Type1SC

AT Commands Reference Guide

Revision History

Revision	Date	Author	Change Description
1.0	5/18/2023	Murata Manufacturing Co.	Initial release

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ⓘ (EN) The integration of the LTE Type1SC cellular module within user application shall be done according to the design rules described in this manual.

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1 Introduction

1.1 Scope

This document provides information about the AT commands available in the Murata LTE Cat-M1/NB-IoT module, LBAD0XX1SC (Type1SC).

1.2 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.

1.3 Contact Information and Customer Support

Contact Murata at ciotsupport@murata.com for technical support services, technical questions, and documentation error reporting.

1.4 List of Acronyms

Acronym	Description
APN	Access Point Name
AT	Attention command
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
ECM	Embedded Connection Manager
eDRX	Extended Discontinuous Reception
HTTP	Hypertext Transfer Protocol
NVM	Non-Volatile Memory
PDN	Packet Data Network
RAT	Radio Access Technology

1.5 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.

1.6 Related Documents

- 3GPP TS 27.007 specification and rules http://www.3gpp.org/ftp/Specs/archive/27_series/27.007/
- ITU-T V.250: Serial asynchronous automatic dialling and control (07/2003)
- Type1SC Networking Application Guide
- Type1SC Socket Service Application Guide
- Type1SC Software Application Master Guide
- Type1SC HIFC Service Application Guide

2 Overview

This document describes the AT commands implemented on the Murata wireless module Type1SC.

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⚠ The integration of the LTE Type1SC cellular module within user application shall be done according to the design rules described in this manual. If these points are not followed, the module and end user equipment may fail or malfunction.

⚠ This document describes the specified behavior of the AT commands. The actual performance may differ due to firmware limitation. Please refer to the corresponding firmware release note for any deviation.

3 AT Commands

The Murata wireless module can be controlled via the serial interface using the standard AT commands. Moreover, the Murata wireless module supports also proprietary AT commands for special purposes. The following is a description of how to use the AT commands with the Murata wireless module.

ⓘ The set of proprietary AT commands differentiates from the standard one because the name of each command begins with "%". Proprietary AT commands follow the same syntax rules as extended commands.

ⓘ Maximum AT command size (including "AT" and and termination <CR>) is 3072 bytes.

⚠ The host must ensure that the parameters are valid, since the FW may not check the range of parameters.

⚠ Reserved parameters should be ignored.

3.1 Definitions

The following syntactical definitions apply:

<CR> Carriage return character, is the command line and result code terminator character. The default value is 13.

<LF> Linefeed character, is the character recognized as line feed character. The default value is 10.

<...> 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.

3.1.1 Command Response Time-Out

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

3.1.2 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.

3.2 Standard AT Commands Supported

The following table lists the standard AT commands supported. Please refer to the respective 3GPP and ITU-T specifications for the detailed descriptions of these commands.

Table 3-1 Standard AT Command Set Supported

AT Cmd / URC	Description	Notes / Limitations	3GPP Rev
+CGMI	Request manufacturer identification	None	Rev14
+GMI	Request TA manufacturer identification (equals to +CGMI)	None	ITU-T V.250
+CGMM	Request model identification	None	Rev14
+GMM	Request TA model identification (equals to +CGMM)	None	ITU-T V.250
+CGMR	Request revision identification	None	Rev14
+GMR	Request TA revision identification (equals to +CGMR)	None	ITU-T V.250
+CGSN	Request revision identification	None	Rev14
+GSN	Request TA serial number identification (may equal to +CGSN)	None	ITU-T V.250
+CIMI	Request international mobile subscriber identity (IMSI)	None	Rev14
+CNUM	Subscriber number	None	Rev14
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
I	Request manufacturer specific information about the TA.	None	ITU-T V.250
+CFUN	Set phone functionality	Currently supports (see AT+CFUN=? result): +CFUN: (0-1,4),(0-1) Only mode 4 (flight	Rev14

		mode) is stored in NVM.	
+CEREG	EPS network registration status	None	Rev14
E	Command Echo (same as ATE0)	None	ETSI V.250
E0	Command Echo disabled	None	ETSI V.250
E1	Command Echo enabled	None	ETSI V.250
&K	Flow Control	Support only &K0 and &K3. Default is &K0.	ITU-T V.250
+IPR	Fixed DTE Interface Rate	Automatic detection is not supported. Default rate is 115200. Command settings are stored into NVM. Min baud rate is 110, max is 921600.	ITU-T V.250
+CPSMS	Power Saving Mode Setting	Persistency depends on `modem_apps.Mode.AtCmdSetPersistence`	Rev14
+CEDRXS	Controls the setting of eDRX parameters	Persistency depends on `modem_apps.Mode.AtCmdSetPersistence`	Rev14
+CEDRXRDP	Retrieves eDRX parameters	None	Rev14
+CSQ	Signal quality	None	Rev14
+CMEE	Report mobile termination error	None	Rev14
+CEER	Extended error report	None	Rev14
+COPS	PLMN selection	<mode>=4 is not supported	Rev14
+IFC	DTE-Modem Local Flow Control	Command settings are stored into NVM Support only: AT+IFC=0,0 AT+IFC=2,2	ITU-T V.250
D*99	End to end PPP over LTE connection establishment	Use PDN for <ext_session_id>=1 as defined in AT%PDNSET	
+++	Escape sequence		ITU-T V.250
O	Return To Online Mode	Only ATO command is supported without additional parameter.	ITU-T V.250
+CSIM	Generic SIM access	None	Rev14
+CCLK?	Query network time	Value only available after receiving the time from	Rev14

		the network	

ⓘ The command **AT<CR>** causes the **OK** result code to be returned

3.3 Proprietary AT Commands

The table below details the proprietary AT commands supported by the Type1SC system software solution.

Table 3-2 Proprietary AT Command Set Supported

AT Cmd / URC	Description
%MEAS	Returns measurement for specified measurement type
%CCID	Reads the ICCID from SIM EF_{ICCID}
%SETACFG	Set a configuration parameter
%GETACFG	Get a configuration parameter
%D*99	Initiate end to end PPP session
%H0	Terminate PPP session
%DNSRSLV	Resolve specific domain name
%PINGCMD	Ping specified address
%SOCKETCMD	Create and maintain sockets
%SOCKETDATA	Send/receive data to/from the socket
%SOCKETEV	Handle socket events
%CERTCMD	Manage user certificates
%CERTCFG	Manage certificate profile configuration file
%PDNSET	Set the run-time PDN parameters for PDNs that are exposed to host
%PDNRDP	Get the relevant information for an active PDN
%PDNACT	Activate specified PDN defined by %PDNSET
%BOOTEV	Unsolicited event to inform Host about boot type
%CMATT	Instruct ECM to attach/detach in manual connection mode operation
%SETSYSCFG	Define system parameters such as selected bands
%GETSYSCFG	Retrieve system parameters defined by %SETSYSCFG
%LDOCMD	Activate/deactivate LDO output
%HTTPCFG	Configure HTTP connection parameters
%HTTPCMD	Send GET or DELETE request
%HTTPEV	Notify HTTP events
%HTTPREAD	Read the HTTP response from the server
%HTTPSEND	Send a POST or PUT request

%MQTTCFG	Configure MQTT connection parameters
%MQTTCMD	Communicate with MQTT broker
%MQTTEV	Notify MQTT events
%CSQ	Get signal quality
%STATUS	Query UE status
%RATACT	Manage active RAT
%RATEV	Notify RAT switching events
%RATIMGSEL	Select RAT image for subsequence boot
%PCONI	Query physical connectivity and eNB parameters info
%RSTINFO	Query reset cause information
%CEER	Query the last failure report
%NOTIFYEV	Notify specified event in module
%CCLK	Retrieve current clock
%AWSIOTCFG	Configure AWS IOT connection parameters
%AWSIOTCMD	Communicate with AWS IoT message broker
%AWSIOTEV	Notify AWS IOT events
%CEDRXS	Manage PTW value for eDRX

For these commands, the current firmware value will be used for any optional value not specified in the command that must be part of the action trigger. The current firmware value is the latest value updated by the user. If the user have not provided any update, then it would be the default value.

3.3.1 AT%MEAS

Table 3-3 AT%MEAS Command Syntax

Command	Possible response(s)
AT%MEAS= <measurement type>	For <measurement type> of 0, 2; <MT> is RSRP or SINR; when Reported measurement is returned as N/A, some of the subsequent fields may not be present, so all remaining fields should be ignored. [%MEAS: <MT>:Reported=<measurement value>, Rx0Tx0=<measurement value>,Rx0Tx1=<measurement value>, Rx0Tx2=<measurement value>,Rx0Tx3=<measurement value>, Rx1Tx0=<measurement value>,Rx1Tx1=<measurement value>, Rx1Tx2=<measurement value>,Rx1Tx3=<measurement value>] OK For <measurement type> of 1, 3; <MT> is RSRQ or RSSI; any returned value out of specified range below should be treated as at the range limit. [%MEAS: <MT>: Reported=<measurement value>, Rx0Tx0=<measurement value>, Rx0Tx1=<measurement value>, Rx1Tx0=<measurement value>, Rx1Tx1=<measurement value>] OK For TX Power (<measurement type> of 4): %MEAS: TX power: PUSCH=<measurement value>, PUCCH=<measurement value>, PRACH=<measurement value>, SRS=<measurement value> OK For Signal Quality (<measurement type> of 8): %MEAS: Signal Quality: RSRP = <measurement value>, RSRQ = <measurement value>, SINR = <measurement value>, RSSI = <measurement value> OK For E-CID (95) in compressed format: %MEAS: ECID:<gcid>[,<TimeDifIndex>,<ta>,<MCC>,<MNC>,<TAC>, <EARFCN>,<cell ID>,<SFN>,<RSRP>,<RSRQ> [,<EARFCN>,<cell ID>,<SFN>,<RSRP>,<RSRQ> [...]]] OK For NBS RSRP and RSRQ (<measurement type> of 98,99) where <MT> is RSRP or RSRQ: [%MEAS: EARFCN=<EARFCN>,CellID=<cell ID>, <MT>=<measurement value>

Command	Possible response(s)
	[<CR><LF>%MEAS: EARFCN=<EARFCN>, CellID=<cell ID>,<MT>=<measurement value>] […]] OK For NBS simultaneous RSRP and RSRQ reporting (<measurement type>=97): [%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>] […]] OK For <measurement type> outside of the exported or reserved range: ERROR
AT%MEAS?	ERROR Operation is not supported
AT%MEAS=?	%MEAS: <list of supported <measurement type>s> OK

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, its "reported" value contains combined value of all antennas' measurements
- 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.
- 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.
- Only single "reported" value is supported for neighbor eNB measurements.

Defined values:

<measurement type>: string

- “0” - RSRP
- “1” - RSRQ

- “2” – SINR
- “3” – RSSI
- “4” – TX power; not applicable for NB-IoT in RRC IDLE mode
- “8” – Signal Quality (RSRP & RSRQ & SINR & RSSI)
- "95" - Measurements for E-CID
- “97” – RSRP & RSRQ for all detected NBS
- “98” – RSRP for all detected NBS
- “99” – RSRQ for all detected NBS
- Others – Reserved

<EARFCN>: integer

- Decimal EARFC value

<cell ID>: integer

- Decimal Physical Cell ID value

<gcid>: hexadecimal string

- The Global cell ID hexadecimal value of the serving cell

<TimeDifIndex>: integer

- RxTxTimeDiff decimal index (as defined in 9.1.9.2 of 3GPP 36.133) of the measured cell

<ta>: integer

- Currently used Timing Advance value (NTA) of the measured cell

<MCC>: string

- A three-digit value indicating mobile country code

<MNC>: string

- A three-digit or two-digit value indicating the mobile network code

<TAC>: hexadecimal string

- Two bytes tracking area code in hexadecimal format

<SFN>: integer

- The decimal system frame number (SFN) of the measured cell during which the measurement has been performed. If value is not available at the time of the query, command returns N/A

<measurement value>: integer

- The measurement results are returned in the following measurement units:
  - dBm for RSRP, RSSI
  - dB for RSRQ, SINR
  - 0.1 dBm for TX Power

- Measurement range
  - -260 <= TX Power <= 400
  - -156 <= RSRP <= 0
  - -60 <= RSRQ <= 3
  - -128 <= SINR <= 40
- If RSRP/RSRQ measurement value for some antenna is not supported, command returns N/S for <measurement value> – 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 for <measurement value>: not available indication for this specific antenna in the returned string.
- Note: The reported range is wider than the range defined for Measurement Reporting in 3GPP spec. It is intended to report weak and abnormal measurements, especially for neighboring cells, for jamming detection.

3.3.2 AT%SOCKETCMD

Table 3-4 AT%SOCKETCMD Command Syntax

Command	Possible Response(s)
AT%SOCKETCMD=<cmd>[,<param1>[,<param2>[,<param3>…]]]	**For "INFO" command:** [%SOCKETCMD:<socket_stat>,<socket_type>,<src_ip>,<dst_ip>,<src_port>,<dst_port>[,<socket_dir>,<socket_to>]] OK/ERROR **For "SSLINFO" command:** [%SOCKETCMD:<SSL_mode>,<ClientCerId>] OK **For "LASTERROR" command:** [%SOCKETCMD:<socket_err>] OK/ERROR **For "ALLOCATE" command:** %SOCKETCMD:<socket_id> OK/ERROR **For "SSLKEEP" command:** %SOCKETCMD:<ssl_session_id> OK **For other commands not listed above:** OK/ERROR

AT%SOCKETCMD?	Returns the list of created sockets and their status: [%SOCKETCMD:<socket_id>,<socket_stat>[<CR><LF>%SOCKETCMD:<socket_id>,<socket_stat> […]]] OK
AT%SOCKETCMD=?	%SOCKETCMD: (list of supported <cmd>s) OK

Description

- This command is used to create and maintain sockets 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 a socket is opened (using "OPEN" or “LISTEN” or “LISTENP” command) the unsolicited %SOCKETEV is automatically enabled (see AT%SOCKETEV for details). “OPEN” creates a client or dialer socket, while “LISTEN” and “LISTENP” create server or listener sockets.
- There are two types of server sockets, connectionless and connection based.
  - Connectionless: UDP sockets.

    After a server UDP socket is activated, it listens for incoming data. The command %SOCKETDATA can be used to send UDP datagrams to specific peers. Incoming datagrams are indicated by the %SOCKETEV URCs and no new socket is spawned.
  - Connection based: TCP/TLS sockets.
    - After a server TCP/TLS socket is activated, it listens for incoming connection request. There are 2 types of listener socket: "synchronous" and "asynchronous":
      - Synchronous (“LISTEN”): The connection is established before "OK" is responded; after accepting the incoming connection request, the listening socket ceases to listen for any further incoming connection request and change to a connected socket for communication. The host can start to send and receive data using this socket ID after receiving the “OK” response from the module. The maximum waiting time for the connection establishment is deterministic.
      - Asynchronous (“LISTENP”): The connection is not yet established even though "OK" is responded. Before sending and receiving any data, the host must wait for an URC to indicate that a new connection has been established with the peer. When a new connection request is accepted, the FW spawns a new socket and assigns a new socket ID for this connection while the existing listening socket continue to listen for incoming connection requests. The new

connection is indicated to the host via the %SOCKETEV=4 unsolicited response. The connection socket and the listening sockets are independent of each other -- deactivating/deleting a connection socket has no effect on the listening socket, and vice versa.

After the total number of allocated and spawned sockets reached the maximum number of sockets, no new socket is spawned for incoming new connection request.

See *Type1SC Socket Service Application Guide* for more details.

ⓘ Important Notes:

- A maximum of 4 sockets can be created at the same time.
- Unless stated otherwise below, AT%SOCKETCMD is blocking. Unless explicitly specified to be non-blocking during "ACTIVATE", the following may cause blocking of the AT channel for a long time:
  - For connection-based (TCP/TLS) sockets -- "ACTIVATE" a client ("OPEN") or synchronous listening ("LISTEN") socket.
  - For connectionless (UDP) sockets – "ACTIVATE" a URL addressed client ("OPEN") socket which needs DNS resolution
- The "DEACTIVATE" and "DELETE" commands are non-blocking by default. They could be configured to wait for operation completion using an additional parameter (the TCP socket implementation may take about 30 sec to close the connection due to internal TCP FIN timer)
- The "DEACTIVATE" and "DELETE" commands may be issued while data is still retained inside the module. In such cases, the module activates the "close" process only after it has sent the internally retained data to its destination. However, the module may still drop the internally retained data in case of connection loss and in case of PDN closure.
- Local IP address cannot be configured by AT%SOCKETCMD; it is assigned by the network
- Local IP port can be configured by the AT%SOCKETCMD command or can be set automatically by the socket.
- For client TLS sockets, successfully activated security sessions may be kept and reused, as indicated below.
  - After a TLS session is established, the associated security sessionID for a client socket is kept until that socket is destroyed ("DELETE"). Deactivating ("DEACTIVATE") a socket closes the connection but does not free the security sessionID for the socket; activating ("ACTIVATE") a deactivated socket causes the FW to attempt to resume the security sessionID used before the socket was deactivated.
  - To retain the security sessionID for reuse with a different client socket after the "DELETE" operation, use "SSLKEEP" to save that information (<ssl_session_id>) before deleting the socket.

- Use the saved identifier (<ssl_session_id>) in the “ACTIVATE” sub-command with a different TCP socket. That will trigger the FW to use the saved security sessionID to attempt TLS resumption.
- Delete kept SSL session <ssl_session_id> by "SSLDEL" subcommand when it is no longer needed to free the resource.
- The maximum number of SSL sessions that may be kept is 4.

Defined Values

The non-reserved commands and parameters are described below.

<cmd>: string

- “ALLOCATE” –Allocates socket session with the following parameters

<param1>: integer

- The session identifier of the PDN (see AT%PDNSET for more details about <ext_session_id>).

<param2>: string

- "TCP" – For creation of TCP socket (TLS mode when security added)
- "UDP" – For creation of UDP socket

<param3>: string

- "OPEN" – Create TCP/UDP client socket to connect with the peer
- “LISTEN” – Create synchronous TCP/UDP/TLS listener socket.
- “LISTENP” – Create asynchronous TCP/TLS listener socket. Once activated, new corresponding connected sockets could be spawned from it.

<param4>: string

- Destination IPv4 or IPv6 address or URL (up to 253 bytes)

<param5>: integer

- Destination UDP/TCP port number in the range 1-65535

<param6>: integer

- Optional source (local) UDP/TCP port number in the range 0-65535 (0 – means auto port selection by the socket which is also the default value)

<param7>: integer

- Reserved (no value is needed)

<param8>: integer

- Optional TCP Connection setup timeout parameter. It is only applicable for TCP synchronous listening socket created by “LISTEN” command. It is ignored for “OPEN”/”LISTENP” if this parameter is present.
- Parameter range is 30-360 sec (default is 60 sec).

- If the timer expires, the command returns ERROR. The timeout event occurs when “SYN” is not received from the peer within setup timeout.

<param9>: integer

- Optional parameter used to configure preferred IP type to resolve the hostname for a connection using URL in <param4>. If this parameter is omitted, IP type of the selected <ext_session_id> is used as default. Parameter value is ignored if IP is specified in <param4>:
- 0 - IPv4v6
- 1 - IPv4
- 2 - IPv6

<cmd>: string

- “SSLALLOC” – Update specific socket session id with the following SSL parameters.

<param1>: integer

- The previously allocated socket id

<param2>: integer

- Optional SSL mode. See definition in <SSL_mode>

<param3>: integer

- Client certificate ID. See definition in <ClientCerId>

<cmd>: string

- “ACTIVATE” – Activate the predefined socket

<param1>: integer

- The socket ID (identifier) of the specified socket

ⓘ Note: For TCP client, connection timeout is 9 seconds if an IP address is specified.

<param2>: integer

- Optional. The <ssl_session_id> from another socket kept by "SSLKEEP" beforehand.

<param3>: integer

- Optional synchronous or asynchronous sub-command processing method.
- 0 - sync, command blocked up to complete sub-command execution (Default)
- 1 - async, command returns OK/ERROR immediately. For OK return code, %SOCKETEV URC with final operation result is expected; any new sub-command for the same socket before the URC will be rejected.

<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 the connection.

<param1>: integer

- The socket ID (identifier) to be closed

<param2>: integer

- Optional flag on whether or not to wait for socket deactivation completion
  - 0 – do not wait (default)
  - 1 - wait

<cmd>: string

- “DELETE” – Request to delete specific socket ID allocation (including TLS session context if exist)

<param1>: integer

- The socket ID (identifier) to be closed

<param2>: integer

- Optional flag on whether or not to wait for socket deactivation completion
  - 0 – do not wait (default)
  - 1 - wait

<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

- 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

- 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.

<cmd> - string:

- "SSLKEEP" – Used after successful “ACTIVATE” to keep SSL session of specific TLS client socket ID for reuse later with a different socket

<param1> - integer:

- Client socket ID (identifier) for which SSL session is kept after socket deletion.

<cmd> - string:

- "SSLDEL" - Delete kept SSL session saved by “SSLKEEP”

<param1> - integer:

- The <ssl_session_id> to free.

<socket_id>: integer

- The socket ID (identifier) of the specified socket

<socket_stat>**:** string

- **"**DEACTIVATED" – The socket is not active
- "ACTIVATING" – The socket is activating in async mode, if enabled in "ACTIVATE" command. Only applicable for connection-based sockets.
- "ACTIVATED " – The socket is active
- “LISTENING” – The socket is listening for incoming connection request

ⓘ The firmware will only change the <socket_stat> value based on AT%SOCKETCMD commands. For example, if the peer close a socket, the firmware will generate the socket close event “%SOCKETEV:3,<socket_id>”, but the <socket_stat> value for <socket_id> will not change. The host can re-establish the same socket connection by executing AT%SOCKETCMD="DEACTIVATE",<socket_id> followed by AT%SOCKETCMD="ACTIVATE",<socket_id>.

Otherwise, the host can free the socket with AT%SOCKETCMD="DELETE",<socket_id>.

<socket_type>: string

- "TCP" – for creation of TCP socket (TLS mode when security is enabled)
- "UDP" – for creation of UDP socket

<src_ip>: string

- Source IPv4 or IPv6 address

<dst_ip>: string

- Destination IPv4 or IPv6 address

<src_port>: integer

- Source UDP/TCP port number in the range 1-65535

<dst_port>: integer

- Destination UDP/TCP port number in the range 1-65535

<socket_dir>: integer

- The direction of the TCP socket
- 0 – no set
- 1 – dialer (client socket)
- 2 – listener (server socket)

<socket_to>: integer

- Reserved.

<socket_err>: integer

- 0 - No error
- 1 - Out of memory error
- 2 - Invalid value
- 3 - Timeout
- 4 - Input/output error
- 5 - Resource temporarily unavailable
- 6 - Resource busy
- 7 - No such device
- 8 - No data available
- 9 - Address already in use
- 10 - Already connected
- 11 - Not connected
- 12 - Network is unreachable

- 13 - Connection aborted
- 14 - Connection reset
- 15 - Operation in progress
- 16 - Connection closure timeout
- 255 - Internal error.

<SSL_mode>: integer

- 0 – mutual authentication (default)
- 1 – authenticate client side only
- 2 – authenticate server side only
- 3 - no authentication

<ClientCerId>: integer

- 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.

<ssl_session_id>: integer

- The SSL session ID kept for later reuse with a different socket

3.3.3 AT%SOCKETDATA

Table 3-5 AT%SOCKETDATA Command Syntax

Command	Possible Response(s)
AT%SOCKETDATA=<cmd>[,<param1>[,<param2>[,<param3>…]]]	For “RECEIVE” command: [%SOCKETDATA:<socket_id>[,<rlength>,<more Data>[,<rdata>[,<src_ip>,<src_port>]]]] OK/ERROR For “SEND” command: [%SOCKETDATA:<socket_id>[,<wlength>]] OK/ERROR
AT%SOCKETDATA?	ERROR (not supported)
AT%SOCKETDATA=?	%SOCKETDATA: (list of supported <cmd>s) OK

Description

- This command is used to send/receive to/from the socket.

Notes:

- For TCP sockets:

- An operation that returns with ERROR indicates that the TCP socket was closed (by the user or by peer). There is unsolicited indication for socket closure 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 in an ERROR.

- The application can issue AT%SOCKETCMD="LASTERROR" to get the reason for the last failure

Defined Values

<cmd>: string

- “SEND” – Write to the socket

<param1>: integer

- The socket ID (identifier) of the socket.

<param2>: integer

- The length in bytes of the data which needs to be written (1 to 1500)

<param3>: hexadecimal

- The data, in HEX format (in quotes), which will be written to the specified socket.

<param4>: string

- Optional parameter. Must only be specified for UDP sockets created by AT%SOCKETCMD="ALLOCATE" with “LISTEN” or “LISTENP”.
- Destination IPv4 or IPv6 address.

<param5>: integer

- Optional parameter. Must only be specified for UDP sockets created by AT%SOCKETCMD="ALLOCATE" with “LISTEN” or “LISTENP”.
- Destination port number in the range 1-65535.

<param6>: integer

- Optional parameter. Only applicable to request URC confirmation of UDP datagrams being send to the network (see %SOCKETEV <event_id>=5).
- If omitted, default unconfirmable mode (0) is used.
- 0 - unconfirmable (default)
- 1 – confirmable.

<cmd>: string

- “RECEIVE” – Read from the socket

<param1>: integer

- The socket ID (identifier) of the socket.

<param2>: integer

- Maximum number of bytes of the data to read (1 to 1500)

<socket_id>: integer

- The socket ID (identifier) of the specified socket.

<rlength>: integer

- The actual length in bytes of the data which was actually read.

<moreData>: integer

- The length in bytes of the data left in the RX buffer.

<rdata>: hexadecimal

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

<wlength>: integer

- The actual length in bytes of the data written to the socket.

<src_ip>: string

- Optional parameter, returned for UDP datagrams only.
- Source IPv4 or IPv6 address

<src_port>: integer

- Optional parameter, returned for UDP datagrams only.
- Source UDP port number in the range 1-65535

3.3.4 AT%SOCKETEV

Table 3-6 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) OK
(unsolicited)	%SOCKETEV:<event_id>,<socket_id>[,<res1>]

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” or “LISTENP” sub-command of the AT%SOCKETCMD command.

- The unsolicited event is described in the <event_id> field below.

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, If there are data to read, this event doesn't happen until they all are read.
- 4 – New connected socket is spawned from the asynchronous listening TCP socket
- 5 – Packet sent confirmation is indicated by modem, if configured in AT%SOCKETDATA="SEND"
- 6 – Socket activation finished in asynchronous mode, if configured in AT%SOCKETCMD="ACTIVATE"

<mode>: integer
- Unsolicited result response presentation
- 0 – Disabled
- 1 – Enabled

<socket_id>: integer
- The socket ID (identifier) of the socket

For <event_id>=1, 3:

<res1> is not present.

For <event_id>=4:

<res1>: integer
- The socket ID (identifier) of connected socket spawned from the asynchronous listening TCP socket specified by <socket_id>

For <event_id>=5:

<res1>: integer
- Optional parameter; only appliable to UDP packet transfer indicating confirmable send result.
- 0 - packet sent successfully
- 1 - packet send failed, packet discarded
- 2 - buffer overflow

For <event_id>=6:

<res1>: integer
- 0 – success

- 1 - fail

3.3.5 AT%CERTCMD

Table 3-7 AT%CERTCMD Command Syntax

Command	Possible Response(s)
AT%CERTCMD=<cmd>[,<filename>[,<type>,<data>]]	**For <cmd>=”READ”:** [%CERTCMD: <data>] OK/ERROR **For <cmd>=”DIR”:** [%CERTCMD:<filename>[,<filename>…]] OK/ERROR **For other commands:** OK/ERROR
AT%CERTCMD?	ERROR (not supported)
AT%CERTCMD=?	%CERTCMD: (list of supported <cmd>s), (list of supported <type>s) OK

Description:

- Execution command is used to read/write/delete/list user certificates to/from NVM.
- Parameters <type> and <data> are only used for the WRITE command.

Defined values:

<cmd>: string

- File operation on the NVM
- “READ” - read the certificates pointed by <filename>. [Private key cannot be read, command returns ERROR.] Require single parameter: <filename>.
- “WRITE” - write the credentials with its <filename> to the NVM. All the parameters must be specified.
- “DELETE” - delete the credential pointed by the <filename> from the NVM. Require single parameter: <filename>.
- “DIR” – get the list of credential file names pointed by <filename>. Only uses the optional <filename> parameter.
- “COPY” – Reserved.

<filename>: string

- Max 28 characters

- The name of the file to be transferred, deleted or listed. Use “~” for this parameter to retrieve Root Trusted certificates folder content. If omitted, the list of files from User Trusted certificate folder (written by AT%CERTCMD="WRITE") is shown.
- The following are unsupported characters in file name: "/*|,

<type>: integer

- 0 – certificate
- 1 – private key

<data>: string

- For <type> of certificate/private key in PEM format (0 or 1)
- Up to 2048 bytes
- 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.

3.3.6 AT%CERTCFG

Table 3-8 AT%CERTCFG Command Syntax

Command	Possible Response(s)
AT%CERTCFG=<op>,<profile_id>[,[<ca_file>][,[<ca_path>][,<dev_cert>,<dev_key>]]]	OK/ERROR
AT%CERTCFG?	[%CERTCFG: <profile_id>[,<profile_id>…]] OK
AT%CERTCFG=?	%CERTCFG: (list of supported <op>s) OK

Description:

- Execution command is used to add/update/delete TLS certificate profiles.
- Device contains 2 persistent storage locations for certificates:
  - Root Trusted folder, which contains only preloaded root CAs
  - User Trusted folder, which may contain root CAs and device credentials (certificate and private key) installed by user or provisioned over the air.
- The parameters specify the TLS profile stored into a configuration file identified by <profile_id>.
- Parameters <ca_file>, <ca_path>, <dev_cert> and <dev_key> are optional and may be omitted

- Pairs <dev_cert> and <dev_key> shall be always added together or omitted together.
- If <ca_path> is not specified, then Root Trusted folder is used.
- If any of <ca_file>, <dev_cert> or <dev_key> is not specified, then that component is not updated by this command. By default, each profile component is empty until it is defined by the host using this command.
- The profile ID=0 cannot be defined by this AT command. This implicit profile specifies server authentication using root CA stored in Root Trusted folder.
- The following are unsupported characters in any file name: "/*|,

Defined values:

<op>: string

- Operation to be applied to TLS profile. ADD operation applied to an existing profile will update the profile with the fields specified while leaving those not specified unchanged.
- "ADD" – add new profile
- “DELETE” – delete profile

<profile_id>: integer

- Numeric value to identify set of credentials used together for some TLS connection(s). Range:
- 1-255

<ca_file>: string

- The name of the root certificate file. Maximum file name length is 28.

<ca_path>: string

- The path of the user-added or trusted root certificates.
- "~": Root Trusted folder.
- ".": User Trusted folder (populated by AT%CERTCMD="WRITE").

<dev_cert>: string

- The name of the user-added device cert file. Maximum file name length is 28.

<dev_key>: string

- The name of the user-added device private key file. Maximum file name length is 28.

3.3.7 AT%CCID

Table 3-9 AT%CCID Command Syntax

Command	Possible response

AT%CCID	%CCID: <iccid> OK/ERROR
AT%CCID?	ERROR
AT%CCID=?	OK

Description:

- Execution command reads the ICCID (card identification number) from SIM EF_{ICCID}. It is a unique identification number for the SIM.
- If SIM is not inserted, ERROR is returned by execution command.

Defined values:

<iccid>: unquoted string

- String (without quotes) of 19 or 20 decimal digits, which reflects SIM ICCID value. The format of the ICCID is: MMCCIINNNNNNNNNNNNCx
- **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.

3.3.8 AT%SETACFG

Table 3-10 AT%SETACFG Command Syntax

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

Description

- This command sets a configuration field defined by <param file name>.<param section>.<param name>, e.g., `AT%SETACFG=APNTable.Class1.AuthName,"myName"`. The user should treat the <param file name>.<param section>.<param name> configuration field as a symbolic reference pointer to a settable parameters.

- The supported public configuration fields are listed in the table below.

Note

- The <param value> to set should not be more than 256 bytes for any parameter.
- Length of <param file name>.<param section>.<param name> should not be more than 200 bytes.

ⓘ The following parameters have been set in the module firmware. The modem should be reset after these parameters have been configured.

Table 3-11 Public Configuration Fields

Configuration Field	Default Value	Descriptions
`pm.conf.sleep_mode`	`disable`	Controls module low power support. Valid values: • "disable"= module does not enter low power mode. • "enable"= module supports low power mode.
`pm.hifc.mode`	`disable`	Specify module Host Interface Control (HIFC) for low power mode. See "*Type1SC HIFC Service Application Guide*". Valid values: • "disable"=Module PMU_WAKEUP is disabled. If this is set, must also set `pm.conf.sleep_mode` to "disable". • "A"=Module awaked by PMU_WAKEUP pin with handshake to switch the UART port between GPIO and UART modes of operation. Host must implement HIFC-Mode A support. • "C"=Module awaked by PMU_WAKEUP pin. Host must wait 500ms before sending data to module. Once PMU_WAKEUP is low, the module must disable its UART lines connected to the module.
`pm.reset_indication.mode`	`disable`	Controls HW reset indication support when HIFC is enabled. See "*Type1SC HIFC Service Application Guide*".

		Valid values: • "disable"= indication disabled. • "enable"= indication enabled.
APNTable.Class1.AuthType	null	PPP authentication type (<ppp_auth>) for the active host PDN defined by %PDNSET. Valid values: • NULL • PAP • CHAP
APNTable.Class1.AuthName	null	Username string (<user>) used for authentication for the active host PDN defined by %PDNSET. The string should not exceed 70 bytes.
APNTable.Class1.AuthPwd	null	Password string (<passw>) used for authentication the active host PDN defined by %PDNSET. The string should not exceed 70 bytes.
modem_apps.Mode.AutoConnectMode	false	Enable/disable LTE Embedded Connection Manager (ECM); reset module after setting change to take effect. ECM should be enabled for normal mode of operation. Valid values: • true – ECM is enabled (override CFUN=0,1 setting after reset) • false – ECM is disabled (override CFUN=1,1 setting after reset)
manager.urcBootEv.enabled	true	Enable/disable %BOOTEV URC event reporting; reset module after setting change to take effect. Valid values: • true – URC is enabled • false – URC is disabled
modem_apps.Mode.AtCmdSetPersistence	true	Specify if AT command updates to eDRX/PSM parameters are saved in NVM. • true – updates are saved to NVM • false – updates are not saved to NVM

3.3.9 AT%GETACFG

Table 3-12 AT%GETACFG Command Syntax

Command	Possible Response(s)
AT%GETACFG=<param file name>.<param section>.<param name>	[%GETACFG: <param_value>] OK/ERROR
AT%GETACFG?	ERROR
AT%GETACFG=?	%GETACFG: (list of supported <param>) OK

Description

- This command gets a configuration field defined by <param file name>.<param section>.<param name>, e.g., `AT%GETACFG=APNTable.Class1.AuthName`.
- See AT%SETACFG for possible values for <param file name>.<param section>.<param name> and <param_value>.

3.3.10 AT%PDNSET

Table 3-13 AT%PDNSET Command Syntax

Command	Possible Response(s)
AT%PDNSET=<ext_session_id>,<apnname>,<ip_type>	OK/ERROR
AT%PDNSET?	[%PDNSET:<ext_session_id>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<auth_host>,<IPv4AddrAlloc>,<pcscf_discovery>,< NSLPI> [<CR><LF>%PDNSET:<ext_session_id>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<auth_host>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI>]] 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 NVM
- To change the PPP security parameters in the NVM, use the AT%SETACFG command -- <ppp_auth>, <user>, <passw>, respectively, are mapped to configuration fields APNTable.Class1.AuthType, APNTable.Class1.AuthName, APNTable.Class1.AuthPwd. See Table 3-11 for more details.
- This command is effective immediately, as described below. See *Type1SC Networking Application Guide* for details on using this command.

- In the Operational state (CFUN=1): if the 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 command response (OK/ERROR) depends on the result of this reactivation.
- In the non-Operational state (CFUN=0/4): the command updates only storage of the parameters (NV or run-time, see above).

Notes:

- A parameter which is not specified will be written as ",," in both command and response.
- <ext_session_id> is fixed to 1.
- The <apnname> should not be more than 63 bytes. Default is not defined.
- The <auth_host> should not exceed 70 bytes. Default is not defined.
- Default for <IPv4AddrAlloc>, <pcscf_discovery>, <NSLPI> are all 0.

Defined Values

<ext_session_id>: integer

- The numeric value of the session identifier which is configured and used by the host.

<apnname>: string

- Indicates the APN name configured for PDN

<ip_type>: string

- "IP" – IPv4 only
- "IPV6" – IPv6 only
- "IPV4V6" – IPv4 and IPv6

<auth_host>: string

- The name of the authentication server.

<ppp_auth>: string; PPP authentication type:

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

<user>- string; username used for authentication

<passw>: string; password used for authentication

<pcscf_discovery>: integer

- 0 – Disable
- 1 – Enable

<IPv4AddrAlloc>: integer

- Controls how the host requests the IPv4 address information

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

<NSLPI>: integer

- Indicates the NAS signaling priority requested for this PDP context as defined in AT+CGDCONT in 3GPP 27.007

3.3.11 AT%PDNRDP

Table 3-14 AT%PDNRDP Command Syntax

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

Description

- The execution command returns the relevant information for an active PDN identified by <ext_session_id>.

Defined Values

<ext_session_id>: integer

- A numeric value of the session identifier which is configured and used by the host, and described in AT%PDNSET.

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

3.3.12 AT%PDNACT

Table 3-15 AT%PDNACT Command Syntax

Command	Possible Response(s)
AT% PDNACT=<act>,<ext_session_id> [,<APN>]	OK/ERROR
AT%PDNACT?	%PDNACT: <ext_session_id>,<stat>,<APN>,<cid> [<CR><LF>%PDNACT: <ext_session_id>,<stat>,<APN>,<cid>] OK

Description

- This command is used by external Host to instruct the FW to connect (disconnect) the specified PDN to the Host.

Notes:

- <APN> is the <apnname> described in AT%PDNSET, so it should not be more than 63 bytes.
- <ext_session_id> must be specified. If both <ext_session_id> and <APN> are specified, the PDN is identified by <APN> and <ext_session_id> is ignored.

Defined Values

<act> : integer

- Indicates the required action:
- 0 – disconnect
- 1 – connect

<ext_session_id>: integer

- The numeric value of the session identifier which is configured and used by the host, as described in AT%PDNSET

<APN>: string

- Indicates the APN name configured for the PDN, as described in AT%PDNSET.

<stat>: integer

- Indicates the actual PDN state
- 0 – non-active
- 1 – active

<cid>: integer

- The PDN's context ID as defined in AT+CGDCONT in 3GPP 27.007.

3.3.13 AT%D*99

Table 3-16 AT%D*99 Command Syntax

Command	Possible Response(s)
AT%D*99***<ext_session_id>#	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_session_id>` parameter.

Defined values:

<ext_session_id>: integer

- See definition in AT%PDNSET

3.3.14 AT%H0

Table 3-17 AT%H0 Command Syntax

Command	Possible Response(s)
AT%H0	OK/ERROR

Description:

- AT command to end PPP session after the PPP connection is suspended by "+++" command.

3.3.15 AT%DNSRSLV

Table 3-18 AT%DNSRSLV Command Syntax

Command	Possible Response(s)
AT%DNSRSLV=<ext_session_id>[,<domain_name>[,< addr_ip_type>[,<async>]]]	[%DNSRSLV:<ip_type>,<ip_addr> [%DNSRSLV:<ip_type>,<ip_addr>[…]]] OK/ERROR
AT%DNSRSLV?	ERROR (not supported)

Description

- This command provides a request from the device to resolve a specific domain name.
- If execution command is called with <ext_session_id> parameter only (no <domain_name> specified), it is treated as a query command and the response represents DNS server IP address list instead of <domain_name> resolved IP address list.
- 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

Defined Values

<ext_session_id>: integer

- PDN identifier. See AT%PDNSET.

<domain_name>: string

- Domain name to resolve. Maximum string size is 253 bytes.

<addr_ip_type>: integer

- Optional parameter defining the IP address type to resolve
- 0 - IPv4
- 1 - IPv6
- 2 - IPv4v6 (default)

<ip_type>: integer

- 0 – IPv4
- 1 – IPv6

<ip_addr>: string

- IPv4 or IPv6 resolved address, if <domain_name> is specified
- Pv4 or IPv6 address of DNS server, if <domain_name> is not specified

<async>: integer

- Optional parameter. Synchronous or asynchronous resolution command processing method.
- 0 - sync (default)
- 1 – async

<event>: integer

- Result of DNS resolution. It is applicable to <async>=1 only.
- 0 - DNS resolution success
- 1 - DNS resolution failure

3.3.16 AT%PINGCMD

Table 3-19 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/ERROR
AT%PINGCMD?	ERROR (not supported)
AT%PINGCMD=?	OK

Description

- This command is used for executing PING services.
- The IP address formatting for use in this command is as described in the AT%DNSRSLV command.

Defined Values

<id>: integer

- The identifier of each individual reply of the ping request (this can be 1 to <count>)
- 1-20

<ip_type>: integer

- 0 – Ipv4
- 1 – IPv6

<dst_ip>: string

- Destination (remote machine) IPv4 or IPv6 address

<count>: integer

- The number of ping request retries (default: 1)
- 1-20

<packetsize>: integer

- Specifies the number of data bytes to be sent. The max size for IPv4 and IPv6, respectively, is 9936 and 9908 bytes.
- The default is 56, which translates into 64 ICMP data bytes when combined with the 8 bytes of ICMP header data.

<timeout>: integer

- Time to wait for a response, in seconds (default: 6).
- 1-60

<ttl>: integer

- 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>: integer

- The round trip time of the PING.

3.3.17 AT%CMATT

Table 3-20 AT%CMATT Command Syntax

Command	Possible response
AT%CMATT=<param>	OK/ERROR
AT%CMATT?	%CMATT: <param> OK
AT%CMATT=?	%CMATT: (list of supported <param>s) OK

Description:

- This command is used in the manual mode with ECM disabled (`modem_apps.Mode.AutoConnectMode = false`).
- It is sent from the external Host, which instructs LTE module (ECM) to attach to or detach from the LTE network.

Defined values:

<param>: Integer

- 0 - detach
- 1 - attach

3.3.18 AT%SETSYSCFG

Table 3-21 AT%SETSYSCFG Command Syntax

Command	Possible Response(s)
AT%SETSYSCFG=<obj>[,<value>]	**For <obj>="SW_CFG.catm_band_table.band#1-40"**: ENABLE, DISABLE; <range1>, <range2>, … OK **For others:** OK/ERROR
AT%SETSYSCFG?	ERROR
AT%SETSYSCFG=?	OK

Description

- Sets an object parameter as defined by the strings <obj> and its <value>, e.g., `AT%SETSYSCFG="SW_CFG.catm_band_table.band#1","ENABLE;3"`
- The exported <obj> and associated <value> are listed in the table below.

Notes:

ⓘ The modem should be reset after these parameters have been configured.

Optional band control:

- The host application can limit the bands to use. The bands used for CAT-M1 and NB-IoT can be defined as entries in the appropriate band table. The operations should be performed when the radio is not active. The following are the rules that must be adhered when adding, updating, and deleting bands:
  - The defined bands for the CAT-M1 and NB-IoT can be retrieved by using <obj> of `"SW_CFG.catm_band_table.band#1-40"` and `"SW_CFG.nb_band_table.band#1-40",` respectively, with no <value> parameter specified in %SETSYSCFG.

The number (<N>) of individual bands defined, respectively, specifies the largest <index> supported in "SW_CFG.catm_band_table.band#<index>" and "SW_CFG.nb_band_table.band#<index>". The value of <rangeX> can be one of the following

- A single number <band> indicating the supported band value
- A range of form <B1>-<B2> indicating the <band> range from <B1> to <B2>, inclusive of <B1> and <B2>

- New band entries must be added using consecutive <index> from 1 to <N> with no gaps in between, so band#1 must be added first, followed by band#2, etc.
- The defined entries can be retrieved by AT%GETSYSCFG.
- A defined entry can be changed by overwriting it with a new <value>, from example, from ENABLE to DISABLE.
- Band entries may be removed by setting an empty <value> string ("") starting from the last defined entries. After the module is reboot (e.g., issue ATZ), those entries will be removed from the table.
- The host must ensure that a band is only defined once in the table.

Table 3-22 Exported <obj> and <value> pairs for band control

Exported <obj>	Default Value	Descriptions
"SW_CFG.catm_band_table.band#1" to "SW_CFG.catm_band_table.band#40"		Specify bands to use for Cat-M1. The parameter <value> is required. By default, no band entry is specified so the module uses the default (<N>) bands returned by AT%SETSYSCFG="SW_CFG.catm_band_table.band#1-40" (this is also true if all the entries in the table are disabled). Valid <value> strings: • "ENABLE;<band>" – Enable <band>. • "DISABLE;<band>" – Disable <band>. • "" – Remove entry; see detail above. For example, the following command adds band 3 to band#1: AT%SETSYSCFG="SW_CFG.catm_band_table.band#1","ENABLE;3"
"SW_CFG.nb_band_table.band#1" to "SW_CFG.nb_band_table.band#40"		Specify bands to use for NB-IoT. The parameter <value> is required. By default, no band entry is specified so the module uses the default (<N>) bands returned by AT%SETSYSCFG="SW_CFG.nb_band_tabl

		e.band#1-40" (this is also true if all the entries in the table are disabled). Valid <value> strings: • "ENABLE;<band>" – Enable <band>. • "DISABLE;<band>" – Disable <band>. • "" – Remove entry; see detail above. For example, the following command adds band 3 to band#1: AT%SETSYSCFG="SW_CFG.nb_band_table.band#1","ENABLE;3"

Optional SIM detection:

- By default, none of the SIM detection parameters is specified. To enable the optional SIM detection URC provided by AT%NOTIFYEV, the customer must ensure that the SIM is connected to the module as specified in the Murata reference schematics and specify all the parameters below as indicated.

Table 3-23 Exported <obj> and <value> pairs for SIM detection

Exported <obj>	Default Value	Descriptions
"HW_CFG.sim1.activate"		By default, no value is specified. Must be set to "ENABLE".
"HW_CFG.sim1.detect_mode"		By default, no value is specified. Must be set to "GPIO".
"HW_CFG.sim1.detect_pin"		By default, no value is specified. Must be set to "16".
"HW_CFG.sim1.detect_pull"		By default, no value is specified. Must be set to "PULL_UP".
"HW_CFG.sim1.detect_polarity"		By default, no value is specified. Must be set to "POSITIVE".
"HW_CFG.sim1.ldo_select"		By default, no value is specified. Must be set to "SIM_LDO".

3.3.19 AT%GETSYSCFG

Table 3-24 AT%GETSYSCFG Command Syntax

Command	Possible Response(s)

AT%GETSYSCFG=<obj>	%GETSYSCFG: <obj>,<value> OK/ERROR
AT%GETSYSCFG?	ERROR
AT%GETSYSCFG=?	OK

Description

- This command gets the value for the corresponding <obj>, e.g., `AT%GETSYSCFG="SW_CFG.catm_band_table.band#1"`.
- See AT%SETSYSCFG for possible values for <obj> and <value>

3.3.20 AT%LDOCMD

Table 3-25 AT%LDOCMD Command Syntax

Command	Possible response
AT%LDOCMD=<cmd>,<ldo>	OK/ERROR
AT%LDOCMD?	ERROR
AT%LDOCMD=?	%LDOCMD: (list of supported <cmd>s), (list of supported <ldo>s) OK

Description:

- This command is used to activate/deactivate the specified LDO output.

Defined values:

<cmd>: String

- "ON" - activate LDO output
- "OFF" - disable LDO output

<ldo>: Integer

- 2 – VDD_AUX LDO

3.3.21 AT%RATACT

Table 3-26 AT%RATACT Command Syntax

Command	Possible Response(s)
AT%RATACT=<rat>[,<storage>]	OK/ERROR
AT%RATACT?	%RATACT: <current_rat>,<rat_mode>,<source>

	OK
AT%RATACT=?	%RATACT: (list of supported <rat>s),(list of supported <storage>s),(list of supported <source>s) OK

Description

- The execution command switches to selected RAT without full reboot.
- By default, CATM is used as the default RAT configuration.
- Execute this AT command with <switch_rat>="DEFAULT" will return the modem to the default RAT configuration.
- The command with <switch_rat>="C2D"/"N2D"/"C2DUC"/"N2DUC" executes a one-shot attempt to connect to the target RAT in the single RAT mode.
    - If the attempt fails, the modem returns to default RAT configuration and, if possible, to the same cell immediately in the case of a scan attempt failure on the target RAT.
    - In the attempt succeeds, the following applies:
        - For “C2D”/“N2D”:
          Modem will stay on the target RAT perpetually until AT%RATACT="DEFAULT" is invoked by the host or FW to return to the default RAT configuration.
        - For “C2DUC”/“N2DUC”:
          Modem will stay on the target RAT until either the next scan attempt failure or AT%RATACT="DEFAULT" is invoked by the host or FW to return to the default RAT configuration

ⓘ Any attempt to switch to the RAT already in use will be silently ignored with OK returned.

Defined Values

<rat>: string

- RAT to be activated by execution command
- "DEFAULT" - activate the default RAT configuration
- "CATM" - activate CAT-M RAT
- "NBIOT" - activate NB-IOT RAT
- "C2D" – activate CAT-M RAT with fallback to the default RAT configuration
- "N2D" – activate NB-IOT RAT with fallback to the default RAT configuration
- "C2DUC" – activate CAT-M RAT with unconditional fallback to the default RAT configuration

- "N2DUC" – activate NB-IOT RAT with unconditional fallback to the default RAT configuration
- Others – Reserved

<storage>: integer

- Flag indicates if settings are persistent over a power-cycle (stored into non-volatile memory)
- 0 - not persistent (default if parameter omitted)
- 1 – persistent; also sets the target RAT as the new default RAT

<source>: integer

- Reserved

<rat_mode>: integer

- Reserved

<current_rat>: string

- "CATM" - CAT-M RAT
- "NBIOT" - NB-IOT RAT

3.3.22 AT%RATEV

Table 3-27 AT%RATEV Command Syntax

Command	Possible response(s)
%RATEV=<mode>	OK or ERROR
%RATEV?	ERROR (Not supported)
%RATEV=?	%RATEV: (list of supported <modes>s) OK
unsolicited	%RATEVU: <event>,<rat-id>,<source>

Description:

- This command is intended to notify about RAT switch events.

Defined values:

<mode>: integer

- status of unsolicited result response presentation
- 0 - disabled
- 1 - enabled

<event>: integer

- 0 - scan success
- 1 - scan failed

<rat-id>: integer

- 0 - CAT-M RAT
- 1 - NB-IOT RAT
- Others - Reserved

<source>: integer

- Reserved

3.3.23 AT%RATIMGSEL

Table 3-28 AT%RATIMGSEL Command Syntax

Command	Possible Response(s)
AT%RATIMGSEL=<img_id>	OK/ERROR
AT%RATIMGSEL?	%RATIMGSEL:<img_id> OK
AT%RATIMGSEL=?	OK

Description

- This command is intended for testing use only. It specifies the RAT FW image that will be activated in subsequent boot-up.
- Read command returns the image identifier currently in use and will not reflect any newly modified <img_id> value.

Defined Values

<img_id>: integer

- Image bank identifier
- 1 - CAT-M RAT
- 2 - NB-IOT RAT

3.3.24 AT%HTTPCFG

Table 3-29 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) OK

Description

- This command is used to configure HTTP connection parameters.
- The "NODES" parameters must be defined before starting an HTTP connection
- The <profile_id> uniquely identifies the profile for all HTTP related commands and events: AT%HTTPCFG, AT%HTTPCMD, AT%HTTPSEND, AT%HTTPREAD, and %HTTPEVU.
- The default "FORMAT" configuration is as follows. It may be overridden by explicit "FORMAT" settings and will then be applied to any data transfer using the same <profile_id>. The response format for specific "GET" operation may be also overridden in AT%HTTPREAD itself.
    - Text data transfer
    - Automatic HTTP request header generation
    - The AT response HTTP header is present in response to observed errors (AT%HTTPREAD).

Notes:

- 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 ensure that the proper values will be used, it is recommended to call "CLEAR" sub-command before entering new configurations for previously used <profile_id>.

Defined Values

<obj>: string

- "NODES" - configure client & server nodes parameters
- "TLS" - configure TLS layer security parameters
- "IP" - configure IP layer parameters
- "FORMAT" - configure HTTP data/header representation
- "TIMEOUT" – Server response timeout
- "CLEAR" – executes “ABORT” and then clear all previous configuration settings for specified <profile_id>
- "ABORT" – abort connection and stop receiving further data from server for specified <profile_id>
- Others – Reserved

<profile_id> - integer

- User specified profile ID
- 1-5

For "NODES", <param1> to <param4> are used:

Total length must satisfy the following constraints:

- Length of (<param1>+<param2>+<param3>) must not exceed 3000 bytes
- Length of (<param2>+<param3>) must not exceed 128 bytes

For the string argument, enter "" when the string is omitted

- <param1>: string
  - URI or IP address.
- <param2>: string
  - Optional authentication user identification string for HTTP.
- <param3>: string
  - Optional authentication password for HTTP.
- <param4>: integer
  - Optional format of user/password
  - 0: plain text(default)
  - 1: B64 format

For "TLS", <param1> to <param5> are used:

- <param1>: string
  - TLS authentication mode
  - 0 - mutual authentication (default value)
  - 1 - authenticate client side only
  - 2 - authenticate server side only
  - 3 - no authentication
- <param2>: integer
  - Predefined authentication context (profile) configured by AT%CERTCFG
- <param3>: integer
  - Optional parameter to enable TLS session resumption. If this flag is configured to enable, TLS resumption will be used instead of full TLS handshake in case of TLS session expiry or when reopening a socket due

to LTE connectivity loss or similar issue. The TLS and TCP sessions are released together only after "CLEAR" commands is applied to specified HTTP <profile_id>.

- 0 - disable (default value)
- 1 - enable

◦ <param4>: integer

- Optional cipher suite filtering option to be applied to the default list of supported ciphers for negotiation with server.
- 0 - white list
- 1 - black list
- 2 - no list (default value)

◦ <param5>: string

- Optional cipher suite list (white or black) as per https://www.iana.org/assignments/tls-parameters/tls-parameters.xhtml definition. All cipher suites in the list are encoded into single string using hexadecimal cipher suite ID separated by ";" (e.g., "C02C;C0AD...C003").

The list of permitted values to be inserted into string (refer to IANA site for exact definition).

"C02C"	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
"C030"	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
"009F"	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384
"C0AD"	TLS_ECDHE_ECDSA_WITH_AES_256_CCM
"C09F"	TLS_DHE_RSA_WITH_AES_256_CCM
"C024"	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384
"C028"	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384
"006B"	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256
"C00A"	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA
"C014"	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
"0039"	TLS_DHE_RSA_WITH_AES_256_CBC_SHA
"C0AF"	TLS_ECDHE_ECDSA_WITH_AES_256_CCM_8
"C0A3"	TLS_DHE_RSA_WITH_AES_256_CCM_8
"C02B"	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
"C02F"	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
"009E"	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
"C0AC"	TLS_ECDHE_ECDSA_WITH_AES_128_CCM
"C09E"	TLS_DHE_RSA_WITH_AES_128_CCM
"C023"	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256
"C027"	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256
"0067"	TLS_DHE_RSA_WITH_AES_128_CBC_SHA256
"C009"	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA
"C013"	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA
"0033"	TLS_DHE_RSA_WITH_AES_128_CBC_SHA
"C0AE"	TLS_ECDHE_ECDSA_WITH_AES_128_CCM_8

"C0A2"	TLS_DHE_RSA_WITH_AES_128_CCM_8
"009D"	TLS_RSA_WITH_AES_256_GCM_SHA384
"C09D"	TLS_RSA_WITH_AES_256_CCM
"003D"	TLS_RSA_WITH_AES_256_CBC_SHA256
"0035"	TLS_RSA_WITH_AES_256_CBC_SHA
"C032"	TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384
"C02A"	TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384
"C00F"	TLS_ECDH_RSA_WITH_AES_256_CBC_SHA
"C02E"	TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384
"C026"	TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384
"C005"	TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA
"C0A1"	TLS_RSA_WITH_AES_256_CCM_8
"009C"	TLS_RSA_WITH_AES_128_GCM_SHA256
"C09C"	TLS_RSA_WITH_AES_128_CCM
"003C"	TLS_RSA_WITH_AES_128_CBC_SHA256
"002F"	TLS_RSA_WITH_AES_128_CBC_SHA
"C031"	TLS_ECDH_RSA_WITH_AES_128_GCM_SHA256
"C029"	TLS_ECDH_RSA_WITH_AES_128_CBC_SHA256
"C00E"	TLS_ECDH_RSA_WITH_AES_128_CBC_SHA
"C02D"	TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA256
"C025"	TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256
"C004"	TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA
"C0A0"	TLS_RSA_WITH_AES_128_CCM_8
"C008"	TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA
"C012"	TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA
"0016"	TLS_DHE_RSA_WITH_3DES_EDE_CBC_SHA
"000A"	TLS_RSA_WITH_3DES_EDE_CBC_SHA
"C00D"	TLS_ECDH_RSA_WITH_3DES_EDE_CBC_SHA
"C003"	TLS_ECDH_ECDSA_WITH_3DES_EDE_CBC_SHA

- For "IP", <param1> to <param4> are used:
  - <param1>: integer
    - Optional PDN identifier (see AT%PDNSET for more details about <ext_session_id>). If omitted default data PDN is used.
  - <param2>: integer
    - Optional IP type used to configure preferred IP type for connection.
    - 0 - IPv4v6 (default)
    - 1 - IPv4
    - 2 - IPv6
  - <param3>: integer
    - Optional; optional destination (server) TCP port number. If omitted default HTTP port number is used.
    - 1 - 65535

- <param4>: integer
  - Optional; Reserved

For "FORMAT", <param1> to <param3> are used:

- <param1>: integer
  - Optional data transfer format for the UART interface
  - 0 - Data text mode (default value)
  - 1 - Data PDU (ASCII encoded hex) mode
- <param2>: integer
  - Optional; AT response header (RSH) presence as part of <data> parameter in AT%HTTPREAD
  - 0 - disable
  - 1 - enable (default value)
- <param3>: integer
  - Optional; AT request header (RQH) presence as a part of <data> parameter in AT%HTTPSEND. If feature is enabled, all HTTP header override parameters in AT%HTTPSEND are irrelevant and ignored.
  - 0 - disable (default value)
  - 1 - enable

For "TIMEOUT", <param1> is used:

- <param1>: integer
  - server response timeout (seconds). 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.
  - 1 - 65535

3.3.25 AT%HTTPCMD

Table 3-30 AT%HTTPCMD Command Syntax

Command	Possible response(s)
AT%HTTPCMD=<cmd>,<profile_id>,[<uri>][,<param1>,...]	OK or ERROR
AT%HTTPCMD?	ERROR (not supported)
AT%HTTPCMD=?	%HTTPCMD: (list of supported <cmd>s), (list of supported <profile_id>s) OK

Description

- This command is used to send a GET or DELETE request to the HTTP server. All sub-commands are unblocking. The final status of the HTTP operation will be provided in a %HTTPEVU URC.

Defined Values

<cmd>: string

- "GET" - Send HTTP GET.
- "DELETE" - Send HTTP DELETE.

<profile_id>: integer

- Profile ID specified in %HTTPCFG.
- 1-5

<uri>: string

- Optional resource (URI) or requested object. If omitted the default IP/URI defined in AT%HTTPCFG will be used.

For "GET", the following <param> may be specified:

- <param1>: integer
  - Optional parameter. Specify the format for downloaded data transfer and override any defined by AT%HTTPCFG="FORMAT".
  - 0 - Data text mode (default value)
  - 1 - Data PDU (ASCII encoded hex) mode
- <param2>: integer
  - Optional parameter. Specify the response header presence and override any setting by AT%HTTPCFG="FORMAT".
  - 0 - disable
  - 1 - enable (default)
- <param3>-<param13>: string
  - Optional HTTP extra header line. These parameters are ignored if AT%HTTPCFG="FORMAT" either specifies "Data PDU" format or HTTP header is part of <data> content. The number of extended headers is limited by 11 or by overall AT command buffer size, whichever is encountered first.

3.3.26 AT%HTTPEV

Table 3-31 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) OK
unsolicited	%HTTPEVU:<ev_type>,<profile_id>,<state>[,<res1> [,<res2>,...]]

Description

- This command is used to notify the host about HTTP events.
- By default, URC is disabled for all event types. Most of the events are related to asynchronous operation triggered by AT%HTTPCMD/HTTPSEND. Enable the URC if message body in server response is needed.
- The "GETRCV" and "PRSPRCV" events are also issued if new data is available for retrieval by AT%HTTPREAD.

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

Defined Values

<ev_type>: string

- "PUTCONF" - PUT confirmation status
- "POSTCONF" - POST confirmation status
- "DELCONF" - DELETE confirmation status
- "GETRCV" - GET data arrival event
- "PRSPRCV" - PUT/POST response download resumed event
- "SESTERM" - Session terminated remotely or locally
- "ALL" - All events, used only in execution command
- Others - Reserved

<mode>: integer

- Unsolicited result response presentation
- 0 – Disabled (default)
- 1 – Enabled

<profile_id>: integer

- 1-5: The profile ID (identifier)

<state> - integer

- The operation result status
- 0 - success, relevant for "xxxCONF"/"GETRCV"/"PRSPRCV".
- 1 – GET/POST/PUT/DELETE HTTP transaction failure, relevant for "xxxCONF"/"GETRCV".
- 2 - Session terminated by server, relevant for "SESTERM".

- 3 - Session terminated locally due to session initiation or handling failures. Relevant for "SESTERM".
- 4 - Session terminated locally due to timeout waiting for the respond to be received. Relevant for "SESTERM".
- 5 - Session terminated locally due to TLS authentication failure. Relevant for "SESTERM".

For "GETRCV" event reporting successful result (<state>=0):

<res1>: integer

- Actual data size in bytes received from server until now.
- More data may be received before data retrieval by AT%HTTPREAD. Length depends on read mode (with or without header).

<res2>: integer

- Optional "Content length" from HTTP header, if present.

For other events:

<res1>: integer

- Optional status or error code. Its availability depends on the <state> value as described below.
- For <state>=0,1 (HTTP protocol success or error status):
  - HTTP status code as defined in RFC 7231, sec.8.2.3
- For <state>=3 (HTTP client local error):
  - 1 - Wrong parameter like value out of range
  - 2 - Buffer allocation fail
  - 3 - Failed to create socket
  - 4 - Failed to convert the IP address
  - 6 - Failed to send message
  - 7 - Failed to receive message
  - 8 - URL translation error or certification files do not exist on path
  - 10 - DNS client could not retrieve IP address from DNS server
  - 11 - HTTP header version not supported by http client
  - 12 - HTTP header not include the length of file download
  - Others - Reserved
- For <state>=5 (TLS error):
  - 255 - Other TLS errors
  - 256 - An invalid SSL record was received.
  - 257 - The server has no cipher suite in common with the client.

- 260 - No CA Chain is set, but required to operate
- 261 - A fatal alert message was received from our peer
- 262 - Verification of our peer failed.
- Others - Reserved

For "PUTCONF", "POSTCONF" and "PRSPRCV":

<res2>: integer

- Actual data size in bytes received from the server until now. More data may be received before data retrieval by AT%HTTPREAD. Length depends on read mode (with or without header).

<res3>: integer

- Optional "Content length" from HTTP header, if present.

3.3.27 AT%HTTPREAD

Table 3-32 AT%HTTPREAD Command Syntax

Command	Possible response(s)
AT%HTTPREAD=<profile_id>[,<max_len>]	[%HTTPREAD: <data_len>,<rcv_len> <CR><LF><data>] OK/ERROR
AT%HTTPREAD?	[%HTTPREAD: <profile_id>,<rcv_len> [<CR><LF>HTTPREAD: <profile_id>,<rcv_len> [...]]] OK
AT%HTTPREAD=?	%HTTPREAD: (list of supported <profile_id>s) OK

Description

- This command is used to read the HTTP response from the server as indicated by the URC %HTTPEVU.
- If there is no data for the specified <profile_id>, the command returns ERROR.

Only a single internal receiver buffer is available per <profile_id>, so if the buffered data are not read by the host in time, they may be override by subsequent incoming HTTP data.

The following describes the relationship between <max_len>, <data_len> and <rcv_len>:

- If <max_len> is less than <rcv_len>, only <max_len> (= <data_len>) bytes of the received data will be transferred to the host, and (<rcv_len> - <data_len>) bytes remain in the buffer. Any additional data waiting to be read will be indicated by new %HTTPEV: "GETRCV" URC

or by %HTTPEV: "PRSPRCV" URC. The host can use AT%HTTPREAD again to get the remaining data.

- If <max_len> is no less than <rcv_len>, then only <rcv_len> (= <data_len>) bytes are send to the host.

Defined Values

<profile_id>: integer

- The profile ID as defined by %HTTPCFG

<max_len>: integer

- Optional max size of data to read from receive buffer. Actual number of bytes read depends on encoding
- Data text mode: 1 - 3000 bytes
- Data PDU (hex) mode: 1 - 1500 (total of 2 – 3000 bytes due to encoding)

<data_len>: integer

- Data size returned in %HTTPREAD response.
- Data text mode: 1 - 3000 bytes
- Data PDU (hex) mode: 1 - 1500 (total of 2 – 3000 bytes due to encoding)

<rcv_len>: integer

- Data received from server and stored in the internal buffer. The number of bytes is <rcv_len> and 2 × <rcv_len>, respectively, for text and PDU mode.

<data>:

- Received HTTP payload without quotes

3.3.28 AT%HTTPSEND

Table 3-33 AT%HTTPSEND Command Syntax

Command	Possible response(s)
AT%HTTPSEND=<cmd>,<profile_id>,[<data_len>], [<uri>][,<param1>,...] <CR><data>	OK or ERROR
AT%HTTPSEND?	[%HTTPSEND: <profile_id>,<busy_len>,<free_len> [<CR><LF>%HTTPSEND: <profile_id>,<busy_len>,<free_len>...]] OK
AT%HTTPSEND=?	%HTTPSEND: (list of supported <cmd>s),(list of supported <profile_id>s) OK

Description

- This command is used to send a POST or PUT request to the HTTP server. The final status of the HTTP operation will be provided in a %HTTPEVU URC.

- The <data_len> parameter may be omitted. In this case, <data> must be terminated with Ctrl+Z (ASCII code 0x1A).

Defined Values

<cmd>: string

- "PUT" - Send HTTP PUT.
- "POST" - Send HTTP POST.
- Others - Reserved

<profile_id>: integer

- Profile ID specified in %HTTPCFG.

<uri>: string

- Optional resource (URI) or requested object. If omitted the default IP/URI defined in AT%HTTPCFG will be used.

<data_len>: integer

- Data size send in <data>. Actual number of bytes sent depends on encoding.
- Data text mode: 1 - 3000 bytes
- Data PDU (hex) mode: 1 - 1500 (total of 2 – 3000 bytes due to encoding)

<data>:

- HTTP payload to send without quotes

For <param3>=0 of AT%HTTPCFG="FORMAT" (<data> does not contain HTTP header)

<param1>: string:

- Optional HTTP Content Type identifier. This parameter may be omitted if default text/plain content is transferred.
- This parameter must be specified if "Data PDU" format is selected by AT%HTTPCFG="FORMAT".

<param2>: integer:

- Optional parameter. Amount of pending data which is waiting to be sent using the same POST/PUT sub-commands.
  - 0 - This is the last POST/PUT chunk (default value)
  - 1+ - Size of remaining pending data to send chunk by chunk in subsequent AT%HTTPSEND commands.

<param3>: integer:

- Optional parameter. Override the format/technique of uploaded data transfer (default or as defined by AT%HTTPCFG="FORMAT").
  - 0 - Data text mode (default value)
  - 1 - Data PDU (ASCII encoded hex) mode

<param4>-<param11>: string:

- Optional HTTP extra header line. Number of extended headers is limited by 8 or by overall AT command buffer size, whichever limit is exceeded first. Note that these parameters, if present, reduce the space available to send <data> since the entire AT command must fit in the same AT command buffer.
- This parameter is ignored if "Data PDU" format is selected by AT%HTTPCFG="FORMAT".

3.3.29 %BOOTEV (unsolicited)

Table 3-34 %BOOTEV URC Event Syntax

Command	Possible Response(s)
(unsolicited result code)	%BOOTEV: <boot_reason>

Description

- Unsolicited event to inform Host about boot type; it is normally sent as a first URC after boot procedure has been completed.

Notes:

- This URC by default is disabled (see "manager.urcBootEv.enabled" field in AT%SETACFG)

Defined Values

<boot_reason>: integer

- Indicates the boot reason
- 0 – unknown
- Others -- Reserved

3.3.30 AT%MQTTCFG

Table 3-35 AT%MQTTCFG Command Syntax

Command	Possible Response(s)
AT%MQTTCFG=<obj>,<conn_id>[,<param 1>[, <param2>]...]]	OK or ERROR
AT%MQTTCFG?	ERROR (not supported)
AT%MQTTCFG=?	%MQTTCFG: (list of supported <cmd>s) ,(list of supported <conn_id>s) OK

Description

- This command is used to configure MQTT connection parameters.
- The "NODES" parameters must be defined before starting an MQTT connection.
- If "TLS" layer is not configured, unsecured connection will be used.
- If "IP" layer is not configured, default PDN, IP type and default MQTT ports will be used.
- If "PROTOCOL" parameters are not configured, default protocol parameters will be selected.
- If "WILLMSG" parameters are not configured, no Will message will be used.

Notes:

ⓘ To ensure that the proper values are used, it is recommended to call "CLEAR" sub-command before entering new configurations for previously used <conn_id>.

Defined Values

<obj>: string

- "NODES" - configure client & server nodes parameters
- "TLS" - configure TLS layer security parameters
- "IP" - configure IP layer parameters.
- "WILLMSG" - configure MQTT will message
- "PROTOCOL" - configure MQTT protocol parameters.
- "CLEAR" - clear all previous configuration settings for specified <conn_id>
- Others - Reserved

<conn_id> - integer

- User specified connection ID
- 1-5

For "NODES", <param1> to <param4> are used:

- <param1>: string
  - Unique client ID used to connect to the broker
  - Up to 127 bytes
- <param2>: string
  - Broker URL or IP address.
  - Up to 255 bytes
- <param3>: string
  - Optional username for broker authentication

- Up to 255 bytes
- <param4>: string
  - Optional password for broker authentication
  - Up to 255 bytes

For "TLS", <param1> to <param2> are used:

- <param1>: integer
  - TLS authentication mode
  - 0 - mutual authentication (default)
  - 1 - authenticate client side only
  - 2 - authenticate server side only
  - 3 - no authentication
- <param2>: integer
  - Predefined authentication context (profile) configured by AT%CERTCFG.

For "IP", <param1> to <param3> are used:

- <param1>: integer
  - PDN identifier; see AT%PDNSET for more details about <ext_session_id>
- <param2>: integer
  - Optional IP type used to configure preferred IP type for connection.
  - 0 - IPv4v6 (default)
  - 1 - IPv4
  - 2 - IPv6
- <param3>: integer
  - Optional destination (server) TCP/UDP port number. If omitted, default MQTT port number is used.
  - 1-65535

For "WILLMSG", <param1> to <param5> are used:

- <param1>: integer
  - Will message presence
  - 0 - disable (default)
  - 1 - enable
- <param2>: integer
  - Will message QoS value.
  - 0 - at most once delivery (default value)
  - 1 - at least once delivery

        - 2 - exactly once delivery
    - <param3>: integer
        - Will message retain - whether the Will Message will be retained across disconnects
        - 0 - disable (default); Will Message will not be retained at the MQTT server across disconnects from MQTT client
        - 1 – enable; Will Message will be retained at the MQTT server across disconnects from MQTT client (until superseded by another message)
    - <param4>: string
        - Will Topic - Standard MQTT Topic Name.
        - Up to 127 bytes.
    - <param5>: string
        - Will message defines the content of the message that is published to the Will topic if the client is unexpectedly disconnected.
        - Up to 127 bytes.

For "PROTOCOL", <param1> to <param3> are used:

- <param1>: integer
    - MQTT protocol type for connection
    - 0 - MQTT (default)
- <param2>: integer
    - Keep-alive time (seconds) which defines the maximum time interval between messages received from a client. The default value is 600 sec (10 min).
    - 0 - no timeout, keep-alive deactivated
    - 1 - 65535 (18 hours, 12 minutes and 15 seconds.)
- <param3>: integer
    - Optional Clean session flag
    - 0: the server must store the subscriptions of the client after it disconnects
    - 1: the server must discard any previously maintained information about the client and treat the connection as “clean”. (Default)

3.3.31 AT%MQTTCMD

Table 3-36 AT%MQTTCMD Command Syntax

Command	Possible response(s)
AT%MQTTCMD=<cmd>,<conn_id>[,<param1>,<param2>[,<param3>[,[<param4>][,<param5>]]]] [<CR><LF><data>]	For "**SUBSCRIBE**"/"**UNSUBSCRIBE**"/"**PUBLISH**": %MQTTCMD: <msg_id> OK or ERROR

AT%MQTTCMD?	ERROR (not supported)
AT%MQTTCMD=?	%MQTTCMD: (list of supported <cmd>s) ,(list of supported <conn_id>s) OK

Description

- This command is used to send a request to the MQTT server (broker). All commands are unblocking. The final status of the MQTT operation will be provided in a %MQTTEVU URC.
- The Will message used in "CONNECT" shall be predefined in AT%MQTTCFG.
- The "PUBRCV" URC can provide incoming publication data in the <data> parameter only for textual or pseudo-textual data transfer (i.e. JSON, PEM, B64, etc.). Arbitrary binary data transfer is possible only to a file. Use AT%MQTTCMD="SUBSCRIBE" to define the filename for binary data download.
- The "PUBLISH" command provides 2 mechanisms to publish data:
    - Only textual or pseudo-textual (e.g., JSON, B64, etc.) data transfer is permitted for direct AT call using <data> parameter.
    - Arbitrary binary data transfer is possible only from file.
- The "SUBSCRIBE" with defined filename parameter will cause all publications from the server to be stored into the file and indicated by %MQTTEVU: "PUBRCV" URC. Use different filenames for different <conn_id> and topic names to prevent potential file override.

Defined Values

<cmd>: string

- "CONNECT" - Start connection with endpoint
- "DISCONNECT" - End connection with endpoint
- "SUBSCRIBE" - Subscribe to a topic on the endpoint
- "UNSUBSCRIBE" - Stop subscription to a topic on the endpoint
- "PUBLISH" - Send publish packet to endpoint

<conn_id>: integer

- Connection ID specified in %MQTTCFG.

<msg_id>: integer

- Message ID (automatically generated by FW).
- 1-65535

For "CONNECT"/"DISCONNECT": no <param>/<data>

For "SUBSCRIBE", <param1> to <param3> are used:

- <param1>: integer
    - QoS level at which the client wants to subscribe to the message.
    - 0 - at most once delivery

        - 1 - at least once delivery
        - 2 - exactly once delivery
    - <param2>: string
        - Subscription topic name
        - Up to 255 bytes
    - <param3>: string
        - Optional filename to store received publications on b:/.
        - Up to 255 bytes

      User shall specify only filename for "SUBSCRIBE" sub-command. Any attempt to specify full path in this command will be rejected with ERROR.

For "UNSUBSCRIBE", <param1> is used:

    - <param1>: string
        - Subscription topic name
        - Up to 255 bytes

For "PUBLISH", <param1> to <param5> and <data> are used:

    - <param1>: integer
        - QoS level at which the client wants to publish the message.
        - 0 - at most once delivery (default value)
        - 1 - at least once delivery
        - 2 - exactly once delivery
    - <param2>: integer
        - Specify whether the server will retain the message after it has been delivered to the current subscribers
        - 0 - The server will not retain the message after it has been delivered to the current subscribers
        - 1 - The server will retain the message after it has been delivered to the current subscribers
    - <param3>: string
        - Publication topic name
        - Up to 255 bytes
    - <param4>: integer
        - Actual data size in bytes for transfer to server
        - 0 - undefined, publish from file
        - 1 to 3000 bytes for Data text mode
    - <param5> - string

- Optional parameter. Full path to file to publish from. The name of the file itself is limited to 28 bytes.

<data> - ASCII payload without quotes

3.3.32 AT%MQTTEV

Table 3-37 AT%MQTTEV Command Syntax

Command	Possible response(s)
AT%MQTTEV=<ev_type>,<mode>	OK/ERROR
AT%MQTTEV?	ERROR (not supported)
AT%MQTTEV=?	%MQTTEV: (list of supported <ev_type>s),(list of supported <mode>s) OK
unsolicited	%MQTTEVU:<ev_type>,<conn_id>[,<res1>[,<res2>[,<res3>[,<res4>,<res5>]]][<CR><LF><data>]]

Description

- This command is used to notify the host about MQTT events.
- By default, URC is disabled for all event.
- The "PUBRCV" event provides notification about data received from the server, to which the client already subscribed by AT%MQTTCMD="SUBSCRIBE".

The "PUBRCV" URC can provide incoming publication data in the <data> parameter only for textual or pseudo-textual (i.e. JSON, PEM, B64, etc.) data transfer. The arbitrary binary data transfer is possible only to file on b:/. Use AT%MQTTCMD="SUBSCRIBE" to define filename for binary data download.

AT%MQTTCMD="PUBLISH" with QoS=0 will not send any acknowledge message and <ev_type>="PUBCONF" is not generated.

Defined Values

<ev_type>: string

- "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
- "PUBRCVSTORFAIL" – Incoming publication message store failure

- "CONNFAIL" - Connection failure
- "ALL" - All events, used only in execution command
- Others - Reserved

<mode>: integer
- Unsolicited result response presentation
- 0 – Disabled (default)
- 1 – Enabled

<conn_id>: integer
- Connection ID specified in %MQTTCFG.

For "CONCONF/"DISCONF ":

<res1>: integer
- 0 – success
- 1 – fail

<res2>: integer
- Optional error code.
- 0 – no error
- 1 – error

For “UNSCONF”:

<res1>: integer
- Message ID
- 1-65535

<res2>: integer
- 0 – success
- 1 – fail

<res3>: integer
- Optional; Reserved

For “SUBCONF”/ “PUBCONF”:

<res1>: integer
- Message ID
- 1-65535

<res2>: integer
- 0 – success
- 1 – fail

<res3>: integer

- Optional; Reserved

For “PUBRCV"/"PUBRCVSTORFAIL”:

<res1>: integer

- Message ID. It may be zero (undefined) for QoS=0.
- 0 - undefined
- 1-65535

<res2>: string

- Publication topic name
- Up to 255 bytes

<res3>: integer

- Size of data in bytes transferred by this URC. If this parameter is equal to zero, no <data> is included in the same URC.

<res4>: integer

- Optional data size in bytes stored into file

<res5> - string

- Optional parameter. Filename where received publication has been stored (or failed attempt to be stored for "PUBRCVSTORFAIL") on b:/.

For “CONNFAIL”: there is no optional parameter

<data> - ASCII payload without quotes

3.3.33 AT%CSQ

Table 3-38 AT%CSQ Command Syntax

Command	Possible Response(s)
AT%CSQ	%CSQ: <rsrp>,<ber>,<rsrq> OK
AT%CSQ?	ERROR (not supported)
AT%CSQ=?	%CSQ:(0-31,99),(0-7,99),(0-34,99) OK

Description

- This command is used to retrieve the received signal quality as indicated.

Defined Values

<rsrp>: integer

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

<ber>: integer

- Channel bit error rate
- 0...7 as RXQUAL values in the table in TS 45.008 subclause 8.2.4
- 99: not known or not detectable

<rsrq>: integer

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

3.3.34 AT%STATUS

Table 3-39 AT%STATUS Command Syntax

Command	Possible Response(s)
%STATUS=<subsystem>	For <subsystem> of “EMM”: EMM: <status> OK For <subsystem> of “RRC”: RRC: <status> OK For <subsystem> of “UICC”: UICC: <status>

	OK

Description

- This command retrieves the status of the specified UE subsystem.

Defined Values

<subsystem>: string

- “EMM”
- “RRC”
- “UICC”
- Others - Reserved

<status>:

- Status of current <subsystem>.
- The following integer values are defined for “EMM”
  - 1 - EMM_NULL
  - 2- EMM_DEREGISTERED_NORMAL_SERVICE
  - 3- EMM_DEREGISTERED_ATTEMPTING_TO_ATTACH
  - 4 - EMM_DEREGISTERED_PLMN_SEARCH
  - 5- EMM_DEREGISTERED_NO_IMSI
  - 6- EMM_DEREGISTERED_ATTACH_NEEDED
  - 7- EMM_DEREGISTERED_NO_CELL_AVAILABLE
  - 8 - EMM_DEREGISTERED_ATTACH_ACCEPT_RECEIVED
  - 9- EMM_DEREGISTERED_REGISTRATION_INITIATED
  - 10 - EMM_DEREGISTERED_LIMITED_SERVICE
  - 11- EMM_REGISTERED_LIMITED_SERVICE
  - 12 - EMM_REGISTERED_NORMAL_SERVICE
  - 13- EMM_REGISTERED_ATTEMPTING_TO_UPDATE
  - 14- EMM_REGISTERED_PLMN_SEARCH
  - 15- EMM_REGISTERED_UPDATE_NEEDED
  - 16- EMM_REGISTERED_NO_CELL_AVAILABLE
  - 17- EMM_REGISTERED_ATTEMPTING_TO_UPDATE_MM
  - 18- EMM_REGISTERED_IMSI_DETACH_INITIATED
  - 19 - EMM_REGISTERED_NO_CELL_AVAILABLE_PSM_ACTIVE

- 20- EMM_REGISTERED_DEREGISTERATION_INITIATED
- 21- EMM_REGISTERED_TRACKING_AREA_UPDATING_INITIATED
- 22- EMM_REGISTERED_SERVICE_REQUEST_INITIATED
- Others - Reserved

- The following unquoted words are defined for “RRC”
  - IDLE
  - CONNECTED
  - UNKNOWN - Used for all other states (init, standby, flight mode, etc.)
  - Others - Reserved

- The following integer values are defined for “UICC”
  - 0 – SIM is not inserted
  - 1 – SIM inserted, init is in progress
  - 2 – SIM init passed, wait for PIN unlock
  - 3 – Personalization failed, wait for run-time depersonalization
  - 4 – Activation completed
  - 5 – Activation completed
  - Others - Reserved

3.3.35 AT%PCONI

Table 3-40 AT%PCONI Command Syntax

Command	Possible Response(s)
AT%PCONI[="COMPR"]	For **COMPR** mode: %PCONI: <duplexing mode>,[<tm>],[<bw>],<EARFCN>,<eci>,[<pci>],[<HNBN>],<band>[,<nwo_femtocell_ind>] OK/ERROR For **non-COMPR** mode: duplexing mode: <duplexing mode> Transmission mode: <antenna/TX mode> Bandwidth: <bw> EARFCN: <EARFCN> Global Cell ID: <eci>

	Physical Cell ID: <pci> HNBN: <HNBN> OK/ERROR

Description

- This command returns physical connectivity and eNB parameters info; ERROR is returned if connection to eNB is not established yet.

ⓘ Note: for uncompressed format, string and hexadecimal parameters are returned without quotes.

Defined Values

<duplexing mode> - string

- "FDD"

<tm> - string

- transmission mode, of form “tmX”

<antenna/TX mode> - Reserved

<bw> - integer

- Reserved

<EARFCN> - integer

- As per 3GPP encoding for EARFCN for E-UTRAN.

<eci> - hexadecimal

- As per 3GPP encoding for E-UTRAN cell ID.

<pci> - integer

- As per 3GPP encoding for Physical cell ID for E-UTRAN.

<HNBN> - string

- Home eNB name encoded in SIB9 (string size up to 48 symbols).
- In compressed mode unsupported HNBN could be omitted or return "N/A"
- Not supported in NB-IoT

<band> - integer

- As per 3GPP encoding for band for E-UTRAN.

<nwo_femtocell_ind> - integer

- Reserved

3.3.36 AT%RSTINFO

Table 3-41 AT%RSTINFO Command Syntax

Command	Possible response
AT%RSTINFO	%RSTINFO: <rst_type>[,<rst_cause>[,<cpu>[,<failure_type>]]] OK
AT%RSTINFO?	ERROR (OPRATION_NOT_ALLOWED)
AT%RSTINFO=?	OK

Description:

- This command is used to get reset cause information after boot.

Defined values:

<rst_type>: integer

- Reset type
- 0 - power on, no reset
- 1 - boot caused by reset

<rst_cause>: integer

- Reset cause
- 1 - shutdown button
- 7 - user triggered (i.e. ATZ)
- 9 - FW upgrade triggered
- Others - Reserved

<cpu >: Reserved

<failure_type >: Reserved

3.3.37 AT%CEER

Table 3-42 AT%CEER Command Syntax

Command	Possible response
AT%CEER= <mode>,<clear_err>[,<rep_type>]	OK/ERROR
AT%CEER?	%CEER: <mode>[,<module>, <procedure>, <failure>[,[<reject_cause>][,[<error_info>][,<EARFCN>,<pci>,<oper>,<tac>]]]] OK
(unsolicited)	%CEER: <module>,<procedure>,<failure> [,[<reject_cause>][,[<error_info>][,<EARFCN>,<pci>,<oper>,<tac>]]]

Description:

- Enable URC report or read the latest failure information which can be used for debugging purposes.

Defined values:

<mode>: integer

- Status of unsolicited result response presentation
- 0 – Disabled (default)
- 1 – Enabled

<clear_err>: integer

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

<rep_type>: integer

- Optional reporting type to enable report extensions. Regular reporting is truncated after <error info> parameter.
- 0 – Regular (default)
- 1 – Extended with failure cell identity (EARFCN, PCI, PLMN, TAC)

<module>: string

- Describe protocol layer/entity involved in the failure

<procedure>: string

- Describe <module> procedure involved in the failure

<failure>: string

- Describe failure type

<reject_cause>: <module> specific text/integer

- Reject code per <module> protocol definition

<error_info>: <module> specific text

- Text providing additional information about failure

<EARFCN>: Reserved

<pci>: Reserved

<oper>: Reserved

<tac>: Reserved

3.3.38 AT%NOTIFYEV

Table 3-43 AT%NOTIFYEV Command Syntax

Command	Possible Response(s)
AT%NOTIFYEV= <ev_type>,<mode>	OK/ERROR

AT%NOTIFYEV?	ERROR (not supported)
AT%NOTIFYEV=?	%NOTIFYEV: (list of supported <ev_type>s), (list of supported <mode>s) OK
(unsolicited)	%NOTIFYEV:<ev_type>[,<param1>[,<param2>]...]

Description

- This command is used to notify about specified events.
- Reporting for all event types is disabled by default at wakeup time.

Defined Values

< ev_type >: string

- "SIMD" - SIM inserted/removed state change. See the "*Optional SIM detection*" description in AT%SETSYSCFG for the necessary configurations.
- All other values are reserved

<mode>: integer

- Unsolicited result response presentation
- 0 - Disabled
- 1 – Enabled

"SIMD" events:

- 0 – SIM removed
- 1 – SIM inserted

3.3.39 AT%CCLK

Table 3-44 AT%CCLK Command Syntax

Command	Possible response
AT%CCLK?	%CCLK:<time>[,<dst>[,<utc>[,<leap>]]] OK

Description

- The command returns the current time.

Notes:

- The optional <dst> parameter is reported only if provided in NAS message.

Defined Values

<time>: string

- Time as encoded in +CCLK response defined in 3GPP 27.007 (yy/mm/dd,hh:mm:ss+-zz)

<dst>: integer

- Indicates whether <time> includes Daylight Savings Time 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

<utc>: integer

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

<leap>: integer

- The leap seconds offset between GPS Time and UTC.

3.3.40 AT%AWSIOTCFG

Table 3-45 AT%AWSIOTCFG 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) OK

Description

- This command is used to configure AWS IOT cloud connection parameters.
- To start a new AWS IOT connection, at least the "CONN" parameters should be defined.
- If "IP" parameters are not configured, default IP parameters will be selected (see below).
- If "PROTOCOL" parameters are not configured, default protocol parameters will be selected (see below).
- "PROTOCOL" parameters must be configured after "CONN" parameters and "IP" parameters have been configured.

The certificate of a trusted root CA is pre-installed into module to support proper AWS security level. If the selected TLS certificate profile contains <ca_file> or <ca_path> fields (see AT%CERTCFG), this AT command returns ERROR.

Defined values

<cmd>: string

- "CONN"- configure connection parameters
- "IP" - configure IP layer parameters
- "PROTOCOL"- configure MQTT protocol parameters

For "CONN", <param1> to <param3> are used:

- <param1> - string
  - Endpoint URL up to 127 bytes
- <param2> - integer
  - TLS predefined authentication context (<profile_id>) previously configured by AT%CERTCFG
- <param3> - string
  - Optional unique client ID used to connect to the broker. The IMEI is used as client ID by default.
  - Up to 255 bytes

For " IP ", <param1> to <param2> are used:

- <param1> - integer
  - numeric PDN identification (see <ext_session_id> in AT%PDNSET)
- <param2> - integer
  - Optional IP type used to configure the IP type for the connection
  - 0 - IPv4v6 (default value)
  - 1 - IPV4
  - 2 - IPV6

For " PROTOCOL", <param1> to <param3> are used:

- <param1> - integer
  - Optional MQTT keep-alive time in seconds. Default 1200 sec (20 min).
  - 1-1200
- <param2> - integer
  - Optional QoS setting for "PUBLISH"
  - 0 - with no confirmation (default value)
  - 1 - confirmed (acknowledged)
- <param3> - integer
  - Optional clean session flag
  - 0 - the server must store the subscriptions of the client after it disconnects

- 1 - the server must discard any previously maintained information about the client and treat the connection as "clean". (Default)

3.3.41 AT%AWSIOTCMD

Table 3-46 AT%AWSIOTCMD Syntax

Command	Possible response(s)
AT%AWSIOTCMD=<cmd>[,<param1>[,<param2>]]	For "SUBSCRIBE"/"UNSUBSCRIBE"/"PUBLISH": [%AWSIOTCMD: <msg_id>] OK/ERROR For others: OK/ERROR
AT%AWSIOTCMD?	ERROR (not supported)
AT%AWSIOTCMD=?	%AWSIOTCMD: (list of supported <cmd>s) OK

Description

- This command is used to communicate with the AWS IoT message broker.
- All commands are unblocking.
- If %AWSIOTEV URC is enabled, more info is provided in %AWSIOTEVU URC.

ⓘ Message ID may be used to pair subscribe, unsubscribe and publish (confirmed) messages with their URCs.

Defined Values

<cmd>: string

- "CONNECT" - Start connection
- "DISCONNECT" - End connection
- "SUBSCRIBE" - Subscribe (register) to the topic on the endpoint
- "UNSUBSCRIBE" - Stop subscription (unregister) from the topic on the endpoint
- "PUBLISH" - Publish (send) packet to endpoint

For "SUBSCRIBE", <param1> is used:

- <param1> - string
  - The subscription topic name
  - Up to 255 bytes

For "UNSUBSCRIBE", <param1> is used:

- <param1> - string
  - The subscription topic name.
  - Up to 255 bytes

For " PUBLISH ", <param1> to <param2> are used:

- <param1> - string
  - The publication topic name
  - Up to 255 bytes
- <param2> - string
  - Textual message that appears in the publication
  - Max size 3000 bytes

<msg_id> - integer

- Message ID
- 0 – not in use
- 1-65535

3.3.42 AT%AWSIOTEV

Table 3-47 AT%AWSIOTEV 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) OK
(unsolicited)	%AWSIOTEVU:<ev_type>[,<res1>[,<res2>[,<res3>]]]

Description

- This command is intended to notify about AWS IOT events.
- Default mode is URC disabled for all events.

Notes

- Most of the events are related to asynchronous operation triggered by AT%AWSIOTCMD.
- “PUBRCV" is enabled by the first call of AT%AWSIOTCMD="SUBSCRIBE".

- Only "PUBRCV" event provides the data from the topic to which the client had pre-subscribed (pre-registered) by AT%AWSIOTCMD="SUBSCRIBE".
- AT%AWSIOTCMD="PUBLISH" in unconfirmed mode (no ACK) will not send any acknowledge message and <ev_type>="PUBCONF" is not generated.
- Message ID may be used to pair subscribe, unsubscribe and publish (confirmed) messages sent by AT%AWSIOTCMD with their URCs.

ⓘ If a TCP session is disconnected because of link lost, no URC is sent.

Defined Values

<ev_type> - string

- "CONCONF" - Connect procedure confirmation status
- "DISCONF" - 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> - integer

- Status of unsolicited result response presentation
- 0 - disabled (default)
- 1 - enabled

For "CONCONF/"DISCONF":

- <res1> - integer
  - Result code
  - 0 - success
  - 1 - fail

For "SUBCONF"/"UNSCONF"/"PUBCONF":

- <res1> - integer
  - Message ID
  - 0 - not in use
  - 1-65535
- <res2> - integer

- Result code
- 0 - success
- 1 - fail

For "PUBRCV":

- <res1> - string
  - The publication topic name
  - Up to 255 bytes
- <res2> - string
  - Publication message content received from endpoint
  - Textual publication message content received from endpoint
  - Max size 3000 bytes

For "CONNFAIL": there is no optional parameter

3.3.43 AT%CEDRXS

Table 3-48 AT%CEDRXS Command Syntax

Command	Possible response
AT %CEDRXS=<ptw>	OK/ERROR
AT%CEDRXS?	ERROR (not supported)
AT%CEDRXS=?	OK

Description

- The command sets the PTW value to propose to the network.

Notes:

- The change will be applied after next TAU or re-attach only.
- Persistency of the <ptw> update is determined by `modem_apps.Mode.AtCmdSetPersistence` (see AT%SETACFG).

Defined Values

<ptw>: integer

- LTE-specific paging transmission window. Default value is 0.
- The mapping between <ptw> and actual time is listed in the table below.

<ptw>	Cat-M1 duration (seconds)	NB-IoT duration (seconds)

0	1.28	2.56
1	2.56	5.12
2	3.84	7.68
3	5.12	10.24
4	6.4	12.8
5	7.68	15.36
6	8.96	17.92
7	10.24	20.48
8	11.52	23.04
9	12.8	25.6
10	14.08	28.16
11	15.36	30.72
12	16.64	33.28
13	17.92	35.84
14	19.20	38.4
15	20.48	40.96

4 Technical Support Contact

For technical support and to obtain the most current firmware release, please contact us at ciotsupport@murata.com.