barred within the CUG	
1057	Bearer capability not authorized	
1058	Bearer capability not presently available	
1063	Service or option not available, unspecified	
1065	Bearer service not implemented	
1068	ACM equal to or greater than ACMmax	
1069	Requested facility not implemented	
1070	Only restricted digital information bearer capability is available	
1079	Service or option not implemented, unspecified	
1081	Invalid transaction identifier value	
1087	User not member of CUG	
1088	Incompatible destination	
1091	Invalid transit network selection	
1095	Semantically incorrect message	
1096	Invalid mandatory information	
1097	Message type non-existent or not implemented	
1098	Message type not compatible with protocol state	
1099	Information element non-existent or not implemented	
1100	Conditional IE error	
1101	Message not compatible with protocol state	
1102	Recovery on timer expiry	
1111	Protocol error, unspecified	
1127	Interworking, unspecified	
1279	Number not allowed	
1283	CCBS possible	
1500	Wrong GPIO identifier	+UGPIOC, +UGPIOR, +UGPIOW
1501	Set GPIO default error	+UGPIOC
1502	Select GPIO mode error	+UGPIOC
1503	Read GPIO error	+UGPIOR
1504	Write GPIO error	+UGPIOW
1505	GPIO busy	+UGPIOC
1520	Wrong ADC identifier	+UADC
1521	Read ADC error	+UADC
1530	IPv4 only allowed	+CGDCONT
1531	IPv6 only allowed	
1540	Wrong ringer identifier	+URNG
1542	LLC or SNDCCP failure	
1543	Regular deactivation	

<err>	Meaning	Resulting from the following commands
1544	Reactivation requested	
1545	Single address bearers only allowed	
1546	Invalid transaction identifier value	
1547	APN restriction val incompatible with PDP context	
1548	PDP activation rejected	+UPSDA
1549	unknown PDP address or PDP type	+UPSDA
1550	GPRS generic operation error	+UPSD, +UPSDA
1551	GPRS invalid APN	+CGACT, +UPSDA
1552	GPRS authentication failure	+UPSDA
1553	GPRS QoS parameters inconsistent	+UPSD
1554	GPRS network failure	+UPSDA, +CGATT, +CGACT
1555	GPRS context busy	+UPSD, +UPSDA, +UCEDATA
1556	CSD generic operation error	+UCSD, +UCSDA, +UCSND
1557	CSD undefined profile	+UCSDA
1558	CSD context busy	+UCSD, +UCSDA
1559	PLMN scan not allowed	+COPS
1600	FFS error	
1600	PDP type IPv4 only allowed	+CGACT, +CGDATA
1600	PDP type IPv6 only allowed	+CGACT, +CGDATA
1612	FILE NOT FOUND	+UPLAYFILE, +UDELFILE, +USECMNG
1613	Cannot open file	+UDWNFILE, +ULSTFILE
1620	Buffer full	+USOWR, +USOST
1621	FFS initializing	+UDWNFILE
1622	FFS already open file	+UDWNFILE
1623	FFS not open file	+UDWNFILE
1624	FFS file not found	+UDWNFILE
1625	FFS file already created	+UDWNFILE
1626	FFS illegal id	+UDWNFILE
1627	FFS illegal file handle	+UDWNFILE
1628	FFS illegal type	+UDWNFILE
1629	FFS illegal mode	+UDWNFILE
1630	FFS file range	+UDWNFILE, +URDBLOCK
1631	FFS operation not possible	+UDWNFILE
1632	FFS write error	+UDWNFILE
1633	FFS user id error	+UDWNFILE
1634	FFS internal fatal error	+UDWNFILE
1635	FFS memory resource error	+UDWNFILE
1636	FFS maximum number of files exceeded	+UDWNFILE
1637	FFS memory not available	+UDWNFILE
1638	FFS invalid filename	+UDWNFILE
1639	FFS streaming not enabled	+UDWNFILE
1640	FFS operation not allowed on static file	+UDWNFILE
1641	FFS memory table inconsistency	+UDWNFILE
1642	FFS not a factory default file	+UDWNFILE
1643	FFS requested memory temporary not available	+UDWNFILE
1644	FFS operation not allowed for a directory	+UDWNFILE
1645	FFS directory space not available	+UDWNFILE
1646	FFS too many streaming files open	+UDWNFILE
1647	FFS requested dynamic memory temporary not available	+UDWNFILE
1648	FFS user provided a NULL parameter instead of a suitable buffer	+UDWNFILE
1649	FFS timeout	+UDWNFILE
1650	Command line too long	All commands
1660	Call barred - Fixed dialing numbers only	D
1700	GPS GPIO not configured	+UGPS
1701	GPS GPIO ownership error	+UGPS

<err>	Meaning	Resulting from the following commands
1702	Invalid operation with GPS ON	+UGPRF, +ULOC
1703	Invalid operation with GPS OFF	+UGPS, +UGTMR, +UGAOS, +UGUBX
1704	Invalid GPS aiding mode	+UGPS, +UGAOS
1705	Reserved GPS aiding mode	+UGPS
1706	GPS aiding mode already set	+UGPS
1707	Invalid GPS trace mode	+UGPRF
1708	Parameter valid only in case of GPS OTA	+UGPRF
1709	GPS trace invalid server	+UGPRF
1710	Invalid TimeZone	+UGTMR
1711	Invalid value	+UGZDA, +UGGGA, +UGGLL, +UGGSV, +UGRMC, +UGVTG, +UGGSA
1712	Invalid parameter	+UGAOF, +UGAOP
1713	Invalid operation with LOC running / GPS Busy	+UGPS
1801	IBM busy / eCall already armed/active	+UECALLDATA
1802	IBM feature off / eCall feature off	+UECALLDATA, +UECALLVOICE
1803	Wrong IBM requested	(RFU)
1804	Audio resource not available	+UECALLDATA
1805	ECALL restriction	+COPS
1806	eCall invalid dial number	+UECALLTYPE, +UDCONF=90, +CECALL
1900	No SAP Server Connection	+USAPMODE
1901	SAP Protocol Error	+USAPMODE
1902	SAP Connection failure	+USAPMODE
1903	SAP Server Disconnection	+USAPMODE
1904	SAP Other terminal using service	+USAPMODE
1910	USECMNG import timeout expired (no input for > 20 s)	+USECMNG
1911	USECMNG import file size exceeds limit	+USECMNG
1912	USECMNG no memory available	+USECMNG
1913	USECMNG invalid certificate/key format	+USECMNG
1914	USECMNG database full	+USECMNG
1950	CDC-ECM is not available	+UCEDATA
1951	CDC-ECM is busy	+UCEDATA
1952	No DHCP Packets received from the DTE	+UCEDATA
2000	Command timeout	
3000	Command aborted	Commands that can be aborted
4000	APN configuration mismatch	+UPSDA
4001	IP type configuration mismatch	+UPSDA

A.2 NEUL specific error codes

<code>	Meaning	Resulting from the following commands
256	Required parameter not configured	
257	TUP not registered	

B Appendix: AT Commands List

AT command	Datagram messages						
	+NCDP	+NMGR	+NMG5	+NM/MI	+NQ/MGR	+NQ/MG5	+NSMI
SARA N200-01B / N201-01B	•	•	•	•	•	•	•
N210-01B / N280-01B							
N200-02B / N201-02B							
N210-02B / N211-02B	•	•	•	•	•	•	•
N280-02B							

Objective Specification

AT command		General commands									
		+CCID	+CGMI	+CGMM	+CGMR	+CGSN	+CIMI	+CLAC	+USETPARAM	/	
SARA	N200-01B / N201-01B		•	•	•	•	•	•			
	N210-01B / N280-01B										
	N200-02B / N201-02B										
	N210-02B / N211-02B	•	•	•	•	•	•	•	•	•	
	N280-02B										

Objective Specification

AT command		Internet suite	
		+NFINV	
SARA	N200-01B / N201-01B	•	
	N210-01B / N280-01B		
	N200-02B / N201-02B	•	
	N210-02B / N211-02B		
	N280-02B		

Objective Specification

AT command		Mobile equipment control and status								
		+CCLK	+CFUN	+CIND	+CMEE	+CPWROFF	+CTZU	+NCONFIG	+NRB	+NUESTATS
SARA	N200-01B / N201-01B	•	•		•			•	•	•
	N210-01B / N280-01B									
	N200-02B / N201-02B									
	N210-02B / N211-02B	•	•	•	•	•	•	•	•	•
	N280-02B									

Objective Specification

AT command	Network service						
	+COPS	+CSCON	+CSQ	+NBAND	+NEARFCN	+UNTIMERS	+UQDRX
SARA N200-01B / N201-01B	•	•	•	•	•		
N210-01B / N280-01B							
N200-02B / N201-02B							
N210-02B / N211-02B	•	•	•	•	•	•	•
N280-02B							

Objective Specification

AT command		Packet switched data services				
		+CEREG	+CGATT	+CGCONTRDP	+CGDCONT	+CGPADDR
SARA	N200-01B / N201-01B	•	•		•	•
	N210-01B / N280-01B					
	N200-02B / N201-02B					
	N210-02B / N211-02B	•	•	•	•	•
	N280-02B					

Objective Specification

AT command		SIM functionalities	
		+UBIP	
SARA	N200-01B / N201-01B N210-01B / N280-01B N200-02B / N201-02B N210-02B / N211-02B N280-02B	•	

Objective Specification

AT command	System features					
	+CPSMS	+NLOGLEVEL	+UANTR	+UFWUPD	+URING	+UTEST
SARA N200-01B / N201-01B		•				
N210-01B / N280-01B						
N200-02B / N201-02B						
N210-02B / N211-02B	•	•	•	•	•	•
N280-02B						

Objective Specification

AT command		Internet protocol transport layer					
		+NSOCL	+NSOCR	+NSONIMI	+NSORF	+NSOST	+NSOSTF
SARA	N200-01B / N201-01B	•	•	•	•	•	•
	N210-01B / N280-01B						
	N200-02B / N201-02B						
	N210-02B / N211-02B	•	•	•	•	•	•
	N280-02B						

Objective Specification

B.1 Parameters stored in profiles

The parameter settings of some commands can be stored in the profiles available in the memory module. To store, partially display, activate and de-activate these profiles, see the [AT&W](#), [AT&V](#), [AT&Y](#) commands description.

Not all the parameter setting are displayed through [AT&V](#) command.

Some AT commands have a unique configuration for all the AT interfaces while for other AT commands it is possible to set a different configuration for each AT interface: the "AT interface configuration sharing" column in the next table provides this information.

Some AT command interfaces have a dynamic activation, which means they are not statically activated at boot time (MUX AT channel is activated when the MUX protocol is established, USB AT channel is activated if/when the USB cable is plugged-in, deactivated when it is removed). Since the activation reloads the AT command profile from NVM for the activated interface, the shared "AT interface configurations" could be overwritten. It is suggested to reconfigure them at the requested value if an AT command interface is dynamically activated.

The following table lists the AT commands which setting can be stored in the profiles with their parameters as well as the factory-programmed values.

AT command	Description	AT interface configuration sharing	Factory-programmed value / Remarks
+COPS	Operator selection	Yes	<ul style="list-style-type: none"> 0 (autoregistration enabled) 0 (operator expressed in long alphanumeric format) FFFF (undefined PLMN to register when COPS=1)

B.2 Parameters stored in non volatile memory

The following table lists the AT commands which setting can be stored in the non volatile memory with their parameters and the factory-programmed values.

AT command	Description	Factory-programmed value / Comment
+CCLK	Clock	04/01/01,00:00:00+00
+CGDCONT	PDP context definition	
+CTZU	Automatic time zone update	<ul style="list-style-type: none"> SARA-N2 - 1 (automatic time zone via NITZ enabled)
+NCDP	Neul CDP IP address	
+UBIP	Bearer Independent Protocol status indication	0 (BIP status indication disabled)
+URING	RING line handling	0 (feature disabled (RING line is only asserted on incoming call and incoming SMS))
+USETPARAM	Manufacturer information validation	Empty

B.3 Estimated command response time

After having sent a command to a u-blox cellular module, the time to obtain a resulting result code depends on the SIM and the network. It is possible to have an immediate response if the command does not interact with either the network or the SIM.

The following table reports the maximum time to get the result code for the AT commands. The commands are grouped by categories.

Category	Estimated maximum time to get response	Commands
Power off	< 40 s	+CPWROFF
Call control and supplementary services	< 20 s	A, H, +CAEMLPP, +CHLD, +CHUP, +CNAP, +COLP, +COLR, +CSVM
	Up to 7 min	+VTS
Network commands	Up to 3 min (<1 s for prompt ">" when present)	D, D>, DL, +CCFC, +CCWA, +CFUN, +CGATT, +CGDATA, +CLCK, +CLIP, +CLIR, +COPS, +CPMS, +CMGL, +CMGR, +CMGS, +CMSS, +CPWD, +CTFR, +CUSD, +UCGOPS, +UCMGL, +UCMGP, +UCMGR, +UCMGS, +UCSDA, +UPSDA

Category	Estimated maximum time to get response	Commands
	Up to 1 s	+UDOPN
	< 5 s	+UCELLINFO
	< 40 s	+UEONS
Phonebook commands	< 35 s	+CPBF, +CPBR, +CPBS, +CPBW
Delete all the SMSes	< 55 s	+CMGD
Send an SMS	< 150 s	+CMGS, +CMSS
	Up to 3 min (<1 s for prompt ">" when present)	+UCMGS3GPP2
New message acknowledgement to MT	< 150 s	+CNMA
SIM management	< 10 s	+CACM, +CAMP, +CAOC, +CMGW, +CNUM, +CPIN, +CPOL, +CPUC, +CR, +CRES, +CRSM, +CSCA, +CSCB, +CSMP, +UCMGW
SIM toolkit	< 20 s	+SATD, +SATE, +SATR, +STKENV, +STKTR, +UCATENV, +UCATTR, +URCATE, +URCATR
PDP context activation	< 150 s	+CGACT, +UPSDA
PDP context deactivation	< 40 s	+CGACT, +UPSDA
ECM data connection	Up to 3 min	+UCEDATA
Restore configuration	< 5 s	+UFACTORY
Audio path testing	< 2 s	+UMAAT
GPIO commands	< 10 s	+UGPIOC, +UGPIOR, +UGPIOW
Internet suite (TCP/IP, DNS, FTP, HTTP, SMTP)	< 10 s (except URC)	+USMTPC, +USMTPM, +USOCL, +USODL, +USOLI, +USORD, +USORF, +USOST, +USOWR
	< 20 s	+USOCO
	< 70 s (except URC)	+UDNSRN
GNSS commands	< 10 s (except +UGPS for which timeout is according to the performed operation)	+UGAOS, +UGGGA, +UGGLL, +UGGSA, +UGGSV, +UGPS, +UGRMC, +UGTMR, +UGUBX, +UGVTG, +UGZDA, +ULOC
Wi-Fi	< 15 s	+UWSCAN
	< 20 s	+UWAPCFG, +UWCFG, +UWSTACFG
Audio recording	Up to 10 s	+URECFILE
OMA-DM alert	~400s (depending on network connectivity)	+UOMADMALERT

C Appendix: Glossary

2G	2nd Generation
3G	3rd Generation
3GPP	3rd Generation Partnership Project
ADC	Analog to Digital Converter
AleC	Automatically Initiated eCall
ADN	Abbreviated Dialing Numbers
AMR	Adaptive Multi Rate
AP	Access Point
APN	Access Point Name
ASCII	American Standard Code for Information Interchange
AT	AT Command Interpreter Software Subsystem, or attention
BL	Black List
BSD	Berkley Standard Distribution
CB	Cell Broadcast
CBM	Cell Broadcast Message
CLI	Calling Line Identification
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Restriction
CM	Connection Management
CPHS	Common PCN Handset Specification
CR	Carriage Return
CS	Circuit Switch
CSD	Circuit-Switched Data
CSG	Closed Subscriber Group
CTS	Clear To Send
CUG	Closed User Group
DA	Destination Address
DARF	Downlink Advanced Receiver Performance
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DCM	Data Connection Management
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DSR	DSC transponder response
DTE, TE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTR	Data Terminal Ready
DUT	Device Under Test
EARFCN	E-UTRAN Absolute Radio Frequency Channel Number
eCall	Emergency Call
EEP	EEPROM Emulation Parameters
EF	Elementary File
EF _{CGST}	Elementary File "Closed Subscriber Group Type"
EF _{HNB}	Elementary File "Home Node B Number"
EF _{PLMNwACT}	Elementary File "User controlled PLMN Selector with Access Technology"
eIM	eCall In-band Modem
EONS	Enhanced Operator Name from SIM-files EF _{OPL} and EF _{PNN}
EPD	Escape Prompt Delay
ETSI	European Telecommunications Standards Institute
E-UTRAN	Evolved UTRAN
FDN	Fixed Dialling Number

FOAT	Firmware Over AT
FOTA	Firmware Over The Air
FS	File System
FTP	File Transfer Protocol
FW	Firmware
FWINSTALL	Firmware Install
GAS	Grouping information Alpha String
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HDLC	High Level Data Link Control
HNB	Home Node B
HPLMN	Home PLMN
HTTP	HyperText Transfer Protocol
I	Information
I ² C	Inter-Integrated Circuit
I ² S	Inter IC Sound or Integrated Interchip Sound
ICCID	Integrated Circuit Card ID
ICMP	Internet Control Message Protocol
ICP	Inter Processor Communication
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Station Identity
InBM	In-Band Modem (generic)
IP	Internet Protocol
IRA	International Reference Alphabet
IRC	Intermediate Result Code
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IVS	In-Vehicle System (eCall related)
L3	Layer 3
LCP	Link Control Protocol
LF	Line Feed
LNS	Linux Network Subsystem
M2M	Machine-To-Machine
MCC	Mobile Country Code
ME	Mobile Equipment
MleC	Manually Initiated eCall
MMI	Man Machine Interface
MN	Mobile Network Software Subsystem
MNC	Mobile Network Code
MNO	Mobile Network Operator
MO	Mobile Originated
MS	Mobile Station
MSD	Minimum Set of Data (eCall related)
MSIN	Mobile Subscriber Identification Number
MSISDN	Mobile Systems International Subscriber Identity Number
MSPR	Multi-Slot Power Reduction
MT	Mobile Terminated
MWI	Message Waiting Indication
NITZ	Network Identity and Time Zone
NVM	Non-Volatile Memory
ODIS	OMA-DM IMEI Sync
OLCM	On Line Commands Mode
PAD	Packet Assembler/Disassembler
P-CID	Physical Cell Id

PCN	Personal Communication Network
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identification Number
PLMN	Public Land Mobile Network
PPP	Point-to-Point Protocol
PSAP	Public Safety Answering Point (eCall related)
PSD	Packet-Switched Data
PUK	Personal Unblocking Key
QoS	Quality of Service
RAM	Random Access Memory
RDI	Restricted Digital Information
RFU	Reserved for Future Use
RNDIS	Remote Network Driver Interface Specification
RI	Ring Indicator
RTC	Real Time Clock
RTP	Real-time Transport Protocol
RTS	Request To Send
Rx	Receiver
SAP	SIM Access Profile
SC	Service Centre
SI	SIM Application Part Software Subsystem
SIP	Session Initiation Protocol
SIM	Subscriber Identity Module
SMS	Short Message Service
SMSC	Short Message Service Center
SMTP	Simple Mail Transfer Protocol
SoR	Steering of Roaming
SDIO	Secure Digital Input Output
STA	station
SSID	Service Set Identifier
TA	Terminal Adaptor
TCP	Transfer Control Protocol
TE	Terminal Equipment
TFT	Traffic Flow Template
TP	Transfer layer Protocol
Tx	Transmitter
TZ	Time Zone
UCS2	Universal Character Set
UDI	Unrestricted Digital Information
UDP	User Datagram Protocol
UI	Unnumbered Information
UICC	Universal Integrated Circuit Card
UIH	Unnumbered Information with header Check
URC	Unsolicited Result Code
USIM	UMTS Subscriber Identity Module
UTRAN	Universal Terrestrial Radio Access Network
UUS1	User-to-User Signalling Supplementary Service 1
WLAN	Wireless Local Area Network

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Objective Specification

Revision history

Revision	Date	Name	Comments
R01	22-Aug-2016	sfal	Initial release
R02	23-Dec-2016	lpah	<p>New commands: <i>+NRB, +NCDP, +NUESTATS, +CSCON, +NBAND, +NEARFCN, +NMGR, +NMGS, +NQMG, +NQMG, +NNMI, +NSMI, +NLOGLEVEL, +NSOCR, +NSOCL, +NSOST, +NSONMI, +NSORF, +NPING, +NCONFIG</i></p> <p>Modified commands: <i>+CGSN, +CIMI, +CMEE, +CFUN, +COPS, +CGDCONT, +CEREG, +CGATT</i></p> <p>Review the command applicability for these commands: <i>+CGMM, +CGMR, +CGMI, +CGSN, +CIMI, +CLAC, +CFUN, +CMEE, +CSQ, +COPS, +CGDCONT, +CGPADDR, +CEREG, +CGATT</i></p>
R03	30-Jan-2017	lpah	<p>New commands: <i>+NCONFIG</i></p> <p>Modified commands: <i>+CIMI, +CSCON, +NCDP, +NUESTATS, +NBAND, +COPS, +CGPADDR, +CEREG, +NSOCR, +NSONMI, +NPING, +NMGR, +NMGS, +NQMG, +NSMI, +NSORF, +NQMG</i></p>
R04	24-Mar-2017	lpah	<p>Document aligned to FW V100R100C10B655SP2</p> <p>Modified commands: <i>+NUESTATS, +NSOCR, +NSOST, +NPING</i></p>
R05	24-Apr-2017	lpah	<p>Document aligned to FW V100R100C10B656</p> <p>New commands: <i>+NSOSTF</i></p> <p>Modified commands: <i>AT command settings, +CGSN, +CCLK, +NRB, +CSQ, +NEARFCN, <PDP_addr>, +CGPADDR, +CEREG, +NSOCR, CME error result codes, Neul error result codes</i></p>
R06	06-Jun-2017	lpah	<p>Extended the document applicability to SARA-N200-02B, SARA-N201-02B, SARA-N210-02B, SARA-N211-02B, SARA-N280-02B</p> <p>New commands: <i>+CPSMS, +UNTIMERS, +UQDRX, +USETPARAM</i></p> <p>Modified commands: <i>AT command settings, General operation, I, +CIND, +CCLK, +NUESTATS, SIM toolkit introduction, +UBIP, +CGDCONT, +CGCONTRDP, +URING, +UTEST, Internet protocol transport layer, +NSOCR, +NPING</i></p> <p>Review the command applicability for these commands: <i>I, +CCID, +CTZU, +CIND, +CPWROFF, +UBIP, +CGCONTRDP, +UANTR, +UFWUPD, +URING, +UTEST</i></p>

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