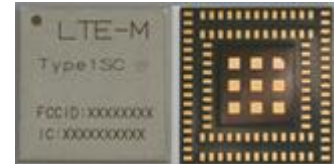


**Type 1SC/
Type 1SC-DM**

**AT Commands
Reference Guide**



Revision History

| Revision | Date | Author | Change Description |
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1 Introduction

1.1 Scope

Purpose of this document is providing a detailed specification and a comprehensive listing as a reference for the whole set of AT commands available with the FW release for the LBAD0XX1SC (LTE CAT-M1/NB-IoT module).

1.1 Audience

This document is intended to familiarize readers with this Murata module and the ease with which it is controlled by means of AT Commands.

1.2 Contact Information and Customer Support

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

Tech_sup@murata.com.

1.3 List of Acronyms

| Acronym | Description |
|---------|---|
| ARFCN | Absolute Radio Frequency Channel Number |
| AT | Attention command |
| ETC. | ETC. |

1.4 Text Conventions



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



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



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

1.5 Related Documents

- 3GPP TS 27.007 specification and rules
http://www.3gpp.org/ftp/Specs/archive/27_series/27.007/
- 3GPP TS 27.005 specification and rules
http://www.3gpp.org/ftp/Specs/archive/27_series/27.005/
- Hayes standard AT command set

2 Overview

This document describes all AT commands implemented on the Murata wireless modem/module listed on the Applicability Table.

- ① (EN) The integration of the LTE Type 1SC cellular modem/module within user application shall be done according to the design rules described in this manual.
- ① The information presented in this document is believed to be accurate and reliable. However, no responsibility is assumed by Murata Manufacturing Co., Ltd. for its use, nor any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent rights of Murata Manufacturing Co., Ltd. other than component circuitry embodied in Murata products. This document is subject to change without notice.

3 AT Commands

The Murata wireless modem/module can be controlled via the serial interface using the standard AT commands. The Murata wireless modem/module is compliant with:

- Hayes standard AT command set, in order to maintain the compatibility with existing SW programs
- 3GPP TS 27.007 specific AT command and LTE specific commands.
- 3Gpp TS 27.005 specific AT commands for SMS (Short Message Service) and CBS (Cell Broadcast Service)

Moreover, the Murata wireless modem/module supports also Murata proprietary AT commands for special purposes.

The following is a description of how to use the AT commands with the Murata wireless modem/module.

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

3.1 AT Commands Exceptions

The following table shows which commands have exceptions on their applicability for the Type 1SC module.

| Commands | LBAD0XX1SC |
|------------|------------|
| Voice Call | N/A |
| GNSS | N/A |
| Etc. | Etc. |

3.2 Definitions

The following syntactical definitions apply:

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

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

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

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

3.3 AT Command Syntax

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

There are two types of extended command:

Parameter type commands. These types of commands may be “set” (to store a value or values for later use), “read” (to determine the current value or values stored), or “tested” (to determine ranges of values supported). Each command has a test command (trailing =?) to give information about the type of its sub parameters. They also have a Read command (trailing ?) to check the current values of sub parameters.

Action type commands. This type of command may be “executed” or “tested.” The “executed” command invokes a function of the equipment, which generally involves more than the simple storage of a value for later use. The “tested” command determines:

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

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

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

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

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

3.3.1 String Type Parameters

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

A string is always case sensitive.

A small set of commands requires writing the input string parameters within quotes. This is explicitly reported in the specific descriptions.

3.3.2 Command Lines

A command line is made up of three elements: the prefix, the body, and the termination character. The command line prefix consists of the characters “AT” or “at” or, to repeat the execution of the previous command line, the characters “A/” or “a/” or AT#/ or at#/. The termination character may be selected by a user option (parameter S3). The default is <CR>.

The basic structures of the command line are:

- ATCMD1<CR> where AT is the command line prefix, CMD1 is the body of a basic command (nb: the name of the command never begins with the character “+”) and <CR> is the command line terminator character ATCMD2=10<CR> where 10 is a sub parameter.
 - +CMD1?<CR> This is a Read command for checking current sub parameter values.
 - +CMD1=?<CR> This is a test command for checking possible sub parameter values.
- ❗ The set of proprietary AT commands differentiates from the standard one because the name of each command begins with either “@”, “#”, “\$” or “*”. Proprietary AT commands follow the same syntax rules as extended commands.

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

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

This is NOT a command, it is the error response to **+Cxxx 3GPP TS 27.007** commands.
Syntax: +CME ERROR: <err>

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

| Numeric Format | Text Format |
|-----------------------|--------------------|
| 1 | tbd |
| 2 | tbd |

3.3.3 Information Responses and Result Codes

3.3.4 Command Response Time-Out

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

3.3.5 Command Issuing Timing

The chain Command -> Response shall always be respected, and a new command must not be issued before the module has terminated the sending of its response result code (whatever it may be). This applies especially to applications that “sense” the OK text and, therefore, may send the next command before the complete code <CR><LF>OK<CR><LF> is sent by the module. It is advisable to wait for at least 20ms between the end of the reception of the response and the issue of the next AT command. If the response codes are disabled, and therefore the module does not report any response to the command, then at least the 20ms pause time shall be respected.

Table 3-1 Command Issuing Timing

| ID | AT Cmd / URC | Description | Notes / Limitations | 3GPP Rev |
|----|--------------|--|---|-------------|
| | +CGMI | Request manufacturer identification | None | Rev12 |
| 2 | +GMI | Request TA manufacturer identification (equals to +CGMI) | None | ITU-T V.250 |
| 3 | +CGMM | Request model identification | None | Rev12 |
| 4 | +GMM | Request TA model identification (equals to +CGMM) | None | ITU-T V.250 |
| 5 | +CGMR | Request revision identification | None | Rev12 |
| 6 | +GMR | Request TA revision identification (equals to +CGMR) | None | ITU-T V.250 |
| 7 | +CGSN | Request revision identification | None | Rev13 |
| 8 | +GSN | Request TA serial number identification (may equal to +CGSN) | None | ITU-T V.250 |
| 9 | +CIMI | Request international mobile subscriber identity (IMSI) | None | Rev12 |
| 10 | Z | TA sets all parameters to their defaults as specified by a user memory profile or by the manufacturer, and resets TA | Reset device but doesn't return values to factory default | ITU-T V.250 |

| | | | | |
|----|---|---|------|-------------|
| 11 | I | Request manufacturer specific information about the TA. | None | ITU-T V.250 |
|----|---|---|------|-------------|

| ID | AT Cmd / URC | Description | Notes / Limitations | 3GPP Rev |
|----|--------------|--|---|-------------|
| 12 | +GCAP | Request overall capabilities of TA; the response code shall be CLTE3 or CLTE4 (based on configured LTE category) | None | ITU-T V.250 |
| 13 | +CNUM | Subscriber number | None | Rev12 |
| 14 | +CREG | Network registration | None | Rev12 |
| 15 | +COPS | PLMN selection | <mode>=4 is not supported | Rev12 |
| 16 | +CLCK | Facility lock | Supported facilities: - "SC" - "P2" - "PN" - "PS" - PU | Rev12 |
| 17 | +CPWD | Change password | Supported facilities: - "SC" - "P2" - "PN" - "PS" - PU | Rev12 |
| 18 | +CFUN | Set phone functionality | Mode 2 not supported. Only mode 4 (flight mode) is stored in NV memory. <fun>=2/3 are not supported. <fun> 128/129 are not supported | Rev11 |

| | | | | |
|----|---------|----------------------------------|--|-------|
| 19 | +CPIN | Enter PIN | Supported facilities: - SIM PIN - SIM PUK - SIM PIN2 - SIM PUK2 - PH-SIM PIN -PH-NET PIN | Rev12 |
| 20 | +CSQ | Signal quality | instead of RSSI the modem returns RSRP | Rev12 |
| 22 | +CMEE | Report mobile termination error | None | Rev12 |
| 29 | +CEREG | EPS network registration status | None | Rev12 |
| 30 | +CEMODE | UE modes of operation for EPS | None | Rev12 |
| 32 | +CCHO | Open Logical Channel | None | Rev12 |
| 33 | +CCHC | Close Logical Channel | None | Rev12 |
| 35 | +CMGF | Message Format | None | Rev12 |
| 36 | +CRSM | Restricted SIM access | None | Rev12 |
| 37 | +CSIM | Generic SIM access | None | Rev12 |
| 38 | +CPOL | Preferred PLMN list | The command accepts <oper> in numeric format only | Rev12 |
| 39 | +CPLS | Selection of preferred PLMN list | None | Rev12 |
| 40 | +CMGL | List Messages | None | Rev12 |
| 41 | +CMGR | Read Messages | None | Rev12 |
| 42 | +CMGD | Delete Messages | None | Rev12 |

| | | | | |
|----|---------|---------------------------------|---|---------------|
| 43 | +CPMS | Preferred Message Storage | Supports only "ME" or "SM" storage | Rev12 |
| 44 | +CPAS | Phone activity status | Command currently reflect data connection status | Rev12 |
| 45 | +CCLK | Set the Real Time clock | None | Rev12 |
| 46 | +CMT | URC delivery of SMS to host | None | Rev12 |
| 47 | +CUSATR | Reads USAT Profile | Partially supported, missed: <ul style="list-style-type: none"> • Reads MT profile that was written by +CUSATW. • Read UICC EFUST • List of MT only facilities | Rev10 |
| 49 | +CTZR | Time Zone reporting | None | Rev12 |
| 50 | +CTZU | Automatic Time Zone update | None | Rev12 |
| 51 | +COPN | Read Operator Names | None | Rev12 |
| 52 | +CPBS | Select phonebook memory storage | None | Rev12 |
| 53 | +CPBR | Read phonebook entries | None | Rev12 |
| 54 | +CPBF | Find phonebook entries | None | Rev12 |
| 55 | +CPBW | Write phonebook entry | None | Rev12 |
| 56 | DT | Modem dial | FAST UART only. ATDT<number> launch PPP daemon and switch to binary mode. The <number> parameter is | Rockwell Rev4 |

| | | | | |
|----|-------|---|--|-------------------|
| | | | ignored. | |
| 57 | O | Returns the modem back to the normal connected state after being interrupted by the "+++" escape code | FAST UART only (PPP Port only). | Hayes command set |
| 58 | +++ | Escape sequence | FAST UART only. (PPP Port only) | Hayes command set |
| 59 | E | Command Echo | PPP Port only | ETSI V.250 |
| 61 | +CEER | Extended error report | None | Rev8 |
| 65 | &F0 | Set To Factory-Defined Configuration | None | ITU-T V.250 |
| 66 | +CNMI | New Message Indications | Currently supports (see AT+CNMI=? result): (1,2),(0-2),(0,2),(0-2),(0-1) Use test command AT+CNMI=? to retrieve more updated limitations. | Rev12 |
| 67 | +CSCA | Service Centre Address | None | Rev12 |

| | | | | |
|----|---------|---|---|---------------|
| 68 | +CSMP | Set Text Mode Parameters | Currently supports (see AT+CSMP=? result): (1,17,33,49,65,81,97,113),(0-255),(0),(0,4,8) Use test command AT+CSMP=? to retrieve more updated limitations. | Rev12 |
| 69 | +CSMS | Select Message Service | None | Rev12 |
| 71 | +CSDH | Show text mode parameters | None | Rev12 |
| 73 | +CUSATA | Activate USAT profile and enable unsolicited +CUSATP | None | Rev10 |
| 74 | +CMGW | Write Message to Memory | None | Rev12 |
| 75 | +CMSS | Send SMS from storage | None | Rev12 |
| 76 | &K | Flow Control | FAST UART only. Support only &K0 and &K3 | Rockwell Rev4 |

3.4 3GPP AT Commands Supported

The tables below detail the standard 3GPP AT commands supported by the Type 1SC system software solution, per release.

Table 3-2 Proprietary AT Command Set Supported

| ID | AT Command / URC |
|-------------|--|
| AT%GETCFG | Get a configuration field from NV memory |
| AT%SETCFG | Set a configuration field in NV memory |
| AT%VER | Display all FW versions (SB/MAC/PHY/ASIPS) |
| AT%CSQ | Signal Quality (includes RSRQ) |
| AT%CPININFO | Returns the number of attempts left for PIN and PUK |
| AT%STATUS | Get entity status |
| AT%MEAS | Returns measurement for specified measurement type |
| AT%SCAN | Return the last RSSI scan results |
| AT%PPPAUTH | Defines APN authentication parameters |
| AT%PPPCFG | Configures security parameters of PPP (CHAP) session |
| AT%CCID | Reads the ICCID from SIM EFICCID |
| AT%TSTRF | Simple RF test mode |

3.5 AT-Commands

3.5.1 AT%GETCFG

Description: Get configuration from NV memory

Use: AT%GETCFG=<param1>,<param2>

Table 3-3 AT%GETCFG command syntax

| Purpose | Param1 | Param2 | Returns |
|---|------------------|---|---|
| Reads device's image in focus from NV | "IMG" | | "HOST", "1", "2" |
| Reads device's log module severity from NV | "LOG" | "SYS", "L1A", "MAC", "MACGN", "MACUL", "MACDL", "RLC", "RLCGN", "RLCUL", "RLCGL", "PDCP", "PDCPGN", "PDCPUL", "PDCPDL", "RRC", "VL1", "NAS", "USIM", "FRM", "ROHC", "PROF0", "PROF1", "PROF2", "PROF4", "PROF6", "OSAL", "SERV", "PACKET_CLASS", "EXCEPTION_MANAGER", "SIMLOCK", "DT", "SMS", "AT", "AMA" | "DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG" |
| Reads device's log severity of all modules from NV | "LOG" | "ALL" | "DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG" |
| Read bands defined in DOP/MDOP file, these bands are the ones to be calibrated and scanned at full scan | "BAND" | | |
| Read the device's USIM simulator enable/disable in NV | "USIM_SIMULATOR" | | <ul style="list-style-type: none"> ● 0: Disabled ● 1: Enabled |
| Read the device's stored cell feature state (enable/disable) in NV | "SC_STATE" | | <ul style="list-style-type: none"> ● 0: Disabled ● 1: Enabled |
| Read Customer Id from NV | "CUSTOMER_ID" | | Customer ID written by manufacturer |
| Read heating traffic control params | "HEATING_TC" | | |
| Reads if the device should disable the reset on assert feature | "DISABLE_RESET" | | <ul style="list-style-type: none"> ● 0: Enabled ● 1: Disabled |

| Purpose | Param1 | Param2 | Returns |
|---|---------------------------|--|--|
| Reads min pause interval between unsuccessful scanning | "REPOSE_MIN" | | Time in seconds |
| Reads max pause interval between unsuccessful scanning | "REPOSE_MAX" | | Time in seconds |
| Reads incremental step interval between unsuccessful scanning | "REPOSE_STEP" | | <ul style="list-style-type: none"> • Time in seconds for linear mode. • 1: For exponent mode |
| Reads power save mode for Idle/Connected RRC state. Reads also power save mode for not in service states. | "PW_MODE" | | <ul style="list-style-type: none"> • 0: SW Default • 2: Shallow (Lite) sleep • 3: Deep sleep • 4: Disabled • 5: Deep hibernation • 8: Lite hibernation • 9: Nap (for Idle, No Service and Connected states) |
| Get 3GPP Rev. 9 enable flag – currently affects only CapabilityInformation reporting | "LTE_RELEASE_NUM" | | <ul style="list-style-type: none"> • SW default • Release 8 • Release 9 • Release 10 • Release 11 • Release 12 • Release 13 |
| Read heating shutdown enable flag | "HEATING_SD_ENABLE" | | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled |
| Read heating shutdown control params | "HEATING_SD_PARAM" | | |
| Reads if PHY logger mechanism is disabled | "PHY_LOG_DISABLE" | | <ul style="list-style-type: none"> • 0: Enabled • 1: Disabled |
| Reads Scan Plan feature enabled flag | "SCAN_PLAN_ENABLE" | | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled |
| Reads Scan List row | "SCAN_LIST" | [row_index] (1-40) If omitted, whole list is reported. | <ul style="list-style-type: none"> • Enabled (0 or 1) • band • EARFCN start • EARFCN end • EARFCN step |
| Reads if device IPv4 source filtering is disabled | "IPV4_SRC_FILTER_DISABLE" | | <ul style="list-style-type: none"> • 0: Enabled • 1: Disabled |
| Reads if device IPv6 source filtering is disabled | "IPV6_SRC_FILTER_DISABLE" | | <ul style="list-style-type: none"> • 0: Enabled • 1: Disabled |

| Purpose | Param1 | Param2 | Returns |
|---|---------------------|--------|--|
| Reads device stateless DHCPv6 configuration | "STATELESS_DHC PV6" | | <ul style="list-style-type: none"> ● 0: SW default ● 1: Enabled in proxy mode ● 2: Enabled in tunnel mode ● 3: Disabled |
| Reads NW Operator Mode flag used to enable operator-specific features | "NW_OPER_MODE" | | <ul style="list-style-type: none"> ● 0: Standard 3GPP ● 1: VZW ● 2: CMCC ● 3: RIL ● 4: KDDI ● 5: AT&T ● 6: USCC ● 7: DoCoMo ● 8: SBM ● 9: LGU+ ● 10: KT ● 11: T-Mobile ● 12: SKT ● 13: CTC |
| Reads if scan plan "Verify BW" feature is enabled | "SP_CELL_BW_EN " | | <ul style="list-style-type: none"> ● 0: Disabled ● 1: Enabled |
| Reads if 32KHz clock correction mechanism is enabled | "DS_32K_CORR_EN" | | <ul style="list-style-type: none"> ● 0: Disabled ● 1: Enabled |
| Reads the test mode status | "ENABLE_TEST_MODE" | | <ul style="list-style-type: none"> ● 0: Normal ● 1: GCF Mode ● 2: RRM Mode ● 3: Data throughput ● 4: VZW field trial ● 6: UICC tests ● 7: CMCC auto/man switch) 8: Control Plain tests |
| Reads Terminal Profile (TP) default download policy | "DL_TP_DEF" | | <ul style="list-style-type: none"> ● 0: SW default ● 1: MT ● 2: MT & TE ● 3: Halt |
| Reads run-time Terminal Profile (TP) overridden download policy | "DL_TP_OVR" | | <ul style="list-style-type: none"> ● 0: Disabled ● 1: MT ● 2: MT & TE ● 3: Halt |
| Reads scan plan mode | "SP_MODE" | | <ul style="list-style-type: none"> ● 0: SW Default ● 1: Limited ● 2: Mixed |

| Purpose | Param1 | Param2 | Returns |
|--|----------------------------|--------|---|
| Reads scan plan scheduling scheme | "SP_SCHED_SCHEME" | | <ul style="list-style-type: none"> 0: Periodic regular 1: Periodic triggered by max repose timer |
| Reads scan plan scheduling counter | "SP_SCHED_COUNTER" | | 0-255 |
| Reads SIM RX-TX delay | "SIM_RX_TX_DELAY" | | <ul style="list-style-type: none"> 0: SW default 1-254: Delay in msec 255: No delay |
| Reads scan plan PLMN selection method | "SP_PLMN_SELECTION_METHOD" | | <ul style="list-style-type: none"> 0: Domestic PLMN only 1: Any PLMN selected |
| Reads MRU table update disabled status | "MRU_UPD_DISABLE" | | <ul style="list-style-type: none"> 0: Enabled 1: Disabled |
| Reads MRU table used entries | "MRU_ENTRIES_USED" | | <ul style="list-style-type: none"> 0: SW default 1-254 255: Unlimited |
| Reads MRU table NBS usage disable status | "MRU_NBS_DISABLE" | | <ul style="list-style-type: none"> 0: Enabled 1: Disabled |
| Reads MRU table entry aging disable status | "MRU_ENTRY_AGING_DISABLE" | | <ul style="list-style-type: none"> 0: Enabled 1: Disabled |
| Reads LTE DL Category settings | "LTE_DL_CATEGORY" | | <ul style="list-style-type: none"> 0: CAT0 6: CAT6 7: CAT7 9: CAT9 10: CAT10 11: CAT11 12: CAT12 13: CAT13 14: CAT14 15: CAT15 16: CAT16 17: CAT17 101: CAT-M1 |
| Reads LTE UL Category settings | "LTE_UL_CATEGORY" | | <ul style="list-style-type: none"> 0: CAT0 3: CAT3 5: CAT5 7: CAT7 8: CAT8 9: CAT9 13: CAT13 14: CAT14 101: CAT-M1 |

| Purpose | Param1 | Param2 | Returns |
|---|-------------------------|---|---|
| Reads PPI capability settings | "PPI_CAP_EN" | | <ul style="list-style-type: none"> 0: Disabled 1: Enabled |
| Reads autonomous gap capability setting | "AUTO_GAP_CAP" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads reconnection recovery delay value | "NW_RECONN_DELAY" | | <ul style="list-style-type: none"> 0: SW default 1-10: Delay in sec 255: Immediate reconnection |
| Reads the device VLSM mode | "IP_VLSM_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads reconnection recovery control flag setting | "NW_RECONN_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Disabled 2: Enabled |
| Reads ROHC profile status | "ROHC" | "PROF0" "PROF1" "PROF2" "PROF0101" "PROF0102" | <ul style="list-style-type: none"> 0: Disabled 1: Enabled |
| Reads max number of ROHC contexts | "ROHC_MAX_CONTEXT_NUM" | | <ul style="list-style-type: none"> 0: SW default 2, 4, 8, 12, 16, 24, 32, 48, 64, 128, 256, 512, 1024 |
| Reads MAC severity override value | "MAC_LOG_SEV" | | <ul style="list-style-type: none"> 0: SW default 1: Debug 6: Informational 7: Notice 8: Warning 9: Error 12: Emergency 255: Disable |
| Reads power save debug and field trial parameters | "PS_DBG_PARM" | | 0: SW default Binary value in quotes |
| Reads NP tolerance override flag | "NP_TOUT_OVERRIDE_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads NP tolerance timeout value | "NP_TOUT_TOLERANCE" | | <ul style="list-style-type: none"> 0: Param not in use 3000-(232-1) (ms) |
| Reads MAC FW max sleep modes wakeup timeout to pool non-ISR IOs | "PS_IO_POLL_TIMEOUT" | | <ul style="list-style-type: none"> 0: SW Default (10sec) 1-255 (sec) |
| Reads the device SIM pool suspend mode | "SIM_POLL_SUSPEND_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |

| Purpose | Param1 | Param2 | Returns |
|---|----------------------|--------|---|
| Reads FGI bit reporting filter | "FGI_REPORT_FILTER" | | [b1[,b2[,...[,b16]...]] bit (b) Values: 1-(max FGI#) |
| Reads CE mode A enable flag | "CE_MODE_A_EN" | | <ul style="list-style-type: none"> 0: Disabled 1: Enabled |
| Reads CE mode B enable flag | "CE_MODE_B_EN" | | <ul style="list-style-type: none"> 0: Disabled 1: Enabled |
| Reads the scan scheduling schema used for wakeup/reset | "SC_POST_NON_OPER" | | <ul style="list-style-type: none"> 0: Old regular scheme 1: Schema #1 2: Schema #2 3: Schema #3 |
| Reads the scan scheduling schema used for exit flight mode | "SC_IN_LIMITED_SERV" | | <ul style="list-style-type: none"> 0: Old regular scheme 1: Schema #1 2: Schema #2 3: Schema #3 |
| Reads the scan scheduling schema used for after unrecovered RLF | "SC_POST_RLF" | | <ul style="list-style-type: none"> 0: Old regular scheme 1: Schema #1 2: Schema #2 3: Schema #3 |
| Reads scan scheduling repose scheme#1 | "REPOSE_SCHEME1" | | [minT1, maxT1, step1, rep1 [...[,minT8, maxT8, step8, rep8]] |
| Reads scan scheduling repose scheme#2 | "REPOSE_SCHEME2" | | [minT1, maxT1, step1, rep1 [...[,minT8, maxT8, step8, rep8]] |
| Reads scan scheduling repose scheme#3 | "REPOSE_SCHEME3" | | [minT1, maxT1, step1, rep1 [...[,minT8, maxT8, step8, rep8]] |
| Reads MO TC1M timeout value | "SMS_TC1M_TOUT_MO" | | 0, 1-45 |
| Reads MT TC1M timeout value | "SMS_TC1M_TOUT_MT" | | 0, 1-45 |
| Reads TR1M timeout value | "SMS_TR1M_TOUT" | | 0, 35-45 |
| Reads TRAM timeout value | "SMS_TRAM_TOUT" | | 0, 25-35 |
| Reads TR2M timeout value | "SMS_TR2M_TOUT_MO" | | 0, 12-20 |
| Reads (AT+CMMS) timeout value | "SMS_CMMS_TOUT" | | 0, 1-5 |
| Reads maximum number of CP DATA message retransmissions | "SMS_MAX_CPDATA_RET" | | 0, 1-3 |
| Reads RF antenna override value | "RF_ANT_OVERRIDE" | | <ul style="list-style-type: none"> 0: No override 1: Single antenna |

| Purpose | Param1 | Param2 | Returns |
|--|-----------------------------|--------|---|
| Reads active mode optimization flag value | "PS_ACT_MODE_OPT" | | <ul style="list-style-type: none"> • 0: SW default • 1: No optimization • 2: Lite optimization |
| Reads dual SIM configuration | "SIM_DUAL_CONFIG" | | <ul style="list-style-type: none"> • 0: SW default • 1: Single SIM • 2: Dual SIM |
| Reads wakeup SIM selection policy | "SIM_INIT_SELECTION_POLICY" | | <ul style="list-style-type: none"> • 0: N/A -single SIM • 1: SIM1 only • 2: SIM2 only • 3: SIM1 with fallback to SIM2 • 4: SIM2 with fallback to SIM1 • 5: iUICC |
| Reads Deep Sleep voltage override value | "DS_VOLTAGE_OVERRIDE" | | <ul style="list-style-type: none"> • 0: SW default • 1: 0.8V • 2: 0.95V |
| Reads if normal attach in roaming is disabled | "NA_ROAM_DIS" | | <ul style="list-style-type: none"> • 0: Enabled • 1: Disabled |
| Reads if capability reporting of Specific Reference Signal is disabled | "CAP_REF_SIG_SUP_DIS" | | <ul style="list-style-type: none"> • 0: Enabled • 1: Disabled |
| Reads if capability reporting of RACH Report from SON-Parameters is disabled | "CAP_SON_RACH_REP_DIS" | | <ul style="list-style-type: none"> • 0: Enabled • 1: Disabled |
| Reads device mobility type flag | "PS_DEV_MOB_TYPE" | | <ul style="list-style-type: none"> • 0: SW default • 1: Mobile • 2: Static |
| Reads rich scan enable flag | "RICH_SCAN_EN" | | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled |
| Reads PMP severity override value | "PMP_LOG_SEV" | | <ul style="list-style-type: none"> • 0: SW default • 1: Debug • 6: Informational • 7: Notice • 8: Warning • 9: Error • 12: Emergency • 255: Disable |
| Reads the device eCP mode | "DL_ECP_MODE" | | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled |
| Reads the device CA mode | "CAP_CA_MODE" | | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled |

| Purpose | Param1 | Param2 | Returns |
|---|-------------------------|--------|---|
| Reads Connected mode DRX capability setting | "DRX_CAPABILITY_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Disabled 2: Long DRX 3: Long and short DRX |
| Reads Idle mode DRX special paging cycle negotiated value | "DRX_SPEC_PAG_CYCLE" | | <ul style="list-style-type: none"> 0: Not applied 1: 320 ms 2: 640 ms 3: 1280 ms 4: 2560 ms |
| Reads TX antenna selection capability override value | "TX_ANT_SEL_CAP" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads FGI filter bit/technology reporting list | "FGI_REPORT_LIST" | | [b1,t1[,b2,t2[,...[,b16,t16]...]] bit (b) values: <ul style="list-style-type: none"> 1-(max FGI#) Tech (t) values: <ul style="list-style-type: none"> 0: Both 1: FDD 2: TDD |
| Reads device LPA presence flag | "DEV_LPA_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads TE LPA Terminal Capability (TC) | "TE_LPA_TC" | | (hex value) |
| Reads modem failure fast recovery flag | "MD_FAIL_FAST_RECOVERY" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads capability override flag for NW-based power consumption optimizations | "CAP_DEV_TYPE" | | <ul style="list-style-type: none"> 0: SW default 1: No NW-based power consumption optimisation |
| Reads PHY TX indication override flag | "PHY_TX_IND_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads modem CAT operating mode flag | "MT_CAT_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads NAS scan stop control flag | "NAS_SCAN_CNTL" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads NAS scan stop criteria | "NAS_SCAN_STOP_CRIT" | | <ul style="list-style-type: none"> 0: SW default 1: Stop on RPLMN or HPLMN/EHPLMN |

| Purpose | Param1 | Param2 | Returns |
|---|------------------------|--------|--|
| Reads power save cell selection optimization flag | "PS_CELL_SEL_OPT" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads iUICC startup init mode | "ISIM_STARTUP_MODE" | | <ul style="list-style-type: none"> 0: SW Default 1: Standard init flow 2: Altair APDU init flow |
| Reads NB-IOT category | "NB_CATEGORY" | | <ul style="list-style-type: none"> 0: SW Default 1: NB1 |
| Reads country scan optimization mode | "COUNTRY_SCAN_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads country scan optimization counter | "COUNTRY_SCAN_COUNT" | | <ul style="list-style-type: none"> 0: Disabled 1: 255 |
| Reads the type of reset on assert and exception failure | "FAIL_RESET_TYPE" | | <ul style="list-style-type: none"> 0: SW default 1: Warm reset 2: Cold reset |
| Reads RFBP override flag for external VBAT control | "VBAT_FEM_EXT_CTRL" | | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled |
| Reads RFBP override flag for external VBAT GPIO pin | "VBAT_FEM_EXT_GPIO" | | <ul style="list-style-type: none"> 0: SW default 1-78 |
| Reads data (RLC TX/RX) inactivity timeout value | "DATA_INACTIVITY_TOUT" | | <ul style="list-style-type: none"> 0: Timer is disabled 1-255: 1-255 sec |
| Reads the mode of BW per band restrictions | "BW_PER_BAND_MODE" | | <ul style="list-style-type: none"> 0: SW default 1: Restriction enabled 2: Restriction disabled |
| Reads NB-IOT band edge power reduction flag | "NB_BE_EN" | | <ul style="list-style-type: none"> 0: Disabled 1: Enabled |
| Reads NB-IOT band edge reduced max TX power | "NB_BE_TX_PWR" | | Value in 100*dBm |

Note: In "LOG" sub-command next shortened module names: "MAC", "RLC" and "PDCP" works similar to wildcard and does not have their own severity to report and will report all related to each layer logs:

- "MAC": "MACGN", "MACUL", "MACDL"
- "RLC": "RLCGN", "RLCUL", "RLCDL"
- "PDCP": "PDCPGN", "PDCPUL", "PDCPDL"

3.5.2 AT%SETCFG

Description:

- Set a configuration field in NV memory

Use:

- AT%SETCFG=<param1>,<param2>,<param3>,<param4>,<param5>

Table 3-4 AT%SETCFG command syntax

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|---|------------------|---|---|--------|--------|
| Sets device's image in focus in NV | "IMG" | "HOST", "1", "2" | | | |
| Sets device's log module severity in NV | "LOG" | "SYS", "L1A", "MAC", "MACGN", "MACUL", "MACDL", "RLC", "RLCGN", "RLCUL", "RLCGL", "PDCP", "PDCPGN", "PDCPUL", "PDCPDL", "RRC", "VL1", "NAS", "USIM", "FRM", "ROHC", "PROF0", "PROF1", "PROF2", "PROF4", "PROF6", "OSAL", "SERV", "PACKET_CLASS", "EXCEPTION_MANAGER", "SIMLOCK", "DT", "SMS", "AT", "AMA" | <ul style="list-style-type: none"> • "DEBUG" • "INFO" • "NOTICE" • "WARNING" • "ERROR" • "EMRG" | | |
| Sets device's log severity for all modules in NV | "LOG" | "ALL" | <ul style="list-style-type: none"> • "DEBUG" • "INFO" • "NOTICE" • "WARNING" • "ERROR" • "EMRG" | | |
| Sets device's USIM simulator enable/disable in NV | "USIM_SIMULATOR" | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|---|-----------------|--|---------------------------|-------------------------|--------|
| Set bands defined in DOP/MDOP file, these bands are the ones to be calibrated and scanned in full scan. | "BAND" | Band1[,Band2[... [,BandN]...]] | | | |
| Set stored cell feature state | "SC_STATE" | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled | | | |
| Set heating traffic control params | "HEATING_TC" | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled | Resume transmit threshold | Stop transmit threshold | |
| Sets if the device should disable the reset on assert feature | "DISABLE_RESET" | <ul style="list-style-type: none"> • 0: Enable • 1: Disable | | | |
| Sets min pause interval between unsuccessful scanning | "REPOSE_MIN" | <ul style="list-style-type: none"> • Time in seconds | | | |
| Sets max pause interval between unsuccessful scanning | "REPOSE_MAX" | Time in seconds | | | |
| Sets incremental step interval between unsuccessful scanning | "REPOSE_STEP" | <ul style="list-style-type: none"> • Time in seconds for linear mode. 1: For exponent mode | | | |
| Sets power save mode for Idle RRC state | "PW_IDLE" | <ul style="list-style-type: none"> • "DEFAULT": SW Default • "SHALLOW": Shallow (Lite) sleep • "DEEP": Deep sleep • "NONE": Disable • "LITEHBR": Lite hibernation • "NAP": Nap | | | |
| Sets power save mode for Connected RRC state | "PW_CONN" | <ul style="list-style-type: none"> • "DEFAULT": SW Default • "SHALLOW": Shallow (Lite) sleep • "NONE": Disable • "NAP": Nap | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|---|-------------------|--|---------------------|--------|--------|
| Sets power save mode for not in service states | "PW_NOSRVC" | <ul style="list-style-type: none"> • "DEFAULT": SW Default • "SHALLOW": Shallow (Lite) sleep • "DEEP": Deep sleep • "NONE": Disable • "LITEHBR": Lite hibernation • "NAP": Nap | | | |
| Sets power save mode for not in service states | "PW_PSM" | <ul style="list-style-type: none"> • "DEFAULT": SW Default • "DEEPHIBER": Deep hibernation | | | |
| Sets min interval to which shallow sleep may be applied | "PW_SS_MIN" | <ul style="list-style-type: none"> • Time in microseconds | | | |
| Sets estimated entry time to shallow sleep | "PW_SS_ENTRY" | Time in microseconds | | | |
| Sets estimated exit time from shallow sleep | "PW_SS_EXIT" | Time in microseconds | | | |
| Sets min interval to which deep sleep may be applied | "PW_DS_MIN" | Time in microseconds | | | |
| Sets estimated entry time to deep sleep | "PW_DS_ENTRY" | Time in microseconds | | | |
| Sets estimated exit time from shallow sleep | "PW_DS_EXIT" | Time in microseconds | | | |
| 3GPP Rev. 9 enable flag – currently affects only Capability Information reporting | "LTE_RELEASE_NUM" | <ul style="list-style-type: none"> • Default • Release 8 • Release 9 • Release 10 • Release 11 • Release 12 • Release 13 | | | |
| Sets heating shutdown enable flag | "HEATING_SD_EN" | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled | | | |
| Sets heating shutdown control params | "HEATING_SD_PRM" | <ul style="list-style-type: none"> • UL shutdown threshold | UL wakeup threshold | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|---|---------------------------|--|---|---|--|
| Sets if device shall disable PHY logger mechanism at wakeup | "PHY_LOG_DISABLE" | <ul style="list-style-type: none"> 0: Enable 1: Disable | | | |
| Sets Scan Plan feature enabled flag | "SCAN_PLAN_EN" | <ul style="list-style-type: none"> 0: Disabled 1: Enabled | | | |
| Sets Scan List Row | "SCAN_LIST" | <ul style="list-style-type: none"> 1–40 (Row index) | <ul style="list-style-type: none"> 0: Disabled 1: Enabled (Row enable flag) | [band] (band to scan, optional for disable) | [EARFCN step [,EARFCN start, EARFCN end]] (optional for disable. If omitted for enable setting, standard band params are used) |
| Sets extended band table (up to 10 bands) enable flag | "EXT_BAND_EN" | <ul style="list-style-type: none"> 0: Disabled 1: Enabled | | | |
| Sets if device shall disable IPv4 source filtering | "IPV4_SRC_FILTER_DISABLE" | <ul style="list-style-type: none"> 0: Enable 1: Disable | | | |
| Sets if device shall disable IPv6 source filtering | "IPV6_SRC_FILTER_DISABLE" | <ul style="list-style-type: none"> 0: Enable 1: Disable | | | |
| Sets device stateless DHCPv6 configuration | "STATELESS_DHCPV6" | <ul style="list-style-type: none"> 0: SW default 1: Enable in proxy mode 2: Enable in tunnel mode 3: Disable | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|--|--------------------|--|--------|--------|--------|
| Sets NW Operator Mode flag used to enable operator-specific features | "NW_OPER_MODE" | <ul style="list-style-type: none"> • 0: Standard 3GPP • 1: VZW • 2: CMCC • 3: RIL • 4: KDDI • 5: AT&T • 6: USCC • 7: DoCoMo • 8: SBM • 9: LGU+ • 10: KT • 11: T-Mobile • 12: SKT • 13: CTC | | | |
| Sets scan plan "Verify BW" feature enable flag | "SP_CELL_BW_EN" | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled | | | |
| Sets 32KHz clock correction mechanism enable flag | "DS_32K_CORR_EN" | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled | | | |
| Sets the test mode | "ENABLE_TEST_MODE" | <ul style="list-style-type: none"> • 0: Normal • 1: GCF Mode • 2: RRM Mode • 3: Data throughput • 4: VZW field trial • 6: UICC tests • 7: CMCC auto/man switch) • 8: Control Plain tests | | | |
| Sets Terminal Profile (TP) default download policy | "DL_TP_DEF" | <ul style="list-style-type: none"> • 0: SW default • 1: MT • 2: MT & TE • 3: Halt | | | |
| Sets run-time Terminal Profile (TP) overridden download policy | "DL_TP_OVERRIDE" | <ul style="list-style-type: none"> • 0: Disabled • 1: MT • 2: MT & TE • 3: Halt | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|--|--------------------|--|--------|--------|--------|
| Sets scan plan mode | "SP_MODE" | <ul style="list-style-type: none"> 0: SW Default 1: Limited 2: Mixed | | | |
| Sets scan plan scheduling scheme | "SP_SCHED_SCHEME" | <ul style="list-style-type: none"> 0: Periodic regular 1: Periodic triggered by max repose timer | | | |
| Sets scan plan scheduling scheme | "SP_SCHED_COUNTER" | <ul style="list-style-type: none"> 0-255 | | | |
| Sets SIM RX-TX delay | "SIM_RX_TX_DELAY" | <ul style="list-style-type: none"> 0: SW default 1-254: Delay in msec 255: No delay | | | |
| Sets scan plan PLMN selection method | "SP_PLMN_SEL_MET" | <ul style="list-style-type: none"> 0: Domestic PLMN only 1: Any PLMN | | | |
| Sets MRU table disable flag for table update | "MRU_UPD_DIS" | <ul style="list-style-type: none"> 0: Enable 1: Disable | | | |
| Sets MRU table used entries number | "MRU_ENT_USED" | <ul style="list-style-type: none"> 0: SW Default 1-254 255: Unlimited | | | |
| Sets MRU table disable flag for NBS usage | "MRU_NBS_DIS" | <ul style="list-style-type: none"> 0: Enable 1: Disable | | | |
| Sets MRU table disable flag for entry aging | "MRU_AGING_DIS" | <ul style="list-style-type: none"> 0: Enable 1: Disable | | | |
| Reset MRU table to all zeros | "MRU_RESET" | <ul style="list-style-type: none"> 1: Apply reset | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|--|-------------------------|---|--------|--------|--------|
| Sets specific LTE DL Category overridden value | "LTE_DL_CATEGORY" | <ul style="list-style-type: none"> • 0: CAT0 • 6: CAT6 • 7: CAT7 • 9: CAT9 • 10: CAT10 • 11: CAT11 • 12: CAT12 • 13: CAT13 • 14: CAT14 • 15: CAT15 • 16: CAT16 • 17: CAT17 • 101: CAT-M1 | | | |
| Sets specific LTE UL Category overridden value | "LTE_UL_CATEGORY" | <ul style="list-style-type: none"> • 0: CAT0 • 3: CAT3 • 5: CAT5 • 7: CAT7 • 8: CAT8 • 9: CAT9 • 13: CAT13 • 14: CAT14 • 101: CAT-M1 | | | |
| Sets PPI capability enable flag | "PPI_CAP_ENABLE" | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled | | | |
| Sets autonomous gap capability flag | "AUTO_GAP_CAP" | <ul style="list-style-type: none"> • 0: SW default • 1: Enable • 2: Disable | | | |
| Sets reconnection recovery delay value | "NW_RECONNECTION_DELAY" | <ul style="list-style-type: none"> • 0: SW default • 1–10: Delay in sec • 255: Immediate reconnection | | | |
| Sets the device VLSM mode | "IP_VLSM_MODE" | <ul style="list-style-type: none"> • 0: SW default • 1: Enable • 2: Disabled | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|--|-------------------------|--|---|--------|--------|
| Sets reconnection recovery control flag | "NW_RECONN_MODE" | <ul style="list-style-type: none"> 0: SW default 1: Disable 2: Enable | | | |
| Sets ROHC profile status | "ROHC" | <ul style="list-style-type: none"> "PROF0" "PROF1" "PROF2" "PROF0101" "PROF0102" | <ul style="list-style-type: none"> 0: Disable 1: Enable | | |
| Sets max number of ROHC contexts | "ROHC_MAX_NUM" | <ul style="list-style-type: none"> 0: SW default 2, 4, 8, 12, 16, 24, 32, 48, 64, 128, 256, 512, 1024 | <ul style="list-style-type: none"> | | |
| Sets MAC severity override value | "MAC_LOG_SEV" | <ul style="list-style-type: none"> 0: SW default 1: Debug 6: Info 7: Notice 8: Warning 9: Error 12: Emergency 255: Disable | | | |
| Sets power save debug and field trial parameters | "PS_DBG_PARAM" | <ul style="list-style-type: none"> 0: SW default Binary value in quotes | | | |
| Sets NP tolerance override flag | "NP_TOUT_OVERRIDE_MODE" | <ul style="list-style-type: none"> 0: SW default 1: Enable 2: Disable | | | |
| Sets NP tolerance timeout value | "NP_TOUT_TOLERANCE" | <ul style="list-style-type: none"> 0: Param not in use 3000–(232-1) (ms) | | | |
| Sets MAC FW max sleep modes wakeup timeout to pool non-ISR IOs | "PS_IO_POOL_TOUT" | <ul style="list-style-type: none"> 0: SW Default (10sec) 1-255 (sec) | | | |
| Sets the device SIM pool suspend mode | "SIM_POLL_SUSP_MODE" | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|--|-------------------------|---|--------|--------|--------|
| Sets FGI bit reporting filter | "FGI_REPORT_FILTER" | <ul style="list-style-type: none"> ["b1","b2",...,"b16"...] bit values: "1"-"(max FGI#)"Empty set erases all values. max FGI# is LTE Release dependent | | | |
| Sets CE mode A enable flag | "CE_MODE_A_EN" | <ul style="list-style-type: none"> 0: Disabled 1: Enabled | | | |
| Sets CE mode B enable flag | "CE_MODE_B_EN" | <ul style="list-style-type: none"> 0: Disabled 1: Enabled | | | |
| Sets scan scheduling schema used for wakeup/reset | "SC_POST_NON_OPER" | <ul style="list-style-type: none"> 0: Old regular scheme 1: Schema #1 2: Schema #2 3: Schema #3 | | | |
| Sets scan scheduling schema used for exit flight mode | "SC_IN_LIMITED_SERVICE" | <ul style="list-style-type: none"> 0: Old regular scheme 1: Schema #1 2: Schema #2 3: Schema #3 | | | |
| Sets scan scheduling schema used for after unrecovered RLF | "SC_POST_RLF" | <ul style="list-style-type: none"> 0: Old regular scheme 1: Schema #1 2: Schema #2 3: Schema #3 | | | |
| Sets scan scheduling repose scheme#1 | "REPOSE_SCHEME1" | <ul style="list-style-type: none"> [minT1,maxT1,step1,rep1,...,minT8,maxT8,step8,rep8] | | | |
| Sets scan scheduling repose scheme#2 | "REPOSE_SCHEME2" | <ul style="list-style-type: none"> [minT1,maxT1,step1,rep1,...,minT8,maxT8,step8,rep8] | | | |
| Sets scan scheduling repose scheme#3 | "REPOSE_SCHEME3" | <ul style="list-style-type: none"> [minT1,maxT1,step1,rep1,...,minT8,maxT8,step8,rep8] | | | |
| Sets MO TC1M timeout value | "SMS_TC1M_TOUT_MO" | 0, 1-45 | | | |
| Sets MT TC1M timeout value | "SMS_TC1M_TOUT_MT" | 0, 1-45 | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|---|--------------------------|---|--------|--------|--------|
| Sets TR1M timeout value | "SMS_TR1M_TOUT" | 0, 35-45 | | | |
| Sets TRAM timeout value | "SMS_TRAM_TOUT" | 0, 25-35 | | | |
| Sets TR2M timeout value | "SMS_TR2M_TOUT_MONTH" | 0, 12-20 | | | |
| Reads (AT+CMMS) timeout value | "SMS_CMMS_TOUT" | 0, 1-5 | | | |
| Sets Maximum number of CP DATA message retransmissions | "SMS_MAX_CPDATA_RET" | 0, 1-3 | | | |
| Sets RF antenna override value | "RF_ANT_OVERRIDE" | <ul style="list-style-type: none"> 0: No override 1: Single antenna | | | |
| Sets active mode optimization flag value | "PS_ACT_MODE_OPT" | <ul style="list-style-type: none"> 0: SW default 1: No optimization 2: Lite optimization | | | |
| Sets dual SIM configuration | "SIM_DUAL_CONFIG" | <ul style="list-style-type: none"> 0: SW default 1: Single SIM 2: Dual SIM | | | |
| Sets wakeup SIM selection policy | "SIM_INIT_SELECT_POLICY" | <ul style="list-style-type: none"> 0: N/A -single SIM 1: SIM1 only 2: SIM2 only 3: SIM1 with fallback to SIM2 4: SIM2 with fallback to SIM1 5: iUICC (for ALT1250 only) | | | |
| Sets Deep Sleep voltage override value | "DS_VOLTAGE_OVERRIDE" | <ul style="list-style-type: none"> 0: SW default 1: 0.8V 2: 0.95V | | | |
| Sets normal attach in roaming disabled flag | "NA_ROAM_DIS" | <ul style="list-style-type: none"> 0: Enable 1: Disable | | | |
| Sets capability reporting of Specific Reference Signal flag | "CAP_REF_SIG_SUP_DIS" | <ul style="list-style-type: none"> 0: Enable 1: Disable | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|--|------------------------|--|--------|--------|--------|
| Sets if capability reporting of RACH Report from SON-Parameters flag | "CAP_SON_RACH_REP_DIS" | <ul style="list-style-type: none"> • 0: Enable • 1: Disable | | | |
| Sets device mobilitytype flag | "PS_DEV_MOB_TYPE" | <ul style="list-style-type: none"> • 0: SW default • 1: Mobile • 2: Static | | | |
| Sets rich scan enable flag | "RICH_SCAN_EN" | <ul style="list-style-type: none"> • 0: Disabled • 1: Enabled | | | |
| Sets PMP severity override value | "PMP_LOG_SEV" | <ul style="list-style-type: none"> • 0: SW default • 1: Debug • 6: Info • 7: Notice • 8: Warning • 9: Error • 12: Emergency • 255: Disable | | | |
| Sets the device eCP mode | "DL_ECP_MODE" | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled | | | |
| Sets Connected mode DRX capability setting | "DRX_CAPABILITY_MODE" | <ul style="list-style-type: none"> • 0: SW default • 1: Disabled • 2: Long DRX • 3: Long and short DRX | | | |
| Sets Idle mode DRX special paging cycle negotiated value | "DRX_SPEC_PAG_CYCLE" | <ul style="list-style-type: none"> • 0: Not applied • 1: 320 ms • 2: 640 ms • 3: 1280 ms • 4: 2560 ms | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|--|--------------------------|---|--------|--------|--------|
| Sets FGI filter bit/technology reporting list | "FGI_REPORT_LIST" | ["b1","t1"],["b2","t2"]...["b16","t16"]... bit (b) values: <ul style="list-style-type: none"> • "1"-"(max FGI#)" Tech (t) values: <ul style="list-style-type: none"> • 0: both • 1: FDD • 2: TDD Empty set erases all values. max FGI# is LTE Release dependent | | | |
| Sets device LPA presence flag | "DEV_LPA_MODE" | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled | | | |
| Sets TE LPA Terminal Capability (TC) | "TE_LPA_TC" | <ul style="list-style-type: none"> • (hex value) | | | |
| Sets modem failure fast recovery flag | "MD_FAIL_FAST_RECOVERY" | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled | | | |
| Sets capability override flag for NW-based power consumption optimizations | "CAP_DEV_TYPE" | <ul style="list-style-type: none"> • 0: SW default • 1: No NW-based power consumption optimization | | | |
| Sets PHY TX indication override flag | "PHY_TX_IND_MODE" | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled | | | |
| Sets modem CAT operating mode flag | "MT_CAT_MODE" | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled | | | |
| Sets NAS scan stop control flag | "NAS_SCAN_CNTL" | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled | | | |
| Sets NAS scan stop criteria | "NAS_SCAN_STOP_CRITERIA" | <ul style="list-style-type: none"> • 0: SW default • 1: stop on RPLMN or HPLMN/EHPLMN | | | |
| Reads power save cell selection optimization flag | "PS_CELL_SELECTION_OPT" | <ul style="list-style-type: none"> • 0: SW default • 1: Enabled • 2: Disabled | | | |

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|--|---------------------------|--|--------|--------|--------|
| Sets iUICC startup init mode | "ISIM_STARTUP_MODE" | <ul style="list-style-type: none"> 0: SW Default 1: Standard init flow 2: Altair APDU init flow | | | |
| Sets NB-IOT category | "NB_CATEGORY" | <ul style="list-style-type: none"> 0: SW Default 1: NB1 | | | |
| Sets country scan optimization mode | "COUNTRY_SCAN_MODE" | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled | | | |
| Sets country scan optimization counter | "COUNTRY_SCAN_COUNTER" | <ul style="list-style-type: none"> 0: "255" | | | |
| Sets the type of reset on assert and exception failure | "FAIL_RESET_TYPE" | <ul style="list-style-type: none"> 0: SW default 1: Warm reset 2: Cold reset | | | |
| Sets RFBP override flag for external VBAT control | "VBAT_FEM_EXT_CTRL" | <ul style="list-style-type: none"> 0: SW default 1: Enabled 2: Disabled | | | |
| Sets RFBP override flag for external VBAT GPIO pin | "VBAT_FEM_EXT_GPIO" | <ul style="list-style-type: none"> 0: SW default 1-78 | | | |
| Sets data (RLC TX/RX) inactivity timeout value | "DATA_INACTIVITY_TIMEOUT" | <ul style="list-style-type: none"> 0: Timer is disabled 1-255: 1-255 sec | | | |
| Sets the mode of BW per band restrictions | "BW_PER_BAND_MODE" | <ul style="list-style-type: none"> 0: SW default 1: Restriction enabled 2: Restriction disabled | | | |
| Sets NB-IOT band edge power reduction flag | "NB_BE_ENABLE" | <ul style="list-style-type: none"> 0: Disabled 1: Enabled | | | |
| Sets NB-IOT band edge reduced max TX power | "NB_BE_TX_PWR" | <ul style="list-style-type: none"> Value in 100*dBm | | | |
| | | | | | |

Note: In "LOG" sub-command next shortened module names: "MAC", "RLC" and "PDCP" works like wildcard and will have effect on all related to each layer logs:

- "MAC": "MACGN", "MACUL", "MACDL"
- "RLC": "RLCGN", "RLCUL", "RLCDL"
- "PDCP": "PDCPGN", "PDCPUL", "PDCPDL"

3.5.3 AT%CULCKI

Table 3-5 AT%CULCKI Command Syntax

| Command | Possible Response(s) |
|--|--|
| AT%CULCKI=<fac>,<pass>,<index>,<net>],[<netsub>],[<sp>],[<corp>],[<imsi>],[<capacity>] | OK or Error |
| AT%CULCKI=<fac>,<pass>,<index>,<?> | %CULCKI:<active>,<capacity>,<net>,<netsub>,<sp>,<corp>,<imsi>] |
| AT%CULCKI? | ERROR Not supported |
| AT%CULCKI=? | %CULCKI: (list of supported <fac>s) |

Description:

%CULCKI is used to insert/modify, erase and query specific personalization information.

When all 4 initial parameters are provided and assuming the provided password matches the specific category password, the information provided will be loaded to the record referenced by index. If a record already exists, it will be rewritten with the new data. The specific information elements need to be included according to the category used.

The categories (facilities) currently supported on each chipset are reflected in AT%CULCKI=? test command response.

Useless irrelevant for selected category parameters shall be omitted in command line.

The optional <capacity> parameter is applied only to category “PN” (Network personalization), “PS” (IMSI personalization) for ALT1250 and per customer demand may be added to other categories. For “PN” it permits to define a range of MNCs within the same MCC. If parameter is omitted the <capacity>=1 is assumed.

When the command only includes the first 3 parameters the specific record referenced by fac and index will be erased and deactivated.

Including a “?” in the 4th parameter will return the values stored in the specific referenced record. This is a special execution AT format, it is not a regular read AT command.

Defined values:

<fac>:

- “PS” - SIM personalization info
- “PN” - Network personalization info
- “PU” - Network Subset personalization info
- “PP” - Service Provider personalization info

Values as defined in 27.007

<pass>:

- An up to 16 digit password for the specific category

<index>:

For ALT1250:

- 1-70

For other chipsets:

- 1-24 : record number for "PN" (Network) category
- 1-6 : record number for "PS" (SIM)category
- 1-70 : record number for "PU" (Network Subset) category

<net> : Network personalization information

<netsub> : Sub Network personalization information (not supported)

<sp> : Service Provider personalization information (not supported)

<corp> : Corporate personalization information (not supported)

<imsi> : Bytes 1-15 of IMSI for SIM personalization

<active> : indication if the queried category is locked (active) or not (1=active, 0=inactive)

<capacity>:

For set command:

For ALT1250:

- 1-999 - for "PN"
- 1 – 2³² – for "PS"
- 1 – for "PU" and "PP"

For other chipsets:

- 1-255 - for "PN"
- 1 – for "PS" and "PU"

For read command: number of MNCs within the same MCC:

- 0 – invalidated entry
- 1-999 capacity of valid (active) "PN" entry

Examples:

1. Set one network (PN) entry:

```
AT%CULCKI="PN", "12345678", 1, "310410"
```

OK

2. Set one IMSI entry:

```
AT%CULCKI="PS", "12345678", 1, , , , "26016000000374"
```

OK

3. Query for network entry:

AT%CULCKI="PN", "12345678", 1, ?

%CULCKI: 0, 1, "310410"

OK

4. Query for IMSI entry:

AT%CULCKI="PS", "12345678", 1, ?

%CULCKI: 0, 1, ,, ,, "260160000000374"

OK

5. Test command:

AT%CULCKI=?

%CULCKI: "PN", "PS"

OK

6. Setting Network subset lock PLMN 310/410 and Network subset of "01"

AT%CULCKI="PU", "12345678", 1, "310410", "01"

OK

7. Query the NW subset on index 1:

AT%CULCKI="PU", "12345678", 1, ?

%CULCKI: 0, 1, "310410", "01"

OK

3.5.4 AT%MASTERKEY

Table 3-6 AT%MASTERKEY Command Syntax

| Command | Possible Response(s) |
|------------------------|---|
| %MASTERKEY=<masterkey> | OK (always) |
| %MASTERKEY? | ERROR (OPERATION_NOT_ALLOWED) Operation is not supported |
| %MASTERKEY=? | ERROR (OPERATION_NOT_ALLOWED) Operation is not supported |

Description:

%MASTERKEY was added due to customer request, for the purpose of recovery process without the need for production tool. This command is used to verify the master key when the UE is blocked due to personalization counters overflowed or missing / unauthenticated PRSNP file.

Upon successful verification of the master key – the PRSNP file is automatically re-created with default values. The master key can be entered only one time per boot, following verifications (after the first) will be ignored.

The response for execution command always OK, no matter of the verification real result.

Note that is during production, the master key was not burned into OTP, then no verification of any master key will be successful, and recovery process is no possible.

The master key can be only digits, and always 16 digits long.

3.5.5 AT%VER

Table 3-7 AT%VER Command Syntax

| Command | Possible response(s) |
|--------------------|----------------------------------|
| %VER[=<component>] | <ver_info> |
| %VER? | ERROR (OPERATION_NOT_ALLOWED) |
| %VER=? | OK |

Description:

- Display SW/FW version information. Optional SW components (such as GPS, etc.) may be retrieved using optional <component> parameter. For “ALL” <component> parameter modem will return full version information including optional components, if present.

Defined values:

<ver_info> - version information

Example:

Using APP processor - no SB or 3B versions

```
MAC Revision: REL_DRAGONFLY_01_00_00_REV_139902
MAC Package Version: ALT1250_01_00_00_00_01_
FW MAC Build Time: May_25_2017_17_54_16
PHY Revision: 12.10.139844
PHY Build Time: May_25_2017_14_51_10
PHY Build Info: release
PMP Revision: 0
PMP Version: Unknown yet
PMP build time:
DSP Revision: 2776
BB Product: 1250
BB HW Revision: 10
RFIC_6200 Revision: 00 00
OK
```

3.5.6 AT%CSQ

Table 3-8 AT%CSQ Command Syntax

| Command | Possible response(s) |
|---------|---|
| %CSQ | %CSQ: <rsqi>,<ber>,<rsrq-signal quality> +CME ERROR: <err> |
| %CSQ? | ERROR (OPRATION_NOT_ALLOWED) Operation is not supported |
| %CSQ=? | %CSQ:(0-31,99),(0-7,99),(0-34,99) OK |

Description:

- Execution command returns received signal strength indication <rsqi>, channel bit error rate <ber> and <rsrq> signal quality.
- The TB (transport blocks) error rate will be used for the BER parameter. Read command is not supported.
- Test command returns the legend.

Defined values

<rsqi>:

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

<ber> (in percent):

- 0...7 as RXQUAL values in the table in TS 45.008 [20] subclause 8.2.4
- 99 not known or not detectable

<rsrq-signal quality>:

The reporting range of RSRQ is defined from -19.5 dB to -3 with 0.5 dB resolution.

- 0 less than -19.5 dB
- 1 -19.5 ... less than -19 dB
- 2 -19 ... less than -18.5 dB
-
- 32 -4 ... less than -3.5 dB
- 33 -3.5 ... less than -3 dB
- 34 -3 dB and greater
- 99 Not known, or not detectable

3.5.7 AT%CPININFO

Table 3-9AT%CPININFO Command Syntax

| Command | Possible Response(s) |
|--------------|--|
| %CPININFO | %CPININFO: <PIN attempts left>, <PUK attempts left>, <PIN2 attempts left>, PUK2 attempts left> |
| %CPININFO? | ERROR |
| %CPININFO =? | OK |

Description:

- Returns the number of attempts left for PIN and PUK

Use:

- AT%CPININFO

Returns:

- +CPININFO:
 - <PIN attempts left>
 - <PUK attempts left>
 - <PIN2 attempts left>
 - <PUK2 attempts left>
- PIN attempts left – number of failed tries to enter PIN, before it is blocked
- PUK attempts left – number of failed tries to enter PUK, before PUK is permanently blocked
- PIN2 attempts left – number of failed tries to enter PIN2, before it is blocked
- PUK2 attempts left – number of failed tries to enter PUK2, before PUK2 is permanently blocked.

For more information on the SIM LOCK functionality please refer to Altair's 'SIM LOCK application note'.

3.5.8 AT%STATUS

Table 3-10 AT%STATUS Command Syntax

| Command | Possible response(s) |
|-----------------------|---|
| %STATUS="<subsystem>" | For all subsystems except of AMBR: %STATUS: <subsystem>: <status> [,<status_info>] |
| %STATUS? | ERROR (OPERATION_NOT_ALLOWED) Operation is not supported |
| %STATUS=? | %STATUS: (list of supported <subsystem>s) |

Description

- Retrieves the current status of the specified UE subsystem
- Read command is not supported.

Defined values:

<subsystem>:

"INIT"

"AMBR"

"USIM"

"RRC"

"SEC"

"ROAM"

IPS

CSPS

"INCA" (interference noise cancellation flow)

"WDIS"

"UICC"

"TEMPM" – temperature monitor

"RFANT"

"DSIMA"

"PSM" – starting v6.2.5 & v1.2.0

"EMM"

"ATT"

"BOOT"

"CA"

"REGCMD"

<status>:

For "INIT":

"INIT: 0" – UE init process ongoing (calibration in progress)

“INIT: 1” – UE init process has finished (calibration complete)

“INIT: 2” – UE init process has finished (calibration complete) but with critical errors (SYS_CRITICAL). (SYS_CRITICAL)

For “USIM”:

“USIM: REAL USIM, LTE”

“USIM: REAL USIM, non-LTE”

“USIM: USIM SIMULATOR”

“USIM: NO USIM”

"USIM: INACTIVE USIM" - USIM is inactive (i.e, deactivated) or it is still in initialization process

"USIM: PERSONALIZATION ERROR"

"USIM: REMOTE USIM"

For “IPS”:

“IPS: 0” – UE IP stack works correctly.

“IPS: 1” – UE IP stack failure

For “AMBR”:

For each bearer with APN AMBR, it retrieves:

EPS bearer ID,

APN-AMBR downlink in kbps

APN-AMBR uplink in kbps

If no APN AMBR is defined, returns “No APN-AMBR is defined”

For “RRC”:

“RRC: IDLE”

“RRC: CONNECTED”

“RRC: UNKNOWN” – Used for all other states (init, standby, flight mode, etc.)

For “SEC”:

The compound status value contains:

SEC: AUTH: x NAS IALG: y1 NAS CALG: z1 AS IALG: y2 AS CALG: z2

Where the parameter range can be as follows:

AUTH: <0-6>

0 - No authentication request sent yet

1 - Authentication success - stored context

2 - Authentication success – new context

3 - Authentication failure - MAC failure

4 - Authentication failure - Synch failure

5 - Authentication failure - non-EPS authentication unacceptable

6 - Authentication failure – error unspecified

7 - Authentication Reject

IALG: <0-3, 99>

0 - EIA0 (null integrity algorithm)

1 - EIA1 (SNOW 3G integrity algorithm)

2 - EIA2 (128-bit AES integrity algorithm)

3 – EIA3 (128-bit ZUC integrity algorithm)

99 - Invalid

CALG: <0-3, 99>

0 - EEA0 (null ciphering algorithm)

1 - EEA1 (SNOW 3G ciphering algorithm)

2 - EEA2 (128-bit AES ciphering algorithm)

3 – EEA3 (128-bit ZUC ciphering algorithm)

99 - Invalid

For “ROAM”:

“ROAM: 0” – not roaming (UE isn’t camped at all or UE is camped on HPLMN/EHPLMN)

“ROAM: 1” – meaning UE is camped on VPLMN

For “CSPS”:

“CSPS: 0” - not registered or EPS_ONLY (PS) mode

“CSPS: 1” - EPS_COMBINED (CS/PS) mode

For “WDIS”:

“WDIS: 0” – enable signal detected

“WDIS: 1” – disable signal detected

For “UICC”:

“UICC: 0” – SIM is not inserted

“UICC: 1” – SIM inserted, init is in progress

“UICC: 2” – SIM init passed, wait for PIN unlock

“UICC: 3” – Personalization failed, wait for run-time depersonalization

“UICC: 4” – Activation completed. Reported when “Ready” state is reported by “AT+CPIN?”

“UICC: 5” – Activation completed. RAM cache also ready except for conditional caches of ISIM files (for IMS) and Phone book.

Note: The phone book (used on demand) is cached by first call of AT+CPBS execution command. Similarly, conditionally used IMS will trigger ISIM files caching by first call of AT%SCACHECMD execution command.

For “TEMPM”:

“TEMPM: 0” – normal UE operation

“TEMPM: 1” – heating protection applied

For “RFANT” – number of RF antennas in use:

o “RFANT: 1”

o “RFANT: 2”

o “RFANT: 4”

o “RFANT: 8”

For “DSIMA” – dual SIM status: active SIM ID in use (ALT1660 only)

“DSIMA: 0” – SIM not selected

“DSIMA: 1” – SIM1 selected

“DSIMA: 2” – SIM2 selected

For “PSM”:

“PSM: 0” – PSM is not active

“PSM: 1” – PSM is active

For “EMM”:

“EMM: 1” - EMM_NULL

“EMM: 2” - EMM_DEREGISTERED_NORMAL_SERVICE

“EMM: 3” EMM_DEREGISTERED_ATTEMPTING_TO_ATTACH

“EMM: 4” - EMM_DEREGISTERED_PLMN_SEARCH

“EMM: 5” - EMM_DEREGISTERED_NO_IMSI

“EMM: 6” - EMM_DEREGISTERED_ATTACH_NEEDED

“EMM: 7” - EMM_DEREGISTERED_NO_CELL_AVAILABLE

“EMM: 8” - EMM_DEREGISTERED_ATTACH_ACCEPT_RECEIVED

“EMM: 9” - EMM_DEREGISTERED_REGISTRATION_INITIATED

“EMM: 10” - EMM_DEREGISTERED_LIMITED_SERVICE

“EMM: 11” - EMM_REGISTERED_LIMITED_SERVICE

“EMM: 12” - EMM_REGISTERED_NORMAL_SERVICE

“EMM: 13” - EMM_REGISTERED_ATTEMPTING_TO_UPDATE

“EMM: 14” - EMM_REGISTERED_PLMN_SEARCH

“EMM: 15” - EMM_REGISTERED_UPDATE_NEEDED

“EMM: 16” - EMM_REGISTERED_NO_CELL_AVAILABLE

“EMM: 17” - EMM_REGISTERED_ATTEMPTING_TO_UPDATE_MM

“EMM: 18” - EMM_REGISTERED_IMSI_DETACH_INITIATED

“EMM: 19” EMM_REGISTERED_NO_CELL_AVAILABLE_PSM_ACTIVE

“EMM: 20” - EMM_REGISTERED_DEREGISTRATION_INITIATED
“EMM: 21”
EMM_REGISTERED_TRACKING_AREA_UPDATING_INITIATED
“EMM: 22” - EMM_REGISTERED_SERVICE_REQUEST_INITIATED
<status_info>:

It is an arbitrary status information text, determined by the UE manufacturer and containing additional information about status.

For “ATT”:

“ATT: 0” – detached
“ATT: 1” – normal attach
“ATT: 2” – attach without PDN
“ATT: 3” – emergency attach

For “BOOT”:

“BOOT: 0” – cold boot
“BOOT: 1” – warm boot

Examples:

**AT%STATUS="RRC"
%STATUS: RRC: CONNECTED
OK**

**AT%STATUS="USIM"
%STATUS: USIM: REAL USIM, LTE
or:
%STATUS USIM: REAL USIM, non-LTE
OK**

**AT%STATUS="SEC"
%STATUS: SEC: AUTH: 1 NAS IALG: 1 NAS CALG: 1 AS IALG: 2 AS CALG: 2
OK**

3.5.9 AT%MEAS

Table 3-11 AT%MEAS Command Syntax

| Command | Possible response(s) |
|-----------------------------|--|
| %MEAS <measurement type> | <p>For RSRP, RSRQ, SINR, RSSI:</p> <p>%MEAS: <measurement type>:Reported=<measurement value>, Rx0Tx0=<measurement value>,Rx0Tx1=<measurement value>, Rx1Tx0=<measurement value>,Rx1Tx1=<measurement value></p> <p>For Temperature, Path loss:</p> <p>%MEAS: <measurement type>:<measurement value></p> <p>For TX Power:</p> <p>%MEAS: <measurement type>:PUSCH=<measurement value>, PUCCH=<measurement value>, PRACH=<measurement value>, SRS=<measurement value></p> <p>For Signal Quality:</p> <p>%MEAS: Signal Quality:RSRP=<measurement value>,RSRQ=<measurement value>, SINR=<measurement value>,RSSI=<measurement value></p> <p>For Antenna relative phase:</p> <p>%MEAS: <measurement type>:TX0=<measurement value>,TX1=<measurement value>, TX2=<measurement value>,TX3=<measurement value>,Rx0RSSI=<measurement value>, Rx1RSSI=<measurement value> For RS_SNR:</p> <p>%MEAS: RS_SNR=<measurement value></p> <p>For RS_SINR:</p> <p>%MEAS: RS_SINR=<measurement value></p> <p>For Power Headroom:</p> <p>%MEAS: PHR=<measurement value>, PHR Level=<measurement value></p> <p>For per-antenna RSRP, RSRQ, SINR, RSSI (20-23):</p> <p>%MEAS:<measurement type>: Reported=<value>,Ant0=<value>,Ant1=<value> Reported=<value>,Ant0=<value>,Ant1=<value>[, Ant2=<value>,Ant3=<value> Ant4=<value>,Ant5=<value> Ant6=<value>,Ant7=<value>]</p> |

| Command | Possible response(s) |
|---------|---|
| | <p>For all NBS RSRP and RSRQ: %MEAS: EARFCN=<EARFCN>,CellID=<cell ID>,<measurement type>=<measurement value> [<CR><LF>%MEAS: EARFCN=<EARFCN>,CellID=<cell ID>,<measurement type>=<measurement value>] [...]</p> <p>For all neighboring NBS simultaneous RSRP and RSRQ reporting: %MEAS: EARFCN=<EARFCN>,CellID=<cell ID>,RSRP=<measurement value>, RSRQ=<measurement value> [<CR><LF>%MEAS:EARFCN=<EARFCN>,CellID=<cell ID>,<RSRP>=<measurement value>, RSRQ=<measurement value>] [...]</p> <p>For NBS RSRP in compressed format: %MEAS: NBS RSRP:<EARFCN>,<cell ID>,<measurement value>[, <EARFCN>,<cell ID>,<measurement value>[...]]</p> <p>For E-CID (AT%MEAS="95") in compressed format: %MEAS:ECID:<gcid>,<TimeDifIndex>,<ta>,<MCC>,<MNC>,<TAC>,<EARFCN>,<cell ID>,<SFN>,<RSRP>,<RSRQ> [,<EARFCN>,<cell ID>,<SFN>,<RSRP>,<RSRQ> [...]]</p> <p>For SINR of all eMBMS areas (type 94): %MEAS:MBMS SINR:Areald=<areald>,Avg=<measurement value>, Rx0=<measurement value>,Rx1=<measurement value> [<CR><LF>%MEAS:MBMS SINR:Areald=<areald>,Avg=<measurement value>, Rx0=<measurement value>,Rx1=<measurement value>] [...]</p> <p>The Network Time correspond to SFN of serving cell(AT%MEAS="93")in compressed format: %MEAS: NWTIME:<networkTTI>,<networkUtcTime></p> |
| %MEAS? | ERROR (OPRATION_NOT_ALLOWED) Operation is not supported |
| %MEAS=? | %MEAS: <list of supported measurements> |

Description:

- Command returns measurement for specified measurement type.
- For RSRP and RSRQ “Reported” measurement value is the averaged narrow-band measurement executed for serving eNB as defined in the spec.

Note: The SINR is not reported over the air, it’s “reported” value contains combined value of all antennas’ measurements.

- Signal Quality measurement type (8) returns together last serving cell measurements of RSRP, RSRQ, SINR and RSSI. The AT command response contains only “reported” values.
- For RSRP only the per antenna measurement value $RXyTXz$ ($y,z=0/1$) is the result of last non-averaged wide-band measurement used for debugging purposes.
- Only single “reported” value is supported for neighbor eNB measurements.
- Antenna relative phase measurement type (9) returns for each eNB TX antenna, the relative phase between UE RX antennas. Command returns also related RSSI measurement as per UE RX antennas.
- RS_SNR measurement type is implemented as per VZW Reqs-LTE_DataDevices.docx. Read command is not supported.

Defined values:

<Measurement type>:

- “0” - RSRP
- “1” - RSRQ
- “2” – SINR
- “3” – RSSI
- “4” – TX Power
- “5” – Temperature
- “6” – Pathloss
- “7” – CQI
- “8” – Signal Quality (RSRP & RSRQ & SINR & RSSI)
- “9” – Antenna relative phase. Starting v4.5.1
- “10” – RSRP reported value only
- “11” – RSRQ reported value only
- “12” – SINR reported value only
- “13” – RS_SNR (reference signal signal-to-noise ratio). Starting late v4.5.6

- “14” – RS_SINR (reference signal signal-to-interference-plus-noise ratio). Starting late v4.5.6
- “15” – Power Headroom
- “16” – “19” Reserved
- “20” – per-antenna RSRP
- “21” – per-antenna RSRQ
- “22” – per-antenna SINR
- “23” – per-antenna RSSI
- “24” – RI
- “25” – “92” Reserved
- “93” – Network Time alignment with SFN
- “94” – SINR of all eMBMS areas
- “95” – Measurements for E-CID
- “96” – RSRP for all detected NBS (same as 98) in compressed format:
 - in single line
 - each eNB measurement data (<EARFCN>,<cell ID>,<measurement value>) is separated by additional space.
- “97” – RSRP & RSRQ for all detected NBS
- “98” – RSRP for all detected NBS
- “99” – RSRQ for all detected NBS

<EARFCN>:

Decimal EARFC value

<gcid>:

The Global cell ID hexadecimal value (See AT%PCONI)

<TimeDifIndex>:

RxTxTimeDiff decimal index (as defined in 9.1.9.2 of 3GPP 36.133) of the measured cell. The value shall be reported by MAC based on RxTxTimeDiff reported by PHY. Be aware that RxTxTimeDiff used by the PHY is different from the value received by MAC CE and has better Ts granularity and accuracy.

<ta>: integer

Currently used Timing Advance value (N_{TA}) of the measured cell. The N_{TA} value is represented by index values of TA = 0, 1, 2, ..., 1282, where an amount of the time alignment is given by $N_{TA} = TA \times 16$ per [3GPP 36.213].

<mcc>: integer

A three-digit value indicating mobile country code as defined in ITU-T Recommendation E.212 Annex A.

<mnc>: integer.

A three-digit or two-digit value indicating the mobile network code as defined in ITU- T Recommendation E.212 Annex A.

<TAC>: string

Two byte tracking area code in hexadecimal format

<SFN>:

The decimal system frame number (SFN) of the measured cell during which the measurement have been performed. Since there is averaging over multiple SFN, it is advised to supply the latest SFN. If value is not available at the time of the query, command returns N/A (without quotes)

<cell ID>:

Decimal Physical Cell ID value<measurement value>

The measurement results are returned in native for each measurement units:

- dBm for RSRP, RSSI, Pathloss, SINR
- dB for RSRQ
- dBm for TX Power (for example, 2.5 dBm = 25)
- Degrees (°C) for Temperature
- Degrees (phase) & 256*dBM (RSSI) units for Antenna relative phase
- dB for RS_SNR, RS_SINR (for example, 2.5 dB = 25)

Measurement range:

- -140 <= RSRP <= 0
- -60 <= RSRQ <=0
- -128 <= SINR <= 40
- -26 <= TX Power <= 40
- -128 <= Temperature <= 128
- 0 <= CQI <= 15
- -12.0 <= RS_SNR, RS_SINR <= 40.0
- -23.0 <= PHR <=40.0

If RSRP/RSRQ measurement value for some antenna is not supported, command returns “N/S” – not supported indication for this specific antenna in the returned string.

If measurement value is not available at the time of the query (if the UE is not connected, for example), command returns N/A (without quotes) - not available indication for this specific antenna in the returned string.

<networkTTI>:

The subframe counter of the serving cell corresponds to the network UTC time. The subframe counter is a decimal running from 0 to 10239 (i.e. rollover at 10240) also known as TTI (Transmission Time Interval) counter.

<networkUtcTime>:

This field specifies the network UTC time which correspond to the specified TTI counter. The UTC time is a decimal counter of 1msec units counted since 00:00:00 on 1 January, 1900

Example:

```
AT%MEAS="0"  
%MEAS: RSRP: Reported = -80, Rx0Tx0 = -80, Rx0Tx1 = -76, Rx1Tx0 = -92,  
Rx1Tx1 = -82  
OK
```

```
AT%MEAS="8"  
%MEAS: Signal Quality: RSRP = -90, RSRQ = -8, SINR = 8, RSSI = -62  
OK
```

```
AT%MEAS="98"  
%MEAS: EARFCN=0, CellID=45, RSRP =76  
%MEAS: EARFCN=0, CellID=75, RSRP =82  
%MEAS: EARFCN=2620, CellID=40 RSRP =73  
OK
```

```
AT%MEAS="96"  
%MEAS: NBS RSRP: 40340,300,-92, 40340,171,-95  
OK
```

```
AT%MEAS="95"  
%MEAS:ECID: "09FBD146",3,234,35,"00C3",40340,15,-92,-8,40340,12,853,-95,-9  
OK
```

```
AT%MEAS="94"  
%MEAS: MBMS SINR: Areald = 1, Avg = -6, Rx0 = -8, Rx1 = -2  
%MEAS: MBMS SINR: Areald = 2, Avg = -5, Rx0 = -7, Rx1 = -1  
OK
```

3.5.10 AT%HTTPCFG

Table 3-12 AT%HTTPCFG Command Syntax

| Command | Possible response(s) |
|--|---|
| AT%HTTPCFG=<obj>,<profile_id>[,<param1>][,<param2>]... | OK or ERROR |
| AT%HTTPCFG? | ERROR (not supported) |
| AT%HTTPCFG=? | %HTTPCFG: (list of supported <cmd>s), (list of supported <profile_id>s) |

Description

- AT command to configure HTTP connection parameters.
- To start new HTTP connection the “NODES” parameters shall be defined at least.
- Other configurations may be omitted, default settings are used:
 - If “TLS” layer is not configured, unsecured connection will be established by default. It will be considered as misconfiguration if “NODES” URL requires security (https), but “TLS” layer is not configured. Any data access via AT%HTTPCMD/READ/SEND will be rejected for such misconfiguration.
 - If “IP” layer is not configured, default PDN will be used.
 - If “TIMEOUT” parameters are not configured, default parameters will be selected.
- To make this omission confidentially working, it is strictly recommended to call “CLEAR” sub-command before entering new configuration for previously used <profile_id>.
- Profile ID parameter is introduced to handle multiple pre-defined HTTP configuration settings. The unique ID for multi-profile configuration is assigned by user and then used for all following profile configurations via same AT%HTTPCFG, for data transfer and other operations (AT%HTTPSEND, AT%HTTPCMD) and for events (AT%HTTPEV/%HTTPEVU).

Defined Values

<obj>:

- “NODES” – configure client & server nodes parameters.
- “TLS” – configure TLS layer security parameters.
- “IP” – configure IP layer parameters.
- “TIMEOUT” – configure timeouts: server and host (switch)

-
- “CLEAR” – clear all previous settings for specified <profile_id>
<profile_id> - integer type; default or previously assigned <profile_id>:
 - 1-5 – multi-profile mode.

For “NODES”:

- <param1> - string type; URL or IP address.
- <param2> - string type; optional authentication user identification string for HTTP.
- <param3> - string type; optional authentication password for HTTP.

For “TLS”:

- <param1> - string type; TLS authentication mode:
 - 0 – mutual authentication (default)
 - 1 – authenticate client side only
 - 2 – authenticate server side only
- <param2> - integer type; TLS predefined authentication context (profile) previously configured by AT%CERTCFG.

For “IP”:

- <param1> - integer type; Session ID – numeric PDN identification defined in APN table for specified PDN. If omitted default data PDN is used unless configured differently by AT%SETRROUTE.

For “TIMEOUT”:

- <param1> - integer type; server response timeout. The default value is 120 sec (2 min). If server response is not arrived during this time, server timeout error will be reported via URC. Unit: seconds:
 - 1 - 65535

3.5.11 AT%HTTPCMD

Table 3-13 AT%HTTPCMD Command Syntax

| Command | Possible response(s) |
|---------------------------------------|--|
| AT%HTTPCMD=<cmd>,<profile_id>,[<uri>] | OK or ERROR |
| AT%HTTPCMD? | ERROR (not supported) |
| AT%HTTPCMD=? | %HTTPCMD: (list of supported <cmd>s), (list of supported <profile_id>s) |

Description

- AT command to communicate with HTTP server.
- All subcommands are unblocking.
- The information about command success or fail will be provided in %HTTPEVU URC.

Defined Values

<cmd>:

- “GET” – Trigger HTTP GET.
- “DELETE” – Trigger HTTP DELETE.

<profile_id> - integer type; previously assigned <profile_id>:

- 1-5 – multi-profile mode.

<uri> - string type; optional resource (URI) or requested object. If omitted the default IP/URL defined in AT%HTTPCFG will be used.

3.5.12 AT%HTTPSEND

Table 3-14 AT%HTTPSEND Command Syntax

| Command | Possible response(s) |
|---|---|
| AT%HTTPSEND=<cmd>,<profile_id>,[<data_len>], [<uri>][,<param1>,...] <CR><LF><data> | OK or ERROR |
| AT%HTTPSEND? | ERROR (not supported) |
| AT%HTTPSEND=? | %HTTPSEND: (list of supported <cmd>s),(list of supported <profile_id>s) |

Description

- AT command performs a POST or PUT request to HTTP server and triggers sending data to the server.
- The <data_len> parameter may be omitted in human debug mode of AT usage. In this use-case data end shall be signaled by Ctrl+Z pressing.
- The information about command success or fail will be provided in %HTTPEVU URC.

Defined Values

<cmd>:

- “PUT” – Trigger HTTP PUT.
- “POST” – Trigger HTTP POST.

<profile_id> - integer type; previously assigned <profile_id>:

- 1-5 – multi-profile mode.

<data_len> - integer type; actual data size in bytes received from server:

- 1 – 3000

<uri> - string type; optional resource (URI) or requested object. If omitted the default IP/URL defined in AT%HTTPCFG will be used.

<param1> - string type; optional HTTP Content-Type identifier. This parameter may be omitted, if default text/plain content is transferred.

3.5.13 AT%HTTPREAD

Table 3-15 AT%HTTPREAD Command Syntax

| Command | Possible response(s) |
|--------------------------------------|---|
| AT%HTTPREAD=<profile_id>[,<max_len>] | %HTTPREAD: <rcv_len>,<data_len> <CR><LF><data> OK or ERROR |
| AT%HTTPREAD? | ERROR (not supported) |
| AT%HTTPREAD=? | %HTTPREAD: list of supported <profile_id>(s) |

Description

- AT command is used to read the body of HTTP response.
- Once URC %HTTPEV informs about some operation confirmation or data received, this AT can be used to retrieve data provided by server.
- If <max_len> is omitted or set to 0, whole server data will be transferred.
- If <max_len> is less than actual <data_len>, the message will be truncated. The <rcv_len> different from <data_len> in AT command response indicates that message was truncated.
- If the data is not present for specified <profile_id>, command returns ERROR.
- Only single packet is stored internally per Profile ID. If it will not be retrieved by user after “GETRCV” URC arrival, next incoming HTTP packet will override previous one.

Defined Values

<profile_id> - integer type; previously assigned <profile_id>:

- 1-5 – multi-profile mode.

<max_len> - integer type; max number of bytes of host allocated buffer to read:

- 1 – 3000

<rcv_len> - integer type; actual data size in bytes received from server:

- 1 – 3000

<data_len> - integer type; data size in bytes returned by AT. It could be shorter than actual received data if was truncated by buffer size:

- 1 – 3000

3.5.14 AT%HTTPEV

Table 3-16 AT%HTTPEV Command Syntax

| Command | Possible response(s) |
|----------------------------|---|
| AT%HTTPEV=<ev_type>,<mode> | OK/ERROR |
| AT%HTTPEV? | ERROR (not supported) |
| AT%HTTPEV=? | %HTTPEV: (list of supported <ev_type>s),(list of supported <mode>s) |

Description

- The command is intended to notify about HTTP events.
- Default HTTP mode is URC disabled for all event types. Most of the events are related to asynchronous operation triggered by AT%HTTPCMD/HTTPSEND. Such acknowledgement may be normally disabled.
- Only “GETRCV” event provides notification about data received from the server.

Note: If TCP session is disconnected because of link lost, no URC is sent.

Defined Values

<ev_type> - string type:

- “PUTCONF” – PUT procedure confirmation status
- “POSTCONF” – POST procedure confirmation status
- “DELCONF” – Delete procedure confirmation status
- “GETRCV” – Unsubscribe procedure confirmation status
- “ALL” - All events, used only in execution command

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

<profile_id> - integer type; default or previously assigned <profile_id>:

- 0 – single HTTP connectivity mode.
-

- 1-3 – profile ID in multi-profile mode.

<res1> - integer type; result code:

- 0 – success
- 1 – fail

<res2> - integer type; optional error code:

- 0 – no errors
- TBD [depend on HTTP package]

<res3> - string type; optional error reason.

For “GETRCV”, successful use-case:

<res2> - integer type; actual data size in bytes received from server:

- 1 – 3000

3.5.15 AT%SCAN

Table 3-17 AT%SCAN Command Syntax

| Command | Possible response(s) |
|------------------------|---|
| %SCAN[=<cmd>[,<mode>]] | For <cmd>=“QUERY” For <mode>=0 (short) or omitted %SCAN:<res>[,<EARFCN>,<PCI>,<RSRP>,<RSRQ> [,<EARFCN>,<PCI>,<RSRP>,<RSRQ>]...] For <mode>=1 (long) %SCAN: <res>[,<band>,<earfcn>,<pci>,<eci>,<mcc>,<mnc>,<RSRP>,<RSRQ>[,<eci>,<mcc>,<mnc>,<bw>,<tac>,<cstat>,<emg>,<oper1> [,<oper2>[...]]] [<CR><LF>%SCAN: <band>,<earfcn>,<pci>,<eci>,<mcc>,<mnc>,<RSRP>,<RSRQ>[,<eci>,<mcc>,<mnc>,<bw>,<tac>,<cstat>,<emg>,<oper1> [,<oper2>[...]]]...]] |
| %SCAN? | %SCAN: for each cell: (<bw>, <eci>, <EARFCN>, <Physical_cell_ID>, <PLMN_ID>, <RSRP>[<RSRQ>]) |
| %SCAN=? | OK |

Description:

Command returns the RSSI scan results. Result is displayed only for cells successfully acquired SIB1 from.

Execute and Test commands are not supported.

Defined values:

<cmd> - command, string:

- “QUERY” – ask for last scan results

<mode> - integer; result representation mode (starting LTESYS-19191):

- 0 – short
- 1 - long

<bw>:

- 0 – 1.4 MHz
- 1 – 3 MHz
- 2 – 5 MHz
- 3 – 10 MHz
- 4 – 15 MHz
- 5 – 20 MHz

<eci> - E-UTRAN Cell ID (28 low bits of ECGI):

- As per 3GPP encoding for cell ID.

<EARFCN>

- As per 3GPP encoding for EARFCN

<Physical cell ID> or <PCI>:

- PHY acquired cell ID.

<PLMN ID>

- As per 3GPP encoding for PLMN ID
- <RSRP>
- RSRP measurements in dbm

<res> - scan result, integer:

- 0 – scan succeeded. Cell measurements will be provided too.
- 1 – scan failed: low power, no cell found
- 2 – scan failed: cell(s) found, but failed to acquire MIB/SIB1. Cell measurements will be provided too.

Next params are as per 3GPP definition:

<band>,<earfcn>,<pci>,<eci>,<mcc>,<mnc>,<RSRP>,<RSRQ>,<bw>,<tac>

<operN>: string type; similar to <oper> parameter of +COPS in decimal numeric format (se 27.007)

<cstat> - integer; cell status from SIB1:

- 0 – regular cell
- 1 – cell barred
- 2 – cell reserved for Operator use

<emg> - integer; as defined in SIB1 [ims-EmergencySupport-r9 for cell:](#)

-
- 0 – false (omitted)
 - 1 – true

3.5.16 AT%GETID

Table 3-18AT%GETID Command Syntax

| Command | Possible Response |
|------------------------|--------------------------------|
| AT%GETID=<requestedID> | %GETID:id1[,id2[...]] |
| AT%GETID? | ERROR (OPRATION_NOT_SUPPORTED) |
| AT%GETID=? | list of supported ID values |

Description:

Command to get identification values of the chip, board and board's components from NV memory.

Supported ID values:

<requestedID>:

- "SerialNumber" – returns the serial number of the board.
Relevant for NP-disabled only.
- "BoardType" – returns Board Type, which is used to differentiate SW behavior per board of same customer.
- "UsbProductId" - returns the USB product identification number. **Relevant for NP-disabled only.**
- "UsbVendorId" – returns the USB vendor identification number. **Relevant for NP-disabled only.**
- "VendorModelId" – returns the vendor model ID number.
Relevant for NP-disabled only.
- "ManufDate" - returns the manufacture date of the board.
Relevant for NP-disabled only.
- "Customer_Id" – returns assigned by Altair Customer ID, which is used to differentiate SW behavior per customer.
- "IMEISV" – returns IMEISV value reported over the air.
- "usbVendorName" - returns the USB vendor name **Relevant for NP-disabled only.**
- "usbProductDescription" - returns the USB product description **Relevant for NP-disabled only.**
- "ChipID" – returns unique Chip Id (Lot ID, Wafer ID, X-pos and Y-pos).

Example:

```
AT%GETID="ChipID"
```

```
%GETID: "KP1080","20",2,15
```

```
OK
```


3.5.17 AT%PPPAUTH

Table 3-19AT%PPPAUTH Command Syntax

| Command | Possible Response |
|---|--|
| %PPPAUTH=<cid>,<auth_type>,<auth_name>,<auth_pwd>,[<host_name>] | OK ERROR |
| %PPPAUTH? | ERROR (OPERATION_NOT_SUPPORTED) |
| %PPPAUTH=? | Returns the list of arguments: <cid>,<auth_type>,<auth_name> ,<auth_pwd>,[<host_name>] |

Description:

Defines APN authentication parameters for the PDP context id <cid>.

Defined values:

<cid>

PDP context.

<auth_type>

- “None”
- “PAP”
- “CHAP”

<auth_name>

Username used for authentication.

<auth_pwd>

Password used for authentication.

<host_name>

Optional, the name of the Authentication server.

3.5.18 AT%TRSHCMD

Table 3-20 AT%TRSHCMD Command Syntax

| Command | Possible Response |
|-----------------------------------|---|
| %TRSHCMD=<module>,<cmd>[,<param>] | OK ERROR |
| %TRSHCMD? | ERROR |
| %TRSHCMD=? | %TRSHCMD: <module1>:<list of supported commands>, <module2>:<list of supported commands> |

Description

This command is used for system troubleshooting at post-production, integration or field troubleshooting stage. It is intended for experienced user and may move device into different test modes applicable only for testing.

The command is compound, which means that <cmd> and <params> parameters are <module> specific.

Note: All settings are applied only during run-time (not NV stored) and will be lost after reboot.

Read command is not supported.

Defined Values

<module>:

- “PHYLOG” – PHY Log module

<cmd>:

- “RSRP”
- “ARSRP” - Average RSRP
- “FREQ” - Frequency
- “TIMING” - Timing
- “TXP” - TX Power
- “AGC”
- “SINRS0” - SINR Symb0
- “SINRS7” - SINR Symb7
- “DCIP” - DCI Parameters
- “CFIC” - CFI type counters
- “CFIHI” - CFI and HI values
- “CPR” – CQI, PMI, RI
- “CRCTB0” - CRC Error TB0
- “CRCTB1” - CRC Error TB1
- “ACKSR” – ACK/NACK counters, SR

- "HARQR" - HARQ Retransmission counter
- "TXCOMP" – TX compressed log
- "RXCOMP" – RX compressed log
- "ALL" – used to disable all PHY logs described above. Some important PHY logs cannot be disabled by this command. Since enabling all PHY logs may cause PHY operation starvation under heavy traffic, the enable all PHY logs command is prohibited. If commanded, the ERROR response will be returned.
- "LOGGER" – used to completely disable PHY logs mechanism. Once enabled, this command will return to the PHY previous log settings (default or last updated using the current command).

<param>:

- "0" – disable
- "1" – enable

<module>:

- "TIMER" – Different protocol timers

<cmd>:

- "TCBAR" - cell barring timer used for reestablishment purposes and defined in TS36.304 as 300sec. The change in this timer value does not impact frequency barring timer (same 300sec) used in IDLE mode.
- "T3402" – Override standard timer value of 12 minutes for testing purposes. To return the timer to default value, the value of 720 sec (12 min) shall be commanded.

<param>:

- Timer value in sec

<cmd>:

- "NpSleep" - modify default (3sec) NP CPU sleep timer.

<param>:

- Timer value in ms; valid range: 500-5000 ms

<module> - following feature is supported starting v4.02:

- "TXANT" – TX antenna selection module (N/A to ALT1250).

<cmd>:

- "ALTDEFM" – Altair default TX diversity mode for antenna selection

<cmd>:

- "USRSELM" – User manual TX antenna selection mode. The antenna selection is ignored if "isTxDiversitySupported" is disabled in PHYBP file. Not applicable to ALT48xx.

<param>:

- 0 – TX0 antenna
- 1 – TX1 antenna
- <cmd>:
- “ANTNUM” – Select number of antennas (ALT48xx).

<param>:

- 0 - 1 TX antenna
- 1 - 2 TX antennas
- 2 – 4 TX antennas

<cmd>:

- “MODE” – Select TX mode (ALT48xx).

<param>:

- 0 - Default
- 1 - CDD
- 2 – Reserved

<module>:

- "RXANT" – RX antenna selection module (N/A to ALT1250).

<cmd>:

- “USRSELM” – User manual RX antenna selection mode

<param> - parameter are chip-dependant. Any attempt to configure improper for current chip RX antenna setting returns ERROR:

- 0- single antenna: RX0 only active (ALT38xx, ALT1160)
- 1- single antenna: RX1 only active (ALT38xx, ALT1160)
- 2- both RX antenna active (ALT38xx, ALT1160)
- 3 – 2 antennas active: RX0, RX1 (ALT48xx)
- 4 – 4 antennas active: RX0, RX1, RX2, RX3 (ALT48xx)
- 5 – all 8 antennas active (ALT48xx)

<module>:

- "TXPWR" – TX power management

<cmd>:

- “DEFMAX” – limiting the max TX power by PHYBP NV values as by default
 - “USRMAX” – User manual max TX power override in floating units
 - “USRMAXD” - User manual max TX power override in decimal units
 - “NBBE” – apply NB band edge power reduction to pre-defined in bands
-

For "USRMAX:

<param> - string; floating value in quotes:

- max TX power for all TX channels

For "USRMAXD:

<param> - integer:

- max TX power in 100*dBm for all TX channels

For "NBBE":

<param> - integer:

- reduced max TX power in 100*dBm for NB band edge EARFCNs

<module> - following feature is supported starting v4.5.1:

- "UE_CAPABILITIES" – UE Capabilities

<cmd>:

- "Category" – Setting the UE Category (N/A to ALT1160/12xx)

<param>:

- "1", "2", "3", "4" or "5".

<cmd>:

- "ASReleaseNum" – Setting the Access Stratum Release Number; starting v(TBD)

<param>:

- "release8"
- "release9"
- "release10"
- "release11"
- "release12"
- "release13"

<module>:

- "RSIM" – Remote USIM module

<cmd>:

- "TIMEOUT" – Time out value for the commands sent from our UE to the remote USIM until response is expected\
Units are in msec
Value of 0 will leave the timeout to be the SW default – 5000m

<param>:

- Timeout value

<module>:

- "NETWORK" – Network provider features management

<cmd>:

- "ARCH" – network provider architecture (N/A to ALT1250)
- "EnableIpv6SrcFiltering"

<param>:

For "ARCH":

- "0" – default LTE 3GPP-compliant architecture
- "1" – VZW compliant architecture
- 2-99 – Reserved for future use

For "EnableIpv6SrcFiltering":

- "0" – false (disable)
- "1" – true (enable)

<module>:

- "USIM"

<cmd>:

- "ERASE_EF" - Erase file regardless of location on SIM or BSP

<param1>: string

- "0" – erase EMM information (EPSLOCI, EPSNSC and ACSGL)

<cmd>:

- "WARMRST" – Apply warm reset to UICC.

<module>:

- "BSPFILE"

<cmd>:

- "ERASE_LTEPP" - Erase some specific entity of LTEPP file (in NV and in RAM mirror of LTEPP)

<param1>: string

- "0" – erase MRU table (all LTE legacy categories including CAT-M)
- "1" – erase ERPLMN List
- "2" – erase NB-IOT MRU table..
- "3" – erase Flight Mode
- "4" – erase PLMN Selection Mode

<module> : following feature is supported for ALT38xx (Griffin) starting v6.2.0

- "CELLSEL" - cell selection RRC module

<cmd>:

- "BANDPR" - modify the cell sorting criteria in cell selection LTE procedure

<param1>: string

- “0” – disable band priority cell selection
- “1” – enable band priority cell selection

<param2>-<param11> - integer; list of bands in priority order.

<module>:

- "SIMDET"

<cmd>:

- “CNTL” - SIM control command, which changes SIM power and SIM HW detection status

<param1>: string

- “0” - Switch to SIM power down mode.
- “1” – Switch to SIM power up mode (if needed) with SIM_DET pin disabled. This operation causes BSP settings override, if SIM_DET feature is enabled in both GSYSBP and DOP files.
- “2” – Switch to SIM power up mode (if needed) with SIM_DET pin enabled. For use-case, that HW SIM_DET feature is disabled in GSYSBP and/or DOP files, any attempt to enable SIM_DET pin will be silently ignored and command returns OK (no BSP override). If such switch is required once UE is in “0” power down mode, the UICC power will be turned on regardless of following SIM_DET operations.

<module>: following feature is supported for ALT38xx (Griffin)

- “BSR” - BSR index calculation

<cmd>:

- “EXPER” – experimental BSR calculation improved for packets still pending process in higher layers

<param1>: string

- “0” – disable
- “1” – enable

<module>: following feature is supported for ALT1160/1250/1250

- “MACLOG” - MAC log run-time policy modification

<cmd>:

- “SEVOVER” – Run-time modification for DOP/MDOP macLogSeverityOverride parameter

<param1>: string

- “0” – disable override, use default setting
- “1”and more – enable override; overrides SW default for all MAC modules with the same severity value

3.5.19 AT%REGIOCTL

Table 3-21 AT%REGIOCTL Command Syntax

| Command | Possible Response |
|---------------------------|---|
| AT%REGIOCTL=<pin>,<value> | OK ERROR |
| AT%REGIOCTL? | %REGIOCTL: <pin>=<value>[,<pin>=<value> [...]] |
| AT%REGIOCTL=? | %REGIOCTL: <list of supported pins> |

Description

- The command is intended to write IO output lines and read all IO lines configured in SYSBP file. This command is vendor implementation independent and may be used for any external on-board circuit management using Alt3100 IO registers configuration.
- The command usage example for customer feature is defined in IO SRS.
- The command may be executed only for IO registers configured in SYSBP ioConfigTable table defined in NV HLD.
- This command takes numeric value of one IO bit and writes it the referenced output IO line.
- The read version of the command reads all lines, which are present in NV SYSBP table and shows the values in the response.

Defined Values

<pin>:

- IOX_Y – IO register name connected to specific pin in terms of internal IO register lines enumeration in Alt3100 datasheet, where:
 - X – number of IO register in range:
 - ALT3100: 2-12
 - ALT38xx: 0-11
 - Y – number of bit within specified register in range: 0 - 7

<value>:

- 0 or 1 physical value of input or output

3.5.20 AT%CEER

Table 3-22 AT%CEER Command Syntax

| Command | Possible Response |
|---|---|
| %CEER=<mode>[, [<clear_err>]][, <rep_type>] | OK or ERROR |
| %CEER? | %CEER: <mode> [, <module>, <procedure>, <failure> [, [<reject cause>][, [<error info>][, <EARFCN>, <pci>, <oper>, <tac>]]]] |
| %CEER=? | %CEER: (list of supported <modes>) |

Description

- This command is used for protocol error notification by enabling unsolicited reporting if needed.
- The set command enables or disables the presentation of unsolicited result response about system failure in form:
- %CEER: <module>, <procedure>, <failure> [, [<reject cause>][, [<error info>][, <EARFCN>, <pci>, <oper>, <tac>]]]]
- If <rep_type>=1 (extended) is used, optional <error info> and <reject cause> parameters may be omitted.
- The read command returns the last failure report added with selected <mode>.
- The test command returns list of supported modes.

Defined Values

<mode>: status of unsolicited result response presentation

- 0 - disabled (default)
- 1 – enabled

<clear_err>: clear last stored failure report

- 0 – keep last stored failure report (default)
- 1 – clear last stored failure report

<rep_type>: optional reporting type to enable report extensions. If missed, default=0 (regular). Regular reporting is truncated after <error info> parameter:

- 0 – regular
- 1 – extended with failure cell identity (EARFCN, PCI, PLMN, TAC)

<module>: protocol layer or protocol entity

- “NAS-EMM”
- “NAS-ESM”
- “PDM”
- “RRC”
- “PDCP”

-
- "RLC"
 - "MAC"
 - "L1A"

<procedure>: protocol defined procedure

For NAS-EMM:

- "ATTACH"
- "DETACH"
- "TAU"
- "SERREQ" - service request
- "AUTH"

For NAS-ESM:

- "PDN_CONN"
- "PDP_ACT"
- "PDP_DEACT"

For PDM:

- "IPV6_RA"

For RRC:

- "CONN_EST"

For PDCP:

- TBD

For RLC:

- TBD

For MAC:

- TBD

For L1A:

- TBD

<failure>:

- "REJECT"
- "MAXRETRY"
- "BARRING"
- "UNEXPECTED"

<reject cause>: as per protocol definition

For NAS-EMM and NAS-ESM:

- #X – numeric value of reject code prefixed with "#"

For RRC:

- 1 - Access class barring
- 99 - Other

<error info>:

It is an arbitrary error information text, determined by the UE manufacturer and containing additional information about failure. For reject it may contain textual definition of reject code.

<earfcn> - cell EARFCN

<pci> - cell PCI

<oper> - string format; cell PLMN encoded as defined for AT+COPS (in quotes)

<tac> - hexadecimal value; as defined to AT+CREG (in quotes)

Example

For read:

AT%CEER?

%CEER: 0,"NAS-EMM","ATTACH","REJECT",#3,INVALID SIM

OK

For unsolicited report:

%CEER: "NAS-EMM","ATTACH","MAXRETRY"

3.5.21 AT%PPPLOC

Table 3-23 AT%PPPLOC Command Syntax

| Command | Possible Response |
|-------------|-----------------------|
| AT%PPPLOC | OK or ERROR |
| AT%PPPLOC? | ERROR (not supported) |
| AT%PPPLOC=? | OK |

Description

This command initiates the local PPP session for modem management without LTE network PPP data connectivity. Its purpose is to provide the user with management access to the modem in a case when there is no active PDN available. Use the ATD*99***command to establish a PPP data session with the LTE network.

3.5.22 AT%DPDNaCT

Table 3-24 AT%DPDNaCT

| Command | Possible Response |
|----------------|--------------------------------------|
| %DPDNaCT=<act> | OK or ERROR |
| %DPDNaCT? | %DPDNaCT: <stat> |
| %DPDNaCT=? | %DPDNaCT: (list of supported <act>s) |

Description

- This command is used by host to instruct eCM to connect/disconnect data PDN. The eCM implementation of this command is transparent to the user and it is operator dependent.
- eCM Implementations:
 - Connect/Disconnect data PDN (e.g.: INTERNET PDN) without affecting other PDNs.
 - When the active Connection Manager is the host, the command returns ERROR. When the eCM is the active Connection Manager (i.e. the eCM is the responsible to send attach/connect commands to the modem), the command returns OK upon success and ERROR upon failure.

Defined Values

<act>: Numeric type; indicates the required action

- 0 – deactivate
- 1 – activate

<stat>: Numeric type; indicates the PDN status

- 0 – inactive
- 1 – active

3.5.23 AT%FILEDATA

Table 3-25 AT%FILEDATA Command Syntax

| Command | Possible response |
|---|--|
| AT%FILEDATA=<cmd>[,<param1>[,<param2>[,<param3>...]]] | <p>For “READ” command: [%FILEDATA:<more2read>[,<rlength>[,rdata>]]] OK/ERROR</p> <p>For “WRITE” command: [%FILEDATA:<wlength>] OK/ERROR</p> |
| AT%FILEDATA? | ERROR (not supported) |
| AT%FILEDATA=? | %FILEDATA: (list of supported <cmd>s) |

Description:

AT command for simple file chunk-by-chunk read/write operation via local interface.

Continuous (chunk-by-chunk) read operation, which is interrupted before EOF, requires new mandatory AT%FILECMD="GET" call (even with the same filename) to restart read process from the file beginning.

Defined values:

<cmd>:

- **“WRITE”** – Write to the data to NV

<param1>: integer

- 0 – This is the last "Write" transaction
- 1 – More pending "Write" transactions

<param2>: integer; the length of transmitted data in ASCII string length units, which it is twice longer than transmitted data length in bytes:

- 2 to 3000 for ALT1250
- 2 to 6000 for other chipsets

<param3>: hexadecimal:

The file chunk data, in HEX format (in quotes)

<cmd>:

- “READ”** – Read the data from NV

<param1>: integer:

The maximal length of data in Bytes which requested to be read in this transaction; the length of data in ASCII string length units, which it is twice longer than received data length in bytes:

- 2 to 3000 for ALT1250
- 2 to 6000 for other chipsets

<param2>: integer; the offset from the start of reading file. This is actual byte offset. If this parameter is not included in AT request, it implies that the offset may be one of:

- Initial file pointer for first file read after AT%FILECMD="GET" file selection
- Next position for continuous read

<rlength> - integer; the actual received data length in ASCII string length units, which it is twice longer than received data length in bytes:

- 2 to 3000 for ALT1250
-

-
- 2 to 6000 for other chipsets

<rdata> - hexadecimal:

- The read data, in HEX format (in quotes).

<wlength> - integer; the actual transmitted data length in ASCII string length units, which it is twice longer than transmitted data length in bytes:

- 2 to 3000 for ALT1250
- 2 to 6000 for other chipsets

<more2read> - integer:

- 0 – No more data to read
- 1 – More data to read

Example:

1. Read whole file from file beginning:

```
AT%FILECMD="GET","update.ua",1
OK
AT%FILEDATA="READ",1000 -> start from file offset 0
%FILEDATA:1,1000,"D4C3B5..."
OK
AT%FILEDATA="READ",1000 -> continue from file offset 500
%FILEDATA:1,1000,"57E13A..."
OK
...
AT%FILEDATA="READ",1000 -> continue from file offset 500*n
%FILEDATA:0,808,"55673E..." -> EOF indicated by <more2read>=0
OK
```

2. Read file portion from the middle of the file:

```
AT%FILECMD="GET","update.ua",1
OK
AT%FILEDATA="READ",1000, 40960 -> start from file offset 0xA000
%FILEDATA:1,1000,"D4C3B5..."
OK
AT%FILEDATA="READ",1000 -> continue from file offset 0xA000+500
%FILEDATA:1,1000,"57E13A..."
OK
...
AT%FILEDATA="READ",1000 -> continue from file offset 0xA000+500*m
%FILEDATA:1,1000,"69834AE..." -> read interrupted before EOF.
OK
```

3.5.24 AT%TSTRF

Table 3-26 AT%TSTRF Command Syntax

| Command | Possible response(s) |
|--|--|
| AT%TSTRF=<cmd>[,<earfcn>,<time>,<TX_type>[,<TX_power>,<TX_param>]] | <ul style="list-style-type: none">• OK or• +CME ERROR: <error> |
| AT%TSTRF? | <ul style="list-style-type: none">• %TSTRF=<status> OK or• +CME ERROR:error> |
| AT%TSTRF=? | OK |

Description:

- Test AT command is intended for RF TX/RX test mode.
- Command is not accepted in operational mode (AT+CFUN=1) and flight mode (CFUN=4). The modem shall be previously switched in non-operational mode by CFUN=0.
- The RX and TX test commands only triggers test operation and are not blocking for the time defined in <time> parameter. To interrupt TX and RX test mode the abort sub-command (AT%TSTRF=1) is required.
- To return to normal operational mode after any type of the RF tests reboot is required.
- The SC-FDMA transmission will be on full BW. For ALT1250 BW 1.4MHz is supported only.
- For SC-FDMA TX test on ALT1250 last parameter <nb_ind> is optional and may be omitted (BW=1.4MHz is only supported).
- For RX tests:
 - When applying CW to UE antenna, it is recommended to use 1Mhz offset to central frequency to avoid DC interference
 - When applying LTE signal to UE antenna, it is recommended to use a continuous FDD radio frame, which

Defined values:

<cmd> - integer type:

- 1 - Abort RX/TX test
- 2 – Start RX test
- 3 – Start TX test
- 4 – RX test results read

<earfcn> - integer type: EARFCN decimal value as per LTE specs

<time> - integer type; test execution time in ms:

- 0 – special value:
For RX: one-shot measurement
For TX: continuous TX forever
- 1-600000 ms

For <cmd>=2 (RX):

<param1> - integer type; selected antenna:

- 0-1 - for ALT38xx, ALT1160
- 0-7 – for ALT4800

For <cmd>=3 (TX):

<param1> – integer type; type of transmitted signal:

- 0 - SC-FDMA
- 1 - CW (continuous waveform)
- 2 – SC-FDMA of NB-IoT for ALT1250

For <param1>=1 (CW):

<param2> - integer type; TX power:

- Absolute output power [dBm*100] starting ALT1160
- Absolute output power [dBm] for previous chips (ALT3100, ALT3800, ALT3850)

<param3> - integer type; offset to central frequency in Hz

For <param1>=0 (SC-FDMA):

<param2> - integer type; TX power:

- Absolute output power [dBm*100] starting ALT1160
- Absolute output power [dBm] for previous chips (ALT3100, ALT3800, ALT3850)

<param3> - integer type; BW:

- 0 – 1.4 MHz – only this value is applicable to ALT1250
- 1 – 3 MHz
- 2 – 5 MHz
- 3 – 10 MHz
- 4 – 15 MHz
- 5 – 20 MHz

<param4> - integer type; MCS. Applicable on ALT1250 only.

- 0-15

<param5> - integer type; number of RB allocation. Applicable on ALT1250 only.

- 1-6

<param6> - integer type; position of RB allocation. Where:
<rb_num>+<rb_pos> <= 6. Applicable on ALT1250 only.

- 0-5

<param7> - integer type; NB index as defined in TS36.211, sec. 5.2.4.
Applicable on ALT1250 only.

- 0 - max (per BW)

For <param1>=2 (SC-FDMA of NB-IoT):

<param2> - integer type; TX power:

- Absolute output power [dBm*100]

<param3> - integer type; MCS:

- 0-12

<param4> - integer type; subcarrier spacing:

- 0 – 15KHz
- 1 – 3.75KHz

<param5> - integer type; subcarrier index, as defined in TS36.211, table 16.5.1.1-1:

- For <param4>=0 (15KHz): 0-18
- For <param4>=1 (3.75KHz): 0-47

<min>, <avg>, <max> - <min> & <max> are not applicable to ALT1250:

- Measured energy value in dBm.

<status> - integer type; status of test:

- 0 – busy
- 1 – ready

<error> - integer type:

- As per 3GPP 27.007
- 516 - Invalid EARFCN (see Annex A)

3.5.25 AT% RATIMGSEL

Table 3-27 AT% RATIMGSEL Command Syntax

| Command | Possible Response |
|-------------------------|---------------------|
| AT% RATIMGSEL =<img_id> | OK or ERROR |
| AT% RATIMGSEL? | %RATIMGSEL:<img_id> |
| AT% RATIMGSEL=? | OK |

Description

This command is used to switch to the FW image bank of the other RAT. A new FW image will be activated for a different RAT once it has been modified. This is done following cold boot.

Read command returns the image identifier currently in use. The newly settled identifier cannot be retrieved before boot.

Defined Values

<img_id> - integer type; image bank identifier on NVM storage:

- 1
- 2

3.5.26 AT% NWOPER

Table 3-28 AT% NWOPER Command Syntax

| Command | Possible response |
|-------------------------|--|
| AT% NWOPER =<oper_name> | OK or ERROR |
| AT% NWOPER? | %NWOPER: <oper_name> |
| AT% NWOPER =? | %NWOPER: (list of supported <oper_name>s) |

Description:

This command is used to set/query NW operator mode of the modem. This mode setting is used to support NW Operator specific requirements defined on top of 3GPP requirements.

The <oper_name>="DEFAULT" means default 3GPP compliant behavior of the modem.

The list of operators is not limited, use test command (AT% NWOPER=?) to retrieve the list of currently supported operators.

Any attempt to set unknown operator name will return ERROR.

Defined values:

<oper_name> - string; the name of operator to select modem mode of operations. The name is Altair-proprietary string, not always the same as defined in GSM MoU SE.13:

-
- “DEFAULT” – default 3GPP compliant mode
 - “VZW” – Verizon Wireless
 - “ATT” - AT&T
 - etc.

Example:

```
AT%NWOPER=?
```

```
%NWOPER:
```

```
("DEFAULT","AUTO","VZW","CMCC","RJIL","KDDI","ATT","USCC","  
DOCOMO","SOFTBANK","LGU+","KT","T-MOBILE","SKT")
```

```
OK
```

3.5.27 AT%SETBDELAY

Table 3-29 AT%SETBDELAY Command Syntax

| Command | Possible response |
|---------------------|--------------------|
| AT%SETBDELAY=<tout> | OK or ERROR |
| AT%SETBDELAY? | %SETBDELAY: <tout> |
| AT%SETBDELAY=? | OK |

Description

- The command is intended for debug purposes. It modifies the uBoot delay applied in next cold boot. Once modified, new timeout value will be used as new default timeout in all following cold boots.
- Read command is not supported.

Defined Values

<tout> - integer type; delay timeout value in sec:

- 0-99 sec

3.5.28 AT%CCID

Table 3-30 AT%CCID Command Syntax

| Command | Possible response |
|-----------|----------------------------|
| AT%CCID | %CCID: <iccid> OK or ERROR |
| AT%CCID? | ERROR (not supported) |
| AT%CCID=? | OK |

Description:

Execution command reads the ICCID (card identification number) from SIM EFICCID. It is a unique identification number for the SIM.

If SIM is not inserted, the ERROR is returned by execution command.

Defined values:

<iccid> - string of 19 or 20 decimal digits, which reflects SIM ICCID value. The format of the ICCID is: MMCC IINN NNNN NNNN NN C x

- **MM** = Constant (ISO 7812 Major Industry Identifier)
- **CC** = Country Code
- **II** = Issuer Identifier
- **N{12}** = Account ID ("SIM number")
- **C** = Checksum calculated from the other 19 digits using the Luhn algorithm.

- **x** = An extra 20th digit, which may be returned by SIM, but it is not officially part of the ICCID.

Example:

AT%CCID%CCID: "01234567890123456789"

OK

3.5.29 AT%ROHCCMD

Table 3-31 AT%ROHCCMD Command Syntax

| Command | Possible response |
|--------------------------|-------------------------------------|
| %ROHCCMD=<cmd>[,<param>] | OK ERROR |
| %ROHCCMD? | ERROR |
| %ROHCCMD=? | ROHCCMD: (list of supported <cmd>s) |

Description:

This command is used to set RTP stream filter for RoHC. For IPv4, The IP addresses shall use the Dot-decimal notation: For IPv4, there shall be 4 decimal numbers, each pair separated by a full stop (dot). For IPv6, there shall be 16 decimal numbers, each pair separated by a full stop (dot).

Defined values:

<cmd>:

- "SETRTP" – Set RTP filter for RoHC profiles 1 and 5
- "CLEAR RTP" – Clear RTP filter for RoHC profiles 1 and 5
- "CLEARALL" – Clear all RTP filters

For "SETRTP" and "CLEAR RTP"

<param1>: string

- RTP stream Source IP address (V4 or V6)

<param2>: decimal

- RTP stream Source port address

<param3>: string

- RTP stream Destination IP address (V4 or V6)

<param4>: decimal

- RTP stream Destination port address

3.5.30 AT%RESETCID

Table 3-32 AT%RESETCID Command Syntax

| Command | Possible response |
|-------------------|-------------------|
| %RESETCID=[<cid>] | |
| %RESETCID? | ERROR |
| %RESETCID=? | OK |

Description:

The command is intended to clear entire cid table (whole or per cid) in LTE FW.

The set command specifies PDP context identified by <cid> (the local context identification parameter) to be reset. If optional <cid> parameter is missed, whole PDP context parameter table is erased and returns PDN table to the device boot up state.

The erase includes PDP context parameters removal for next settings:

- PDN connection parameters defined by AT+CGDCONT or by network
- PDN QOS parameters defined by AT+CGTFT or by network
- Additional PDN PCO parameters defined by AT%SETPCO
- Additional PDN PPP authentication parameters defined by AT%PPPAUTH or by APN table

The read command is not supported.

Defined values:

<cid>: integer type, same as used in +CGDCONT/%SETPCO/%PPPAUTH

3.5.31 AT%GPSCMD

Table 3-33 AT%GPSCMD Command Syntax

| Command | Possible response |
|--|---|
| %GPSCMD =<cmd>[,<param1>[, <param2>]...] | For "FIX" [%GPSCMD:<fix_type>,<latitude>,<longitude>,<altitude>[,<uncertainty>[,<utc>[,<speed>[,<velocity>]]]]] [<CR><LF>%GPSCMD: <fix_type>,<latitude>,<longitude>,<altitude>[,<uncertainty>[,<utc>][, <speed> [,<velocity>]]]]] For "STATUS" %GPSCMD:<gps_stat> For "EPHSTAT" %GPSCMD:<eth_stat> For other commands: OK/ERROR/ERROR(not supported) |
| %GPSCMD? | %GPSCMD:<GpsFwVer>,<GpsConfigVer>,<GpsChipID>,<GpsTrac eabilityID> |
| %GPSCMD=? | %GPSCMD: (List of supported <cmd>s) |

Description

AT command to manage the GNSS functionality.

Notes:

- If "SATUSE" is not sent to configure device, the GPS is selected by default.
- In "FWUPG" - , a parameter which is not specified will be written as ",,"
- The GPS has 2 modes of work: "SETREP" and "SETEV" – To set periodic reporting mode or event triggered mode. Only one mode can work at a time. Setting of one mode cancels the other mode. If none of them is configured the default setting is Periodic reporting with infinite recurrence and 1sec interval.
- With regard to the command "SETCAP" which List of GPS position method which shall be declared to the server. The First method in the list is indicated to the server as "preferred method". If the first item in the list is other than "AGPS MSA" or "AGPS MSB", then "preferred method" will be indicated as "No Preference"

Defined Values

- <cmd>:
 - "START" – Enable GPS hardware functionality (increase power consumption). Default mode is periodic infinite recurrence with 1sec interval.

-
- <cmd>:
- "STOP" – Disable GPS hardware functionality (decrease power consumption)
- <cmd>:
- "FIX" – return the last location acquired by the device
- <cmd>:
- "STATUS" – Return log of AGPS client configuration
- <cmd>:
- "EPHSTAT" – Indicates if the last stored Ephemeris is valid or not
- <cmd>:
- "LOCINJECT" – Inject estimated location of the user. This can be based on Wifi measurements handled by the host, can be based on last recorded location or based on assisted information.
- <param1> - string, which contains floating value of degrees:
- Latitude – estimated location latitude in degrees
- <param2> - string, which contains floating value of degrees:
- longitude – estimated location longitude in degrees
- <param3>: decimal
- accuracy – Represents expected accuracy in meters
- <cmd>:
- "TIMEINJECT" – Inject time to speedup GPS location calculation. The injected time can be calculated by using NTP protocol.
- <param1> - decimal:
- UTC time – UTC time in 1msec units counted since January 1, 1970
- <param2> - decimal:
- TimeReference – The time in the local reference clock related to the supplied UTC time. This allows the device to calculate the current UTC time.
- <param3> - decimal:
- Uncertainty – time Uncertainty in msec.
- <cmd>
- "DELDATA" – Allows the host to delete specific data from the GPS hardware.
- <param1> - hexadecimal:
- The data which required to be deleted encoded as per Android gps.lib:
 - "0001" - EPHEMERIS
 - "0002" - ALMANAC
-

- "0004" - POSITION
- "0008" - TIME
- "0010" - IONO
- "0020" - UTC
- "0040" - HEALTH
- "0080" - SVDIR
- "0100" - SVSTEER
- "0200" - SADATA
- "0400" - RTI
- "8000" - CELLDB_INFO
- "FFFF" - DELETE_ALL

<cmd>:

- SETREP – Set periodic reporting mode

<param1> - decimal:

- Recurrence – location reporting recurrence
 - 0 - Periodic infinite recurrence
 - 1- 999 - specific recurrence setting

<param2> - decimal:

- min_interval – represents the time between fixes reports in seconds

<param3> - decimal:

- Start time –time wait in seconds after "START" before starting periodic mode. If 0 or not present, mode is set immediately on START. Delayed Start Time shall not exceed 8639999 sec.

<param4> - decimal (Configuration applicable only for U-Plane MSB mode):

- 0 - Single SUPL assistance (SUPL_START)
- 1 - Periodic SUPL assistance (SUPL_TRIGGERED_START)

<cmd>:

- "SETEV" – Set Area Trigger Event reporting mode.

<param1> - decimal:

- Maximum number of reports in an Area Trigger Event.

<param2> - decimal:

- min_interval – represents the time between fix reports in seconds

<param3> - decimal: Area event type- Upon which event to report (only single event can be configured)

- 0 – ENTERING - the SET reports to the SLP when it first detects that it is inside the predefined area. If repeated reporting is present, the SET then reports once more for each time it detects that it has re-entered the predefined area after having left in the meantime.

- 1 – INSIDE - the SET reports to the SLP when it is within the predefined area.
- 2 – OUTSIDE - the SET reports to the SLP when it is outside the predefined area.
- 3 – LEAVING - the SET reports to the SLP when it first detects that it is outside the predefined area. If repeated reporting is present, the SET then reports once more for each time it detect that it has exited the predefined area after having been inside again.

<param4>: Latitude sign as defined in 10.7 of OMA User Plane Location Protocol V2.0

- "N" – North
- "S" – South

<param5>: Decimal, Latitude as defined in 10.7 of OMA User Plane Location Protocol V2.0)

- 0..8388607

<param6>: Decimal, Longitude as defined in 10.7 of OMA User Plane Location Protocol V2.0)

- -8388608..8388607

<param7> - decimal:

- Start time –time wait in seconds after "START" before starting Area Trigger Event mode. If 0 or not present, mode is set immediately on START. Delayed Start Time shall not exceed 8639999 sec.

<param8> - decimal:

- Stop time – Stop time in seconds after "START". If 0 or not present, then will not stop until "STOP" command is issued. Stop Time must be greater than Delayed Start Time and shall not exceed 8639999 sec.

<cmd>:

- "SETQOP" – Set the reporting configuration of the modem.

<param1> - decimal:

- Horizontal accuracy– represents the horizontal requested fix accuracy in meters

<param2> - decimal:

- Vertical accuracy– represents the vertical requested fix accuracy in meters
- -1 - not defined

<param3> - decimal:

- Preferred TTFF – represents the requested time to first fix in milliseconds
- -1 - not defined

<param4> - decimal:

- Maximum Location Age – represents the requested Maximum tolerable age of position estimates used for cached position fixes.
- -1 - not defined

<cmd>:

“NMEAEN” – List of enabled NMEA sentences. Empty list means no enabled NMEA sentences.

For SONY CXD5600 Currently supported NMEA sentences:

- “GGA”
- “GLL”
- “GSA”
- “GSV”
- “GNS”
- “RMC”
- “VTG”
- “ZDA”
- “QSM”
- “IMP”
- “IMM”

<param1> - string:

- NMEA sentence name

<param2> - string:

- NMEA sentence name
- .
- .

<paramN> - string:

- NMEA sentence name

<cmd>:

- “SATUSE” – List of satellite systems which are used in the calculation (can be one or more).

For SONY CXD5600 Currently supported satellite systems are:

- “GPS”
 - “GLONASS” - Currently not supported
 - “SBAS” - Currently not supported
 - “QZSS L1-CA” - Currently not supported
 - “IMES” - Currently not supported
 - “QZSS L1-SAIF” - Currently not supported
-

<param1> - string:

- satellite system name

<param2> - string:

- satellite system name
- .
- .

<paramN> - string:

- satellite system name

<cmd>:

- "FWUPG" – command to initiate FW upgrade of GPS hardware.

<param1> - hexadecimal:

- Traceability ID The unique ID of the GPS hardware

<param2> - string:

- "F" – Force update (Useful for the case that TCXO offset is not stored on the device)

<param3> - string:

- Image file (full path)

<param4> - string:

- Configuration file – GPS mode of work: clock, LNA etc ..(full path)

<param5> - string:

- Updater application file to update the image in the GPS hardware (full path)

<cmd>

- "SETCAP" – List of GPS technologies which shall be declared by the device in the GPS capability message to the server (the list shall override default capability settings). Current supported capabilities are:
 - "STANDALONE" - GPS location without assistance from server
 - "AGPS MSB" - GPS location with assistance from server. Location calculated at the device.
 - "AGPS MSA" - GPS location with assistance from server. Location calculated at the server.
 - "ECID" - Cell based location (without GPS). Location calculated at the server.
 - "OTDOA" - Advanced Cell based location (without GPS). Location calculated at the server.

-
- <param1> - string:
 - GPS technology name
 - <param2> - string:
 - GPS technology name
 - <paramN> - string:
 - GPS technology name

Returned Values

- <GpsFwVer> - string:
 - The firmware version of the attached GPS
 - <GpsConfigVer> - string:
 - The configuration file version of the attached GPS
 - <GpsChiplD> - string:
 - The ID of the attached GPS
 - <GpsTraceabilityID> - hexadecimal:
 - The unique ID of the GPS hardware
 - <fix_type> - string; fix type:
 - "MSA"
 - "MSB"
 - <latitude>: string; value is omitted if unknown.
 - Latitude as defined and returned by NMEA command GGA. Positive values represent "North", negative values represent "South".
 - <longitude>: string; value is omitted if unknown.
 - Longitude as defined and returned by NMEA command GGA. Positive values represent "East", negative values represent "West".
 - <altitude>: string; value is omitted if unknown.
 - Altitude as defined and returned by NMEA command GGA.
 - <uncertainty>: integer; value is omitted if unknown.
 - The accuracy of the position in meters (The largest of Semi Major axis and Semi Minor axis).
 - Range: 0-127
 - <utc>: integer; value is omitted if unknown.
 - The UTC timestamp of the position (in 1msec units counted since January 1, 1970).
 - <speed>: integer; value is omitted if unknown.
 - Horizontal speed in kilometers per hour as received in "VTG" NMEA.
 - Range: 0-65535
-

<velocity>: integer; value is omitted if unknown.

- For MSB - The velocity of the device returned by NMEA sentence "RMA" and formatted to kilometers per hour.
- For MSA - The Horizontal velocity of the device returned over SUPL_POS message in kilometers per hour.
- Range: 0-65535

<gps_stat>: integer:

- 0 - GPS not started
- 1 - GPS started

<eth_stat>: integer; status of last stored Ephemeris:

- 0 - invalid
- 1 - valid

Example

Set estimated location with 30m accuracy:

```
AT%GPSCMD="LOCINJECT", "29.563484", "34.954681", 30
OK
```

GPS firmware upgrade:

- AT%GPSCMD="FWUPG", "0xAA", "F"
- AT%GPSCMD="FWUPG", "0xAA"
- AT%GPSCMD="FWUPG", "F"
- AT%GPSCMD="FWUPG"

Query command

- AT%GPSCMD?
- %GPSCMD: "12069_AGPS", "08-0017-04", "0004", "0x00000000"
- OK

3.5.32 AT%GPSEV

Table 3-34 AT%GPSEV Command Syntax

| Command | Possible response |
|------------------------|--|
| AT%GPSEV=<event>,<cmd> | OK/ERROR |
| AT%GPSEV? | ERROR (not supported) |
| AT%GPSEV=? | %GPSEV: (List of supported <events>s),(List of supported <cmd>s) |

Description

This unsolicited command is used deliver unsolicited information from the GPS hardware to the host.

Defined Values

<event>: a numeric parameter

- 0 – Delivery of unsolicited NMEA sentences to host
- 1 – Delivery of GPS status to host
- 2 – Session aborted (by Location Server or by Location Client) 99 – All events

<cmd>: a numeric parameter

- 0 – Disable <event>
- 1 – Enable <event>

<cmd body>:

- For 0 (NMEA sentence) - The command body is a string represent the NMEA sentence (using quote before and after the sentence). This event is delivered according to the periodicity defined by AT%GPSCMD
- For 1 (GPS status) The command body is an integer as following:
 - 0 – NONE (GPS Status unknown)
 - 1- SESSION_BEGIN (GPS has begun navigating)
 - 2- SESSION_END (GPS has stopped navigating)
 - 3- ENGINE_ON (GPS has powered on but is not navigating)
 - 4- ENGINE_OFF (GPS is powered off)

This event is delivered upon status change.

Example

Receive of NMEA sentence with location information:

- %GPSEV=0,"\$GPGGA,123519,4807.038,N,01131.000,E,1,08,0.9,545.4,M,46.9,M,,*47"

3.5.33 AT%GPSINFO

Table 3-35 AT%GPSINFO Command Syntax

| Command | Possible response |
|-----------------|---|
| %GPSINFO=<type> | <p>For "CAPABILITY" return list of Capability flags: %GPSINFO:<Scheduling>,<MSB>,<MSA>,<OTDOA>,<ECID>,<SingleShot>,<Time Injection>,<Geofencing> OK/ERROR</p> <p>For "UTC" return the UTC time: %GPSINFO:<UtcTime> OK/ERROR</p> <p>For "ALMANAC" return bitmap of "Satellite ID"s for which the device has updated Almanac: %GPSINFO: <almanac> OK/ERROR</p> <p>For "EPHEMERIS" return bitmap of "Satellite ID"s for which the device has updated Ephemeris: %GPSINFO: <ephemeris> OK/ERROR</p> <p>For "GETREP" return reporting configuration of the modem: %GPSINFO: <recurrence>, <min_interval> OK/ERROR</p> <p>For "GETQOP" return QoP setting of the modem: %GPSINFO: <h_accuracy>, <v_accuracy>,<tfff>,<max_age> OK/ERROR</p> <p>For "GETMODE" return location modem selected by SUPL server: %GPSINFO: <location_mode> OK/ERROR</p> |
| %GPSINFO? | <p>ERROR (OPRATION_NOT_ALLOWED) Operation is not supported</p> |
| %GPSINFO=? | %GPSINFO: (List of supported <type>s) |

Description

AT command to get information from device's GPS.

Defined Values

<type>:

- "CAPABILITY" – GPS capabilities
- "UTC" – UTC time
- "ALMANAC" - Almanac Satellite ID bitmap
- "EPHEMERIS"- ephemeris Satellite ID bitmap
- "GETREP"- reporting configuration
- "GETQOP"- reporting QoP configuration
- "GETMODE"- reporting location mode selected by SUPL server

<UtcTime> - decimal:

- UTC time in 1msec units counted since January 1, 1970

<Scheduling>:

- 0 –modem doesn't support periodic self fix
- 1 –modem supports periodic self fix

<MSB>:

- 0 – modem doesn't support MS-Based AGPS mode
- 1 –modem supports MS-Based AGPS mode

<MSA>:

- 0 –modem doesn't support MS-Assisted AGPS mode
- 1 –modem supports MS-Assisted AGPS mode

<OTDOA>:

- 0 – modem doesn't support OTDOA mode
- 1 – modem supports OTDOA mode

<ECID>:

- 0 – modem doesn't support ECID mode
- 1 – modem supports ECID mode

<SingleShot>:

- 0 –modem doesn't support single-shot fixes
- 1 –modem supports single-shot fixes

<TimeInjection>:

- 0 – GPS doesn't support time injection
- 1 – GPS supports time injection

<Geofencing>:

- 0 –modem doesn't support Geo-Fencing
- 1 –modem supports Geo-Fencing

<ephemeris>: hexadecimal

- Bitmap of "Satellite ID"s for which the device has updated Ephemeris.

<almanac>: hexadecimal

- Bitmap of "Satellite ID"s for which the device has updated Almanac.

<recurrence>: decimal

- 0 – Periodic infinite location reporting recurrence
- 1- 999 – Specific location reporting recurrence setting

<min_interval>: decimal

- Represents the time between fixes reports in milliseconds

<h_accuracy>: decimal

- Represents the horizontal requested fix accuracy in meters)QoP parameter)

<v_accuracy>: decimal

- Represents the vertical requested fix accuracy in meters)QoP parameter)

<tfff>: decimal

- Represents the requested time to first fix in milliseconds)QoP parameter)

<max_age>: decimal

- Represents the requested Maximum tolerable age in seconds of position estimates used for cached position fixes)QoP parameter)

<location_mode>:

- "Standalone" – current location mode in use is "Standalone"
- "MSB" – current location mode in use is "MSB"
- "MSA" – current location mode in use is "MSA"
- "ECID" – current location mode in use is "ECID"
- "OTDOA" – current location mode in use is "OTDOA"

3.5.34 AT%COUNT

Table 3-36 AT%COUNT Command Syntax

| Command | Possible response |
|--|--------------------------------------|
| %COUNT <layer>[, [<filter>] [, [<counter_type>] [, <action>]]] | %COUNT: <stats string> |
| %COUNT? | ERROR (OPERATION_NOT_ALLOWED) |
| %COUNT=? | %COUNT: (list of supported <layer>s) |

Description:

Command returns counters per LTE protocol layer. Read command is not supported.

Defined values:

<layer>:

- "PDM"
- "PDCP"
- "RLC"
- "MAC"
- "L1A"
- "RRC"
- "NAS"
- "TIMERS"
- "LOG"
- "CRITICALERR"
- "MEM"
- "L1AEXT"
- "ALL"
- "MBMS"
- "PWR"
- "USIM"
- "TIMER_INTERRUPT_LATENCY"

<filter> - used to reduce command output to the info defined by the filter:

- "TX"
- "RX"

<counter_type> - used to reduce command output to specific info defined by:

- "IPBYTES"

<action> - used to modify counter values:

- "CLEAR" - erase all counter values to zero.

<stats string>:

String is defined in arbitrary format for specified layer counters reporting starting from "LAYER Stats:" textual prefix

Example:

To clear counters: AT%COUNT="PDM",,"CLEAR"

OK

3.5.35 AT%LTEINFO

Table 3-37 AT%LTEINFO Command Syntax

| Command | Possible response |
|---------------------------------------|--|
| AT%LTEINFO= <layer>,<type>[,<param1>] | [LTEINFO:<info1>[,<info2>...[,<infoN>]...] |
| AT%LTEINFO? | ERROR (not supported) |
| AT%LTEINFO=? | OK |

Description:

This command is used to get information about LTE protocol layer parameters.

If parameters are not acquired yet or already irrelevant for current LTE state, response string is omitted.

Some LTE parameters provided by eNB may be optional. A parameter, which is not specified, will be omitted and written as ",".

If all parameters are not specified, command will return only OK.

Defined values:

<layer>:

- "MAC"

<type>:

- "TA" – Timing Advance

<info1> - current TA:

- Timing advance value for RRC_CONNECTED mode
- N/A for other modes

<info2> - last received TA, omitted in RRC_CONNECTED mode:

- Last timing advance value received in RRC_CONNECTED mode before leaving it

<layer>:

- "PHY"

<type>:

- "TDDCONF" – TDD UL/DL configuration

<info1> - configuration as per 36.211, sec.4.2:

- 0-6 for TDD
- N/A for FDD

<info2> - special subframe configuration as per 36.211, sec.4.2:

- 0-8 for TDD
- N/A for FDD

<layer>:

- “MAC”

<type>:

- “CRSIB3” – SIB3 cell reselection parameters

<info1> - s-NonIntraSearch reselection threshold as per 36.331

<info2> - threshServingLow reselection threshold as per 36.331

<info3> - cellReselectionPriority as per 36.331

<info4> - s-IntraSearch reselection threshold as per 36.331

<info5> - q-RXLevMIN reselection parameter as per 36.331

<layer>:

- “MAC”

<type>:

- “CRSIB5” – SIB5 cell reselection parameters

<info1> - EARFCN

<info2> - threshX-High reselection threshold as per 36.331

<info3> - threshX-Low reselection threshold as per 36.331

<info4> - cellReselectionPriority as per 36.331

<layer>:

- “MAC”

<type>:

- “BARSIB1” – SIB1 barring parameters

<info1>:

- 0 – barred
- 1 – not barred

<layer>:

- “MAC”

<type>:

- “BARSIB2” – SIB2 barring parameters for Rel9/10

<info1> - ac-BarringFactor of ssac-BarringForMMTEL-Voice-r9 as per 36.331

<info2> - ac-BarringTime of ssac-BarringForMMTEL-Voice-r9 as per 36.331

<info3> - ac-BarringForSpecialAC (in quotes) of ssac-BarringForMMTEL-Voice-r9 as per 36.331

<info4> - ac-BarringFactor of ssac-BarringForMMTEL-Video-r9 as per 36.331

<info5> - ac-BarringTime of ssac-BarringForMMTEL-Video-r9 as per 36.331

<info6> - ac-BarringForSpecialAC (in quotes) ssac-BarringForMMTEL-Video-r9 as per 36.331

<info7> - ac-BarringFactor of ac-BarringForCSFB-r10 as per 36.331

<info8> - ac-BarringTime of ac-BarringForCSFB-r10 as per 36.331

<info9> - ac-BarringForSpecialAC (in quotes) of ac-BarringForCSFB-r10 as per 36.331

<info10> - ac-BarringForEmergency of ac-BarringInfo as per 36.331

<info11> - ac-BarringFactor of ac-BarringForMO-Signalling as per 36.331

<info12> - ac-BarringTime of ac-BarringForMO-Signalling as per 36.331

<info13> - ac-BarringForSpecialAC (in quotes) of ac-BarringForMO-Signalling as per 36.331

<info14> - ac-BarringFactor of ac-BarringForMO-Data as per 36.331

<info15> - ac-BarringTime of ac-BarringForMO-Data as per 36.331

<info16> - ac-BarringForSpecialAC (in quotes) of ac-BarringForMO-Data as per 36.331

<layer>:

- “NAS”

<type>:

- “T3396” – T3396 status and time to expiration

<param1>:

- 0 or missed – return timer for all PLMNs
- 1 – return timers for last selected PLMN

<info1> - timer status:

- 0 – stop
- 1 – run

<info2> - rest of the time to run. Zero or omitted, if timer is stopped.

<info3> - PLMN

<info4> - cid

<layer>:

- “NAS”

<type>:

- “OPERIMSI” – NW operator identifiers of IMSI

<info1> - integer type; Home MCC (from IMSI)

<info2> - integer type; Home MNC (from IMSI)

<info3> - string type (in quotes); short NW operator name converted from IMSI MCC/MNC, may be omitted if unknown

-
- <layer>:
- “RRC”
- <type>:
- “OPERSIB1” – NW operator identifiers provided in SIB1
- <info1> - integer type; MCC (from SIB1)
- <info2> - integer type; MNC (from SIB1)
- <info3> - string type (in quotes); short NW operator name converted from SIB1 MCC/MNC, may be omitted if unknown
- <layer>:
- “SIM” – starting LTESYS-19191
- <type>:
- “EHPLMN” – retrieve EF_EHPLMN list in numeric format
- <info1> - integer type; oper1, (see +COPS <oper> definition)...
- <infoN> - integer type; operN
- <layer>:
- “RRC”
- <type>:
- “CE” – Coverage Enhancement info, starting LTESYS-18601
- <info1> - current CE mode:
- 0 – normal – UE is not camped on cell or UE selected the serving cell in normal coverage mode
 - 1 – UE selected the serving cell in enhanced coverage mode
- <info2> - current CE level that was used for accessing the cell during RACH, optional parameter is omitted in RRC IDLE mode:
- 0 – CE level 0
 - 1 – CE level 1
 - 2 – CE level 2
 - 3 – CE level 3
- <info3> - current CE mode in connected state, optional parameter is omitted in RRC IDLE mode (will be CE mode A, as long as CE mode B not supported)
- 0 – CE mode A
 - 1 – CE mode B
- <layer>:
- “PHY”

<type>:

- “MAXTXPWR” – max TX power actually used by PHY, starting LTESYS-19312 for ALT3800

<info1> - integer; current max TX power limit applied to all TX channels:

- max TX power in 100*dBm units

<layer>:

- “RRC” – starting LTESYS-19670

<type>:

- “RPLMN” – retrieve RPLMN value numeric format

<info1> - integer type; see +COPS <oper> definition

<layer>:

- “PHY”

<type>:

- “TXANTNUM” – number of TX antennas currently in use, starting LTESYS-20507 for ALT4800

<info1> - integer; number of TX antennas currently in use:

- 1/2/4

<layer>:

- “NAS”

<type>:

- “CIOT”, starting LTESYS-20561

<info1> - integer type; same value as reported by +CCIOTOPTI URC in

<supported_Network_opt> parameter. It indicates the negotiated with Network support for CloT EPS optimizations.

- 0 - No support.
- 1 - Support for control plane CloT EPS optimization.
- 2 - Support for user plane CloT EPS optimization.
- 3 - Support for both control plane CloT EPS optimization and user plane CloT EPS optimization.

3.5.36 ATD*99***

Table 3-38 ATD*99*** Command Syntax

| Command | Possible Response(s) |
|---------------------------|----------------------|
| ATD*99***<ext_sessionID># | OK/ERROR |

Description

AT command to initiate end to end PPP session with the LTE network on specific PDN which is set by the <ext_sessionID> parameter.

Defined Values

<ext_sessionID>

See definition in AT%PDNSET

3.5.37 AT%SETLOG

Table 3-39 AT%SETLOG Command Syntax

| Purpose | Param1 | Param2 | Returns |
|--|---|--|----------|
| Sets the module log severity in RAM | <ul style="list-style-type: none"> • "SYS" • "L1A" • "MAC" • "MACGN" • "MACUL" • "MACDL" • "RLC" • "RLCGN" • "RLCUL" • "RLCGL" • "PDCP" • "PDCPGN" • "PDCPUL" • "PDCPDL" • "RRC" • "VL1" • "NAS" • "USIM" • "FRM" • "ROHC" • "PROF0" • "PROF1" • "PROF2" • "PROF4" • "PROF6" • "OSAL" • "SERV" • "PACKET_CLASS" • "EXCEPTION_MANAGER" • "SIMLOCK" • "DT" • "SMS" • "AT" • "AMA" | <ul style="list-style-type: none"> • "DEBUG" • "INFO" • "NOTICE" • "WARN" • "ERROR" • "EMRG" | OK/ERROR |
| Sets the log severity for all modules in RAM | "ALL" | | |

Description

This command sets the log severity for run-time (into RAM) per module. This setting is lost after reboot.

Note: Shortened module names (“MAC”, “RLC”, and “PDCP”) work similar to wildcards. They affect their related modules to each of the following layer logs:

- “MAC”: “MACGN”, “MACUL”, “MACDL”
- “RLC”: “RLCGN”, “RLCUL”, “RLCDL”
- “PDCP”: “PDCPGN”, “PDCPUL”, “PDCPDL”

Usage

AT%GETLOG=<param1>,<param2>

3.5.38 AT%GETLOG

Table 3-40 AT%GETLOG Command Syntax

| Purpose | Param1 | Param2 | Returns |
|---|---|--|---|
| Reads device's log module severity from RAM | <ul style="list-style-type: none"> • "SYS" • "L1A" • "MACGN" • "MACUL" • "MACDL" • "RLCGN" • "RLCUL" • "RLCGL" • "PDCPGN" • "PDCPUL" • "PDCPDL" • "RRC" • "VL1" • "NAS" • "USIM" • "FRM" • "ROHC" • "PROF0" • "PROF1" • "PROF2" • "PROF4" • "PROF6" • "OSAL" • "SERV" • "PACKET_CLASS" • "EXCEPTION_MANAGER" • "SIMLOCK" • "DT" • "SMS" • "AT" • "AMA" | <ul style="list-style-type: none"> • "DEBUG" • "INFO" • "NOTICE" • "WARN" • "ERROR" • "EMRG" | Reads device's log module severity from RAM |

| | | | |
|---|-------|--|---|
| Reads device's log severity of all modules from RAM | "ALL" | <ul style="list-style-type: none"> • "DEBUG" • "INFO" • "NOTICE" • "WARN" • "ERROR" • "EMRG" | Reads device's log severity of all modules from RAM |
|---|-------|--|---|

Description

This command gets the log severity for the currently running SW per module.

Note: Shortened module names ("MAC", "RLC", and "PDCP") work similar to wildcards. They do not have their own severity to report, but instead report all related modules to each of the following layer logs:

- "MAC": "MACGN", "MACUL", "MACDL"
- "RLC": "RLCGN", "RLCUL", "RLCDL"
- "PDCP": "PDCPGN", "PDCPUL", "PDCPDL"

Usage

AT%GETLOG=<param1>

3.5.39 AT%DTLOG

Table 3-41 AT%DTLOG Command Syntax

| Command | Possible Response(s) |
|---------------------------------|---|
| %DTLOG =<mode>[,<tti_interval>] | In case the TTI interval cannot be supported. |
| %DTLOG? | ERROR (OPERATION_NOT_ALLOWED) |
| %DTLOG=? | OK |

Description

- Execution command enable/disable Drive test Logs.

Note: This setting is applied only during run-time (not NV stored) and will be lost after reboot.

- Read command is not supported.
- Test command is not implemented yet.

Defined Values

<mode>:

- 0 - Disables Drive Test logs
- 1 - Enables Drive Test logs

<TTI_interval>:

- Optional, the TTI periodicity of some of the PHY trace messages (262144- 262148).
- Value should be 1-10240.

3.5.40 AT%EARFCN

Table 3-42 AT%EARFCN Command Syntax

| Command | Possible Response(s) |
|---|--|
| %EARFCN=[<EARFCN>[,< EARFCN >...]] (up to 8) | Returns ERROR if the earfcn is not in range. Returns "operation not allowed" in verbose mode (CMEE). |
| %EARFCN? | %EARFCN: <earfcn> |
| %EARFCN=? | %EARFCN: (list of <earfcn>s found in scan) |

Description

- This command is used to create, update, and delete the EARFCN favorite list.
- Preferred EARFCNs may be added to the favorite list. These EARFCNs will be selected before their closest neighbor EARFCNs during the first scanning step of the "PLMN Search" procedure. This means that the detected Xcorr values may occasionally be higher than the actual LTE EARFCN.
- The favorite list accelerates the MIB and SIB acquisition steps of the "PLMN Search" procedure. It does not have any impact on the "PLMN Selection" nor the "Cell Search and Selection" procedures (see 3GPP 23.122 and 36.304).

Note: If AT%EARFCN=0 it will erase the favorite list and disable the EARFCN preference mechanism on all bands.

3.5.41 AT%CEER

Table 3-43 AT%CEER Command Syntax

| Command | Possible Response(s) |
|---|--|
| %CEER=<mode>[, [<clear_err>]][, <rep_type>] | OK or ERROR |
| %CEER? | %CEER: <mode> [, <module>, <procedure>, <failure> [, [<reject cause>][, [<error info>][, <EARFCN>, <pci>, <oper>, <tac>]]]] +CME ERROR: <err> |
| %CEER=? | %CEER: (list of supported <modes>) |

Description

- This set command enables or disables the presentation of unsolicited result responses about system failure in the following form:
- %CEER: <module>, <procedure>, <failure>[, [<reject cause>][, [<error info>][, <EARFCN>, <pci>, <oper>, <tac>]]]]
- If <rep_type>=1 (extended) is used, the optional <error info> and <reject cause> parameters may be omitted.
- The read command returns the last added failure report with the selected
- <mode>.
- The test command returns a list of supported modes.

Defined Values

<mode>: Status of unsolicited result response presentation

- 0 – Disabled (default)
- 1 – Enabled

<clear_err>: Clear last stored failure report

- 0 – Keep last stored failure report (default)
- 1 – Clear last stored failure report

<rep_type>: Optional reporting type to enable report extensions. If missed, default=0 (regular). Regular reporting is truncated after <error info> parameter:

- 0 – Regular
- 1 – Extended with failure cell identity (EARFCN, PCI, PLMN, TAC)

<module>: Protocol layer or protocol entity

- “NAS-EMM”
- “NAS-ESM”
- “PDM”

-
- "RRC"
 - "PDCP"
 - "RLC"
 - "MAC"
 - "L1A"

<procedure>: Protocol defined procedure For NAS-EMM:

- "ATTACH"
- "DETACH"
- "TAU"
- "SERREQ" - Service request
- "AUTH"

For NAS-ESM:

- "PDN_CONN"
- "PDP_ACT"
- "PDP_DEACT"

For PDM:

- "IPV6_RA"

For RRC:

- "CONN_EST"

For PDCP:

- TBD

For RLC:

- TBD

For MAC:

- TBD

For L1A:

- TBD

<failure>:

- "REJECT"
- "MAXRETRY"
- "BARRING"
- "UNEXPECTED"

<reject cause>: As per protocol definition For NAS-EMM and NAS-ESM:

- #X – Numeric value of reject code prefixed with "#"

For RRC:

- 1 - Access class barring
- 99 - Other

<error info>:

An arbitrary error information text, determined by the UE manufacturer, and containing additional information about the failure. For reject it may contain a textual definition of the reject code.

<earfcn> - cell EARFCN

<pci> - cell PCI

<oper> - string format; Cell PLMN encoded as defined for AT+COPS (in quotes)

<tac> - hexadecimal value; As defined for AT+CEREG (in quotes)

3.5.42 AT%SETACFG

Table 3-44 AT%SETACFG Command Syntax

| Command | Possible Response(s) |
|---|---------------------------------------|
| AT%SETACFG=<param file name>.<param section>.<param name> | OK/ERROR |
| AT%SETACFG? | ERROR (OPRATION_NOT_ALLOWED) |
| AT%SETACFG=? | %SETACFG: (list of supported <param>) |

Description

- This command sets a configuration field for the Open Platform Configuration manager.
- This command uses the linux UCI engine, meaning it can override each parameter from one of the configuration files (located in “d:/config”).
- The command parameters (separated by ‘.’) define the path to the parameter as described above.

Example

at%setacfg=pm.conf.sleep_mode,disable, where pm is the <param file name>, conf is the <param section>, sleep_mode is the .<param name>. and “disable” is the value to set.

3.5.43 AT%GETACFG

Table 3-45 AT%GETACFG Command Syntax

| Command | Possible Response(s) |
|---|---------------------------------------|
| AT%GETACFG=<param file name>.<param section>.<param name> | %GETACFG: <param_value> |
| AT%GETACFG? | ERROR (OPRATION_NOT_ALLOWED) |
| AT%GETACFG=? | %GETACFG: (list of supported <param>) |

Description

- This command gets a configuration field from the Open Platform Configuration Manager.
- This command uses the linux UCI engine, meaning it can read each parameter from one of the configuration files (located in “/etc/config”).
- The command parameters (separated by ‘.’) define the path to the parameter as described above.

3.5.44 AT%TSTEXT

Table 3-46 AT%TSTEXT Command Syntax

| Command | Possible Response(s) |
|---------------------------|--|
| AT%TSTEXT=<cmd>[,<param>] | For <cmd>="CLOCK32": <ul style="list-style-type: none">• %TSTEXT: <freq_error> |
| AT%TSTEXT? | ERROR (not supported) |
| AT%TSTEXT=? | OK |

Description

- This command is used for external circuits' test modes.
- It is not accepted in operational mode (AT+CFUN=1), nor flight mode (CFUN=4), and returns ERROR. The modem shall be previously switched into non-operational mode by CFUN=0.
- Read command is not supported.

Defined Values

<cmd>:

- "CLOCK32" – Measures the frequency error for the 32 KHz crystal

<param> - Test duration in ms:

- 20-10,000

<freq_error>- Frequency error in ppm (parts per million) related to the default frequency of 32.768 KHz

3.5.45 AT%CSDH

Table 3-47 AT%CSDH Command Syntax

| Command | Possible response |
|--------------|------------------------------------|
| %CSDH=<show> | |
| %CSDH? | %CSDH: <show> |
| %CSDH=? | %CSDH: (list of supported <show>s) |

Description

The command enables proprietary optional fields in the response for AT commands CMGR/CMGL/CMT.

The optional fields carry information related to:

- Concatenated SMS (<msgid>,<msgn>,<msgpn>)
- WDP header (<wdpdst>, <wdpsrc>)
- 3GPP2 <message_id> & <teleservice_id>
- CMGL extra info (<fo>,<pid>,<dc>, <sca>,<tosca>)

The definition of these parameters can be found in the description of the user modified commands: AT+CMGR, AT+CMGL and +CMT in this document.

Note: This command has effect only when AT+CSDH=1

Defined Values

<show>: decimal

- 0 - So not show any proprietary optional info
- 1 – Show concatenated header info
- 2 – Show Concatenated header info, WDP info, 3GPP2 message & teleservice id (if the SMS is 3GPP2) and CMGL extra info

3.5.46 AT%OTPCMD

Table 3-48 AT%OTPCMD Command Syntax

| Command | Possible response |
|--|---|
| AT%OTPCMD=<cmd> [,<otp_object>[,<value>]] | For <cmd>="RD" (query): %OTPCMD: <otp_object>,<value> For <cmd>="GETLOCK": %OTPCMD: <otp_object>,<lock_state> OK or ERROR |
| AT%OTPCMD? | For ALT1160/1210 only: %OTPCMD: error=<error>[, ENG=<lock_state>, SW=<lock_state>;MCU=<lock_state>] For ALT1250: %OTPCMD: error=<error> |
| AT%OTPCMD=? | %OTPCMD: (list of supported <cmd>s), (list of supported <otp_object>s) |

Description

- This command is used for OTP parameters filling at Production time.
- The query command ("RD") is supported for declared <otp_object>s not only at production time.
- The query command may return ERROR for certain parameters also at production time (Master Key, for example).
- If the OTP memory is not locked at production time, the OTP data may be filled into the OTP memory at later stages (post-production, or pre-sales).
- Since improper OTP handling may cause OTP memory corruption and chip data loss, this command is considered very risky.
- For more protection from arbitrary OTP parameters write, the separate "EN" command to enable OTP modification shall be entered as pre-condition. This enabling command forces customer to send a sequence of 2 AT commands to initiate first OTP parameter write.
- Any OTP parameter may be written only once except of bypass flags.
- The write command ("WR") for some joined parameters (ALT1160/1210) has restricted order of writing to protect further device stuck at wakeup with partially filled joined parameters. There are a list of restrictions for writing order:

- ○ Public Key -> Cold Boot Security Enable=1
- ○ Public Key -> Bypass flags with Cold Boot Security Enable BIT =1
- The “CFGFLAGS” parameter is encoded in the order as it is defined in OTP data sheet of ALT1160 (and further chips). The MSB of <value> parameter will be the flags with smallest address (i.e. “Cold Boot Security Enabled” bit in ALT1160 use-case).
- For parameters joined into the same locked block (ALT1160/1210) SW OTP area may be only locked if next mandatory fields are written (non-zero):
 - IMEI
 - Master Key for SIM lock recovery
- For ALT1250, which has multi-locking opportunities within same area (Manufacturing, Modem, MCU), the lock operation shall specify favorite <otp_object> of the locked block, i.e.:
- AT%OTPCMD= “LOCK”, “IMEI”
- The “LOCK” operation, if it is applied to the block with mandatory favorite object, may be only locked if favorite field is written (non-zero). Otherwise AT%OTPCMD= “LOCK”,... returns ERROR.
- For ALT1250 the multi-locking state cannot be reflected in “AT%OTPCMD?” response.
- To retrieve locking status of specified block the AT%OTPCMD=“GETLOCK”, <otp_object> shall be used instead on ALT1250.

Defined Values

<cmd>:

- “EN” – Enable OTP writing. Once enabled, one or more OTP parameters may be written to the non-locked OTP area.
- “WR” – Writes the new OTP parameter value
- “RD” – Queries the current OTP parameter value
- “LOCK” – Locks and disables further write operations. For ALT1160/1210 it is applied to engineering (ENG) and SW OTP areas. For ALT1250 the <otp_object> parameter shall be always specified to select block to be locked by their favorite object.
- “LOCKMCU” – Locks and disables the MCU OEM area of OTP writing. Once locked, MCU OEM area of OTP is not writable any more - ALT1160/1210 only
- “GETLOCK” – for ALT1250 only: retrieves lock status for blocks identified by their favorite object.

<otp_object> - String name of the field:

| <otp_object> | Description | <value> > type | <value> > size/ range | “WR” | “RD” | “LOCK” “GET LOCK” | Chipset ALTxxx x |
|--------------|--|----------------------|--------------------------------|------|------|-------------------------|------------------------|
| “CFGFLAGS” | Primary and secondary bypass flags | hex | 8 bytes | V | V | - | 1160 1210 |
| “PUBKEY” | Public key | hex | 128 bytes | V | V | - | 1160 1210 |
| “IMEI” | IMEI value | hex | 15 bytes | V | V | V (1250) | Any |
| “MK” | Master Key value | hex | 16 bytes | V | - | V (1250) | Any |
| “JTAGDIS” | JTAG control | bin | 6 bits | V | V | - | 1160 1210 |
| “HVDIS” | High visibility disable, (for read operation from MCU) | bin | 1 bit | V | V | - | 1160 1210 |
| “BRPATCH” | Boot ROM patch | hex | up to 220 bytes | V | V | - | 1160 1210 |
| “SFPATCH” | Serial flash patch | hex | up to 92 bytes | V | V | - | 1160 1210 |
| “MODCUST” | Module OEM customer data | hex | up to 88 bytes | V | V | - | 1160 1210 |
| “MCUCUST” | MCU OEM customer data | hex | up to 252 bytes | V | V | - | 1160 1210 |
| “VDDMIN” | Two’s complement value that is used to calculate the VDD minimum voltage | bin | 8 bit | - | V | - | 1160 1210 |

| <otp_object> | Description | <value> type | <value> size/range | “WR” | “RD” | “LOCK” “GET LOCK” | Chipset ALTxxx |
|-----------------|--|--------------|----------------------------------|------|------|-------------------|----------------|
| “CHIPID” | Chip ID | hex | 16 bits (1160) 40 bits (1250) | - | V | - | Any |
| “ODM4” – “ODM6” | Module ODM customer data | hex | up to 128 bytes | V | V | V | 1250 |
| “ODM7” | Module ODM customer data | hex | up to 127 bytes | V | V | V | 1250 |
| “OVERHEAT” | Enable/disable Temperature Overheating Damage Protection feature | bin | 3 bits | V | V | - | 1250 |
| “OTPVER” | OTP version | integer | 0-255 | - | V | - | 1250 |

<value> - type as per table above:

- integer value
- hexadecimal format for byte memory blocks in quotes
- binary bit(s) value in quotes, see some binary fields explanation below.

For “JTAGDIS” - ALT1160/1210 only:

- “00” – JTAG interface opened
- “01” and “10” - JTAG interface semi-closed, password protected
- “11” - JTAG interface fully closed

For “OVERHEAT” – ALT1250 only.

The position of the leading “1” in this 3-bits value dictate the enable/disable of Temperature Overheating Damage Protection feature. Read command (<cmd=“RD”) shows actual value stored into OTP. The actual value, which is going to be written by write command (<cmd=“WR”) depends on current OTP value. Settled by AT value will be ORed with current OTP value and then it will be written back to OTP (read-modify-write). The “WR” values are limited only by 3 valid values (see below). The “WR” command may modify non-leading “1” too; such setting will not impact modem behaviour.

For “RD”:

- “000” - Disable
- “001” – Enable
- “010”-“011”– Disable
- “100”-“111” - Enable permanently

– For “WR”:

- _001” – Enable
- “010” – Disable
- “100” - Enable permanently

<lock_state>:

- 0 – unlocked
- 1 - locked

<error> - error of last execute command (last write or lock operation):

- 0 – no errors
- 1 – OTP access errors
- 2 – attempt to lock already locked OTP
- 3 – missed mandatory IMEI, returned on attempt to lock OTP1 (ALT1160/1210 only) or to lock “IMEI” object (ALT1250)
- 4 – missed mandatory Master key, returned on attempt to lock OTP1 (ALT1160/1210 only) or to lock “MK” object (ALT1250)
- 5 - attempt to write already written <otp_object>
- 6 – illegal write order
- 7 – illegal value

Example

This will be typical OTP filling flow (if Master Key is not used):

1. Enable OTP write access first:

```
AT%OTPCMD="EN"
```

```
OK
```

2. Write public key value in hex format (ALT1160/1210):

```
AT%OTPCMD="WR","PUKEY","23f1d457...."
```

```
OK
```

3. Write cold boot security value in bit format (ALT1160/1210):

```
AT%OTPCMD="WR","CBSECEN","1"
```

```
OK
```

4. Repetitive write is prohibited (ALT1160/1210):

```
AT%OTPCMD="WR","CBSECEN","0"
```

```
ERROR
```

5. Check failure:

For ALT1160/1210

```
AT%OTPCMD?
```

```
AT%OTPCMD: error=5, ENG=0, SW=0, MCU=0
```

```
OK
```

For ALT1250

```
AT%OTPCMD?
```

```
AT%OTPCMD: error=5
```

```
OK
```

6. Lock SW OTP (ALT1160/1210):

```
AT%OTPCMD="LOCK"
```

```
ERROR
```

7. Check failure and locking status (ALT1160/1210):

```
AT%OTPCMD?
```

```
AT%OTPCMD: error=3, ENG=0, SW=0, MCU=0
```

```
OK
```

8-9. Write IMEI and Master Key

...

10. Lock SW OTP:

For ALT1160/1210

```
%OTPCMD="LOCK"
```

```
OK
```

For ALT1250

%OTPCMD="LOCK","IMEI"

OK

%OTPCMD="LOCK","MK"

OK

11. Check locking status:

For ALT1160/1210

AT%OTPCMD?

AT%OTPCMD: error=0, ENG=1, SW=1, MCU=0

OK

For ALT1250

AT%OTPCMD?

AT%OTPCMD: error=0

OK

AT%OTPCMD="GETLOCK","IMEI"

%OTPCMD:"IMEI",1

OK

AT%OTPCMD="GETLOCK","MK"

%OTPCMD:"MK",1

OK

3.5.47 AT+VZWAPNE

Table 3-49 AT+VZWAPNE Command Syntax

| Command | Possible response |
|--|--|
| AT+VZWAPNE=<wapn>,<apncl>,<apnni>,<apntype>,<apnb>,<apned> | +CME ERROR: <err> |
| AT+VZWAPNE? | +VZWAPNE: <apncl>1,<apnni>1,<apntype>1,<apnb>1,<apned>1, <apncl>2,<apnni>2,<apntype>2,<apnb>2,<apned>2,..., <apncl>n,<apnni>n,<apntype>n,<apnb>n,<apned>n +CME ERROR: <err> |
| AT+VZWAPNE=? | +VZWAPNE: (list of supported <wapn>s), (list of supported <apncl>s), (list of supported <apnni>s), (list of supported <apntype>s), (list of supported <apnb>s), (list of supported <apned>s) +CME ERROR: <err> |

Description

- This Write command allows the APN table on the CFGM to be overwritten. One write command must be issued for each APN edit. The +CME ERROR:
- <err> is returned if the command fails. Refer to 3GPP TS 27.007 subclause 9.2 for <err> values.
- This command is applicable only when operator=VZW, and in “Lab mode” (config/modem_apps=>Mode.LabMode = “true”).

Usage

- A Read command queries the APN table that is currently on the DUT starting from the first entry to the last. The numbers following each value (for example, “1”, “2”, & “n” in the following cases: “<apncl>1”, “<apncl>2”, “<apncl>n”) indicate the source of the available APNs. The maximum number of APNs is “n”.
- The +CME ERROR: <err> is returned if the command fails. Refer to 3GPP TS 27.007 subclause 9.2 for <err> values.
- A Test command returns the supported entry values. The +CME ERROR: <err> is returned if the command fails. Refer to 3GPP TS 27.007 subclause 9.2 for <err> values.

Note: See the APN's section of the Verizon Wireless document "Device Requirements – LTE 3GPP Band 13 Network Access" for more information about the APN table.

Defined Values

<wapn>: Integer type; Indicates which APN entry to edit. The maximum number of APNs is "n":

- 0 - Take no action
- 1 - Edit APN entry #1
- 2 - Edit APN entry #2
- 3 - Edit APN entry #3
- 4 - Edit APN entry #4
- n - Edit APN entry # n

<apncl>: Integer type; Indicates the APN Class. The maximum number of APNs is "n":

- 1 - APN Class #1
- 2 - APN Class #2
- 3 - APN Class #3
- 4 - APN Class #4
- n - APN Class # n

<apnni>: String type; Indicates the Network Identifier

- VZWIMS - Verizon Wireless IMS PDN
- VZWADMIN - Verizon Wireless Administrative PDN
- VZWINTERNET - Verizon Wireless Internet PDN
- VZWAPP - Verizon Wireless Application PDN

<apntype>: String type; APN type

- IPv6 - IPv6 type
- IPv4v6 - IPv4 and IPv6 type

<apnb>: String type; APN Bearer

- LTE - LTE bearer used

<apned>: String type; Enable/Disable the APN

- Enabled - The APN is enabled
- Disabled - The APN is disabled

3.5.48 AT%CMATT

Table 3-50 AT%CMATT Command Syntax

| Command | Possible response |
|----------------|--------------------------------------|
| %CMATT=<param> | OK or ERROR |
| %CMATT? | %CMATT: <param> |
| %CMATT=? | %CMATT: (list of supported <param>s) |

Description:

AT command sent from external Host, which instructs LTE module (eCM application) attach or detach the LTE network.

Defined values:

<param>: Integer type; instruct the device to attach or detach the LTE network.

- 0 - detach
- 1 - attach

3.5.49 AT+VZWRSP

Table 3-51 AT+VZWRSP Command Syntax

| Command | Possible response |
|-------------|---|
| AT+VZWRSP= | ERROR |
| AT+VZWRSP? | +VZWRSP: <cellID>1,<EARFCN>1,<RSRP>1,<cellID> 2, <EARFCN>2,<RSRP>2,...,<cellID>n, <EARFCN>n,<RSRP>n OK or +CME ERROR: <err> |
| AT+VZWRSP=? | OK |

Description

- This execution command is not supported.
- The Read command returns the RSRP values for all cells measured by the UE.
- The device shall support this command in both RRC_IDLE and RRC_CONNECTED modes.
- The +CME ERROR: <err> is returned if the command fails. The “+CME ERROR: operation not allowed” is reported as per 3GPP TS 27.007 subclause 9.2 for <err> values if the device is not in RRC_IDLE or RRC_CONNECTED mode.

Defined Values

<cellID>:

- Integer type; Cell ID where the format is XXX

<EARFCN>:

- Integer type; EARFCN for given cell where EARFCN is per 3GPP TS 36.101

<RSRP>:

- String type; RSRP value where the format is -XXX.XX dBm/15kHz (also supports -XX.XX format and -X.XX format)

3.5.50 AT+VZWRSRQ

Table 3-52 AT+VZWRSRQ Command Syntax

| Command | Possible response |
|--------------|--|
| AT+VZWRSRP= | ERROR |
| AT+VZWRSRQ? | +VZWRSRQ: <cellID>1,<EARFCN>1,<RSRQ>1,<cellID> 2, <EARFCN>2,<RSRQ>2,...,<cellID>n, <EARFCN>n,<RSRQ>n OK or +CME ERROR: <err> |
| AT+VZWRSRQ=? | OK |

Description

- Execution command is not supported
- Read command returns the RSRQ values for all cells being measured by the UE.
- The device shall support this command in both RRC_IDLE and RRC_CONNECTED modes.
- The +CME ERROR: <err> is returned if the command fails. The "+CME ERROR: operation not allowed" is reported, as per 3GPP TS 27.007 subclause 9.2 for <err> values, if the device is not in RRC_IDLE or RRC_CONNECTED mode.

Defined Values

<cellID>:

- Integer type; Cell ID where the format is XXX

<EARFCN>:

- Integer type; EARFCN for a given cell where EARFCN is per 3GPP TS 36.101

<RSRP>:

- String type; RSRQ value where the format is -XX.XX dBm/15k

3.5.51 AT%UPGCMD

Table 3-53 AT%UPGCMD Command Syntax

| Command | Possible Response(s) |
|---------------------------|---|
| AT%UPGCMD=<cmd>[,<param>] | OK/ERROR |
| AT%UPGCMD? | %UPGCMD:mode=<mode>,status=<status> [,error=<error>[,received=<received_count>, total=<total_count>]] |
| AT%UPGCMD=? | OK |

Description:

AT command to manages firmware upgrade (loading and/or update) over LAN.

This command is used by Upgrade Manager on external Host only.

If <param> is omitted in the “START” upgrade command, the default static IP mechanism is used by both uBoot and Upgrade Agent.

The value returned in <status> parameter reflects the status of running or last finished upgrade attempt.

Status is cleared at the beginning of any upgrade attempt by AT%UPGCMD=“START”.

Defined values:

<cmd>:

- “START” - A command to initiate internal upgrade script. **Not applicable to ALT1250.**
- “LOCK” - A command to disable and decline any future attempts to initiate firmware upgrade. **Not applicable to ALT1250.**
- “UPGVRM” - A command to initiate upgrade-vRM script.
- “CFGPART” - for ALT1250 only. A command to configure **interim partitioning map** and **re-generate** tempFS before storing delta image.

<param>:

For <cmd>=“START” – string; IP address assignment mechanism:

- “static”
- “dhcpc”

For <cmd>=“UPGVRM” – string; the name (with full path) of the vRM image will be used for firmware upgrade.

For <cmd>=“CFGPART” – **hexadecimal type; interim partition map.**

<mode>:

- 0 – unlocked
- 1 – locked

<status>:

- 0 – unknown. This status is returned if there was not any upgrade attempt in this device.
- 1 – image loading in progress
- 2 – image update in progress
- 3-succeeded
- 4-failed

<error>:

- 0 – for all other than 4(failed) <status> values
- 1 – General upgrade error
- 10 – General configuration error
- 20 – General download error
- 30 - General run-time error
- 40 – General flash failure
- 50-63 – Reserved for customers. Codes starting 64 are used by OS

<received_count>:

- The number of bytes loaded/updated to the device. Relevant only for states: 1 & 2

<total_count>:

- The total number of bytes of the loaded/update package. Relevant only for states: 1 & 2

3.5.52 AT%PDNACT

Table 3-54 AT%PDNACT Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%PDNACT=<act>,[<sessionID>] [,<apnname>] | OK/ERROR |
| AT%PDNACT? | Returns all active sessions: %PDNACT:<sessionID>,<stat>,<APN>,<cid> [<CR><LF>%PDNACT:<sessionID>,<stat>,<APN>,<cid> d] [...] |
| AT%PDNACT=? | OK |

Description

- This command is used by the external host to instruct eCM to expose and connect (disconnect) a specific PDN to the host. There may be more than one PDN exposed to the host.
- There may be more than one PDN exposed to the host.
- Session ID is an Altair proprietary session identifier. It's defined for each session established over-the-air in the NP config file named '/etc/config/ecm'.
- The user can use <apnname> or <sessionID>, or both, to identify the PDN. If both are defined then the PDN is identified by <apnname>.
- PDNs terminated in the modem cannot be exposed to the host, and any attempt to activate them from the host will return ERROR. PDN sharing between the host and the modem is not yet supported.

Defined Values

<act> : Numeric value, indicates the required action

- 0 – Deactivate
- 1 – Activate

<sessionID>: Numeric value of the session identifier defined in the NP config file

<apnname> : String type; indicates the APN name configured for the PDN.

<stat> : Numeric value, indicates the actual PDN state

- 0 – non-active
- 1 – active

3.5.53 AT%SRVCHANGE

Table 3-55 AT%SRVCHANGE Command Syntax

| Command | Possible Response(s) |
|-----------------------------|---|
| AT%SRVCHANGE=<mode>, <code> | OK/ERROR |
| AT%SRVCHANGE? | ERROR (not supported) |
| AT%SRVCHANGE=? | %SRVCHANGE:(list of supported <mode>s), (list of supported <code>s) |

Description:

The access to the device can be obtained using different services, such as, Telnet, FTP, SSH, HTTP and AT%EXE etc.. . Accessing the device is essential in developing/debugging sessions, but oppose a serious security breach in a commercial mode where these services must be closed.

The AT%SERVCHANGE command is used to toggle between 2 modes:

- Commercial mode in which these services are closed
- Debug mode in which these services are open.

The vendor configure the list of enabled services in both mode according to its needs. Each mode has a configurable list of enabled services:

- /etc/config/admin_commercial
- /etc/config/admin_debug

The default mode is set by the vendor.

Mode changing is protected by <code>.

Defined values:

<mode> : string

- DEBUG
- COMM

<code>: string of 9-10 digits

3.5.54 AT%COLLECTLOGS

Table 3-56 AT%COLLECTLOGS Command Syntax

| Command | Possible Response(s) |
|----------------------------|--|
| AT%SRVCHANGE=<mode>,<code> | OK/ERROR |
| AT%SRVCHANGE? | ERROR (not supported) |
| AT%SRVCHANGE=? | %SRVCHANGE:(list of supported <mode>s),(list of supported <code>s) |

Description:

- The command is used to enable storage of RTOS/NP logs and optional delivery of NP logs to the Host on ALT38xx.
- If no parameter is supplied, then loges are placed to B:\ (ALT1250) or '/nvm/Logs' (other chipsets).
- Alternative options are supported on ALT38xx only: to send log as a package to host via socket or to save the logs to NFS remote directory.

Defined Values

<ipaddr>: string type; applicable to ALT38xx only

- P address of host for transferring log via socat or NFS. If no secondary <rpath> parameter is upplied, then socat is used. If secondary <rpath> parameter is supplied, then NFS is used

<rpath>: string type; applicable to ALT38xx only

- remote path – remote path for log saving over NFS

3.5.55 AT%APNN

Table 3-57 AT%APNN Command Syntax

| Command | Possible Response(s) |
|-----------------|----------------------|
| %APNN=<apnname> | OK/ERROR |
| %APNN? | %APNN: <apnname> |
| %APNN=? | OK |

Description

- Allows the user to change the PDN's APN name used by the host (this is usually the Internet PDN). This command doesn't allow the user to change the APN name of the other PDNs which are controlled by the operator.
- An APN consists of two parts:
- Network Identifier: Defines the external network. This part of the APN is mandatory.
- Operator Identifier: Defines the specific operator's packet domain network. This part of the APN is optional.
- Verizon requires that the APN name will include only the APN Network Identifier part (APNNI) and not the Operator

Identifier. Other operator can also request to use the Operator Identifier.

Defined Values

- <apnname>: String type; Indicates the APN name. For Verizon the default APN name is the Network Identifier: VZWINTERNET

3.5.56 AT%STATCM

Table 3-58 AT%STATCM Command Syntax

| Command | Possible Response(s) |
|----------------------|--------------------------------------|
| AT%STATCM=<mode> | OK or ERROR |
| AT%STATCM? | %STATCM: <mode> |
| AT%STATCM=? | %STATCM: (list of supported <mode>s) |
| (unsolicited report) | %STATCM: <event>[,<param>] |

Description

- This command is used to report state changes in the eCM to the host. The reported state changes are currently limited to the registration state and the state of external PDNs (that is, those PDNs which are not terminated in the device).
- The reporting is disabled by default at wakeup time.

Defined Values

<mode>: Status of unsolicited result response presentation:

- 0 – Disabled (default)
- 1 – Enabled

<event>:

- 0 – LTE deregistered
- 1 – LTE registered (this also indicates the completion of IMS registration if an internal IMS client is used)
- 3 – PDN connected (<param> is used as <sessionID>)
- 4 – PDN disconnected (<param> is used as SessionID)
- 5 – PDN configuration changed (<param> is used as <SessionID>)
- 6–99 – Reserved

<param>:

The <param> is used as <sessionID> for <event> values 3, 4, and 5. The <sessionID> is used for numbering the external PDNs exposed to the user. See also command AT%PDNSET (section 5.2.35).

3.5.57 GETFINFO

Table 3-59 AT%GETFINFO Command Syntax

| Command | Possible Response(s) |
|--------------------------------|-----------------------|
| AT%GETFINFO=<file>,<info_type> | <info> OK/ERROR |
| AT%GETFINFO? | ERROR (not supported) |
| AT%GETFINFO=? | OK |

Description

This command is used to get information about LTE parametric files.

Defined Values

<file> - file name:

- "BOOTBP"
- "SYSBP"
- "PHYBP"
- "FCF"
- "DIP"
- "DOP"
- "PRSNP"
- "EXTSIMP"

<info_type>:

- "CRC" – CRC over entire file content. In case of NPD is embedded in

<info>:

- For CRC:
 - 32-bit CRC value in decimal representation

3.5.58 AT%SETPCO

Table 3-60 AT%SETPCO Command Syntax

| Command | Possible Response(s) |
|-------------------------------------|------------------------------------|
| %SETPCO=<cid>[,<pcoid>[,<payload>]] | OK ERROR |
| %SETPCO? | ERROR (OPERATION_NOT_SUPPORTED) |
| %SETPCO=? | OK |

Description

User defined PCO ID which needs to be requested by LTE modem for the PDP context id <cid>.

Defined Values

- <cid> - integer type. The ID of the PDP context on which the PCO request should be sent.
- <pcoid> - hexadecimal type. The PCO container ID as defined in 3GPP 24.008 section 10.5.6.3. Two-bytes value, the leading zero is mandatory, i.e “001A”.
- <payload> - hexadecimal type. The payload to be sent on the PCO request in HEX format (As an example, this may include MCC, MNC as defined in 3GPP 24.008 section 10.5.6.3).

3.5.59 AT%SETURLIP

Table 3-61 AT%SETURLIP Command Syntax

| Command | Possible Response(s) |
|---|-----------------------------------|
| AT%SETURLIP =<URL>,<iptype>,<ipaddr> | OK/ERROR |
| AT%SETURLIP? | ERROR (not supported) |
| AT%SETURLIP=? | %SETURLIP:<URL>,<iptype>,<ipaddr> |

Description

This command is used to configure the resolved IP address (V6 or V4) of the specific URL. It's used to assist the NP whenever it's not able to resolve this issue by itself although it (the NP) still needs access to the URI (for example, when the LTE is disabled and host connectivity is over WiFi).

Defined Values

<ipaddr>: string

This is the host IP address for transferring the log via socat or NFS.

- socat is used if no secondary <rpath> parameter is supplied.
- NFS is used if a secondary <rpath> parameter is supplied.

<iptype>: string

- IPv6 - IPv6 type
- IPv4 - IPv4 type

<URL>: string

Known as the web address

Example

AT%SETURLIP="4g.dmsserver.operator_name.com", "IPV4", "212.35.345.32"

3.5.60 AT%VECEER

Table 3-62 AT%VECEER Command Syntax

| Command | Possible Response(s) |
|-----------|------------------------------|
| %VECEER | +VECEER: <report>[,<reason>] |
| %VECEER? | ERROR (not supported) |
| %VECEER=? | OK |

Description

The command format is the same as standard AT+CEER command, and it is used to query the reason of the last call failure/disconnection based on indication from VoLTE framework.

Defined values:

<report>:

- "NO ERROR"
- "NO ANSWER"
- "REJECTED"
- "DENIED"
- "CONNECTION TERMINATED"

<reason >: string

The text field in the reason header of the SIP message (See example)

Example:

- In case of Call forking when other endpoint takes the call, the SIP registrar may send connection terminated message with: **SIP; cause=200; text="Call completed elsewhere"** in the reason header
- For the regular connection terminated message, the SIP registrar may send it with: **SIP; cause=603; text="Declined"** in the reason header.

3.5.61 AT%CGDCONT

Table 3-63 AT%CGDCONT Command Syntax

| Command | Possible Response(s) |
|---|--|
| %CGDCONT=<cid>,[<traffic_type>][,[<preferred_transport_type>][,[<apn_rate_cntl>]] | |
| %CGDCONT? | [%CGDCONT:<cid>,<traffic_type>[,<preferred_transport_type>] [<CR><LF>%CGDCONT:<cid>,<traffic_type>[...]]] |
| %CGDCONT=? | OK |

Description

- The command is supplementary to AT+CGDCONT command and provides additional information about PDP (PDP context). This optional command is used ordinary just after standard AT+CGDCONT.
- The execution command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>.
- The <preferred_transport_type> in read command may be omitted if preference was not selected by execution command.

Defined Values

<cid>: integer type, same as used in +CGDCONT

<traffic_type>: integer type, the purpose PDN will be used for:

- 0 - non-data traffic
- 1 - data traffic
- 2 - VoLTE traffic (IMS signaling + voice streams)
- 3 - 99 - Reserved for future use if more detailed info about non-data traffic PDNs (VOIP, SUPL, etc.) will be required

<preferred_transport_type>: integer type; indicates the UE's preference for transport type.

- 0 - No preference.
- 1 - Preference for control plane.
- 2 - Preference for user plane.

<apn_rate_cntl>: integer type; indicates UE APN rate control support capability bit reported in PCO IE (see TS 24.008)

- 0 - disabled(zero)
- 1 - enabled APN rate control support indicator bit in Protocol configuration options IE (see TS 24.008)
- 2 - Preference for user plane.

3.5.62 AT%PDNSET

Table 3-64 AT%PDNSET Command Syntax

| Command | Possible Response(s) |
|--|--|
| AT%PDNSET=<ext_sessionID>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passwd>,<host_name>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI> | OK or ERROR |
| AT%PDNSET? | [%PDNSET:<ext_sessionID>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passwd>,<host_name>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI> [<CR><LF>%PDNSET:<ext_sessionID>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passwd>,<host_name>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI> |
| AT%PDNSET=? | OK |

Description

- This command is used to set the run-time PDN parameters for data PDNs that are exposed to host.
- The APN name and IP type provided in this command will override the default PDN settings from the embedded APN table stored in the UE NV.

Note: The PPP security parameters are run-time only and are not stored in the NV memory.

- This command is effective immediately. This means that if its parameters are different from those already in use, the PDN will be deactivated, updated locally, and on the server via LTE messages, and then reactivated.
- The IPv4v6 will be applied if the <ip_type> parameter is missed.
- Missed PPP security parameters completely remove previous PPP security settings.
- This command is used to substitute the previous %PPPAUTH command which is not synced with other PDN parameters' definitions.

Notes:

1. A parameter which is not specified will be written as "," in both command and response.
2. The last parameters of the command which are not specified may not include the "," notation (for example, AT%PDNSET=<ext_sessionID>,<apnname>,<ip_type>).

Defined Values

<ext_sessionID>: The numeric value of the session identifier which is configured and used by an external application, or by the host, and defined in the NP config file.

pname>: string type; indicates the APN name configured for PDN

<ip_type>: string type:

- "IP"
- "IPv6"
- "IPv4v6"

<ppp_auth>: string type; PPP authentication type:

- "NONE"
- "PAP"
- "CHAP"

<user>- string type; username used for authentication

<passwd>: string type; password used for authentication

<host_name>: string type; Optional, the name of the Authentication server

<pcscf_discovery>: decimal

- 0 – Disable
- 1 – Enable

<IPv4AddrAlloc>: integer type; controls how the host requests the IPv4 address information (same as defined in AT+CGDCONT)

- 0 - IPv4 address allocation through NAS signaling
- 1 - IPv4 address allocated through DHCP

<NSLPI>: integer type; indicates the NAS signaling priority requested for this PDP context as defined in AT+CGDCONT in 3GPP 27.007

3.5.63 AT%PDNRDP

Table 3-65AT%PDNRDP Command Syntax

| Command | Possible Response(s) |
|---------------------------|--|
| AT%PDNRDP=<ext_sessionID> | [%PDNRDP: <ext_sessionID>,<bearer_id>,<apn>[,<local_addr and subnet_mask>[,<gw_addr>[,<DNS_prim_addr>[,<DNS_sec_addr>[,<P-CSCF_prim_addr>[,<PCSCF_sec_addr>]]]]]] |
| AT%PDNRDP? | ERROR (not supported) |
| AT%PDNRDP=? | OK |

Description

This execution command returns the relevant information for an active PDN identified by <ext_sessionID>. The format of this command is aligned with the standard command AT+CGCONTRDP per release 10.

Defined Values

<ext_sessionID>: Integer

A numeric value of the session identifier which is configured and used by an external application, or the host, and defined in the NP config file

All other parameters are defined in AT+CGCONTRDP in 3GPP TS27.007 release 10.

3.5.64 AT%LOGSTOHOST

Table 3-66 AT%LOGSTOHOST Command Syntax

| Command | Possible Response(s) |
|----------------------|--|
| AT%LOGSTOHOST=<mode> | OK/ERROR |
| AT%LOGSTOHOST? | %LOGSTOHOST:<mode> |
| AT%LOGSTOHOST=? | %LOGSTOHOST: (list of supported <mode>s) |

Description:

AT command to control the device logging.

Use <mode>=0/1/2 to store setting persistently. The device reboot is required after execution of this command with persistent parameter setting.

Use <mode>=3/4 to enable log at run-time without reboot if it is persistently disabled. The device reboot is not required after execution of this command with run-time parameter setting.

Defined values:

<mode> : decimal

- 0 – enable internal logs (logs are saved on the device)
- 1 – enable external logs (logs are sent to the host)
- 2 – logs are disabled (default mode)
- 3 – enable internal logs on-the-fly (logs are saved on the device)
- 4 – enable external logs on-the-fly (logs are sent to the host)

3.5.65 AT%D*99***

Table 3-67 AT%D*99*** Command Syntax

| Command | Possible Response(s) |
|----------------------------|----------------------|
| AT%D*99***<ext_sessionID># | OK/ERROR |

Description:

AT command to initiate end to end PPP session with the LTE network on specific PDN which is set by the <ext_sessionID> parameter.

Defined values:

<ext_sessionID>

- See definition in AT%PDNSET

3.5.66 AT%FILECMD

Table 3-68 AT%FILECMD Command Syntax

| Command | Possible Response(s) |
|--|--------------------------------------|
| AT%FILECMD=<cmd>[,<param1>[,<param2>]] | OK/ERROR |
| AT%FILECMD? | ERROR (not supported) |
| AT%FILECMD=? | %FILECMD: (list of supported <cmd>s) |
| (unsolicited) | %FILECMDU:<event> |

Description:

AT command to read/write/delete a file to/from the device storage. The file will be stored on preconfigured path. Upon execution, the command return OK/ERROR immediately.

Command provide opportunity for "out-of-band" binary file transfer, which invokes file transfer protocol (implementation specific) and deliver file between host and the device.

Once "out-of-band" file delivery is started, the AT command path is not accessible by the host. Furthermore, the delivery process can't be aborted. The AT command path become available only after completion of file delivery (with success or failure) which is notified by %FILECMDU:<event>.

The "inband" (using AT%FILEDATA) file transfer is executed chunk-by-chunk. File transfer validity check is in user responsibility. This type of data transfer does not imply URC notification by %FILECMDU.

Defined values:

<cmd>: string

- "PUT" – Initiate file transfer protocol between host and device and write a file to the device
- "GET" – Initiate file transfer protocol between host and device and read a file from the device
- "DEL" – Delete a file from the device.

<param1>: string

- The name of the file to be transferred or deleted

<param2>: integer

- 0 – "out-of-band" default value, if omitted
- 1 – "inband", usage of AT%FILEDATA is expected

<cmd>: string

- "NOTIFY" - command to enable/Disable notification from the file transfer protocol

<param1>: integer

- 0 – notification disabled (default)
- 1 – notification enabled

<event>: integer

- 0 – File transferred successfully
- 1 – File transfer failure

3.5.67 AT%DATA CMD

Table 3-69 AT%DATA CMD Command Syntax

| Command | Possible Response(s) |
|-------------------|--|
| AT%DATA CMD=<cmd> | OK or ERROR |
| AT%DATA CMD? | %DATA CMD: <general_flag>, <roaming_flag> |
| AT%DATA CMD=? | %DATA CMD: (list of supported <cmd>s) |

Description

- The command is used to block and unblock user data traffic in different conditions.
- All user data traffic is enabled by default.

Note: The general user data transfer flag (toggled by “DISABLE”/ “ENABLE”), and the data transfer at roaming flag (toggled by “DISABLEROAM”/ “ENABLEROAM”), may be independently enabled/disabled. The flags will be applied together internally to data transfer as per the rules in Table 3-38.

3.5.67.1 AT%DATACMD Data Transfer Rules

Table 3-70 AT%DATACMD Data Transfer Rules

| | “DISABLE” | “ENABLE” | “DISABLEROAM” | “ENABLEROAM” | Data Transfer |
|---------|-----------|----------|---------------|--------------|---------------|
| Home | 0 | 1 | 0 | 1 | Yes |
| | 0 | 1 | 1 | 0 | Yes |
| | 1 | 0 | 0 | 1 | No |
| | 1 | 0 | 1 | 0 | No |
| Roaming | 0 | 1 | 0 | 1 | Yes |
| | 0 | 1 | 1 | 0 | No |
| | 1 | 0 | 0 | 1 | No |
| | 1 | 0 | 1 | 0 | No |

Defined Values

<cmd>:

- “DISABLE” – Disable all user data
- “DISABLEROAM” – Disable all user data at roaming
- “ENABLE” – Enable all user data
- “ENABLEROAM” – Enable all user data at roaming

<general_flag>:

- “DISABLE” – Disable IMS connectivity
- “ENABLE” – Enable IMS connectivity

<roaming_flag>

- “DISABLEROAM” – Disable IMS connectivity at roaming
- “ENABLEROAM” – Enable IMS connectivity at roaming

3.5.68 AT%CMGWC

Table 3-71 AT%CMGWC Command Syntax

| Command | Possible Response(s) |
|--|---|
| if text mode (+CMGF=1): <ul style="list-style-type: none">• %CMGWC[=<oa/da>[,<tooa/toda> [,<stat>]]]<CR>• text is entered<ctrl-Z/ESC> | <ul style="list-style-type: none">• %CMGWC: <index>[,<index> ...]□ +CMS ERROR: <err> |
| %CMGWC=? | |

Description

- The standard AT+CMGW command, defined in 3GPP 27.00, returns the single storage location index and assumes that concatenation is handled by the host. Therefore, only small SMS segments are used by the standard AT+CMGW command.
- The AT%CMGWC command is the same as AT+CMGW but it's extended to allow the host to write a large SMS to storage. If concatenation is required, it is fully handled by the device which returns a list of indexes that represent the storage location of each SMS fragment.
- The host is required to send each of the returned indexes using the standard AT+CMSS command in order to send the SMS out of storage.

Defined Values

Please refer to section 3.5.3 of 3GPP 27.005.

3.5.69 AT%CMGSC

Table 3-72 AT%CMGSC Command Syntax

| Command | Possible Response(s) |
|---|--|
| if text mode (+CMGF=1): +CMGSC=<da>[,< toda>]<CR> text is entered<ctrl-Z/ESC> | if text mode (+CMGF=1) and sending successful: <input type="checkbox"/> +CMGSC: <mr>[,<mr> ...] if sending fails: <input type="checkbox"/> +CMS ERROR: <err> |
| %CMGSC=? | |

Description

- The standard AT+CMGS command, defined in 3GPP 27.00, returns a single message reference index and assumes that concatenation is handled by the host. Therefore, only small SMS segments are used by the standard AT+CMGS command.
- The AT+CMGSC command is the same as AT+CMGS but it's extended to allow the host to send a large SMS to network. If concatenation is required, it is fully handled by the device which returns a list of message-references, each of which is a reference to a single SMS fragment.
- A delivery report should be received for each SMS fragment if it's been requested by the sender. Each delivery report confirms reception of a single <mr>. The host shall assume reception of an SMS by the peer only if it received a delivery report for the entire <mr> of the SMS.

Defined Values

Please refer to section 3.5.1 of 3GPP 27.005.

3.5.70 AT%CSGCMD

Table 3-73 AT%CSGCMD Command Syntax

| Command | Possible Response(s) |
|--|--|
| AT%CSGCMD=<cmd> [,<mode>[,<csq_id>,<oper>]] | For "SEARCH": [%CSGCMD: <oper>,<csq_id>[,<hnb_name>] [<CR><LF> %CSGCMD: <oper>,<csq_id>[,<hnb_name>]] ...] |
| AT%CSGCMD? | ERROR (not supported) |
| AT%CSGCMD=? | OK |

- Description
- This command provides an opportunity to search and select the CSG cell.
- The "SEARCH" is a blocking command that returns only after the entire scanning is executed. The command will return an empty list followed by OK if no CSG cells were found.
- The "SELECT" is also a blocking command. This command returns ERROR if the cell selection procedure failed.

Defined Values

<cmd>:

- "SEARCH" – Perform search for available CSGs
- "SELECT" – Perform manual CSG selection

<mode>:

- 0 – automatic CSG selection: Currently not supported, FFU
- 1 – manual CSG selection

<csq_id> - decimal, CSG Identity

<oper> - string format, cell PLMN encoded as defined for AT+COPS

<hnb_name> – string format, Home eNB name encoded in SIB9 (string size up to 48 symbols)

Example

1. Search:
AT%CSGCMD="SEARCH"
%CSGCMD: "00101",10,"3gppTest CSG4"
%CSGCMD: "00102",
4 OK
2. Select:
AT%CSGCMD="SELECT",1,10,"00
101" OK

3.5.71 AT%PPPCFG

Table 3-74 AT%PPPCFG Command Syntax

| Command | Possible Response(s) |
|---|---|
| AT%PPPCFG=<cid>,<mode>[,<id>,<user_name>,<rand>,<hash>[,<host_name>]] | OK or ERROR |
| AT%PPPCFG? | [%PPPCFG:<cid>,<mode>[,<id>,<user_name>]][<CR><LF>%PPPCFG: . . .] |
| AT%PPPCFG=? | OK |

Description:

This AT command provides opportunity to configure challenge parameters for PPP CHAP session on specific PDN.

If <mode>=1 is selected, the <id>,<user>,<rand>,<hash> parameters becomes mandatory.

Defined values:

<cid> - decimal; PDP context id

<mode>:

- 0 – disable user-configured CHAP challenge parameters
- 1 – enable user-configured CHAP challenge parameters

<id> - decimal; CHAP challenge ID

<user_name> - string; client's username

<rand> - hexadecimal (in quotes); random number

<hash> - hexadecimal, 16 bytes (in quotes); hash value (MD5)

<host_name> - string; optional, the name of the Authentication server.

3.5.72 AT%CBCMD

Table 3-75 – AT%CBCMD Command Syntax

| Command | Possible Response(s) |
|---|-----------------------|
| AT%CBCMD=<cmd>[,<mode>[,<earfcn>,<pci> [,<earfcn>,<pci>]...]] | OK or ERROR |
| AT%CBCMD? | ERROR (Not supported) |
| AT%CBCMD=? | OK |

Description

- This command configures blocked cell (or Black List: BL) parameters. It's accepted only in detached (unregistered) state. This command also triggers LTE procedures if the device is in operational mode (CFUN=1) and the deregistered state. The LTE procedures shall be finished in camping on one of the cells (other than BL)?

-
- Once the BL cell info parameters are settled they are kept until the next reboot. The cell info parameters (<earfcn>, <pci>) may be omitted, while
 - <mode> shall always be defined. This is done in order for the next command call to enable Cell Block.

Defined Values

<cmd>:

- 0 – Disable cell block (default)
- 1 – Enable cell block

<earfcn> - cell EARFCN

<pci> - cell PCI

3.5.73 AT%CCLK

Table 3-76 AT%CCLK Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%CCLK=[<time>][,<dst>][,<lattermode>]] | OK/ERROR |
| AT%CCLK? | %CCLK: <time>[,<dst>[,<utc>[,<leap>]]] |
| AT%CCLK=? | OK |

Description

- This command is used to extend the standard AT+CCLK command for the DST (Daylight Saving Time) parameter.
- The optional <dst> parameter is reported only if provided in the NAS message.
- The rules to update the system time from different sources are controlled by the <lattermode> parameter. The NAS system time applicability is also controlled by a standard AT+CTZU command. This command may be called in reduced format only in order to modify the following rule:
 - AT%CCLK=,,<lattermode>

Defined Values

<time>: As encoded in the +CCLK response defined in 27.007 (yy/mm/dd,hh:mm:ss±zz)

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

- 0 <time> Includes no adjustment for Daylight Saving Time
- 1 <time> Includes +1 hour adjustment for daylight saving time
- 2 <time> Includes +2 hours adjustment for daylight saving time

<lattermode>: integer; Modifies the default system time update policy (0) and run- time switch between modes:

- 0 – Fixed order of the system timer settings (default); system timer settings are applied in fixed priority order: lower priority sources never update the last higher priority settings:
 - CCLK (highest priority: user set)
 - SIB16 (since it is more accurate than EMM)
 - EMM information (lowest priority)
- 1 – Enable latter mode (which means the last setting is always applied)

<utc>: The timeInfoUTC as encoded in SIB16 (UTC time in 10msec units counted since 00:00:00 on 1 January, 1900).

<leap>: The leap seconds offset between the GPS Time and UTC

3.5.74 AT%CLCMD

Table 3-77 AT%CLCMD Command Syntax

| Command | Possible Response(s) |
|---|-----------------------|
| AT%CLCMD=<cmd>[,<mode>[,<earfcn>,<pci>,[<oper>] [,<earfcn>,<pci>,[<oper>]]...]] | OK or ERROR |
| AT%CLCMD? | ERROR (not supported) |
| AT%CLCMD=? | OK |

Description

- This command configures the Cell Lock and WL parameters. It's accepted only in detached (unregistered) state. This command also triggers LTE procedures if the device is in operational mode (CFUN=1) and the deregistered state. The LTE procedures shall be finished in camping on one of the cells from WL.
- Once the WL cell info parameters are settled they are kept until the next reboot. The cell info parameters (<earfcn>, <pci>, <oper>) may be omitted, while <mode> shall always be defined. This is done in order for the next command call to enable Cell Lock.

Defined Values

<cmd>:

- 0 – Disable cell lock (default)
- 1 – Enable cell lock

<mode>:

- 0 – Cell lock for any scan procedure is applied in unregistered state only. Once registered, device will follow all 3GPP rules for all mobility procedures (for example, scan for PLMN re-selection, cell reselection, cell redirection, measurements, RLF triggered scan, etc.).
- 1 – Cell lock for scan and mobility. All 3GPP mobility procedures (see above) shall be executed for cells on the White List.

<earfcn>: cell EARFCN

<pci>: cell PCI

<oper>: string format, cell PLMN encoded as defined for AT+COPS

Example

1. Trigger first scan with cell lock:
AT%CLCMD=1,0,1500,32,"42502" OK
2. Disable cell lock: AT%CLCMD=0 OK
3. Repeat cell lock scanning using already defined cell list:
AT%CLCMD=1,0
OK

3.5.75 AT%DNSRSLV

Table 3-78 AT%DNSRSLV Command Syntax

| Command | Possible Response(s) |
|--------------------------------------|--|
| AT%DNSRSLV=<SessionID>,<domain_name> | %DNSRSLV:<ip_type>,<ip_addr> [%DNSRSLV: <ip_type>,<ip_addr>[...]] OK |
| AT%DNSRSLV? | ERROR (not supported) |
| AT%DNSRSLV=? | OK |

Description

This command provides a request from the device to resolve a specific domain name. The IP address formatting for this command is as described in the AT%SOCKETCMD command.

Defined Values

< SessionID>: decimal

- A numerical numeric value defined in the NP configuration file which points to the PDN on which the IP address should be resolved. "Session ID" is defined in AT%CGINFO.

<domain_name>: string

- Domain name to resolve

<ip_type>: decimal

- 0 – IPv4
- 1 – IPv6

<ip_addr>: string

- IPv4 or IPv6 resolved address

3.5.76 AT%GETPROP

Table 3-79 AT%GETPROP Command Syntax

| Command | Possible Response(s) |
|----------------------------------|--|
| AT%GETPROP=<fname>[,<param1>...] | <res1>[,<res2>...] OK or ERROR |
| AT%GETPROP? | ERROR (not supported) |
| AT%GETPROP=? | %GETPROP: (list of supported <fname>s) |

Description

Get configuration from the PROP file stored in the NV memory.

Defined Values

<fname> - string format; name of parameter in PROP file. See below list of possible parameter names.

<param1>-<paramN> – additional parameters to get the value. See <param#> format and range specific for each <fname> in the table below.

□ <res1>-<resN> - value of <fname>. See <res#> format and range specific for each <fname> in the table below.

AT%GETPROP returns.

Table 3-80 AT%GETPROP Returns

| Purpose | <fname> | <param1>... | Returns |
|-------------------------|---------|-------------|------------------------------|
| Reads SVN stored value | "SVN" | | 0: 98 |
| Reads IMEI stored value | "IMEI" | | String (15 digits) in quotes |

3.5.77 AT%SETPROP

Table 3-81 AT%SETPROP Command Syntax

| Command | Possible Response(s) |
|----------------------------------|--|
| AT%SETPROP=<fname>[,<param1>...] | OK or ERROR |
| AT%SETPROP? | ERROR (not supported) |
| AT%SETPROP=? | %SETPROP: (list of supported <fname>s) |

Description

Set configuration to the PROP file stored in the NVM.

Defined Values

<fname> - string format; name of parameter in PROP file. See below list of possible parameter names.

□ <param1>-<paramN> – settled values. See <param#> format and range specific for each <fname> in the table below.

AT%SETPROP parameters.

Table 3-82 AT%SETPROP Parameters

| Purpose | Param1 | Param2 | Param3 | Param4 | Param5 |
|----------------|--------|------------------------------|--------|--------|--------|
| Sets SVN value | "SVN" | 0: 98 | | | |
| Set IMEI value | "IMEI" | String (15 digits) in quotes | | | |

3.5.78 AT%GETSPN

Table 3-83 AT%GETSPN Command Syntax

| Command | Possible Response(s) |
|-------------|--|
| AT%GETSPN | %GETSPN:<displayPolicy>[,<SPN>,<PLMN>] OK or ERROR |
| AT%GETSPN? | ERROR Not supported |
| AT%GETSPN=? | OK |

Description

- This command is used to retrieve the service provider display policy and the service provider name from the SIM EFSPN file. The display condition in the SIM file depends on the type of RPLMN (HPLMN or VPLMN). The AT%GETSPN command output reflects the resulting display policy for the current RPLMN. It doesn't reflect a "Display Condition" binary value from EFSPN, which may be retrieved by AT+CSIM/CRSM, if needed.
- The "Unknown" (0) policy is returned if the device is not registered.

Defined Values

<displayPolicy>:

integer type; It returns the value for the display policy as defined in TS 31.102 for a specific RPLMN type. The "Optional" policy reflects the preferred choice between PLMN and SPL, but selection of this option is not mandated in TS31.102.

- 0 - Unknown
- 1 - Show PLMN mandatory
- 2 - Show PLMN optionally
- 3 - Show SPN mandatory
- 4 - Show SPN optionally

<SPN>:

string type; It reflects the SPN value from the SIM EFSPN file. The empty string ("") will be shown for a missed or improperly encoded SPN string in the SIM. The <SPN> parameter may be omitted for "Unknown" policy (0).

<PLMN>:

string type; PLMN name in long alphanumeric format up to 16 characters (refer GSM MoU SE.13 [9]). The <PLMN> parameter may be omitted for "Unknown" policy (0).

3.5.79 AT%CEN

Table 3-84 AT%CEN Command Syntax

| Command | Possible Response(s) |
|----------------------|---|
| AT%CEN[=<reporting>] | OK or ERROR |
| AT%CEN? | %CEN1: <reporting> <CR><LF>[%CEN2: <cat>,<number> [<CR><LF>%CEN2: <cat>,<number> [...]]] |
| AT%CEN=? | %CEN: (list of <reporting> modes) |

Description:

The command is used to query from UICC the Emergency numbers which are stored on it. Read command returns one line of intermediate result code %CEN1: <reporting> with the current <reporting> setting. Then follows zero or more occurrences of the emergency numbers with intermediate result code %CEN2: <cat>,<number>.

Defined values:

<reporting>: integer type; Enables and disables reporting of new emergency numbers stored in UICC.

- 0 – disable reporting (default)
- 1 – enable reporting

<number>: String type. Representing an emergency number from the list defined in 3GPP TS 24.008 subclause 10.5.3.13. The <number> is encoded with one digit per character.

<cat>: integer type. A bitmap indicating the Emergency Service Category Value according to 3GPP TS 24.008 [8] table 10.5.135d.

3.5.80 AT%EMGCMD

Table 3-85 AT%EMGCMD Command Syntax

| Command | Possible Response(s) |
|-------------------------|---|
| AT%EMGCMD[=<reporting>] | OK or ERROR |
| AT%EMGCMD? | %CEN1: <reporting> <CR><LF>[%CEN2: <cat>,<number> [<CR><LF>%CEN2: <cat>,<number> [...]]] |
| AT%EMGCMD=? | %CEN: (list of <reporting> modes) |

Description:

The following AT command shall be used by NP to request Activation of emergency procedure in the MAC FW.

Remark: command is non-blocking command.

Defined values:

<cmd>:

- **"EMGSTART"** – Request FW to enter "emergency mode" (Start RRC Emergency: PLMN selection criteria, RRC connect flags)
- **"EMGEND"** – Request LTE FW to exit "emergency mode". The LTE FW shall disconnect emergency PDN (if in home PLMN) or detach from Emergency Roaming PLMN.
- **"CALLSTART"** – Indication that Emergency call has started (If ECBM timer was active, then it is cancelled). This indication is required by firmware to handle loss of service during call (e.g. section 3.1.2.4 of [1])
- **"CALLEND"** – Indication that the call has ended (and ECBM timer is activated).
- **"PLMN_NA"** – Can't execute IMS on this PDN. Firmware shall mark this PLMN as not good and will wait for the next "CONNECT" command.

<param1>:

- For "PLMN_NA":
 - 0 – Permanent failure (Current use case: Normal IMS doesn't support voice)
 - 1 – Temporary failure (Current use case: SIP failure in Emergency voice call)
- For "SET_DEFAULT_PDN":
 - The CID of the Default PDN

<param2>:

- For "PLMN_NA":
 - A string representing MCC/MNC. The format is as specified in AT+COPS when using numeric format (i.e. format = 2)

<emgstate>: decimal

- 0 – Normal mode
- 1 – Emergency mode,

3.5.81 AT%EMGCBM

Table 3-86 AT%EMGCBM Command Syntax

| Command | Possible Response(s) |
|----------------------|---|
| AT%CEN[=<reporting>] | OK or ERROR |
| AT%CEN? | %CEN1: <reporting> <CR><LF>[%CEN2: <cat>,<number> [<CR><LF>%CEN2: <cat>,<number> [...]]] |
| AT%CEN=? | %CEN: (list of <reporting> modes) |

Description:

This command is used for enabling/disabling Emergency call back mode event indication to host. The command is used also for host request to exit emergency mode.

The command is required in order to support the following Android RIL API:

- ☐ RIL_UNSOL_ENTER_EMERGENCY_CALLBACK_MODE
- ☐ RIL_UNSOL_EXIT_EMERGENCY_CALLBACK_MODE
- ☐ RIL_REQUEST_EXIT_EMERGENCY_CALLBACK_MODE

The notifications indicate on state changes happened in the IMS module.

If the user request to exit callback mode while it is not in call-back mode, the command return ERROR.

Defined values:

<cmd>:

- “**CBMEXIT**” – Request to exit Emergency call-back mode.
- “**CBMSTAT**” – Command to enable/disable unsolicited indications of Emergency call-back mode events

<mode>

- For “**CBMSTAT**” - enable/disable unsolicited indication of Emergency call-back mode state.
 - 0 - disabled (default)
 - 1 – enabled

<param>:

- For "CBMSTAT"
 - 0 – Emergency call-back mode Exit
 - 1 – Emergency call-back mode Entered

3.5.82 AT%LBSCMD

Table 3-87 AT%LBSCMD Command Syntax

| Command | Possible Response(s) |
|-----------------|---|
| AT%LBSCMD=<cmd> | For "MLIDS" command: <ul style="list-style-type: none"> • %LBSCMD:<status>,<relTimeStamp>,<ServCellFlag>,<numNeighMeas>,<gcid>,<TimeDif Index>,<ta>,<mcc>,<mnc>,<tac>,<earfcn>,<cellID>,<sfn>,<rsrp>,<rsrq>[,<earfcn>,<cellID>,<sfn>,<rsrp>,<rsrq>[,...]] [<CR><LF> %LBSCMD: . . .] For "NWTIME" command: <ul style="list-style-type: none"> • %LBSCMD: <sib8present>,<sib16present> |
| AT%LBSCMD? | ERROR (Not supported) |
| AT%LBSCMD=? | %LBSCMD: (list of supported <cmd>s) |
| unsolicited | %LBSCMDU: <ev_type>[,<param1>[,<param2>]] |

Description

This command allows the client (for example, SUPL client) to get LBS related information from the LTE modem.

Note: A parameter which is not specified will be omitted and written as "," in both command and response.

Defined Values

<cmd>: string

"MLIDS" – Reads multiple location IDs from the LTE modem in multiline format. Each line describes a single "location ID" which is represented by serving cells and its neighbors on a specific timestamp.

<status>: integer

- 0 – Stale
- 1 – Current
- 2 – Unknown

<relTimeStamp>: integer

Time stamp of the measured location Id relative to "current Location ID" in units of 0.01 sec. Range from 0 to 65535*0.01 sec. The timestamp for the current Location Id, if present, is 0.

<ServCellFlag>: integer

- 1 – The location ID represents the LTE serving cell and its neighbors.
- Other values reserved FFU

<gcid>: integer

- The Global cell ID hexadecimal value of the serving cell (see AT%PCONI).

<TimeDifIndex>: integer

- RxTxTimeDiff decimal index (as defined in 9.1.9.2 of 3GPP 36.133) of the measured cell. The value shall be reported by the MAC based on the RxTxTimeDiff reported by the PHY. Be aware that the RxTxTimeDiff used by the PHY is different from the value received by the MAC CE, and has a better Ts granularity and accuracy.

<ta>: integer

- Currently used Timing Advance value (NTA) of the measured cell. The NTA value is represented by TA index values of 0, 1, 2, ..., 1282, where the amount of the time alignment is given by $NTA = TA \times 16$ per [3GPP 36.213].

<mcc>: integer

- A three-digit value indicating the mobile country code as defined in ITU-T Recommendation E.212 Annex A.

<mnc>: integer.

- A three-digit or two-digit value indicating the mobile network code as defined in ITU-T Recommendation E.212 Annex A.

<tac>: string

- A two byte tracking area code in hexadecimal format

<earfcn>: integer

- Decimal EARFCN value
- <cellID>: integer
- Decimal Physical Cell ID value

<sfn>: integer

- The decimal System Frame Number (SFN) of the measured cell during which the measurement has been performed. It is recommended to supply the latest SFN since there is averaging over multiple SFNs. The command returns N/A (without quotes) if a value is not available at the time of the query.

<rsrp>: integer

- RSRP measurements in dbm units

<rsrq>: integer

- RSRQ measurements in 0.5 dB (Q1) units (for example, 2.5 dB = 5)

<numNeighMeas>: integer

- The number of neighbor cell measurements reported within the current "Location ID" (response line).

<cmd>: string:

- "NWTIME" – Enables one-shot NW time notifications from SIB8/SIB16. Indicates if these SIBs are expected to be acquired.

<sib8present>: integer:

- 0 – False
- 1 – True

<sib16present>: integer:

- 0 – False
- 1 – True

For <event>:"NWTIME"

<param1>: integer:

- GPS time is a decimal counter of 1msec units counted since 00:00:00 on 6 January, 1980. Since the GPS time is not corrected by leap seconds, it is now ahead of UTC by 18 seconds and this difference is not a static value.

<param2>: integer:

- TTI (Transmission Time Interval) – Sub-frame counter of the serving cell corresponding to the <param1> GPS time.
- 0–10239

3.5.83 AT%CSMP

Table 3-88 AT%CSMP Command Syntax

| Command | Possible Response(s) |
|---|---|
| %CSMP=<replayreq>,<encoding>,<teleid>,<priority>,<cbaddr> | OK/ERROR |
| %CSMP? | +CSMP:<replayreq>,<encoding>,<teleid>,<priority>,<cbaddr> |
| %CSMP=? | %CSMP: (list of supported <replayreq>),(list of supported <encoding>s),(list of supported <teleid>s ,(list of supported <priority>s),<cbaddr> |

Description:

AT command to set text mode parameters for outgoing 3GPP2 SMS (applicable for text mode SMS).

Remark: The <replayreq> parameter must be specified, but all the other parameters may be omitted and therefore will be written as ",," .

Defined values:

<replayreq>: integer type

- 0 – no request for DAK(3GPP2 delivery Ack request)
- 1 – request for DAK
- If parameter is not specified, the default setting is applied.

<encoding>:

- "GSM7BIT"
- "LATIN"
- "UNICODE"
- "IA5"
- "ASCII7BIT"

<teleid>: integer type; Teleservice ID

- 4097 - page
- 4098 - SMS message (factory default)

<priority>: integer type; The priority is different with every carrier.

- In case of Sprint
 - 0 - Normal (factory default)
 - 1 - Interactive
 - 2 - Urgent
 - 3 - Emergency
- In case of Verizon:
 - 0 - Normal (factory default)
 - 1 – High

<cbaddr>: string

- Callback address

3.5.84 AT%EMGNUM

Table 3-89 AT%EMGNUM

| Command | Possible Response(s) |
|-------------------------|---|
| %EMGNUM=<cmd>[,<param>] | For command "NUMTYPE": %EMGNUM:<numtype>[,<cat>] |
| %EMGNUM? | %EMGNUM:<numsrc>,<num1>[,<num2>]...] ... <CR><LF>%EMGNUM:<numsrc>,<num1>[,<num2>]...] |
| %EMGNUM=? | OK |

Description

- AT command to get query the emergency numbers in the device. In addition the command allows the user to check is specific number (e.g. number dialed by the user) is classified as Emergency number or not.
- If some type of emergency numbers is missed, its reporting for "%EMGNUM?" will be omitted.
- If there is no any emergency numbers at all, the "%EMGNUM?" answer will be empty and will return only OK.

Defined Values

<cmd>: string

- "GETTYPE" – Command to check the type of number specified in <param>.

<param>: string

- String type. Represent a dialing number for which it is required to resolve the number type.

<numtype>: Integer

- Indicate the type of the number
 - 0 – Regular number
 - 1 – Emergency number

<cat>: integer

- A bitmap indicating the Emergency Service Category Value according to 3GPP TS 24.008 [8] table 10.5.135d.

<numsrc>: string

- Indicate the source of the emergency number:

- "CONFIG" – Emergency number hardcoded in device configuration file
- "SIM" – Emergency number configured in the SIM card
- "NW" – Emergency number indicated by the network on ATTACH/TAU

<num1>, <num2> ... : String

- o Representing an emergency number from the list.

3.5.85 AT%VLTCMD

Table 3-90 AT%VLTCMD Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%LTECMD=<cmd>,<lte_object> [,<param1>...] | For <cmd>=2 (query): • %LTECMD: <lte_object>[,<param1>...] |
| AT%LTECMD? | ERROR (not supported) |
| AT%LTECMD=? | LTECMD: (list of supported <cmd>s), (list of supported <lte_object>s) |

Description:

The following AT command shall be used phone applications (ATA manager, WEB GIU, Android RIL, etc.) to send VoLTE configuration commands to the IMS module.

The command AT%VLTCMD to setup ad-hoc conference call, automatically enable the unsolicited %VLTCMDU which indicate the result of the ad-hoc call request of the current session. The application can use AT+CLCC to get detailed information about the new call/participants which were added.

Defined values:

<cmd>: string

- o "ADHOC" – Command to setup ad-hoc conference call and join a new participant. If conference call is already set, then just join the new participant.
- o "TTYMODE" – Set the required TTY mode
- o "VEMODE" – Allow to force VE (voice engine) start/stop independently of phone hook state. For example, this is required to allow pre-call features such as receiving Caller-ID and deliver it to the display.
- o "ECMODE"- echo canceller enable/disable
- o "NRMODE"- noise reduction enable/disable
- o "AGCMODE" – Microphone AGC (Automatic Gain Control) enable/disable
- o "AMRMODESET" – AMR mode
- o "AMRWBMODESET" – AMR-WB mode

- **"SESSIONEXP"** – SIP Session Expiration timer
- **"MINSE"**– SIP Minimum Session Expiration time
- **"EBCT"** – Initiate Explicit blind call transfer
- **"VETESTMODE"** – Enable Voice Engine Test mode
- **"TXCNMODE"** – Tx Comfort Noise injected by the echo canceler enable/disable.
- **"SPKRMUTE"** – Enable/Disable Speaker Mute function (When enabled Speaker is in mute)
- **"OUTDTMFDETSW"** - Enable/Disable DTMF detection in software for outgoing DTMF signals generated by the host.
- **"MODTMFVOL"** – Control the volume of outgoing DTMF
- **"CALLRECOVER"** – This command handle the case that "Hold" command (AT+CHLD=2) has returned ERROR although the network already stopped the RTP session (this is network inconsistency which have been found on some networks). The "CALLRECOVER" command allows the user to recover the RTP session of the active call.
- **"DTMFG"** – Generate DTMF tone.

Note: All modes setting in this command are runtime configurations and do not take affect after reset.

<param1>:

For **"TTYMODE"**: string

- "OFF" - The user has only bi-directional voice stream
- "FULL" - The user has only bi-directional TTY stream
- "VCO" - Voice carry over, hard of hearing. User has Voice output +TTY input
- "HCO" - Hearing carry over, speech-disabled. User has TTY output + Voice input

For **"VEMODE"**: Integer

- 0 – VE core is off
- 1– VE core is on

For **"ECMODE"**, **"NRMODE"**, **"AGCMODE"**, **"TXCNMODE"**, **"SPKRMUTE"** and **"OUTDTMFDETSW"**

- 0 – Feature Disabled
- 1– Feature Enabled

For **"AMRMODESET"**: String

- 0-7 in semicolon separated sequence.

For "AMRWBMODESET": String

- 0-8 in semicolon separated sequence

For "**SESSIONEXP**": decimal

- SIP Session Timer value. 90 - 7200 (seconds)

For "**MINSE**": decimal

- Minimum SIP Session Expiration Timer. 90 - 3600 (seconds)

For "**ADHOC**": string

- URI Represented with IRA characters (As defined in AT+CDU command).

For "**ECBT**": string

- URI Represented with IRA characters (As defined in AT+CDU command).

For "**VETESTMODE**": decimal

- 0 – VE test mode Disabled
- 1 – VE test mode Enabled

For "**MODTMFVOL**": decimal

- The required volume 0 - 63 in dB.

For "**CALLRECOVER**": decimal

- Call identification number <ccidx> as described in 3GPP TS 22.030 [19] subclause 6.5.5.1.

For "**DTMFG**": string

- A single ASCII character in the set 0-9, #, *, A-D – represent DTMF character.

<param2>:

For "**DTMFG**": string

- "START" –Start the generation of the specified DTMF digit until instructed to stop.
- "STOP" –Stop the generation of the specified DTMF digit.

<result>: integer

- 0 – failed to setup conference call / add user
- 1 – Succeed to setup conference call / add user

<conf_ccidx>: integer

- Conference call identification number as described in 3GPP TS 22.030 subclause 6.5.5.1.

<part_ccidx>: integer

- Conference call participant identification number as described in 3GPP TS 22.030 subclause 6.5.5.1.

Example:

AT%VLTCMD="AMRMODESET", "1;2;3"

3.5.86 AT%LTECMD

Table 3-91 AT%LTECMD Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%LTECMD=<cmd>,<lte_object> [,<param1>...] | For <cmd>=2 (query): %LTECMD: <lte_object>[,<param1>...] |
| AT%LTECMD? | ERROR (not supported) |
| AT%LTECMD=? | LTECMD: (list of supported <cmd>s), (list of supported <lte_object>s) |

Description

- This command is used for LTE protocol parameters query and override at run-time.
- The command is a compound, which means that the <param#> parameters are <lte_object> specific.
- The query command (2) is supported for all declared <lte_object>s. It may return ERROR for Network provided parameters in LTE disconnected state.
- The override command (1) may be unsupported for certain LTE protocol <lte_object>s especially for those defined by the Network or those negotiated with the Network. In such a case the override command (1) returns ERROR. Missed override support is declared on a per-object basis.
- Some LTE parameters provided by eNB may be optional. A parameter, which is not specified, will be omitted and written as "," in the query (2) command response.

Notes:

- If an overridden parameter is part of the capability negotiation with the Network, it will be applied only after the next re-attach.
- All settings are applied only during run-time (they are not stored in the NVM), and will be lost after reboot.
- Read command is not supported

Defined Values

<cmd>:

- 1 – Override/toggle current LTE parameter value, or negotiate new LTE capability/parameter value with the Network
- 2 – Query current LTE parameter value in use

<lte_object>:

- “PGCYCLE” – UE individual time interval between monitoring Paging Occasions, used to set the UE’s specific DRX parameter for paging cycle (see 24.008). The actual DRX cycle is determined by the shortest of this UE specific DRX value and a default DRX value broadcast in the system information (see 36.304).

<param1>:

- 0 – Return to eNB setting
- 1 – 320 ms
- 2 – 640 ms
- 3 – 1280 ms
- 4 – 2560 ms

<lte_object>:

- “AGAPCAP” – UE Autonomous Gap capability; override command is not supported.
- <param1>:
 - 0 – Disabled
 - 1 – Enabled

<lte_object>:

- “LPP” – enable LPP capability

<param1>:

- 0 – Disabled
- 1 – Enabled

<lte_object>:

- “LCS” – Enable LCS capability

<param1>:

- 0 – Disabled
- 1 – Enabled

<lte_object>:

- “NSLPI” – NAS signaling low priority

<param1>:

- 0 – Low priority disabled
- 1 – Low priority enabled

<lte_object>:

- “DHCP” – DHCP assigned parameters. Starting version TBD.

<param1>: cid, Same format as defined for <cid> parameter in +CGCONTRDP of TS 27.007.

- This parameter is mandatory for query (2) subcommands.

<param2>: string; Address and subnet assigned by DHCP server; same format as defined for <local_addr and subnet_mask> in AT+CGCONTRDP of TS 27.007.

<param3>: string; Optional parameter; gateway address provided by the DHCP server; same

- Format as defined for <gw_addr> in AT+CGCONTRDP of TS 27.007.

<lte_object>:

- “BARSIB1” – Cell Barred restrictions of SIB1.

<param1>:

- 0 – Disabled; no override, use network settings
- 1 – Enabled; ignore network barring restrictions

<lte_object>:

- “BARSIB2” – Access Class barring restrictions of SIB2.

<param1>:

- 0 – Disabled; no override, use network settings
- 1 – Enabled; ignore network barring restrictions

<lte_object>:

- “UTC” – Coordinated Universal Time, starting at LTESYS-17328

<param1>: integer:

- UTC value defined as the number of milliseconds that have elapsed since 00:00:00, Thursday, 1 January 1970.

<param2>: integer:

- Time Zone value; indicates the difference, expressed in quarters of an hour, between the local time and UTC

<param3>: integer; Daylight Savings adjustment:

- 0 - UTC needs no adjustment for daylight saving time
- 1 - UTC needs +1 hour adjustment for daylight saving time
- 2 - UTC needs +2 hours adjustment for daylight saving time

<param4>: integer:

- Number of leap seconds offset between the GPS Time and UTC. UTC and GPS times are related, that is, GPS time: leapSeconds = UTC time

<param5>: integer; indicates UTC source, used only in response of <cmd>=2(query):

- 0 – No UTC acquired from any source
- 1 – User/host setting via AT+CCLK, AT%CCLK, or AT%LTECMD="UTC"
- 2 – SIB16 message as per 3GPP 36.331
- 3 - NAS message as per 3GPP 24.008

<param6>: integer; current TTI value, used only in response of <cmd>=2(query).

<lte_object>:

- "PTW" – LTE-specific paging transmission window (eDRX parameter missed in AT+CEDRXRDP), starting at LTESYS-17540

<param1>:

- 0 - 1,28 seconds
- 1 - 2,56 seconds
- 2 - 3,84 seconds
- 3 - 5,12 seconds
- 4 - 6,4 seconds
- 5 - 7,68 seconds
- 6 - 8,96 seconds
- 7 - 10,24 seconds
- 8 - 11,52 seconds
- 9 - 12,8 seconds
- 10 - 14,08 seconds
- 11 - 15,36 seconds
- 12 - 16,64 seconds
- 13 - 17,92 seconds
- 14 - 19,20 seconds
- 15 - 20,48 seconds

<lte_object>:

- "TXFAILPARAMS" – The object supports the retry mechanism defined in txFailParams from SIB2.

<param1>: integer; retry number, which fits connEstFailCount of txFailParams, if present in SIB2

- 0 – Settled value; use SIB2 value or use SW Default (100 retries), if connEstFailCount is missed in SIB2
- 1–300

<param2>: integer; timeout, which fits connEstFailOffsetValidity of txFailParams, if present in SIB2

- 0 – Settled value; use SIB2 value or use SW Default (30 sec), if connEstFailOffsetValidity is missed in SIB2
- 1-1000 in sec

<param3>: integer; offset, which fits connEstFailOffset of txFailParams. If omitted, infinity value shall be used for “Qoffsettemp” from 36.304 (see 36.331).

- 0 – 255 dB

<lte_object>:

- “INACTTMR” – Inactivity Timer for RRC state mismatch recovery (LTESYS-18210)

<param1>: timeout in sec

- 0 – Disable inactivity timer. Default value is 0.
- 1 and more – Enables inactivity timer for <param1> in seconds. Modem restarts inactivity timer on every UL/DL activity in RLC. The modem will initiate RRC connection re-establishment procedure once the timer has expired.

<lte_object>:

- “NWCAPLEN” – Limit NW capability encoding length to communicate with new 3GPP Releases forward incompatible eNB/NW. Starting at LTESYS-20514.

<param1>:

- 0 – Disabled
- 1 – Enabled

<param2>: TLV length, mandatory for <param1>=1:

- 1–max 3GPP value from latest releases

<lte_object>:

- “BAND4LAYER” – Indicates whether the UE shall report four layer support, for TM3-TM4 capability per band and per-CA, in which the band is involved. Starting at LTESYS-21578.

<param1>: Band number:

<param2>: Four layer support for TM3-TM4:

- 0 – Disabled
- 1 – Enabled (default)

<param3>, <param5>...: Same as <param1>

<param4>, <param6>...: Same as <param2>

<lte_object>:

- “S1UCAP” – Enable/disable NW S1U and Multi-DRB capability in NAS and RRC level (NB-IOT only).
-

<param1>:

- 0 – disabled
- 1 – enabled (default)

<lte_object>:

- “SMSWCOMBINED” – Enable/disable SMS transfer without combined procedure capability as defined in 24.301 (NB-IOT only).

<param1>:

- 0 – disabled
- 1 – enabled (default)

3.5.87 AT%LTESYNC

Table 3-92 AT%LTESYNC Command Syntax

| Command | Possible Response(s) |
|---|-----------------------|
| AT%LTESYNC=<cmd>[,<config_source>[,<start_tti>,<repetition>[,<interval>[,<pulse_size>[,<alignment>[,<offset>,<offset_condition>]]]]]] | OK or ERROR |
| AT%LTESYNC? | ERROR (not supported) |
| AT%LTESYNC=? | OK |

Description

- This command is used to configure, start and stop the pulse issued by the UE, and synchronized with LTE sub-frames. The HW output pin configuration is assumed to be as configured in the BSP files.
- Read command is not supported

Defined Values

<cmd>:

- “START” – Configure and start pulse
- “STOP”

<config_source>: integer:

- 1 – Use BSP configuration
- 2 – Use command config, if this parameter is selected, the following two parameters are mandatory

<start_tti>: integer; TTI value to start first pulse

<repetition>: integer; pulse repetition value:

- 0 – Forever
- 1 or more - For final burst of pulses

<interval>: integer; interval in number of TTIs are:

- 1–10240

<pulse_size>: integer; pulse duration in microseconds (default: 200us, if parameter is omitted):

- 1–200

<alignment>: integer; pulse alignment to RX or TX (propagation delay taken into account):

- 0 – TX
- 1 – RX

<offset>: signed integer; pulse alignment to any additional relative network timing offset from the LTE TTI boundary (in nanosecond units). If parameter is omitted, no additional offset is applied:

- -500000 – 5000000 nsec

<offset_condition>: integer; offset adjustment condition:

- 0 – TDD
- 1 – FDD
- 2 – Both TDD and FDD

3.5.88 AT%CMEEU (unsolicited)

Table 3-93 AT%CMEEU (unsolicited) Command Syntax

| Command | Possible Response(s) |
|---------------------------|----------------------|
| (unsolicited result code) | %CMEEU: <n> |

Description:

Unsolicited event to inform higher layer Apps about last AT+CMEE settings. The URC is activated by any AT+CMEE command call.

Defined values

<n> : integer type, same value as received in last AT+CMEE, see 27.007.

- 0 - disable +CME ERROR: <err> result code and use ERROR instead
- 1 - enable +CME ERROR: <err> result code and use numeric <err> values (refer subclause 9.2 of 27.007)
- 2 - enable +CME ERROR: <err> result code and use verbose <err> values (refer subclause 9.2 of 27.007)

3.5.89 AT%MASTERKEY

Table 3-94 AT%MASTERKEY Command Syntax

| Command | Possible Response(s) |
|--------------------------|---|
| AT%MASTERKEY=<masterkey> | OK (always) |
| AT%MASTERKEY? | ERROR (OPERATION_NOT_ALLOWED) Operation is not supported |
| AT%MASTERKEY=? | ERROR (OPERATION_NOT_ALLOWED) Operation is not supported |

Description

- This command was added for the recovery process without the need for an additional production tool. It's used to verify the master key when the UE is blocked due to personalization counters overflowed or a missing/unauthenticated PRSNP file.
- The PRSNP file is automatically re-created with its default values upon successful verification of the master key. The master key can be entered only one time per boot. It will be ignored following verifications after the first boot.

The execution command response is always OK no matter what the real verification results are.

Note: Neither verification of a master key, nor the recovery process is possible during production if the master key was not first burned into the OTP.

The master key can be comprised only of digits, and must always be 16 digits long.

3.5.90 AT%ALERT

Table 3-95 AT%ALERT Command Syntax

| Command | Possible Response(s) |
|---|---|
| AT%ALERT=<ev_type>,<mode>[,<ev_id>,<cond> [,<val1>,<val2>]] | OK or ERROR |
| AT%ALERT? | ERROR (not supported) |
| AT%ALERT=? | %ALERT: (list of supported <ev_type>s), (list of <mode>s), (range of <ps_tout>) |
| (unsolicited report) | %ALERTU:<ev_type>[,<ev_id>[,<param1>...]] |

Description

- This command is used for different (emergency or critical) alert notifications from the LTE modem to the NP/MAP.
- Command is applicable to ALT1160/1210/1250.
- For multi-instantiated <ev_type> (more than one <ev_id> within same <ev_type>):
 - Last commanded <mode>=0 (disable) param setting will be applicable to ALL events of the same <ev_type>.
 - Last commanded setting of <ps_tout> value is also common and will be applied to ALL events of the same <ev_type>.
 - Specified instance of such event may be removed by:
AT%ALERT=<ev_type>,<mode>,<ev_id>,0
- For repetitive hysteresis type events, the URC will not be sent if the value will oscillate within the interval limited by hysteresis boundaries.
- For threshold type events it is recommended to use one-shot URC (followed by polling) to prevent repetitive URCs.

Defined Values

<ev_type>:

- "TEMP" – Temperature threshold/hysteresis notification. A single <cond1> & <val1> setting is mandatory for this alert type.

<mode>: Status of unsolicited result response presentation:

- 0 – Disabled (default)
- 1 – Enabled URC on each occurrence of condition
- 2 – Enable one-shot URC. The URC shall be re-enabled again to receive the next URC.

<ev_id>: integer type; event ID unique within same <ev_type>:

- 1–3

<ps_tout> - integer type; optional parameter, may be omitted. Indicates if the alert source shall be polled in power save modes and what is the max polling interval in sec:

- 0 – infinite, no polling needed (default)
- 1 – 32767

<cond>: integer type; URC condition. Also used to remove some specific <ev_id> within a multi-instantiated <ev_type>:

For any multi-instantiated <ev_type>:

0 – Remove the specified <ev_id> within the same <ev_type> For “TEMP”:

- 1 – Hysteresis
- 2 – Overflow threshold
- 3 – Underflow threshold

<val1>: integer type:

- For TEMP - Temperature in °C:
- Single threshold or low hysteresis value

<val2>: integer type:

- For “TEMP” - Temperature in °C:
- High hysteresis value

<param1>: integer type:

- For “TEMP”
- Current temperature in °C

Examples

- Enable temperature hysteresis URC event #2 with boundaries: low: 55°; high: 65°:
 - AT%ALERT="TEMP",1,,2,1,55,65
 - OK
- URC Arrival:
 - %ALERTU:"TEMP",2,67
 - ...
 - %ALERTU:"TEMP",2,55

3.5.91 AT%CGINFO

Table 3-96 AT%CGINFO Command Syntax

| Command | Possible Response(s) |
|----------------------------------|--|
| AT%CGINFO= <type>,<sessionID> | %CGINFO:<info1> OK/ERROR |
| AT%CGINFO? | Returns all mapping table rows: [%CGINFO:<sessionID>,<cid>] [<CR><LF>%CGINFO:<sessionID>,<cid>] [...]] |
| AT%CGINFO=? | OK |

Description

- This command is used to query different information about packet domain parameters (it's an extension for AT+CGxxx of 27.007).
- The Session ID is an Altair proprietary session identifier which is defined for each session established over-the-air in the NP config file named '/etc/config/ecm'.
- The command returns the cid value assigned by the modem to the specified session if "cid" is queried.
- The "cid" value may then be used with any of the packet domain commands defined in section 10 of 27.007.

Defined Values

<type>:

- "cid"

<sessionID>: Numeric value of session identifier defined in the NP config file

<info1>:

- For "cid": Numeric cid value

Example

```
AT%CGINFO="cid",1
%CGINFO:
3 OK
```

3.5.92 AT%NETSEL

Table 3-97 AT%NETSEL Command Syntax

| Command | Possible Response(s) |
|------------------------------|----------------------|
| AT%NETSEL=<arch>,<apn_table> | OK or ERROR |
| AT%NETSEL? | Current APN table |
| AT%NETSEL=? | OK |

Description

- This Set command forces network architecture selection. It selects the network specific APN table.
- This command is accepted only at CFUN=0/4 mode. The command is discarded and the ERROR is returned if the UE is in any other mode.

Defined Values

<arch>: network architecture:

- 0 – Default LTE 3GPP-compliant architecture
- 1 – VZW compliant architecture
- 2-99 – Reserved for future use

<apn_table>: APN table file name in textual format

3.5.93 AT%NETUPD

Table 3-98 AT%NETUPD Command Syntax

| Command | Possible Response(s) |
|-------------------------|-------------------------------------|
| AT%NETUPD=<cmd>,<param> | OK or ERROR |
| AT%NETUPD? | ERROR (not supported) |
| AT%NETUPD=? | %NETUPD: (list of supported <cmd>s) |

Description

- This command is used to enable/disable network override for specified LTE parameters (that is, by EMM messages).

Defined Values

<cmd>: string

- "NWNNAME" – Set the behavior of the Network name supplied by the AT+COPS command.

<param>:

- For "NWNNAME ": decimal
 - 0 - "AT+COPS?" shows the most updated full network name as required by the 27.007 standard
 - 1 - Prohibits override of the network name by an EMM message (for example, shown in "AT+COPS?", etc.) even if the EMM information message indicates another Full network name.

3.5.94 AT%NOTIFYEV

Table 3-99 AT%NOTIFYEV Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%NOTIFYEV=<ev_type>,<mode> [,<ev_type>,<mode>[,<ev_type>,<mode>...]] | OK or ERROR |
| AT%NOTIFYEV? | ERROR (not supported) |
| AT%NOTIFYEV=? | %NOTIFYEV: (list of supported <ev_type>s), (list of supported <mode>s) |
| (unsolicited report) | %NOTIFYEV:<ev_type>[,<param1>[,<param 2>] ...] |

Description

- This command is used to notify the host about important events that have occurred in the LTE device. The reporting may be enabled/disabled per event type. Multiple events may be enabled/disabled by the same command call.
- This is a compound command which means that the <paramN> parameters are <ev_type> specific.
- Reporting for all event types is disabled by default at wakeup time
- Read command is not supported

Note: The "LTIME" indication for time change in the "FW" is based on "time-priority" as follows:

- CCLK (highest priority: User set)
- SIB16 (Since it is more accurate than EMM)
- EMM information (Lowest priority)

Examples

- **Example 1**
 - If the time was set with "CCLK", there will be no time change and no "LTIME" indication, even if updated SIB16 or EMM time change information is received later.
- **Example 2**
 - If the time was set with SIB16, there will be no time change and no "LTIME" indication, even if updated EMM information is received later.
- **Example 3**
 - If the time was set with SIB16, and the user later set the time with CCLK, then the time will be changed according to CCLK, and an "LTIME" indication will be sent.

Defined Values

<ev_type>:

- “LTIME” – Time change in FW. Could be a result of an SIB16 change, updated EMM-information (NITZ), or a user change with the +CCLK command or %CCLK command.
- “SIMREFRESH” – SIM refresh occurred. The event is sent, in addition to the AT%SIMREFRESH response. It is used to notify Altair or OEM internal NP applications or/and external host (such as Android) about SIM refresh event.
- “WDIS” – W_DISABLE signal state change
- “SIMD” – SIM inserted/removed state change
- “ROAM” – Current PLMN camping/connection state was changed between HPLMN/EHPLMN and VPLMN
- “CSPS” – Enables notification on switches between PS and CS/PS modes in the modem
- “SIMSTATE” - Reports that the UICC entered a new state during start-up or that the UICC ended startup and entered active state.
- “MANSTUCK” - Reports repetitive attach attempt rejections for user selected PLMN in Manual mode.
- “RRCSTATE” – Reports any RRC layer state change
- “SIB1” – Reports any SIB1 arrival and processing in MAC
- “SIB2” – Reports any SIB2 arrival and processing in MAC
- “ALL” – Enables/disables all event types. This event type cannot be sent in unsolicited reporting.

<mode>: status of unsolicited result response presentation:

- 0 - Disabled (default)
- 1 – Enabled

<param1>:

For “LTIME”: <time> as encoded in the +CCLK response defined in 27.007 (yy/mm/dd,hh:mm:ss±zz)

For “SIMREFRESH”: <isRestart> as encoded in the %SIMREFRESH command

For “WDIS”: W_DISABLE line changed status:

- 0 – False (enable signal detected)
- 1 – True (disable signal detected)

For “SIMD”: changed status:

- 0 – Removal signal detected
- 1 – Insertion signal detected

For "ROAM": changed status:

- 0 – Moved to Home PLMN (HPLMN/EHPLMN)
- 1 – Moved to roaming PLMN (VPLMN)

For "CSPS":

- 0 - Moved to PS mode
- 1 - Moved to CS/PS mode

For "SIMSTATE":

- 1 – SIM init passed, wait for PIN unlock
- 2 – Personalization failed, wait for run-time depersonalization
- 3 – Activation completed. Event is sent once "Ready" state reported by "AT+CPIN?" is achieved. Event is always sent at any SIM activation completion.

For "RRCSTATE":

- 0 – RRC Idle
- 1 – RRC Connected
- 2 – RRC Unknown. Applicable for all LTE-disabled device states (init, standby, flight mode, etc.)

<param2>:

For "SIMREFRESH": <RefreshType> as encoded in 102.223 sec.8.6:

- 0 - NAA Initialization and Full File Change Notification;
- 1 - File Change Notification;
- 2 - NAA Initialization and File Change Notification;
- 3 - NAA Initialization;
- 4 - UICC Reset;
- 5 - NAA Application Reset;
- 6 - NAA Session Reset;
- 7 - Steering of Roaming

For "LTIME": <dst> as encoded in the %CCLK command response defined in the current document.

<param3>:

For "SIMREFRESH": <AID> as encoded in the %SIMREFRESH command, starting with v5.0.2:

For "LTIME": <netname> as long alphanumeric format (up to 16 characters long as defined in 10.5.3.5a in 3GPP TS 24.008) which received in NITZ IE as a part of the EMM INFORMATION message. The "LTIME" notification will arrive without a network name parameter whenever it is not supplied by the network EMM information message.

Example

%NOTIFYEV:"LTIME","12/05/06,22:10:00+02",0,"Verzion"

%NOTIFYEV:"SIMREFRESH",1

3.5.95 AT%PBCMD

Table 3-100 AT%PBCMD Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%PBCMD=<cmd> [,<param1> [,<param2>]] | <p>For "DELALL":</p> <ul style="list-style-type: none"> • OK or ERROR <p>For "GASR":</p> <ul style="list-style-type: none"> • AT%PBCMD:<cmd>,<index1>,<text>[<CR><LF> <p>%PBCMD: <index2>,<text>[...]]</p> <p>For "GASW":</p> <ul style="list-style-type: none"> • AT%PBCMD:<cmd>,<Windex>,<Wtext> <p>For "STATUS":</p> <ul style="list-style-type: none"> • %PBCMD: <adn_num>,<sne_size>,<sne_free>,<gas_size>,<gas_free>,<grp_size>,<grp_free>,<iap_size>,<iap_free>,<aas_size>,<aas_free>,<psc_size>,<psc_free>,<ext1_free>,<mail_size>,<mail_free>,<mail_len>,<sec_name_len>,<anr_size>,<anr_free>[,<anr_size>,<anr_free>[,<anr_size>,<anr_free>]] [<CR><LF>%PBCMD: <adn_num>,<sne_size>,<sne_free>,<gas_size>,<gas_free>,<grp_size>,<grp_free>,<iap_size>,<iap_free>,<aas_size>,<aas_free>,<psc_size>,<psc_free>,<ext1_free>,<mail_size>,<mail_free>,<mail_len>,<sec_name_len>,<anr_size>,<anr_free>[,<anr_size>,<anr_free>[,<anr_size>,<anr_free>]]] |
| AT%PBCMD? | %PBCMD:<cachestat> |
| AT%PBCMD=? | %PBCMD:(<RminIndex>: <RmaxIndex>), (list of supported <Windex>s),<tlength> |

Description

- This command handles Phonebook commands.

Defined Values

<cmd>: string

- "DELALL" – Deletes all phonebook entries in the current phonebook memory storage, selected with +CPBS.
- "GASR" - Returns grouping information Alpha String (GAS) USIM file entries in location number range [Sindex,Eindex]. If Eindex is not specified, only location Eindex is returned.
- "GASW" - Writes grouping information Alpha String (GAS) USIM file entry in location of number Index.
- "STATUS" – Retrieves structure and current status of Phone Book. The second EF_ADN will be reported if present on the SIM.

<param1>:

For "GASR":

- Sindex - integer type, Start index value of the location number range of GAS.

For "GASW":

- Windex - integer type, index value of the write location of GAS.

<param2>:

For "GASR":

- Eindex- integer type, End index value of the location number range of GAS.

For "GASW":

- Wtext- string type, the text associated to the GAS write entry

<index1>, <index2> ...<indexN>: integer

- The returned location number of each returned GAS entry

<text>: string

- The alphanumeric text associated to the entry

<RminIndex>: decimal

- The minimum index number to read GAS

<RmaxIndex>: decimal

- The maximum index number to read GAS

<Windex>: decimal

- The Write index entry for GAS

<tlength>: decimal

- The maximum text field length

<cachestat>: decimal

- 0 – Unknown
- 1 - Busy by PB caching
- 2 – Cache ready

3.5.96 AT%DEVINFO

Table 3-101 AT%DEVINFO Command Syntax

| Command | Possible Response(s) |
|-----------------|--|
| %DEVINFO=<type> | %DEVINFO: <value1>[,<value2>...] |
| %DEVINFO? | %DEVINFO: <value1>[,<value2>...] <CR><LF>%DEVINFO: <value1>[,<value2>...] ... <CR><LF>%DEVINFO: <value1>[,<value2>...] ERROR (OPRATION_NOT_SUPPORTED) |
| %DEVINFO=? | %DEVINFO (list of supported <reqID>s) |

Description:

Command to get identification values of the device components from different type of persistent memory.

If field is not configured yet, command returns ERROR.

Read command returns a list of configured values:

Defined values:

<type> - string parameter :

- "DeviceSerialNumber" – returns string: the serial number of the board.
- "ModelNumber" – returns string: the vendor model ID number.
- "SiliconPartNumber" – returns string: silicon part number of ALT1250.
- "SiliconID" – returns hexadecimal 16-byte individual silicon identifier of ALT1250.
- "OtpVersion" – returns integer value of OTP version.
- "SiliconLoc" – returns integer values of physical location of the silicon on die.
- "MinVoltage" – returns integer values of min voltage used in different Power Save mode states.

<value>:

- 0-255 – for "OtpVersion"
- string or hex parameter in quotes for other <type>s.

Example:

AT%DEVINFO="DeviceSerialNumber"

%DEVINFO: "123456789"

OK

AT%DEVINFO="SiliconPartNumber"

%DEVINFO:"ALT1250DC0_TG"

OK

AT%DEVINFO="SiliconID"

%DEVINFO:"5B390FA810000F1278A4056B643E957"

OK

AT%DEVINFO="OtpVersion" %DEVINFO: 10,0,3,0 OK

AT%DEVINFO="SiliconLoc" %DEVINFO: 1080,20,2,15 OK

AT%DEVINFO="MinVoltage" %DEVINFO: 970,880,721

OK

3.5.97 AT%PCONI

Table 3-102 AT%PCONI Command Syntax

| Command | Possible Response(s) |
|---------------------------------------|--|
| AT%PCONI[=<format>[,<cell_type>]] | <ul style="list-style-type: none"> • AT%PCONI <CR><LF>duplexing mode: <duplexing mode> <CR><LF>Transmission mode: <antenna/TX mode> <CR><LF>Bandwidth: <bw> <CR><LF>EARFCN: <EARFCN> <CR><LF>Global Cell ID: <Global cell ID> <CR><LF>Physical Cell ID: <Physical cell ID> <CR><LF>HNBN: <HNBN> For secondary cells: <ul style="list-style-type: none"> • %PCONI <CR><LF>Secondary cell index: <cell_index> <CR><LF>duplexing mode: <duplexing mode> <CR><LF>Transmission mode: <antenna/TX mode> <CR><LF>Bandwidth: <bw> <CR><LF>EARFCN: <EARFCN> <CR><LF>Global Cell ID: <Global cell ID> <CR><LF>Physical Cell ID: <Physical cell ID> <CR><LF>Band: <band> For “COMPR”: <ul style="list-style-type: none"> • %PCONI: <duplexing mode>, <tm>, <bw>, <EARFCN>, <Global cell ID>, <Physical cell ID>, <HNBN>, <band>[,<nwo_femtocell_ind>[,<cell_index>]] |
| AT%PCONI? | ERROR (OPRATION_NOT_ALLOWED) Operation is not supported |
| AT%PCONI=? | %PCONI: (list of supported <duplexing mode>s), (list of supported <antenna mode>s), (list of supported <bw>s) |

Description

- This command returns the physical connectivity and eNB parameters info.
- Returns ERROR if the connection to eNB is not yet established.
 - Returns OK if secondary cell(s) are queried, but not in use.
 - Only the <cell_type> parameter shall be omitted to read the primary cell.
 - The list will contain all cells in use: primary and all secondaries when the
 - <cell_type>=0 parameter is used.
 - Read command is not supported.
 - The optional <format>="COMPR" parameter provides the ability to report all parameters in a single line.
 - The cell parameters are reported in textual uncompressed format if the
 - <format> parameter is omitted.

Note: All of the following string and hexadecimal parameters are returned without quotes for uncompressed format.

Defined Values

<format>: string:

- "COMPR" – Compressed format
- "TEXT" – Text prepended parameter report

<cell_type> – integer format; All cells indications or cell indexes are used to identify the requested secondary cell

- 0 – List of all cells: primary and secondary
- 1–7 – Secondary cell index

<cell_index>: integer format; If <cell_type>=0 parameter value is used in the command call for compressed format, the <cell_index> parameter presence in AT response is mandatory.

- 0 – Primary cell
- 1-7 – Secondary cell index

<duplexing mode>: string:

- "TDD"
- "FDD"

<antenna/TX mode>: string:

- "SISO" - (tm1)
- "Tx diversity" - (tm2)
- "Open loop MIMO" - (tm3)
- "Closed loop MIMO" - (tm4)
- "tmX" – for tm5 and more

Antenna mode report is based on currently used Transmission Mode (TMx).

<tm>: transmission mode, string:

- "tmX"

<bw>:

- 0 – 1.4 MHz
- 1 – 3 MHz
- 2 – 5 MHz
- 3 – 10 MHz
- 4 – 15 MHz
- 5 – 20 MHz

<EARFCN>: decimal

- As per 3GPP encoding for EARFCN

<Global cell ID>: hexadecimal:

- As per 3GPP encoding for cell ID

<Physical cell ID>: decimal:

- Physical cell Id acquired by cell search

<HNBN>: string:

- Home eNB name encoded in SIB9 (string size up to 48 symbols)

<band>: decimal

- As per 3GPP encoding for band

<nwo_femtocell_ind>- decimal; NW Operator specific femtocell indication:

This parameter indicates if the cell is a regular cell or femtocell (for NW operators which support proprietary femtocell indication). This parameter is omitted for NW operators which don't support this indication.

- 0 – Regular cell
- 1 – Femtocell
- 2–99 – Reserved FFU

Example

1-Uncompressed format:

- a. Without CA:
 - AT%PCONI
 - Duplexing mode: TDD
 - Transmission mode: tm7
 - Bandwidth: 5
 - EARFCN: 40340
 - Global Cell ID: 09FBD146
 - Physical Cell ID: 300
 - HNBN: N/A
 - OK

- b. With CA:

- Example 1: Secondary Only:

- AT%PCONI="TEXT",1
 - Secondary cell index: 1
 - Duplexing mode: TDD
 - Transmission mode: tm7
 - Bandwidth: 5
 - EARFCN: 40341
 - Global Cell ID: 09FBD147
 - Physical Cell ID: 50
 - OK

- Example 2: All Cells:

- AT%PCONI="TEXT",0
 - Duplexing mode: TDD
 - Transmission mode: tm7
 - Bandwidth: 5
 - EARFCN: 40340
 - Global Cell ID: 09FBD146
 - Physical Cell ID: 30
 - HNBN: N/A
 - Secondary cell index: 1
 - Duplexing mode: TDD
 - Transmission mode: tm7
 - Bandwidth: 5
 - EARFCN: 40341
 - Global Cell ID: 09FBD147
 - Physical Cell ID: 50
 - OK

2-Compressed format:

- c. Without CA:
 - AT%PCONI
 - %PCONI: "TDD", "tm7", 5, 40340, "09FBD146", 300, "N/A", 41
 - OK
- d. With CA:

Example 1: Secondary only:

- AT%PCONI="COMPR",1
- %PCONI: "TDD","tm7",5,40341, "09FBD147",50,"N/A",41
- OK

Example 2: All cells:

- AT%PCONI="COMPR",0
- %PCONI: "TDD","tm7",5,40340,"09FBD146",30,"N/A",41,,0
- %PCONI:"TDD","tm7",5,40341, "09FBD147",50,"N/A",41,,1
- OK

3.5.98 AT%PINGCMD

Table 3-103 AT%PINGCMD Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%PINGCMD=<ip_type>,<dst_ip>[,<count>[,<packetsize>,<timeout>]] | %PINGCMD:<id>,<dest_ip>,<rtt>,<ttl> [%PINGCMD:<id>,<dest_ip>,<rtt>,<ttl>[...]] OK |
| AT%PINGCMD? | ERROR (not supported) |
| AT%PINGCMD=? | OK |

Description

This command is used for executing PING services. The IP address formatting for using this command is as described in the AT%SOCKETCMD command.

Defined Values

<id>: decimal

- The identifier of each individual reply of the ping request (this can be 1 to <count>)

<IP type>: decimal

- 0 – Ipv4
- 1 – IPv6

<dst_ip>: string

- Destination (remote machine) IPv4 or IPv6 address

<packetsize>: decimal

- Specifies the number of data bytes to be sent. The default is 56, which translates into 64 ICMP data bytes when combined with the 8 bytes of ICMP header data.

<count>: decimal

- The number of ping request retries (default is 1)

<timeout>: decimal

- Time to wait for a response, in seconds.

<ttl>: decimal

- The time to leave within the PING reply. TTL specifies how long to hold or use the packet, or any of its included data before expiring and discarding it.

<rtt>: decimal

- The round trip PING time.

3.5.99 AT%PWRVSCMD

Table 3-104 AT%PWRVSCMD Command Syntax

| Command | Possible Response(s) |
|--|--|
| AT%PWRVSCMD=<cmd>[,<mode>[,<timeout>[,<wakeup_mask>]]] | For "WAKECAUSE": %PWRVSCMD: <cause> OK or ERROR |
| AT%PWRVSCMD? | ERROR (not supported) |
| AT%PWRVSCMD=? | %PWRVSCMD: (list of supported <cmd>s), (list of supported <mode>s) |

Description

- This command is used to manage the user commanded power save mode.
- Some <cmd> and <mode> combinations are prohibited (see permitted combinations below). The call for such prohibited parameter pairs will return an ERROR.
- An optional timeout parameter defines the delta time to wakeup in seconds. It is only applicable to AT%PWRVSCMD= "FORCE" and AT%PWRVSCMD= "TEST",2(DH).
 - If parameter is omitted an endless timeout will be applied.
 - If a non-zero <timeout> value is specified for other than DH Power Save (PS) test modes, it will be ignored, and the module will stay in these modes forever. Reboot should recover the module from any endless PS test mode.

Defined Values

<cmd>:

- "FORCE" – Force specified power save mode. Applicable to ALT1160/12xx.

<mode>: PS mode:

- 1 – Standby mode. Exit from this mode is always executed by rebooting the modem.

<timeout>: sleep time before wakeup in sec:

- 0 – Forever
- 1 – 4294967295 sec

<wakeup_mask>: hexadecimal (in quotes); to mask 1 or more (up to 4) HW pins as wakeup source of standby (DH0) mode.

- "0" – Unmasked (default)
- "1"- "F" – Masked sources (bits enumerated from right to left):
 - 1st bit: Shutdown

- 2nd bit: Wakeup
- 3rd bit: Power button
- 4th bit: ATIN (once the anti-tamper is enabled)

3.5.100 AT%SCACHECMD

Table 3-105 AT%SCACHECMD Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%SCACHECMD= <cmd>,<app> ,<file_id> [,<record_num>] | %SCACHECMD: <file_id>,[<record_num>],<value> [<CR><LF>%SCACHECMD:<file_id>,[<record_num >],<value>] [...] |
| AT%SCACHECMD? | ERROR (not supported) |
| AT%SCACHECMD=? | OK |

Description

- This command provides the opportunity to get SIM files from the FW SIM cache in RAM.
- The "RD" command returns all cached records per that file if the
- <record_num> parameter is omitted.
- If the record number is not applicable to a specific file, its value is omitted in the command response, but points are kept in the string.
- The command returns an ERROR if the required file is missed in cache (not supported).

Defined Values

<cmd>:

- "RD"

<app>:

- "USIM" – Reserved FFU
- "ISIM"

<file_id>: hex value (in quotes) as per 31.102 and 31.103

<record_num>: decimal value, requested record number

<value>: hex value (in quotes) as per 31.102 and 31.103

3.5.101 AT%SCANCFG

Table 3-106 AT%SCANCFG Command Syntax

| Command | Possible Response(s) |
|--|-----------------------|
| AT%SCANCFG=<rs_cfg>[,<sl_cfg>[,<e_start>,<estop>,<estep>[,<estart>,<estop>,<estep>]]...] | OK or ERROR |
| AT%SCANCFG? | ERROR (not supported) |
| AT%SCANCFG=? | OK |

Description

- This command is used to configure changes in the regular scan procedure following a user-triggered scan.
- Rich Scan is a scan, which list not only the strongest cell on each mandated frequency, but also all intra cells which can be acquired on the same EARFCN.
- Next configurations may be configured for a user-triggered scan procedure:
 - Regular scan over regular DOP scan settings (default)
 - Regular scan over Run-Time Scan List (RTSL)
 - Rich scan over regular DOP scan settings
 - Rich scan over Run-Time Scan List (RTSL)
- The RTSL EARFCN values shall be a subset of the bands defined in the BSP (DOP) file and used for device calibration at wakeup time.

Defined Values

<rs_cfg>: Rich scan configuration:

- 0 – Disable Rich scan (default)
- 1 – Enable Rich scan for AT%SCANCMD
- 2 – Enable Rich scan for any regular scan procedure

<sl_cfg>: RTSL configuration:

- 0 – Disable RTSL (default)
- 1 – Enable RTSL for AT%SCANCMD
- 2 – Enable RTSL for any regular scan procedure

<estart>: Start EARFCN

<estop>: Stop EARFCN

<estep>: EARFCN step

Examples

- Configure the rich scan at wakeup if only the Rich scan over default bands/scan list (defined in BSP) is required:
- `AT%SCANCFG=1`
- If a list of scanned frequencies is dynamically changed, then configure the rich scan and RTSL before each single rich scan, for example:
- `AT%SCANCFG=1,1,2620,2625,1`

3.5.102 AT%SMMA

Table 3-107 AT%SMMA Command Syntax

| Command | Possible Response(s) |
|-----------|-----------------------|
| AT%SMMA | OK/ERROR |
| AT%SMMA? | ERROR (not supported) |
| AT%SMMA=? | OK |

Description

- This command is used by the host SMS application to signal the LTE network that SMS storage has available memory, and it's able to receive a new incoming SMS.
- The device will send an RL_SMMA message (as defined in section 7.3.2 of 3GPP TS 24.011) to the network upon receipt of this command.
- Defined Values

The command doesn't take or return any value.

3.5.103 AT%CBARR

Table 3-108 AT%CBARR Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%CBARR=<type>,<cmd>[,<ruleid>[,<uri>]] | <p>When <type>="ANONYM" and <cmd>="READ": [%CBARR: <status>]</p> <p>When <type>="IDENTITY" and <cmd>="READ": [%CBARR: <ruleid>,<status>,<uri>[,<ruleid>,<status>,<uri> > [...]]]</p> <p>For all other <type> and <cmd>: OK or ERROR</p> |
| AT%CBARR? | ERROR (not supported) |
| AT%CBARR=? | %CBARR: (list of supported <type>s), (list of supported <cmd>s) |

Description:

The following AT command shall be used by phone applications (ATA manager, WEB GIU, Android RIL, etc.) to set call barring rules via XCAP client (if supported by the device and the operator).

If there are no rules registered on server, read command returns only OK.

Defined values:

<type >: string

- **"IDENTITY"** – call barring rule to block malicious identity
- **"ANONYM"** – call barring rule to block anonymous identity

<cmd>: string

- For "IDENTITY":
 - **"REGISTER"** – Write the rule to XCAP server
 - **"ERASE"** – Erase the rule from XCAP server
 - **"ACTIVATE"** – Activate registered rule on the XCAP server
 - **"DEACTIVATE"** – Deactivate registered rule on the XCAP server (but don't erase)
 - **"READ"** – Read a list of all "identity" rules
- For "ANONYM":
 - **"ACTIVATE"** – Activate barring of anonymous call
 - **"DEACTIVATE"** – Deactivate barring of anonymous call
 - **"READ"** – read the status of anonymous CB

<ruleid >: string

- Rule ID which the application assigns to each "Identity" rule.

<uri>: string

- URI of the blocked "identity", including the prefix specifying the URI type (tel or sip) as defined in AT+CDU (3GPP 27.007).

This parameter is not required to be specified if the command is issued on a rule which is already registered on the XCAP server

<status>: decimal

- 0 –Rule Deactivated
- 1– Rule Activated

3.5.104 AT%SCANCMD

Table 3-109 AT%SCANCMD Command Syntax

| Command | Possible Response(s) |
|----------------------------|---|
| AT%SCANCMD=<cmd>[,<mode>] | OK or ERROR |
| AT%SCANCMD? | <ul style="list-style-type: none">• [%SCANCMD: <earfcn>,<pci>,<eci>,<plmnl>,<RSRP>,<RSRQ>,<bw>,<tac>,<cstat> [<CR><LF>%SCANCMD: <earfcn>,<pci>,<eci>,<plmnl>,<RSRP>,<RSRQ> ,<bw>,<tac>,<cstat>...]] |
| AT%SCANCMD=? | OK |
| (unsolicited report) | %SCANEND: <stat> |

Description

- This command is used to handle user-triggered scan procedures. It's accepted only in detached (unregistered) mode.
- The after-scan behavior may be different based on a previous configuration defined by AT%SCANCFG:
 - If the run-time scan list is not defined (<sl_cfg>=0), no additional scan is applied. The modem is already camped on a legal cell after the user-triggered scan procedure.
 - If run-time scan list is defined, and overrides default settings (<sl_cfg>=1), the scan of original band table/scan list is automatically triggered at the end of a user scanning to camp on the legal cell.
- The read command is used to query the last user-triggered scan results. It will be different from the AT%SCAN results, which return the last regular scanning results.
- Any attempt to read user-triggered scan results before scanning will only return OK.

Defined Values

<cmd>:

- 0 - Set unsolicited result response presentation in accordance with <mode>
- <mode>: status of unsolicited result response presentation of %SCANEND:
- 0 - Disabled (default)
- 1 – Enabled

<cmd>:

- 1 – Start scan as predefined in AT%SCANCFG

<stat>:

- 0 - No cells to report
- 1 – Scan succeeded to acquire one or more cells

Next params are as per 3GPP definition:

- <earfcn>,<pci>,<eci>,<RSRP>,<RSRQ>,<bw>,<tac>
- <plmnId>: integer type; similar to <oper> parameter of +COPS in decimal numeric format (se 27.007), but reported without quotes.

<cstat>: cell status from SIB1:

- 0 – Regular cell
- 1 – Cell barred
- 2 – Cell reserved for operator use

3.5.105 AT%SMSINFO

Table 3-110 AT%SMSINFO Command Syntax

| Command | Possible Response(s) |
|-----------------|--|
| %SMSINFO=<type> | For "LAST_UNREAD" return the index of last received unread SMS: <ul style="list-style-type: none">• %SMSINFO: <index>• OK/ERROR |
| %SMSINFO? | <ul style="list-style-type: none">• ERROR (OPRATION_NOT_ALLOWED)• Operation is not supported |
| %SMSINFO=? | %SMSINFO: List of supported <type> |

Description

- This command gets detailed SMS information.

Defined Values

<type>: string

- "LAST_UNREAD" – Returns the last unread received SMS

<index>: Integer

- The storage index of the last unread received SMS. If that requested SMS can't be found in storage, the command returns an ERROR.

3.5.106 AT%VLTEV

Table 3-111 AT%VLTEV Command Syntax

| Command | Possible Response(s) |
|---------------------------|---|
| AT%VLTEV=<ev_type>,<mode> | OK or ERROR |
| AT%VLTEV? | ERROR (not supported) |
| AT%VLTEV=? | %VLTEV: (list of supported < ev_type>s), (list of supported < mode>s) |
| (unsolicited report) | %VLTEV:<ev_type>[,<param1>[,<param2>] ...] |

Description

- This command is used for enabling/disabling VoLTE notifications from NP to host.
- The notifications indicate on state changes happened in the IMS module.

Defined Values

<ev_type>:

- "DTMF" – DTMF signal received over IMS/SIP message from remote user
- "KEYPRESS" – Local user key-press signal (DTMF or Dial)
- "VMAIL" – Voice mail notification received over SIP message
- "VMAIL3GPP2" – Voice mail notification received over 3GPP2 SMS message (Teleservice Identifier= 4099: CDMA Voice Mail Notification)
- "MSG3GPP2" –Message notification received over 3GPP2 SMS message
- (Teleservice Identifier= 4098: CDMA Cellular Messaging Teleservice Notification)
- "FAX" – Enable notification of on switching to "FAX mode"
- "CALLINPROG" – Enable Call in progress indication (SIP 100 trying)
- "SESSPROG" – Enable Session Progress indication (SIP 183)
- "RINGPEER" – Enable notification on Alert indication received by peer (SIP 180 ringing)
- "REDIALAFTER" – Enable notification on Redial request from network
- "REMOTETTY" – Enable notification on remote side TTY session request

-
- "CONFCALL" – Enable notification on Conference Call event
 - "ALL" – enables/disables all event types. This event type cannot be sent in unsolicited reporting.

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

<param1>:

For "DTMF" and "KEYPRESS":

- A single ASCII character in the set 0-9, #, *, A-D. (This format is the same as defined in standard AT command AT+VTS mode 1)

For "VMAIL": Decimal

- represents the number of new voice mails stored in the mail box

For "VMAIL3GPP2": Decimal

- represents the total number of voice mails stored in the mail box

For "MSG3GPP2": Decimal

- represents the total number of messages stored in mail box

For "FAX":

- 0 – FAX mode disabled
- 1 – FAX mode enabled

For "CALLINPROG", "SESSPROG" and "RINGPEER":

- The call id <ccidx> as defined in AT+CDU per 27.007

For "REDIALAFTER ": Decimal

- The time in seconds after which the host application may redial

For "CONFCALL": Decimal

- Conference call participant identification number as described in 3GPP TS 22.030 subclause 6.5.5.1.

<param2>:

For "VMAIL": Decimal

- Number represents the number of old received voice mails stored in the mail box

For "VMAIL3GPP2" and "MSG3GPP2": string

- User data – Operator's proprietary extra information such as "how many new messages are stored in the mail box"

For "CONFCALL": Decimal

- Conference Call event as defined in the RFC 4575, section 5.7.3.
Where:

– 0 – Disconnected (user leaved the conference call)

<param3>:

For "VMAIL3GPP2": string

- Message center time stamp in format: "yy/mm/dd,hh:mm:ss"

For "MSG3GPP2": string

- Deferred Delivery Time in format: "yy/mm/dd,hh:mm:ss"

<param4>:

For "VMAIL3GPP2" and "MSG3GPP2": decimal - Alert on Message Delivery:

- 0 - Use Mobile default alert
- 1 - Use Low-priority alert
- 2 - Use Medium-priority alert
- 3 - Use High-priority alert

<param5>:

For "VMAIL3GPP2" and "MSG3GPP2": string

- Call-Back Number

Example

```
%VLTEV: "DTMF",*
```

```
%VLTEV: "DTMF",3
```

```
%VLTEV: "VMAIL",1,10
```

```
%VLTEV:"VMAIL3GPP2", 11,"5 NEW VMAIL 0 URG 0 FAX *86", "15/05/21  
21:54:19",0,"*86"
```

3.5.107 AT%FLTSMS

Table 3-112 AT%FLTSMS Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%FLTSMS=<cmd>[,<param1>[,<param2>]...] | [%FLTSMS: <result1>[,<result2>...]] OK or ERROR |
| AT%FLTSMS? | ERROR (OPERATION_NOT_ALLOWED) Operation is not supported |
| AT%FLTSMS=? | %FLTSMS: (List of supported <cmd>s) |
| (unsolicited result code) | %FLTSMS: <event>[,<result1>[,<result2>...]] |

Description:

This command handle special SMS features such as filtering, Antitheft etc.

The "GETSMS" sub-command will return ERROR if storage is empty.

Defined values:

<cmd>:

- "MTEVEN" – Command to enable unsolicited indication on new incoming SMS

<param1>: decimal

- 0 – Disable unsolicited indication
- 1 – Enable unsolicited indication

<event>:

- "MTEV" – unsolicited indication on new incoming SMS

<cmd>:

- "GETNUM" – Command to get the number of SMS placed in the dedicated storage.

<result1>: integer

- Number of filtered SMS in the dedicated storage.

<cmd>:

- "GETSMS" – Command to get the latest SMS stored in the dedicated storage

<param1>: decimal

- 0 – PDU mode
- 1 – Text mode

<param2>: decimal

- 0 – Keep SMS in storage
- 1 – Delete SMS from storage

<result1>-<resultN>: same format as returned by +CMGR (see 3GPP 27.005)

<cmd>:

- "SETFILTER" – Command to set a list of phone numbers for Incoming SMS filtering. The filtered incoming SMS shall be placed in dedicated location in NP file system. If "SETFILTER" is executed without parameters, the whole list is deleted.

<param1>: string

- phone number (can include digits 0-9,*,#,+)

<param2>: string

- phone number

<paramN>: string

□ phone number

Examples:

- Define filter list:
 - AT%FLTSMS="SETFILTER","6045629341","7789182026","567#89","123456","*1130","#90"
 - %FLTSMS
 - OK
- Clear filter list:
 - AT%FLTSMS="SETFILTER"
 - %FLTSMS
 - OK
 - Get SMS text Base64:
 - AT%FLTSMS="GETSMS",1,1
 - %FLTSMS: "REC
UNREAD","+358507654321","Mr.
Jones","95/07/03,17:38:15+04"
 - TWFuIGlzlGRpc3Rpbmd1aXNoZWQsIG5vdCBvbmx5I
 - OK

3.5.108 AT%SOCKETCMD

Table 3-113 AT%SOCKETCMD Command Syntax

| Command | Possible Response(s) |
|---|---|
| AT%SOCKETCMD=<cmd>[,<param 1>[,<param2>[,<param3>...]]] | <p>For "INFO" command:</p> <ul style="list-style-type: none"> [%SOCKETCMD:<socket_stat>,<socket_type>,<src_ip>,<dst_ip>,<src_port>,<dst_port>[,<socket_dir>,<socket_to>]] OK <p>For "SSLINFO" command: [%SOCKETCMD:<SSL_mode>,<ClientCerId>] OK</p> <p>For "LASTERROR" command: [%SOCKETCMD:<socket_err>] OK</p> <p>For "ALLOCATE" command: %SOCKETCMD:<socket_id> OK</p> <p>For "FASTSEND" and "CONFSEND" command: %SOCKETCMD:<wlength> OK</p> <p>For other commands:</p> <ul style="list-style-type: none"> OK/ERROR |
| AT%SOCKETCMD? | <p>Returns the list of created sockets and their status:</p> <ul style="list-style-type: none"> [%SOCKETCMD:<socket_id>,<socket_stat>[<CR><LF>%SOCKETCMD:<socket_id>,<socket_stat>[...]]] OK |
| AT%SOCKETCMD=? | %SOCKETCMD: (list of supported <cmd>s) |

Description

- This command is used to create and maintain a socket by the device.
- The IP address formatting for use in this command is:
 - IPv4 format shall use the format (xxx.xxx.xxx.xxx). Where xxx is a decimal number from 0–255. When the leading digits in each segment are 0, the number of digits is adjusted accordingly, and then output. Example: 192.0.2.1, 127.0.0.1, etc ...
 - IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx) where x is in hexadecimal notation. Example:
2001:0db8:bd05:01d2:288a:1fc0:0001:10ee
- When socket is opened (using "OPEN" or "LISTEN" command) the unsolicited %SOCKETEV is automatically enabled (see AT%SOCKETEV for details).
- There are 2 types of listener socket: “synchronous” and “asynchronous”:
 - Synchronous: The connection had been established once “OK” is responded. The maximum waiting time for the connection establishment is deterministic.
 - Asynchronous: The connection is not yet established even “OK” is responded. User must wait for URC, which can be happened at any time (or never).
- Asynchronous listening socket is also called Parent Listening socket below. Parent listening socket and spawned from it connected sockets will have different IDs.
- After activating of parent listening socket, %SOCKETEV=4 unsolicited response will be used to notify "accept incoming connection". This URC provides both listening and spawned from it connected sockets IDs.
- Parent listening socket cannot be used for fast send operation. The ERROR will be returned on "FASTSEND" call for such socket.
- If connected socket has been spawned from parent listening socket, the connected socket deactivation will close this connected socket completely.

Important Notes Related to SSL

- The network allocated SSL session ID is kept and maintained internally by the device per connection allocated "Session ID". The SSL session ID is kept even when the TCP connection is closed to allow reuse of the SSL session on new opened TCP connection.
- Upon “ACTIVATE” command, if SSL session ID is allocated by the network, then device will try first to recover the

existing SSL session ID. If failed to recover SSL connection, then will open new one.

- "SSLALLOC" command will delete previously allocated SSL session-id.

Defined Values

<cmd>: string

- "ALLOCATE" –Allocates socket session with the following parameters

<param1>: integer

- The "Session ID" - a numerical value defined in NP configuration file which points to the PDN on which the socket should be opened on. "Session ID" is defined in AT%CGINFO.

<param2>: string

- "TCP" – For creation of TCP socket (TLS mode when security added)
- "UDP" – For creation of UDP socket (DTLS mode when security added)

<param3>: string

"

- "OPEN" – The socket open TCP/UDP connection with the peer
- "LISTEN" –The socket create TCP/UDP listener
- "LISTENP" –The socket create TCP/UDP parent listener socket. Once activated, multiple connected sockets could be spawned from it.

<param4>: string

- Destination IPv4 or IPv6 address

<param5>: decimal

- Destination UDP/TCP port number in the range 1-65535

<param6>: string

- Source (local) UDP/TCP port number in the range 0-65535 (0 – means auto port selection by the socket and it is also used as the default value)

<param7>: integer

- Packet size to be used by the TCP/UDP/IP stack for data sending.
 - 0 - select automatically default value (MTU based).
 - 1- 1500 - packet size in bytes.

<param8>: integer

- TCP Connection setup timeout. If timer expires, then command return ERROR. Parameter range is 30–360sec (Default is 60 sec). Parameter is irrelevant for parent listening socket; it will be ignored if present.
- In case that connection type is "OPEN" the timeout event is: No SYN-ACK reply from the peer.
- In case that connection type is "LISTEN" the timeout event is: No SYN request from the peer.

<cmd>: string

- "SSLALLOC" – Add SSL for specific socket session id with the following SSL parameters.

<param1>: integer

- The previously allocated socket id

<param2>: integer

- SSL mode. See definition in <SSL_mode>

<param3>: integer

- Client certificate ID. See definition in <ClientCerId>

<param4>: string type.

- Hostname for Server Identity verification – the URI to check it against the server's identity as presented in the server's Certificate

<cmd>: string

- "ACTIVATE" – Activate the predefined socket

<param1>: integer

- The socket ID (identifier) of the specified socket

<cmd>: string

- "INFO" – return the details of specific socket ID

<param1>: integer

- The socket ID (identifier) for which info is requested

<cmd>: string

- "SSLINFO" – return the SSL details of specific socket ID

<param1>: integer

- The socket ID (identifier) for which info is requested

<cmd>: string

-
- “DEACTIVATE” – Request to deactivate specific socket ID and release its resources

<param1>: integer

- The socket ID (identifier) to be closed

<cmd>: string

- “FASTSEND” – This command activates the predefined socket, write to the socket and then deactivate it.

<param1>: integer

- The socket ID (identifier) of the socket

<param2>: integer

- The length in Bytes of the data which need to be written; range is:
 - 1 to 1500 for ALT1250
 - 1 to 3000 for other chipsets

<param3>: hexadecimal

The data, in HEX format (in quotes), which will be written to the specified socket.

<cmd>: string

- “DELETE” – Request to delete specific socket ID allocation (including SSL session context if exist)

<param1>: integer

- The socket ID (identifier) to be closed

<cmd>: string

“LASTERROR” – Request to get the last Socket error code

<param1>: integer

- The socket ID (identifier)

<cmd>: string

“SETOPT” – Set Socket options for specific socket ID

<param1>: integer

- The socket ID (identifier) for which the option is set

<param2>: integer

- TCP/UDP aggregation timer in msec (1-36000, default: 5000). This timer allows improved data transmission efficiency by aggregating several transmissions to single packet.

<param3>: integer

-
- TCP/UDP TX buffer aggregation size in Bytes (1-2048, default: 1500). This aggregation allows improved data transmission efficiency by aggregating several transmissions to single packet.

<param4>: integer

- TCP idle timer in seconds (0-300, default: 60). When there is no client/server activity over the predefined time, the socket is deactivated (Socket option TCP_KEEPINTVL)

<cmd>: string

- "CONFSEND" – Similar to "FASTSEND" this command activates the predefined socket, writes to the socket and then deactivates it. In addition, this command guarantees that data has been transmitted within pre-defined timeout (command is blocking). If not, command returns ERROR.

<param1> - integer type:

- The socket ID (identifier) of the socket

<param2> - integer type; timeout in sec:

- 10-360 sec

<param3> - integer type:

- The length in Bytes of the data which need to be written; range is:
 - 1 to 1500 for ALT1250
 - 1 to 3000 for other chipsets

<param4> - hexadecimal type:

- The data, in HEX format (in quotes), which will be written to the specified socket.

<socket_id>: integer

- The socket ID (identifier) of the specified socket

<socket_stat>: string

- "DEACTIVATED" – The socket is not active
- "ACTIVATED " – The socket is active
- "LISTENING" – The socket is listening

<socket_type>: string

- "TCP" – for creation of TCP socket (TLS mode when security is enabled)
- "UDP" – for creation of UDP socket (DTLS mode when security is enabled)

-
- <src_ip>: string
- Source IPv4 or IPv6 address
- <dst_ip>: string
- Destination IPv4 or IPv6 address
- <src_port>: string
- Source UDP/TCP port number in the range 1-65535
- <dst_port>: string
- Destination UDP/TCP port number in the range 1-65535
- <socket_dir>: integer, the direction of the TCP socket
- 0 – no set
 - 1 – dialer
 - 2 - listener
- <socket_to>: integer
- TCP connection setup timeout as specified in "OPEN" command
- <socket_err>: integer
- Error values as defined by 3GPP TS 27.007 subclause 9.2 for <err> values with extension.
 - The following extensions are proposed (TBD):
 - TCP connection setup failure.
 - Tx Buffer Full
 - TCP connection closed by peer
 - TCP connection closed due to idle timer expiration
 - Can't execute command because PDN disconnected
 - etc...
 - Additional proposed errors related to SSL (TBD):
 - Unknown internal TLS error
 - Wrong format of certificate data
 - Certificate validity period is in future
 - Certificate validity period expired
 - Peer certificate is not confirmed
 - Wrong signature key format
 - Unsupported signature key type
 - Wrong protocol data format
-

-
- Wrong protocol data format
 - No memory available for TLS
 - Buffer error in TLS
 - Wrong input data for RSA operation
 - TLS/SSL protocol error
 - Internat error in TLS
 - Certificate format error
 - The certificate does not exist
 - Unknown TLS error code!
 - etc ..

<SSL_mode>: integer

- 0 – mutual authentication (default)
- 1 – authenticate client side only
- 2 – authenticate server side only

<ClientCerId>: integer

- For ALT1250: Certificate profile ID pre-settled by AT%CERTCFG. Default zero profile ID may be used for server authentication only and will apply root CAs stored into Root Trusted folder for authentication.
- For other chipsets: Client certificate ID (default is: 0). The ID of client certificate which should be sent by the client to the server to authenticate the client. The referenced certificate must be provisioned on the device file system and identified with ID

<wlength>: integer

- The actual length in Bytes of data written to the socket in "FASTSEND" command.

3.5.109 AT%SOCKETDATA

Table 3-114 AT%SOCKETDATA Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%SOCKETDATA=<cmd>[,<param1>[,<param2>[,<param3>...]]] | <p>For "RECEIVE" command: [%SOCKETDATA:<socket_id>[,<rlength>,<more Data>[,<rdata>]]]</p> <p>OK/ERROR</p> <p>For "SEND" command: [%SOCKETDATA:<socket_id>[,<wlength>]]</p> <p>OK/ERROR</p> |
| AT%SOCKETDATA? | ERROR (not supported) |
| AT%SOCKETDATA=? | %SOCKETDATA: (list of supported <cmd>s) |

Description

- This command is used to send/receive to/from the socket.

Notes:

- An operation that returns with ERROR this can be evidence that the TCP socket was closed (by the user, the socket idle timer, or by peer). There is unsolicited indication for socket closure by idle timer or by peer.
- The "SEND" command returns "OK" after the actual transmission of the data, but before "ACK" reception from the peer. This can result in TX buffer fill-up and therefore further "SEND" commands may result with an ERROR.
- The application can issue AT%SOCKET="LASTERROR" to get the reason for the last failure

Defined Values

<cmd>

- "SEND" – Write to the socket

<param1>: integer type

- The socket ID (identifier) of the socket.

<param2>: integer type

- The length in Bytes of the data which needs to be written; range is:
 - 1 to 1500 fir ALT1250
 - 1 to 3000 for other chipsets

<param3>: hexadecimal type:

- The data, in HEX format (in quotes), which will be written to the specified socket.

<param4>: string type; optional parameter. Applied for UDP datagrams only.

- Destination IPv4 or IPv6 address

<param5>: integer type; optional parameter. Applied for UDP datagrams only.

- Destination port number in the range 1-65535

<cmd>

- “RECEIVE” – Read from the socket

<param1>: integer type

- The socket ID (identifier) of the socket.

<param2>: integer type

- 1 to 1500 for ALT1250
- 1 to 3000 for other chipsets

<socket_id>: integer type

- The socket ID (identifier) of the specified socket.

<rlength>: integer type

- The actual length in Bytes of the data which was actually read.

<moreData>: integer type

- The length in Bytes of the data left in the RX buffer.

<rdata>: hexadecimal type

- The read data in HEX format (in quotes).

<wlength>: integer type

- The actual length in Bytes of the data written to the socket.

<src_ip>: string type; optional parameter, returned for UDP datagrams only:

- Source IPv4 or IPv6 address

<src_port>: integer type; optional parameter, returned for UDP datagrams only:

- Source UDP port number in the range 1-65535

3.5.110 AT%SOCKETEV

Table 3-115 AT%SOCKETEV Command Syntax

| Command | Possible Response(s) |
|-------------------------------|---|
| AT%SOCKETEV=<event_id>,<mode> | OK/ERROR |
| AT%SOCKETEV? | ERROR (not supported) |
| AT%SOCKETEV=? | %SOCKETEV: (list of supported <event_id>s), (list of supported <mode>s) |
| (unsolicited) | %SOCKETEV:<event_id>,<socket_id> [,<connected_socket_id>] |

Description

- This command is used to notify about socket events. The reporting may be enabled/disabled per event type.
- The unsolicited %SOCKETEV command is automatically enabled for all event types when the socket is opened using the "OPEN" or "LISTEN" sub-commands of the AT%SOCKETCMD command.
- The unsolicited is sent in the following four cases:
 - Rx buffer has more Bytes to read
 - Socket termination due to Idle timer expiration
 - Socket terminated by peer
 - New connected socket is accepted/spawned from the listening socket
- There are two types of listener sockets: "synchronous" and "asynchronous". The user must wait for URC, which may occur at any time (or never) for asynchronous sockets.
- An Asynchronous listening socket is also called a Parent listening socket below. Parent listening sockets, and connected sockets that are spawned from it, will have different IDs.
- The %SOCKETEV=4 command unsolicited response will be used to notify "accept incoming connection" after activating the parent listening socket. This URC provides both listening and spawned from its connected socket's IDs.

Defined Values

<event_id>: integer:

- 0 – All events, used only in execution command
- 1 – Rx buffer has more Bytes to read
- 3 – Socket terminated by peer

<mode>: integer; unsolicited result response presentation:

- 0 - Disabled
- 1 – Enabled

<socket_id>: integer; the socket ID (identifier) of the socket (parent for async)

<connected_socket_id>: integer; the socket ID (identifier) of the connected socket spawned from the specified parent listening socket

3.5.111 AT%DEVCFG

Table 3-116 AT%DEVCFG Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%DEVCFG=<cmd>,<object>[, [<storage_type>] [, <value1>[, <value2>...]]] > | For "RD" command: %DEVCFG:<value1>[, <value2>...] |
| AT%DEVCFG? | ERROR (not supported) |
| AT%DEVCFG=? | %DEVCFG: (list of supported <cmd>s), (list of supported <objects>s), (list of supported <storage_type>s) |

Description:

AT command provides configuration parameters (i.e. IMEI) storage abstraction.

In the case that only single storage is expected, the <storage_type> parameter may be set to SW default (0) or omitted. Any attempt to store parameter to the unsupported storage type will return ERROR.

Using this AT, any parameter with more than one storage option may be stored into more than one storage location. At run-time safely stored parameter (write-once) has a preference over any other storage types.

The "RD" command with <storage_type>=0 or omitted will return the parameter value currently in use.

If parameter is not stored yet, the "RD" command will return ERROR.

Defined values:

<cmd> - string type:

- "WR" – Write new configuration parameter value(s)
- "RD" – Query current configuration parameter value(s)

<object> - string type:

- "IMEI"
- "PBON" – power button ON parameters.
- "PBOFF" - power button OFF parameters, starting TBD
- "PBONOFF" – power button ON & OFF parameters, starting TBD

<storage_type> - integer type:

- 0 – SW default
- 1 – write-once
- 2 – persistent

For "IMEI":

<value1> - string type; IMEI value (15 bytes).

For "PBON":

<value1> - integer type; feature enable state:

- 0 – disable
- 1 - enable

<value2> - integer type; debounce timeout in ms:

- 1-31

<value3> - integer type; threshold value in ms:

- 0-16383

For "PBOFF":

<value1> - integer type; feature enable state:

- 0 – disable
- 1 - enable

<value2> - integer type; debounce timeout in ms:

- 1-31

<value3> - integer type; threshold value in ms:

- 0-16383

For "PBONOFF":

<value1> - integer type; feature enable state:

- 0 – disable
- 1 - enable

<value2> - integer type; debounce timeout in ms:

- 1-31

<value3> - integer type; ON threshold value in ms:

- 0-16383

<value4> - integer type; OFF threshold value in ms:

- 0-16383

Examples:

1. Configure Power Button ON parameters: 1 sec pressing time, 10 ms debounce:
AT%DEVCFG="WR","PBON",0,10,1000
OK

3.5.112 AT%ISIMTST

Table 3-117 AT%ISIMTST Command SYntax

| Command | Possible Response(s) |
|--|--|
| AT%ISIMTST=<mode>[,<param1>[,<param2>...]] | OK or ERROR |
| AT%ISIMTST? | [AT%ISIMTST: <mode>[,<mode>...]] OK |
| AT%ISIMTST=? | %ISIMTST: (list of supported <mode>s) |

Description

- Execution command is used to apply special iUICC test mode(s) at Production or debugging stage.
- Read command returns a list of currently enabled test modes.

Defined Values

<mode> - string type:

- "IGNORESTAT" – allow communication with SIM regardless of returned status

<param1> - integer type:

- 0 - disable
- 1 – enable

<param2> - hexadecimal type; status to ignore. Optional parameter, if omitted, any error status is ignored. If present, status is encoded as 2-byte value:

- "6A82" – ignore indication that ISIM does not contain any MF

<mode> - string type:

- "APDUTUN" – test mode of APDU tunneling without any additional internal APDU processing. This is a special continuous test mode, which is applied all the time while it is enabled.

<param1> - integer type:

- 0 - disable
- 1 – enable

Example

Read command example:

AT%ISIMTST?

%ISIMTST: "IGNORESTAT", "APDUTUN"

3.5.113 AT%ISIMCFG

Table 3-118 AT%ISIMCFG Command Syntax

| Command | Possible Response(s) |
|----------------------------------|--|
| AT%ISIMCFG=<op>,<type>[,<value>] | For <op>="GET": %ISIMCFG:<type>,<value> OK or ERROR |
| AT%ISIMCFG? | ERROR (not supported) |
| AT%ISIMCFG=? | %ISIMCFG: (list of supported <op>s), (list of supported <type>s) |

Description:

Execution command is used to modify run-time parameter settings to work with iUICC.

Defined values:

<op> - string type; operation to be applied:

- "SET"
- "GET"

<type> - string type; iUICC parameter type to be set or get:

- "WTEXTOUT"

<value> - timeout in msec:

- 0 – max 2³²

3.5.114 AT%IGNSSACT

Table 3-119 AT%IGNSSACT Command Syntax

| Command | Possible Response(s) |
|----------------------------------|--|
| AT%IGNSSACT=<mode>[,<tolerance>] | |
| AT%IGNSSACT? | %IGNSSACT: <active_mode> |
| AT%IGNSSACT=? | %IGNSSACT: (list of supported <mode>s), (range of supported <delay>) |

Description:

Activate GNSS hardware functionality.

Defined values:

<mode> - integer type; activation/deactivation mode:

- 0 – Stop GNSS.
- 1 – Start GNSS - default mode is periodic infinite recurrence with 1sec interval.
- Returns OK if RF usage is currently allowed and ERROR if RF usage is not allowed.
- 2 – Start GNSS with tolerance delay. Same as start, but returns OK even if RF usage is not currently allowed and tries to start GNSS within tolerance delay provided by user.

<tolerance> - integer type; tolerance delay in seconds:

- 0-99999

<active_mode> - integer type:

- 0 – GNSS is not active
- 1 – GNSS is active

3.5.115 AT%IGNSSCFG

Table 3-120 AT%IGNSSCFG Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%IGNSSCFG=<operation>,<category> [,<param1>[,<param2>...]] | For "GET": [%IGNSSCFG: <param1>[,<param2>...]] |
| AT%IGNSSCFG? | ERROR (not supported) |
| AT%IGNSSCFG=? | %IGNSSCFG: (list of supported <operation>s), (list of supported <category>s),(list of supported <type>s) |

Description:

Set and get GNSS run-time mode configuration.

Defined values:

<operation> - string type:

- □ "SET" – set the <category> configuration. If this command is used when GNSS is active, new settings will be applied only after GNSS deactivation. The SET command is not persistent, i.e. configurations are lost after power-cycle. This run-time setting overrides the configuration file static setting and/or default SW functionality.
- "GET" – get the <category> configuration.

<category> - string type:

- "SAT" – satellite systems used in the calculation.
- "NMEA" – enabled NMEA sentences.

<param1>-<paramN> - string type:

- For "SAT" – satellite system types:
 - "GPS"
 - "GLONASS"
- By default, satellite system type is configured to "GPS".
- One or more types can be used (separated by ","), i.e – for HYBRID mode: "GPS","GLONASS".
- For "NMEA"- NMEA sentence types:
 - "GGA"
 - "GLL"
 - "GSA"
 - "GSV"
 - "GNS"
 - "RMC"
 - "VTG"
 - "ZDA"
 - "GST"

One or more types can be used (separated by “,”). Empty list means no enabled NMEA sentences.

3.5.116 AT%IGNSSINFO

Table 3-121 AT%IGNSSINFO Command Syntax

| Command | Possible Response(s) |
|---------------------|--|
| AT%IGNSSINFO=<type> | For “SAT”: %IGNSSINFO: <num_of_sat> [%IGNSSINFO: <PRN>,<elevation>,<azimuth>,<SNR>] [...] For “FIX” and “LASTFIX”: %IGNSSINFO: <fix_type>,<time>,<date>,<latitude>,<longitude>,<altitude>,<utc> [,<accuracy>[,<speed>]] For “TTF”: %IGNSSINFO: <tfff> For “EPH”: %IGNSSINFO: <eph_status> |
| AT%IGNSSINFO? | ERROR (not supported) |
| AT%IGNSSINFO=? | %IGNSSINFO: (list of supported <type>s) |

Description:

Query GNSS information.

Defined values:

<type> - string type:

- “SAT” - returns log of satellite in view.
- “FIX” – returns information of current location acquired by the device.
- “TTF” – returns the Time-To-First-Fix of the most recent GNSS activation.
- “EPH” – indicates if the last stored Ephemeris is valid or not.
- “LASTFIX” - returns the last location on the last fix. Used when fix cannot be obtained and the last location is needed.
-

<num_of_sat> - integer type; number of satellites in view.

<PRN> - integer type; pseudo-random noise code of the satellite:

- 1-37 for GPS
- 38-61 for GLONASS

<elevation> - integer type; satellite elevation:

- 0-90

<azimuth> - integer type; satellite azimuth:

- □ 0-360

<SNR> - integer type; signal strength of the satellite:

- 0-10 – No signal
- 10-15 – Very low signal
- 15-25 – Low signal
- 25 – 40 – Good signal
- >40 – Excellent signal

<fix_type> - integer type:

- 0 – No fix
- 1 – MSA
- 2 - MSB

<time> - string type; last fix time, in format hh:mm:ss .

<date> - string type; last fix date, in format dd/mm/yyyy.

<latitude> - string type, which contains floating value; value is omitted if unknown.

- Latitude as defined and returned by NMEA command GGA. Positive values represent "North", negative values represent "South".

<longitude> - string type, which contains floating value; value is omitted if unknown.

- Longitude as defined and returned by NMEA command GGA. Positive values represent "East", negative values represent "West".

<altitude> - string type, which contains floating value; value is omitted if unknown.

- Altitude as defined and returned by NMEA command GGA.

<utc> - integer type:

- The UTC timestamp of the position (in 1ms units counted since January 1, 1970).

<accuracy> - integer type; radius accuracy in meters

<speed> - string type, which contains floating value; speed in m/sec

<tfff> - string type, which contains floating value; time-to-the-first-fix of the most recent GNSS activation (in milliseconds).

<eph_status> - integer type:

- 0 – Last stored ephemeris is not valid.
- 1 – Last stored ephemeris is valid.

3.5.117 AT%IGNSSTST

Table 3-122. AT%IGNSSTST Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%IGNSSTST=<op>,<sat_id>,<threshold>,<insp_time> | For “INSP”: %IGNSSTST: <result>,<CNO>,<tcxo_offset> |
| AT%IGNSSTST? | ERROR (not supported) |
| AT%IGNSSTST=? | %IGNSSTST: (list of supported <op>s),(range of supported <sat_id>s),(range of supported <threshold>s),(range of supported <insp_time>) |

Description:

Provides some GNSS test modes for future use. Currently only “INSP” is supported.

Defined values:

<op> - string type:

- “INSP” - Measures GNSS frequency offset, writes it to GNSS flash and checks if the C/NO criteria passed.

<sat_id> - integer type; satellite ID:

- 1-32

<threshold> - integer type; CN0 required threshold:

- 20-50

<insp_time> - integer type; the inspection time in seconds (when CN0 is lower than CN0_threshold):

- 1-10

3.5.117.1 AT%IGNSSEV

Table 3-123 AT%IGNSSEV Command Syntax

| Command | Possible Response(s) |
|---------------------------|--|
| AT%IGNSSEV=<event>,<mode> | |
| AT%IGNSSEV? | %IGNSSEV: <event>,<mode>[,<event>,<mode>...] |
| AT%IGNSSEV=? | %IGNSSEV: (list of supported <event>s),(list of supported <mode>s) |
| (unsolicited report) | %IGNSSEVU: <event>,<event body> |

Description:

Enable GNSS unsolicited notification events.

The unsolicited command is used to deliver information from GNSS to the application.

Defined values:

<event> - string type:

- “NMEA” – NMEA sentence report.
- “SESSIONSTAT” – Status event reported upon GNSS session status change.
- “ALLOWSTAT” – Status event reported upon GNSS allowed status change.

<mode> - integer type:

- 0 – Disable <event>
- 1 – Enable <event>

<event body> :

- For “NMEA” - The event body is of string type representing the NMEA sentence (using quote before and after the sentence).
- For “SESSIONSTAT” – The event body is of integer type as following:
 - 0 – NONE (GNSS status unknown)
 - 1 - SESSION_BEGIN (GNSS started)
 - 2- SESSION_END (GNSS stopped)

For “ALLOWSTAT” – The event body is of integer type as following:

- 0 - GNSS is not allowed.
- 1 - GNSS is allowed.
- 2 – GNSS started automatically, when auto-restart is enabled in the configuration file or when GNSS starts working in delay when tolerance is given.

3.5.118 AT%IGNSSMEM

Table 3-124 AT%IGNSSMEM Command Syntax

| Command | Possible Response(s) |
|----------------------------|---|
| AT%IGNSSMEM=<op>,<bitmask> | |
| AT%IGNSSMEM? | ERROR (not supported) |
| AT%IGNSSMEM=? | %IGNSSMEM: (list of supported <op>s),(range of supported <bitmask>) |

Description:

Allows the host to delete specific data from the GNSS storage.

Defined values:

<op> - string type:

- "ERASE"

<bitmask> - hexadecimal type; The data which is required to be deleted.
Bitmask can contain any combination of the bits reflected below:

- "0" - DELETE_ALL
- "0001" - EPHEMERIS
- "0002" - ALMANAC
- "0004" - POSITION
- "0008" - TIME
- "10000" - TCXO

3.5.119 AT%IGNSSCEP

Table 3-125 AT%IGNSSCEP Command Syntax

| Command | Possible Response(s) |
|---------------------------|---|
| AT%IGNSSCEP=<op>[,<days>] | For "STAT" %IGNSSCEP: <status>[,<rem_days>,<rem_hours>,<rem_minutes>] |
| AT%IGNSSCEP? | ERROR (not supported) |
| AT%IGNSSCEP=? | %IGNSSCEP:(list of supported <op>s),(range of supported <days>) |

Description:

Allows the host to download, erase or query about CEP data file saved in memory.

Defined values:

<op> - string type:

- "DLD" – Download CEP file for <num_of_days> from Sony Server.
- "ERASE" – Erase CEP file from memory
- "STAT" – Query for CEP validity status.
In case of CEP valid, returns also the number of days/hours and minutes which will remain valid.

<days> - integer type; valid values are as following:

- 1
- 2
- 3
- 7
- 14
- 28

<rem_days> - integer type; remaining number of days for CEP validity.

<rem_hours> - integer type; remaining number of hours for CEP validity.

<rem_minutes> - integer type; remaining number of minutes for CEP validity.

3.5.120 AT%IGNSSVER

Table 3-126 AT%IGNSSVER Command Syntax

| Command | Possible Response(s) |
|---------------|---|
| AT%IGNSSVER | %IGNSSVER: <fw version_num>,<sw_version_number> |
| AT%IGNSSVER? | ERROR (not supported) |
| AT%IGNSSVER=? | OK |

Description:

Returns GNSS Firmware and Software version number

Defined values:

- < fw version_num> - hexadecimal type; GNSS firmware version number
- <sw_version_number> - string type; GNSS software version number

3.5.121 AT%RATACT

Table 3-127 AT%RATACT Command Syntax

| Command | Possible Response(s) |
|-----------------------------|--|
| AT%RATACT=<rat>[,<storage>] | OK/ERROR |
| AT%RATACT? | %RATACT: <rat> |
| AT%RATACT=? | %RATACT: (list of supported <rat>s),(list of supported <storage>s) |

Description

Execution command switches to selected RAT without full reboot. Any attempt to switch to the RAT already in use will be silently ignored and return OK.

Defined Values

<rat> - string type; RAT to be activated by execution command or currently used RAT for read command:

- "DEFAULT" – activate default RAT, used for execution AT only
- "CATM" – activate CAT-M RAT
- "NBIOT" – activate NB-IOT RAT

<storage> - integer type; flag indicates if settings are persistent over a power-cycle (stored into non-volatile memory):

- 0 – not persistent (default if parameter omitted)
- 1 - persistent

3.5.122 AT%SIMCMD

Table 3-128 AT%SIMCMD Command Syntax

| Command | Possible Response(s) |
|--|-------------------------------------|
| AT%SIMCMD=<cmd>[,<param1>[,<param2>...]] | OK or ERROR |
| AT%SIMCMD? | ERROR (not supported) |
| AT%SIMCMD=? | %SIMCMD: (list of supported <cmd>s) |

Description

- Execution command is used to trigger some run-time SIM manipulation at post-production, integration or field exclusive use-cases.
- The command is compound, which means that <paramX> parameters content is <cmd> specific.

Defined Values

<cmd> - string type; operation to be applied:

- "SWITCH" – switch to other SIM. The attempt to move to the SIM already in use will be silently ignored and AT returns OK. The attempt to move to the SIM disabled in GSYSBP will return ERROR.

<param1> - integer type; the SIM selection policy to be applied immediately:

- 1 – SIM1
- 2 – SIM2

<param2> - integer type; persistence of the setting:

- 0 – not persistent (default if parameter omitted)
- 1 - persistent

3.5.123 AT%CLI

Table 3-129 AT%CLI Command Syntax

| Command | Possible Response(s) |
|---------------------------------------|-----------------------|
| AT%CLI=<cmd>[,<param1>[,<param2>...]] | OK or ERROR |
| AT%CLI? | ERROR (not supported) |
| AT%CLI=? | OK |

Description:

Execution command is used to switch serial interface from AT command mode to CLI-style command mode.

3.5.124 AT%NPPSDBG

Table 3-130 AT%NPPSDBG Command Syntax

| Command | Possible Response(s) |
|-----------------|---|
| AT%NPPSDBG=<op> | For <op>="SLEEPcnt": %NPPSDBG: <CR><LF><counter> ... |
| AT%NPPSDBG? | ERROR (not supported) |
| AT%NPPSDBG=? | %NPPSDBG: (list of supported < op>s) |

Description

- Execution command is used to debug NP power save mode.
- Use AT%NPPSCFG="SLEEPcnt",1 to receive more sleep counters than enabled by default.

Defined Values

<op> - string type; debug operation to be applied:

- "SLEEPcnt" – show sleep counters

<counter> - string without quotes; counter information in user friendly readable format

3.5.125 AT%CERTCMD

Table 3-131 AT%CERTCMD Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%CERTCMD=<cmd>[,<filename>[,<type>,<CR><LF><data>]] | For <cmd>="READ": [%CERTCMD: <data>] For <cmd>="DIR": [%CERTCMD:<filename>[,<filename>...]] |
| AT%CERTCMD? | ERROR (not supported) |
| AT%CERTCMD=? | %CERTCMD: (list of supported <cmd>s), (list of supported <type>s) |

Description:

Execution command is used to read/write/delete/list user certificates to/from NV.

The PEM pseudo-text format specifics is that this format contains newlines (<LF>) in the <data> body. This causes some AT command processing troubles even if the <data> string context is enclosed in quotes. To overcome these troubles, the AT%CERTCMD="WRITE" command shall contain <CR><LF> additional newline separator just before PEM data enclosed in quotes.

Defined values:

- <cmd> - string type; file operation on the NV storage:
- "READ" - read the certificates pointed by <filename>. [Private key cannot be read, command returns ERROR.]
 - "WRITE" - write the credentials with its <filename> to the NV storage
 - "DELETE" - delete the credential pointed by the <filename> from the NV storage
 - "DIR" – get the list of credential file names pointed by <filename>.

<filename> - string type; the name of the file to be transferred, deleted or listed. Use "~" for this parameter to retrieve trusted root certificates folder content. If omitted, the list of files from user root certificate folder (written by AT%CERTCMD="WRITE") is shown.

<type> - integer type:

- 0 – certificate
- 1 – private key

<data> - string type; certificate/private key in PEM format. Usage of quotes is mandatory. The data content in PEM format is transferred in pseudo-text format with <LF> (0x10) service symbols inside and will be shown with newlines.

Example:

1. Upload CA certificate named AmazonRootCA3ECC256.pem

```
AT%CERTCMD="WRITE","AmazonRootCA3ECC256.pem",0,"-----BEGIN CERTIFICATE---  
--
```

...

```
-----END CERTIFICATE-----"
```

OK

2. Upload client private key named 97fbc28291-private.pem.key while encrypting the key

```
AT%CERTCMD="WRITE","97fbc28291-private.pem.key",1,"-----BEGIN RSA PRIVATE  
KEY-----
```

...

```
-----END RSA PRIVATE KEY-----"
```

OK

3. Read Client Certificate named b7c1bd8c7c-certificate.pem.crt

AT%CERTCMD="READ","b7c1bd8c7c-certificate.pem.crt"

%CERTCFG: "-----BEGIN CERTIFICATE-----"

...

-----END CERTIFICATE-----"

OK

4. Get the list of credential folder files:

AT%CERTCMD="DIR"

%CERTCFG: "AmazonRootCA3ECC256.pem","b7c1bd8c7c-private.pem.key",
"b7c1bd8c7c-certificate.pem.crt"

OK

3.5.126 AT%CERTCFG

Table 3-132 AT%CERTCFG Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%CERTCFG=<op>,<profile_id>[, [<ca_file>], [<ca_path>], <dev_cert>, <dev_key>]] | |
| AT%CERTCFG? | [%CERTCFG: <profile_id>[, <profile_id>...]] OK |
| AT%CERTCFG=? | %CERTCFG: (list of supported <op>s) |

Description:

Execution command is used to to add/delete certificate (TLS) profiles into TLS certificate profiles config file.

Device contains 2 certificate storage locations:

- Root Trusted folder, which contains only root CAs
- User Trusted folder, which contains root CAs and device credentials (certificate and private key) installed by user or provisioned over the air.

The parameters encoded in AT commands and composed then into single TLS profile stored into configuration file.

This config file content will be composed from per-profile sections like:

```
"profile_id": {  
    - 'cafile': "ca_file",  
    - 'capath': "ca_path",  
    - 'cert': "dev_cert",  
    - 'key': "dev_key",  
    - }
```

Where <profile_id>, <ca_file>, <ca_path>, <dev_cert> and <dev_key> are taken from the input parameter list.

Any `<ca_file>`, `<ca_path>`, `<dev_cert>` and `<dev_key>` are optional and may be omitted. The `<dev_cert>` and `<dev_key>` shall be always added together or omitted together too. If some parameters are omitted, they will be also omitted in config file.

When per-profile section is created by this AT, TLS security layer using this profile For will apply next rules:

- If root CA file name is known and `<ca_file>` parameter is set, then try to find `<ca_file>` in both storage locations in next order:
 - Root Trusted folder
 - User Trusted folder
- If `<ca_file>` is defined, but not found or if root CA file name is unknown and `<ca_file>` parameter is omitted, apply `<ca_path>` parameter, if present:
- If `<ca_path> = "~"`, then use Root Trusted folder to verify server certificate
 - If `<ca_path> = "."`, then use User Trusted folder to verify server certificate
- Always use User Trusted folder to find device `<dev_cert>` and `<dev_key>` pair

This is the AT responsibility, which is going to use TLS profile (i.e. AT%SOCKETCMD, AT%ATSIOTCMD, etc.) to verify if the profile is properly defined and contain all needed credential for mutual, server or device authentication.

The Default profile ID=0 cannot be defined by this AT and does not present in TLS config file.

It may be used by TLS-consumer ATs (such as AT%SOCKETCMD, AT%ATSIOTCMD, etc.). This default profile implies only server authentication using root CA stored into Root Trusted folder.

Read command returns the list of Profile IDs already in use. If there is not any profile ID defined yet, read command returns only OK.

Defined values:

`<op>` - string type; operation to be applied to TLS profile in config file. Add operation applied to existed profile will return ERROR. Explicit profile deletion is expected:

- "ADD" – add new profile
- "DELETE" – delete profile

`<profile_id>` - integer type; numeric value to identify set of credentials used together for some TLS connection(s). The `profile_id=0` is prohibited and reserved for root trusted certs already stored into default root trusted folder.

Range:

- 1-255

<ca_file> - string type; the name of the root certificate file, if it is known.

<ca_path> - string type; the path of the user-added or trusted root certificates. Use "~" (home directory) to create 'ca_path' config file parameter for default root trusted folder. Use "." to create 'ca_path' config file parameter for user root certificate folder (which content is populated by AT%CERTCMD="WRITE").

<dev_cert> - string type; the name of the user-added device cert file.

<dev_key> - string type; the name of the user-added device private key file.

Example:

1. Create new config file section:

```
AT%CERTCFG="ADD",1,"AmazonRootCA3ECC256.pem",,"b7c1bd8c7c-  
certificate.pem.crt","b7c1bd8c7c-private.pem.key"
```

OK

Created section:

```
"1": {  
'cafile': "AmazonRootCA3ECC256.pem",  
'cert': "b7c1bd8c7c-certificate.pem.crt",  
'key': "b7c1bd8c7c-private.pem.key",  
}
```

3.5.127 AT%AWSIOTCFG

Table 3-133 AT%AWSIOTCFG Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%AWSIOTCFG=<cmd>,[<param1>],[<param2>[,<param3>]] | OK or ERROR |
| AT%AWSIOTCFG? | ERROR (not supported) |
| AT%AWSIOTCFG=? | %AWSIOTCFG: (list of supported <cmd>s) |

Description:

AT command to configure AWS IOT cloud connection parameters.

To start new AWS IOT connection the “CONN” parameters shall be defined at least.

Mandatory TLS profile ID, which shall be pre-configured by AT%CERTCFG, is a special TLS profile, which does not contain both: root certificate file and root certificate path. The root certificate path is hardcoded in SW and implies the usage of trusted root CA pre-installed into device to support proper AWS security level. If selected TLS certificate profile contains <ca_file> or <ca_path> fields (see AT%CERTCFG), AT command returns ERROR.

If “PROTOCOL” parameters are not configured, default protocol parameters will be selected (see below).

Defined values:

<cmd>:

- “**CONN**” – pre-configure connection parameters
- <param1> - string type; endpoint URL
- <param2> - TLS predefined authentication context (profile) previously configured by AT%CERTCFG.
- <param3> - string type; optional unique client ID used to connect to the broker. The IMEI is used as client ID by default.

<cmd>:

- “**PROTOCOL**” – pre-configure protocol parameters

<param1> - integer type; optional MQTT keep-alive time in seconds. Default 1200 sec (20 min).

- 1-1200

- <param2> - integer type; optional QoS setting for “PUBLISH”:
- 0 – with no confirmation (default value)
- 1 – confirmed (acknowledged)

3.5.128 AT%AWSIOTTCMD

Table 3-134 AT%AWSIOTTCMD Command Syntax

| Command | Possible Response(s) |
|---|--|
| AT%AWSIOTCFG=<cmd>[,<param1>][,<param2>[,<param3>]] | OK or ERROR |
| AT%AWSIOTCFG? | ERROR (not supported) |
| AT%AWSIOTCFG=? | %AWSIOTCFG: (list of supported <cmd>s) |

Description:

AT command to configure AWS IOT cloud connection parameters.

To start new AWS IOT connection the “CONN” parameters shall be defined at least.

Mandatory TLS profile ID, which shall be pre-configured by AT%CERTCFG, is a special TLS profile, which does not contain both: root certificate file and root certificate path. The root certificate path is hardcoded in SW and implies the usage of trusted root CA pre-installed into device to support proper AWS security level. If selected TLS certificate profile contains <ca_file> or <ca_path> fields (see AT%CERTCFG), AT command returns ERROR.

If “PROTOCOL” parameters are not configured, default protocol parameters will be selected (see below).

Defined values:

<cmd>:

- “**CONN**” – pre-configure connection parameters

<param1> - string type; endpoint URL

<param2> - TLS predefined authentication context (profile) previously configured by AT%CERTCFG.

<param3> - string type; optional unique client ID used to connect to the broker. The IMEI is used as client ID by default.

<cmd>:

- “**PROTOCOL**” – pre-configure protocol parameters

<param1> - integer type; optional MQTT keep-alive time in seconds. Default 1200 sec (20 min).

- o 1-1200

<param2> - integer type; optional QoS setting for “PUBLISH”:

- o 0 – with no confirmation (default value)
- o 1 – confirmed (acknowledged)

3.5.129 AT%AWSIOTEV

Table 3-135 AT%AWSIOTEV Command Syntax

| Command | Possible Response(s) |
|------------------------------|--|
| AT%AWSIOTEV=<ev_type>,<mode> | OK/ERROR |
| AT%AWSIOTEV? | ERROR (not supported) |
| AT%AWSIOTEV=? | %AWSIOTEV: (list of supported <ev_type>s), (list of supported <mode>s) |
| (unsolicited) | %AWSIOTEVU:<ev_type>,<res1>[,<res2>[,<res3]] |

Description:

The command is intended to notify about AWS IOT events.

Default mode is URC disabled for all event types except of "PUBRCV", which is enabled by first call of AT%AWSIOTCMD="SUBSCRIBE". Most of the events are related to asynchronous operation triggered by AT%AWSIOTCMD. Such acknowledgement may be normally disabled.

Only "PUBRCV" event provides the data from the topic, to which the client was pre-subscribed (pre-registered) by AT%AWSIOTCMD="SUBSCRIBE".

Note that AT%AWSIOTCMD="PUBLISH" in unconfirmed mode (no ACK) will not send any acknowledge message and <ev_type>="PUBCONF" is not expected.

Non-zero message ID may be used to pair subscribe, unsubscribe and publish (confirmed) messages sent by AT%AWSIOTCMD with their URCs. At this stage, message ID is not supported, zero value is always reported.

Note: if TCP session is disconnected because of link lost, no URC is sent.

Defined values:

<ev_type> - string type:

- "CONCONF" – Connect procedure confirmation status
- "DISCONF" – Graceful disconnect procedure confirmation status
- "SUBCONF" – Subscribe procedure confirmation status
- "UNSCONF" – Unsubscribe procedure confirmation status
- "PUBCONF" – Outgoing publication procedure confirmation status
- "PUBRCV" – Incoming publication message received
- "CONNFAIL" – Connection failure
- "ALL" - All events, used only in execution command

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- • 1 – enabled

For "CONCONF"/"DISCONF":

<res1> - integer type; result code:

- 0 – success
- 1 – fail

For "SUBCONF"/"UNSCONF"/"PUBCONF":

<res1> - message ID:

- 0 – not in use
- 1-65535

<res2> - integer type; result code:

- 0 – success
- 1 – fail

For "PUBRCV":

<res1> - string type; the publication topic name

<res2> - string type; publication message content received from endpoint

3.5.130 AT%LDOCMD

Table 3-136 AT%LDOCMD Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%LDOCMD=<cmd>,<ldo> [,<pwr_consumption>] | OK or ERROR |
| AT%LDOCMD? | ERROR (not supported) |
| AT%LDOCMD=? | %LDOCMD: (list of supported <cmd>s), (list of supported <ldo>s) |

Description:

Execution command is used to activate/deactivate LDO output.

Defined values:

<cmd> - string type; LDO operation:

- "ON" - activate LDO output.
- "OFF" – disable LDO output

<ldo> - integer type; the ID of LDO to manipulate:

- 2 – AUX LDO ID

<pwr_consumption> - integer type:

For "ON": optional parameter:

- 0 – low power consumption, up to 1mA
- 1 – high power consumption (default), up to 50mA

3.5.131 AT%TESTCFG

Table 3-137 AT%TESTCFG Command Syntax

| Command | Possible Response(s) |
|---|---|
| AT%TESTCFG=<test_mode>[,<param1>[,<param2>...]] | OK or ERROR |
| AT%TESTCFG? | %TESTCFG: <test_mode> |
| AT%TESTCFG=? | %TESTCFG: (list of supported <test_mode >s) |

Description:

Execution command is used to configure parameters for modem system tests.

Defined values:

<test_mode> - string type:

General tests:

- "DEFAULT" – the default setting is different per operator
- "DEFAULT_PDN"
- "LWM2M_TEST"
- "LWM2M_SERVER"
- "GCF_RF"
- "GCF_BB"
- "GCF_RRM"
- "GCF_SUP_RF"
- "GCF_PROT"
- "GCF_USIM"
- "GCF_UICC"
- "USAT"
- "BLOCK_DATA"
- "ATCMD"

For VZW NW Operator only:

- "VZW_IOT"
- "VZW_DTHPUT"
- "VZW_FT"
- "VZW_SUP_SIG"
- "VZW_DRETRY"
- "VZW_IMS"
- "VZW_SMS"
- "VZW_IBAND"

- "VZW_USAT"
- <param1> - string type;
- For "LWM2M_SERVER":
 - LWM2M server URL
- <param2> - string type;
- For "LWM2M_SERVER":
 - "BS_NOSEC" – bootstrap server non-secure connection
 - "BS_SEC" - bootstrap server secure connection
 - "DM_NOSEC" – device management server non-secure connection
 - "DM_SEC" - device management server secure connection
- <param3> - string type;
- For "LWM2M_SERVER" & ("BS_SEC" or "DM_SEC"):
 - PSK Identity
- <param4> - string type;
- For "LWM2M_SERVER" & ("BS_SEC" or "DM_SEC"):
 - Secret Key

3.5.132 AT%GETSYSCFG

Table 3-138 AT%GETSYSCFG Command Syntax

| Command | Possible Response(s) |
|--------------------|---|
| AT%GETSYSCFG=<obj> | %GETSYSCFG: <value1>[,<value2>...] OK or ERROR |
| AT%GETSYSCFG? | ERROR (not supported) |
| AT%GETSYSCFG=? | OK |

Description:

Command to get value(s) from system configuration files HW_CFG and SW_CFG.

Defined values:

<obj> - string type; path name of parameter in config file, where filename is the part of the path. Path components are separated by '.'.

<value1>-<valueN> - string format; value(s) of <obj>. Any data type including integer values are returned in quotes.

The table below contains the list of currently supported SW_CFG <obj>s and <value>s.

Table 3-139 AT%GETSYSCFG Supported SW_CFG <obj>s and <value>s.

| <obj>s | Complete List for Possible <value>s |
|--|---|
| "sw_cfg.cfg_version.version" | "xx.xx" |
| "sw_cfg.3gpp.plmn_roaming" | "DISABLE"/"ENABLE" |
| "sw_cfg.catm_band_table.band#1"- "sw_cfg.catm_band_table.band#40" | "DISABLE"/"ENABLE" "1"-“66” (band) |
| "sw_cfg.catm_vendor_scan_plan.activate" | "DISABLE"/"ENABLE" |
| "sw_cfg.catm_vendor_scan_plan.verify_bw" | "DISABLE"/"ENABLE" |
| "sw_cfg.catm_vendor_scan_plan.mode" | "SW_DEFAULT"/LIMITED"/ "MIXED" |
| "sw_cfg.catm_vendor_scan_plan.sched_sch eme" | "0"/"1" |
| "sw_cfg.catm_vendor_scan_plan.sched_cou nter" | "0"-“255” |
| "sw_cfg.catm_vendor_scan_plan.plmn_sel_ mode" | "DOMESTIC"/"STANDARD" |
| "sw_cfg.catm_scan_list.entry#1"- "sw_cfg.catm_scan_list.entry#64" | "DISABLE"/"ENABLE" "1"-“66” (band) "-1"-“68585” (start EARFCN) "-1"-“68585” (stop EARFCN) "1"-“255” (EARFCN step) |
| "sw_cfg.nb_band_table.band#1"- "sw_cfg.nb_band_table.band#40" | "DISABLE"/"ENABLE" "1"-“66” (band) |
| "sw_cfg.nb_vendor_scan_plan.activate" | "DISABLE"/"ENABLE" |
| "sw_cfg.nb_vendor_scan_plan.verify_bw" | "DISABLE"/"ENABLE" |
| "sw_cfg.nb_vendor_scan_plan.mode" | "SW_DEFAULT"/LIMITED"/ "MIXED" |
| "sw_cfg.nb_vendor_scan_plan.sched_schem e" | "0"/"1" |
| "sw_cfg.nb_vendor_scan_plan.sched_counte r" | "0"-“255” |
| "sw_cfg.nb_vendor_scan_plan.plmn_sel_mo de" | "DOMESTIC"/"STANDARD" |
| "sw_cfg.nb_scan_list.entry#1"- "sw_cfg.nb_scan_list.entry#64" | "DISABLE"/"ENABLE" "1"-“66” (band) "-1"-“68585” (start EARFCN) "-1"-“68585” (stop EARFCN) "1"-“255” (EARFCN step) |
| "sw_cfg.scan_time_schedule.rep_min_interv | "0"-“32767” |

| | |
|---|---|
| al | |
| "sw_cfg.scan_time_schedule.rep_max_interv al" | "0"- "32767" |
| "sw_cfg.scan_time_schedule.rep_step" | "-1" - "32767" |
| "sw_cfg.sim.rx_tx_delay_ms" | "0"- "255" |
| "sw_cfg.sim.poll_suspend_mode" | "SW_DEFAULT"/"DISABLE"/"ENABLE" |
| "sw_cfg.sim.dual_config" | "SINGLE_SIM"/"DUAL_SIM" |
| "sw_cfg.sim.dual_init_select" | "NA"/"SIM1_ONLY"/"SIM2_ONLY"/ "DUAL_SIM2_FALLBACK"/ "DUAL_SIM1_FALLBACK" |
| "sw_cfg.debug.disable_reset_on_failure" | "FALSE"/"TRUE" |
| "sw_cfg.debug.reset_on_failure_type" | "SW_DEFAULT"/"WARM_RESET"/ "COLD_RESET" |
| "sw_cfg.power_save_flags.ds_clock32k_corr ection" | "DISABLE"/"ENABLE" |
| "sw_cfg.power_save_flags.ps_device_mobilit y_type" | "MOBILE"/"STATIC" |
| | |

The table below contains the list of currently supported HW_CFG <obj>s and <value>s.

Table 3-140 AT%GETSYSCFG Supported HW_CFG <obj>s and <value>s

| <obj>s | Complete List for Possible <value>s |
|---|--|
| "hw_cfg.cfg_version.version" | "xx.xx" |
| "hw_cfg.sim1.activate" | "DISABLE"/"ENABLE" |
| "hw_cfg.sim1.detect_mode" | "DISABLE"/"GPIO" |
| "hw_cfg.sim1.detect_pin" | "1"-"78" |
| "hw_cfg.sim1.detect_pull" | "DISABLE"/"PULL_UP"/"PULL_DOWN" |
| "hw_cfg.sim1.detect_polarity" | "POSITIVE"/"NEGATIVE" |
| "hw_cfg.sim1.ldo_select" | "SIM_LDO"/"AUX_LDO" |
| "hw_cfg.sim2.activate" | "DISABLE"/"ENABLE" |
| "hw_cfg.sim2.detect_mode" | "DISABLE"/"GPIO" |
| "hw_cfg.sim2.detect_pin" | "1"-"78" |
| "hw_cfg.sim2.detect_pull" | "DISABLE"/"PULL_UP"/"PULL_DOWN" |
| "hw_cfg.sim2.detect_polarity" | "POSITIVE"/"NEGATIVE" |
| "hw_cfg.sim2.ldo_select" | "SIM_LDO"/"AUX_LDO" |
| "hw_cfg.vbat_fem_ext_ctrl.activate" | "DISABLE"/"ENABLE" |
| "hw_cfg.vbat_fem_ext_ctrl.gpio" | "1"-"78" |
| "hw_cfg.vbat_fem_ext_ctrl.time_on_offset_us" | "(-50)-50" |
| "hw_cfg.vbat_fem_ext_ctrl.time_off_offset_us" | "(-50)-50" |

| | |
|---|--------------------|
| "hw_cfg.tx_indicator.activate" | "DISABLE"/"ENABLE" |
| "hw_cfg.tx_indicator.gpio" | "1"-78" |
| "hw_cfg.tx_indicator.time_on_offset_us" | "(-50)-50" |
| "hw_cfg.tx_indicator.time_off_offset_us" | "(-50)-50" |
| "hw_cfg.antenna_tuning_ctrl.type" | "DISABLE"/"STATIC" |
| "hw_cfg.antenna_tuning_ctrl.interface" | "MIPI"/"GPIO" |
| "hw_cfg.antenna_tuning_ctrl.mipi_vio_gpio" | "1"-78" |
| "hw_cfg.antenna_tuning_ctrl.gpio_ctrl#0"- "hw_cfg.antenna_tuning_ctrl.gpio_ctrl#3" | "1"-78" |

Example:

AT%GETSYSCFG="sw_cfg.sim.dual_config"

%GETSYSCFG="DUAL_SIM"

OK

3.5.133 AT%SETSYSCFG

Table 3-141 AT%SETSYSCFG Command Syntax

| Command | Possible Response(s) |
|---|---|
| AT%SETSYSCFG=<obj>[,<value1>[,<value2>...]] | [%SETSYSCFG: <range1>[,<range2>...]] OK or ERROR |
| AT%SETSYSCFG? | ERROR (not supported) |
| AT%SETSYSCFG=? | OK |

Description

Command to set value(s) to system configuration files HW_CFG and SW_CFG.

Execution command AT%SETSYSCFG=<obj> with completely omitted <valueX>s parameter(s) may be used to retrieve currently permitted capability value range/list defined in HW_CAP and SW_CAP.

Before the command sets the value on the configuration file, it validates settled object and its value(s) against the same field in the XX_CAP files. If settled value is part of the options described in the XX_CAP file, command will set the value on XX_CFG file, otherwise it will return ERROR.

Defined values:

<obj> - string format; path name of parameter in config file, where filename is the part of the path. Path components are separated by ‘.’.

<value1>-<valueN> - string format; value(s) of <obj> to set. Any data type including integer values shall be defined in quotes.

<range1>-<rangeN> - string format; range or list of value(s) of <obj> currently permitted in XX_CAP files.

The table below contains the list of currently supported SW_CFG <obj>s and <value>s.

Table 3-142 AT%SETSYSCFG Supported SW_CFG <obj> and <value>s

| <obj>s | <value>s |
|--|--|
| AT%TIMEREV=<ev_type>,<mode> | OK or ERROR |
| AT%TIMEREV? | ERROR (not supported) |
| AT%TIMEREV=? | OK |
| (unsolicited report) | % TIMEREV:<ev_type>,<status>[,<param1>[,< param2>]] |
| "sw_cfg.3gpp.plmn_roaming" | "DISABLE"/"ENABLE" |
| "sw_cfg.catm_band_table.band#1"- "sw_cfg.catm_band_table.band#40" | "DISABLE"/"ENABLE" "1"-“66” (band) |
| "sw_cfg.catm_vendor_scan_plan.activate" | "DISABLE"/"ENABLE" |
| "sw_cfg.catm_vendor_scan_plan.verify_bw" | "DISABLE"/"ENABLE" |

| | |
|--|---|
| "sw_cfg.catm_vendor_scan_plan.mode" | "SW_DEFAULT"/LIMITED"/ "MIXED" |
| "sw_cfg.catm_vendor_scan_plan.sched_scheme" | "0"/"1" |
| "sw_cfg.catm_vendor_scan_plan.sched_counter" | "0"- "255" |
| "sw_cfg.catm_vendor_scan_plan.plmn_sel_mode" | "DOMESTIC"/"STANDARD" |
| "sw_cfg.catm_scan_list.entry#1"- "sw_cfg.catm_scan_list.entry#64" | "DISABLE"/"ENABLE" "1"- "66" (band) "-1"- "68585" (start EARFCN) "-1"- "68585" (stop EARFCN) "1"- "255" (EARFCN step) |
| "sw_cfg.nb_band_table.band#1"- "sw_cfg.nb_band_table.band#40" | "DISABLE"/"ENABLE" "1"- "66" (band) |
| "sw_cfg.nb_vendor_scan_plan.activate" | "DISABLE"/"ENABLE" |
| "sw_cfg.nb_vendor_scan_plan.verify_bw" | "DISABLE"/"ENABLE" |
| "sw_cfg.nb_vendor_scan_plan.mode" | "SW_DEFAULT"/LIMITED"/ "MIXED" |
| "sw_cfg.nb_vendor_scan_plan.sched_scheme" | "0"/"1" |
| "sw_cfg.nb_vendor_scan_plan.sched_counter" | "0"- "255" |
| "sw_cfg.nb_vendor_scan_plan.plmn_sel_mode" | "DOMESTIC"/"STANDARD" |
| "sw_cfg.nb_scan_list.entry#1"- "sw_cfg.nb_scan_list.entry#64" | "DISABLE"/"ENABLE" "1"- "66" (band) "-1"- "68585" (start EARFCN) "-1"- "68585" (stop EARFCN) "1"- "255" (EARFCN step) |
| "sw_cfg.scan_time_schedule.rep_min_interval" | "0"- "32767" |
| "sw_cfg.scan_time_schedule.rep_max_interval" | "0"- "32767" |
| "sw_cfg.scan_time_schedule.rep_step" | "-1"- "32767" |
| "sw_cfg.sim.rx_tx_delay_ms" | "0"- "255" |
| "sw_cfg.sim.poll_suspend_mode" | "SW_DEFAULT"/"DISABLE"/ "ENABLE" |
| "sw_cfg.sim.dual_config" | "SINGLE_SIM"/"DUAL_SIM" |
| "sw_cfg.sim.dual_init_select" | "NA"/"SIM1_ONLY"/ "SIM2_ONLY"/ "DUAL_SIM2_FALLBACK"/ "DUAL_SIM1_FALLBACK" |
| "sw_cfg.debug.disable_reset_on_failure" | "FALSE"/ "TRUE" |

| | |
|---|---|
| "sw_cfg.debug.reset_on_failure_type" | "SW_DEFAULT"/ "WARM_RESET"/ "COLD_RESET" |
| "sw_cfg.power_save_flags.ds_clock32k_correction" | "DISABLE"/"ENABLE" |
| "sw_cfg.power_save_flags.ps_device_mobility_type" | "MOBILE"/"STATIC" |

The table below contains the list of currently supported HW_CFG <obj>s and <value>s.

Table 3-143 AT%SETSYSCFG Supported HW_CFG <obj>s and <value>s

| <obj> | <value>s |
|---|----------------------------------|
| "hw_cfg.sim1.activate" | "DISABLE"/"ENABLE" |
| "hw_cfg.sim1.detect_mode" | "DISABLE"/"GPIO" |
| "hw_cfg.sim1.detect_pin" | "1"-78" |
| "hw_cfg.sim1.detect_pull" | "DISABLE"/"PULL_UP"/ "PULL_DOWN" |
| "hw_cfg.sim1.detect_polarity" | "POSITIVE"/"NEGATIVE" |
| "hw_cfg.sim1.ldo_select" | "SIM_LDO"/"AUX_LDO" |
| "hw_cfg.sim2.activate" | "DISABLE"/"ENABLE" |
| "hw_cfg.sim2.detect_mode" | "DISABLE"/"GPIO" |
| "hw_cfg.sim2.detect_pin" | "1"-78" |
| "hw_cfg.sim2.detect_pull" | "DISABLE"/"PULL_UP"/ "PULL_DOWN" |
| | |
| "hw_cfg.sim2.detect_polarity" | "POSITIVE"/"NEGATIVE" |
| "hw_cfg.sim2.ldo_select" | "SIM_LDO"/"AUX_LDO" |
| "hw_cfg.vbat_fem_ext_ctrl.activate" | "DISABLE"/"ENABLE" |
| "hw_cfg.vbat_fem_ext_ctrl.gpio" | "1"-78" |
| "hw_cfg.vbat_fem_ext_ctrl.time_on_offset_us" | "(-50)-50" |
| "hw_cfg.vbat_fem_ext_ctrl.time_off_offset_us" | "(-50)-50" |
| "hw_cfg.tx_indicator.activate" | "DISABLE"/"ENABLE" |
| "hw_cfg.tx_indicator.gpio" | "1"-78" |
| "hw_cfg.tx_indicator.time_on_offset_us" | "(-50)-50" |
| "hw_cfg.tx_indicator.time_off_offset_us" | "(-50)-50" |
| "hw_cfg.antenna_tuning_ctrl.interface" | "MIPI"/"GPIO" |
| "hw_cfg.antenna_tuning_ctrl.mipi_" | "1"-78" |

| | |
|---|---------------|
| vio_gpio" | |
| "hw_cfg.antenna_tuning_ctrl.gpio_ctrl#0"- "hw_cfg.antenna_tuning_ctrl.gpio_ctrl#3" | "1"-78" |
| "hw_cfg.antenna_tuning_ctrl.interface" | "MIPI"/"GPIO" |

Example:

```
AT%SETSYSCFG="sw_cfg.sim.dual_config","DUAL_SIM"
```

```
OK
```

3.5.134 AT%FWUPGCMD

Table 3-144 AT%FWUPGCMD Command Syntax

| Command | Possible Response(s) |
|---------------------------------------|---------------------------------------|
| AT%FWUPGCMD=<cmd>,<param1>[,<param2>] | OK or ERROR |
| AT%FWUPGCMD? | %FWUPGCMD: <state>[,<rep1>[,<rep2>]] |
| AT%FWUPGCMD=? | %FWUPGCMD: (list of supported <cmd>s) |

Description:

AT command to manage firmware/software upgrade over the air.

This command is intended to communicate with external Host involved into FOTA process.

Defined values:

<cmd> - string type:

- “DLRSP” – Host response for pending Download event.
- “UPRSP” – Host response for pending Update event.
- “HOSTUPRES” – Host result reporting for Host Update.

For “DLRSP”/“UPRSP”:

<param1> - integer type, Host confirmation code:

- 0 – accept
- 1 - cancel

<param2> - integer type; optional <result>, if cancelled.

For “HOSTUPRES”:

<param1> - integer type; Host update result, see <result> values defined below.

<state> - integer type:

- 0 - Idle
- 1 - Waiting for download confirmation
- 2 - Download precondition
- 3 - During download
- 4 - Download completed
- 5 - Waiting for update confirmation
- 6 - Update precondition
- 7 - Waiting for reboot
- 8 - Waiting for host result
- 9 - FOTA finished

For <state>= 3 (During download)

<rep1> - integer type; currently downloaded size of image in bytes for download in progress

<rep2> - integer type; total size of image to download

For <state>=9 (FOTA finished)

<rep1> - integer type; final <result> value, see <result> values definition below

<result> - integer type:

- 0 - Initial value
- 1 - Success
- 2 - Not enough flash memory during download
- 3 - Out of RAM during download
- 4 - Connection lost during download
- 5 - Integrity check failure
- 6 - Unsupported package type
- 7 - Invalid URI
- 8 - Image update failed
- 9 - Unsupported protocol

3.5.135 AT%FWUPGEV

Table 3-145 AT%FWUPGEV Command Syntax

| Command | Possible Response(s) |
|-------------------|---------------------------------------|
| AT%FWUPGEV=<mode> | OK/ERROR |
| AT%FWUPGEV? | ERROR (not supported) |
| AT%FWUPGEV=? | %FWUPGEV: (list of supported <mode>s) |
| (unsolicited) | %FWUPGEVU:<ev_type>[,<res1>] |

Description:

This unsolicited command notifies the Host about the events of firmware upgrade. It also used to request the Host confirmation to continue with the download/update process.

Defined values:

<ev_type> - string type:

- "DLPENDING"
- "DLDONE"
- "UPPENDING"
- "REBOOTNEEDED"
- "FAILURE"

<mode> - integer type; status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

For "DLDONE"/"UPPENDING":

<res1> - integer type; images to download/update:

- 1 - Modem FW
- 2 - Host SW
- 3 - Both host SW and modem FW

For "FAILURE":

<res1> - integer type; download/update failure result value:

- 0 - Reserved
- 1 - Reserved
- 2 - Not enough flash memory during download
- 3 - Out of RAM during download
- 4 - Connection lost during download
- 5 - Integrity check failure
- 6 - Unsupported package type
- 7 - Invalid URI
- 8 - Image update failed
- 9 - Unsupported protocol

3.5.136 AT%DEVCMD

Table 3-146 AT%DEVCMD Command Syntax

| Command | Possible Response(s) |
|--|-------------------------------------|
| AT%DEVCMD=<cmd>[,<param1>[,<param2>...]] | OK or ERROR |
| AT%DEVCMD? | ERROR (not supported) |
| AT%DEVCMD=? | %DEVCMD: (list of supported <cmd>s) |

Description

- Execution command is used to trigger some device manipulation or some run-time device parameters changes. If parameters are changed, they will be applied immediately without reboot.
- The command is compound, which means that <paramX> parameters content is <cmd> specific.

Defined Values

<cmd> - string type; operation to be applied:

- "PSMAX" - max power save mode limit

For "PSMAX":

<param1> - string type:

- "DH0" – stateless deep hibernation type 0
- "DH1" – deep hibernation type 1
- "DH2" - deep hibernation type 2
- "DS" – deep sleep

3.5.137 AT%**CUSATP**

Table 3-147 AT%**CUSATP** Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT% CUSATP =<mode>[,<pr_cmd>[,<pr_cmd>...]] | OK or ERROR |
| AT% CUSATP ? | ERROR (not supported) |
| AT% CUSATP =? | % CUSATP : (list of supported <mode>s), (list of supported <pr_cmd>s) |

Description

- AT command provides enabling for selective proactive commands routing by +**CUSATP** and proactive processing finish indication by +**CUSATEND**. The disabling of proactive commands routing (<mode>=0) is provided by this AT exclusively.
- Default command call of AT%**CUSATP**=1 is equivalent to the standard AT+**CUSATA**=1 call.
- If mandatory operation required in proactive command cannot be executed because of proactive command routing disabled by this AT, MT will return: "Terminal currently unable to process command" (20) in **TERMINAL RESPONSE** to **UICC**.
- The filters selected by AT%**CUSATP** command using <pr_cmd> parameters are always "ORed". Command accepts with OK any overlapping or inclusive filters configuration.

Defined Values

<mode> - integer type:

- 0 – disable +**CUSATP** & +**CUSATEND**
- 1 – enable +**CUSATP** & +**CUSATEND**

<pr_cmd> - integer type; if all <pr_cmd>s are omitted for <mode>=1, the default proactive set is enabled (see <pr_cmd>=100) .

- 0-7 – REFRESH type 0-7
- 8-19 – Reserved for future REFRESH types

-
- 20 – REFRESH of all types
 - 21 - OPEN CHANNEL
 - 22 - CLOSE CHANNEL
 - 23 - RECEIVE DATA
 - 24 - SEND DATA
 - 25 - SEND SHORT MESSAGE
 - 26 - RUN AT COMMAND
 - 27 - SET UP EVENT LIST, TE-only list
 - 28 - SET UP EVENT LIST, full event list
 - 29-98 – Reserved (TBD, individual TE proactive commands will be added on customer demand)
 - 99 – enable all TE-only proactives
 - 100 – enable all proactives in a default proactive set: 20-27 & 99
 - 101 – enable all proactives (regardless of type)

Examples

1. Configure that only REFRESH type 4 and OPEN CHANNEL proactives will be routed:

```
AT%CUSATP=1,4,21
```

2. Configure that all proactives (MT & TE) will be routed:

```
AT%CUSATP=1,101
```

3. Apply normal (compliant to 3GPP) proactive routing rules:

```
AT%CUSATP=1
```

4. The IoT CAT Application may define min proactive set (ignore confirmation phase for most MT-only proactives) to reduce power consumptions:

```
AT%CUSATP=1,99,21
```


3.5.138 AT%CPSMS

Table 3-148 AT%CPSMS Command Syntax

| Command | Possible Response(s) |
|-----------------|-------------------------------------|
| AT%CPSMS=<mode> | OK or ERROR |
| AT%CPSMS? | %CPSMS: <state>,<act> |
| AT%CPSMS=? | %CPSMS: (list of supported <mode>s) |
| (unsolicited) | %CPSMSU:<event> |

Description

- AT command provides enabling/disabling for PSM status change notification.
- Read command returns together:
 - PSM feature enabled state (may be also retrieved by AT+CPSMS?)
 - Current PSM activated status (may be also retrieved by AT%STATUS="PSM")

Defined Values

<mode> - integer type; mode of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

<state> - integer type; state of PSM feature:

- 0 - disabled
- 1 – enabled

<act> - integer type; PSM activity status:

- 0 - inactive
- 1 – active

<event> - integer type:

- 0 - exit PSM
- 1 - enter PSM

3.5.139 AT%LW2MOBJCMD

Table 3-149 AT%LW2MOBJCMD Command Syntax

| Command | Possible Response(s) |
|-----------------------|---|
| AT%LWM2MOBJCMD=<mode> | OK or ERROR |
| AT%LWM2MOBJCMD? | %LWM2MOBJCMD: <mode> |
| AT%LWM2MOBJCMD=? | %LWM2MOBJCMD: (list of supported <mode>s) |
| (unsolicited) | %LWM2MOBJCMDU: <command>,<seq_num>,<server id>,[<uri>,<value>[<uri>,<value[...]] For "OBSERVE_START": %LWM2MOBJCMDU: "OBSERVE_START",<seq_num>,<server id>,<token>,<format>,<uri>,<min_period>,<max_period> [,<greater than>][,<less than>][,<step>]] For "OBSERVE_STOP": %LWM2MOBJCMDU: "OBSERVE_STOP",<seq_num>,<server id>,<token>,<format>,<uri> |

Description

Command enables/disables %LWM2MCMDCU URC command that forwards LWM2M server operation on host related object.

Defined Values

<mode> - integer type:

- 0 – disable
- 1 – enable

<command> - string type, LWM2M operation:

- "READ" - read object/resource(s)
- "WRITE" - write into single/multi instance resource. For multi-instance resource case, instances that are not included in the command should be deleted
- "WRITE_PARTIAL" - write into multi-resource. Resource instances that are not included in the command should be left unchanged (currently not supported)
- "EXE" - execute resource
- "OBSERVE_START" - start observation
- "OBSERVE_STOP" - stop observation

<seq_num> - integer type, used for this URC and "%LWM2MOBJRSP" AT command synchronization.

<server_id> - integer type, LWM2M Short Server ID

<format> - integer type; content format:

- 0 – text
- 40 – link
- 42 – OPAQUE
- 11542 – TLV
- 11543 - JSON

<uri> - string type, resource URI path: /<Obj ID>[/<Obj Inst>[/<Resource ID>[/Resource Inst >]]]

<value> - string type; resource value

<token> - string type; token of CoAP message in observation message. The corresponding AT%LWM2MOBJEV notification should have the same token value

<min_period> - integer type, the minimum time in seconds between two notifications

<max_period> - integer type, the maximum time in seconds between two notifications

<greater_than> - high threshold value of resource for notification. Format: xx.xx.

<less_than> - low threshold value of resource for notification. Format: xx.xx.

<step> - a minimum change value of resource between two notifications. Format: xx.xx.

3.5.140 AT%LWM2MOBJRSP

Table 3-150 AT%LWM2MOBJRSP Command Syntax

| Command | Possible Response(s) |
|---|--------------------------|
| AT%LWM2MOBJRSP=<seq_num>,<ret_code>[,<uri>,<value> [,<uri>,<value>[...]]] | OK or ERROR |
| AT%LWM2MOBJRSP? | ERROR (not supported) |
| AT%LWM2MOBJRSP=? | OK |

Description

Command is used to provide Host application response for %LWMWMCMDU URC.

Defined Values

<seq_num> - integer type, used for this URC and "%LWM2MOBJRSP" AT command synchronization:

- 1-1000

<ret_code> - string type, CoAP response code:

- "2.04" – Changed – operation completed successfully
- "2.05" – Content – operation completed successfully
- "4.01" – Unauthorized – access right permission denied
- "4.04" – Not Found – URI not found

<value> - string type; resource value

<value> - string type; resource value

3.5.141 AT%LWM2MOBJEV

Table 3-151 AT%LWM2MOBJEV Command Syntax

| Command | Possible Response(s) |
|--|--------------------------|
| AT%LWM2MOBJEV=[<token>],[<serverId>],[<format>],[<fragment_info>],[<uri>,<value>],[<uri>,<value>[...]] | OK or ERROR |
| AT%LWM2MOBJEV? | ERROR (not supported) |
| AT%LWM2MOBJEV=? | OK |

Description

Command is used by Host application to send notification with resource/s value.

Note: The <uri>s in the command can be single or/and multi-resource instance. All <uri> must be from the same object instance, meaning /<Obj ID>/<Obj Inst> must be the same for all resources.

Defined Values

<token> - string type. Optional, applied only to the resulting event of "OBSERVE_START". Token of CoAP message in observation message. Used to synchronize the event with AT%LWM2MCMD="OBSERVE_START" command.

<server_id> - integer type; optional. LWM2M Short Server ID. Parameter can be omitted is single server is in use. If parameter is omitted for multiple servers use-case, command returns ERROR.

<format> - integer type; optional. Content format. The format requested by server will be selected if parameter is omitted:

- 0 – text
- 40 – link
- 42 – OPAQUE
- 11542 – TLV
- 11543 – JSON

<fragment_info> - integer type; fragment event information:

- 0 - Single AT Command for event notification. (default)
- 1 - AT Command is part of group AT commands event and contains a fragment of event message.
- 2 - AT Command is part of group AT commands event and contains the last fragment of event message.

Notes:

- All AT commands in a group of AT commands sent with <fragment_info>=1/2 must be for the same Object ID
- Object Instance ID must be not repeated in a group of AT commands sent with <fragment_info>=1/2

<uri> - string type, resource URI path: /<Obj ID>[/<Obj Inst>[/<Resource ID>[/Resource Inst >]]]

<value> - string type; resource value

3.5.142 AT% APPLOG

Table 3-152 AT%APPLOG Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%APPLOG=<op>[,<module>[,<severity>]] | [%APPLOG: <module>,<severity>] OK or ERROR |
| AT%APPLOG? | %APPLOG: <module>,<severity> <CR><LF>%APPLOG: <module>,<severity> ... <CR><LF>%APPLOG: <module>,<severity> |
| AT%APPLOG=? | %APPLOG: (list of <op>s), (list of <module>s), (list of <severity>s) |

Description

- Command to manage Application CPU log output.
- Application CPU logs are disabled by default as they slow down the system. The AT%APPLOG="ENABLE" shall be applied to trigger log reporting.
- Per-module reporting is controlled by per-module severity. Default severity for each module is hardcoded in SW.
- Once log is enabled and severity is defined for some module (hardcoded or overridden by this AT):
 - all lower severity logs are disabled for this module
 - the <severity> and higher severity logs are reported for this module
- The AT%APPLOG="SET" without any parameters returns all modules to their default severity.
- Execution command provides opportunity to enable/disable Application logs and to modify log <severity> at run-time only. After each modem power on the expected modifications of modem default behaviour shall be applied again.
- Read command returns the list of modules with their severities.

Defined Values

<op> - string type: operation to be applied to log:

- “DISABLE”
- “ENABLE”
- “SET”
- “GET”

<module> - string type; module/sub-system name. N/A to
<op>=“DISABLE”/“ENABLE”:

- “INIT”
- “DEFAULT”
- “DEFATBIN”
- “LTEDRVFILE”
- “LTEDRVAT”
- “LTEDRVMAIN”
- “LTEDRVCTRL”
- “LTEDRVPACK”
- “ATSWITCH”
- “ATCLIENT”
- “LWIP”
- “PWRMNG”
- “SLPMNG”
- “SOCKSERVER”
- “TIMESTAMP”
- “TRAPPER”
- “ALTHHTPC”
- “ECM”
- “MODEMCOMMON”
- “MEMRTN”
- “HIFC”
- “FILEMNG”
- “TMRSVC”
- “JSON”
- “RADIOM”
- “FILESYSTEM”
- “SERIALFLASH”

- “ATAWS”
- “MQTT”

<severity> - string type; log severity value in higher to lower order. N/A to <op>= “DISABLE”/“ENABLE”:

- "EMRG"
- "ERROR"
- "WARN"
- "NOTICE"
- "INFO"
- "DEBUG"
- “PROLIX”

3.5.143 AT%HTTPCFG

Table 3-153 AT%HTTPCFG Command Syntax

| Command | Possible Response(s) |
|--|---|
| AT%HTTPCFG=<obj>,<profile_id>[,<param1>][,<param2>]... | OK or ERROR |
| AT%HTTPCFG? | ERROR (not supported) |
| AT%HTTPCFG=? | %HTTPCFG: (list of supported <cmd>s), (list of supported <profile_id>s) |

Description

- AT Command to configure connection parameters.
- To start new HTTP connection the “NODES” parameters shall be defined at least.
- Other configurations may be omitted, default settings are used:
 - If “TLS” layer is not configured, unsecured connection will be established by default. It will be considered as misconfiguration if “NODES” URL requires security (https), but “TLS” layer is not configured. Any data access via AT%HTTPCMD/READ/SEND will be rejected for such misconfiguration.
 - If “IP” layer is not configured, default PDN will be used.
 - If “TIMEOUT” parameters are not configured, default parameters will be selected.
- To make this omission confidentially working, it is strictly recommended to call “CLEAR” sub-command before entering new configuration for previously used <profile_id>.
- Profile ID parameter is introduced to handle multiple pre-defined HTTP configuration settings. The unique ID for multi-profile configuration is assigned by user and then used for all following

profile configurations via same AT%HTTPCFG, for data transfer and other operations (AT%HTTSEND, AT%HTTSEND, AT%HTTPCMD) and for events (AT%HTTPEV/%HTTPEVU).

Defined Values

<obj>:

- “NODES” – configure client & server nodes parameters.
- “TLS” – configure TLS layer security parameters.
- “IP” – configure IP layer parameters.
- “TIMEOUT” – configure timeouts: server and host (switch)
- “CLEAR” – clear all previous settings for specified <profile_id>

<profile_id> - integer type; default or previously assigned <profile_id>:

- 1-5 – multi-profile mode.

For “NODES”:

- <param1> - string type; URL or IP address.
- <param2> - string type; optional authentication user identification string for HTTP.
- <param3> - string type; optional authentication password for HTTP.

For “TLS”:

<param1> - string type; TLS authentication mode:

- 0 – mutual authentication (default)
- 1 – authenticate client side only
- 2 – authenticate server side only

<param2> - integer type; TLS predefined authentication context (profile) previously configured by AT%CERTCFG.

For “IP”:

- <param1> - integer type; Session ID – numeric PDN identification defined in APN table for specified PDN. If omitted default data PDN is used unless configured differently by AT%SETRROUTE.

For “TIMEOUT”:

<param1> - integer type; server response timeout. The default value is 120 sec (2 min). If server response is not arrived during this time, server timeout error will be reported via URC. Unit: seconds:

- 1 - 65535

3.5.144 AT%TIMEREV

Table 3-154 AT%TIMEREV Command Syntax

| Command | Possible Response(s) |
|-----------------------------|--|
| AT%TIMEREV=<ev_type>,<mode> | OK or ERROR |
| AT%TIMEREV? | ERROR (not supported) |
| AT%TIMEREV=? | OK |
| (unsolicited report) | % TIMEREV:<ev_type>,<status>[,<param1>[, < param2>]] |

Description

- This command is used to notify sensitive internal or host apps, about LTE timers start/stop operations, which may impact LTE connectivity. The reporting may be enabled/disabled per event type.
- The reporting for all event types is disabled by default at wakeup time.
- Read command is not supported

Defined Values

<ev_type>:

- “T3402” – T3402 timer status
- “ALL” – Enables/disables all event types. This event type cannot be sent in unsolicited reporting.

<mode>: status of unsolicited result response presentation:

- 0 - Disabled (default)
- 1 – Enabled

<status>: timer status change:

- 0 – Stop
- 1 – Start

For “T3402”:

<param1>: string format; PLMN encoded as <oper> parameter in numeric format as defined in AT+COPS

3.5.145 AT%STATEV

Table 3-155 AT%STATEV Command Syntax

| Command | Possible Response(s) |
|----------------------|---------------------------------------|
| AT%STATEV=<mode> | OK or ERROR |
| AT% STATEV? | ERROR (not supported) |
| AT% STATEV=? | %STATEV: (list of supported < mode>s) |
| (unsolicited report) | % STATEV: <event> |

- Description
 - This command is used to report events for different important state transitions and system occurrences.
 - The reporting is disabled by default at wakeup time.

Defined Values

<mode>: status of unsolicited result response presentation:

- 0 - Disabled (default)
- 1 – Enabled

<event>:

- 0 - Start Scan
- 1 - Fail Scan
- 2 - Enter Camped
- 3 - Connection Establishment
- 4 - Start Rescan
- 5 – Connected
- 6-99 – Reserved

3.5.146 AT%BANDCAP

Table 3-156 AT%BANDCAP Command Syntax

| Command | Possible Response(s) |
|--------------|--|
| AT%BANDCAP | %BANDCAP:band1[,band2[,band3[,band4[,band5]]]]] |
| AT%BANDCAP? | %BANDCAP:[band1[,band2[,band3[,band4[,band5]]]]] |
| AT%BANDCAP=? | OK |

Description

- This command returns the band(s) entered during production into the PHYBP file.
- The calibration process is intended to be executed at Production by the board vendor for these bands.

Defined Values

<band>:

- 0 - Indicated one-SKU multiband support; applicable only to ALT1250
- Band number in numeric value

Example

```
AT%BANDCAP
%BANDCAP:
3,38 OK
```

3.5.147 AT%**CUSTWA**

Table 3-157 AT%CUSTWA** Command Syntax**

| Command | Possible Response(s) |
|---|-----------------------|
| AT% CUSTWA =<cmd> [,<param1>[,<param2>[...]]] | OK or ERROR |
| AT% CUSTWA ? | ERROR (not supported) |
| AT% CUSTWA =? | OK |

Description

- This command is used for different customer one-shot workarounds or NW operator/vendor proprietary spec-incompliant changes in standard LTE behavior.
- Some sub-commands will be accepted only in non-operational modes CFUN=0/4, otherwise sub-commands will return an ERROR.
- Some sub-commands will be accepted only for special NW Operator IDs and/or Customer IDs configured in BSP. Otherwise, command will return an ERROR.
- Error conditions are clarified per sub-command.

Defined Values

<cmd>:

- "CREATE38" – Create band 38 PHYBP and FCF from band 41.
- Command returns OK if band41 BSP files are present, but band38 are missed.
- This command returns ERROR if there are no band41 in BSP, or band38 entities, already created.
- "CREATE41" – Creates band41 (with limited boundaries) PHYBP and FCF from band38.
- Returns OK if band38 BSP files are present, but band41 are missed.
- This command returns ERROR if there are no band38 in BSP, or band41 entities, already created.
- "SWIMSI" – Switches to special IMSI value. This command is accepted only in non-operational modes only for SKT NW operator.
- "DRX_USIM_DEACT" – Applies advanced eDRX policy to deactivate (switch off) the SIM in normal DRX (Idle paging) operations mode.
- "INTERSEARCHTH" – Applies different cell reselection criteria than defined in 3GPP.
- "EDRXUSIMACT" - Applies special eDRX USIM activation policy to keep USIM active/inactive in eDRX mode.

<param1>:

For "SWIMSI":

- 0 - Switch to standard IMSI
- 1 - Switch to special IMSI

For "DRX_USIM_DEACT":

- 0 – Disable feature
- 1 – Enable feature

For "LHGTIME":

- Guard time in microseconds

For "INTERSEARCHTH":

- 0 – Disable feature
- 1 – Enable feature

For "EDRXUSIMACT":

- 0 – Apply default SIM activation policy (as per SIM EF_AD setting) in eDRX mode
- 1 – Activate SIM in eDRX mode regardless of SIM settings
- 2 – Deactivate SIM in eDRX mode, regardless of SIM settings

<param2>:

For "INTERSEARCHTH":

- Min RSRP value in 1 dBm units

<param3>:

For "INTERSEARCHTH":

- Min RSRQ value in 1 dB units

Example

AT%CUSTWA="CREATE38" OK

3.5.148 AT%LWM2MCMD

Table 3-158 AT%LWM2MCMD Command Syntax

| Command | Possible Response(s) |
|--|--|
| AT%LWM2MCMD=<cmd>[,<param1>[,<param2>[,<param3>]]] | <p>For "SERVERSINFO", list of server details:</p> <ul style="list-style-type: none"> [%LWM2MCMD:<ServerUri>,<ServerID>,<Liftime>,<binding>,<ServerStat>[,<LastRegDate>][<CR><LF>%LWM2MCMD:<cmd>,<ServerUri>,<ServerID>,<Liftime>,<binding>,<ServerStat>[,<LastRegDate>] [...]]] <p>For "GET_RESOURCE", list of server details:</p> <p>%LWM2MCMD:<ObjectID>,<ObjectInstanceID>[,<ResourceID>[,<ResourceInstanceID>[,<val>]]]</p> <p>[<CR><LF>%LWM2MCMD:<ObjectID>,<ObjectInstanceID>[,<ResourceID>[,<ResourceInstanceID>[,<val>]]]]</p> <p>[...]</p> <p>For "DISCOVER", list of LWM2M client object(s), object instance(s) [and resource(s)]:</p> <p>[%LWM2MCMD: <res1>[,<res2>[...]]]</p> <p>For "PROGRESS", download progress:</p> <p>%LWM2MCMD: received=<CurDISize>,total=<TotalImgSize></p> <p>For "GET_FOTA_STATE":</p> <p>%LWM2MCMD: <FotaState></p> <p>For other commands:</p> <p>OK/ERROR</p> |
| AT%LWM2MCMD? | ERROR |
| AT%LWM2MCMD=? | OK |

Description

This command is used to control the LWM2M client. It's used by the FOTA manager.

Defined Values

<cmd>

- "REGISTER" – Application initiated command to register with the LWM2M server

<param1>: integer

- Short Server ID as defined in section 6.2 of [1], If this param is missing, operation will be done to all servers

<cmd>

- “DEREGISTER” - Application initiated command to de-register from the LWM2M server

<param1>: integer

- Short Server ID as defined in section 6.2 of [1], If this param is missing, operation will be done to all servers

<cmd>

- “REGISTERUPD” - Application initiated command to Re-register the LWM2M server

<param1>: integer

- Short Server ID as defined in section 6.2 of [1], If this param is missing, operation will be done to all servers

<cmd>:

- BOOTSTRAP – Initiate bootstrap procedure

<cmd>

- “UPDATEREP” – FOTA manager report of the update results

<param1>: string

- “SUCCESS”: Firmware updated successfully
- “FAIL” Firmware update failed

<param2>: integer. For <param1> = “FAIL”, provides FOTA Update Result (resource 5/0/5) as defined in section E.6 of [10].

<cmd>

- “DLRSP” - A command that answers to a request from the OMA-DM client to start/cancel/defer package download.

<param1>:

- “ACCEPT” – Accept the request to start package download
- “CANCEL” – Cancel the request to start package download

<param2>: integer. For <param1>=“CANCEL”. provides FOTA Update Result (resource 5/0/5) as defined in section E.6 of [10].

- “RESUME” – Resume download after internal download error (for example, out of coverage, reboot, etc..)

<cmd>

- “UPDRSP” - A command that answers to a request from the OMA-DM client to update the firmware with the downloaded package.

<param1>:

- “ACCEPT” – Accept the request to update the firmware
- “CANCEL” – Cancel the request to update the firmware

<param2>: integer. For <param1="CANCEL". provides FOTA Update Result (resource 5/0/5) as defined in section E.6 of [10].

<cmd>

- "SERVERSINFO" - A query for server information

<cmd>

- "SET_RESOURCE" – Sets the resource value to the LwM2M tree. This command, when executed on a multi resource instance, will generate an instance if one does not already exist. Note that this command can also write a single resource instance in a case of a multi-resource instance.
- "GET_RESOURCE" – Gets the resource value from the LwM2M tree. This can be a multiline reply (each describing a single resource value) when queried:
 - Object ID - Returns all the resource values of the object ID
 - Object-instances ID – Return all the resource values of that Object- instances ID
 - Resource ID – Returns all the multi-resource values of that Resource ID
- "DEL_RESOURCE_INSTANCE" – Deletes the specific resource instance of a multi-resource instance
- "EXE_RESOURCE" – Execute resource value to LwM2M tree
Note: All of the above operations cannot be done on a "host" related resource.

<param1>: integer

- See definition of <ObjectID>

<param2>: integer

- See definition of <ObjectInstanceID>

<param3>: integer

- See definition of <ResourceID>

<param4>: integer

- See definition of <ResourceInstanceID>

<param5>: string type

- See definition of <val>

<cmd>:

- "SETINSTANCES" – to update the list of object instances at run-time (currently limited to Host Objects). This command completely overrides previously defined object instance list.

<param1>: integer

- See definition of <ObjectID>
-

<param2>-<param...> - integer; optional parameters. If no <param2> at all, there won't be any instances of this object:

- See definition of <ObjectInstanceID>

<cmd>:

- “DISCOVER” – to discover object/object instances/object resources.

<param1> - string type; the path to the object or object instance tree to discover. Optional parameter.

- if path is missing, command reports the list of all discovered objects with their instance IDs
- if path is “/object”, command reports the list of all instance IDs located on the path
- if path is “/object/instance ID”, command reports the list of all resource IDs located on the path

<cmd>:

- “GET_FOTA_STATE” – return FOTA state:

<cmd>:

- “PROGRESS” – return download progress

<ServerUri>: string type:

- The Server URI as defined in 6.2 of [1]

<ServerID>: integer:

- The Server Short ID as defined in 6.2 of [1]

<Lifetime>: integer:

- The server registration period from the last registration date (in seconds).

<binding>: integer:

- 0 – Unknown
- 1 – UDP (U)
- 2 – UDP queue mode (UQ)
- 3 – SMS (S)
- 4 – SMS queue mode (SQ)
- 5 – UDP with SMS (US)
- 6 – UDP queue mode with SMS (UQS)

<ServerStat>: integer

- 0 - Not registered or bootstrap not started
- 1- Registration pending
- 2 - Successfully registered

- 3 - Last registration failed
- 4 - Registration update pending
- 5 - Deregistration pending
- 6 - Bootstrap hold off time
- 7 - Bootstrap request sent
- 8 - Bootstrap on going
- 9 - Bootstrap done
- 10 - Bootstrap failed

<LastRegDate>: integer

- The UTC time in 10msec units counted since 00:00:00 on 1 January, 1900.

<ObjectID>: integer

- Specifies the LWM2M Object ID

<ObjectInstanceID>: integer

- Specifies the LWM2M Instance ID of the object (optional parameter)

<ResourceID>: integer

- Specifies the LWM2M resource ID of the object instance (optional parameter)

<ResourceInstanceID>: integer

- Specifies the LWM2M resource Instance ID of the object instance (optional parameter)

<val>: string type

- Specifies the value of the resource (optional parameter)

| Type | Values |
|-----------------------|--|
| Boolean | "TRUE", "FALSE" |
| Integer/float/text | String within " " |
| Buffer (opaque field) | Data buffer delivered in chunks of 3000/1500 Bytes and formatted as a "HEX" string. |
| Object link | "object;object-instance" |
| "Observe" Event | "pmin={minimum period}&pmax={maximum period}>={greater than}<={less than}&st;={step}" All the parameters in the string are optional |

<res1>-<res...> - string type; shortened textual representation of the discovered LWM2M tree/sub-tree structure located on the path (<param1> of "DISCOVER"):

- if path is missing, <res...> params report the list of all discovered objects with their instance IDs in form of: "/object/instance ID"
- if path is "/object", <res...> params report the list of all instance IDs located on the path in form of: "/object/instance ID"

- if path is “/object/instance ID”, <res...> params report the list of all resource IDs located on the path in form of: “/object/instance ID/resource ID”

<CurDISize> - integer; currently downloaded size in bytes

<TotalImgSize> - integer; total image size in bytes

<FotaState> - integer:

- 0 - Idle
- 1 - Pending download
- 2 - During download
- 3 - Download failed
- 4 - Download completed
- 5 - Pending update
- 6 - Update confirmed

Examples:

1. Discover Object ID=16 structure (list of object instances):

```
AT%LWM2MCMD="DISCOVER", "/16"
%LWM2MCMD: "/16/0", "/16/1"
OK
```

2. Discover Object ID=2 structure, no instance is found for this object:

```
AT%LWM2MCMD="DISCOVER", "/2"
OK
```

3. Discover Object ID=3 structure, object is disabled:

```
AT%LWM2MCMD="DISCOVER", "/3"
ERROR
```

4. Discover Object ID=16 & Instance ID=0 structure (list of resources):

```
AT%LWM2MCMD="DISCOVER", "/3/0"
%LWM2MCMD: "/3/0/0", "/3/0/1", "/3/0/2", "/3/0/3", "/3/0/4", "/3/0/5",
"/3/0/6", "/3/0/10", "/3/0/11", "/3/0/12", "/3/0/13", "/3/0/14", "/3/0/16", "/3/0/17", "/3/0/18", "/3/0/19", "/3/0/21"
OK
```

5. Discover all existed Object IDs & Instance IDs:

```
AT%LWM2MCMD=="DISCOVER"
%LWM2MCMD: "/0/0", "/1/0", "/3/0", "/4/0", "/5/0", "/7/0", "/15/0", "/16/0", "/16/1"
OK
```

3.5.149 AT%LWM2MEV

Table 3-159 AT%LWM2MEV Command Syntax

| Command | Possible Response(s) |
|---------------------------|--|
| (unsolicited result code) | %LWM2MEV:<event>,[<package_size>],[<reserved>],[<package_name>],[<error_type>] |

Description

This unsolicited command notifies the host about the status of firmware upgrade. It also used to request the host confirmation to continue with the download/update process. %LWM2MEV URC is triggered by FOTA session.

Defined values

<mode> : a numeric parameter

- 0 – Disable unsolicited FOTA event indications
- 1 – Enable unsolicited FOTA event indications

<event> : a numeric parameter

- 0 – PENDING DOWNLOAD
- 1 – PENDING UPDATE
- 2 – DOWNLOAD COMPLETE
- 3 – DOWNLOAD FAILED
- 4 – FOTA CANCELLED BY LWM2M SERVER
- 5-99 - Reserved

<package_size>: decimal

- For PENDING DOWNLOAD:
 - The package size in bytes

<package_name>: string

- For PENDING DOWNLOAD:
 - The file name of download package
- For PENDING UPDATE:
 - The file name of update package

<error_type>: integer

- For DOWNLOAD FAILED
 - 0 – NON FATAL – can be resumed by sending AT%LWM2MCMD="RESUME"
 - 1 – FATAL (download resume is not possible, FOTA manager shall move to idle)

3.5.150 AT%LWM2MOPEV

Table 3-160 AT%LWM2MOPEV Command Syntax

| Command | Possible Response(s) |
|-----------------------------|---|
| AT%LWM2MOPEV=<mode>,<event> | OK/ERROR |
| AT%LWM2MOPEV? | ERROR (not supported) |
| AT%LWM2MOPEV=? | OK |
| (unsolicited result code) | %LWM2MEOPV: <event>[,<serverShortId>],[<ObjectID>],[<ObjectInstanceID>],[<ResourceID>],[<ResourceInstanceID>],[<val>],[<MsgId>]] |

Description

- This unsolicited command notifies the host about operations performed by the server on the LWM2M tree.

Notes:

- In both command and response, a parameter which is not specified will be written as ",,"
- URC will not notify about security object events.

Defined Values

<mode> - integer type:

- o 0 - Disable unsolicited "server operation" event indications
- o 1 - Enable unsolicited "server operation" event indications

<event> - integer type:

- o 0 - Write
- o 1 - Execute
- o 2 - Create (Currently not supported)
- o 3 - Delete (Currently not supported)
- o 4 - Write Attributes
- o 5 - Discover
- o 6 - Read
- o 7 - Observe
- o 8 - Cancel observation
- o 9 - Client is offline.
- o 10 - Client is online.
- o 11 - Client sent observation notification to a server.
- o 12 - Client received wakeup SMS.
- o 13 - Client received notification acknowledge.
- o 14 - Client ON: LMM2M client exits Client OFF state and tries to re-connect server due to explicitly AT Command registration request.
- o 15 - Client OFF: LWM2M client has exhausted server connection retries..
- o 14-99 - Reserved
- o 100-enable all notifications

<serverShortId> - integer type; short server ID:

- 0- 65535

<ObjectID> - integer type:

- Specifies the LWM2M Object ID

<ObjectInstanceID> - integer type:

- Specifies the LWM2M Instance ID of the object (Optional parameter)

<ResourceID> - integer type:

- Specifies the LWM2M resource ID of the object instance (Optional parameter)

<ResourceInstanceID>" - integer type:

- Specifies the LWM2M resource Instance ID of the object instance (Optional parameter)

<val>: string type:

- Specifies the value of the resource (Optional parameter)

| Type | Values |
|-----------------------|---|
| Boolean | "TRUE", "FALSE" |
| Integer/float/text | String within " " |
| Buffer (opaque field) | Data buffer delivered in chunks of 3000 Byte and formatted as "HEX" string. |
| Object link | "object;object-instance" |
| "Observe" Event | "pmin={minimum period}&pmax={maximum period}>={greater than}<={less than}&st={step}" All the parameter in the string are optional. |

<MsgId> - integer type; COAP message ID (for NOTIFY event)

- 0- 65535

Example

```
AT%LWM2MOPEV=1,0 //Enable notification for  
"Write" OK
```

```
%LWM2MOPEV=0,0,0,0,"coaps://183.25.34.22:81",//Notification on writing  
"security object" instance 0 resource 0
```

3.5.151 AT%PCOINFO

Table 3-161 AT%PCOINFO Command Syntax

| Command | Possible Response(s) |
|-------------------------|--|
| %PCOINFO=<mode>[,<cid>] | Mode 0,1: OK ERROR Mode 2: %PCOINFO:<mode>,<cid>[,<pcoid>[,<payload>]] OK ERROR Mode 3: %PCOINFO:<mode>,<cid>[,<pcoid>[,<payload>]] [<CR><LF>%PCOINFO: <cid>,<pcoid>,<payload>]...] OK ERROR |
| %PCOINFO? | %PCOINFO: <mode>,<cid>[,<pcoid>[,<payload>]] [<CR><LF>%PCOINFO: <cid>[,<pcoid>[,<payload>]]] ... |
| %PCOINFO=? | OK |
| (unsolicited report) | %PCOINFO:<cid>,<pcoid>[,<payload>] |

Description

- This command queries the modem to get the last PCO payload which was received.
- The command may be used also to set unsolicited indication for network unsolicited PCO indication. See 3GPP 24.008 section 10.5.6.3 for list of PCO's.
- For <mode>=2 and 3:
 - If result code is ERROR, this is because PCO request was not sent or because the modem still wait for PCO response (over ATTACH ACCEPT or over ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST)
 - If the received result code is <cid>, but without <pcoid> and without <payload> than consider it as network reply (ATTACH ACCEPT or ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST) without PCO.
- The "AT%PCOINFO?" command returns the list of pre-configured user PCO information for the active PDNs.
- The AT%PCOINFO command to disable/enable unsolicited indication (i.e. <mode>=0,1) shall not specify <cid> because the setting is applicable for all CIDs.
- The unsolicited indication mode (i.e. <mode>=0,1) is returned in all query commands.

Defined Values

<mode>: the mode of the command:

- 0 – disable unsolicited PCO notification
- 1 – enable unsolicited PCO notification for pre-configured user PCO
- 2 – query received pre-configured user PCO for specified cid
- 3 – query all received PCOs for specified cid

<cid>: The ID of the PDP context on which the PCO request was sent.

<pcoid>: The PCO container ID as defined in 3GPP 24.008 section 10.5.6.3"

3.5.151.1.1 Implementation Notes:

The <payload> parameter is implemented in hex format, but without quotes (""). The < payload > parameter is implemented in hex format, but without quotes ("").

Example

```
AT%PCOINFO: 2,1
```

```
%PCOINFO: 0,1,0010,0594 – where pcoid = 0x0010 (MTU size),  
payload=0x0594=1428
```

```
OK
```


3.5.152 AT%EXE

Table 3-162 AT%EXE Command Syntax

| Command | Possible Response(s) |
|--|-----------------------|
| AT%EXE=<script_name>[,<param1>[,<param2>]] | <output> OK/ERROR |
| AT%EXE? | ERROR (not supported) |
| AT%EXE=? | OK |

Description:

This command Executes script file in NP. The command is intended for Factory Production and Debug purposes only. It is strictly recommended to disable it for end user on commercial devices.

Defined values:

- <script_name> - Script file name to be executed. In case that the script is not located in one of the Linux search paths (\$PATH), the full script path must be provided.
- <param1> - First script parameter
- <param2> - Second script parameter
- <output> - Script output

Example:

AT%EXE= snapshot-control.sh,list

%EXE: Snapshot list:

snapshot_01 snapshot_05

OK

3.5.153 AT%AUTH

Table 3-163 AT%AUTH Command Syntax

| Command | Possible Response(s) |
|---------------------------------------|---|
| %AUTH=<logical_channel>,<autn>,<rand> | %AUTH :<status>[,<res>],[<ck>],[<ik>],[<auts>]] OK/ERROR |
| %AUTH? | ERROR (OPRATION_NOT_ALLOWED) |
| %AUTH=? | OK |

Description

This command intended to provide SIM authentication for host requests.

Defined Values

<logical_channel>:

- o 0-4. Value 0 is reserved for USIM always

<autn>:

- o 16 byte hexadecimal Authentication Token as per 33.102

<rand>

- 16 byte hexadecimal random input as per 33.102

<status> - command execution status:

- 0 - USIM Authentication Response success,
- 1 - USIM Authentication Response sync failure,
- 2 - USIM Authentication Response MAC failure,
- 3 - USIM Authentication Response non-EPS authentication unacceptable failure,
- 4 - USIM Authentication Response security context not supported

<xres>, <ck>, <ik> (expected response XRES, cipher key CK and integrity key IK):

- conditional hexadecimal params related to successful status

<auts> - synchronization failure parameter as per 33.102

Note: All hexadecimal parameters in this command are encoded without quotes ("").

Example

```
AT%AUTH=1,B756ABA9E30A0000483D44503EA5F239,66552797069527F4E46F0  
1FC12ACFA86
```

Status 0 - Success

```
%AUTH:0,43C60171,95A3004CA5AE4EBF5143B8EBD1AA15A6,CDA269152E176  
3A7805E393F5D2FA13A  
OK
```

Status 1 - Sync Failure

```
%AUTH : 1,,,,3FDD6C44FE9919A65CC4ACE757B3
```

Status 2 - Response MAC Failure

```
%AUTH : 2
```

Status 3 - Non-EPS Authentication Unacceptable Failure

```
%AUTH : 3
```

Status 4 - Security Context Not Supported

```
%AUTH : 4
```

3.5.154 **AT%USMSF**

Table 3-164 AT%USMSF Command Syntax

| Command | Possible Response(s) |
|--------------------|---------------------------------------|
| %USMSF=<smsformat> | OK/ERROR |
| %USMSF? | %USMSF: <smsformat> |
| %USMSF=? | %USMSF: List of supported <smsformat> |

Description

- This command is used to configure the format of the outgoing user SMS: 3GPP or 3GPP2. The new configuration is updated on the device NVM.

-
- The command has the following limitations:
 - It controls outgoing SMS transmissions and storage format: 3GPP or 3GPP2. Incoming SMS is supported with both 3GPP and 3GPP2 formats.
 - It has effect only when the user sends the SMS in text mode.
 - The command shall return an error when trying to configure the SMS format to 3GPP2 while the SMS is configured to be stored in UICC. The 3GPP2 configuration is applicable only to storage in the NP internal file system, or when an SMS is sent without storage.
 - The 3GPP2 configuration is applicable only for SMS over IMS. The command shall return an error when trying to configure the SMS format to 3GPP2 in SMS over SGs mode.

Defined Values

<smsformat>:

- "3GPP"
- "3GPP2"

4 CMEE Error Codes Supported

Table 8 describes the CMEE error codes supported by the ALT1250 system software solution per release.

4.1 Table 4-1. Error Codes Supported for CMEE Command in ALT1250 Software

Table 4-1 Error Codes Supported for CMEE Command in ALT1250 Software

| Error Code | | Supported by Altair | |
|------------|---|---------------------|--------|
| No. | Description | CMEE=1 | CMEE=2 |
| 3 | Operation not allowed | • | • |
| 4 | Operation not supported | • | • |
| 10 | SIM not inserted | • | • |
| 11 | SIM PIN required | • | • |
| 12 | SIM PUK required | • | • |
| 13 | SIM failure | • | • |
| 15 | SIM wrong | • | • |
| 16 | Incorrect password | • | • |
| 17 | SIM PIN2 required | | • |
| 18 | SIM PUK2 required | | • |
| 30 | No network service | • | • |
| 31 | Network timeout | • | • |
| 32 | Network not allowed– emergency calls only | • | • |
| 40 | Network personalization PIN required | • | • |
| 41 | Network personalization PUK required | • | • |
| 50 | Incorrect parameters | • | • |
| 100 | Unknown | • | • |

4.2 Extended Error Report

AT+CEER will always return the last error cause that was returned by the network. If no error cause was returned yet, the AT+CEER will return OK. If the error received by the network is different from the list below the returned error will be “others”.

AT+CEER will supply the error cause, if returned by the network in the following cases:

- Attach reject
- Service reject
- Tracking area update reject
- Dedicated bearer activation failure
- Dedicated bearer deactivation failure

4.3 Table 4-2 Extended Error Report

Table 4-2 Extended Error Report

| Error code | Send by |
|---|---------|
| IMSI_UNKNOWN_IN_HLR | EMM |
| ILLEGAL_UE | EMM |
| ILLEGAL_ME | EMM |
| EPS_SERVICES_NOT_ALLOWED | EMM |
| EPS_AND_NON_EPS_SERVICES_NOT_ALLOWED | EMM |
| UE_IDENTITY_CANNOT_BE_DERIVED_BY_THE_NETWORK | EMM |
| IMPLICITLY_DETACHED | EMM |
| PLMN_NOT_ALLOWED | EMM |
| TRACKING_AREA_NOT_ALLOWED | EMM |
| ROAMING_NOT_ALLOWED_IN_THIS_TRACKING_AREA | EMM |
| EPS_SERVICES_NOT_ALLOWED_IN_THIS_PLMN | EMM |
| NO_SUITABLE_CELLS_IN_TRACKING_AREA | EMM |
| MSC_TEMPORARILY_NOT_REACHABLE | EMM |
| NETWORK_FAILURE | EMM |
| CS_DOMAIN_NOT_AVAILABLE | EMM |
| MAC_FAILURE | EMM |
| SYNCH_FAILURE | EMM |
| CONGESTION | EMM |
| UE_SECURITY_CAPABILITIES_MISMATCH | EMM |
| SECURITY_MODE_REJECTED_UNSPECIFIED | EMM |
| NOT_AUTHORIZED_FOR_THIS_CSG | EMM |
| SEMANTICALLY_INCORRECT_MESSAGE | EMM |
| INVALID_MANDATORY_INFORMATION | EMM |
| MESSAGE_TYPE_NON_EXISTENT | EMM |
| MESSAGE_TYPE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE | EMM |
| INFORMATION_ELEMENT_NOT_EXISTENT | EMM |
| CONDITIONAL_IEI_ERROR | EMM |
| MESSAGE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE | EMM |
| PROTOCOL_ERROR_UNSPECIFIED | EMM |

| Error code | Send by |
|-----------------------------|---------|
| OPERATOR_DETERMINED_BARRING | ESM |
| INSUFFICIENT_RESOURCES | ESM |
| UNKNOWN_OR_MISSING_APN | ESM |

| | |
|--|-----|
| UNKNOWN_PDN_TYPE | ESM |
| USER_AUTHENTICATION_FAILED | ESM |
| ACTIVATION_REJECTED_BY_SERVING_GW_OR_PDN_GW | ESM |
| ACTIVATION_REJECTED_UNSPECIFIED | ESM |
| SERVICE_OPTION_NOT_SUPPORTED | ESM |
| REQUESTED_SERVICE_OPTION_NOT_SUBSCRIBED | ESM |
| SERVICE_OPTION_TEMPORARILY_OUT_OF_ORDER | ESM |
| PTI_ALREADY_IN_USE | ESM |
| REGULAR_DEACTIVATION | ESM |
| EPS_QoS_NOT_ACCEPTED | ESM |
| NETWORK_FAILURE | ESM |
| FEATURE_NOT_SUPPORTED | ESM |
| SEMANTIC_ERROR_IN_THE_TFT_OPERATION | ESM |
| SYNTACTICAL_ERROR_IN_THE_TFT_OPERATION | ESM |
| UNKNOWN_EPS_BEARER_CONTEXT | ESM |
| SEMANTIC_ERRORS_IN_PACKET_FILTERS | ESM |
| SYNTACTICAL_ERRORS_IN_PACKET_FILTERS | ESM |
| EPS_BEARER_CONTEXT_WITHOUT_TFT_ALREADY_ACTIVATED | ESM |
| PTI_MISMATCH | ESM |
| LAST_PDN_DISCONNECTION_NOT_ALLOWED | ESM |
| PDN_TYPE_IPV4_ONLY_ALLOWED | ESM |
| PDN_TYPE_IPV6_ONLY_ALLOWED | ESM |
| SINGLE_ADDRESS_BEARERS_ONLY_ALLOWED | ESM |
| ESM_INFORMATION_NOT_RECEIVED | ESM |
| PDN_CONNECTION_DOES_NOT_EXIST | ESM |
| MULTIPLE_PDN_CONNECTIONS_FOR_APN_NOT_ALLOWED | ESM |
| COLLISION_WITH_NETWORK_REQUEST | ESM |
| INVALID_PTI_VALUE | ESM |
| ESM_SEMANTICALLY_INCORRECT_MESSAGE | ESM |

| Error code | Send by |
|---|---------|
| ESM_INVALID_MANDATORY_INFORMATION | ESM |
| MESSAGE_TYPE_NON_EXISTENT_OR_NOT_IMPLEMENTED | ESM |
| MESSAGE_TYPE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE | ESM |

| | |
|---|-----|
| INFORMATION_ELEMENT_NON_EXISTENT_OR_NOT_IMPLEMENTED | ESM |
| CONDITIONAL_IE_ERROR | ESM |
| ESM_MESSAGE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE | ESM |
| ESM_PROTOCOL_ERROR_UNSPECIFIED | ESM |
| APN_RESTRICTION_VALUE_INCOMPATIBLE_WITH_ACTIVE_BEARER_CONTEXT | ESM |

4.4 Altair Proprietary Error Codes

The following error codes are returned by CME ERROR in addition to what is defined in 27.007 in sec. 9.2:

- 513: Bad Personalization File
- 514: Not camped on cell
- 515: PLMN busy
- 516: Invalid EARFCN

4.5 CMEE Error Codes Supported

The table below details the CMEE error codes supported by the ALT1250 system software solution, per release.

Table 4-3 Error Codes Supported for CMEE Command in ALT1250 Software

| Error Code | Supported by Altair | |
|--|---------------------|--------|
| | CMEE=1 | CMEE=2 |
| 3 Operation not allowed | • | • |
| 4 Operation not supported | • | • |
| 10 SIM not inserted | • | • |
| 11 SIM PIN required | • | • |
| 12 SIM PUK required | • | • |
| 13 SIM failure | • | • |
| 15 SIM wrong | • | • |
| 16 Incorrect password | • | • |
| 17 SIM PIN2 required | | • |
| 18 SIM PUK2 required | | • |
| 30 No network service | • | • |
| 31 Network timeout | • | • |
| 32 Network not allowed - emergency calls only | • | • |
| 40 Network personalisation PIN required | • | • |
| 41 Network personalisation PUK required | • | • |
| 50 Incorrect parameters | • | • |
| 100 Unknown | • | • |

4.6 Extended Error Report

AT+CEER will always return the last error cause that was returned by the network. If no error cause was returned yet, the AT+CEER will return OK. In case that the error received by the network is different from the list below the returned error will be "others".

In the following cases, AT+CEER will supply the error cause, if returned by the network:

- Attach reject
- Service reject
- Tracking area update reject
- Dedicated bearer activation failure
- Dedicated bearer deactivation failure

Table 4-4 Extended Error Report

| Error code | Send by |
|--|---------|
| IMSI_UNKNOWN_IN_HLR | EMM |
| ILLEGAL_UE | EMM |
| ILLEGAL_ME | EMM |
| EPS_SERVICES_NOT_ALLOWED | EMM |
| EPS_AND_NON_EPS_SERVICES_NOT_ALLOWED | EMM |
| UE_IDENTITY_CANNOT_BE_DERIVED_BY_THE_NETWORK | EMM |
| IMPLICITLY_DETACHED | EMM |
| PLMN_NOT_ALLOWED | EMM |
| TRACKING_AREA_NOT_ALLOWED | EMM |
| ROAMING_NOT_ALLOWED_IN_THIS_TRACKING_AREA | EMM |
| EPS_SERVICES_NOT_ALLOWED_IN_THIS_PLMN | EMM |
| NO_SUITABLE_CELLS_IN_TRACKING_AREA | EMM |
| MSC_TEMPORARILY_NOT_REACHABLE | EMM |
| NETWORK_FAILURE | EMM |
| CS_DOMAIN_NOT_AVAILABLE | EMM |
| MAC_FAILURE | EMM |
| SYNCH_FAILURE | EMM |
| CONGESTION | EMM |
| UE_SECURITY_CAPABILITIES_MISMATCH | EMM |
| SECURITY_MODE_REJECTED_UNSPECIFIED | EMM |
| NOT_AUTHORIZED_FOR_THIS_CSG | EMM |
| SEMANTICALLY_INCORRECT_MESSAGE | EMM |
| INVALID_MANDATORY_INFORMATION | EMM |
| MESSAGE_TYPE_NON_EXISTENT | EMM |

| Error code | Send by |
|--|---------|
| MESSAGE_TYPE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STAT | EMM |
| INFORMATION_ELEMENT_NOT_EXISTENT | EMM |
| CONDITIONAL_IEI_ERROR | EMM |
| MESSAGE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE | EMM |
| PROTOCOL_ERROR_UNSPECIFIED | EMM |
| OPERATOR_DETERMINED_BARRING | ESM |
| INSUFFICIENT_RESOURCES | ESM |
| UNKNOWN_OR_MISSING_APN | ESM |
| UNKNOWN_PDN_TYPE | ESM |
| USER_AUTHENTICATION_FAILED | ESM |
| ACTIVATION_REJECTED_BY_SERVING_GW_OR_PDN_GW | ESM |
| ACTIVATION_REJECTED_UNSPECIFIED | ESM |
| SERVICE_OPTION_NOT_SUPPORTED | ESM |
| REQUESTED_SERVICE_OPTION_NOT_SUBSCRIBED | ESM |
| SERVICE_OPTION_TEMPORARILY_OUT_OF_ORDER | ESM |
| PTI_ALREADY_IN_USE | ESM |
| REGULAR_DEACTIVATION | ESM |
| EPS_QoS_NOT_ACCEPTED | ESM |
| NETWORK_FAILURE | ESM |
| FEATURE_NOT_SUPPORTED | ESM |
| SEMANTIC_ERROR_IN_THE_TFT_OPERATION | ESM |
| SYNTACTICAL_ERROR_IN_THE_TFT_OPERATION | ESM |
| UNKNOWN_EPS_BEARER_CONTEXT | ESM |
| SEMANTIC_ERRORS_IN_PACKET_FILTERS | ESM |
| SYNTACTICAL_ERRORS_IN_PACKET_FILTERS | ESM |
| EPS_BEARER_CONTEXT_WITHOUT_TFT_ALREADY_ACTIVATED | ESM |
| PTI_MISMATCH | ESM |
| LAST_PDN_DISCONNECTION_NOT_ALLOWED | ESM |
| PDN_TYPE_IPV4_ONLY_ALLOWED | ESM |
| PDN_TYPE_IPV6_ONLY_ALLOWED | ESM |
| SINGLE_ADDRESS_BEARERS_ONLY_ALLOWED | ESM |

| Error code | Send by |
|---|---------|
| ESM_INFORMATION_NOT_RECEIVED | ESM |
| PDN_CONNECTION_DOES_NOT_EXIST | ESM |
| MULTIPLE_PDN_CONNECTIONS_FOR_APN_NOT_ALLOWED | ESM |
| COLLISION_WITH_NETWORK_REQUEST | ESM |
| INVALID_PTI_VALUE | ESM |
| ESM_SEMANTICALLY_INCORRECT_MESSAGE | ESM |
| ESM_INVALID_MANDATORY_INFORMATION | ESM |
| MESSAGE_TYPE_NON_EXISTENT_OR_NOT_IMPLEMENTED | ESM |
| MESSAGE_TYPE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE | ESM |
| INFORMATION_ELEMENT_NON_EXISTENT_OR_NOT_IMPLEMENTED | ESM |
| CONDITIONAL_IE_ERROR | ESM |
| ESM_MESSAGE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE | ESM |
| ESM_PROTOCOL_ERROR_UNSPECIFIED | ESM |
| APN_RESTRICTION_VALUE_INCOMPATIBLE_WITH_ACTIVE_EPS_BEARER_CONTEXT | ESM |

4.7 Altair Proprietary Error Codes

The following error codes are returned by CME ERROR in addition to what is defined in 27.007 in sec. 9.2:

- 513 - Bad Personalization File
- 514 - Not camped on cell
- 515 – PLMN busy
- 516 – Invalid EARFCN

5 AT Socket Application

5.1 AT Socket Overview

Socket service is controlled by using AT commands format. Socket service can be useful for an external host which doesn't support PPP client.

Note Prior to using this service, make sure the device is connected to an LTE network.

5.2 Socket States

The possible socket service states and transitions are described in Figure 1 below.

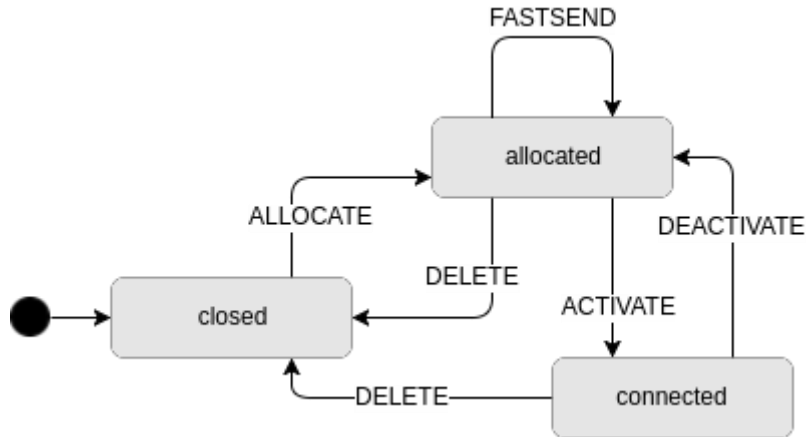


Figure 1: Socket Server – State Diagram

5.3 AT Commands

To allow AT socket service, the list of commands must be used. Detailed command explanations are contained in this guide.

5.4 Configuration

The default number of simultaneously running sockets is 4. Maximum value can be changed by using 'config -s sockserv.config.maxnum <val>' CLI command.

5.5 Examples

This chapter provides several examples of socket service usage.

5.5.1 Open Client Socket

5.5.1.1 UDP

This example accesses public UDP echo daemon.

To reproduce the example, please follow the process below:

1. AT%SOCKETCMD="ALLOCATE",0,"UDP","OPEN","140.112.148.237",7
%SOCKETCMD:1 OK
2. AT%SOCKETCMD="SETOPT",1,36000,1
OK
3. AT%SOCKETCMD="ACTIVATE",1
OK
4. AT%SOCKETDATA="SEND",1,13,"48656C6C6F2C20776F726C6421"
%SOCKETDATA:1,13
OK
%SOCKETEV:1,1
5. AT%SOCKETCMD="INFO",1
%SOCKETCMD:"ACTIVATED","UDP",,"140.112.148.238",50538,7
OK
6. AT%SOCKETDATA="RECEIVE",1,1500
%SOCKETDATA:1,13,0,"48656C6C6F2C20776F726C6421"
OK
7. AT%SOCKETCMD="DEACTIVATE",1
OK
8. AT%SOCKETCMD="DELETE",1
OK

A detailed process description can be found in the flow diagram below:

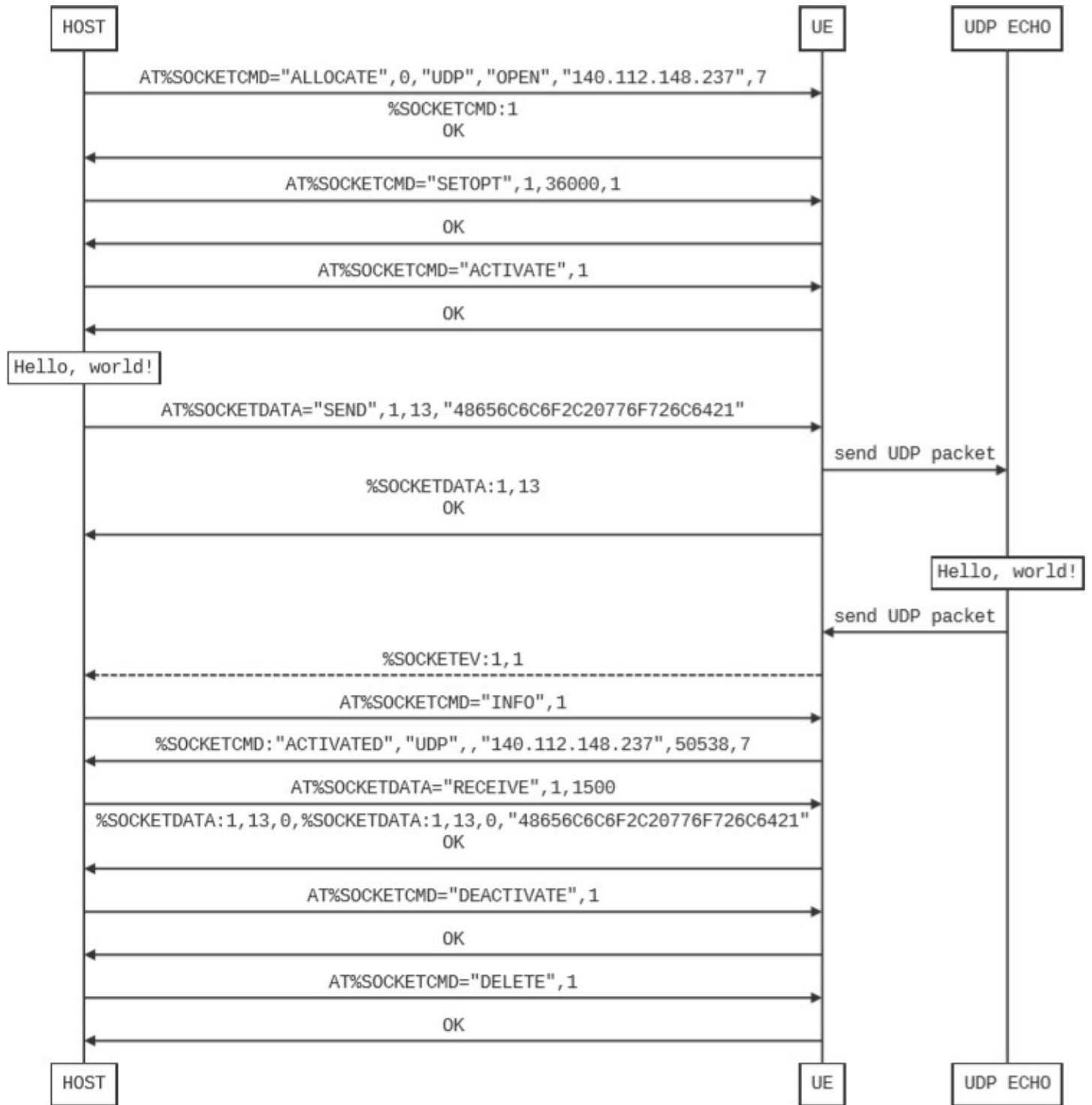


Figure 2: Open UDP Client Socket – Flow Diagram

5.5.1.2 TCP

This example requires current time from the 'nist' server.

To reproduce the example, please follow the process below:

1. AT%DNSRSLV=0,"time-c.nist.gov"
%DNSRSLV:0,"129.6.15.30"
OK
2. AT%SOCKETCMD="ALLOCATE",0,"TCP","OPEN","129.6.15.30",13
%SOCKETCMD:1
OK
3. AT%SOCKETCMD="ACTIVATE",1
OK

%SOCKETEV:1,1
4. AT%SOCKETDATA="RECEIVE",1,1500
%SOCKETDATA:5,51,0,"0A35383435362031382D31322D30342031323A32393A3
533203030203020302030203737322E3620555443284E49535429202A200A"
OK

%SOCKETEV:3,1
5. AT%SOCKETCMD="DELETE",1
OK

Note: To encode a received message, a linux machine must be used with the following command:

```
echo -en  
0A35383332392031382D30372D33302030343A32343A303120353020  
302030  
203332362E3720555443284E49535429202A200A | xxd -p -r
```

```
[labuser@localhost ~]$ echo -en 0A35383332392031382D30372D33302030343A32343A3031203530  
20302030203332362E3720555443284E49535429202A200A | xxd -p -r  
58329 18-07-30 04:24:01 50 0 0 326.7 UTC(NIST) *
```

A detailed process description can be found in flow diagram below:

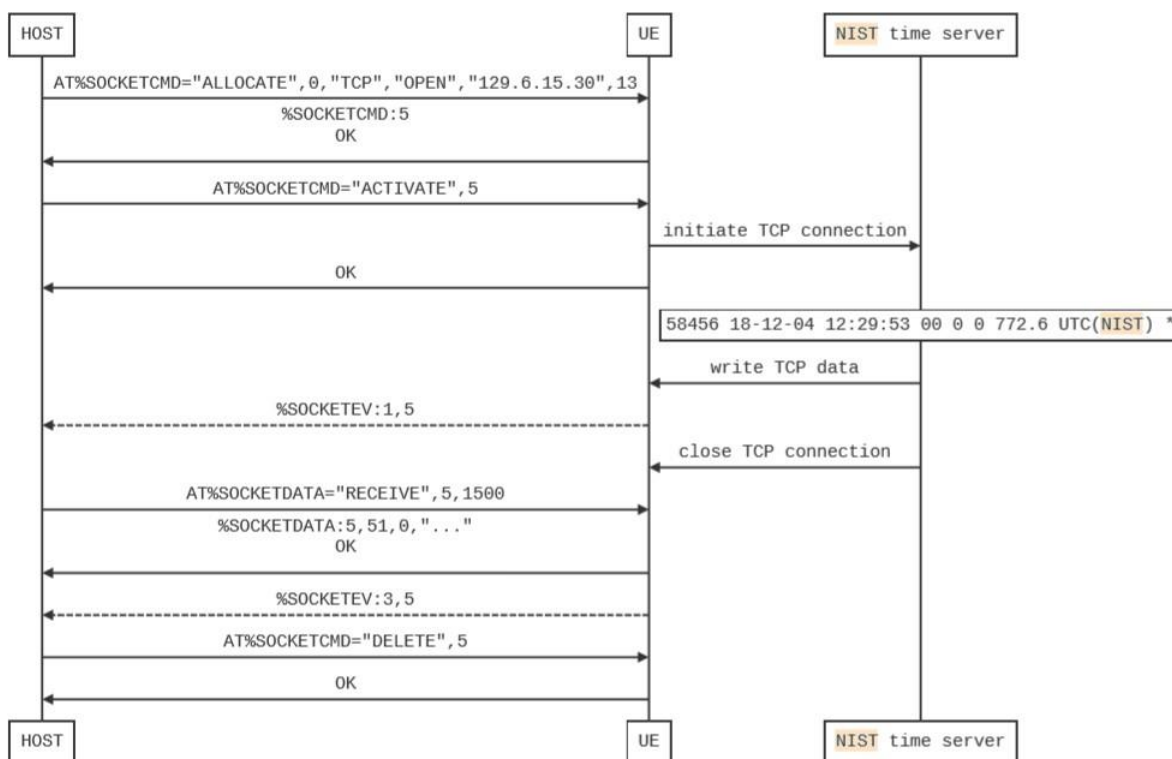


Figure 3: Open TCP Client Socket - Flow Diagram

5.6 Open Server Socket

5.6.1 UDP

This example shows how to open IPv4 and IPv6 UDP server for listening. To reproduce the IPv4 example, please run follow the process below:

1. it's required to specify IP type
AT%SOCKETCMD="ALLOCATE",0,"UDP","LISTEN",,,12345
%SOCKETCMD:1
OK
2. // activate UDP socket
AT%SOCKETCMD="ACTIVATE",1
OK
3. Send data from client - user must simulate data sending to the server via udp on port 12345, e.g.:
 1. Connect device to Callbox via LTE (Do ping to ensure the device is connected)
 2. Send to device UDP packet, e.g.:
 3. echo "hello" > /dev/udp/192.168.2.2/1234
 4. observe the response below:
4. data in socket 1 buffer
%SOCKETEV:1,1
5. AT%SOCKETCMD="INFO",1
%SOCKETCMD:"ACTIVATED","UDP",,,12345,
OK
6. read 1500 bytes (at most)
AT%SOCKETDATA="RECEIVE",1,1500
%SOCKETDATA:1,5,0,"68656C6C6F"
OK
7. AT%SOCKETCMD="DELETE",1
OK

A detailed process can be found in the flow diagram below.

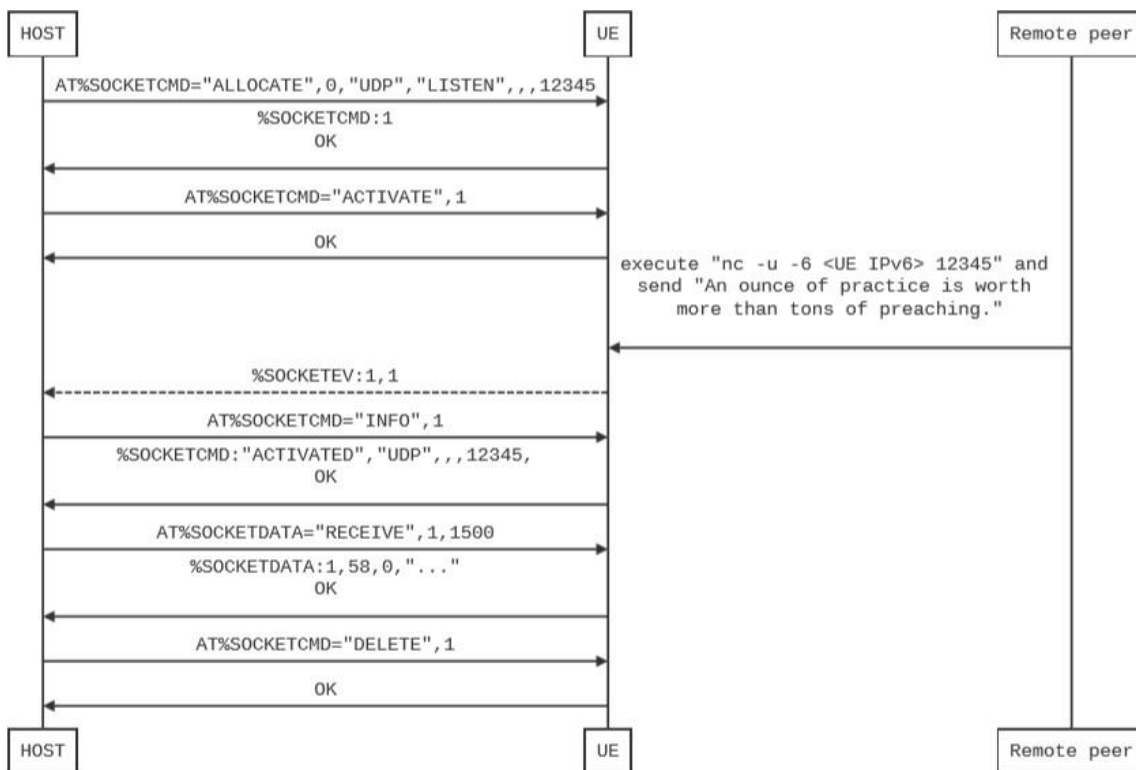


Figure 4: Open UDP Server Socket – Flow Diagram

5.6.2 TCP

This example shows how to open IPv4 and IPv6 TCP server for listening. To reproduce IPv4 example, follow the process below:

1. allocate a TCP IPv4 socket at port 9683 for accepting incoming connections (socket id 1 assigned)
AT%SOCKETCMD="ALLOCATE",0,"TCP","LISTENP","0.0.0.0",,9683,0
%SOCKETCMD:1
OK

Note:

For TCP IPv6 socket a command will be:

```
AT%SOCKETCMD="ALLOCATE",0,"TCP","LISTENP","::",,9683,0  
%SOCKETCMD:2 OK
```

2. activate TCP IPv4 listening socket
AT%SOCKETCMD="ACTIVATE",1
OK
3. Activate TCP IPv6 listening socket
AT%SOCKETCMD="ACTIVATE",2 OK
4. Connect device to Callbox via LTE (Do ping to ensure the device is connected)
OpenTCP packet, e.g.:
telnet 192.168.2.2 9683
Observe the response below:
5. TCP IPv4 incoming connection is accepted (socket id 3 assigned)
%SOCKETEV:4,1,3
6. Send data from open on client telnet (10 bytes),
e.g.: "hello"
Observe the response below:
data in socket 3 buffer
%SOCKETEV:1,3
7. Read 10 bytes (at most)
AT%SOCKETDATA="RECEIVE",3,10
8. 10 bytes read, no more data
%SOCKETDATA:3,10,0,"7F1DDC95DCE9B2E7FB80"
OK
9. Terminate telnet session on the client
Observe the answer below

Connection is remotely closed
%SOCKETEV:3,3

5.7 Open TLS Server

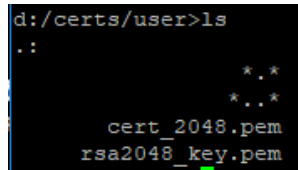
For this example, please put the following files on the device under the d:/certs/user location by using 'AT%CERTCMD' command (detailed command descriptions can be found in this guide):

Note: During the copy/paste process, do not copy the CR character.

```
AT%CERTCMD="WRITE", "cert_2048.pem", 0, "-----BEGIN CERTIFICATE-----
MIIDSjCCAjKgAwIBAgIJAiYltIQHBBG0MA0GCSqGSIb3DQEBCwUAMDoxCzAJBgNV
BAYTAKNBMQswCQYDVQQIDAJPTjEQAQA4GA1UEBwwHVGV9yb250bzEMMAoGA1UECgwD
RUZGMB4XDTE3MDUyOTA3NDIwMVVoXDTQ4MMDzMDA3NDIwMVVowOjELMAkGA1UEBhMC
Q0ExCzAJBgNVBAGMAk9OMRAwDgYDVQQHDAdU3JvbnRvMQwwCgYDVQQKDANFRkYw
ggEiMA0GCSqGSIb3DQEBAQUAA4IBDwAwggEKAoIBAQMlWIEcnHjL4FsJvxDP27G
yeqnXKc41HsRP9cv4z+NDjE94mDgva5ndieiA9xZ0Sh7LXtZcGDcpGop+D7s+oh0
apV6idIJ9eEPUegYlGxOFJQnZ8re6hd7MaAlNZEvhZrWjvRgy6rTFpi3DaNokGn7
r3s2nrQ9aziljkWRp1PnTBnRNgOdi3clIB2f4+2PdykjihxlnYUuI4Wf5QU5pFx6
0a2mdTVDC+bKAP22IvuQnnkHgJYYs/oMxFT9QR4xQRPOx7U2RWVrFDVMJ3mIB8F
OW6JXfQsmaZzr46xclbEIr4QQ6RcPWvcJ1cCVlidFjEmufi52sV7r1Bf3nCJfK1f
AgMBAAGjUzBRMB0GA1UdDgQWBBSdJ++M23AW3LkFD7LkhsH7gL6/2jAfBgNVHSME
GDAWgBSdJ++M23AW3LkFD7LkhsH7gL6/2jAPBgNVHRMBAf8EBTADAQH/MA0GCSqG
SIb3DQEBCwUAA4IBAQCv5kSt1HTFzUPdBvxT455YrLd3jIsRt1pRNUgJVaUYIRxh
vds8NN1Z8h/8Cdzz8NVkIdCuYb21FaDjs3zNVUQxCyVcH7xVyPwFI85NR27+HPRv
xzz2rwzST+NKYst6ZBg086BKjqFtxs16lpU/TD6tOJqg86TBbfP6gib/ocGeER2D
HEEik69FjmUCziT6uXyYW5y1Pxdl5UWO3RwTpao0vGtTPceTeuu005PVeCU1x8X
YXg9zoVWBba0GF+qQJ67zT5nvfc2KJcgnWRIRr/90YXzBf+FdFVuC4xPHINBI0J
5XBLJOv61Zu+Du/nmlBVcb8KL/Vd2oZyfoH+0oCN
-----END CERTIFICATE-----
```

```
AT%CERTCMD="WRITE", "rsa2048_key.pem", 1, "-----BEGIN PRIVATE KEY-----
MIIEvIBADANBgkqhkiG9w0BAQEFAASCBBKkwggSlAgEAAoIBAQMlWIEcnHjL4Fs
JvxDP27GyeqnXKc41HsRP9cv4z+NDjE94mDgva5ndieiA9xZ0Sh7LXtZcGDcpGop
+D7s+oh0apV6idIJ9eEPUegYlGxOFJQnZ8re6hd7MaAlNZEvhZrWjvRgy6rTFpi3
DaNokGn7r3s2nrQ9aziljkWRp1PnTBnRNgOdi3clIB2f4+2PdykjihxlnYUuI4Wf
5QU5pFx60a2mdTVDC+bKAP22IvuQnnkHgJYYs/oMxFT9QR4xQRPOx7U2RWVrFDV
MJ3mIB8FOW6JXfQsmaZzr46xclbEIr4QQ6RcPWvcJ1cCVlidFjEmufi52sV7r1Bf
3nCJfK1fAgMBAAGCgEAJkHbVntagfgd+cbZbXm2sIdKQGlwXk92/Zxd3tZMcuNY
rU+/C2bJ5uTEm+OR/V9f3FXlscagGde2t7ExFnJScSRAGCuFRxudMMI/wNvUvnpR
O9vN3HxrRo2rZqBkqHIzCR0d2Bxs/0cvGqTLZgsvWVKV4xM07TThcE7DtvsnGegRn
WFxfSrcRypkIvZobalHagvCiturBEa07R7mQp8kRhP9ZeRq3bZws9qBmqzj1cylG
q8QA4F0q7sK8P78bpIhrcOFBDar+Vr1ZGY6u01J0w13Mut16iIx4VCjQKt4NkzsK
dj2q+GAMwhReR2ZS42o8LiyGpwusj+dKIFfFekgK2QKBgQD4wmmRDgvt85brQTNF
Tkhui0eToz5oXt8mVDb58nwkpjFQOv87ZyNsEqm7S0t/3RtEViVio2aymTmsrz4
21vRq46dvhINQ3DoMok6xIcheOEgMeonOilkURWtrMjD/Kn297Asv7zOqI5BCNiP
3FFcRqf+CaqbhnOgMkcI5z6b7QKBgQDtm1otFFHyS7ctyLRuMeFyxWUSbWHvi8U
xjUW256c6wpQ2DBLSVB61VQjfrSjkZ5DJVFGnbw42HxSDafl1lmzTbY1vDbgtgLK
YiuVHG7OYZJTLaZoM68BseX4xHN8Fztnvvp1ttuk5oFb+vd8q6ODZSEawRd3PvtX
D7RtNouc+wKBgQDiwBWGTUF+gt18T5BGilbnvLlf0Btg06mgrH74UpnqZoqhEs6J
XKwPwZqSkfruxL4BdSBEH214QSiklgA+7uTBOBnlm42k3WaboQUJtn5eG5651AXV
/+Qe9vJFvwu56iObZKcIAZy9Qdn5YHDWoULgU99pZrJG1cWrrmilqvOc+QKBgQCB
iOslsly0N+926eJxzDn4qkjtJzh2+e1AfcjLWx0F4mEwroK/Ow5IvPVxmZE1NJ3B
baMBR9gwg1RfhhS+4gKG9NRsPuMJ7BZfd+LeH7AImEorU1RptAc1fGW0HqP+wchi
DU2I6pqhNBTMLG2myo2Sg93mce6y1sRFuEmh2EGPawKBgQC3uUEdjQekXaxXfYHi
1Dk3Ht1a9t8XwoCVRqicE7lqlwDts2y9lHAeUP7JNY8ZGNjx8srRZpkYVMztugo
Ecw26UA7FbNqJP5OPkGjfiFqtOq70h9vlfLdiAPmoqyOx//RkginXt9m5xcDzdzB
7EtBK59KSiQk8fHtooy7Ipiiw==
-----END PRIVATE KEY-----
```

To validate certification files loading, enter d:/certs/user folder and observe added files.

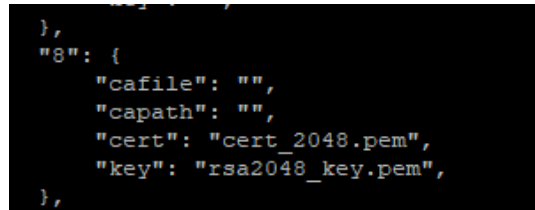


```
d:/certs/user>ls
.:
*.*
*.*
cert_2048.pem
rsa2048_key.pem
```

Figure 6: Loading Certification Files

Assignee added certification files to specific area in 'certprofile' configuration file that can be found under d:/config location: AT%CERTCFG="ADD",8,,,"cert_2048.pem","rsa2048_key.pem."

To validate correct certification assignment, use d:/config>cat certprofile and observe section 8.



```
},
"8": {
  "cafile": "",
  "capath": "",
  "cert": "cert_2048.pem",
  "key": "rsa2048_key.pem",
},
```

Figure 7: Certification Files Assignment

Following the steps listed above, use the following commands on the device and host:

1. Allocate a TCP IPv6 socket at port 23473 for accepting incoming connections (socket id 1 assigned) AT%SOCKETCMD="ALLOCATE",0,"TCP","LISTENP",":",,23473,0,
%SOCKETCMD:1 OK
2. Read socket info
AT%SOCKETCMD="INFO",1
%SOCKETCMD:"DEACTIVATED","TCP",,,23473,,2,60
OK
3. Enable TLS with configuration 8 in 'certprofile'
AT%SOCKETCMD="SSLALLOC",1,1,8
OK
4. Activate TLS IPv4 listening socket
AT%SOCKETCMD="ACTIVATE",1
OK
5. Read socket info
AT%SOCKETCMD="INFO",1
%SOCKETCMD:"LISTENING","TLS",,,23473,,2,60
OK
6. Open ssl client on the server (Host --> execute "openssl s_client -host >UE IP> -port 23473") and observe on the device the following prints:
%SOCKETEV:4,1,2
7. Send "hello" from server and observe the following print on the device.
%SOCKETEV:1,2
8. Read received data info
AT%SOCKETDATA="RECEIVE",2,4
%SOCKETDATA:2,4,2,"68656C6C"
OK

9. Read received data info


```
AT%SOCKETDATA="RECEIVE",2,4
%SOCKETDATA:2,2,0,"6F0A"
OK
```
10. Terminate the TLS session


```
AT%SOCKETCMD="DEACTIVATE",2
OK
```

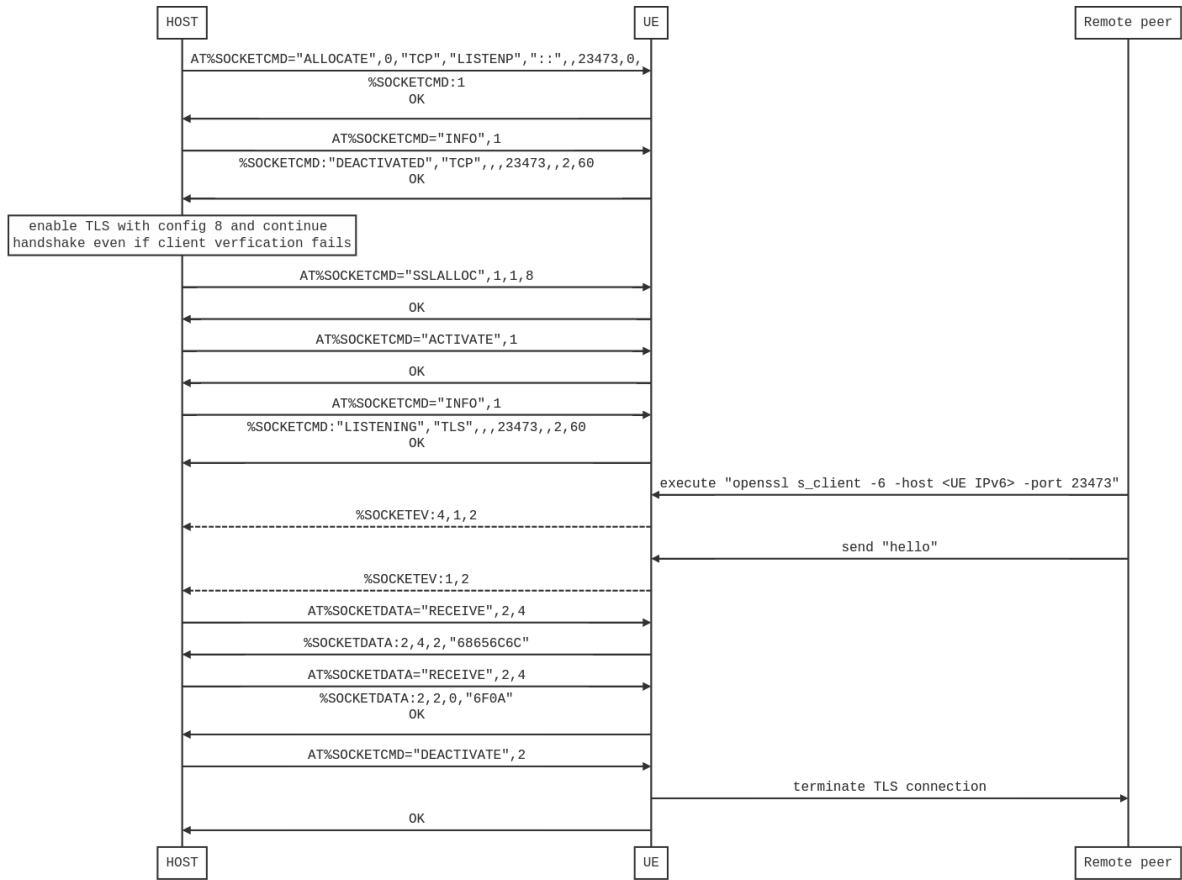


Figure 8: Open TLS Server Socket – Flow Diagram

6 AT Command References

6.1 Command Line General Format

6.1.1 Command Line Prefixes

6.1.1.1 Starting a Command Line – AT

AT The prefix AT, or at, is a two-character abbreviation (ATtention), always used to start a command line to be sent from TE to TA, with the only exception of AT#/prefix R

| AT - Starting A Command Line | | SELINT 2 |
|------------------------------|---|----------|
| AT | The prefix AT , or at , is a two-character abbreviation (ATtention), always used to start a command line to be sent from TE to TA, with the only exception of AT#/ prefix | |
| Reference | 3GPP TS 27.007 | |

7 AT Socket Overview

Socket service is controlled by using AT commands format. Socket service can be useful for an external host which doesn't support PPP client.

Note:

Prior to using this service, make sure the device is connected to an LTE network.

7.1 Socket States

The possible socket service states and transitions are described in Figure 1 below.

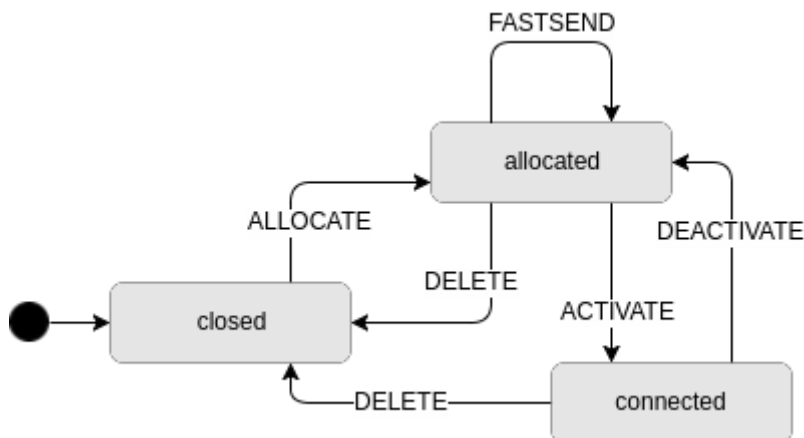


Figure 9 - Socket Server - State Diagram

7.2 AT Commands

To allow AT socket service, the list of commands must be used. For detailed command explanation, refer to Type 1SC AT Commands earlier in this document.

7.3 Configuration

The default number of simultaneously running sockets is 4. Maximum value can be changed by using 'config -s sockserv.config.maxnum <val>' CLI command.

8 Examples

This chapter provides several examples of socket service usage.

8.1 Open Client Socket

8.1.1 UDP

This example accesses public UDP echo daemon.

To reproduce the example, please follow the process below:

1. `AT%SOCKETCMD="ALLOCATE",0,"UDP","OPEN","140.112.148.237",7`
`%SOCKETCMD:1`
`OK`

8.1.1.1 `AT%SOCKETCMD="SETOPT",1,36000,1 OK`

```
AT%SOCKETCMD="ACTIVATE",1 OK
```

4. `AT%SOCKETDATA="SEND",1,13,"48656C6C6F2C20776F726C6421"`
`%SOCKETDATA:1,13`
`OK`

`%SOCKETEV:1,1`
5. `AT%SOCKETCMD="INFO",1`
`%SOCKETCMD:"ACTIVATED","UDP",,"140.112.148.238",50538,7`
`OK`
6. `AT%SOCKETDATA="RECEIVE",1,1500`
`%SOCKETDATA:1,13,0,"48656C6C6F2C20776F726C6421"`
`OK`
7. `AT%SOCKETCMD="DEACTIVATE",1 OK`
8. `AT%SOCKETCMD="DELETE",1 OK`

A detailed process description can be found in the flow diagram below:

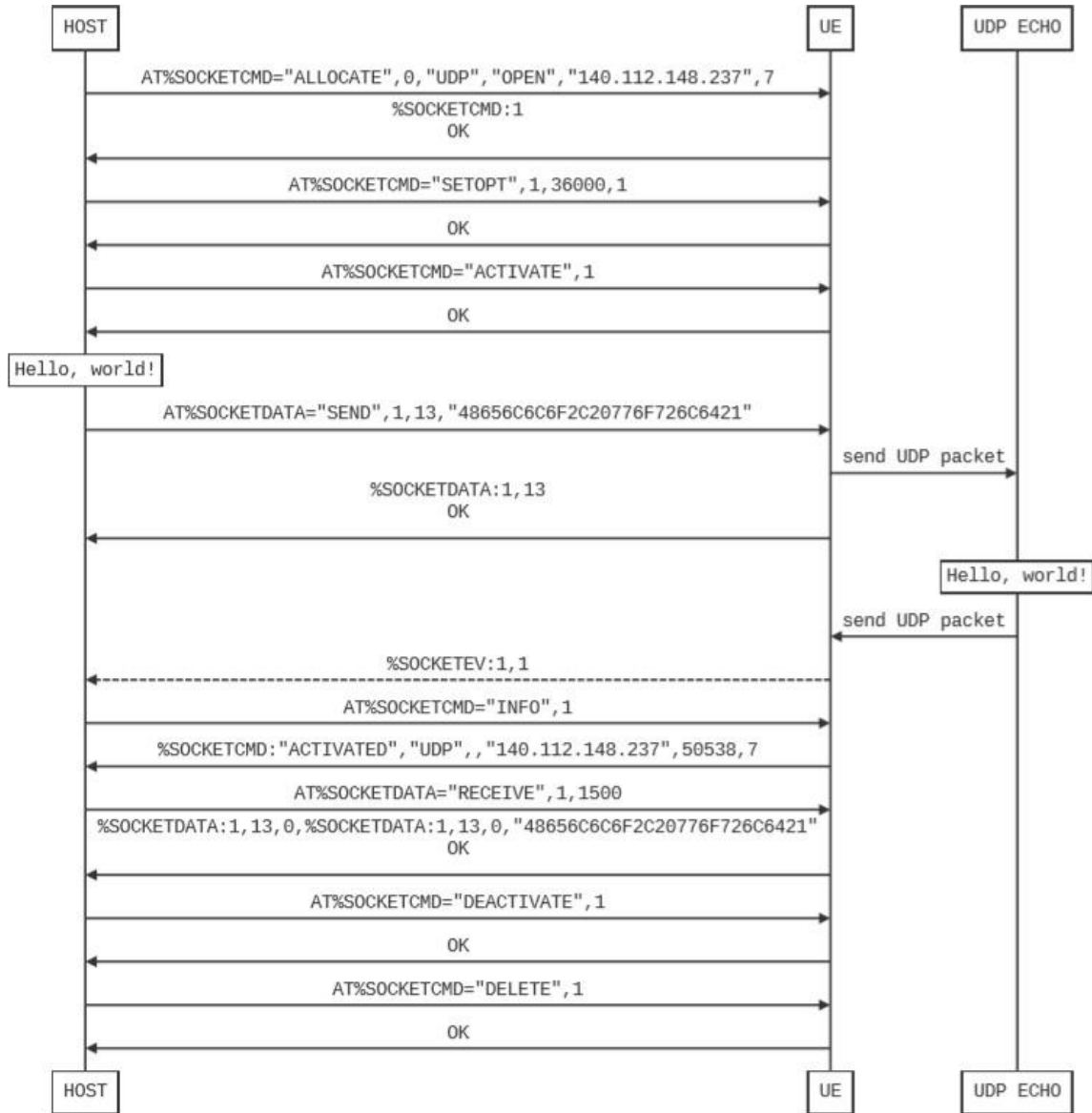


Figure 10 - Open UDP Client Socket - Flow Diagram

8.1.2 DTLS

The following example demos DTLS access to a public CoAP server - californium.eclipse.org. Prior using the example, relevant certifications must be installed on the device:

```
AT%CERTCMD="WRITE","californium_cert.pem",0,"-----BEGIN CERTIFICATE--
---
MIIB/jCCAaGgAwIBAgIESwtAUzAMBggqhkJOPQQDAgUAMFoxyDjAMBgNVBAMTBWNm
LWNhMRQwEgYDVQQLLEwtDYWxpZm9ybml1bTEUMBIGA1UEChMLRWNSaXBzZSBjb1Qx
DzANBgNVBACtBk90dGF3YTELMakGA1UEBhMCQ0EwHhcNMTgwNTE2MTQ0NjE2WhcN
MTkwNTE2MTQ0NjE2WjBeMRIwEAYDVQQDEw1jZi1jbGllbnQxFDASBgNVBAsTC0Nh
bGllb3JuaXVtMRQwEgYDVQKKEwtFY2xpcHN1IEl1vVDEPMA0GA1UEBxMGT3R0YXdh
MQswCQYDVQQGEwJDQTBZMBMGByqGSM49AgEGCCqGSM49AwEHA0IABOF+egd3Sue5
l10rusUGT5IaowJBxAoy6nwC5u+OycUPzcIWOpXGs1Kv/5K01IajjXJbUKC/clBX
0DlNThAtYGmjTzBNMB8GA1UdIwQYMBaAFJ5VgkCrbs17eXzWzLMV3HdZAlLlMASG
AlUdDwQEAwIHgDADBgNVHQ4EFgQUNfOfHdJPaERb+anqTJqE259vr8cwDAYIKoZI
zj0EAAwIFAANJADBGAIeA/jCvOVW0sPrVkhXu2iKvMUnyML2j0a2LJbCw47IWTTC
IQD2wlpwLVgKnZ7b8zQ9kqa+tRfTifikzMN4ilBvw7Q1IQ==
-----END CERTIFICATE-----
"
OK

AT%CERTCMD="WRITE","californium_key.pem",1,"-----BEGIN PRIVATE KEY-----
MEECAQAwEwYHkoZiZj0CAQYIKoZiZj0DAQcEJzAlAgEBBCADWJmvAFFlb08RmGcU
qwVvXfacrOX2Ykff4FE8l28Tnw==
-----END PRIVATE KEY-----
"
OK

AT%CERTCFG="ADD",9,,,"californium_cert.pem","californium_key.pem"
OK
```

Following the described above preparations, use the following commands on the device and the host to open the socket:

1. Get address
AT%DNSRSLV=1,"californium.eclipse.org"
%DNSRSLV:0,"104.196.15.150" OK
2. Allocate socket session
AT%SOCKETCMD="ALLOCATE",0,"UDP","OPEN","104.196.15.150",5684
%SOCKETCMD:1

OK
3. Set socket option
AT%SOCKETCMD="SETOPT",1,36000,1

OK
4. Add SSL for the specific socket

AT%SOCKETCMD="SSLALLOC",1,1,9

OK

5. Activate socket

AT%SOCKETCMD="ACTIVATE",1

OK

6. Send data

AT%SOCKETDATA="SEND",1,40,"46016BEC071121D88AF93D0A63616C69666F726E69756D2E65636C697073652E6F72678474657374" %SOCKETDATA:1,40 OK %SOCKETEV:1,1

7. Read data

AT%SOCKETDATA="RECEIVE",1,1500

%SOCKETDATA:1,72,0,"66456BEC071121D88AF9C0211EFF547970653A20302028434F4E290A436F64653A20312028474554290A4D49443A2032373632380A546F6B656E3A20303731313231443838414639","104.196.15.150",5684

OK

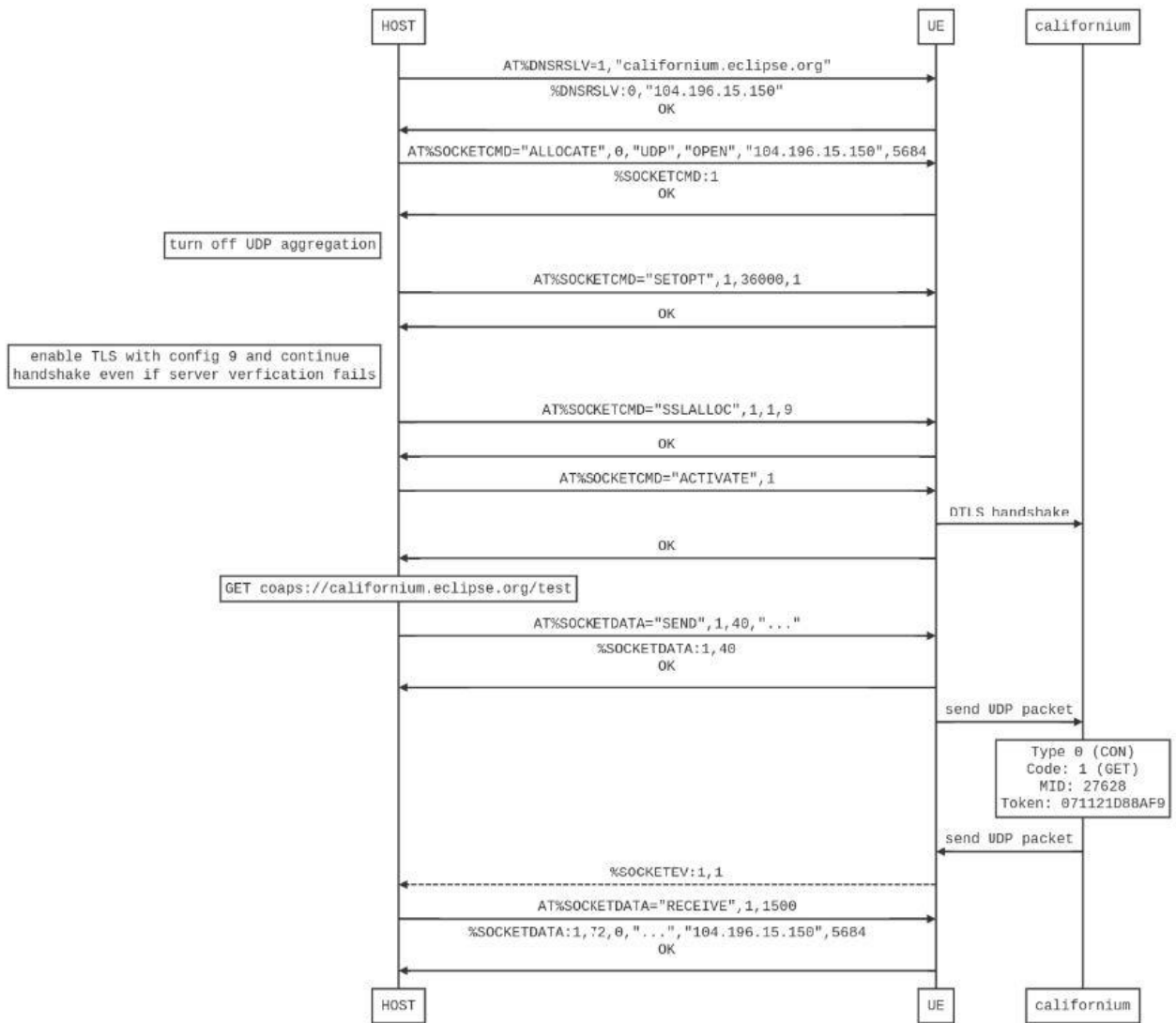


Figure 11 - DTLS Client Socket – Flow Diagram

8.1.3 TCP

8.1.3.1.1 This example requires current time from the 'nist' server.

8.1.3.1.1.2 To reproduce the example, please follow the process below:

1. `AT%DNSRSLV=0,"time-c.nist.gov"`
`%DNSRSLV:0,"129.6.15.30"`
OK
2. `AT%SOCKETCMD="ALLOCATE",0,"TCP","OPEN","129.6.15.30",13`
`%SOCKETCMD:1`
OK
3. `AT%SOCKETCMD="ACTIVATE",1` OK

`%SOCKETEV:1,1`
4. `AT%SOCKETDATA="RECEIVE",1,1500`
`%SOCKETDATA:5,51,0,"0A35383332392031382D31322D30342031323A32393A3`
`533203030203020302030203737322E3620555443284E49535429202A200A"`
OK

`%SOCKETEV:3,1`
5. `AT%SOCKETCMD="DELETE",1` OK

Note:

To encode received message, a Linux machine must be used with the following command:

```
echo -en 0A35383332392031382D30372D33302030343A32343A303120353020302030  
203332362E3720555443284E49535429202A200A | xxd -p -r
```

```
[labuser@localhost ~]$ echo -en 0A35383332392031382D30372D33302030343A32343A3031203530  
20302030203332362E3720555443284E49535429202A200A | xxd -p -r  
58329 18-07-30 04:24:01 50 0 0 326.7 UTC(NIST) *
```

A detailed process description can be found in flow diagram below:

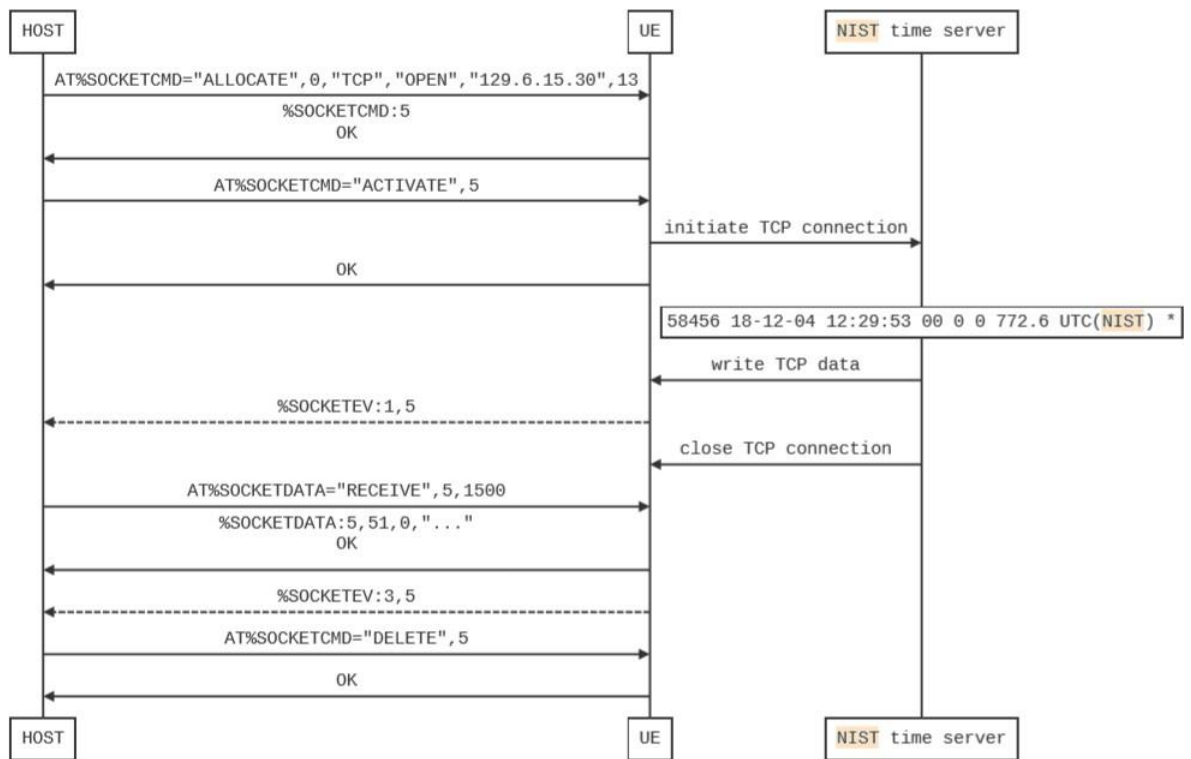


Figure 12 - TCP Client Socket - Flow Diagram

8.1.4 TLS

This example shows how to open IPv4 TLS client socket. Prior using this example relevant certifications must be installed on the device:

```
AT%CERTCMD="WRITE", "Baltimore_CyberTrust_Roo.crt", 0, "-----BEGIN
CERTIFICATE-----
MIIDdzCCAl+gAwIBAgIEAgAAuTANBgkqhkiG9w0BAQUFADBAMQswCQYDVQQGEwJJ
RTESMBAGA1UEChMJQmFsdGltb3JlMRMwEQYDVQQLEwplDeWJlclRydXN0MSIwIAYD
VQQUDEXlCYWx0aW1vcMUGQ3liZXJUCnVzdCBSb290MB4XDTAwMDUxMjE4NDYwMFoX
DTI1MDUxMjEzNTkwMFowWjELMAkGA1UEBhMCSUUEjAQBgNVBAoTCUJhbHRpbW9y
ZTETMBEGA1UECzMkQ3liZXJUCnVzdDEiMCAGA1UEAxMZQmFsdGltb3JlIEN5YmVy
VHJlc3QgUm9vdDCCASIdDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBAKMEuyKr
mD1X6CZymrV51Cni4eiVgLGw41uOKymaZN+hXe2wCQVt2yguzmKiYv60iNoS6zjr
IZ3AQSSBUUnuId9Mcyj8e6uYilagnnc+gRQKfRzMpijS3ljwumUNKoUMMO6vWvRjYeK
mpYcqWe4PwzV9/lSEy/CG9VwcPCPwBLKSua4dnKM3p31vjjsuffoREJIE9LAWqSu
XmD+tqYF/LTdB1kClFkYmGP1pWPgkAx9XbIGevOF6uvUA65ehD5f/xXtabz50TZy
dc93Uk3zyZAsuT3lySNTPx8kmCFcB5kpvcY67Oduhjprl3RjM71oGDHweI12v/ye
jl0qhqdNkNwnGjkCAwEAAaNFMEMwHQYDVR0OBBYEFOWdWTCCR1jMrPoIVDaGezq1
BE3wMBIGA1UdEwEB/wQIMAYBAf8CAQMwDgYDVR0PAQH/BAQDAgEGMA0GCSqGSIb3
DQEBBQUAA4IBAQCFFDF2O5G9RaEIFoN27TyclhAO992T9Ldcw46QQF+vaKSm2eT92
9hkTI7gQCvlyPnRhcL0EYWoSihfVcR3FvDB81ukMJY2GQE/szKN+OMY3EU/t3Wgx
jkzSswF07r51XgdIGn9w/xZchMB5hbgF/X++ZRGjD8ActPhSNzke1akxehi/oCr0
Epn3o0WC4zxe9Z2etciefC7IpJ50CBRLbflwbWsaY71k5h+3zvDyny67G7fyUIhz
ksLi4xaNmjICq44Y3ekQEe5+NauQrz4wlHrQMz2nZQ/1/I6eYs9HRCwBXbsdtTLS
R9I4LtD+gdwyah617jzV/OeBHRnDJELqYZmp
-----END CERTIFICATE-----
```

"

```
AT%CERTCFG="ADD", 3, "Baltimore_CyberTrust_Roo.crt"
```

OK

After the credentials installation (two commands above), follow the socket will be activated by using the process described below:

1. Get httpstat.us IP by using DNS service.

```
AT%DNSRSLV=1, "httpstat.us"
%DNSRSLV:0, "23.99.0.12"
```

OK

2. Allocate a TCP IPv4 socket

```
AT%SOCKETCMD="ALLOCATE", 0, "TCP", "OPEN", "23.99.0.12", 443
%SOCKETCMD:1
```

OK

3. Enable TLS

```
AT%SOCKETCMD="SSLALLOC", 1, 0, 3
```

OK

4. Activate client socket

```
AT%SOCKETCMD="ACTIVATE", 1
```

OK

```
5. Send data to server
  AT%SOCKETDATA="SEND",1,40,"474554202F34313820485454502F312E310D0A48
  6F73743A2068747470737461742E75730D0A0D0A"
%SOCKETDATA:1,40
```

OK

```
6. Read received data from socket
  AT%SOCKETDATA="RECEIVE",1,1500
%SOCKETDATA:1,372,0,"485454502F312E31203431382049276D20612074656170
6F740D0A43616368652D436F6E74726F6C3A20707269766174650D0A53657276657
23A204D6963726F736F66742D4949532F31302E300D0A582D4173704E65744D7663
2D56657273696F6E3A20352E310D0A4163636573732D436F6E74726F6C2D416C6C6
F772D4F726967696E3A202A0D0A582D4173704E65742D56657273696F6E3A20342E
302E33303331390D0A582D506F77657265642D42793A204153502E4E45540D0A536
5742D436F6F6B69653A20415252416666696E6974793D3737633437376533653634
3936343365353737313837336531613133313739666230303938336263373363373
1653139366266323539363766643435336466393B506174683D2F3B487474704F6E
6C793B446F6D61696E3D68747470737461742E75730D0A446174653A205468752C2
03234204A616E20323031392030383A33363A303720474D540D0A436F6E74656E74
2D4C656E6774683A20300D0A0D0A"
OK
```

```
7. Delete socket AT%SOCKETCMD="DELETE",1
OK
```

Note:

```
Response after HEX-to-ASCII conversion:
HTTP/1.1 418 I'm a teapot
Cache-Control: private
Server: Microsoft-IIS/10.0
X-AspNetMvc-Version: 5.1
Access-Control-Allow-Origin:
* X-AspNet-Version: 4.0.30319
X-Powered-By: ASP.NET
Set-Cookie:
ARRAffinity=77c477e3e649643e5771873e1a13179fb00983bc73c71e196bf259
67fd453df9;Path=/;HttpOnly;Domain=httpstat.us
Date: Thu, 24 Jan 2019 08:36:07 GMT
Content-Length: 0
```

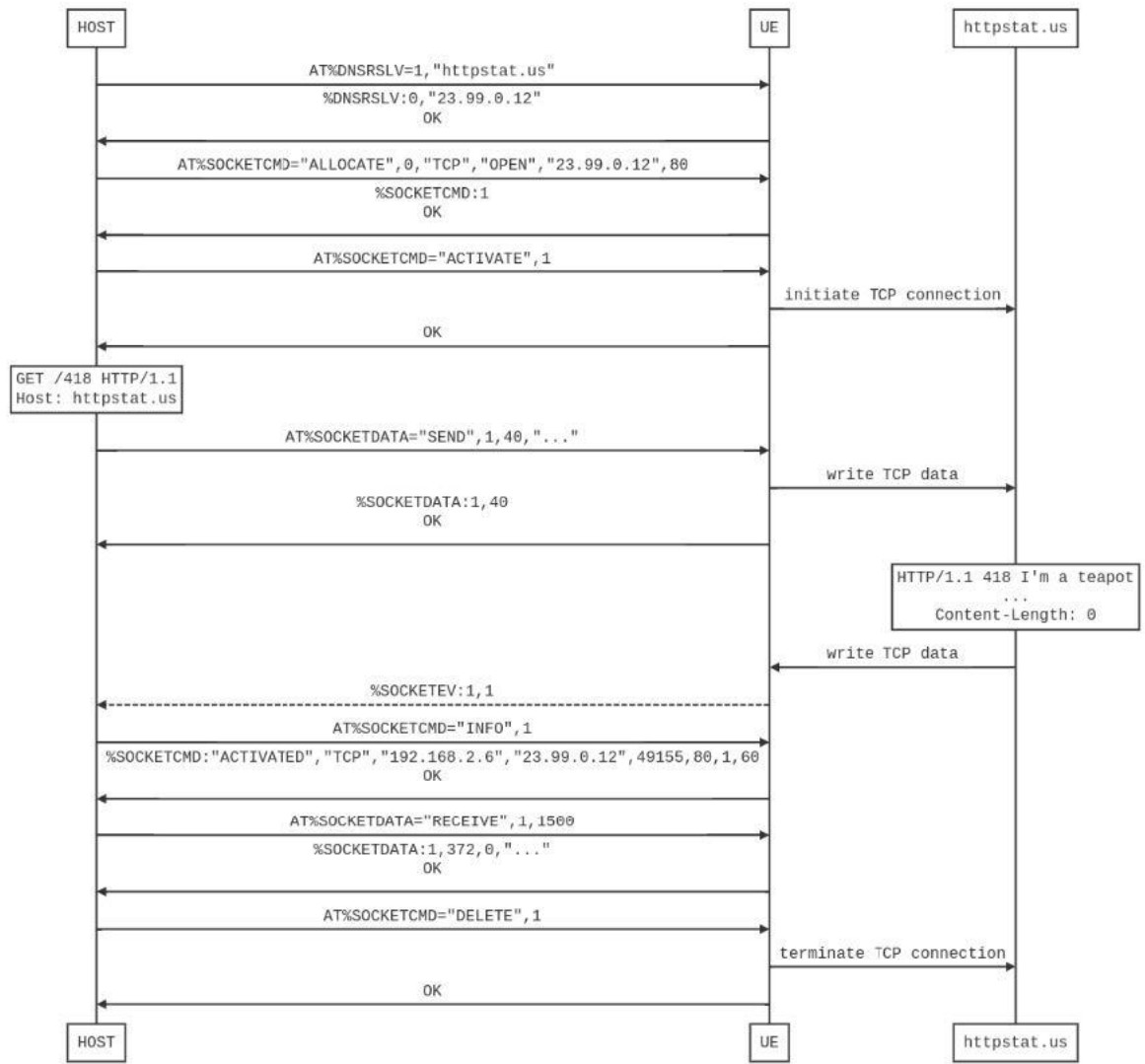


Figure 13 - TLS Client Socket Flow Diagram

8.2 Open Server Socket

8.2.1 UDP

This example shows how to open IPv4 and IPv6 UDP server for listening. To reproduce the IPv4 example, please run follow the process below:

it's required to specify IP type

```
AT%SOCKETCMD="ALLOCATE",0,"UDP","LISTEN",,,12345
```

```
%SOCKETCMD:1 OK
```

```
// activate UDP socket AT%SOCKETCMD="ACTIVATE",1 OK
```

Send data from client – user must simulate data sending to the server via udp on port 12345, e.g.:

Connect device to Callbox via LTE (Do ping to ensure the device is connected)

Send to device UDP packet, e.g.:

3. echo “hello” > /dev/udp/192.168.2.2/1234

4. observe the response below:

data in socket 1 buffer

```
%SOCKETEV:1,1
```

```
AT%SOCKETCMD="INFO",1
```

```
%SOCKETCMD:"ACTIVATED","UDP",,,12345, OK
```

read 1500 bytes (at most)

```
AT%SOCKETDATA="RECEIVE",1,1500
```

```
%SOCKETDATA:1,5,0,"68656C6C66" OK
```

```
AT%SOCKETCMD="DELETE",1 OK
```

A detailed process description can be found in flow diagram below:

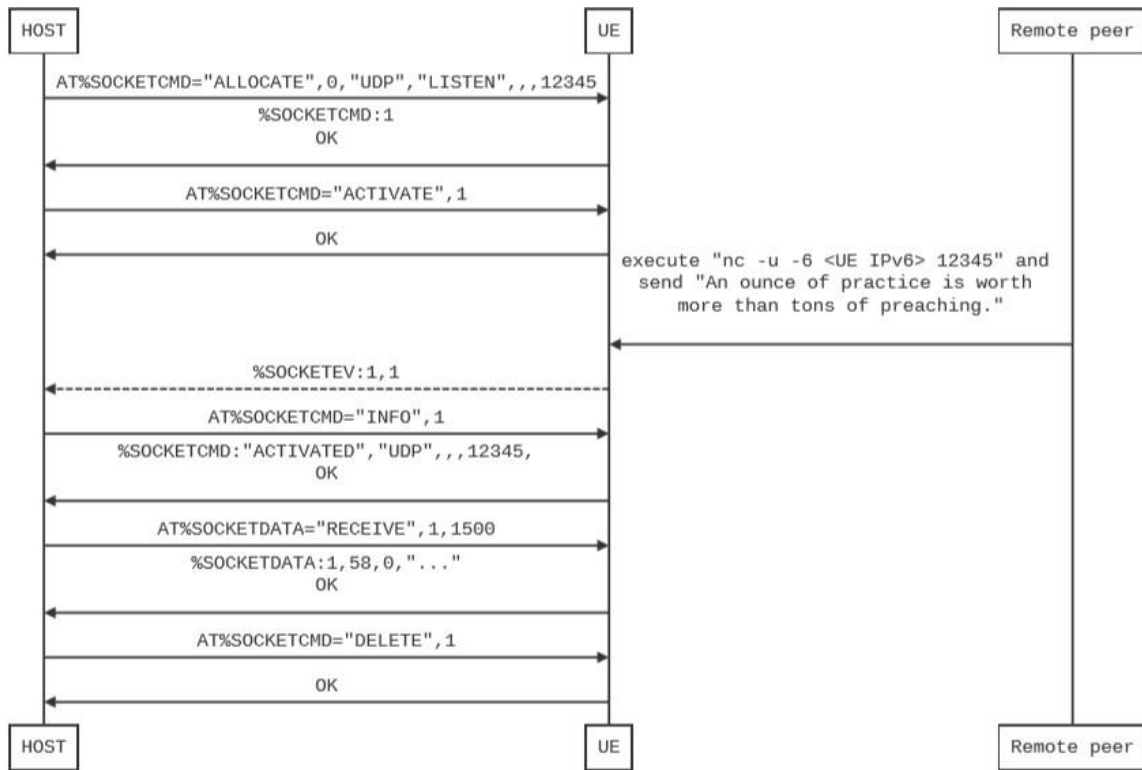


Figure 14 - Open UDP Server Socket – Flow Diagram

8.2.2 DTLS

The following example shows how to setup IPv4/IPv6 DTLS server and use openssl s_client utility to send a message to UE.

Here is the AT command sequence:

```
1. Allocate a UDP socket (socket id 1 assigned)
   AT%SOCKETCMD="ALLOCATE",1,"UDP","LISTEN","0.0.0.0",,17559,0,
   %SOCKETCMD:1

OK

2. Turn off UDP aggregation
   AT%SOCKETCMD="SETOPT",1,36000,1

OK

3. Return socket info
   AT%SOCKETCMD="INFO",1
   %SOCKETCMD:"DEACTIVATED","UDP",,,17559,

OK

4. Add SSL for specific socket
   AT%SOCKETCMD="SSLALLOC",1,1,8

OK

5. Return socket info
   AT%SOCKETCMD="INFO",1
   %SOCKETCMD:"DEACTIVATED","DTLS",,,17559,

OK

6. Activate DTLS socket
   AT%SOCKETCMD="ACTIVATE",1
   OK

7. Return socket info
   AT%SOCKETCMD="INFO",1
   %SOCKETCMD:"ACTIVATED","DTLS","192.168.2.6","192.168.2.1",17559,561
04

OK

8. Received data in socket 1 buffer
   %SOCKETEV:1,1

9. Read received data
   AT%SOCKETDATA="RECEIVE",1,1500
   %SOCKETDATA:1,4,0,"5E5F5E0A","192.168.2.1",56104

OK

10. Deactivate socket
    AT%SOCKETCMD="DEACTIVATE",1

OK
```

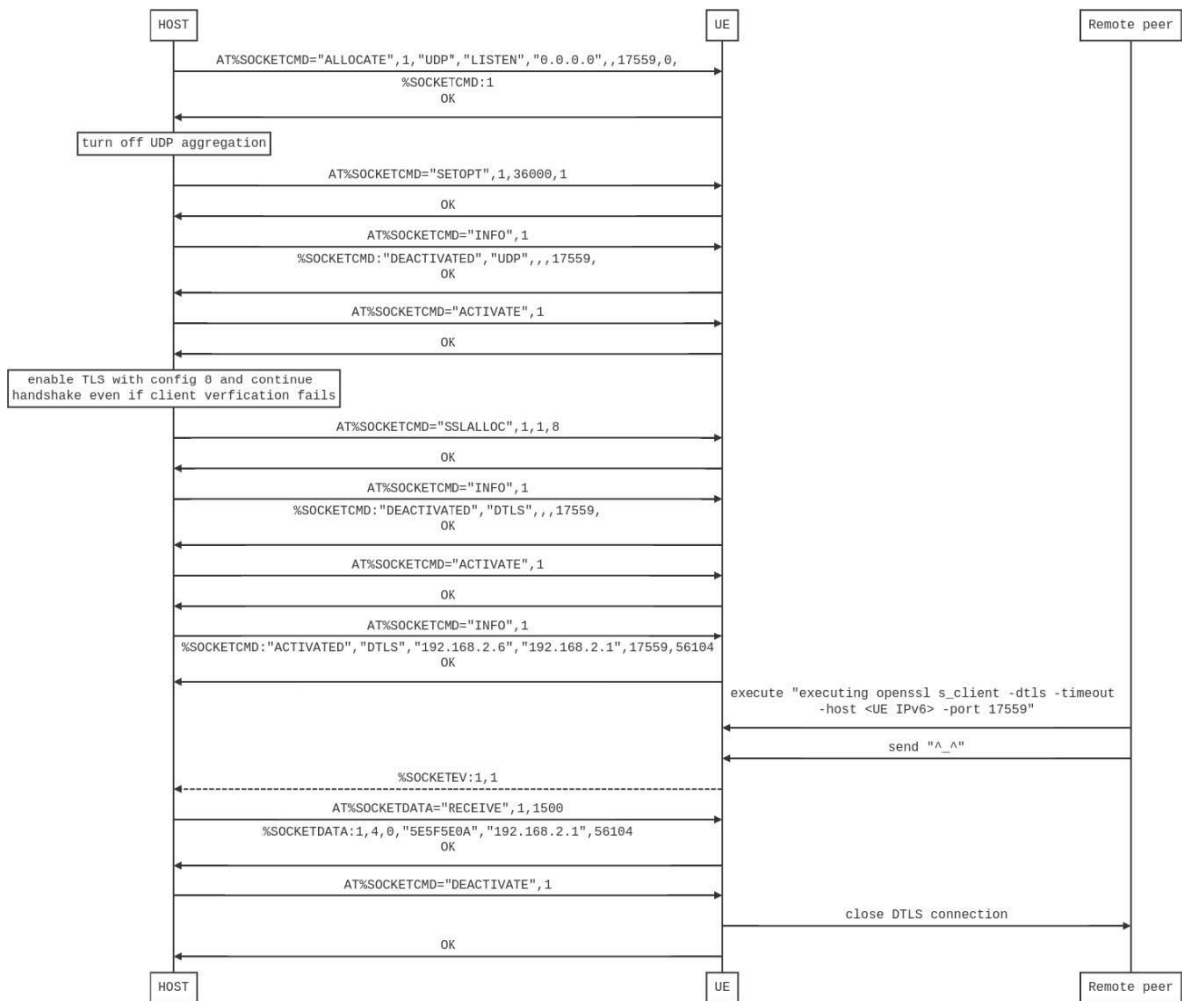


Figure 15- DTLS Server Socket – Flow Diagram

8.2.3 TCP

This example shows how to open IPv4 and IPv6 TCP server for listening. To reproduce IPv4 example, follow the process below:

5. allocate a TCP IPv4 socket at port 9683 for accepting incoming connections (socket id 1 assigned)

```
AT%SOCKETCMD="ALLOCATE",0,"TCP","LISTENP","0.0.0.0",9683,0
%SOCKETCMD:1
OK
```

Note:

For TCP IPv6 socket a command will be:

```
AT%SOCKETCMD="ALLOCATE",0,"TCP","LISTENP","::",9683,0
%SOCKETCMD:2
OK
```

6. activate TCP IPv4 listening socket

```
AT%SOCKETCMD="ACTIVATE",1
OK
```

7. Activate TCP IPv6 listening socket

```
AT%SOCKETCMD="ACTIVATE",2
OK
```

8. Connect device to Callbox via LTE (Do ping to ensure the device is connected)

OpenTCP packet, e.g.:
telnet 192.168.2.2 9683

Observe the response below:

9. TCP IPv4 incoming connection is accepted (socket id 3 assigned)

```
%SOCKETEV:4,1,3
```

10. Send data from open on client telnet (10 bytes), e.g.: "hello"

Observe the response below:

data in socket 3 buffer

```
%SOCKETEV:1,3
```

11. Read 10 bytes (at most)

```
AT%SOCKETDATA="RECEIVE",3,10
```

12. 10 bytes read, no more data

```
%SOCKETDATA:3,10,0,"7F1DDC95DCE9B2E7FB80"
```

```
OK
```

13. Terminate telnet session on the client Observe the answer below

Connection is remotely closed

```
%SOCKETEV:3,3
```


A detailed process description can be found in the flow diagram below:

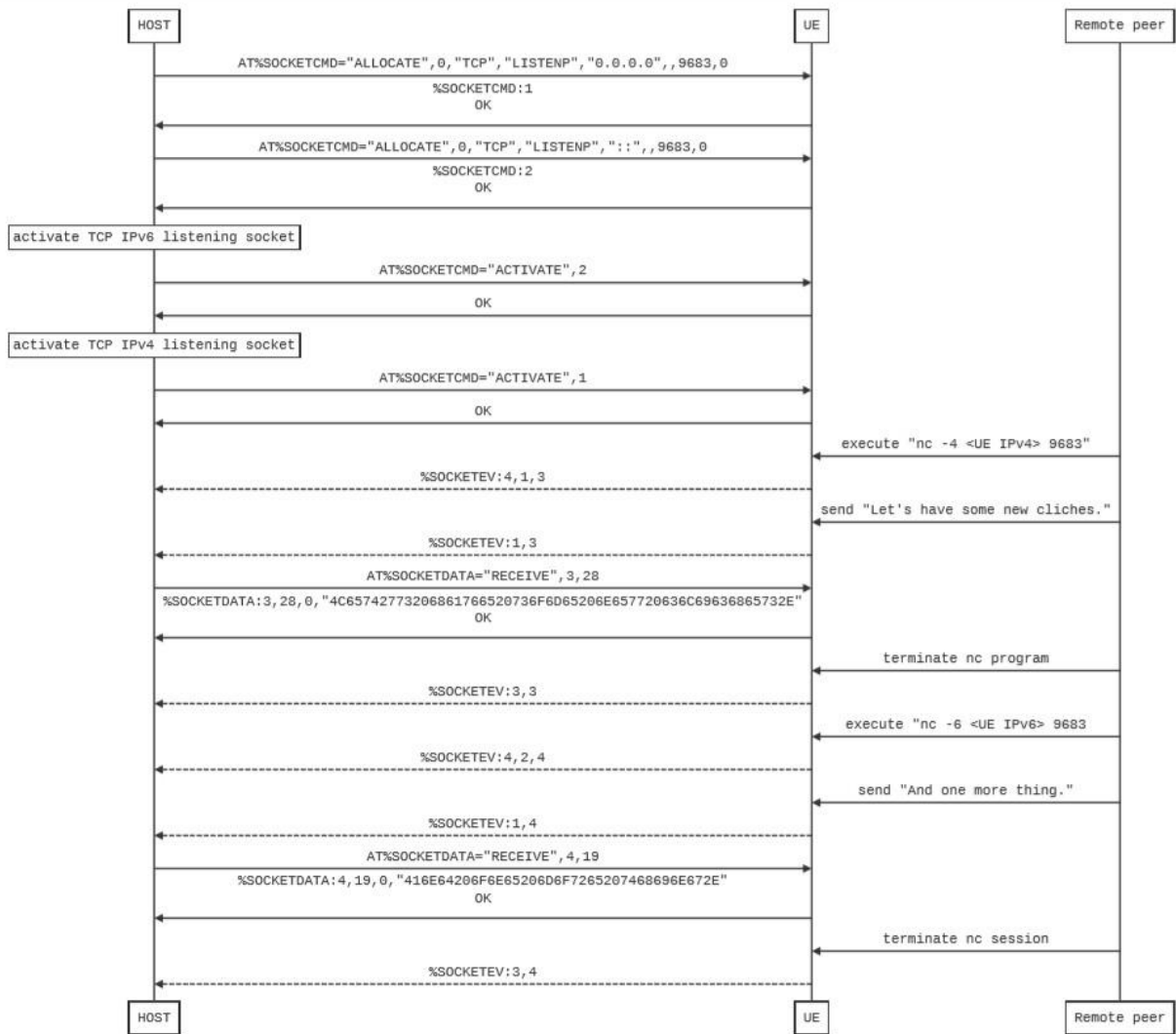


Figure 16 - Open TCP Server Socket - Flow Diagram

8.3 TLS

For this example, please put the following files on the device under the d:/certs/user location by using 'AT%CERTCMD' command (for detailed commands description refer to Type 1SC AT_commands_reference_V4_12-11-18.pdf):

Note: During the copy/paste process, do not copy the CR character.

```
AT%CERTCMD="WRITE", "cert_2048.pem", 0, "-----BEGIN CERTIFICATE-----
MIIDSjCCAjKgAwIBAgIJAIYLtIQHBBG0MA0GCSqGSIb3DQEBCwUAMDoxCzAJBgNV
BAYTAKNBMQswCQYDVQQIDAJPTjEQMA4GA1UEBwwHVHG9yb250bzEMMAoGA1UECgwD
RUZGMB4XDTE3MDUyOTA3NDIwMVoXDTQ4MDMzMzMDA3NDIwMVowOjELMAkGA1UEBhMC
Q0ExCzAJBgNVBAGMAk90MRAwDgYDVQQHDAdUb3JvbnRvMQwwCgYDVQQKDANFRkYw
ggEiMA0GCSqGSIb3DQEBAQUAA4IBDwAwggEKAoIBAQMdlWIecnhjL4FsJvxDP27G
yeqnXKc41HsRP9cv4z+NDjE94mDgva5ndieia9xZ0Sh7LXtZcGDcpGop+D7s+oh0
apV6idIJ9eEPUegYlGxOFJQnZ8re6hD7MaAlNZEvhZrwJvrGy6rTFpi3DaNokGn7
r3s2nrQ9aziljkWRp1PnTBnRNgOdi3c1IB2f4+2PdykjihxlnYUuI4Wf5QU5pFx6
0a2mdTVDC+bKAP22IvuQnnkHgJYYS/oMxFT9QR4xQRPOx7U2RWVrFDVJM3mIB8F
OW6JXfQsmaZzr46xclbEIr4QQ6RcPWvcJlCV1idFjEmufi52sV7r1Bf3nCJfK1f
AgMBAAGjUzBRMB0GA1UdDgQWBBSdJ++M23AW3LkFD7LkhsH7gL6/2jAfBgNVHSME
GDAWgBSdJ++M23AW3LkFD7LkhsH7gL6/2jAPBgNVHRMBAf8EBTADAQH/MA0GCSqG
SIb3DQEBCwUAA4IBAQCv5kSt1HTFzUPdBvxT455YrLd3jIsRt1pRNuGjVaUYIRxh
vds8NN1Z8h/8Cdzz8NVkIdCuYb2lFaDjs3zNVUQxVcYVcH7xVypwFI85NR27+HPRv
xxx2rzwST+NKYst6ZBg086BKjqFtxs16lpU/TD6tOJgg86TBbfp6gib/ocGeER2D
HEEik69FjmUCziT6uXyYW5y1Pxdl5UWO3Rw0Tpao0vGtTPceTeu005PVeCULx8X
YXg9zoVWBba0GF+qQJ67zT5nvfc2KJcgnWRIRr/90YXzBf+FdFVuC4xPHINBI10J
5XBLJOv61Zu+Du/nmlBVcb8KL/Vd2oZyfoH+0oCN
-----END CERTIFICATE-----
```

```
"
AT%CERTCMD="WRITE", "rsa2048_key.pem", 1, "-----BEGIN PRIVATE KEY-----
MIIEvWIBADANBgkqhkiG9w0BAQEFAASCBKkwggSlAgEAAoIBAQMdlWIecnhjL4Fs
JvxDP27GyeqnXKc41HsRP9cv4z+NDjE94mDgva5ndieia9xZ0Sh7LXtZcGDcpGop
+D7s+oh0apV6idIJ9eEPUegYlGxOFJQnZ8re6hD7MaAlNZEvhZrwJvrGy6rTFpi3
DaNokGn7r3s2nrQ9aziljkWRp1PnTBnRNgOdi3c1IB2f4+2PdykjihxlnYUuI4Wf
5QU5pFx60a2mdTVDC+bKAP22IvuQnnkHgJYYS/oMxFT9QR4xQRPOx7U2RWVrFDV
MJ3mIB8FOW6JXfQsmaZzr46xclbEIr4QQ6RcPWvcJlCV1idFjEmufi52sV7r1Bf
3nCJfK1fAgMBAECCggEAJkhhVntagfgd+cbZbXm2sIdKQGlwXk92/Zxd3tZMcuNY
rU+/C2bJ5uTEm+0R/V9f3FX1sCagGde2t7ExFnJScSRAGCuFRxudMMI/wNvUvnpR
09vN3HxrRo2rZqBkqHIZCR0d2Bxs/0cvGqTLZgsVWkv4xM07TThcE7DtvsnGegRn
WFxfSfRcRypkIvZoba1HagvCitURBEa07R7mQp8kRhP9ZeRq3bZws9qBmqzj1cylG
q8QA4Foq7sK8P78bpIhrcOFBDar+Vr1ZGY6u01J0w13MUtl6iIx4VCjQKt4NkzsK
dj2q+GAMwhReR2ZS42o8LiyGpwusj+dKIFFekgK2QKBgQD4wmmRDgvt85brQTNF
Tkhui0eToz5oXt8mVDb58nwkpjFQOv87ZyNsEqm7S0t/3RtEViVio2aymTMsrz4
21vRq46dvhINQ3DoMok6xIchEOEgMeonOilkURWtrMjD/Kn297Asv7zOqI5BCNiP
3FFcRqf+CaqbhnOgMkcI5z6b7QKBgQDtjMlotFFHyS7ctyLRuMeFyxWUSbWHvi8U
xjUW256c6wpQ2DBLSVB61VQjfrSjkZ5DJVFGnbw42HxSDafL1lmzTbY1vDbgtgLK
YiuVHG7OYZJTLaZoM68BseX4xHN8Fztnvp1ttuk5oFb+vD8q6ODZSEawRd3PvtX
D7RtNouc+wKBgQDiwBWTUF+gt18T5BGilbnvLlF0Btg06mgrH74UpnqZoqhEs6J
XKWpWzqSkfruxL4BdsBEH214QSiklga+7uTBOBnlm42k3WaboQUJtn5eG5651AXV
/+Qe9vJFvwu56iObZKcIAzY9QdN5YHDWoULgU99pZrJG1cWrrmilqvOc+QKBgQCB
iOslsly0N+926eJxzDn4qkjtZzh2+e1AfcjLWx0F4mEwroK/Ow5IvPVxmZE1NJ3B
baMBR9gwg1RfhhS+4gKG9NRsPuMJ7BZfd+LeH7AImEorU1RPtAc1fgW0HqP+wchi
DU2I6pqhNBTMLG2myo2Sg93mce6y1sRFuEmh2EGPawKBgQC3uUEdjQekXaxXfYHi
1Dk3Ht1a9t8XxwoCVRqice7lqlwDts2y9lHAeUP7JNy8ZGNjx8srRZpkYVMztugo
Ecw26UA7FbNqJP50PkGjfiFqtOq70h9v1fLdiAPmoqyOx//RkginXt9m5xcDzdzB
7EtBK59KSiQk8fhtooy7Ipiiw==
-----END PRIVATE KEY-----
```

To validate certification files loading, enter d:/certs/user folder and observe added files.

```
d:/certs/user>ls
.:
*.*
*.*.*
cert_2048.pem
rsa2048_key.pem
```

Figure 17 - Loading certification files

Assignee added certification files to specific area in 'certprofile' configuration file that can be found under d:/config location: AT%CERTCFG="ADD",8,,,"cert_2048.pem","rsa2048_key.pem"

To validate correct certification assignment, use d:/config>cat certprofile and observe section 8.

```
},
"8": {
  "cafile": "",
  "capath": "",
  "cert": "cert_2048.pem",
  "key": "rsa2048_key.pem",
},
```

Figure 18 - Certification files assignment

Following the steps listed above, use the following commands on the device and host.

1. Allocate a TCP IPv6 socket at port 23473 for accepting incoming connections (socket id 1 assigned)
AT%SOCKETCMD="ALLOCATE",0,"TCP","LISTENP","::",,23473,0,
%SOCKETCMD:1
OK
2. Read socket info
AT%SOCKETCMD="INFO",1
%SOCKETCMD:"DEACTIVATED","TCP",,23473,,2,60
OK
3. Enable TLS with configuration 8 in 'certprofile'
AT%SOCKETCMD="SSLALLOC",1,1,8
OK
4. Activate TLS IPv4 listening socket
AT%SOCKETCMD="ACTIVATE",1
OK
5. Read socket info
AT%SOCKETCMD="INFO",1
%SOCKETCMD:"LISTENING","TLS",,23473,,2,60
OK

6. Open ssl client on the server (Host --> execute "openssl s_client -host >UE IP> -port 23473") and observe on the device the following prints:
%SOCKETEV:4,1,2
7. Send "hello" from server and observe the following print on the device.
%SOCKETEV:1,2
8. Read received data info
AT%SOCKETDATA="RECEIVE",2,4
%SOCKETDATA:2,4,2,"68656C6C"
OK
9. Read received data info
AT%SOCKETDATA="RECEIVE",2,4
%SOCKETDATA:2,2,0,"6F0A"
OK
10. Terminate the TLS session
AT%SOCKETCMD="DEACTIVATE",2
OK

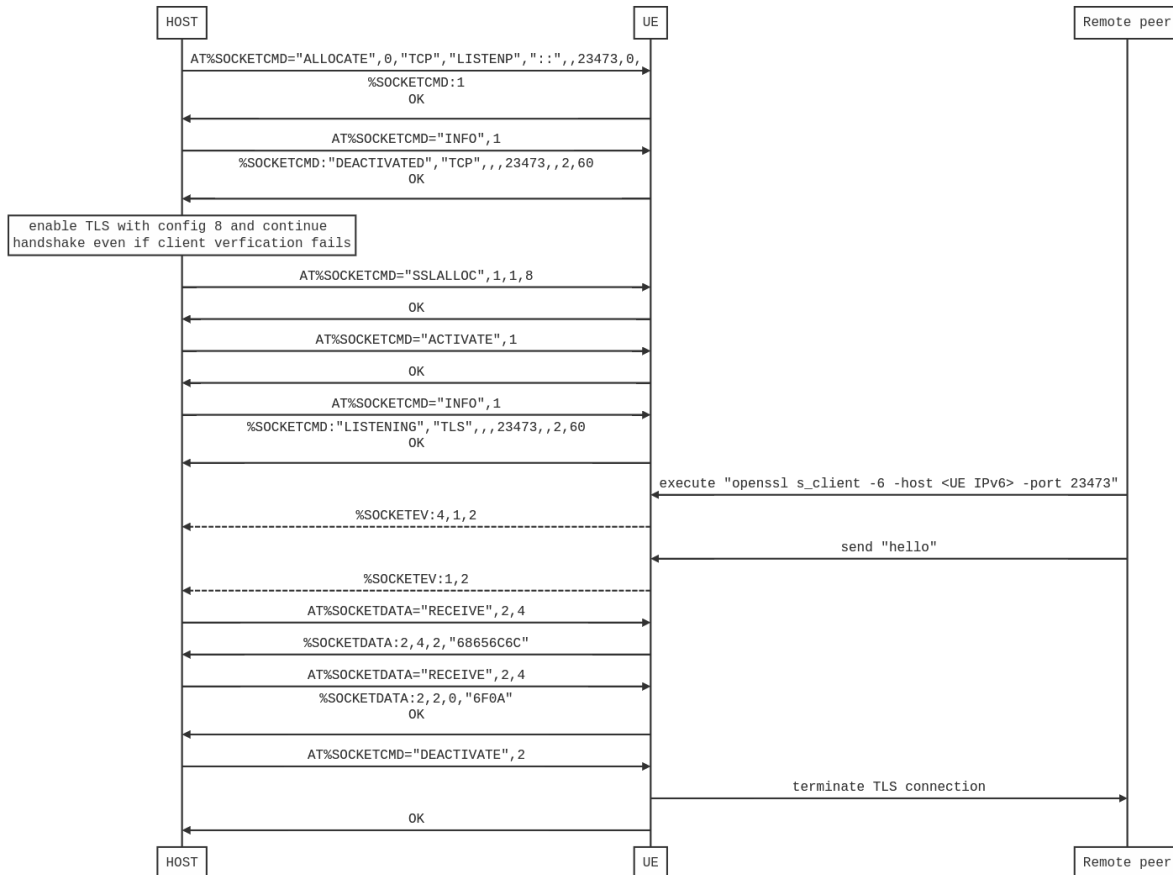


Figure 19 - Open TLS Server Socket - Flow Diagram

9 Technical Support Contact

For technical support and to obtain the most current firmware release, please contact us at tech_sup@murata.com.

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