AT Commands Interface

Altair Software 201, Rev 12

July 2017

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Document Revision Control

Rev	Date	R&D Revision (Standard / Proprietary)	Description
1	June, 2015	V1.31/ V3.91	Preliminary version
2	October, 2015	V2.00/ V4.20	• Extended AT%TRSHCMD for release# modification. • Updated %NPEV command. • Added an AT%MEAS=”93” to return the network time with its corresponding TTI. • Extended AT%TRSHCMD for new NP sleep timer modifications. • Extended %STATUS with new "UICC" subcommand. • Added a support for &F command. • Added a support for AT+CTZR and AT+CTZU. • Updated unsolicited %NOTIFYEV:"LTIME". • Added SIM handling sub-command to AT%TRSHCMD. • Modified DHCPv6-light configuration flag in AT%GETCFG and AT%SETCFG. • Updated AT%CCLK to include set time with adjustment for Daylight Saving Time. • Updated %VLTEV to indicate FAX mode and Voice mail over 3GPP2 SMS. • Updated %FLTSMS to indicate SMS storage FULL. • Added support for AT+CPINR.
3	November, 2015	V2.00/ V4.32	• Updated AT%CGDCONT to indicate VoLTE traffic • Extended AT%VER command • Additional events for AT%VLTEV • Added a NW_RECONN_MODE to AT%GETCFG and AT%SETCFG • Added a Clarification to %NOTIFYEV:"LTIME" • Updated AT%VLTCMD to enable Test mode • Added more parameters to “STATUS” subcommand to %PBCMD • Added an AT%CLCMD.
4	March, 2016	V2.06/V4.55	• Updated AT%OTPCMD

Rev	Date	R&D Revision (Standard / Proprietary)	Description
			• Modified AT%CLCMD • Added AT%SCANCFG • Added AT%SCANCMD • Added "Session Progress" (SIP 183) indication to %VLTEV • Added a “ROCH” sub-command to AT%GETCFG and AT%SETCFG • Modified ROCH max context number handling in same command • Added a modification in GETCFG and SETCFG: • Removed "PROD_MK_DEF_EN” • Removed “VZW_MODE_EN” • Renamed “HEATIG” to “HEATING” • Renamed “HD_BAND64_EN” to “HD_B64_ENABLE" • Removed "ROHC_RTP_RECOG" • Removed “ROHC_RTP_NUM” • Removed “ROCH_RTP_LIST” • Renamed "CUS_PRODUCT_ID" to “CUSTOMER_ID" • Renamed “SL_DHCPV6_CONFIG” to "STATELESS_DHCPV6" • Updated AT%VLTCMD to enable/disable AGC • Added a Manual mode stuck indication to %NOTIFYEV • Updated %VLTEV to support "Redial After" event • Removed unsupported features from AT%FLTSMS • Removed obsoleted log severities from %SET/GETCFG and %SET/GETLOG. • Added a Power Save tolerance timers into AT%GETCFG and AT%SETCFG. • Removed obsolete log module “L1AC” from AT%SETLOG, GETLOG, AT%SETCFG=”log” and GETCFG=”log”s • Added support for AT+CSDH
5		V2.11/V4.70	• Added new event for %VLTEV. (REMOTETTY) • Added VDDMIN and VDDVAL to OTPCMD

Rev	Date	R&D Revision (Standard / Proprietary)	Description
			• Added NAS configuration low priority subcommand to %LTECMD • Added RRC status change notification to %NOTIFYEV • Modified existing ATs: ♦ AT%SCAN extended with execution command ♦ AT%COUNT extended with "CLEAR" option ♦ AT%TSTRF provides more accuracy for TX power • Updated AT%VLTCMD to support: • Enabled/Disabled of comfort noise in the echo canceler • Enabled/Disabled of Speaker Mute (Downlink voice stream) • Updated unsolicited %VLTEV to indicate that user leaved the conference call • Updated AT%VLTCMD to enable/disable DTMF detection in software. • Added +COPN, +CESQ, +CSCM, +CSSAC, +CGAUTH, +CEMBMSCFG, +CEMBMSR, +CEN, +CEPPI, +CPBS, +CPBR, +CPBF, +CPBW
6	July, 2016	V2.13/V4.78	• Added a new NW Operator Mode value for LGU+ and KT into AT%SETCFG/GETCFG. • Updated VLTCMD AT commands to include MO DTMF volume control. • Added a new NW Operator Mode value for T-Mobile into AT%SETCFG/GETCFG • Added explain BPFLAGS parameter encoding of AT%OTPCMD. • Updated the status of recently added commands. • Updated %SETCFG/%GETCFG • Added a support for AT+CLIR
7	September, 2016	V2.17/V4.93	• Removed BPFLAGS parameter and add CFGFLAGS instead of it to AT%OTPCMD. • Added a temperature monitor status to AT%STATUS. • Added a new NW Operator Mode value for SKT into AT%SETCFG/GETCFG. • Added a CSG support AT%TRSHCMD

Rev	Date	R&D Revision (Standard / Proprietary)	Description
			• Updated AT%SMSINFO to return ERROR instead of -1 in case that no SMS is found. • Updated AT%FOTACMD="UPDRSP" • To include reason number. • Added a SIM cache explanations for AT%STATUS="UICC". • Updated %FOTAEV to indicate <error_type> in case of download failure. • Updated %LWM2MEV to indicate <error_type> in case of download failure • Added Standard AT commands to control Fast UART • Added AT%GPIOSEL & AT%GPIOCMD
8	September, 2016	V2.20 /V4.99	• Updated revision numbers and limitations • Added an antenna status to %STATUS • Added new per-antenna measurement subcommands into %MEAS • Added new AT%PPPCFG for secured PPP configuration • Limitation fix for:+CMUX, &C, &D, &S, &K, S2, S12, DT,O,E,V,S0 • Limitation fix for:+IPR,+IFC,+ICF • Updated revision numbers for all AT commands, • Updated limitations of:+CGSN, +CSCS, +COPS, +CLCK, +CPWD, +CFUN, +CPIN, +CGDCONT, +CGDSCONT, +CGTFT, +CGEREP, +CGCONTRDP, +CGSCONTRDP, +CMGL, +CMGR, +CMGW, +CMGD, +CPMS, +CSCA, +CMGS, +CMTI, +CDSI, +CPAS, +CMSS, +CMT, +CGSMS, +CDU, +CDUU, RING, ATA, ATH, NO CARRIER, +CLCC, +CHLD, +CLIP, +CCWA, +CSSI, +CSSU, +CSSN, +CIREG, +CSMP, +CMMS • Add personalization commands limitations: • +CPIN,+CLCK,+CPWD • Updated Notes/Limitations of +CGTFT • Removed: S3,S4,S5,E, +CGATFT, +CGETFADS, +CGETFADR, +CGLA
9	October, 2016	V2.21 /V5.08	• Added %DEVINFO command. • Added AT%I2SCFG.

Rev	Date	R&D Revision (Standard / Proprietary)	Description
			• Added AT%IMSCMD • Added ISIM caching AT%SCACHECMD • Added AT%SCANCFG • Added AT%SCANCMD • Updated AT%PDNSET • Updated Notes/Limitations • Update FW version the following AT commands: • AT%DEVINFO • AT%IMSCMD • AT%SCACHECMD • Updated AT%VLTEV event types: • "VMAIL3GPP2" • "MSG3GPP2" • Updated AT%PDNSET parameter name <ext_sessionID> • Removed AT command: +CGLA • Update limitation description for +CGDCONT, +CGACT
10	November, 2016	V2.25/V5.17	• Added "LMTSCANTOUT" subcommand into %LTECMD • Added "PSM" subcommand into %STATUS • Removed rand parameter length limitation from %PPPCFG • Updated AT%VECEER with <reason> • Added a limitation description for AT+CAVIMS • Added notes for non-standard implementation: Z, +CGEREP • Updated a limitation description for +CGDCONT, +CGACT • Updated revision History release notes of • R8,R9 AT command document • Update AT%CMATT? To return the status: attach/detached
11	December, 2016	V2.27/V5.33	• Added new "ChipID" subcommand into %GETID command. • Added AT commands AT%TSTSIM, AT%PDNRDP

Rev	Date	R&D Revision (Standard / Proprietary)	Description
			• Aligned documentation with actual implementation: AT%LSTASSRT=?, AT%SCAN=? , AT+VZWRSRP?, AT%ROHCCMD, AT%CGDCONT?, AT%PDNRDP, AT%STATCM?, AT%SETURLIP=?, AT%COUNT, %USMSF • Removed AT%LSTASSRT at command • Modified AT%PDNSET to include <IPv4AddrAlloc> • Added read command into %PBCMD command • Fixed %CLCMD description • Removed AT%SHUTDOWN at command • Added DHCP acquired parameters update to %LTECMD • Aligned documentation with actual implementation: ♦ AT%TSTSIM=? ♦ AT%IMSCMD? ♦ AT%GPSCMD? • Removed the parameter "IMG" in AT%SETCFG and AT%GETCFG • AT%STATUS="IPS"- fixed typo in command description • Updated limitation of AT+ICF • Updated AT%CEN • Aligned to current implementation: ♦ AT%FOTAINFO=? ♦ AT%FOTAEV=? ♦ AT%OMACMD=? ♦ AT%CSMP=? ♦ AT%FOTACMD=? • Updated AT%SRVCHANGE command • Added old already supported parameter DRX_CAPABILITY_MODE to AT%SETCFG/GETCFG • Added PTW set/get to AT%LTECMD • Added new %BSPIOCFG command.

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1 Introduction

This document provides information about the AT command set supported by the FourGee-11XX system software releases.

The various AT commands are listed and associated with a particular FourGee-11XX Software Release.

The AT commands in this document are divided into the following sections:

- 3GPP standard AT commands
- Altair's proprietary AT commands – including an appendix for AT commands which are relevant for VZW application

The error codes supported for the CMEE commands are provided for the SW developer's reference.

Notes:

- For detailed description of standard 3GPP AT commands please refer to spec (3GPP TS 27.007).
- This document aims to provide only high level overview of the AT command support in the various releases. For specific information about each release please refer to the appropriate release notes document.

1.1 Terminology

URC – Unsolicited Result Code

2 3GPP AT commands supported

The table below details the standard 3GPP AT commands supported by the FourGee-11XX system software solution, per release.

Table 1. 3GPP AT command set supported by FourGee-3800 Software

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
1	+CGMI	Request manufacturer identification	None	Rev12
2	+GMI	Request TA manufacturer identification (equals to +CGMI)	None	ITU-T V.250
3	+CGMM	Request model identification	None	Rev12
4	+GMM	Request TA model identification (equals to +CGMM)	None	ITU-T V.250
5	+CGMR	Request revision identification	None	Rev12
6	+GMR	Request TA revision identification (equals to +CGMR)	None	ITU-T V.250
7	+CGSN	Request revision identification	Doesn't support additional capabilities of Rev12	Rev11
8	+GSN	Request TA serial number identification (may equal to +CGSN)	None	ITU-T V.250
9	+CSCS	Select TE (Terminal) character set	Affects only SMS AT commands. Support only: • UCS2 • 8859-1 (Latin) • IRA • PCCP437	Rev12
10	+CIMI	Request international mobile subscriber identity (IMSI)	None	Rev12

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
11	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
12	I	Request manufacturer specific information about the TA.	None	ITU-T V.250
13	+GCAP	Request overall capabilities of TA; the response code shall be CLTE3 or CLTE4 (based on configured LTE category)	None	ITU-T V.250
14	+WS46	Select wireless network	• We support only EUTRAN • The modem returns "28" for the read and test command. • The set command accepts only 28.	Rev12
15	+CNUM	Subscriber number	None	Rev12
16	+CREG	Network registration	None	Rev12
17	+COPS	PLMN selection	<mode>=4 is not supported	Rev12
18	+CLCK	Facility lock	Supported Facilities: • SC • P2 • PN • PS	Rev12
19	+CPWD	Change password	Supported Facilities: • SC • P2 • PN • PS	Rev12
20	+CPNET	Preferred network indication	None	Rev12
21	+CPNSTAT	Preferred network status	None	Rev12

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
22	+CFUN	Set phone functionality	• Mode 2 not supported. • Only mode 4 (flight mode) is stored in NV memory. • <fun> doesn't support 128 and 129	Rev11
23	+CPIN	Enter PIN	Supported facilities: • SIM PIN • SIM PUK • SIM PIN2 • SIM PUK2 • PH-SIM PIN • PH-NET PIN	Rev12
24	+CSQ	Signal quality	None	Rev12
25	+CLAC	List all available AT commands	None	Rev12
26	+CRLA	Restricted UICC Logical Channel access	None	Rev12
27	+CMEE	Report mobile termination error	None	Rev12
28	+CGDCONT	Define PDP Context	• <PDP_addr>: Parameter omitted • <d_comp>: Data compression is not supported. Parameters omitted • <h_comp>: Header compression is not supported. Parameters omitted • <emergency indication>: Parameters omitted • <IM_CN_Signalling_Flag_Ind>: Parameters omitted **Note:** Altair modem may automatically set the PDN context. Command shall be used with caution.	Rev12

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
29	+CGDSCONT	Define Secondary PDP Context	• <d_comp>: Data compression is not supported. Parameters omitted • <h_comp>: Header compression is not supported. Parameters omitted • <IM_CN_Signalling_Flag _Ind>: Parameters omitted	Rev12
30	+CGTFT	Traffic Flow Template. Used to define a Traffic Flow Template for a PDP context or a Traffic Flow Aggregate for an EPS bearer resource.	Filtering of <local address and subnet mask> - not supported	Rev12
31	+CGATT	PS attach or detach	None	Rev12
32	+CGACT	PDP context activate or deactivate	**Note:** Altair modem which includes internal stack may automatically activate/deactivate PDN context. Command shall be used with caution	Rev12
33	+CGPADDR	Show PDP address +CGPADDR	None	Rev12
34	+CGEREP	Packet Domain event reporting	The set command only serves as +CGEV enabler and disabler. The Buffer modes are ignored (no buffering) +CGEV has no support for: • ME CLASS • NW CLASS • ME MODIFY • ME PDN ACT - doesn't return <reason> and <cid_other>	Rev12
35	+CEREG	EPS network registration status	None	Rev12

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
36	+CGCONTRDP	PDP Context Read Dynamic Parameters	<IM_CN_Signalling_Flag_Ind>: Parameters omitted	Rev11
37	+CGSCONTRDP	Secondary PDP Context Read Dynamic Parameters	<IM_CN_Signalling_Flag_Ind>: Parameters omitted	Rev10
38	+CGTFTRDP	Traffic Flow Template Read Dynamic Parameters	None	Rev10
39	+CGEQOS	Define EPS Quality Of Service	None	Rev12
40	+CGEQOSRDP	EPS Quality Of Service Read Dynamic Parameters	None	Rev10
41	+CEMODE	UE modes of operation for EPS	None	Rev12
42	+CEER	Extended error report	None	Rev12
43	+CCHO	Open Logical Channel	None	Rev12
44	+CCHC	Close Logical Channel	None	Rev12
45	+CGCMOD	PDP Context Modify	None	Rev10
46	+CSMS	Select Message Service	• Support service=0 with MT and MO • Relevant for NP enabled only	Rev12
47	+CMGF	Message Format	Support only Text mode	Rev12
48	+CNMI	New Message Indications	Supported only in NP-enabled.	Rev12
49	+CRSM	Restricted SIM access	None	Rev12
50	+CSIM	Generic SIM access	None	Rev12
51	+CPOL	Preferred PLMN list	The command accepts <oper> in numeric format only	Rev12
52	+CPLS	Selection of preferred PLMN list	None	Rev12
53	+CMGL	List Messages	Support only Text mode	Rev12
54	+CMGR	Read Messages	Support only Text mode	Rev12
55	+CMGW	Write Message to Memory	Support only Text mode	Rev12

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
56	+CMGD	Delete Messages	None	Rev12
57	+CPMS	Preferred Message Storage	Support UICC storage only	Rev12
58	+CSCA	Service Centre Address	None	Rev12
59	+CMGS	Send Message from host	Support Text/PDU mode.	Rev12
60	+CMTI	URC indication of SMS to host	Support only Text mode.	Rev12
61	+CDSI	URC indication of status report to host	Support only Text mode.	Rev12
62	+CPAS	Phone activity status	Command currently reflect data connection status	Rev12
63	+CCLK	Set the Real Time clock	None	Rev12
64	+CGCMOD	PDP Context Modify	None	Rev11
65	+CMSS	Send SMS from storage	None	Rev12
66	+CMT	URC delivery of SMS to host	Support Text/PDU mode.	Rev12
67	+CDS	URC delivery of status report to host	Support Text/PDU mode. Relevant for NP-enabled only.	Rev12
68	+CGSMS	Switch MO SMS between IMS to SGs	None	Rev12
69	+CDU	Dial Request	Relevant for VOLTE only	Rev11
70	+CDUU	URC Indication of the current call status	Relevant for VOLTE only	Rev11
71	RING	URC incoming call notification	Relevant for VOLTE only	ITU-T V.250
72	ATA	Accept incoming call	Relevant for VOLTE only	ITU-T V.250
73	ATH	Reject incoming call	Relevant for VOLTE only	ITU-T V.250
74	NO CARRIER	URC notification of peer hang-up of MT call	Relevant for VOLTE only	ITU-T V.250

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
75	+CLCC	List of current calls	Relevant for VOLTE only Only mandatory fields are returned	Rev12
76	+CHLD	Handle waiting/hold calls	Relevant for VOLTE only Support only <n>=0,1,1x,2,3,4	Rev12
77	+CLIP	To get the identity of the calling party in MT call.	Relevant for VOLTE only	Rev12
78	+CCWA	Incoming waiting call indication	• Relevant for VOLTE only • In set command <mode> and <class> are not supported. • Unsolicited result code return only: <number>, <type>,<class>,<alpha>	Rev12
79	+CSSI	URC indication that MO call is waiting in peer side	Relevant for VOLTE only Only support <code>=3. Other returned values and parameters are not supported	Rev12
80	+CSSU	URC indication that peer put the call in hold	Relevant for VOLTE only Only support <code>=3 and 2. Other returned values and parameters are not supported.	Rev12
81	+CSSN	Enable +CSSI and +CSSU indication	Relevant for VOLTE only	Rev12
82	+CBM	URC indication of broadcast message	Support only PDU mode	Rev12
83	+CPNER	Enable +CPNERU URC indication	None	Rev11
84	+CPNERU	URC Primary ETWS indication	None	Rev11
85	+CIREG	Enable +CIREGU URC indication	Relevant for device with IMS.	Rev11
86	+CIREGU	URC IMS registration information	Relevant for device with IMS.	Rev11
87	+CEVDP	UE's Voice Domain Preference	Relevant for VOLTE only	Rev11

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
88	+CAVIMS	Availability for voice calls with IMS	Relevant for VOLTE only **Note:** Altair modem which includes internal stack of IMS/VoLTE may automatically set CAVIMS to the correct mode depends if VoLTE is enabled/disabled on the device.	Rev11
89	+CSMP	Set Text Mode Parameters	None	Rev12
90	+CEUS	UE's usage setting for EPS	Relevant for VOLTE only	Rev11
91	+CMMS	More Messages to Send	None	Rev12
92	+CNMA	New Message Acknowledgement to ME/TA	None	Rev12
93	+CIREP	IMS network reporting	Relevant for VOLTE only	Rev10
94	+CNEM	Network emergency bearer services support	Relevant for VOLTE only	Rev10
95	+CIREPI	URC Indication of IMS Voice Over PS sessions support indication from the network. (IMSVOPS)	Relevant for VOLTE only	Rev10
96	+CNEMS1	URC Indication of Network emergency bearer services support indication from network (EMC-BS)	Relevant for VOLTE only.	Rev10
97	+CUSATR	Read USAT Profile	Partially supported, missed: • Read MT profile that was written by +CUSATW. • Read UICC EFUST • List of MT only facilities	Rev10

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
98	+CUSATW	Write USAT Profile	Partially supported, missed: • MT profile storage. • MT/TE profiles conflicts	Rev10
99	+CUSATA	Activate USAT profile and enable unsolicited +CUSATP	None	Rev10
100	+CUSATD	Profile download upon start-up	Partially supported, missed: • Unsolicited +CUSATS enable/disable	Rev10
101	+CUSATP	URC indication for USAT proactive command from UICC	None	Rev10
102	+CUSATT	Send USAT terminal response to USAT proactive command from UICC	None	Rev10
103	+CUSATE	Send a USAT envelope command	None	Rev10
104	+CUSATEND	URC to indicate to a host that a proactive session has ended	None	Rev10
105	&F	Set To Factory-Defined Configuration	None	ITU-T V.250
106	+CTZR	Time Zone reporting	None	Rev12
107	+CTZV	URC to indicate time zone change	None	Rev12
108	+CTZU	Automatic Time Zone update	None	Rev12
109	+CPINR	Remaining PIN retries	None	Rev12
110	+CCFCU	Communication forwarding number and conditions with URI support	Relevant for VOLTE only	Rev12
111	+CSDH	Show text mode parameters	None	Rev12
112	+VTS	DTMF and tone generation	Relevant for VOLTE only	Rev12

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
113	+CPSMS	Power Saving Mode Setting	For 1160 only	Rev13
114	+VTD	Tone Duration	Relevant for VOLTE only	Rev12
115	+CMUT	MIC Mute	Relevant for VOLTE only	Rev12
116	+COPN	Read Operator Names	None	Rev12
117	+CESQ	Extended Signal Quality	None	Rev12
118	+CSCM	Session start and stop for smart congestion mitigation	None	Rev12
119	+CSSAC	Service Specific Access Control restriction status	None	Rev12
120	+CGAUTH	Define PDP context authentication parameters	None	Rev12
121	+CEMBMSCFG	eMBMS configuration	None	Rev13
122	+CEMBMSR	eMBMS status reporting	None	Rev13
123	+CEN	Emergency Numbers	None	Rev12
124	+CEPPI	Power Preference Indication for EPS	None	Rev13
125	+CPBS	Select phonebook memory storage	None	Rev12
126	+CPBR	Read phonebook entries	None	Rev12
127	+CPBF	Find phonebook entries	None	Rev12
128	+CPBW	Write phonebook entry	None	Rev12
129	+CLIR	Calling line identification restriction	Relevant for VOLTE only	Rev12

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
130	+CMUX	Multiplexing mode	FAST UART only Parameters values are limited as following: • <transparency> = {0} • <subset>= {0} • <port_speed>={5} • <N1>={1..1509}	Rev12
131	+IPR	Fixed DTE Interface Rate	• FAST UART only • Automatic detection not supported • Default rate is 115200	ITU-T V.250
132	&C	Data Carrier Detect (DCD) control	FAST UART only	ITU-T V.250
133	&D	Data Set Ready (DSR) Control	FAST UART only	ITU-T V.250
134	&S	Data Set Ready (DSR) Control	FAST UART only	Rockwell Rev4
135	&K	Flow Control	FAST UART only Support only &K0 and &K3	Rockwell Rev4
136	+IFC	DTE-Modem Local Flow Control	FAST UART only Support only: • AT+IFC=0,0 • AT+IFC=2,2	ITU-T V.250
137	+ICF	DTE-Modem Character Framing	FAST UART only. Support only: • <format>={1,2,3,5} • <parity>={0,1}	ITU-T V.250
138	S2	Escape Character	FAST UART only	Rockwell Rev4
139	S12	Escape Prompt Delay	FAST UART only	Rockwell Rev4

ID	AT Cmd/ URC	Description	Notes/Limitations	3GPP Rev
140	DT	Modem dial	FAST UART only ATDT<number> launch PPP daemon and switch to binary mode. The <number> parameter is ignored.	Rockwell Rev4
141	O	Return To On Line Mode	FAST UART only Only ATO command is supported without additional parameter.	ITU-T V.250

*Additional information in 'Extended Error Report' chapter.

3 Supported Dummy AT Commands List (for backward compatibility)

AT Cmd/URC	Description	Notes/Limitations
E	Command Echo	. Always Returns OK. Does not do anything
V	Response format	Always Returns OK. Does not do anything
S0	Number Of Rings To Auto Answer	Always Returns OK. Does not do anything

4 Altair Proprietary AT Commands Supported

4.1 AT Commands

The table below details the proprietary AT commands supported by the FourGee-11XX system software solution, per release.

Table 2. Proprietary AT command set supported by FourGee-11XX Software

Name	Description
AT%GETCFG	Get a configuration field from NV memory.
AT%SETCFG	Set a configuration field in NV memory
AT%EARFCN	Command to configure DL frequency favorite list
AT%VER	Display all FW versions (SB/MAC/PHY/ASIPS)
AT%CSQ	Signal Quality (includes RSRQ)
AT%CULCKI	Used to manage the SIM-LOCK data.
AT%CPININFO	Returns the number of attempts left for PIN and PUK
AT%MASTERKEY	Verify the master key when the UE is blocked due to personalization counters overflowed or missing / unauthenticated PRSNP file
AT%SETLOG	Command to set log severity in RAM per module.
AT%GETLOG	Command to get log severity in RAM per module.
AT%DTLOG	Enable/Disable Drive Test logs
AT%STATUS	Get entity status
AT%COUNT	Returns counters per LTE protocol layer
AT%MEAS	Returns measurement for specified measurement type
AT%PCONI	Returns physical connectivity parameters info
AT%SCAN	Return the last RSSI scan results
AT%LSTASSRT	Return the last assert or exception
AT%GETID	Return identification values of the board
AT%PPPAUTH	Defines APN authentication parameters
AT%TRSHCMD	Enable PHY logs
AT%REGIOCTL	Read/write IO output lines
AT%AUTH	Command is intended to provide SIM authentication for host requests.

Name	Description
AT%CEER	Protocol error notification
AT%RSIMREQ	Encapsulated AT command to remote SIM owner
AT%RSIMRSP	Encapsulated AT command answer from remote SIM owner
AT% CATSTAT	Allows the CAT to receive status bytes of SIM transactions
AT%SIMREFRESH	Refresh SIM cache or reinitialize SIM or application on SIM
AT%CATPOLLINT	Modify polling interval of SIM for CAT purposes
AT%CATLOCINF	Retrieve data required by CAT application
AT% REGIOWR	Write a value into a group of IO registers together
AT%REGIORD	Read values from a group of IO registers together
AT%REGIOCLK	Manage IO clock related operations
AT%REGIOEV	Report that one of IO ISR lines meets ISR condition or clock repetition is exhausted
AT%STATEV	Report events for different important state transitions and system occurrences
AT%NOTIFYEV	Notify the Host about important events occurred in LTE device
AT%TSTRF	Simple RF test mode
AT%SPMMODE	Command is intended to manage special measurement mode
AT%SETPCO	This command is used to set PCO request in the modem attach/connect request
AT%MBMSCMD	MBMS command to select received services
AT% MBMSEV	Unsolicited notification on services update
AT%MBMSINFO	MBMS command to select received services
AT%PCOINFO	This command is used to get PCO replay (solicited and unsolicited) modem attach/connect request
AT%LTEINFO	Get LTE protocol layer information
AT%GETACFG	Command to get a configuration file from OP file system
AT%SETACFG	Command to set configuration to OP file system
AT%CMATT	Command to Instruct eCM to attach or detach the LTE network
AT%CMGRS	Read SMS message status
AT%USMSF	Select the SMS format of outgoing SMS: 3GPP or 3GPP2. Applicable for text mode
AT%STATCM	Command to report eCM status to the host
AT%UPGCMD	Manage firmware upgrade (loading and/or update) over LAN
AT%FOTAINFO	Query FOTA info

Name	Description
AT%CGINFO	Query info about packet domain parameters (extension for AT+CGxxx of 27.007)
AT%PDNACT	Command to start/stop any PDN connection
AT%SRVCHANGE	Command to open/lock device services
AT%SRVLOCK	Command to disable usage of AT%SRVCHANGE
AT%COLLECTLOGS	Command to set log storage
AT%URLRES	Un solicited AT command to resolve URL
AT%SETURLIP	Result of URL resolve
AT%OMAEV	Indication to host related to OMA-DM
AT%OMACMD	Commands to OMA-DM client related to DM/DL sessions
AT%DMSES	User initiated DM session
AT%FOTACMD	A command to manage firmware download over the air
AT%FOTAEV	Notification to host on FOTA status
AT%EXE	This command Executes script file in NP
AT%GETAID	Command to get identification values of hardware components managed by NP
AT%APNN	Allow user to change the APN name
AT%NETSEL	Command is intended to select network architecture and parameters
AT%CCLK	Command is similar to AT+CCLK with additional ‘dst’ parameter
AT%VECEER	Query the reason of last voice call failure/ disconnection
AT%RESETCID	AT command to clear entire cid table (whole or per cid)
AT%CGDCONT	Supplementary to AT+CGDCONT command
AT%CHKPLMN	Check PLMN offload to NP and its applications
AT%PDNSET	Set run-time PDN parameters for data PDNs exposed to host
AT%SMSINFO	Return SMS information
AT%GPSCMD	Send command to GPS module
AT%GPSEV	Enable GPS unsolicited notification events
AT%GPSINFO	Query GPS information
AT%NPEV	Event message to NP
AT%VLTEV	VoLTE event message to host

Name	Description
AT%OTDOACMD	OTDOA location measurement request
AT%CMGWC	Write Long SMS to storage
AT%CMGSC	Send Long SMS
AT%GETSPN	Retrieves service provider display policy and service provider name from SIM EFSPN file
AT%CEN	Read Emergency numbers from UICC
AT%EMGCMD	Handle Emergency call
AT%EMGCBM	Handle Emergency call-back mode state
AT%DATACMD	Block and unblock user data traffic
AT%CCID	Reads the ICCID from SIM EFICCID
AT%ROHCCMD	Set/Clear RoHC filters
AT%LTECMD	LTE protocol pram's query override and toggle at run-time
AT%EMGNUM	Query the emergency numbers in the device
AT%VLTCMD	Send user VoLTE command to the IMS module
AT%NETUPD	enable/disable network override for specified LTE parameters
AT%DEVINFO	Get identification values of the device components from NV memory
AT%CLCMD	Configures Cell Lock and WL parameters
AT%OTPCMD	Fills the content of OTP on eFuse
AT%CSMP	Set Text Mode Parameters for 3GPP2 SMS
AT%PBCMD	Phone book Command
AT%SMMA	SMS storage memory available message
AT%GPIOSEL	Predefine a list of GPIO pins in use by NP CPU
AT%GPIOCMD	Write IO output line and read any IO line
AT%TSTEXT	External circuits test mode
AT%CSDH	Enable SMS text mode proprietary optional fields
AT+CMGR (user extended)	User extended SMS read command
AT+CMGL (user extended)	User extended SMS List command
AT+CMT (user extended unsolicited)	User extended SMS delivery to the host

Name	Description
AT%LWM2MCMD	Control LWM2M client
AT%LWM2MEV (unsolicited)	Notifies the host about the LWM2M client status
AT%PWRSVCMD	Manages user commanded power save mode
AT%PHYSRV	Provides PHY services for higher layer applications
AT%LWM2MOPEV (unsolicited)	LWM2M server operation event
AT%I2SCFG	Configures I2S driver and the group of IO pins to be used as the audio serial bus.
AT%ADCCMD	Configures and read analogue value via SAR ADC pin
AT%PPPCFG	Configures security parameters of PPP (CHAP) session
AT%IMSCMD	Block and unblock IMS traffic
AT%SCACHECMD	SIM cache command
AT%SCANCFG	Configure for user-triggered scanning
AT%SCANCMD	Handle for user-triggered scanning
AT%H	Halt PPP daemon on the device side
AT%%HEVU (Unsolicited)	Unsolicited Event indication on PPP halt by device
AT%LOGSTOHOST	Deliver debug logs
ATD*99***	Open PPP session end to end
AT%FILECMD	Open file transfer session between host and device
AT%LTESYNC	Configure, start and stop the pulse issued by UE and synchronized with LTE sub-frames.
AT%%CMEEU (Unsolicited)	Unsolicited event to inform higher layer Apps about last AT+CMEE settings
AT%SOCKETCMD	AT command to enable socket service
AT%SOCKETDATA	DATA delivery for Socket service
AT%FTPCMD	AT command to enable FTP service
AT%FTPDATA	AT%FTPDATA
AT%BSPIOCFG	Product-maker access to set/get configurations of some IOSYSBP (BSP) pins

4.2 AT Commands Manual

4.2.1 AT%GETCFG

Description

Get configuration from NV memory

Use

AT%GETCFG=<param1>,<param2>

Purpose	Param1	Param2	Returns
Reads device's operation mode from NV	“OPER”		"SERV"," NET"
Reads device's log module severity from NV	“LOG”	"SYS","L1A", "MAC", "MACGN", "MACUL", "MACDL", "RLC","RLCGN", "RLCUL", "RLCGL", "PDCP", "PDCPGN", "PDCPUL", "PDCPDL", "RRC", "VL1", "NAS", "USIM","FRM", "ROHC", "PROF0", "PROF1", "PROF2", "PROF4", "PROF6", "OSAL", "SERV", "PACKET_CLASS","EXCEPTION_MANAGER", "SIMLOCK","DT","SMS","AT", "AMA"	"DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG"
Reads device's log severity of all modules from NV	"LOG"	"ALL"	"DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG"
Read bands defined in DOP file, these bands are the ones to be calibrated and scanned at full scan	“BAND”		Bands: “X”, “Y”, “Z”
Read the Usim simulator status.	"USIM_SIMULATOR"		
Read stored cell status	“SC_STATE"		0: Disabled 1: Enabled

Purpose	Param1	Param2	Returns
Read the device's stored cell information	"SC_INFO"		MCC, MNC, EARFCN
Read the Customer ID from NV	"CUSTOMER_ID"		Customer ID written by manufacturer
Reads heating traffic control parameter in NV	"HEATING_TC"		(TCXO) (Enabled? “x”) Reduced Thresh “x” Stop Thresh “x”
Read the reset on assert status	“DISABLE_RESET"		0: Disabled 1: Enabled
Reads if the device RFIF to GPIO feature is enabled	“RFIF_TO_GPIO_EN”		0: Disabled 1: Enabled
Reads if the device GPIO HW line for W_DISABLED is present (enabled)	“W_DISABLED_PRESENT”		0: False 1: True
Reads if flight (silent) mode run-time is activated	“SILENT_MODE_ACTIVE”		0: False 1: True
Reads min pause interval between unsuccessful scanning	“REPOSE_MIN”		Time in seconds
Reads max pause interval between unsuccessful scanning	“REPOSE_MAX”		Time in seconds
Reads incremental step interval between unsuccessful scanning	“REPOSE_STEP”		Time in seconds for linear mode. 1: For exponent mode
Reads power save mode for Idle/Connected RRC state. Reads also power save mode for not in service states.	“PW_MODE”		0: SW Default 2: Shallow (Lite) sleep 3: Deep sleep 4: Disabled 5: Deep hibernation 8: Lite hibernation 9: Nap (for Idle, No Service and Connected states)

Purpose	Param1	Param2	Returns
Reads min interval to which shallow/deep sleep may be applied. Reads also estimated entry/exit time to shallow/deep sleep	“PW_ATTR”		Time in microseconds (For all: • ShallowMinDuration • ShallowEntryGurdTime • ShallowExitGurdTime • DeepMinDuration • DeepEntryGurdTime • DeepExitGurdTime) The *GuardTime parameters for ALT38xx are not in use and return zero
Get 3GPP Rev. 9 enable flag – currently affects only Capability Information reporting	”LTE_RELEASE_NUM”		• SW default • Release 8 • Release 9 • Release 10 • Release 11 • Release12
Get IMEI from DOP (only if OTP is not locked)	“DEBUG_IMEI”		“IMEI value”
Read heating power control enable flag	"HEATING_PWR_EN"		0: Disabled 1: Enabled
Read heating power control parameters	"HEATING_PWR_PRM"		
Read heating shutdown enable flag	"HEATING_SD_EN"		0: Disabled 1: Enabled
Read heating shutdown control parameters	"HEATING_SD_PRM"		
Reads if band64 half-duplex mode is enabled	"HD_B64_ENABLE”		0: Disabled 1: Enabled
Reads CEMODE stored value	"CEMODE_VAL”		0: PS only 1: Combined PS/CS, non-EPS preferred 2: Combined PS/CS, EPS – preferred

Purpose	Param1	Param2	Returns
Reads USB buffer configuration	"USB_BUFF_CONFIG"	0: SW default (10640) 1: Small (1520) 2: Medium (5320) 3: Large (10640)	Size in Bytes
Reads Scan Plan feature enabled flag	"SCAN_PLAN_EN"	0: Disabled 1: Enabled	
Reads Scan List row	"SCAN_LIST"	[row_index] (1-40) If omitted, whole list is reported	• Band • EARFCN start • EARFCN end • EARFCN step
Reads LTE category setting	"LTE_UE_CATEGORY"	0: SW default 1: CAT1 2: CAT2 3: CAT3 4: CAT4 5: CAT5	
Reads log TimeStamp type	"LOG_TS_TYPE"		0: SW default 1: HW TS 2: DebugStreamer unique ID TS 3: both
Reads if TM8 is enabled	"TDD_TM8_EN"		0: Disabled 1: Enabled
Reads customer product ID value	"CUSTOMER_ID"		0 – 255
Reads if device IPv4 source filtering is disabled	"IPV4_SRC_FILTER_DIS"		0: Enabled 1: Disabled
Reads if device IPv6 source filtering is disabled	"IPV6_SRC_FILTER_DIS"		0: Enabled 1: Disabled
Reads if the device IO HW line for DPR is present (enabled)	"DPR_PRESENT"		0: False 1: True
Reads if the device IO HW line for SIM_DET is present (enabled)	"SIM_DET_PRESENT"		0: False 1: True

Purpose	Param1	Param2	Returns
Reads device stateless DHCPv6 configuration	"STATELESS_DHCPV6"		0: SW default 1: Enabled in proxy mode 2: Enabled in tunnel mode 3: Disabled
Reads if the device PMIC power save feature is enabled	"PMIC_PS_MODE"		0: SW default 1: Enabled 2: Disabled
Reads NW Operator Mode flag used to enable operator-specific features	"NW_OPER_MODE"		0: Standard 3GPP 1: VZW 2: CMCC 3: RIL 4: KDDI 5: AT&T 6: USCC 7: DoCoMo 8: SBM 9: LGU+ 10: KT 11: T-Mobile 12: SKT
Reads if scan plan "Verify BW" feature is enabled	"SP_CELL_BW_EN"		0: False 1: True
Reads if 32KHz clock correction mechanism is enabled	"DS_32K_CORR_EN"		0: False 1: True
Sets Terminal Profile (TP) default download policy	"DL_TP_DEF"		0: SW default, 1: MT 2: MT & TE 3: Halt
Sets run-time Terminal Profile (TP) overridden download policy	"DL_TP_OVR"		0: Disabled, 1: MT 2: MT & TE 3: Halt

Purpose	Param1	Param2	Returns
Reads scan plan mode	“SP_MODE”		0: SW Default 1: Limited 2: Mixed
Reads scan plan scheduling scheme	“SP_SCHED_SCHEME”		0: Periodic regular 1: Periodic triggered by max repose timer
Reads scan plan scheduling scheme	“SP_SCHED_COUNTER”		0–255
Reads SIM RX-TX delay	“SIM_RX_TX_DELAY”		0: SW default 1–254: Delay in msec 255: No delay
Sets scan plan PLMN selection method	“SP_PLMN_SEL_MET”		0: Domestic PLMN only 1: Any PLMN
Sets MRU table disable flag for table update	“MRU_UPD_DIS”		0: Enable 1: Disable
Sets MRU table used entries number	“MRU_ENT_USED”		0”- SW Default, 1–254 255: Unlimited
Sets MRU table disable flag for NBS usage	“MRU_NBS_DIS”		0: Enable 1: Disable
Sets MRU table disable flag for entry aging	“MRU_AGING_DIS”		0: Enable 1: Disable
Reset MRU table to all zeros	“MRU_RESET”		
Reads ROHC profile status	“ROHC”	“PROF0” “PROF1” “PROF2” “PROF0101” “PROF0102”	0: Disabled 1: Enabled
Reads NP tolerance override flag	"NP_TOUT_OVERRIDE_MODE"		0 - SW default 1 – enabled 2 - disabled
Reads NP tolerance timeout value	“NP_TOUT_TOLERANCE”		0-param not in use, 3000 - (232-1) (ms)

Purpose	Param1	Param2	Returns
Reads LTE category override settings	"LTE_CAT_OVERRIDE_EN"		0: Disabled 1: Enabled
Reads LTE DL Category settings	"LTE_DL_CATEGORY"		0: CAT0 6: CAT6 7: CAT7 9: CAT9 10: CAT10 11: CAT11 12: CAT12 13: CAT13 14: CAT14 15: CAT15 16: CAT16 17: CAT17 101: CAT-M1
Reads LTE UL Category settings	"LTE_UL_CATEGORY"		0: CAT0 3: CAT3 5: CAT5 7: CAT7 8: CAT8 9: CAT9 13: CAT13 14: CAT14 101: CAT-M1
Reads PPI capability settings	"PPI_CAP_EN"		0: Disabled 1: Enabled
Reads PSM capability settings	"PSM_CAP_EN"		0: Disabled 1: Enabled
Reads extended TAU capability setting	"EXT_TAU_CAP_EN"		0: Disabled 1: Enabled
Reads autonomous gap capability setting	"AUTO_GAP_CAP"		0: SW default 1: Enabled 2: Disabled
Reads reconnection recovery flag setting	"NW_RECONN_DIS"		0: Enabled 1: Disabled

Purpose	Param1	Param2	Returns
Reads reconnection recovery delay value	“NW_RECONN_DELAY”		0: SW default 1-10: Delay in sec 255: Immediate reconnection
Reads the device VLSM mode	“IP_VLSM_MODE”		0: SW default 1: Enabled 2: Disabled
Reads if device RX diversity is disabled	"RX_DIVERSITY_DIS”		0: Enabled 1: Disabled
Reads reconnection recovery control flag setting	“NW_RECONN_MODE”		0: SW default 1: Disabled 2: Enabled
Reads max number of ROHC contexts	“ROHC_MAX_CT_NUM”		0: SW default 2, 4, 8, 12, 16, 24, 32, 48, 64, 128, 256, 512, 1024
Reads MAC severity override value	“MAC_LOG_SEV”		0: SW default 1: Debug 6: Informational 7: Notice 8: Warning 9: Error 12: Emergency 255: Disable
Reads power save debug and field trial parameters	“PS_DBG_PARM”		0: SW default Binary value in quotes
Reads the device SIM pool suspend mode	“SIM_POLL_SUSP_MODE”		0 - SW default 1 – enabled 2 - disabled
Reads FGI bit reporting filter	“FGI_REPORT_FILTER”		[b1[,b2[,…[,b16]…]]
Reads RF antenna override value	“RF_ANT_OVERRIDE”		0 – no override 1 – single antenna
Reads dual SIM configuration	“SIM_DUAL_CONFIG”		0 – SW default 1 – single SIM 2 – dual SIM

Purpose	Param1	Param2	Returns
Reads wakeup SIM selection policy	"SIM_INIT_SELECT_POLICY"		0 – N/A -single SIM, 1 – SIM1 only, 2 – SIM2 only, 3 – SIM1 with fallback to SIM2, 4 – SIM2 with fallback to SIM1
Reads if capability reporting of Specific Reference Signal is disabled	"CAP_REF_SIG_SUP_DIS"		0: Enabled 1: Disabled
Reads if capability reporting of RACH Report from SON-Parameters is disabled	"CAP_SON_RACH_REP_DIS"		0: Enabled 1: Disabled
Reads device mobility type flag	"PS_DEV_MOB_TYPE"		0: SW default 1: Mobile 2: Static
Reads PMP severity override value	"PMP_LOG_SEV"		0 - SW default 1 - Debug 6 - Informational 7 - Notice 8 - Warning 9 - Error 12 – Emergency 255 - Disable
Reads Connected mode DRX capability setting	"DRX_CAPABILITY_MODE"		0 – SW Default 1 – Disabled 2 – Long DRX 3 – Long and short DRX

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

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

4.2.2 AT%SETCFG

Description

Set a configuration field in NV memory

Use

AT%SETCFG=<param1>,<param2>,<param3>

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets device's operation mode in NV	"OPER"	"SERV"," NET"				OK\ ERROR
Sets device's log module severity in NV	"LOG"	"SYS","L1A", "MAC", "MACGN", "MACUL", "MACDL", "RLC", "RLCGN", "RLCUL", "RLCGL","PDCP", "PDCPGN", "PDCPUL", "PDCPDL", "RRC", "VL1", "NAS", "USIM","FRM", "ROHC", "PROF0", "PROF1", "PROF2", "PROF4", "PROF6", "OSAL", "SERV", "PACKET_CLASS","EXCEPTION_MANAGER", "SIMLOCK","DT","SMS","AT", "AMA"	"DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG"			OK\ ERROR
Sets device's log severity for all modules in NV	"LOG"	"ALL"	"DEBUG", ""INFO", "NOTICE", "WARN", "ERROR", "EMRG"			OK\ ERROR

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Set bands defined in DOP file, these bands are the ones to be calibrated and scanned – note only bands that also reside in PhyBP are allowed	“BAND”	Band1[,Band2[,Band3[,Band4[,Band5[,Band6[,Band7[,Band8[,Band9[,Band10]]]]]]]]				OK\ ERROR
Sets device's USIM simulator enable/disable in NV	"USIM_SIMULATOR"	"0" (disable) "1" (enable)				OK\ ERROR
Set stored cell feature state	“SC_STATE”	"0" (disable) "1" (enable)				OK\ ERROR
Set reset on assert	“DISABLE_RESET”	"0" (disable) "1" (enable)				OK\ ERROR
Sets if the device RFIF to GPIO feature is enabled	“RFIF_TO_GPIO_EN”	"0" (disable) "1" (enable)				OK\ ERROR
Sets device's Watch Dog module enable/disable in NV	“WATCHDOG_EN”	"0" (disable) "1" (enable)				OK\ ERROR
Sets the WD time parameter in NV	“WATCHDOG_TIMEOUT”					OK\ ERROR
Sets the FW crash mechanism time parameter in NV	“CRASH_TIMEOUT”					OK\ ERROR
Set heating traffic control parameter in NV	“HEATING_TC”	“HEATING_TC”				OK\ ERROR
Sets if the device should disable the reset on assert feature	"DISABLE_RESET"	"0" (enable) "1" (disable)				OK\ ERROR

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets if the device RFIF to GPIO feature is enabled	“RFIF_TO_GPIO_EN”	"0" (disable) "1" (enable)				OK\ ERROR
Sets if the device GPIO HW line for W_DISABLED is present (enabled)	“W_DISABLED_PRESENT”	"0" (false) "1" (true)				OK\ ERROR
Sets min pause interval between unsuccessful scanning	“REPOSE_MIN”	Time in seconds				OK\ ERROR
Sets max pause interval between unsuccessful scanning	“REPOSE_MAX”	Time in seconds				OK\ ERROR
Sets incremental step interval between unsuccessful scanning	“REPOSE_STEP”	Time in seconds for linear mode. -1 for exponent mode				OK\ ERROR
Sets power save mode for Idle RRC state	“PW_IDLE”	“DEFAULT” - SW Default “SHALLOW” - Shallow (Lite) sleep “DEEP” - Deep sleep “NONE” – Disable “LITEHBR” – Lite hibernation “NAP” - Nap				OK\ ERROR

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets power save mode for Connected RRC state	“PW_CONN”	“DEFAULT” - SW Default “SHALLOW” - Shallow (Lite) sleep “NONE” – Disable “NAP” - Nap				OK\ ERROR
Sets power save mode for not in service states	“PW_NOSRVC”	“DEFAULT” - SW Default “SHALLOW” - Shallow (Lite) sleep “DEEP” - Deep sleep “NONE” – Disable “LITEHBR” – Lite hibernation “NAP” - Nap				OK\ ERROR
Sets power save mode for not in service states	“PW_PSM”	“DEFAULT” - SW Default “DEEPHIBER” - Deep hibernation				OK\ ERROR
Sets min interval to which shallow sleep may be applied	“PW_SS_MIN”	Time in microseconds				OK\ ERROR
Sets min interval to which deep sleep may be applied	“MIN_DS_DURATION”	Time in microseconds				OK\ ERROR
Sets estimated entry time to deep sleep	“DS_ENTRY_GUARD_TIME”	Time in microseconds				OK\ ERROR
Sets estimated exit time from shallow sleep	“DS_EXIT_GUARD_TIME”	Time in microseconds				OK\ ERROR

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
3GPP Rev 9 enable flag – currently affects only Capability Information reporting	“LTE_RELEASE_NUM”	“default”, “release8”, “release9”, “release10”, “release11”, “release12”				OK\ ERROR
Set IMEI to DIP (only if OTP is not locked)	“DEBUG_IMEI”	“IMEI value”				OK\ ERROR
Sets heating power control enable flag	"HEATING_PWR_EN"	"0" (disable) "1" (enable)				OK\ ERROR
Sets heating power control parameters	"HEATING_PWR_PRM"	Reduce power temperature threshold	Reduce power rate			OK\ ERROR
Sets heating shutdown enable flag	"HEATING_SD_EN"	"0" (disable) "1" (enable)				OK\ ERROR
Sets heating shutdown control parameters	"HEATING_SD_PRM"	UL shutdown threshold				OK\ ERROR
Sets if device will disable PHY logger mechanism at wakeup	"PHY_LOG_ DISABLE”	"0" (enable) "1" (disable)				OK\ ERROR
Sets band64 half-duplex mode enable flag	"HD_B64_ENABLE”	"0" (disable) "1" (enable)				OK\ ERROR
Reads CEMODE stored value	"CEMODE_VAL”	“0” - PS only “1” – combined PS/CS, non-EPS preferred “2” – combined PS/CS, EPS - preferred				OK\ ERROR

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets USB buffer configuration	"USB_BUFF_CONFIG"	“0” - SW default “1” - Small “2” - Medium “3” - Large				OK\ ERROR
Sets BOOTP ‘sname’ for internal DHCP server	“BOOTP_SNAME”	String up to 64 symbols.				OK\ ERROR
Sets DHCP lease time for internal DHCP server	“DHCP_LEASE”	0 or more Zero means use SW default.				OK\ ERROR
Sets Scan Plan feature enabled flag	“SCAN_PLAN_EN”	"0" (disable) "1" (enable)				OK\ ERROR
Sets Scan List Row	“SCAN_LIST”	row_index (1-40)	"0" (disable), "1" (enable)	[band] (band to scan, optional for disable)	[EARFCN step [,EARFCN start, EARFCN end]] (Optional for disable. If omitted for enable setting, standard band parameters are used)	OK\ ERROR

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets LTE category	“LTE_UE_CATEGORY”	“0” – SW default “1” – CAT1 “2” – CAT2 “3” – CAT3 “4” – CAT4 “5” – CAT5				OK\ ERROR
Sets log TimeStamp type	“LOG_TS_TYPE”	“0” – SW default “1” – HW TS “2” – DebugStreamer unique ID TS “3” - both				OK\ ERROR
Sets TM8 enable flag	“TDD_TM8_EN”	“0” - disable “1” – enable				
Sets customer product ID value	“CUSTOMER_ID”	“0”-“255”				
Sets extended band table (up to 10 bands) enable flag	“EXT_BAND_EN”	“0” – disable “1” – enable				
Sets if device will disable IPv4 source filtering	"IPV4_SRC_FILTER_DIS”	“0” - disable “1” - enable				
Sets if device will disable IPv6 source filtering	"IPV6_SRC_FILTER_DIS”	“0” - disable “1” - enable				
Sets if the device IO HW line for DPR is present (enabled)	“DPR_PRESENT”	0 - false 1 - true				
Sets if the device IO HW line for SIM_DET is present (enabled)	“SIM_DET_PRESENT”	0 - false 1 - true				

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets device stateless DHCPv6 configuration	"STATELESS_DHCPV6"	“0” - SW default “1” – Enable in proxy mode “2” – Enable in tunnel mode “3” - Disable				
Sets device PMIC power save mode	“PMIC_PS_MODE”	“0” – SW default “1” – enable “2” - disable				
Sets NW Operator Mode flag used to enable operator-specific features	“NW_OPER_MODE”	0 – standard 3GPP 1 - VZW 2 – CMCC 3 – RIL 4 – KDDI 5 – AT&T 6 – USCC 7 – DoCoMo 8 – SBM 9 – LGU+ 10 – KT 11 – T-Mobile 12 - SKT				
Sets scan plan “Verify BW” feature enable flag	“SP_CELL_BW_EN”	“0” - disable “1” - enable				
Reads if 32KHz clock correction mechanism is enabled	“DS_32K_CORR_EN”	“0” - disable “1” - enable				
Sets Terminal Profile (TP) default download policy	“DL_TP_DEF”	“0” – SW default “1” – MT “2” – MT & TE “3” – Halt				

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Reads run-time Terminal Profile (TP) overridden download policy	“DL_TP_OVR”	“0” – disabled, “1” – MT “2” – MT & TE “3” – Halt				
Sets scan plan mode	“SP_MODE”	“0” – SW Default “1” – Limited “2” – Mixed				
Sets scan plan scheduling scheme	“SP_SCHED_SCHEME”	“0” – Periodic regular “1” – Periodic triggered by max repose timer				OK\ ERROR
Sets scan plan scheduling scheme	“SP_SCHED_COUNTER”	“0” – “255”				OK\ ERROR
Sets SIM RX-TX delay	“SIM_RX_TX_DELAY”	“0” – SW default, “1”-“254” – delay in msec “255” – no delay				OK\ ERROR
Sets ROHC profile status	“ROHC”	“PROF0” “PROF1” “PROF2” “PROF0101” “PROF0102”	“0” – disable “1” – enable			OK\ ERROR
Sets NP tolerance override flag	"NP_TOUT_OVERRIDE_MODE"		“0” - SW default “1” – enable “2” - disable			OK\ ERROR
Sets NP tolerance timeout value	“NP_TOUT_TOLERANCE”		0-param not in use, 3000 - (232-1) (ms)			OK\ ERROR

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets LTE Category Override enable flag	"LTE_CAT_OVERRIDE_EN"	"0" – disable "1" – enable				
Sets specific LTE DL Category overridden value	"LTE_DL_CATEGORY"	"0" – CAT0 "6" – CAT6 "7" – CAT7 "9" – CAT9 "10" – CAT10 "11" – CAT11 "12" – CAT12 "13" – CAT13 "14" – CAT14 "15" – CAT15 "16" – CAT16 "17" – CAT17 "101" – CAT-M1				
Sets specific LTE UL Category overridden value	"LTE_UL_CATEGORY"	"0" – CAT0 "3" – CAT3 "5" – CAT5 "7" – CAT7 "8" – CAT8 "9" – CAT9 "13" – CAT13 "14" – CAT14 "101" – CAT-M1				
Sets PPI capability enable flag	"PPI_CAP_EN"	"0" – disable "1" – enable				
Sets PSM capability enable flag	"PSM_CAP_EN"	"0" – disable "1" – enable				
Sets extended TAU capability enable flag	"EXT_TAU_CAP_EN"	"0" – disable "1" – enable				

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets autonomous gap capability flag	“AUTO_GAP_CAP”	“0” – SW default “1” – enable “2” - disable				
Sets reconnection recovery flag	“NW_RECONN_DIS”	“0” – enable “1” – disable				
Sets reconnection recovery delay value	“NW_RECONN_DELAY”	“0” – SW default “1”-“10” – delay in sec “255” – immediate reconnection				
Sets the device VLSM mode	“IP_VLSM_MODE”	“0” - SW default “1” – enable “2” - disable				
Sets if device shall disable RX diversity	"RX_DIVERSITY_DIS”	"0" (enable) "1" (disable)				
Sets reconnection recovery control flag	“NW_RECONN_MODE”	“0” - SW default “1” – disable “2” - enable				
Sets max number of ROHC contexts	“ROHC_MAX_CT_NUM”	“0” - SW default “2”,”4”, “8”,”12”, “16”, “24”, “32”, “48”, “64”, “128”, “256”, “512”, “1024”				

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets MAC severity override value	“MAC_LOG_SEV”	“0” - SW default “1” - Debug “6” - Info “7” - Notice “8” - Warning “9” - Error “12” – Emergency “255” - Disable				
Sets power save debug and field trial parameters	“PS_DBG_PARM”	“0” - SW default Binary value in quotes				
Sets the device SIM pool suspend mode	“SIM_POLL_SUSP_MODE”	“0” - SW default “1” – enable “2” - disable				
Sets FGI bit reporting filter	“FGI_REPORT_FILTER”	[“b1”[,”b2”[,…[,”b16”]…]] bit values: “1”-“64” Empty set erases all values				
Sets RF antenna override value	“RF_ANT_OVERRIDE”	0 – no override 1 – single antenna				
Sets dual SIM configuration	“SIM_DUAL_CONFIG”	“0” – SW default “1” – single SIM “2” – dual SIM				

Purpose	Param1	Param2	Param3	Param 4	Param 5	Returns
Sets wakeup SIM selection policy	"SIM_INIT_SELECT_POLICY"	"0" – N/A, single SIM, "1" – SIM1 only, "2" – SIM2 only, "3" – SIM1 with fallback to SIM2, "4" – SIM2 with fallback to SIM1				
Sets capability reporting of Specific Reference Signal flag	"CAP_REF_SIG_SUP_DIS"	"0" - enable "1" - disable				
Sets if capability reporting of RACH Report from SON-Parameters flag	"CAP_SON_RACH_REP_DIS"	"0" - enable "1" - disable				
Sets device mobility type flag	"PS_DEV_MOB_TYPE"	"0" – SW default "1" – mobile "2" – static				
Sets PMP severity override value	"PMP_LOG_SEV"	"0" - SW default "1" - Debug "6" - Info "7" - Notice "8" - Warning "9" - Error "12" – Emergency "255" - Disable				
Sets Connected mode DRX capability setting	"DRX_CAPABILITY_MODE"	"0" – SW Default "1" – Disabled "2" – Long DRX "3" – Long and short DRX				

4.2.3 AT%EARFCN

Command	Possible response(s)
%EARFCN=[<EARFCN>[,< EARFCN >…]] (up to 8)	In case the earfcn not in range, return ERROR. Will return "operation not allowed" in verbose mode (CMEE).
%EARFCN?	%EARFCN: <earfcn> Currently camped EARFCN.
%EARFCN=?	%EARFCN: (list of <earfcn>s found in scan)

Description

Command is intended to create, update and delete ERFCN favorite list.

The preferred EARFCNs may be added to favorite list. This means that during the first scanning step of “PLMN Search” procedure these ERFCNs will be preferred over closest neighbor ERFCNs, which detected Xcorr value and may be occasionally higher than actual LTE EARFCN.

The favorite list accelerates the following MIB and SIB acquisition step of “PLMN Search” procedure. It does not have any impact on following “PLMN Selection” and “Cell Search and Selection” procedures (see 23.122 and 36.304).

Note: in case of AT%EARFCN=0, it will erase favorite list and disable EARFCN preference mechanism on all bands

4.2.4 AT%VER

Command	Possible Response(s)
%VER[=<component>]	<ver_info> +CME ERROR: <err>
%VER?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%VER=?	OK

Description

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

Defined Values

<component> - SW component to return version info:

- “ALL”
- “GPS”
- “WIFI”

<ver_info> - version information

Example

AT%VER
Using APP processor - no SB or 3B versions
MAC Revision: REL_06_02_02_REV_81841
MAC Package Version: ALT3800_06_02_02_00_42_FW
MAC Build Time: Nov_01_2015_10_09_41
PHY Revision: 6.22.81835
PHY Build Time: Nov_01_2015_09_28_22
PHY Build Info: release
PMP Revision: 0
PMP Version:
PMP build time:
DSP Revision: 37429
BB Product: 3800
BB HW Revision: 10
RFIC_6300 Revision: 32
HLRD Revision: HN_02_02_00_20_00_LO
NP Build Time: 2015.11.05_11:12:59
DTB: AltairATA_USBModuleGPS
OK

4.2.5 AT%CSQ

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

Description

Execution command returns received signal received power <rsrp>,channel bit error rate <ber> and <rsrq> signal quality from the MT.

Taken from the above link, the definition for the <ber> is:

"The BER values used to define a quality band are the estimated error probabilities before channel decoding, averaged over the full set or sub set of TDMA frames as defined in sub clause 8.4."

The TB (transport blocks) error rate will be used for the BER parameter.

Read command is not supported.

Test command returns the legend.

Defined Values

<rsrp>:

- 0 113 dBm or less
- 1 111 dBm
- 2...30 109... 53 dBm
- 31 51 dBm or greater
- 99 not known or not detectable <ber> (in percent):
- 0...7 as RXQUAL values in the table in TS 45.008 [20] sub clause 8.2.4
- 99 not known or not detectable

<rsrq-signal quality>:

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

- 0 less than -19.5 dB
- 1 -19.5 … less than -19 dB
- 2 -19 … less than -18.5 dB
- … … …
- 32 -4 … less than -3.5 dB
- 33 -3.5 … less than -3 dB
- 34 -3 dB and greater

4.2.6 AT%CULCKI

Command	Possible Response(s)
AT%CULCKI=<fac>,<pass>,<index>,[<net>],[<netsub>],[<sp>], [<corp>],[<imsi>],[<capacity>]	OK or Error
AT%CULCKI=<fac>,<pass>,<index>,?	• %CULCKI:<active>,< capacity>, • [<net>],[<netsub>],[<sp>],[<corp>], • [<imsi>]
AT%CULCKI=?	%CULCKI: (list of supported <fac>s)

Description

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

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

Only 2 categories (facilities) are currently supported (see below).

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

The optional <capacity> parameter is applied only to category “PN” (Network personalization) and per customer demand. It permits to define a range of MNCs within the same MCC. If parameter is omitted the <capacity>=1 is assumed. Call Altair support to check this feature availability.

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

Including a “?” in the 4th parameter will return the values stored in the specific referenced record.

Defined Values

<fac>:

- “PS” : SIM personalization info
- “PN” : Network personalization info

Values as defined in 27.007

<pass>:

An up to 16 digit password for the specific category

<index>:

1-24 : record number for “PN” (Network) category

1-6: record number for “PS” (SIM) category

<net> : Network personalization information

<netsub>

: Sub Network personalization information (not supported)

<sp>

: Service Provider personalization information (not supported)

<corp>

: Corporate personalization information (not supported)

<imsi>

: Bytes 1-15 of IMSI for SIM personalization

<active>

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

<capacity>:

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

- 1-999 - for “PN”
- 1 – for “PS”

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

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

Examples

1. Set one network entry:
   AT%CULCKI="PN","12345678”,1,"310410"
   OK
2. Set one IMSI entry:
   AT%CULCKI="PS","12345678",1,,,,,"260160000000374"
   OK
3. Query for network entry:
   AT%CULCKI="PN","12345678",1,?
   %CULCKI: 0,1,"310410"
   OK
4. Query for IMSI entry:
   AT%CULCKI="PS","12345678",1,?
   %CULCKI: 0,1,,,,,"260160000000374"
   OK
5. Test command:
   AT%CULCKI=?
   %CULCKI: “PN”,”PS”
   OK

4.2.7 AT%CPININFO

Description

Returns the number of attempts left for PIN and PUK

Use

AT%CPININFO

Returns

+CPININFO: <PIN attempts left>, <PUK attempts left>, <PIN2 attempts left>, <PUK2 attempts left>

- PIN attempts left – number of failed tries to enter PIN, before it is blocked
- PUK attempts left – number of failed tries to enter PUK, before PUK is permanently blocked
- PIN2 attempts left – number of failed tries to enter PIN2, before it is blocked
- PUK2 attempts left – number of failed tries to enter PUK2, before PUK2 is permanently blocked

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

4.2.8 AT%MASTERKEY

Description

Verify the master key when the UE is blocked due to personalization counters overflowed or missing / unauthenticated PRSNP file

Use

AT%MASTERKEY=<masterkey>

Returns

OK

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

4.2.9 AT%SETLOG

Description

Command to set log severity for run-time (into RAM) per module. This setting will be lost after reboot.

Use

AT%SETLOG=<param1>,<param2>

Purpose	Param1	Param2	Returns
Sets module log severity in RAM	"SYS", "L1A", "MAC", "MACGN", "MACUL", "MACDL", "RLC", "RLCGN", "RLCUL", "RLCGL","PDCP", "PDCPGN", "PDCPUL", "PDCPDL", "RRC", "VL1", "NAS", "USIM","FRM", "ROHC", "PROF0", "PROF1", "PROF2", "PROF4", "PROF6", "OSAL", "SERV", "PACKET_CLASS","EXCEPTION_MANAGER", "SIMLOCK","DT","SMS","AT", "AMA"	"DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG"	OK\ ERROR
Sets log severity for all modules in RAM	"ALL"	"DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG"	OK\ ERROR

Note: Next shortened module names: “MAC”, “RLC” and “PDCP” works similar to wildcard and will have effect on all related to each layer logs:

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

4.2.10 AT%GETLOG

Description

Command to get log severity for currently running SW per module.

Use

AT%GETLOG=<param1>

Purpose	Param1	Returns
Reads device's log module severity from RAM	"SYS","L1A","MACGN", "MACUL", "MACDL", "RLCGN", "RLCUL", "RLCGL", "PDCPGN", "PDCPUL", "PDCPDL", "RRC", "VL1", "NAS", "USIM","FRM", "ROHC", "PROF0", "PROF1", "PROF2", "PROF4", "PROF6", "OSAL", "SERV", "PACKET_CLASS","EXCEPTION_MANAGER", "SIMLOCK","DT","SMS","AT", "AMA"	"DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG"
Reads device's log severity of all modules from RAM	"ALL"	"DEBUG", "INFO", "NOTICE", "WARN", "ERROR", "EMRG"

Note: Next shortened module names: “MAC”, “RLC” and “PDCP” works similar to wildcard and does not have their own severity to report and will report all related severity reports to each layer logs:

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

4.2.11 AT%DTLOG

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

Description

Execution command enable\disable Drive test Logs.

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

Read command is not supported.

Test command is not implemented yet.

Defined Values

<mode>:

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

<TTI_interval>:

Optional, the TTI periodicity of some of the PHY trace messages (262144-262148).

Value should be 1-10240.

4.2.12 AT%STATUS

Command	Possible Response(s)
%STATUS <subsystem>	For all subsystems except of AMBR: • %STATUS: <subsystem>: <status> [,<status_info>]
%STATUS?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%STATUS=?	%STATUS: (list of supported <subsystem>s)

Description

Execution command retrieves current status of specified UE subsystem.

Read command is not supported.

Defined Values

<subsystem>:

- “INIT’
- “AMBR”
- “USIM”
- “RRC”
- “SEC”
- “ROAM”
- "IPS"
- “CSPS”
- "INCA" (interference noise cancellation flow)
- “WDIS”
- “UICC”
- "TEMPM" – temperature monitor
- “RFANT”
- “DSIMA”
- “PSM” – starting v6.2.5 & v1.2.0

- "EMM"

<status>:

For "INIT":

- "INIT: 0" – UE init process ongoing (calibration in progress)
- "INIT: 1" – UE init process has finished (calibration complete)
- "INIT: 2" - UE init process has finished (calibration complete) but with critical errors. (SYS_CRITICAL)

For "USIM":

- "USIM: REAL USIM, LTE"
- "USIM: REAL USIM, non-LTE"
- "USIM: USIM SIMULATOR"
- "USIM: NO USIM"
- "USIM: REAL USIM DEACTIVATED"
- "USIM: INVALID USIM"
- "USIM: PERSONALIZATION ERROR"
- "USIM: REMOTE USIM"

For "IPS":

- "IPS: 0" – UE IP stack works correctly.
- "IPS: 1" – UE IP stack failure

For "AMBR":

For each bearer with APN AMBR, it retrieves:

- EPS bearer ID,
- APN-AMBR downlink in kbps
- APN-AMBR uplink in kbps

In case no APN AMBR are define, returns "No APN-AMBR is define"

For "RRC":

- "RRC: IDLE"
- "RRC: CONNECTED"
- "RRC: UNKNOWN" – Used for all other states (init, standby, flight mode, etc.)

For "SEC":

The compound status value contains:

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

Where the parameter range can be as following:

AUTH: <0-6>

0 - No authentication request sent yet

1 - Authentication success - stored context

2 - Authentication success – new context

3 - Authentication failure - MAC failure

4 - Authentication failure - Synch failure

5 - Authentication failure - non-EPS authentication unacceptable

6 - Authentication failure – error unspecified

7 - Authentication Reject

IALG: <0-3, 99>

0 - EIA0 (null integrity algorithm)

1 - EIA1 (SNOW 3G integrity algorithm)

2 - EIA2 (128-bit AES integrity algorithm)

3 – EIA3 (128-bit ZUC integrity algorithm)

99 - Invalid

CALG: <0-3, 99>

0 - EEA0 (null ciphering algorithm)

1 - EEA1 (SNOW 3G ciphering algorithm)

2 - EEA2 (128-bit AES ciphering algorithm)

3 – EEA3 (128-bit ZUC ciphering algorithm)

99 - Invalid

For “ROAM”:

- “ROAM: 0” – not roaming (UE isn’t camped at all or UE is camped on HPLMN/EHPLMN)
- “ROAM: 1” – meaning UE is camped on VPLMN

For “CSPS”:

- “CSPS: 0” - not registered or EPS_ONLY (PS) mode
- “CSPS: 1” - EPS_COMBINED (CS/PS) mode

For “INCA”:

- “INCA: 0” – INCA is deactivated
- “INCA: 1” – INCA is activated

For “WDIS”:

- “WDIS: 0” – enable signal detected
- “WDIS: 1” – disable signal detected

For “UICC”:

- “UICC: 0” – SIM is not inserted
- “UICC: 1” – SIM inserted, init is in progress
- “UICC: 2” – SIM init passed, wait for PIN unlock
- “UICC: 3” – Personalization failed, wait for run-time depersonalization
- “UICC: 4” – Activation completed. Reported when “Ready” state is reported by “AT+CPIN?”
- “UICC: 5” – Activation completed. RAM cache also ready except of conditional caches of ISIM files (for IMS) and Phone book.

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

For "TEMPM":

- "TEMPM: 0" – normal UE operation
- "TEMPM: 1" – heating protection applied

For "RFANT" – number of RF antennas in use:

- "RFANT: 1"
- "RFANT: 2"
- "RFANT: 4"
- "RFANT: 8"

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

- "DSIMA: 0" – SIM not selected
- "DSIMA: 1" – SIM1 selected
- "DSIMA: 2" – SIM2 selected

For "PSM":

- "PSM: 0" – PSM is not active
- "PSM: 1" – PSM is active

For "EMM":

- "EMM: 1" - EMM_NULL
- "EMM: 2" - EMM_DEREGISTERED_NORMAL_SERVICE
- "EMM: 3" - EMM_DEREGISTERED_LIMITED_SERVICE
- "EMM: 4" - EMM, EMM_DEREGISTERED_ATTEMPTING_TO_ATTACH
- "EMM: 5" - EMM_DEREGISTERED_PLMN_SEARCH
- "EMM: 6" - EMM_DEREGISTERED_NO_IMSI
- "EMM: 7" - EMM_DEREGISTERED_ATTACH_NEEDED
- "EMM: 8" - EMM_DEREGISTERED_NO_CELL_AVAILABLE
- "EMM: 9" - EMM_REGISTERED_INITIATED
- "EMM: 10" - EMM_REGISTERED_NORMAL_SERVICE
- "EMM: 11" - EMM_REGISTERED_ATTEMPTING_TO_UPDATE
- "EMM: 12" - EMM_REGISTERED_LIMITED_SERVICE
- "EMM: 13" - EMM_REGISTERED_PLMN_SEARCH
- "EMM: 14" - EMM_REGISTERED_UPDATE_NEEDED
- "EMM: 15" - EMM_REGISTERED_NO_CELL_AVAILABLE
- "EMM: 16" - EMM_REGISTERED_NO_CELL_AVAILABLE_PSM_ACTIVE
- "EMM: 17" - EMM_REGISTERED_ATTEMPTING_TO_UPDATE_MM
- "EMM: 18" - EMM_REGISTERED_IMSI_DETACH_INITIATED
- "EMM: 19" - EMM_DEREGISTERED_INITIATED
- "EMM: 20" - EMM_TRACKING_AREA_UPDATING_INITIATED

- “EMM: 21” - EMM_SERVICE_REQUEST_INITIATED
- “EMM: 22” - EMM_DEREGISTERED_ATTACH_ACCEPT_RECEIVED

<status_info>:

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

Example

AT%STATUS=”RRC”

%STATUS: RRC: CONNECTED

OK

AT%STATUS=”USIM”

%STATUS: USIM: REAL USIM, LTE

or:

%STATUS USIM: REAL USIM, non-LTE

OK

AT%STATUS=”SEC”

%STATUS: SEC: AUTH: 1 NAS IALG: 1 NAS CALG: 1 AS IALG: 2 AS CALG: 2

OK

4.2.13 AT%COUNT

Command	Pssible Response(s)
%COUNT <layer>[,<filter>[,<counter_type>]]	%COUNT: <stats string>
%COUNT?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%COUNT=?	%COUNT: (list of supported <layer>s)

Description

Command returns counters per LTE protocol layer.

Read command is not supported.

Defined Values

<layer>:

- “PDM”
- “PDCP”
- “RLC”
- “MAC”
- “L1A”
- “RRC”
- “NAS”
- “TIMERS”

- "LOG"
- "CRITICALERR"
- "MEM"
- "L1AEXT",
- "ALL"
- "MBMS"
- "PWR"

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

- "TX"
- "RX"

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

- "IPBYTES"

<stats string>:

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

4.2.14 AT%MEAS

Command	Possible Response(s)
%MEAS <measurement type>	For RSRP, RSRQ, SINR, RSSI: • %MEAS: <measurement type>:Reported=<measurement value>, • Rx0Tx0=<measurement value>,Rx0Tx1=<measurement value>, • Rx1Tx0=<measurement value>,Rx1Tx1=<measurement value> For Temperature, Path loss: • %MEAS: <measurement type>:<measurement value> For TX Power: • %MEAS: <measurement type>:PUSCH=<measurement value>, • PUCCH=<measurement value>, PRACH=<measurement value>, • SRS=<measurement value> For Signal Quality: • %MEAS: Signal Quality:RSRP=<measurement value>,RSRQ=<measurement value>, • SINR=<measurement value>,RSSI=<measurement value> For Antenna relative phase: • %MEAS: <measurement type>:TX0=<measurement value>,TX1=<measurement value>, • TX2=<measurement value>,TX3=<measurement value>,Rx0RSSI=<measurement value>,

Command	Possible Response(s)
	• Rx1RSSI=<measurement value> For RS_SNR: • %MEAS: RS_SNR=<measurement value> For RS_SINR: • %MEAS: RS_SINR=<measurement value> For per-antenna RSRP, RSRQ, SINR, RSSI (20-23): • %MEAS:<measurement type>: Reported=<value>,Ant0=<value>,Ant1=<value> For all NBS RSRP, RSRQ and RSSI: • %MEAS: EARFCN=<EARFCN>,CellID=<cell ID>,<measurement type>=<measurement value> • [<CR><LF>%MEAS: EARFCN=<EARFCN>,CellID=<cell ID>,<measurement type>=<measurement value>] • […] For all neighboring NBS simultaneous RSRP and RSRQ reporting: • %MEAS: EARFCN=<EARFCN>,CellID=<cell ID>,RSRP=<measurement value>, RSRQ=<measurement value> • [<CR><LF>%MEAS:EARFCN=<EARFCN>,CellID=<cell ID>,<RSRP>=<measurement value>, RSRQ=<measurement value>] • […] For NBS RSRP in compressed format: • %MEAS: NBS RSRP:<EARFCN>,<cell ID>,<measurement value>[, <EARFCN>,<cell ID>,<measurement value>[…]] For E-CID (AT%MEAS="95") in compressed format: • %MEAS: ECID:<gcid>,<TimeDifIndex>,<ta>,<MCC>,<MNC>,<TAC>, • <EARFCN>,<cell ID>,<SFN>,<RSRP>,<RSRQ> • [,<EARFCN>,<cell ID>,<SFN>,<RSRP>,<RSRQ> […]] • For SINR of all eMBMS areas (type 94): • %MEAS:MBMS SINR:AreaId=<areaId>,Avg=<measurement value>, • Rx0=<measurement value>,Rx1=<measurement value> • [<CR><LF>%MEAS:MBMS SINR:AreaId=<areaId>,Avg=<measurement value>, Rx0=<measurement value>,Rx1=<measurement value>] • […] The Network Time correspond to SFN of serving

Command	Possible Response(s)
	cell(AT%MEAS="93")in compressed format: • %MEAS: NWTIME:<networkTTI>,<networkUtcTime>
%MEAS?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%MEAS=?	%MEAS: <list of supported measurements>

Description

Command returns measurement for specified measurement type.

For RSRP and RSRQ "Reported" measurement value is the averaged narrow-band measurement executed for serving eNB as defined in the spec.

Note: The SINR is not reported over the air, its "reported" value contains combined value of all antennas' measurements.

Signal Quality measurement type (8) returns together last serving cell measurements of RSRP, RSRQ, SINR and RSSI. The AT command response contains only "reported" values.

For RSRP only the per antenna measurement value RXyTXz (y,z=0/1) is the result of last non-averaged wide-band measurement used for debugging purposes.

Only single "reported" value is supported for neighbor eNB measurements.

Antenna relative phase measurement type (9) returns for each eNB TX antenna, the relative phase between UE RX antennas. Command returns also related RSSI measurement as per UE RX antennas.

RS_SNR measurement type is implemented as per VZW Reqs-LTE_DataDevices.docx.

Read command is not supported.

Defined Values

<Measurement type>:

- "0" - RSRP
- "1" - RSRQ
- "2" – SINR
- "3" – RSSI
- "4" – TX Power
- "5" – Temperature
- "6" – Pathloss
- "7" – CQI
- "8" – Signal Quality (RSRP & RSRQ & SINR & RSSI)
- "9" – Antenna relative phase. Starting v4.5.1
- "10" – RSRP reported value only
- "11" – RSRQ reported value only
- "12" – SINR reported value only

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

<EARFCN>:

Decimal EARFC value

<gcid>:

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

<TimeDifIndex>:

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

<ta>: integer

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

<mcc>: integer

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

<mnc>: integer.

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

<TAC>: string

Two byte tracking area code in hexadecimal format

<SFN>:

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

<cell ID>:

Decimal Physical Cell ID value<measurement value>

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

- dBm for RSRP, RSSI, Pathloss, SINR
- dB for RSRQ
- 10dBm for TX Power
- Degrees (°C) for Temperature
- Degrees (phase) & 256*dBM (RSSI) units for Antenna relative phase
- 10dB for RS_SNR, RS_SINR

Measurement Range:

- -140 <= RSRP <= 0
- -60 <= RSRQ <=0
- -128 <= SINR <= 40
- -26 <= TX Power <= 40
- -128 <= Temperature <= 128
- 0 <= CQI <= 15
- -120 <= RS_SNR, RS_SINR <= 400 (in 10dB units)

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

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

<networkTTI>:

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

<networkUtcTime>:

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

Implementation Notes

Command may obsolete %CSQ command, which contains the same <ber> as standard “+CSQ” command. All other parameters are provided by this command. The RSSI value is calculated using RSRP and RSRQ values reported by PHY.

MAC-PHY “Frame Ready” interface shall be extended for new 4 TX Power values and CQI.

CQI returns last value of WBCQI of layer 0.

Potentially a long list of neighbors is returned in a number of lines separated by end symbol (ordinary CR+LF). For intra measurements the EARFCN output parameter may be omitted as per [4] rules, but it is not recommended. Using “0” for current EARFCN as described above is preferable.

Example

AT%MEAS="0"

%MEAS: RSRP: Reported = -80, Rx0Tx0 = -80, Rx0Tx1 = -76, Rx1Tx0 = -92, Rx1Tx1 = -82

OK

AT%MEAS="8"

%MEAS: Signal Quality: RSRP = -90, RSRQ = -8, SINR = 8, RSSI = -62

OK

AT%MEAS="98"

%MEAS: EARFCN=0, CellID=45, RSRP =76

%MEAS: EARFCN=0, CellID=75, RSRP =82

%MEAS: EARFCN=2620, CellID=40 RSRP =73

OK

AT%MEAS="96"

%MEAS: NBS RSRP: 40340,300,-92, 40340,171,-95

OK

AT%MEAS="95

%MEAS:ECID: “09FBD146”,3,234,35,"00C3",40340,15,-92,-8,40340,12,853,-95,-9

OK

AT%MEAS="94"

%MEAS: MBMS SINR: AreaId = 1, Avg = -6, Rx0 = -8, Rx1 = -2

%MEAS: MBMS SINR: AreaId = 2, Avg = -5, Rx0 = -7, Rx1 = -1

OK

4.2.15 AT%PCONI

Command	Possible Response(s)
%PCONI[=<format>]	AT%PCONI • <CR><LF>duplexing mode: <duplexing mode> • <CR><LF>Transmission mode: <antenna/TX mode> • <CR><LF>Bandwidth: <bw> • <CR><LF>EARFCN: <EARFCN> • <CR><LF>Global Cell ID: <Global cell ID> • <CR><LF>Physical Cell ID: <Physical cell ID> • <CR><LF>HNBN: <HNBN> For "COMPR": • %PCONI: <duplexing mode>, <tm>, <bw>, <EARFCN>, <Global cell ID>, <Physical cell ID>, <HNBN>, <band>[,< nwo_femtocell_ind >]
%PCONI?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%PCONI=?	%PCONI: (list of supported <duplexing mode>s), (list of supported <antenna mode>s), (list of supported <bw>s)

Description

Command returns physical connectivity and eNB parameters info.

Command return ERROR if connection to eNB is not established yet.

Read command is not supported.

Optional <format>="COMPR" parameter provides opportunity to report all parameters in single line.

Note: Note that for uncompressed format all following string and hexadecimal parameters are returned without quotes.

Defined Values

<format> - string:

- "COMPR" – compressed format

<duplexing mode> - string:

- "TDD"
- "FDD"

<antenna/TX mode> - string:

- "SISO" (tm1)

- ”Tx diversity” (tm2)
- “Open loop MIMO” (tm3)
- “Closed loop MIMO” (tm4)
- “tmX” – for tm5 and more

Antenna mode report is based on currently used Transmission Mode (TMx).

<tm> - transmission mode, string:

- “tmX”

<bw>:

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

<EARFCN> - decimal:

3GPP spec encoding for EARFCN.

<Global cell ID> - hexadecimal:

3GPP spec encoding for cell ID.

<Physical cell ID> - decimal:

Physical cell Id acquired by cell search.

<HNBN> - string:

Home eNB name encoded in SIB9 (string size up to 48 symbols).

<band> - decimal:

As per 3GPP encoding for band.

<nwo_femtocell_ind>- decimal; NW Operator specific femtocell indication:

For NW operators which support proprietary femtocell indication, this parameter indicates if cell is regular cell or femtocell. For NW operators, which don't support this indication, this parameter is omitted.

- 0 – regular cell
- 1 – femtocell
- 2-99 – Reserved FFU

Example

6. Uncompressed format:

   AT%PCONI

   Duplexing mode: TDD

   Transmission mode: tm7

   Bandwidth: 5

   EARFCN: 40340

   Global Cell ID: 09FBD146

Physical Cell ID: 300

HNBN: N/A

OK

7. Compressed format:

AT%PCONI

%PCONI: “TDD”, “tm7”, 5, 40340, “09FBD146”, 300, “N/A” , 41

OK

Implementation Notes

Please, use quotes (“”) for AT response in <format>=”COMPR”.

This command partially duplicates %EARFCN and %SETBW read commands. It may substitute these commands in the future, when both of them will be removed because of unsupported set commands.

The TDD/FDD is completely defined by the band used. Band could be known from EARFCN. Some parameter duplication is placed into this command intentionally for usage simplicity.

4.2.16 AT%SCAN

Command	Possible Response(s)
%SCAN[=<cmd>]	For <cmd>=“QUERY” • %SCAN:<res>[,<EARFCN>,<PCI>,<RSRP>,<RSRQ> • [,<EARFCN>,<PCI>,<RSRP>,<RSRQ>]…]
%SCAN?	%scan: for each cell: (<bw>, <Global_cell_ID>, <EARFCN>, <Phycical_cell_ID>, <PLMN_ID>, <RSRP>[)
%SCAN=?	OK

Description

Command returns the RSSI scn results, a results is displayed only for cells successfully acquired SIB1 from.

Execute and Test commands are not supported.

Defined Values

<cmd> - command, string:

- “QUERY” – ask for last scan results

<bw>:

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

<Global cell ID>:

- As per 3GPP encoding for cell ID.

<EARFCN>

- As per 3GPP encoding for EARFCN

<Physical cell ID> or <PCI>:

- PHY acquired cell ID.

<PLMN ID>

- As per 3GPP encoding for PLMN ID

<RSRP>

- RSRP measurements in dbm

<res> - scan result, integer:

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

Implementation Notes

The results are updated after every PLMN search, in case the UE doesn't perform PLMN search (stored cell), the command will return only OK.

Note that scan for measurements reporting during scan failure there is no need in new MAC-PHY API: the measurements are already provided by PHY to MAC during MIB/SIB1 acquisition.

4.2.17 AT%GETID

Command	Possible Response(s)
AT%GETID=<requested ID>	%GETID:id1[,id2[…]]
AT%GETID?	ERROR (OPRATION_NOT_SUPPORTED)
AT%GETID=?	Returns a list of supported ID values

Description

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

Supported ID Values

<requestedID>:

- "SerialNumber" – returns the serial number of the board. Relevant for NP-disabled only.
- "BoardType" – returns Board Type, which is used to differentiate SW behavior per board of same customer.

- ”UsbProductId” - returns the USB product identification number. Relevant for NP-disabled only.
- ”UsbVendorId” – returns the USB vendor identification number. Relevant for NP-disabled only.
- ”VendorModelId” – returns the vendor model ID number. Relevant for NP-disabled only.
- ”ManufDate” - returns the manufacture date of the board. Relevant for NP-disabled only.
- “Customer_Id” – returns assigned by Altair Customer ID, which is used to differentiate SW behavior per customer.
- “IMEISV” – returns IMEISV value reported over the air.
- “usbVendorName” - returns the USB vendor name Relevant for NP-disabled only.
- “usbProductDescription” - returns the USB product description Relevant for NP-disabled only.
- ”ChipID” – returns unique Chip Id (Lot ID, Wafer ID, X-pos and Y-pos). For ALT1160 and ALT12xx. (starting vTBD)

Example

AT%GETID=”ChipID”

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

OK

Implementation Notes

Command is intended to show different identification values, which are stored into OTP, DIP (NPD) and SYSBP file.

Internally for some parameters AT%GETID and AT%GETCFG use the same function call: ServiceManagerGetValFromNv. This means that both AT commands can get the same NV fields using the same first parameter value. But it is important to keep DIP and SYSBP RO parameters handled in separate AT command from DOP. The DOP RW parameters are supported by pair of symmetric parameters in AT%SETCFG and AT%GETCFG.

It is strictly recommended to avoid exposing of DOP parameters through this command.

4.2.18 AT%PPPAUTH

Command	Possible Response(s)
%PPPAUTH=<cid>,<auth_type>,<auth_name>, <auth_pwd>, [<host_name>]	OK ERROR
%PPPAUTH?	ERROR (OPRATION_NOT_SUPPORTED) CME ERROR: operation not allowed

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

Description

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

Defined Values

<cid>

PDP context

<auth_type>

- None
- PAP
- CHAP

<auth_name>

Username used for authentication.

<auth_pwd>

Password used for authentication.

<host_name>

Optional, the name of the Authentication server.

4.2.19 AT% TRSHCMD

Command	Possible Response(s)
%TRSHCMD=<module>,<cmd>[,<param>]	OK ERROR
%TRSHCMD?	ERROR
%TRSHCMD=?	• TRSHCMD: <module1>:<list of supported commands>, • <module2>:<list of supported commands> • …

Description

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

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

The commands applied to SERVICE module move device to Service operational mode. There is no back transfer from Service mode to normal operational mode.

To return to normal operational mode the UE shall be resettled through AT command or physically.

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

Read command is not supported.

Defined Values

<module>:

- "PHYLOG" – PHY Log module

<cmd>:

- "RSRP"
- "ARSRP" - Average RSRP
- "FREQ" - Frequency
- "TIMING" - Timing
- "TXP" - TX Power
- "AGC"
- "SINRS0" - SINR Symb0
- "SINRS7" - SINR Symb7
- "DCIP" - DCI Parameters
- "CFIC" - CFI type counters
- "CFIHI" - CFI and HI values
- "CPR" – CQI, PMI, RI
- "CRCTB0" - CRC Error TB0
- "CRCTB1" - CRC Error TB1
- "ACKSR" – ACK/NACK counters, SR
- "HARQR" - HARQ Retransmission counter
- "TXCOMP" – TX compressed log
- "RXCOMP" – RX compressed log
- "ALL" – used to disable all PHY logs described above. Some important PHY logs cannot be disabled by this command. Since enabling all PHY logs may cause PHY operation starvation under heavy traffic, the enable all PHY logs command is prohibited. If commanded, the ERROR response will be returned.
- "LOGGER" – used to completely disable PHY logs mechanism. Once enabled, this command will return to the PHY previous log settings (default or last updated using the current command).
- <param>:
- "0" – disable
- "1" – enable

<module>:

- "SERVICE" – Service module

<cmd>:

- “CONN4MEAS"

<param>:

- EARFCN

<module>:

- "TIMERS" – Different protocol timers

<cmd>:

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

<param>:

- Timer value in sec

<cmd>:

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

<param>:

- Timer value in ms; valid range: 500-3000 ms

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

- "TXANT" – TX antenna selection module. The antenna selection is ignored if “isTxDiversitySupported” is disabled in PHYBP file.
- <cmd>:
- “ALTDEFM" – Altair default TX diversity mode for antenna selection
- “USRSELM” – User manual TX antenna selection mode

<param>:

- 0 – TX0 antenna, relevant for “USRSELM” command only.
- 1 – TX1 antenna, relevant for “USRSELM” command only.

<module> - following feature is supported starting v4.51:

- "MEAS" – Measurement module

<cmd>:

- “PGINT” – paging interval used in Idle mode

<param>:

- 0 – Return to eNB setting
- 1 – 320 ms
- 2 – 640 ms
- 3 – 1280 ms
- 4 – 2560 ms

<module> - following feature is supported starting version (late 4.5.6):

- "RXANT" – RX antenna selection module

<cmd>:

- "USRSELM" – User manual RX antenna selection mode

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

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

<module> - following feature is supported starting v4.5:

- "TXPWR" – TX power management

<cmd>:

- "DEFMAX" – limiting the max TX power by PHYBP NV values as by default
- "USRMAX" – User manual max TX power override

<param>:

- max TX power in 256*dBm for all TX channels

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

- "UE_CAPABILITIES" – UE Capabilities

<cmd>:

- "Category" – Setting the UE Category

<param>:

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

<cmd>:

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

<param>:

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

<module> - following feature is supported starting v4.5.6:

- "RSIM" – Remote USIM module

<cmd>:

- "TIMEOUT" – Time out value for the commands sent from our UE to the remote USIM until response is expected

- Units are in msec
- Value of 0 will leave the timeout to be the SW default – 5000m
- <param>:
- Timeout value

<module> - following feature is supported starting late v4.5.6:

- "NETWORK" – Network provider features management

<cmd>:

- “ARCH" – network provider architecture
- “EnableIpv6SrcFiltering”

<param>:

For “ARCH”:

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

For “EnableIpv6SrcFiltering”:

- “0” – false (disable)
- “1” – true (enable)

<module>:

- "USIM"

<cmd>:

- “ERASE_EF” - Erase file regardless of location on SIM or BSP

<param1>: string

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

<module>:

- "BSPFILE" – For ALT38xx (Griffin) only starting late v6.2.0

<cmd>:

- “ERASE_LTEPP” - Erase some specific entity of LTEPP file (in NV and in RAM)

<param1>: string

- “0” – erase MRU table
- “1” – erase ERPLMN List

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

- ”CELLSEL” - cell selection RRC module

<cmd>:

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

<param1>: string

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

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

<module>:

- "SIMDET"

<cmd>:

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

<param1>: string

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

4.2.20 AT%AUTH

Command	Possible Response(s)
%AUTH=<logical channel>, <auth>,<RAND>	%AUTH :<status>[,[<res>],[<ck>],[<ik>][,<auts>]] OK/ERROR
%AUTH?	ERROR (OPRATION_NOT_ALLOWED)
% AUTH =?	OK

Description

This command intended to provide SIM authentication for host requests.

Defined Values

<logical_channel>:

- 0-4. Value 0 is reserved for USIM always

<autn>:

- 16byte hexadecimal Authentication Token as per 33.102

<rand>

- 16byte hexadecimal random input as per 33.102

<status> - command execution status:

- 0 - USIM Authentication Response success,
- 1 – USIM Authentication Response sync failure,
- 2 – USIM Authentication Response MAC failure,
- 3 – USIM Authentication Response non-EPS authentication unacceptable failure,
- 4 – USIM Authentication Response security context not supported

- <xres>, <ck>, <ik> (expected response XRES, cipher key CK and integrity key IK):
- conditional hexadecimal parameters related to successful status

<auts> - synchronization failure parameter as per 33.102

Note: All hexadecimal parameters in this command are encoded without quotes (“”).

Example

AT%AUTH=1,B756ABA9E30A0000483D44503EA5F239,66552797069527F4E46F01FC12ACFA86

Status 0 - success

%AUTH:0,43C60171,95A3004CA5AE4EBF5143B8EBD1AA15A6,CDA269152E1763A7805E393F5D2FA13A

OK

Status 1 - sync failure

%AUTH : 1,,,,3FDD6C44FE9919A65CC4ACE757B3

Status 2 - Response MAC failure

%AUTH : 2

Status 3 - non-EPS authentication unacceptable failure

%AUTH : 3

Status 4 - security context not supported

%AUTH : 4

4.2.21 AT%CEER

This command is used for protocol error notification by enabling unsolicited reporting if needed.

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

Description

The set command enables or disables the presentation of unsolicited result response about system failure in form:

%CEER: <module>,<procedure>,<failure>[,<reject cause>[,<error info>]]

The read command returns the last failure report added with selected <mode>.

The test command returns list of supported modes.

Defined Values

<mode>: status of unsolicited result response presentation

- 0 - disabled (default)
- 1 – enabled

<clear_err>: clear last stored failure report

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

<module>: protocol layer or protocol entity

- “NAS-EMM”
- “NAS-ESM”
- “PDM”
- “RRC”
- “PDCP”
- “RLC”
- “MAC”
- “L1A”

<procedure>: protocol defined procedure

For NAS-EMM:

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

For NAS-ESM:

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

For PDM:

- "IPV6_RA"

For RRC:

- ”CONN_EST”

For PDCP:

- TBD

For RLC:

- TBD

For MAC:

- TBD

For L1A:

- TBD

<failure>:

- “REJECT”

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

<reject cause>: as per protocol definition

For NAS-EMM and NAS-ESM:

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

For RRC:

- 1 - Access class barring
- 99 - Other

<error info>:

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

Example

For read:

AT%CEER?

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

OK

For unsolicited report:

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

Implementation Notes

1. Command is partially defined. This is pilot AT command definition opened for future extensions.

   All the next parameters may be extended with new values in the future:

   – <module>
   – <procedure>
   – <failure>

   It is strictly recommended to keep consistency within AT command implementation for all future extensions.
2. This AT command will be mostly used in unsolicited report mode. Each time system protocol error occurs, specified layer/module will send message to AT Manager, which will send unsolicited report, if unsolicited mode is enabled.
3. To be prepared to answer to the "AT%CEER?" read command, especially when unsolicited reports are disabled, AT command manager shall store last error report string internally and send it as answer to this read command adding info about current mode on top of the message. If there was not any error occurred until now, the "AT%CEER?" will return only "mode" value.

4. Some failure may be indicated by more than one error, for example Combined Attach may return Attach Reject with reject cause #19, "ESM failure". In addition the PDN CONNECTIVITY REJECT message will contain ESM reject code.

   In such a case the NAS entity will send more than one message to AT Manager. These messages will be interpreted as two separate unsolicited reports sent to the host over AT command channel. Note that the last ESM code is more important in this scenario. It is enough that only this last code will be always returned as an answer to “AT%CEER?”.
5. Note that when there is no reject cause (for example in Authentication Reject or in Max Retry scenario) the reject cause and the error info will not be displayed.

4.2.22 AT%RSIMREQ

Command	Possible Response(s)
(unsolicited result code)	%RSIMREQ:<cmd name>, <cmd body>

Description

This unsolicited command requests the host (CM) to tunnel encapsulated AT command to SIM device owner. The command answer will be provided as encapsulated to AT%RSIMRSP command.

Defined Values

<cmd name>:

- “CRSM” – AT command name of AT+CRCM as per TS27.007
- “CSIM” - AT command name of AT+CSIM as per TS27.007
- “AUTH” – since all vendors call their proprietary authentication AT commands differently, the common alias name “AUTH” for all such commands is preferable.

<cmd body>:

- For “CRSM” – AT command body copied from original command starting just after “=” as per TS27.007
- For “CSIM” - AT command body copied from original command starting just after “=” as per TS27.007
- For “AUTH” – AT command body starting just after “=”. Most of vendor-proprietary authentication commands have the same input parameters even if their commands have different names.

Example

The 3G command used to get authentication data by CM for LTE:

AT+ERTCA="20385521F9FDD4EB24EE4281AA7E37CD","A487886131A3F2507DF3ACB5A9688927"

Will be sent as unsolicited result code from LTE to CM in form:

%RSIMREQ:”AUTH”,"20385521F9FDD4EB24EE4281AA7E37CD","A487886131A3F2507DF3ACB5A9688927"

4.2.23 AT%RSIMRSP

Command	Possible Response(s)
%RSIMRSP=<cmd name>, <rsp body>	OK/ERROR
%RSIMRSP?	ERROR (OPRATION_NOT_ALLOWED)
%RSIMRSP=?	ERROR (OPRATION_NOT_ALLOWED)

Description

This command allows to CM on an external host to provide the SIM owner (3G modem) answer to the last AT%RSIMREQ command from LTE. This commands encapsulates the AT command answer into Altair-proprietary form.

Since this command is not planned for manual use, only for automatic from CM, the test command is not supported.

Defined Values

<cmd name>:

- "CRSM" – AT command name of AT+CRCM as per TS27.007
- "CSIM" - AT command name of AT+CSIM as per TS27.007
- "AUTH" – since all vendors call their proprietary authentication commands differently, the common alias name "AUTH" for all such commands is preferable.

<rsp body>:

- For "CRSM" – AT command response body copied from original command starting just after ":" as per TS27.007
- For "CSIM" - AT command body copied from original command starting just after ":" as per TS27.007
- For "AUTH" – AT command response body starting just after ":". Most of vendor-proprietary authentication commands have the same input parameters, but slightly different output parameters. Some customization per NV parameter (CustomerId) may be needed for output parameter parsing in the future.

Example

The 3G command response received by CM:

+ERTCA=2

OK

Will be sent as AT command from CM to LTE in form:

%RSIMRSP:"AUTH",2

The 3G command response received by CM:

+ERTCA:0,11111111,22222222222222222222222222222222,3333333333333333333333333333333

OK

Will be sent as AT command from CM to LTE in form:

%RSIMRSP:"AUTH",0,11111111,22222222222222222222222222222222,33333333333333333333333333333333

Note: +ERTCA customer-proprietary command is not compliant to spec and does not use quotes in the answer for hexadecimal parameters. Its output will be used "as is", no quotes expected.

4.2.24 AT%CATSAT

Command	Possible Response(s)
%CATSTAT=<mode>	OK / ERROR
%CATSTAT?	%CATSTAT=<mode>[,<SW1>,<SW2>]
(unsolicited result code)	%CATSTAT: <SW1>,<SW2>
%CATSTAT=?	%CATSTAT: (list of supported <modes>)

Description

This command allows the CAT to receive status bytes of SIM transactions in order to follow proactive SIM operation. %CATSTAT are provided by terminal as unsolicited AT commands whenever a valid status word is received (91-xx).

The CAT application can control when it is activated and can get proactive commands.

When terminal powers up the default mode is 0 i.e. no status indication are transferred to host.

Once the CAT application is activated, it will transfer the terminal to mode 1 as it waits for CAT commands from SIM.

Read command provides last proactive command status (only last 0x91XX status). Status is cleared after each read.

Defined Values

<mode>:

- 0 - No status words are transferred to CAT application (default).
- 1 - Status words 91 XX are transferred to CAT application.
- 2 - All status words are transferred to CAT application – will not be supported

<sw1>, <sw2>:

Status words.

4.2.25 AT%SIMREFRESH

Command	Possible Response(s)
%SIMREFRESH=<mode>[,AID[,<refresh info>>]]	%SIMREFRESH:<isRestart> OK / ERROR
%SIMREFRESH?	ERROR (OPRATION_NOT_ALLOWED)
%SIMREFRESH=?	%SIMREFRESH: (list of supported <modes>)

Description

This command is used to request terminal to refresh SIM cache or to reinitialize SIM or application on SIM.

The other unsolicited command %NOTIFYEV is used (if enabled) for reporting to NP (all applications) or external host on SIM refresh event regardless of LTE reset is required or not. This is NP Application or external Host responsibility to decide about actions needed on SIM refresh.

Defined Values

<mode> - indicates the type of refresh to be performed according to definition as in TS 102.223 (for modes 0-6):

- 0 – NAA initialization
- 1 – NAA File change notification
- 2 - NAA Initialization and File Change Notification.
- 3 - NAA Initialization and Full File Change Notification.
- 4 - UICC Reset.
- 5 - NAA Application Reset.
- 6 - NAA Session Reset.
- 7 - Steering of Roaming as defined in TS 23.122.

Where NAA = USIM or ISIM.

<AID> - application ID to be refreshed: USIM or ISIM. If omitted, the default (USIM) application needs to be refreshed.

<refresh info>:

For modes 0-6:

- EF list - File List of file identifiers to refresh. If omitted for mode 2 and 3 all files needs to be refreshed.

For mode 7:

- PLMNwACT List – hexadecimal EF_PLMNwAct file encoding as it is received from USIM.

<isRestart>:

- 0 – none
- 1 – restart as a result of PLMN lists changes may be needed

- 2 – restart as a result of IMSI changes is mandatory required

Command returns (2), if EFIMSI is updated.

Command returns (1), if files involved into PLMN selection were changed. This indication is used to restart Automatic or Manual PLMN selection flow from the beginning. The PLMN selection related files:

- EFLRPLMNSI
- EFEPSLOCI (TBD, check)
- EFPNN
- EFPLMNwAcT
- EFOPLMNwACT
- EFHPLMNwAcT
- EFOPL

Example

1. Request (from SIM to CAT): D0 09 8103010103 82028182

   Converted to AT command:

   AT%SIMREFRESH=0

2. Request (from SIM to CAT): D0 12 8103010101 82028182 9211033F007FFF6F3B3F002F053F007F106F7E (File List)

   Converted to AT command:

   AT%SIMREFRESH=1,,28475,12037,28542

3. Request (from SIM to CAT): D0 15 8103010107 82028182 720A522400C080521400C080 (PLMNwACT List)

   Converted to AT command:

   AT%SIMREFRESH=7,,"522400C080521400C080"

Implementation Notes

1. The AT will get the information from the USIM (same as CRSM read) and will send a message to the EMM with the info to update.
2. The EF list provided by CAT is already pre-parsed by CAT and provided as list of identifiers, separated by comma. Note, that comma separation is not syntactically right because it is kept for parameters separation, not for separation inside single parameter. This is our current implementation.
3. The PLMNwACT List is sent to UE in unparsed form as single hexadecimal parameter.

4.2.26 AT%CATPOLLINT

Command	Possible Response(s)
%CATPOLLINT=<interval>	OK/ERROR
%CATPOLLINT?	%CATPOLLINT: <interval>
%CATPOLLINT=?	OK

Description

This command is used to modify polling interval of SIM in seconds for CAT purposes. Default value is 30 sec.

A value of 0 indicates no polling.

Defined Values

<interval>:

Time value in seconds

4.2.27 AT%CATLOCINF

Command	Possible Response(s)
%CATLOCINF=<type>	%CATLOCINF: <data>
%CATLOCINF?	ERROR (OPRATION_NOT_ALLOWED)
%CATLOCINF=?	%CATLOCINF: (list of supported < type>s)

Description

This command is used to retrieve data required by CAT application to respond to USIM LOCAL_INFO request.

Defined Values

<type>:

- 0 - Location information as defined in TS 102.223
- 1 - IMEI of terminal
- 2 - Measurement results as defined in TS 102.223 & TS 31.111
- 3–5 - Reserved for future use as per TS 102.223
- 6 – Access Technology as defined in TS 102.223
- 7–8 - Reserved for future use as per TS 102.223
- 9 - Search mode – will return PLMN search mode as defined in TS 102.223 (0- manual, 1 – automatic)

<data>:

As defined in the above specs for the relevant data

Implementation Notes

1. Location information as defined in TS 102.223 – will be taken from nas_db_info.identities.Last_Visited_Reg_TAI
2. IMEI of terminal – will be taken from nas_db_info.identities.IMEI
3. Measurement results as defined in TS 102.223 & TS 31.111 – will be taken from (same as at%meas=98 – it will contain also inter measurements)

4.2.28 AT%STATEV

Command	Possible Response
AT%STATEV=< mode>	OK or ERROR

Command	Possible Response
AT% STATEV?	ERROR (not supported)
AT% STATEV=?	%STATEV: (list of supported < mode>s)
(unsolicited report)	% STATEV: <event>

Description

The command is intended to report events for different important state transitions and system occurrences.

The reporting is disabled by default at wakeup time.

Defined Values

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

<event>:

- 0 - Start Scan
- 1 - Fail Scan
- 2 - Enter Camped
- 3 - Connection Establishment
- 4 - Start Rescan
- 5 – Connected
- 6-99 – Reserved

4.2.29 AT%NOTIFYEV

Command	Possible Response
AT%NOTIFYEV=<ev_type>,<mode>	OK or ERROR
AT%NOTIFYEV?	ERROR (not supported)
AT%NOTIFYEV=?	%NOTIFYEV: (list of supported < ev_type>s), (list of supported < mode>s)
(unsolicited report)	%NOTIFYEV:<ev_type>[,<param1>[,<param2>] …]

Description

The command is intended to notify Host about important events occurred in LTE device. The reporting may be enabled/disabled per event type.

The command is compound, which means that <paramN> parameters are <ev_type> specific.

The reporting for all event types is disabled by default at wakeup time.

Read command is not supported.

Note: "LTIME" indication for time change in the "FW" is based on "time-priority" as following:

- CCLK (highest priority – user set)
- SIB16 (since it is more accurate than EMM)
- EMM information (Lowest priority)

Example 1

If time was set with "CCLK", then there will be no time change and no "LTIME" indication in case of later SIB16 or EMM information reception of time change

Example 2

If time was set with SIB16 there will be no time change and no "LTIME" indication in case of later reception of EMM information

Example 3

If time was set with SIB16 there and later User set the time with CCLK. Time will be changed according to CCLK and "LTIME" indication will be sent.

Defined Values

<ev_type>:

- "LTIME" –Time change in FW. Could be a result of SIB16 change, EMM-information (NITZ) or user change with +CCLK command or %CCLK command.
- "SIMREFRESH" – SIM refresh occurred. The event is sent in addition to AT%SIMREFRESH response. It is used to notify other than refresh issuer (CAT ordinary) NP applications (IMS, etc.) or/and external Host (such as Android) about SIM refresh event.
- "WDIS" – W_DISABLE signal state change, starting v4.5.6.10
- "SIMD" – SIM inserted/removed state change, starting v5.0.2
- "SIMREADY" – SIM ready event, which is sent once "Ready" state reported by "AT+CPIN?", but only if PIN unlock was required and succeeded.
- "ROAM" – current PLMN camping/connection state was changed between HPLMN/EHPLMN and VPLMN
- "CSPS" – enable notification on switches between PS and CS/PS modes in the modem
- "SIMSTATE" - reports that the UICC entered a new state during start-up or that the UICC ended startup and entered active state.
- "MANSTUCK" - reports about repetitive attach attempt rejections for user selected PLMN in Manual mode.
- "RRCSTATE" – reports about any RRC layer state change
- "SIB1" – reports any SIB1 arrival and processing in MAC.
- "SIB2" – reports any SIB2 arrival and processing in MAC.
- "ALL" – enables/disables all event types. This event type cannot be sent in unsolicited reporting.

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

<param1>:

For “LTIME”: <time> as encoded in +CCLK response defined in 27.007 (yy/mm/dd,hh:mm:ss±zz)

For “SIMREFRESH”: <isRestart> as encoded in %SIMREFRESH command

For “WDIS”: W_DISABLE line changed status:

- 0 – false (enable signal detected)
- 1 – true (disable signal detected)

For “SIMD”: changed status:

- 0 – removal signal detected
- 1 – insertion signal detected

For “ROAM”: changed status:

- 0 – moved to Home PLMN (HPLMN/EHPLMN)
- 1 – moved to roaming PLMN (VPLMN)

For “CSPS”:

- 0 - moved to PS mode
- 1 - moved to CS/PS mode

For ”SIMSTATE”:

- 1 – SIM init passed, wait for PIN unlock
- 2 – Personalization failed, wait for run-time depersonalization
- 3 – Activation completed. Event is sent once “Ready” state reported by “AT+CPIN?” is achieved. Event is sent always at any SIM activation completion.

For ”RRCSTATE”:

- 0 – RRC Idle
- 1 – RRC Connected
- 2 – RRC Unknown. Applicable for all LTE-disabled device states (init, standby, flight mode, etc.)

<param2>:

For “SIMREFRESH”: <RefreshType> as encoded in 102.223 sec.8.6:

- 0 = NAA Initialization and Full File Change Notification;
- 1 = File Change Notification;
- 2 = NAA Initialization and File Change Notification;
- 3 = NAA Initialization;
- 4 = UICC Reset;
- 5 = NAA Application Reset;
- 6 = NAA Session Reset;
- 7 = Steering of Roaming

For “LTIME”: <dst> as encoded in %CCLK response defined in current document.

<param3>:

For “SIMREFRESH”: <AID> as encoded in %SIMREFRESH command, starting v5.0.2:

For “LTIME”: <netname> as long alphanumeric format (up to 16 characters long as defined in 10.5.3.5a in 3GPP TS 24.008) which received in NITZ IE as a part of EMM INFORMATION message. The "LTIME" notification will arrive without network name parameter whenever it is not supplied by network EMM information message"

Implementation Notes

Command is proposed for future extensions with different events sent by different LTE subsystems.

Example

%NOTIFYEV:"LTIME","12/05/06,22:10:00+02",0,"Verzion"

%NOTIFYEV:"SIMREFRESH",1

4.2.30 AT%SIMREFRESH

Command	Possible Response(s)
%SIMREFRESH=<mode>[,AID[,<refresh info>]]	%SIMREFRESH:<isRestart> OK / ERROR
%SIMREFRESH?	ERROR (OPRATION_NOT_ALLOWED)
%SIMREFRESH=?	%SIMREFRESH: (list of supported <modes>)

Description

This command is used to request terminal to refresh SIM cache or to reinitialize SIM or application on SIM.

The other unsolicited command %NOTIFYEV is used (if enabled) for reporting to NP (all applications) or external host on SIM refresh event regardless of LTE reset is required or not. This is NP Application or external Host responsibility to decide about actions needed on SIM refresh.

Defined Values

<mode> - indicates the type of refresh to be performed according to definition as in TS 102.223 (for modes 0-6):

- 0 – NAA initialization
- 1 – NAA File change notification
- 2 - NAA Initialization and File Change Notification.
- 3 - NAA Initialization and Full File Change Notification.
- 4 - UICC Reset.
- 5 - NAA Application Reset.

- 6 - NAA Session Reset.
- 7 - Steering of Roaming as defined in TS 23.122

Where NAA = USIM or ISIM.

<AID> - application ID to be refreshed: USIM or ISIM. If omitted, the default (USIM) application needs to be refreshed.

<refresh info>:

For modes 0-6:

– EF list - File List of file identifiers to refresh. If omitted for mode 2 and 3 all files needs to be refreshed.

For mode 7:

– PLMNwACT List – hexadecimal EF_PLMNwAct file encoding as it is received from USIM.

<isRestart>:

- 0 – none
- 1 – restart as a result of PLMN lists changes may be needed
- 2 – restart as a result of IMSI changes is mandatory required; personalization is missed or successful
- 3 – detach as a result of IMSI change and personalization fail is mandatory required

Command returns (2) or (3), if EFIMSI is updated.

Command returns (1), if files involved into PLMN selection were changed. This indication is used to restart Automatic or Manual PLMN selection flow from the beginning. The PLMN selection related files:

- EFLRPLMNSI
- EFEPSLOCI (TBD, check)
- EFPNN
- EFPLMNwAcT
- EFOPLMNwACT
- EFHPLMNwAcT
- EFOPL

Example

1. Request (from SIM to CAT): D0 09 8103010103 82028182

Converted to AT command:

AT%SIMREFRESH=0

2. Request (from SIM to CAT): D0 12 8103010101 82028182 9211033F007FFF6F3B3F002F053F007F106F7E (File List)

Converted to AT command:

AT%SIMREFRESH=1,,28475,12037,28542

3. Request (from SIM to CAT): D0 15 8103010107 82028182 720A522400C080521400C080 (PLMNwACT List)

Converted to AT command:

AT%SIMREFRESH=7,,"522400C080521400C080"

Implementation Notes

1. The AT will get the information from the USIM (same as CRSM read) and will send a message to the EMM with the info to update.
2. The EF list provided by CAT is already pre-parsed by CAT and provided as list of identifiers, separated by comma. Note, that comma separation is not syntactically right because it is kept for parameters separation, not for separation inside single parameter. This is our current implementation.
3. The PLMNwACT List is sent to UE in unparsed form as single hexadecimal parameter.

4.2.31 AT%TSTRF

Command	Possible Response(s)
AT%TSTRF=<cmd>[,<earfcn>,<time>, <RX_antenna/TX_type>[,<TX_power>, <TX_param>]]	For <cmd>=4 (RX read)only: • %TSTRF: min=<min>, avg=<avg>, max=<max> For all: • OK or • +CME ERROR: <error>
AT%TSTRF?	%TSTRF:<status> OK or +CME ERROR: <error>
AT%TSTRF=?	OK

Description

Test AT command is intended for RF TX/RX test mode.

Command is not accepted in operational mode (AT+CFUN=1) and flight mode (CFUN=4). The modem shall be previously switched in non-operational mode by CFUN=0.

The RX and TX test commands only triggers test operation and are not blocking for the time defined in <time> parameter. To interrupt TX and RX test mode the abort sub-command (AT%TSTRF=1) is required.

To return to normal operational mode after any type of the RF tests the return to normal mode sub-command (AT%TSTRF=0) is required.

The SC-FDMA transmission will be on full BW.

For RX tests:

- When applying CW to UE antenna, it is recommended to use 1Mhz offset to central frequency to avoid DC interference
- When applying LTE signal to UE antenna, it is recommended to use a continuous FDD radio frame, which occupy all subcarriers including the ones dedicated for PBCH/PSC/SSC.

Defined Values

<cmd>:

- 0 - Return to normal mode
- 1 - Abort RX/TX test
- 2 – Start RX test
- 3 – Start TX test
- 4 – RX test results read

<earfcn>:

- EARFCN decimal value as per LTE spec

<time> - test execution time in ms:

- 0 – special value:
- For RX: 0 is not allowed
- For TX: continuous TX forever
- 1-600000 ms

<RX_antenna/TX_type>:

For RX (2):

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

For TX (3) – type of transmitted signal:

- 0 - SC-FDMA
- 1 – CW (continuous waveform)

<TX_power>:

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

<TX_param>:

For SC-FDMA - BW:

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

ForCW:

offset to central frequency in Hz

<min>, <avg>, <max>:

- Measured energy value in dBm.

<status> - status of test:

- 0 – busy

- 1 – ready

<error>

- As per 3GPP 27.007
- Invalid EARFCN

Implementation Notes

MAC always reply to this AT command immediately.

If test start is commanded (2 and 3), the MAC-PHY API is always blocking up to PHY FW response over MAC-PHY API.

The PHY internally shall manage zero value differently:

- For RX time=0 implies one measurement and return.
- For TX time=0 implies continuous TX (immediate return or not?). Only abort command will stop PHY TX.

The TX continuous mode requires abort to return to normal system operation.

PHY shall be ready to receive nested abort command not only for continuous mode, but also for any limited timer operation.

MAC does not sniff all AT command parameters. MAC shall be kept simple.

This is a reason why the return to normal mode <cmd> = 0 is expected from user.

The MAC logic is the next:

- On any command: 1, 2, 3 MAC turns the rfTest flag to true and pass the command to PHY.
- On command: 0 MAC turns the rfTest flag to false. In addition MAC shall send abort command to PHY to be sure that RX/TX tests are aborted. PHY shall be ready to ignore abort command if there is not any test running
- On command: 4 MAC returns last acquired from PHY measurement or returns ERROR if the PHY response on RX test is still did not returned.
- If CFUN=1 is received when rfTest = true, return error.

During porting to ALT1160 the TX power accuracy shall be increased from dBm to dBm*100. This is possible to do since MAC-PHY API for TX power is in Q8 units.

4.2.32 AT%SPMMODE

Command	Possible Response
AT%SPMMODE=<state>[,<rel_state>[,<rel_th>[,<abs_ia>[,<abs_ir>]]]]	OK or ERROR
AT%SPMMODE?	<state>

Description

The command is intended to command enter and exit from Special measurement mode.

Special measurement mode may be enabled only if device is in RRC IDLE state. Use AT%STATUS=”RRC” to get the RRC state. Alternatively, the unsolicited AT%STATEV may be used to detect that device is entered IDLE mode sending

status 2 (Enter Camped). Any attempts to enable Special mode in other than RRC_IDLE state will be declined with ERROR.

Use unsolicited AT%STATEV with event=3 (Connection Establishment) to detect that Special mode is interrupted as a result of Connection establishment attempt.

Defined Values

<state> - status of Special mode and its reporting:

- 0 – disable Special mode (FFU)
- 1 – enable Special mode

<rel_state> - status of relative threshold:

- 0 – disable relative threshold
- 1 – enable relative threshold

<rel_th> - relative threshold value in dB (same for inter and intra)

<abs_ia> - intra absolute RSRP threshold value in dBm

<abs_ir> - inter absolute RSRP threshold value in dBm

4.2.33 AT% SETPCO

Command	Possible Response
AT%SETPCO=<cid>[,<pcoid>[,<payload>]]	OK or ERROR
AT%SETPCO?	ERROR (OPRATION_NOT_SUPPORTED) CME ERROR: operation not allowed
AT%SETPCO=?	OK

Description

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

Defined values:

<cid> - The ID of the PDP context on which the PCO request should be sent.

<pcoid>- The PCO container ID as defined in 3GPP 24.008 section 10.5.6.3

<payload> - The payload to be sent on the PCO request in HEX format (As an example, this may include MCC, MNC as defined in 3GPP 24.008 section 10.5.6.3).

Implementation Notes

The LTE modem support single “user defined PCO” request. Therefore, if this command is called again with other parameters, it is override the previous setting.

If the <pcoid> and <payload> fields are not specified, then PCO request will be disabled.

4.2.34 AT%PCOINFO

Command	Possible Response
AT% PCOINFO=<mode>[,<cid>]	Mode 0,1: ♦ OK ♦ ERROR Mode 2: ♦ %PCOINFO:<mode>,<cid>[,<pcoid>[,<payload>]] ♦ OK ♦ ERROR Mode 3: ♦ %PCOINFO:<mode>,<cid>[,<pcoid>[,<payload>]] ♦ [<CR><LF>%PCOINFO: <cid>,<pcoid>,<payload>]…] OK ♦ ERROR
AT% PCOINFO?	• PCOINFO: :<mode>,<cid>[,<pcoid>[,<payload>]] • [<CR><LF>%PCOINFO: <cid>[,<pcoid>[,<payload>]]]
AT% PCOINFO=?	OK
(unsolicited report)	%PCOINFO:<cid>,<pcoid>[,<payload>]

Description

This command queries the modem to get the last PCO payload which was received for the pre-configured AT%SETPCO. The received <payload> is for the <pcoid> configured by the AT%SETPCO.

The command may be used also to set unsolicited indication for network unsolicited PCO indication. See 3GPP 24.008 section 10.5.6.3 for list of PCO's.

For <mode>=2 and 3:

- If result code is ERROR, this is because PCO request was not sent or because the modem still wait for PCO response (over ATTACH ACCEPT or over ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST)
- if received result code is <cid> but without <pcoid>and without <payload> then consider it as network reply (ATTACH ACCEPT or ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST) without PCO

The AT%PCOINFO? returns the list of pre-configured user PCO information for the active PDNs.

The AT%PCOINFO command to disable/enable unsolicited indication (i.e. <mode>=0,1) shall not specify <cid> because the setting is applicable for all CIDs.

The unsolicited indication mode (i.e. <mode>=0,1) is returned in all query commands.

Defined Values

<mode> - the mode of the command:

- 0 – disable unsolicited PCO notification
- 1 – enable unsolicited PCO notification for pre-configured user PCO
- 2 – query received pre-configured user PCO for specified cid
- 3 – query all received PCOs for specified cid

<cid> - The ID of the PDP context on which the PCO request was sent.

<pcoid>- The PCO container ID as defined in 3GPP 24.008 section 10.5.6.3

Important Note: The <pcoid> parameter is implemented in hex format, but without quotes (“”).

<payload>- PCO container payload received from LTE network for the specified <cid> and <pcoid>. The payload will be received in HEX format

Important Note: The < payload > parameter is implemented in hex format, but without quotes (“”).

Example

AT%PCOINFO: 2,1

%PCOINFO: 0,1,0010,0594 – where pcoid=0x0010 (MTU size), payload=0x0594=1428

OK

4.2.35 AT%LTEINFO

Command	Possible Response(s)
AT%LTEINFO= <layer>,<type>[,<param1>]	• [LTEINFO:<info1>[,<info2>…[,<infoN>]…] • [<CR><LF>LTEINFO:<info1>[,<info2>…[,<infoN>]…] • …] • OK/ERROR
AT%LTEINFO?	ERROR (not supported)
AT%LTEINFO=?	OK

Description

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

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

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

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

Defined Values

<layer>:

- "MAC"

<type>:

- "TA" – Timing Advance

<info1> - current TA:

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

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

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

<layer>:

- "PHY"

<type>:

- "TDDCONF" – TDD UL/DL configuration

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

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

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

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

<layer>:

- "MAC"

<type>:

- "CRSIB3" – SIB3 cell reselection parameters

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

<info2> - threshServingLow reselection threshold as per 36.331

<info3> - cellReselectionPriority as per 36.331

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

<layer>:

- "MAC"

<type>:

- "CRSIB5" – SIB5 cell reselection parameters

<info1> - EARFCN

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

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

<info4> - cellReselectionPriority as per 36.331

<layer>:

- "MAC"

<type>:

- "BARSIB1" – SIB1 barring parameters

<info1>:

- 0 – barred
- 1 – not barred

<layer>:

- "MAC"

<type>:

- "BARSIB2" – SIB2 barring parameters for Rel9/10

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

<layer>:

- "NAS"

<type>:

- "T3396" – T3396 status and time to expiration

<param1>:

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

<info1> - timer status:

- 0 – stop
- 1 – run

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

<info3> - PLMN

<info4> - cid

<layer>:

- "NAS"

<type>:

- "OPERIMSI" – NW operator identifiers of IMSI

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

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

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

<layer>:

- "RRC"

<type>:

- "OPERSIB1" – NW operator identifiers provided in SIB1

<info1> - integer type; MCC (from SIB1)

<info2> - integer type; MNC (from SIB1)

<info3> - string type (in quotes); short NW operator name converted from SIB1 MCC/MNC, may be omitted if unknown

4.2.36 AT%GETACFG

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

Description

Get configuration from Open Platform Configuration Manager. This command uses the Linux UCI engine, meaning each parameter from one of the configuration files (located in "/etc/config/") can be read using this command. Command parameters (separated by '.') define the path to the parameter as described above.

4.2.37 AT%SETACFG

Command	Possible Response(s)
%SETACFG=<param file name>.<param section>.<param name>	OK/ERROR

Command	Possible Response(s)
%SETACFG?	ERROR (OPRATION_NOT_ALLOWED)
%SETACFG=?	%SETACFG: (list of supported <param1>)

Description

Set a configuration file to Open Platform Configuration manager. This command uses the Linux UCI engine, meaning each parameter from one of the configuration files (located in "/etc/config/") can be override using this command. Command parameters (separated by '.') define the path to the parameter as described above.

4.2.38 AT%CMATT

Command	Possible Response(s)
%CMATT <param>	OK or ERROR
%CMATT?	%CMATT: <param>
%CMATT=?	%CMATT: (list of supported <modules>)

Description

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

Defined Values

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

- 0–detach
- 1–attach

4.2.39 AT%CMGRS

Command	Possible Response(s)
AT%CMGRS=<index>	If PDU mode (+CMGF=0) and command successful: %CMGRS: <stat> otherwise: +CMS ERROR: <err>

Description

Execution command returns message status with location value <index> from preferred message storage <mem1> to the TE. If reading fails, final result code +CMS ERROR: <err> is returned.

Defined Values

<stat> integer type in PDU mode (default 0), indicates the status of message in memory; defined values:

- 0 – received unread message (i.e. new message)
- 1 – received read message
- 2 – stored unsent message
- 3 – stored sent message

4.2.40 AT%USMSF

Command	Possible Response(s)
%USMSF=<smsformat>	OK/ERROR
%USMSF?	%USMSF: <smsformat>
%USMSF=?	%USMSF: List of supported <smsformat>

Description

The command is used to configure the format of outgoing user SMS: 3GPP or 3GPP2. The new configuration is updated on the device NV

The command has the following limitations:

- It controls outgoing SMS transmission and storage format: 3GPP or 3GPP2. Incoming SMS is supported with both 3GPP and 3GPP2 formats.
- It has effect only when the user sends the SMS in text mode.
- The command shall return an error when trying to configure SMS format to 3GPP2 while SMS is configured to be stored in UICC. The 3GPP2 configuration is applicable only to storage in NP internal file system or when SMS is sent without storage.
- The 3GPP2 configuration is applicable only for SMS over IMS. The command shall return an error when trying to configure SMS format to 3GPP2 in SMS over SGs mode.

Defined Values

<smsformat>:

- "3GPP"
- "3GPP2"

4.2.41 AT%STATCM

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

Description

The command is used to report state changes in the eCM to the host. The reported states changes are currently limited to registration state and the state of external PDNs (i.e. those PDNs which not terminated in the device).

The reporting is disabled by default at wakeup time.

Defined Values

<mode> - status of unsolicited result response presentation:

- 0 –disabled (default)
- 1 – enabled

<event>:

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

<param>:

- For <event> values 3,4,5 the <param> is used as <sessionID>. The <sessionID> is used for numbering of external PDNs exposed to the user. See also in command AT%PDNSET.

4.2.42 AT%UPGCMD

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

Description

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

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

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

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

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

Defined Values

<cmd>:

- "START" - A command to initiate internal upgrade script.
- "LOCK" - A command to disable and decline any future attempts to initiate firmware upgrade.

<param>:

For <cmd>="START" – IP address assignment mechanism:

- "static"
- "dhcpc"

<mode>:

- 0 – unlocked
- 1 – locked

<status>:

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

<error>:

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

<received_count>:

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

<total_count>:

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

4.2.43 AT%FOTAINFO

Command	Possible Response(s)
AT%FOTAINFO=<type>	%FOTAINFO:<info1>[,<info2>[,<info3>[,<info4>[,<info5>[,<info6>]]]]]
AT%FOTAINFO?	ERROR (not supported)

Command	Possible Response(s)
AT%FOTAINFO=?	%FOTAINFO:(list of supported <type>s)

Description

AT command is used by upgrade manager in host to query information related to FOTA update and upgrade. The command is handled by FOTA plugin running in NP.

Defined Values

<type>:

- "DDEUXATTR" – Enhanced User Experience Download Descriptor.

For <type>="DDEUXATTR":

<info1> - PreDownloadMessage:

- Pre download message presented to the user by upgrade manager

<info2> - PostDownloadMessage:

- Post download message presented to the user by upgrade manager

<info3> - PostUpdateMessage:

- Post update message presented to the user by upgrade manager

<info4> - PreDownloadURL:

- Pre download URL link presented to the user

<info5> - PostDownloadURL:

- Post download URL link presented to the user

<info6> - PostUpdateURL:

- Post update URL link presented to the user

4.2.44 AT%CGINFO

Command	Possible Response(s)
AT%CGINFO= <type>,<sessionID>	%CGINFO:<info1>OK/ERROR
AT%CGINFO?	Returns all mapping table rows: • [%CGINFO:<sessionID>,<cid>] • [<CR><LF>%CGINFO:<sessionID>,<cid>] • [...]]
AT%CGINFO=?	OK

Description

Command is intended to query different info about packet domain parameters (extension for AT+CGxxx of 27.007).

Session ID is Altair proprietary session identifier, which is defined for each session established over-the-air in NP config file named '/etc/config/ecm'

If "cid" is acquired, the command returns the cid value assigned by modem to the specified session.

The “cid” value may be then used with any of packet domain commands defined in section 10 of 27.007.

Defined Values

<type>:

- “cid”

<sessionID> - numeric value of session identifier defined in NP config file

<info1>:

For “cid” – numeric cid value

Example

AT%CGINFO=”cid”,1

%CGINFO: 3

OK

4.2.45 AT%PDNACT

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

Description

This command is used by external Host to instruct eCM to expose and connect (disconnect) specific PDN to the Host. There may be more than one PDN exposed to Host.

There may be more than one PDN exposed to Host.

Session ID is Altair proprietary session identifier, which is defined for each session established over-the-air in NP config file named ‘/etc/config/ecm’.

User can use <apnname> or <sessionID> or both to identify PDN. If both are defined, PDN is identified by <apnname>.

The PDNs terminated in modem cannot be exposed to Host and any attempt to activate them from host will return ERROR. PDN sharing between Host and modem is not supported yet.

Defined Values

<act> : Numeric value, indicates the required action

- 0 – deactivate
- 1 – activate

<sessionID> - numeric value of session identifier defined in NP config file

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

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

- 0 – non-active
- 1 – active

4.2.46 AT%SRVCHANGE

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

Description

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

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

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

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

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

The default mode is set by the vendor.

Mode changing is protected by <code>.

Defined Values

<mode> : string

- DEBUG
- COMM

<code>: string of 9-10 digits

4.2.47 AT%SRVLOCK

Command	Possible Response(s)
AT%SRVLOCK	OK/ERROR
AT%SRVLOCK?	ERROR (not supported)
AT%SRVLOCK=?	OK

Description

The AT%SRVLOCK command can be used by external host to block the usages of the AT%SRVCHANGE command as an extra security countermeasures. Assuming that host code is protected, the host can call this command during device startup to avoid unauthorized mode change. The lock has effect until next power cycle.

Defined Values

None.

4.2.48 AT%COLLECTLOGS

Command	Possible Response(s)
AT%COLLECTLOGS=[<ipaddr>[,<rpath>]]	OK/ERROR
AT%COLLECTLOGS?	ERROR (not supported)
AT%COLLECTLOGS =?	OK

Description

The command is used to configure delivery/storage of NP logs. If no parameter is supplied, then loges are placed to '/nvm/Logs'. Alternative options are to send log as a package to host via socket or to save the logs to NFS remote directory.

Defined Values

<ipaddr>: string

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

<rpath>: string

Remote path – remote path for log saving over NFS

4.2.49 AT%URLRES

Command	Possible Response
AT%URLRES=<mode>	OK or ERROR
AT%URLRES?	ERROR (not supported)
AT%URLRES=?	%URLRES: (list of supported < mode>s)
(unsolicited report)	%URLRES: <URL>

Description

The command is used by NP to resolve the IP address of the specified <URL> whenever it is not able to resolve it by itself but still has to access the URI (e.g. when LTE is disabled and host connectivity is over Wi-Fi).

The reporting is disabled by default at wakeup time.

Defined Values

<mode> – Status of unsolicited result response presentation:

- 0 –disabled (default)
- 1 – enabled

<URL> – URL address to resolve

Example

%URLRES: "4g.dmserver.LTEoperator.com"

4.2.50 AT%SETURLIP

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

Description

The command is used to configure the resolved IP address (V6 or V4) of specific URL . The command is used as an helper to NP whenever it is not able to resolve it by itself but still has to access the URI (e.g. when LTE is disabled and host connectivity is over WiFi).

Defined Values

<ipaddr>: string

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

<iptype>: string

- IPv6 - IPv6 type
- IPv4 - IPv4 type

<URL>: string

Known as web address

Example

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

4.2.51 AT%OMAEV

Command	Possible Response
AT%OMAEV=<mode>[,<ev_type>]	OK or ERROR
AT%OMAEV?	ERROR (not supported)
AT%OMAEV =?	%OMAEV: (list of supported < ev_type>s), (list of supported < mode>s)

Command	Possible Response
(unsolicited report)	% OMAEV:<ev_type>[,<param1>[,<param2>]]

Description

The command is intended to notify host about important events occurred in OMA DM client device. The reporting may be enabled/disabled per event type.

The command is compound, which means that <paramN> parameters are <ev_type> specific.

The reporting for all event types is disabled by default at wakeup time.

Read command is not supported.

If <ev_type> is not specified, it shall be considered as "ALL"

Defined Values

<ev_type>:

- "WIFIONLY" – "WiFi only" configuration event received from DM server.
- "CONFCHG" – notify host on configuration change in case that device receives a Replace or Execute command during the DM session for nodes other than FUMO nodes.
- "ALL" – Enable all events

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

<param1>:

For "WIFIONLY":

- 0 – Flag unset
- 1 – Flag set

For "CONFCHG":

A string with the configuration version as specified by DM node: "/DevInfo/Ext/ConfigurationVer"

<param2>:

For "WIFIONLY": int

Time in hours in which host is required to honor "Wifi Only" flag.

For "CONFCHG": int, reset_type required to be applied by Host or internally

- 0 – no reset needed
- 1 – reattach required
- 2 – reboot required

Example

%OMAEV: "WIFIONLY", 1, 23

%OMAEV: "CONFCHG", "F15.VZW.NGFF.0", 2

4.2.52 AT%OMACMD

Command	Possible response(s)
AT%OMACMD=<cmd>[,<param1>]	OK/ERROR
AT%OMACMD?	ERROR (not supported)
AT%OMACMD=?	%OMACMD:(list of supported <cmd>s)

Description

AT command to manages OMADM session many aspects such as Wi-Fi

Defined Values

<cmd>:

- "SETIF", - A command to select IF type
- "ABORT" - A command to abort DL session silently. Used to stop session on failed or disabled interface.
- "DLSWAP"- DL session swap operation is required. The DM client will swap to the last configured "SETIF"
- "DMREP" – DM client is required to open special reporting DM session and send a report to the OMA-DM server over interface configured by last received "SETIF".

<param1>:

For <cmd>="SETIF" – set the IF TYPE:

- "LTE"
- "WiFi"

For <cmd>="DMREP" – set the error code:

Example

AT%OMACMD="DMREP",550,"WiFi connection terminated"

4.2.53 AT%DMSES

Command	Possible Response
AT%DMSES=[<mode>]	OK or ERROR
AT%DMSES?	ERROR
AT%DMSES=?	OK

Description

The AT%DMSES command is used for "User-Initiated" DM session (as opposed to "Network initiated" DM session). When DM client in NP receive this command it initiate DM session with the DM server.

If <mode> parameter is omitted, the DM session init is expected.

<mode>:

- "DM" – Trigger an user-initiated DM session

- “FOTA” – Trigger an user-initiated special FOTA firmware upgrade session

4.2.54 AT%FOTACMD

Command	Possible response(s)
AT%FOTACMD=<cmd>[,<param1>[,<param2>[,<param3>]]]	OK/ERROR
AT%FOTACMD?	%FOTACMD:received=<received_count>,total=<total_count>[,<package_name>,<package_version>,<package_URI>,<package_size>,<package_type>,<package_vendor>,<package_desc>,<package_installParam>]
AT%FOTACMD=?	%FOTACMD:(list of supported <cmd>s)

Description

AT command to manage FOTA (firmware download over the air).

This command is used by Upgrade Manager (on internal or external host) only.

Defined Values

<cmd>

- “UPGINIT” - A command to initiate firmware upgrade session (device-initiated request only).

<cmd>

- “RESUME” - A command to resume firmware download (device-initiated request only).

<cmd>

- “DLRSP” - A command answers to the request from OMA-DM client to start/cancel/defer package download.

<param1>:

- “ACCEPT” – Accept the request to start package download
- “CANCEL” – Cancel the request to start package download
- “DEFER” – Defer the request to start package download

<param2>: string

- error code – error code sent to DM server for “CANCEL”. If error code is not specified then error code 401 is sent.

<cmd>

- “UPDRSP” - A command answers to the request of OMA-DM client to update firmware with the downloaded package.

<param1>:

- “ACCEPT” – Accept the request to update firmware
- “CANCEL” – Cancel the request to update firmware

<param2>: integer from the following list:

- 401 (update canceled by user)

- 402 (Corrupted firmware update package, e.g. CRC error)
- 404 (Failure to positively validate digital signature of update package)
- 409 (Failure not defined by any other error code)
- 502 (Updated failure due to isn't sufficient memory to process the update)

<cmd>

- "UPDREP" - A command to OMA-DM client to send a report to the OMA-DM server.

<param1> - update status, integer:

- "FAIL" – Update failed
- "SUCCESS" – Update completed successfully

<param2>: - file post-operation, integer

- 0 – Update package deleted from the device
- 1 – Update package kept on the device

<param3>: failure cause, integer

- As per "Over the Air Mobile Device Management (OTA-DM)" sec. 6.3

<received_count>: integer

- The number of bytes written to the device

<total_count>: integer

- The total number of bytes of the update package

<package_name>: string

- The name of the package

<package_version>: string

- The version of the Download Descriptor technology

<package_URI>: string

- The URI (usually a URL) from which the package can be downloaded

<package_size>: string

- The number of bytes to be downloaded from the URI

<package_type>: string

- The MIME type of the package

<package_vendor>: string

- The organization that provides the package

<package_desc>: string

- A short textual description of the package

<package_installParam>: string

- An installation parameter associated with the package

4.2.55 AT%FOTAEV (unsolicited)

Command	Possible Response(s)
AT%FOTACMD=<cmd>[,<param1>[,<param2>[,<param3>]]]	OK/ERROR
AT%FOTACMD?	%FOTACMD:received=<received_count>,total=<total_count>[,<package_name>,<package_version>,<package_URI>,<package_size>,<package_type>,<package_vendor>,<package_desc>,<package_installParam>]
AT%FOTACMD=?	%FOTACMD:(list of supported <cmd>s)

Description

This unsolicited command notifies the host about the status of firmware upgrade. It also used to request the host confirmation to continue with the download/update process.

Defined Values

<mode> : a numeric parameter

- 0 – Disable unsolicited FOTA event indications
- 1– Enable unsolicited FOTA event indications

<event> : a numeric parameter

- 0 – PENDING DOWNLOAD
- 1 – PENDING UPDATE
- 2 – DOWNLOAD COMPLETE
- 3 – DOWNLOAD FAILED
- 4 –Download/Update canceled by server (Cancel SMS)
- 5 – Upgrade not available
- 6–99 – Reserved

<severity/cause>: integer

For PENDING DOWNLOAD:

- 0 – OPTIONAL
- 1 – MANDATORY

For PENDING UPDATE:

- 0 – OPTIONAL
- 1 – MANDATORY

For DOWNLOAD FAILED:

- As per “Over the Air Mobile Device Management (OTA-DM)” sec. 6.3

<package_name>: string

For PENDING DOWNLOAD:

- The file name of download package

For PENDING UPDATE:

- The file name of update package

<package_type>: string

For PENDING DOWNLOAD:

The MIME type of the media object (per www.iana.org) http://www.iana.org/assignments/media-types/application

<error_type>: integer

For DOWNLOAD FAILED

- 0 – NON FATAL – can be resumed by sending AT%FOTACMD="RESUME"
- 1 – FATAL (download resume is not possible, FOTA manager shall move to idle)

4.2.56 AT%EXE

Command	Possible Response(s)
AT%EXE=<script_name>[,<param1>[,<param2>]]	<output> OK/ERROR
AT%EXE?	ERROR (not supported)
AT%EXE=?	OK

Description

This command Executes script file in NP. The command is intended for Factory Production and Debug purposes only. It is strictly recommended to disable it for end user on commercial devices.

Defined Values

<script_name> - Script file name to be executed. In case that the script is not located in one of the Linux search paths ($PATH), the full script path must be provided.

<param1> - First script parameter

<param2> - Second script parameter

<output> - Script output

Example

AT%EXE= snapshot-control.sh,list

%EXE: Snapshot list:

snapshot_01 snapshot_05

OK

4.2.57 AT%GETAID

Command	Possible Response(s)
%GETAID=<requestedID>	Returns ID value and OK for a supported <requestedID>. Returns +CME ERROR: operation not allowed for any other entered value.

Command	Possible Response(s)
%GETAID?	ERROR (OPRATION_NOT_SUPPORTED) CME ERROR: operation not allowed
%GETAID=?	OK

Description

Command to get identification values of hardware components managed by NP.

Supported ID Values

<requestedID>:

”NandID” – returns the serial number of the nand flash (16 Byte length)

4.2.58 AT%APNN

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

Description

Allow user to change the APN name of the PDN which is used by the host (usually the Internet PDN). This command doesn’t allow the user to change APN name of the other PDNs which are in the control of the operator.

An APN consists of two parts:

- Network Identifier: Defines the external network. This part of the APN is mandatory.
- Operator Identifier: Defines the specific operator’s packet domain network. This part of the APN is optional.

Verizon require that the APN name will include only the APN Network Identifier part (APNNI) and not the Operator Identifier. Other operator can request to use also the Operator Identifier.

Defined Values

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

4.2.59 AT%NETSEL

Command	Possible Response
AT%NETSEL=<arch>,<apn_table>	OK or ERROR
AT%NETSEL?	Current APN table
AT%NETSEL=?	OK

Description

Set command forces network architecture selection. In addition, this command selects network specific APN table. The command is accepted only at CFUN=0/4 mode. If UE is in any other mode the command is discarded and the ERROR is returned.

Read command is not supported.

Defined Values

<arch> - network architecture:

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

<apn_table> - APN table file name in textual format

4.2.60 AT%CCLK

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

Description

The command is used to extend standard AT+CCLK command for DST (Daylight Saving time) parameter.

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

Defined Values

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

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

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

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

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

4.2.61 AT%VECEER

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

Command	Possible Response(s)
%VECEER=?	OK

Description

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

Defined Values

<report>:

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

<reason >: string

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

Example

In case of Call forking when other endpoint take the call, the SIP registrar may send connection terminated message with: SIP; cause=200; text="Call completed elsewhere" in the reason header

For the regular connection terminated message, the SIP registrar may send it with: SIP; cause=603; text="Declined" in the reason header

4.2.62 AT%RESETCID

Command	Possible Response(s)
%RESETCID=[<cid>]	
%RESETCID?	ERROR
%RESETCID=?	OK

Description

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

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

The erase includes PDP context parameters removal for next settings:

- PDN connection parameters defined by AT+CGDCONT or by network
- PDN QOS parameters defined by AT+CGTFT or by network
- Additional PDN PCO parameters defined by AT%SETPCO

- Additional PDN PPP authentication parameters defined by AT%PPPAUTH or by APN table

The read command is not supported.

Defined Values

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

4.2.63 AT%GPSCMD

Command	Possible Response(s)
%GPSCMD =<cmd>[,<param1>[,<param2>]…]	OK/ERROR/ERROR(not supported)
%GPSCMD?	%GPSCMD:<eLCver>,<GpsFwVer>,<GpsConfigVer>,<GpsChipID>,<GpsTraceabilityID>
%GPSCMD=?	%GPSCMD: List of supported <cmd>

Description

AT command to manage the GNSS functionality.

Note: If “SATUSE” is not sent to configure device, the GPS is selected by default.

Defined Values

<cmd>:

- “START” – Enable GPS hardware functionality (increase power consumption)

<cmd>:

- “STOP” – Disable GPS hardware functionality (decrease power consumption)

<cmd>:

- “LOCINJECT” – Inject estimated location of the user. This can be based on Wifi measurements handled by the host, can be based on last recorded location or based on assisted information.

<param1> - string, which contains floating value of degrees:

- Latitude – estimated location latitude in degrees

<param2> - string, which contains floating value of degrees:

- longitude – estimated location longitude in degrees

<param3>:decimal

- accuracy – Represents expected accuracy in meters

<cmd>:

- “TIMEINJECT” – Inject time to speedup GPS location calculation. The injected time can be calculated by using NTP protocol.

<param1> - decimal:

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

<param2> - decimal:

- TimeReference – The time in the local reference clock related to the supplied UTC time. This allows the device to calculate the current UTC time.

<param3> - decimal:

- Uncertainty – time Uncertainty in msec.

<cmd>

- "DELDATA" – Allows the host to delete specific data from the GPS hardware.

<param1> - hexadecimal:

The data which required to be deleted encoded as per Android gps.lib:

- "0001" - EPHEMERIS
- "0002" - ALMANAC
- "0004" - POSITION
- "0008" - TIME
- "0010" - IONO
- "0020" - UTC
- "0040" - HEALTH
- "0080" - SVDIR
- "0100" - SVSTEER
- "0200" - SADATA
- "0400" - RTI
- "8000" - CELLDB_INFO
- "FFFF" - DELETE_ALL

<cmd>:

"SETREP" – Set the reporting configuration of the modem.

<param1> - decimal:

Recurrence – location reporting recurrence

- 0 - Periodic infinite recurrence
- 1 - 999 - specific recurrence setting

<param2> - decimal:

- min_interval – represents the time between fixes reports in milliseconds

<cmd>:

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

<param1> - decimal:

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

<param2> - decimal:

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

<param3> - decimal:

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

<param4> - decimal:

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

<cmd>:

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

For SONY CXD5600 Currently supported NMEA sentences:

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

<param1> - string:

- NMEA sentence name

<param2> - string:

- NMEA sentence name

<paramN> - string:

- NMEA sentence name

<cmd>:

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

For SONY CXD5600 Currently supported satellite systems are:

- o "GPS"

<param1> - string:

- satellite system name

<param2> - string:

- satellite system name

<paramN> - string:

- satellite system name

cmd>:

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

<param1> - string:

- Image file (full path)

<param2> - string:

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

<param3> - string:

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

<cmd>

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

<param1> - string:

- GPS technology name

<param2> - string:

- GPS technology name

<paramN> - string:

- GPS technology name

<eLCver> - decimal:

- The version of embedded location software module

<GpsFwVer> - decimal:

- The firmware version of the attached GPS

<GpsConfigVer> - decimal:

- The configuration file version of the attached GPS

<GpsChipID> - decimal:

- The ID of the attached GPS

<GpsTraceabilityID> - hexadecimal:

- The unique ID of the attached GPS

Example

Set estimated location with 30m accuracy:

AT%GPSCMD=“LOCINJECT”, “29.563484”,”34.954681”, 30

OK

GPS firmware upgrade:

AT%GPSCMD="FWUPG","/upload/cxd5600_fw_r8669.sbin", "/upload/Config_08_ALT_01.scbin", "/upload/cxd5600_updater.sbin"

Query command:

AT%GPSCMD?

%GPSCMD: eLCver=2016-12-12 17:11:46 - GpsFwVer=12069_AGPS GpsConfigVer=08-0017-04 GpsChipID=0004 GpsTraceabilityID=0x00000000

OK

4.2.64 AT%GPSEV (unsolicited)

Command	Possible Response(s)
AT%GPSEV=<event>,<cmd>	OK/ERROR
AT%GPSEV?	ERROR (not supported)
AT%GPSEV=?	%GPSEV: List of supported <cmd>
(unsolicited result code)	%GPSEV: <event>, <cmd body>

Description

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

Defined Values

<event> : a numeric parameter

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

<cmd> : a numeric parameter

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

<cmd body>:

- For 0 (NMEA sentence) - The command body is a string represent the NMEA sentence (using quote before and after the sentence). This event is delivered according to the periodicity defined by AT%GPSCMD
- For 1 (GPS status) The command body is an integer as following:
  - 0 – NONE (GPS Status unknown)

- 1- SESSION_BEGIN (GPS has begun navigating)
- 2- SESSION_END (GPS has stopped navigating)
- 3- ENGINE_ON (GPS has powered on but is not navigating)
- 4- ENGINE_OFF (GPS is powered off)

This event is delivered upon status change.

Example

Receive of NMEA sentence with location information:

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

4.2.65 AT%GPSINFO

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

Description

AT command to get information from device's GPS.

Defined Values

<type>:

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

<UtcTime> - decimal:

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

<Scheduling>:

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

<MSB>:

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

<MSA>:

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

<OTDOA>:

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

<ECID>:

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

<SingleShot>:

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

<TimeInjection>:

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

<Geofencing>:

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

<ephemeris>: hexadecimal

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

<almanac>: hexadecimal

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

<recurrence>: decimal

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

<min_interval>: decimal

- Represents the time between fixes reports in milliseconds

<h_accuracy>: decimal

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

<v_accuracy>: decimal

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

<ttff>: decimal

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

<max_age>: decimal

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

<location_mode>:

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

4.2.66 AT%CGDCONT

Command	Possible Response(s)
%CGDCONT=<cid>,<traffic_type>	
%CGDCONT?	[%CGDCONT:<cid>,<traffic_type>[%CGDCONT:<cid>,<traffic_type>[…]]]
%CGDCONT=?	OK

Description

The command is supplementary to AT+CGDCONT command and provides additional information about PDN (PDP context). This optional command is used ordinary just after standard AT+CGDCONT.

The set command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>.

The read command is not supported.

Defined Values

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

<traffic_type>: the purpose PDN will be used for:

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

4.2.67 AT%CHKPLMN

Command	Possible Response
AT%CHKPLMN =<cmd>[,<param>]	OK or ERROR
AT%CHKPLMN?	ERROR Not supported
AT%CHKPLMN=?	OK
(unsolicited report)	% CHKPLMN: <oper>

Description

Check PLMN executes check PLMN offload to NP and its applications (i.e.CAT).

The offload is executed conditionally per nwOperatorMode flag stored in DOP file.

The unsolicited reporting is disabled by default at wakeup time.

Defined Values

<cmd>:

- "MODE" – sets mode of unsolicited result response presentation

<param> - the reporting mode:

- 0 - disabled (default)
- 1 – enabled

<cmd>:

- "DONE" – reports that offload is finished

<oper>:

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

Example

%CHKPLMN: "310005",

where MCC=310, MNC=005

4.2.68 AT%PDNSET

Command	Possible Response
AT%PDNSET=<ext_sessionID>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<host_name>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI>	OK or ERROR
AT%PDNSET?	[%PDNSET:<ext_essionID>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<host_name>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI> [<CR><LF>%PDNSET:<ext_sessionID>,<apnname>,<ip_type>,<ppp_auth>,<user>,<passw>,<host_name>,<IPv4AddrAlloc>,<pcscf_discovery>,<NSLPI> OK
AT%PDNSET=?	OK

Description

The command is intended to set run-time PDN parameters for data PDNs exposed to host.

In addition, the APN name and IP type provided in the command will override default PDN settings from embedded APN table stored into UE NV. The PPP security parameters are run-time only and are not stored into non-volatile memory.

The command will be effective immediately, which means that if parameters are different from those already in use, the PDN will be deactivated, updated locally and on server (via LTE messages) and then reactivated.

If <ip_type> parameter is missed, the IPv4v6 will be applied.

Missed PPP security parameters remove previous PPP security setting completely.

Command is intended to substitute previous %PPPAUTH command, which is not synced with other PDN parameters definition.

Notes:

- In both command and response, a parameter which is not specified will be written as ",,"
- Last parameters of the command which are not specified may not include the ",," notation. e.g. AT%PDNSET=<ext_sessionID>,<apnname>,<ip_type>

Defined Values

<ext_sessionID> - numeric value of the session identifier which is configured and used by external application or host and defined in NP configuration file

<apnname> - string type; indicates the APN name configured for PDN.

<ip_type> - string type:

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

<ppp_auth> - string type; PPP authentication type:

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

<user>- string type; username used for authentication.

<passw> - string type; password used for authentication.

<host_name> - string type. Optional, the name of the Authentication server.

<pcscf_discovery>: decimal

- 0 – disable
- 1 – Enable

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

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

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

4.2.69 AT%SMSINFO

Command	Possible Response(s)
%SMSINFO=<type>	For "LAST_UNREAD" return the index of last received unread SMS: • %SMSINFO: <index> • OK/ERROR
%SMSINFO?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%SMSINFO=?	%SMSINFO: List of supported <type>

Description

AT command to get detailed SMS information.

Defined Values

<type>: string

- "LAST_UNREAD" – return the last unread received SMS

<index>: Integer

- The storage index of the last unread received SMS. In case that requested SMS can't be found in storage, the AT command return ERROR.

4.2.70 AT%CATINFO

Command	Possible Response(s)
%CATINFO=<type>	%CATINFO: <param1> OK/ERROR
%CATINFO?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%CATINFO=?	%CATINFO: List of supported <type>s

Description

AT command to get different CAT L1 detailed information from FW CAT-Proxy.

Defined Values

<type>: string

- "DLTPCUR" – return the current Terminal Profile type already downloaded or halted state indication

<param1>: integer

For "DLTPCUR":

- 0 – Irrelevant, SIM not ready
- 1 – MT
- 2 – MT & TE
- 3 – Halt, wait for user command to download

4.2.71 AT%MBMSEV (unsolicited)

Command	Possible Response(s)
AT%MBMSEV=<cmd>	OK/ERROR
AT%MBMSEV?	ERROR (not supported)
AT%MBMSEV=?	%MBMSEV: List of supported <cmd>
(unsolicited result code)	%MBMSEV: <event>

Description

This unsolicited command indicates the host that there are changes in the MBMS services. The host may query for updated service list by using "AT%MBMSCMD?".

Defined Values

<cmd> : a numeric parameter

- 0 – Disable unsolicited MBMS indications
- 1 – Enable unsolicited MBMS indications

<event> : a numeric parameter

- 0 – Service change event

- 1 - SAI (Service Area Identities) list change
- 2-99 - Reserved

4.2.72 AT%FLTSMS

Command	Possible Response(s)
AT%FLTSMS=<cmd>[,<param1>[,<param2>]…]	[%FLTSMS: <result1>[,<result2>…]] OK or ERROR
AT%FLTSMS?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
AT%FLTSMS=?	%FLTSMS: List of supported <cmd>
(unsolicited result code)	%FLTSMS: <event>[,<result1>[,<result2>…]]

Description

This command handle special SMS features such as filtering, Antitheft etc ..

The “GETSMS” sub-command will return ERROR if storage is empty.

Defined Values

<cmd>:

“MTEVEN” – Command to enable unsolicited indication on new incoming SMS

<param1>: decimal

- 0 – Disable unsolicited indication
- 1 – Enable unsolicited indication

<event>:

- “MTEV” – unsolicited indication on new incoming SMS

<cmd>:

“GETNUM” – Command to get the number of SMS placed in the dedicated storage.

<result1>: integer

- Number of filtered SMS in the dedicated storage.

<cmd>:

“GETSMS” – Command to get the latest SMS stored in the dedicated storage

<param1>: decimal

- 0 – PDU mode
- 1 – Text mode

<param2>: decimal

- 0 – Keep SMS in storage
- 1 – Delete SMS from storage

<result1>-<resultN>: same format as returned by +CMGR (see 3GPP 27.005)

<cmd>:

"SETFILTER" – Command to set a list of phone numbers for Incoming SMS filtering. The filtered incoming SMS shall be placed in dedicated location in NP file system. If "SETFILTER" is executed without parameters, the whole list is deleted.

<param1>: string

- phone number (can include digits 0-9,*,#,+)

<param2>: string

- phone number

<paramN>: string

- phone number

Examples

Define filter list:

AT%FLTSMS="SETFILTER","6045629341","7789182026","567#89","123456", "*1130","#90"

%FLTSMS

OK

Clear filter list:

AT%FLTSMS="SETFILTER"

%FLTSMS

OK

Get SMS text Base64:

AT%FLTSMS="GETSMS",1,1

%FLTSMS: "REC UNREAD","+358507654321","Mr. Jones","95/07/03,17:38:15+04"

TWFuIGlzIGRpc3Rpbmd1aXNoZWQsIG5vdCBvbmx5I

OK

4.2.73 AT%NPEV

Command	Possible Response
AT%NPEV=<ev_type>,<mode>	For query (mode=2): %NPEV:<ev_type>[,<param1>[,<param2>] …]] OK or ERROR
AT%NPEV?	ERROR (not supported)
AT%NPEV=?	%NPEV: (list of supported < ev_type>s)
(unsolicited report)	%NPEV:<ev_type>[,<param1>[,<param2>] …]

Description

This command is used for enabling/disabling notifications from LTE modem to NP.

The notifications indicate on state changes happened in the LTE modem. The command can also be used to query these states of LTE modem.

Defined Values

<ev_type>:

- "EPCLCS" – enables/disables notification on a switch between "location services via EPC" (C-Plane) is enabled by network or not (per Table 9.9.3.12A.1 of 3GPP 24.301). The notification is sent upon change.
- "EMGATT" – enables/disables event notification of attach result.
- "T3412EXP" – enables/disables event notification on timer expiration while in "Emergency Mode". The NP is required to decide on next Network registration and PDNs activation steps and send command to LTE firmware accordingly. Upon this event The LTE firmware detach locally.
- "ALL" – enables/disables all event types. This event type cannot be sent in unsolicited reporting.

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled
- 2 - query

<param1>:

For "EPCLCS":

- 0 – not supported
- 1 – supported

For "EMGATT":

- 0 – Normal Attach
- 1 – Emergency Attach
- 2 – Modem full scan failure, could not find any network with emergency call support. The NP is required to decide on next Network registration and PDNs activation steps and send command to LTE firmware accordingly.

4.2.74 AT%VLTEV

Command	Possible Response
AT%VLTEV=<ev_type>,<mode>	OK or ERROR
AT%VLTEV?	ERROR (not supported)
AT%VLTEV=?	%VLTEV: (list of supported < ev_type>s), (list of supported < mode>s)
(unsolicited report)	%VLTEV:<ev_type>[,<param1>[,<param2>] …]

Description

This command is used for enabling/disabling VoLTE notifications from NP to host.

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

Defined Values

<ev_type>:

- “DTMF” – DTMF signal received over IMS/SIP message from remote user
- "KEYPRESS" – Local user key-press signal (DTMF or Dial)
- “VMAIL” – Voice mail notification received over SIP message
- “VMAIL3GPP2” – Voice mail notification received over 3GPP2 SMS message (Teleservice Identifier= 4099: CDMA Voice Mail Notification)
- “MSG3GPP2” –Message notification received over 3GPP2 SMS message
- (Teleservice Identifier= 4098: CDMA Cellular Messaging Teleservice Notification)
- "FAX" – Enable notification of on switching to "FAX mode"
- "CALLINPROG" – Enable Call in progress indication (SIP 100 trying)
- "SESSPROG" – Enable Session Progress indication (SIP 183)
- "RINGPEER" – Enable notification on Alert indication received by peer (SIP 180 ringing)
- "REDIALAFTER" – Enable notification on Redial request from network
- "REMOTETTY" – Enable notification on remote side TTY session request
- "CONFCALL" – Enable notification on Conference Call event
- “ALL” – enables/disables all event types. This event type cannot be sent in unsolicited reporting.

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

<param1>:

For" DTMF” and "KEYPRESS":

- A single ASCII character in the set 0 9, #,*,A D. (This format is the same as defined in standard AT command AT+VTS mode 1)

For “VMAIL”: Decimal

- represents the number of new voice mails stored in the mail box

For “VMAIL3GPP2”: Decimal

- represents the total number of voice mails stored in the mail box

For “MSG3GPP2”: Decimal

- represents the total number of messages stored in mail box

For “FAX”:

- 0 – FAX mode disabled
- 1 – FAX mode enabled

For "CALLINPROG", "SESSPROG" and "RINGPEER":

- The call id <ccidx> as defined in AT+CDU per 27.007

For "REDIALAFTER ": Decimal

- The time in seconds after which the host application may redial

For "CONFCALL": Decimal

- Conference call participant identification number as described in 3GPP TS 22.030 subclause 6.5.5.1.

<param2>:

For “VMAIL”: Decimal

- Number represents the number of old received voice mails stored in the mail box

For “VMAIL3GPP2” and “MSG3GPP2” : string

- User data – Operator's proprietary extra information such as "how many new messages are stored in the mail box"

For "CONFCALL": Decimal

- Conference Call event as defined in the RFC 4575, section 5.7.3. Where:

  0 – Disconnected (user leaved the conference call)

<param3>:

For “VMAIL3GPP2”: string

- Message center time stamp in format: "yy/mm/dd,hh:mm:ss"

For “MSG3GPP2” : string

- Deferred Delivery Time in format: "yy/mm/dd,hh:mm:ss"

<param4>:

For “VMAIL3GPP2” and “MSG3GPP2”: decimal - Alert on Message Delivery:

- 0 - Use Mobile default alert
- 1 - Use Low-priority alert
- 2 - Use Medium-priority alert
- 3- Use High-priority alert

<param5>:

For “VMAIL3GPP2” and “MSG3GPP2”: string

- Call-Back Number

Example

%VLTEV: "DTMF",*

%VLTEV: "DTMF",3

%VLTEV: “VMAIL”,1,10

%VLTEV:"VMAIL3GPP2", 11,"5 NEW VMAIL 0 URG 0 FAX *86", "15/05/21 21:54:19",0,"*86"

4.2.75 AT%OTDOACMD

Command	Possible Response(s)
%OTDOACMD=<Cid>,<Gcid>,<mcc>,<mnc>,<Earfcn>,<AntPortCfg>,<CpLength>,<PrsBW>,<PrsCfg>,<PrsDlFrames>,<PrsMutLen>, <PrsMutInfo> [<freqLayerIndx>,<Cid>,<Gcid>,<mcc>,<mnc>,<Earfcn>,<AntPortCfg>,<CpLength>,<PrsBW> ,<PrsCfg>,<PrsDlFrames>,<PrsMutInfo>,<CrsSlotNoOffset>,<PrsSfOffset>,<PrsExpRSTD>,<PrsExpRSTDUNC> [,…]]	OK or ERROR
%OTDOACMD?	ERROR (not supported)
%OTDOACMD=?	OK
(unsolicited result code)	• %OTDOAMEAS:<Cid>,<Gcid>,<Earfcn>,<RefQ>,<Sfn> • [,<Cid>,<Gcid>,<Earfcn>,<RSTD>,<RSTDQ> [,…]]

Description

AT command to request OTDOA measurements from MAC.

The command supplies the assistance information for both reference cell and neighbor cells: the first set of parameters is the reference cell and the following sets are the neighbor cells.

Upon receiving this command the LTE modem may request the LTE network to allocate OTDOA measurement gaps (Inter-frequency RSTD measurement indication Message)

The command enable single instance of unsolicited result code: %OTDOAMEAS. The result code Include the parameters of the selected reference cell (can be different from the reference cell in the assisted information) followed by measurements of the neighbor cells.

The sender of this command is required to not send additional AT%OTDOACMD until receiving the unsolicited result code

In both command and unsolicited result code, a parameter which is not specified will be written as ",,"

Defined Values

<Cid>: decimal

- The Physical Cell ID of the reference/neighbor cell

<Gcid>: hexadecimal

- The Global cell ID of the reference/neighbor cell

<mcc>: integer

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

<mnc>: integer

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

<Earfcn>: decimal

- The EARFCN value of the reference/neighbor cell

<AntPortCfg>: decimal

- The number of ports used by the reference/neighbor cell for Cell-specific Reference Signals (CRS)

<CpLength>: decimal

- Cyclic prefix length of the reference/neighbor cell signal PRS/CRS

<PrsBW>: decimal

- The bandwidth, expressed by the number of resource blocks that are used by reference/neighbor cell to configure the positioning reference signals.

<PrsCfg>: decimal

- The positioning reference/neighbor cell signals configuration index IPRS as defined in 3GPP TS 36.211.

<PrsDlFrames>: decimal

- The number of consecutive downlink subframes NPRS of the reference/neighbor cell with positioning reference signals, as defined in 3GPP TS 36.211

<PrsMutLen>: decimal

- The number of PRS positioning occasions as defined in 3GPP 36.355 section 6.5.1.2

<PrsMutInfo>: hexadecimal

- The PRS muting bit sequence of the reference/neighbor cell. The first bit of the PRS muting sequence corresponds to the first PRS positioning occasion that starts after the beginning of the assistance data reference cell SFN=0, as defined in 3GPP TS 36.211.

<freqLayerIndx>: decimal

- The frequency layer index as defined in 3GPP 36.355 section 6.5.1.2

<CrsSlotNoOffset>: decimal

The CRS slot number offset at the transmitter between this neighbor cell and the reference cell.

<PrsSfOffset>: decimal

- The offset between the first PRS subframe in the reference cell on the reference carrier frequency layer and the first PRS subframe in the closest subsequent PRS positioning occasion of this neighbor cell on the other carrier frequency layer

<PrsExpRSTD>: decimal

- The PRS RSTD value that the target device is expected to measure between this neighbor cell and the reference cell. The resolution is 3Ts, with Ts=1/(15000*2048) seconds.

<PrsExpRSTDUNC>: decimal

- The uncertainty PRS RSTD value that the target device is expected to measure on the RSTD between this neighbor cell and the reference cell. The resolution is 3Ts, with Ts=1/(15000*2048) seconds.

<RefQ>: hexadecimal

- The target device's best estimate of the quality of the OTDOA measurement from the RSTD reference cell, TSubframeRxRef, where TSubframeRxRef is the time of arrival of the signal from the RSTD reference cell.

<Sfn>: decimal

- The SFN of the RSTD reference cell containing the starting subframe of the PRS/CRS positioning occasion

<RSTD>: decimal

- The relative timing difference between this neighbor cell and the RSTD reference cell. The resolution is 3Ts, with Ts=1/(15000*2048) seconds.

<RSTDQ>: hexadecimal

- The target device's best estimate of the quality of the measured RSTD. The quality is a bit string as defined by OTDOA-MeasQuality in section 6.5.1.5 of 3GPP 36.355

4.2.76 AT%CMGWC

Command	Possible Response(s)
if text mode (+CMGF=1): +CMGWC[=<oa/da>[,<tooa/toda>[,<stat>]]]<CR> text is entered<ctrl-Z/ESC>	+CMGWC: <index>[,<index> …] +CMS ERROR: <err>
+CMGWC=?	

Description

The standard AT+CMGW command, defined in 3GPP 27.00, return single storage location index and assume that concatenation is handled by the host, therefore only small SMS segments are used by the standard AT+CMGW command.

The AT+CMGWC command is the same as AT+CMGW but extended to allow the host to write large SMS to storage. In case that concatenation is required, it is fully handled by the device which return list of indexes represents the storage location of each SMS fragment.

In order to send the SMS from storage, the host is required to send each of the returned indexes by using the standard command AT+CMSS.

Defined Values

Please refer to section 3.5.3 of 3GPP 27.005.

4.2.77 AT%CMGSC

Command	Possible Response(s)

if text mode (+CMGF=1):
+CMGSC=<da>[,<toda>]<CR>
text is entered<ctrl-Z/ESC>
	if text mode (+CMGF=1) and sending successful:
	+CMGSC: <mr>[,<mr> …]
	if sending fails:
	+CMS ERROR: <err>

+CMGSC=?	

Description

The standard AT+CMGS command, defined in 3GPP 27.00, return single message reference index and assume that concatenation is handled by the host, therefore only small SMS segments are used by the standard AT+CMGS command.

The AT+CMGSC command is the same as AT+CMGS but extended to allow the host to send large SMS to network. In case that concatenation is required, it is fully handled by the device which return list of message-references, each is a references of single SMS fragment.

If delivery report has been requested by the sender, then it should be received for each SMS fragment. Each delivery report confirms reception of single <mr>. The host shall assume reception of SMS by the peer only if it received delivery report for all the <mr> of the SMS.

Defined Values

Please refer to section 3.5.1 of 3GPP 27.005.

4.2.78 AT%GETSPN

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

Description

The command is intended to retrieve service provider display policy and service provider name from SIM EFSPN file. The display condition in SIM file depends on the type of RPLMN (HPLMN or VPLMN). The AT%GETSPN command output reflects resulting display policy for current RPLMN, and not a “Display Condition” binary value from EFSPN, which may be retrieved by AT+CSIM/CRSM, if needed.

If device is not registered, the “Unknown” (0) policy is returned.

Defined Values

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

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

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

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

4.2.79 AT%CEN

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

Description

The command is used to query from UICC the Emergency numbers which are stored on it.

Read command returns one line of intermediate result code %CEN1: <reporting> with the current <reporting> setting. Then follows zero or more occurrences of the emergency numbers with intermediate result code %CEN2: <cat>,<number>.

Defined Values

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

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

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

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

4.2.80 AT%EMGCMD

Command	Possible Response
AT%EMGCMD=<cmd>[,<param1>[,<param2>] …]	OK or ERROR
AT%EMGCMD?	%EMGCMD:<emgstate>
AT%EMGCMD =?	%EMGCMD: (list of supported <cmd>s)

Description

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

Remark: command is non-blocking command.

Defined Values

<cmd>:

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

<param1>:

For "PLMN_NA":

- 0 – Permanent failure (Current use case: Normal IMS doesn't support voice)
- 1 – Temporary failure (Current use case: SIP failure in Emergency voice call)

For "SET_DEFAULT_PDN":

- The CID of the Default PDN

<param2>:

For "PLMN_NA":

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

<emgstate>: decimal

- 0 – Normal mode
- 1– Emergency mode,

4.2.81 AT%EMGCBM

Command	Possible Response
AT%EMGCBM =<cmd>,<mode>	OK or ERROR
AT%EMGCBM?	ERROR (not supported)
AT%EMGCBM=?	%EMGCBM: (list of supported <cmd>s), (list of supported < mode>s)
(unsolicited report)	%EMGCBM:<cmd>,<param>

Description

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

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

- RIL_UNSOL_ENTER_EMERGENCY_CALLBACK_MODE
- RIL_UNSOL_EXIT_EMERGENCY_CALLBACK_MODE
- RIL_REQUEST_EXIT_EMERGENCY_CALLBACK_MODE

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

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

Defined Values

<cmd>:

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

<mode>

For “CBMSTAT” - enable/disable unsolicited indication of Emergency call-back mode state.

- 0 - disabled (default)
- 1 – enabled

<param>:

For "CBMSTAT”

- o 0 – Emergency call-back mode Exit
- o 1 – Emergency call-back mode Entered

4.2.82 AT%DATACMD

Command	Possible Response
AT%DATACMD=<cmd>	OK or ERROR

Command	Possible Response
AT%DATACMD?	%DATACMD: <general_flag>, <roaming_flag>
AT%DATACMD=?	%DATACMD: (list of supported <cmd>s)

Description

The command is used to block and unblock user data traffic in different conditions.

By default, all user data traffic is enabled.

Note that general user data transfer flag (toggled by “DISABLE”/ “ENABLE”) and data transfer at roaming flag (toggled by “DISABLEROAM”/ “ENABLEROAM”) may be independently enabled/disabled. Internally the flags will be applied together to data transfer as per next rules:

	“DISABLE”	“ENABLE”	“DISABLEROAM”	“ENABLE ROAM”	Data Transfer
Home	0	1	0	1	Yes
	0	1	1	0	Yes
	1	0	0	1	No
	1	0	1	0	No
Roaming	0	1	0	1	Yes
	0	1	1	0	No
	1	0	0	1	No
	1	0	1	0	No

Defined Values

<cmd>:

- “DISABLE” – disable all user data
- “DISABLEROAM” – disable all user data at roaming
- “ENABLE” – enable all user data
- “ENABLEROAM” – enable all user data at roaming

4.2.83 AT%CCID

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

Description

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

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

Defined Values

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

- MM = Constant (ISO 7812 Major Industry Identifier)
- CC = Country Code
- II = Issuer Identifier
- N{12} = Account ID ("SIM number")
- C = Checksum calculated from the other 19 digits using the Luhn algorithm.
- x = An extra 20th digit, which may be returned by SIM, but it is not officially part of the ICCID.

Example

AT%CCID%CCID: “01234567890123456789”

OK

4.2.84 AT%ROHCCMD

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

Description

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

Defined Values

<cmd>:

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

For “SETRTP" and “CLEARRTP"

<param1>: string

- RTP stream Source IP address (V4 or V6)

<param2>: decimal

- RTP stream Source port address

<param3>: string

– RTP stream Destination IP address (V4 or V6)

<param4>: decimal

– RTP stream Destination port address

4.2.85 AT%LTECMD

Command	Possible Response(s)
AT%LTECMD=<cmd>,<lte_object> [,<param1>…]	For <cmd>=2 (query): • %LTECMD: <lte_object>[,<param1>…]
AT%LTECMD?	ERROR (not supported)
AT%LTECMD=?	LTECMD: (list of supported <cmd>s), (list of supported <lte_object>s)

Description

This command is used for LTE protocol parameters query and override at run-time.

The command is compound, which means that <param#> parameters are <lte_object> specific.

The query command (2) is supported for all declared <lte_object>s. It may return ERROR for Network provided parameters in LTE disconnected state.

The override command (1) may be unsupported for some LTE protocol <lte_object>s especially for those defined by Network or negotiated with Network. In such a case the override command (1) returns ERROR. Missed override support is declared on per-object base.

Some LTE parameters provided by eNB may be optional. A parameter, which is not specified, will be omitted and written as ",," in query (2) AT command response.

Notes:

- If overridden parameter is part of capability negotiation with Network, it will be applied after next re-attach only.
- All settings are applied only during run-time (not NV stored) and will be lost after reboot.

Read command is not supported.

Defined Values

<cmd>:

- 1 – override/toggle current LTE parameter value or negotiate with network new LTE capability/parameter value
- 2 – query current LTE parameter value in use

<lte_object>:

- "PGCYCLE" – UE individual time interval between monitoring Paging Occasions, used to set UE specific DRX parameter for paging cycle (see 24.008). Actual DRX cycle is determined by the shortest of this UE specific DRX value and a default DRX value broadcast in system information (see 36.304).

<param1>:

- 0 – Return to eNB setting
- 1 – 320 ms
- 2 – 640 ms
- 3 – 1280 ms
- 4 – 2560 ms

<lte_object>:

- "AGAPCAP" – UE Autonomous Gap capability; override command is not supported. Starting version TBD.

<param1>:

- 0 – disabled
- 1 – enabled

<lte_object>:

- "LPP" – enable LPP capability

<param1>:

- 0 – disabled
- 1 – enabled

<lte_object>:

- "LCS" – enable LCS capability

<param1>:

- 0 – disabled
- 1 – enabled

<lte_object>:

- "NSLPI" – NAS signaling low priority

<param1>:

- 0 – low priority disabled
- 1 – low priority enabled

<lte_object>:

- "LMTSCANTOUT" - Limited Scan timeout

<param1> - timeout in ms

<lte_object>:

- "DHCP" – DHCP assigned parameters. Starting version TBD.

<param1> - cid, same format as defined for <cid> parameter in +CGCONTRDP of TS 27.007.

This parameter is mandatory for query (2) subcommand.

<param2> - string; address and subnet assigned by DHCP server; same format as defined for <local_addr and subnet_mask> in AT+CGCONTRDP of TS 27.007.

<param3> - string; optional parameter; gateway address provided by DHCP server; same format as defined for <gw_addr> in AT+CGCONTRDP of TS 27.007.

<lte_object>:

- "BARSIB1" – Cell Barred restrictions of SIB1. Starting version TBD.
- <param1>:
- 0 – disabled; no override, use network setting
- 1 – enabled; ignore network barring restrictions

<lte_object>:

- "BARSIB2" – Access Class barring restrictions of SIB2. Starting version TBD.

<param1>:

- 0 – disabled; no override, use network setting
- 1 – enabled; ignore network barring restrictions

<lte_object>:

- "UTC" – Coordinated Universal Time

<param1> - integer:

- UTC value defined as the number of milliseconds that have elapsed since 00:00:00, Thursday, 1 January 1970.

<param2> - integer:

- Time Zone value, indicates the difference, expressed in quarters of an hour, between the local time and UTC

<param3> - integer; Daylight Savings adjustment:

- 0 - UTC needs no adjustment for daylight saving time
- 1 - UTC needs +1 hour adjustment for daylight saving time
- 2 - UTC needs +2 hours adjustment for daylight saving time

<param4> - integer:

- Number of leap seconds offset between GPS Time and UTC. UTC and GPS time are related i.e. GPS time - leapSeconds = UTC time

<param5> - integer; indicates UTC source, used only in response of <cmd>=2(query):

- 0 – no UTC acquired from any source
- 1 – user/host setting via AT+CCLK, AT%CCLK or AT%LTECMD="UTC"
- 2 – SIB16 message as per 3GPP 36.331
- 3 - NAS message as per 3GPP 24.008

<param6> - integer; current TTI value, used only in response of <cmd>=2(query).

<lte_object>:

- "PTW" – LTE-specific paging transmission window (eDRX parameter missed in AT+CEDRXRDP)

<param1>:

- 0 - 1,28 seconds
- 1 - 2,56 seconds
- 2 - 3,84 seconds
- 3 - 5,12 seconds
- 4 - 6,4 seconds
- 5 - 7,68 seconds
- 6 - 8,96 seconds
- 7 - 10,24 seconds
- 8 - 11,52 seconds
- 9 - 12,8 seconds
- 10 - 14,08 seconds
- 11 - 15,36 seconds
- 12 - 16,64 seconds
- 13 - 17,92 seconds
- 14 - 19,20 seconds
- 15 - 20,48 seconds

<lte_object>:

- "TXFAILPARAMS" – the object supports retry mechanism defined in txFailParams from SIB2

<param1> - integer; retry number, which fits connEstFailCount of txFailParams, if present in SIB2

- 0 – settled value; use SIB2 value or use SW Default (100 retries), if connEstFailCount is missed in SIB2
- 1-300

<param2> - integer; timeout, which fits connEstFailOffsetValidity of txFailParams, if present in SIB2

- 0 – settled value; use SIB2 value or use SW Default (30 sec), if connEstFailOffsetValidity is missed in SIB2
- 1-1000 in sec

<param3> - integer; offset, which fits connEstFailOffset of txFailParams. If omitted, infinity value shall be used for "Qoffsettemp" from 36.304 (see 36.331)

- 0 – 255 dB

4.2.86 AT%CSMP

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

Description

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

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

Defined Values

<replayreq>: integer type

- 0 – no request for DAK(3GPP2 delivery Ack request)
- 1 – request for DAK

If parameter is not specified, the default setting is applied.

<encoding>:

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

<teleid>: integer type; Teleservice ID

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

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

In case of Sprint

- 0 - Normal (factory default)
- 1 - Interactive
- 2 - Urgent
- 3 - Emergency

In case of Verizon:

- 0 - Normal (factory default)
- 1 – High

<cbaddr>: string

- Callback address

4.2.87 AT%PBCMD

Command	Possible response
AT%PBCMD=<cmd> [,<param1> [,<param2>]]	For "DELALL": • OK or ERROR For "GASR": • AT%PBCMD:<cmd>,<index1>,<text>[<CR><LF> • %PBCMD: <index2>,<text>[…]] For "GASW": • AT%PBCMD:<cmd>,<Windex>,<Wtext> For "STATUS": • %PBCMD: <adn_num>,<sne_size>,<sne_free>,<gas_size>, <gas_free>, <grp_size>,<grp_free>,<iap_size>,<iap_free>, <aas_size>,<aas_free>,<pbc_size>,<pbc_free>,<ext1_free>, • <mail_size>,<mail_free>,<mail_len>,<sec_name_len>,<anr_size>, <anr_free>[,<anr_size>,<anr_free>[,<anr_size>,<anr_free>]] • [<CR><LF>%PBCMD: <adn_num>,<sne_size>,<sne_free>,<gas_size>, <gas_free>, <grp_size>,<grp_free>,<iap_size>,<iap_free>, <aas_size>,<aas_free>,<pbc_size>,<pbc_free>,<ext1_free>, • <mail_size>,<mail_free>,<mail_len>,<sec_name_len>,<anr_size>, <anr_free>[,<anr_size>,<anr_free>[,<anr_size>,<anr_free>]]]
AT%PBCMD?	%PBCMD:<cachestat>
AT%PBCMD=?	%PBCMD:(<RminIndex> - <RmaxIndex>), (list of supported <Windex>s),<tlength>

Description

The following AT command handle Phonebook commands.

Defined Values

<cmd>: string

- "DELALL" – Execution command deletes all phonebook entries in the current phonebook memory storage selected with +CPBS.

- "GASR" - returns grouping information Alpha String (GAS) USIM file Entries in location number range [Sindex,Eindex]. If Eindex is not specified, only location Eindex is returned.
- "GASW" - writes grouping information Alpha String (GAS) USIM file entry in location number Index.
- "STATUS" – retrieves structure and current status of Phone Book. The second EF_ADN will be reported if present on SIM.

<param1>:

For "GASR":

- Sindex - integer type, Start index value of the location number range of GAS.

For "GASW":

- Windex - integer type, index value of the write location of GAS.

<param2>:

For "GASR":

- Eindex- integer type, End index value of the location number range of GAS.

For "GASW":

- Wtext- string type, the text associated to the GAS write entry.

<index1>, <index2> …<indexN>: integer

- The returned location number of each returned GAS entry

<text>: string

- The alphanumeric text associated to the entry

<RminIndex>: decimal

- The minimum index number to read GAS

<RmaxIndex>: decimal

- The maximum index number to read GAS

<Windex>: decimal

- The Write index entry for GAS

<tlength>: decimal

- The maximum text field length

<cachestat>: decimal

- 0 – unknown
- 1 - busy by PB caching
- 2 – cache ready

4.2.88 AT%EMGNUM

Command	Possible Response(s)
%EMGNUM=<cmd>[,<param>]	For command "NUMTYPE": • %EMGNUM:<numtype>[,<cat>]

Command	Possible Response(s)
%EMGNUM?	• %EMGNUM:<numsrc>,<num1>[,<num2>]…] • … • <CR><LF>%EMGNUM:<numsrc>,<num1>[,<num2>] …]
%EMGNUM=?	%EMGNUM: List of supported <cmd>s

Description

AT command to get query the emergency numbers in the device. In addition the command allows the user to check is specific number (e.g. number dialed by the user) is classified as Emergency number or not.

If some type of emergency numbers is missed, its reporting for "%EMGNUM?" will be omitted.

If there is no any emergency numbers at all, the "%EMGNUM?" answer will be empty and will return only OK.

Defined Values

<cmd>: string

- "GETTYPE" – Command to check the type of number specified in <param>.

<param>: string

- String type. Represent a dialing number for which it is required to resolve the number type.

<numtype>: Integer

- Indicate the type of the number
  - 0 – Regular number
  - 1 – Emergency number

<cat>: integer

- A bitmap indicating the Emergency Service Category Value according to 3GPP TS 24.008 [8] table 10.5.135d.

<numsrc>: string

- Indicate the source of the emergency number:
  - "CONFIG" – Emergency number hardcoded in device configuration file
  - "SIM" – Emergency number configured in the SIM card
  - "NW" – Emergency number indicated by the network on ATTACH/TAU

<num1>, <num2> ... : String

- Representing an emergency number from the list.

4.2.89 AT%VLTCMD

Command	Possible Response
AT%VLTCMD=<cmd>,<param1>[,<param2>]	OK or ERROR
AT%VLTCMD?	ERROR (not supported)
AT%VLTCMD=?	%VLTCMD: (list of supported <cmd>s)
(unsolicited)	%VLTCMDU:<result>[,<conf_ccidx>[,<part_ccidx>]]

Description

The following AT command shall be used phone applications (ATA manager, WEB GIU, Android RIL, etc.) to send VoLTE configuration commands to the IMS module.

The command AT%VLTCMD to setup ad-hoc conference call, automatically enable the unsolicited %VLTCMDU which indicate the result of the ad-hoc call request of the current session. The application can use AT+CLCC to get detailed information about the new call/participants which were added.

Defined Values

<cmd>: string

- "ADHOC" – Command to setup ad-hoc conference call and join a new participant. If conference call is already set, then just join the new participant.
- "TTYMODE" – Set the required TTY mode
- "VEMODE" – Allow to force VE (voice engine) start/stop independently of phone hook state. For example, this is required to allow pre-call features such as receiving Caller-ID and deliver it to the display.
- "ECMODE"- echo canceller enable/disable
- "NRMODE"- noise reduction enable/disable
- "AGCMODE" – Microphone AGC (Automatic Gain Control) enable/disable
- "AMRMODESET" – AMR mode
- "AMRWBMODESET" – AMR-WB mode
- "SESSIONEXP" – SIP Session Expiration timer
- "MINSE"– SIP Minimum Session Expiration time
- "EBCT" – Initiate Explicit blind call transfer
- "VETESTMODE" – Enable Voice Engine Test mode
- "TXCNMODE" – Tx Comfort Noise injected by the echo canceler enable/disable.
- "SPKRMUTE" – Enable/Disable Speaker Mute function (When enabled Speaker is in mute)
- "OUTDTMFDETSW" - Enable/Disable DTMF detection in software for outgoing DMTF signals generated by the host.
- "MODTMFVOL" – Control the volume of outgoing DTMF

- "CALLRECOVER" – This command handle the case that "Hold" command (AT+CHLD=2) has returned ERROR although the network already stopped the RTP session (this is network inconsistency which have been found on some networks). The "CALLRECOVER" command allows the user to recover the RTP session of the active call.
- "DTMFG" – Generate DTMF tone.

Note: All modes setting in this command are runtime configurations and do not take affect after reset.

<param1>:

For "TTYMODE": string

- "OFF" - The user has only bi-directional voice stream
- "FULL" - The user has only bi-directional TTY stream
- "VCO" - Voice carry over, hard of hearing. User has Voice output +TTY input
- "HCO" - Hearing carry over, speech-disabled. User has TTY output + Voice input

For "VEMODE": Integer

- 0 – VE core is off
- 1– VE core is on

For "ECMODE", "NRMODE", "AGCMODE", "TXCNMODE", "SPKRMUTE" and "OUTDTMFDETSW"

- 0 – Feature Disabled
- 1– Feature Enabled

For "AMRMODESET": String

- 0-7 in semicolon separated sequence.

For "AMRWBMODESET": String

- 0-8 in semicolon separated sequence

For "SESSIONEXP": decimal

- SIP Session Timer value. 90 - 7200 (seconds)

For "MINSE": decimal

- Minimum SIP Session Expiration Timer. 90 - 3600 (seconds)

For "ADHOC": string

- URI Represented with IRA characters (As defined in AT+CDU command).

For "ECBT": string

- URI Represented with IRA characters (As defined in AT+CDU command).

For "VETESTMODE": decimal

- 0 – VE test mode Disabled
- 1– VE test mode Enabled

For "MODTMFVOL": decimal

- The required volume 0 - 63 in dB

For "CALLRECOVER": decimal

- Call identification number <ccidx> as described in 3GPP TS 22.030 [19] subclause 6.5.5.1.

For "DTMFG": string

- A single ASCII character in the set 0 9, #,*,A D – represent DTMF character.

<param2>:

For "DTMFG": string

- "START" –Start the generation of the specified DTMF digit until instructed to stop.
- "STOP" –Stop the generation of the specified DTMF digit.

<result>: integer

- 0 – failed to setup conference call / add user
- 1– Succeed to setup conference call / add user

<conf_ccidx>: integer

- Conference call identification number as described in 3GPP TS 22.030 subclause 6.5.5.1.

<part_ccidx>: integer

- Conference call participant identification number as described in 3GPP TS 22.030 subclause 6.5.5.1.

Example

AT%VLTCMD="AMRMODESET",“1;2;3”

4.2.90 AT%NETUPD

Command	Possible Response
AT%NETUPD=<cmd>,<param>	OK or ERROR
AT%NETUPD?	ERROR (not supported)
AT%NETUPD=?	%NETUPD: (list of supported <cmd>s)

Description

The following AT command is intended to enable/disable network override for specified LTE parameters (i.e. by EMM messages).

Defined Values

<cmd>: string

"NWNAME” – Set the behavior of Network name supplied by AT+COPS.

<param>:

For "NWNAME ": decimal

- 0 - "AT+COPS?" shows the most updated full network name as required by the 27.007 standard

– 1 - Prohibit override of network name by EMM message (i.e. shown in "AT+COPS?", etc.) even if the EMM information message indicates another Full network name.

4.2.91 AT%SMMA

Command	Possible Response(s)
AT%SMMA	OK/ERROR
AT%SMMA?	ERROR (not supported)
AT%SMMA=?	OK

Description

This command is used by host SMS application to signal the LTE network that SMS storage has available memory and it is able to receive new incoming SMS.

Upon receive of this AT command the device will send to the network RL_SMMA message as defined in section 7.3.2 of 3GPP TS 24.011

Defined Values

The command doesn't take or return any value.

4.2.92 AT%GPIOSEL

Command	Possible Response
AT%GPIOSEL=<pin>[,<pin>[,…]]	OK or ERROR
AT%GPIOSEL?	• [%GPIOSEL: <pin>=<dir>,<value> • [<CR><LF>%GPIOSEL:<pin>=<dir>,<value> • […]]]
AT%GPIOSEL=?	OK

Description

The command is intended to predefine a list of GPIO pins in use, which will be reported in query command “AT%GPIOSEL?”.

Altair chips have 80-120 pins, which may be configured as GPIO. This command is used to select part of them for pure GPIO usage. Specific for each Altair chip GPIO pin enumeration is defined in IOSYSBP file definition ([2] for Firefly series).

Command returns ERROR if one of pin numbers is invalid.

Read command returns a list of pre-selected GPIO pins. If there are not any pins selected, the query command returns only OK.

Note: For ALT1160 chip the command could use as GPIO only pins, which are muxed to GPIO functionality by default (see pad2ball chip definition) or configured to GPIO functionality in Device Tree. Otherwise, all GPIO selection and configuration operations will be silently ignored.

Defined Values

<pin>:

- 1-99 for Firefly (see [2]). Pin enumeration is not continuous.

<dir> - GPIO direction:

- 0 – input
- 1 - output

<value>:

- 0 or 1 physical value of input or output

Implementation Notes

Next implementation is expected:

- The execution AT%GPIOSEL command will call Linux export() to expose GPIO pins to User Space, if not exposed yet.
- The read AT%GPIOSEL? command will return gpio pin settings.

4.2.93 AT%TSTEXT

Command	Possible Response(s)
AT%TSTEXT=<cmd>[,<param>]	For <cmd>="CLOCK32": • %TSTEXT: <freq_error>
AT%TSTEXT?	ERROR (not supported)
AT%TSTEXT=?	OK

Description

Test AT command is intended for external circuits test mode.

Command is not accepted in operational mode (AT+CFUN=1) and flight mode (CFUN=4) and returns ERROR. The modem shall be previously switched in non-operational mode by CFUN=0.

Read command is not supported.

Defined Values

<cmd>:

- "CLOCK32" – measures frequency error for 32kHZ crystal

<param> - test duration in ms:

- 20-10,000

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

Implementation Notes

The formula for <freq_error>:

- A - expected freq
- X - measured freq
- freq_error= ((X-A)*1000000)/A

4.2.94 AT%GPIOCMD

Command	Possible Response
AT%GPIOCMD=<cmd>,<pin>[,<direction>[,<pull>[,<value>]]]	For <cmd>=0/2: • %GPIOCMD: <pin>,<dir>,<pull>,<value>
AT%GPIOCMD?	ERROR (not supported)
AT%GPIOCMD=?	OK

Description

The command is intended to write IO output line and read any IO line. Specific for each chip GPIO pin enumeration is defined in IOSYSBP file definition ([2] for Firefly series).

Command returns ERROR if pin number is invalid.

Internal pulling shall be always disabled (0) for OUTPUT pin. Any other settings for <pull> parameter will be silently ignored.

Note: For ALT1160 chip the command could use as GPIO only pins, which are muxed to GPIO functionality by default (see pad2ball chip definition) or configured to GPIO functionality in Device Tree. Otherwise, all GPIO selection and configuration operations will be silently ignored.

Defined Values

<cmd>:

- -0 - configure and read INPUT pin
- -1 – configure and write OUTPUT pin
- -2 – read or readback (INPUT or OUTPUT pin), configuration parameters are ignored, if present
- -3 - write OUTPUT pin, configuration parameters are ignored, if present

<pin>:

- -1-99 for Firefly (see [2]). Pin enumeration is not continuous.

<dir> - GPIO direction:

- -0 – input
- -1 - output

<pull> - internal GPIO pull settings:

- -0 –disable pull up/down
- -1 – enable pull down
- -2 – enable pull up

<value> - physical value of input or output:

- -0 or 1

Examples

1. Configure and write pin value for GPIO8 (pin=9) on Firefly:

   AT%GPIOCMD=1,9,1,0,1

OK

2. Readback same pin:

   AT%GPIOCMD=2,9

   %GPIOCMD=9,1,0,1

   OK

3. Configure input pin GPIO18 (pin=18) with default pull (omitted optional param) and read its value:

   AT%GPIOCMD=0,18,0

   %GPIOCMD=18,0,1,0

   OK

Implementation Notes

Next implementation is expected:

- -There is not required to call AT%GPIOSEL if pin group read is not expected.
- -The execution AT%GPIOCMD command will check if pin is already exposed to User Space (by AT%GPIOSEL call or previous AT%GPIOCMD call). If not, the export() API shall be called first to expose pin to User Space before any further gpio pin operations.
- -The following operations (config/read/write) will use Kernel API:
  - Existed API to set direction and value.
  - New API for setting pull value
  - Existed API to read or read-back value.

Direction and pull value read operation may be implemented as actual read from registers or as stored in local DB.

4.2.95 AT%ADCCMD

Command	Possible Response
AT%ADCCMD=<cmd>,<pin>	%ADCCMD: <pin>,<value>
AT%ADCCMD?	• [%ADCCMD: <pin>=<value> • [<CR><LF>%ADCCMD:<pin>=<value> • […]]]
AT%ADCCMD=?	OK

Description

The command is intended to configure and read analogue value via SAR ADC pin. Pin name-to-Pin ID mapping is chip specific (see specific Altair chip App Notes).

Due to the complexity of some pins configuration into ADC mode it is recommended to call configuration command (<cmd>=1) only once after wakeup and then use only read ADC command (<cmd>=2).

Command returns ERROR if pin number is invalid.

Read “AT%ADCCMD?” command returns a list of previously configured (with <cmd>=1) ADC pins. If there is not any ADC pins configured beforehand, the command returns only OK.

Defined Values

<cmd>:

- -1 - configure and read ADC pin
- -2 – read ADC value, no any pin configurations are applied

<pin>:

- -0-3 for SAR ADC on Firefly (SAR_VAINP0-3)

<value> - physical value of input in mV

4.2.96 AT%DEVINFO

Command	Possible Response(s)
%DEVINFO=<reqID>	%DEVINFO: <idValue>
%DEVINFO?	ERROR (OPRATION_NOT_SUPPORTED)
%DEVINFO=?	%DEVINFO (list of supported <reqID>s)

Description

Command to get identification values of the device components from NV memory.

Defined Values

<reqID> - string parameter:

- ”DeviceSerialNumber” – returns the serial number of the board.
- ”ModelNumber” – returns the vendor model ID number.

<idValue> - string parameter

Example

AT%DEVINFO="DeviceSerialNumber"

%DEVINFO:"123456789"

OK

4.2.97 AT%CLCMD

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

Description

The command configures Cell Lock and WL parameters. Command is accepted only in detached (unregistered) state. If device is in operational mode (CFUN=1) and deregistered state, the command also triggers LTE procedures, which shall be finished in camping on one of the cells from WL.

Once WL cell info parameters are settled, they will be kept forever up to next reboot. This means that for next AT command call to enable Cell Lock the cell info parameters (<earfcn>, <pci>, <oper>) may be omitted, while <mode> shall be always defined.

Defined Values

<cmd>:

- 0 – disable cell lock (default)
- 1 – enable cell lock

<mode>:

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

<earfcn> - cell EARFCN

<pci> - cell PCI

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

Example

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

4.2.98 AT%SCANCFG

Command	Possible Response
AT%SCANCFG=<rs_cfg>[,<sl_cfg[,<estart>,<estop>,<estep> [,<estart>,<estop>,<estep>]]…]	OK or ERROR
AT%SCANCFG?	ERROR (not supported)

Command	Possible Response
AT%SCANCFG=?	OK

Description

The command is intended to configure changes in regular scan procedure for following user-triggered scan.

Rich Scan is a scan, which provides not only strongest cell on each mandated frequency, but also all intra cells, which can be acquired on same EARFCN.

Next configurations may be configured for user-triggered scan procedure:

- Regular scan over regular DOP scan settings (default)
- Regular scan over run-time scan list (RTSL)
- Rich scan over regular DOP scan settings
- Rich scan over run-time scan list (RTSL)

The EARFCN values of RTSL shall be a subset of bands defined in BSP (DOP) file and used for device calibration at wakeup time.

Defined Values

<rs_cfg> - Rich scan configuration:

- 0 – disable Rich scan (default)
- 1 – enable Rich scan for AT%SCANCMD
- 2 – enable Rich scan for any regular scan procedure

<sl_cfg> - run-time scan list (RTSL) configuration:

- 0 – disable RTSL (default)
- 1 – enable RTSL for AT%SCANCMD
- 2 – enable RTSL for any regular scan procedure

<estart> - Start EARFCN

<estop> - Stop EARFCN

<estep> - EARFCN step

Examples

1. If only Rich scan over default bands/scan list (defined in BSP) is required, configure rich scan once at wakeup:

   AT%SCANCFG=1

2. If list of scanned frequencies is changed dynamically, configure rich scan and RTSL before each single rich scan, for example:

   AT%SCANCFG=1,1,2620,2625,1

4.2.99 AT%TSTEXT

Command	Possible Response(s)
AT%TSTEXT=<cmd>[,<param>]	For <cmd>="CLOCK32": • %TSTEXT: <freq_error>

Command	Possible Response(s)
AT%TSTEXT?	ERROR (not supported)
AT%TSTEXT=?	OK

Description

Test AT command is intended for external circuits test mode.

Command is not accepted in operational mode (AT+CFUN=1) and flight mode (CFUN=4) and returns ERROR. The modem shall be previously switched in non-operational mode by CFUN=0.

Read command is not supported.

Defined Values

<cmd>:

- "CLOCK32" – measures frequency error for 32kHZ crystal

<param> - test duration in ms:

- 20-10,000

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

Implementation Notes

The formula for <freq_error>:

A - expected freq

X - measured freq

freq_error= ((X-A)*1000000)/A

4.2.100 AT%CSDH

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

Description

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

The optional fields carry information related to:

- Concatenated SMS (<cmsgid>,<cmsgn>,<cmsgpn>)
- WDP header (<wdpdst>, <wdpsrc>)
- CMGL extra info (<fo>,<pid>,<dcs>, <sca>,<tosca>)

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

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

Defined Values

<show>: decimal

- 0 - So not show any proprietary optional info
- 1 – Show concatenated header info
- 2 – Show Concatenated header info, WDP info and CMGL extra info

4.2.101 AT+CMGR (User extended)

Command	Possible Response(s)

+CMGR=<index>	if text mode (+CMGF=1), command successful and SMS-DELIVER:
	• +CMGR: <stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>[,[<cmsgid>],[<cmsgn>],[<cmsgpn>][,<wdpdst>,<wdpsrc>]]]<CR><LF><data>
	
	if text mode (+CMGF=1), command successful and SMS-SUBMIT:
	• +CMGR: <stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>[,[<cmsgid>],[<cmsgn>],[<cmsgpn>][,<wdpdst>,<wdpsrc>]]]<CR><LF><data>
	
	if text mode (+CMGF=1), command successful and SMS-STATUS-REPORT:
	• +CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>
	
	if text mode (+CMGF=1), command successful and SMS-COMMAND:
	• +CMGR: <stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length>
	<CR><LF><cdata>]
	
	if text mode (+CMGF=1), command successful and CBM storage:
	• +CMGR: <stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>
	
	Otherwise:
	• +CMS ERROR: <err>

+CMGR=?	

Description

The command is the same as standard AT+CMGR with additional proprietary parameters which shown when enabled by both AT+CSDH=1 and AT%CSDH=1/2

Defined Values

<cmsgid> - concatenated msg ID

<cmsgn> - concatenated msn number of parts

<cmsgpn> - concatenated msg part number

<wdpdst> - WDP destination port, as defined by WAP-259-WDP-20010614-a

<wdpsrc> - WDP source port, as defined by WAP-259-WDP-20010614-a

All other parameters are defined in 3GPP 27.005

4.2.102 AT+CMGL (User extended)

Command	Possible Response(s)

MGL[=<stat>]	if text mode (+CMGF=1), command successful and SMS-DELIVERs:
	• +CMGL: <index>,<stat>,<oa/da>,[<alpha>],[<scts>][,<tooa>,
	• <length>[,[<cmsgid>],[<cmsgn>],[<cmsgpn>][,[<wdpdst>],[<wdpsrc>][,<fo>,<pid>,<dcs>,<sca>,<tosca>]]]]<CR><LF><data>[<CR><LF>
	• +CMGL: <index>,<stat>,<da/oa>,[<alpha>],[<scts>][,<tooa>,
	• <length>[,[<cmsgid>],[<cmsgn>],[<cmsgpn>][,[<wdpdst>],[<wdpsrc>][,<fo>,<pid>,<dcs>,<sca>,<tosca>]]]]<CR><LF><data>[<CR><LF>
	• if text mode (+CMGF=1), command successful and SMS-SUBMITs:
	• +CMGL: <index>,<stat>,<oa/da>,[<alpha>],[<scts>][,<toda>,
	• <length>[,[<cmsgid>],[<cmsgn>],[<cmsgpn>][,[<wdpdst>],[<wdpsrc>][,<fo>,<pid>,<dcs>,<sca>,<tosca>]]]]<CR><LF><data>[<CR><LF>
	• +CMGL: <index>,<stat>,<da/oa>,[<alpha>],[<scts>][,<toda>,
	• <length>[,[<cmsgid>],[<cmsgn>],[<cmsgpn>][,[<wdpdst>],[<wdpsrc>][,<fo>,<pid>,<dcs>,<sca>,<tosca>]]]]<CR><LF><data>[<CR><LF>
	
	if text mode (+CMGF=1), command successful and SMS-STATUS-REPORTs:
	• +CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[<CR><LF>
	• +CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[...]]
	
	if text mode (+CMGF=1), command successful and SMS-COMMANDs:
	• +CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF>
	• +CMGL: <index>,<stat>,<fo>,<ct>[...]]
	
	if text mode (+CMGF=1), command successful and CBM storage:
	• +CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages>
	• <CR><LF><data>[<CR><LF>
	• +CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages>
	• <CR><LF><data>[...]]
	
	otherwise:
	• +CMS ERROR: <err>

+CMGL=?	+CMGL: (list of supported <stat>s)

Description

The command is the same as standard AT+CMGL with additional proprietary parameters which shown when enabled by both AT+CSDH=1 and AT%CSDH=1/2

Defined Values

<cmsgid> - concatenated msg ID

<cmsgn> - concatenated msn number of parts

<cmsgpn> - concatenated msg part number

<wdpdst> - WDP destination port, as defined by WAP-259-WDP-20010614-a

<wdpsrc> - WDP source port, as defined by WAP-259-WDP-20010614-a

All other parameters are defined in 3GPP 27.005

4.2.103 AT%LWM2MCMD

Command	Possible Response(s)
AT%LWM2MCMD=<cmd>[,<param1>[,<param2>[,<param3>]]]	For "SERVERSINFO", list of server details • [%LWM2MCMD:<ServerUri>,<ServerID>,<Liftime>,<binding>,<ServerStat>[,<LastRegDate>][<CR><LF>%LWM2MCMD:<cmd>,<ServerUri>,<ServerID>,<Liftime>,<binding>,<ServerStat>[,<LastRegDate>] [...]]] For "GET_RESOURCE", list of server details • %LWM2MCMD:<ObjectID>[,<ObjectInstanceID>[,<ResourceID>[,<ResourceInstanceID>[,<val>]]]] • [<CR><LF%LWM2MCMD:<ObjectID>[,<ObjectInstanceID>[,<ResourceID>[,<ResourceInstanceID>[,<val>]]]]] […] For other commands: • OK/ERROR
AT%LWM2MCMD?	ERROR
AT%LWM2MCMD=?	OK

Description

AT command to control LWM2M client. The command is used by FOTA Manager

Defined Values

<cmd>

“REGISTER” – Application initiated command to register with LWM2M server

<param1>: decimal

Short Server ID as defined in section 6.2 of [1]

<cmd>

- “DEREGISTER” - Application initiated command to de-register from LWM2M server

<param1>: decimal

Short Server ID as defined in section 6.2 of [1]

<cmd>

- “REGISTERUPD” - Application initiated command to Re-register LWM2M server

<param1>: decimal

Short Server ID as defined in section 6.2 of [1]

<cmd>

- “UPDATEREP” – FOTA manager report of the update result

<param1>: decimal

- 1: Firmware updated successfully
- 2: Firmware update failed This Resource MAY be reported by sending Observe op

<param2>: decimal

Short Server ID as defined in section 6.2 of [1]

<cmd>

- “DLRSP” - A command answers to the request from OMA-DM client to start/cancel/defer package download.

<param1>:

- “ACCEPT” – Accept the request to start package download
- “CANCEL” – Cancel the request to start package download
- "RESUME" – Resume download after internal download error (e.g. out of coverage, reboot etc..)

<param2>: decimal

Short Server ID as defined in section 6.2 of [1]

<cmd>

- “UPDRSP” - A command answers to the request of OMA-DM client to update firmware with the downloaded package.

<param1>:

- “ACCEPT” – Accept the request to update firmware
- “CANCEL UPDATE” – Cancel the request to update firmware (but keep package for later update)
- "PACKAGE_CRC_ERROR" – Cancel the whole FOTA process
- "PACKAGE_UNSUPORTED" – Cancel the whole FOTA process

<param2>: decimal

Short Server ID as defined in section 6.2 of [1]

<cmd>

- “SERVERSINFO” - A query for server information

<cmd>

- "SET_RESOURCE" – Set resource value to LwM2M tree. This command when executed on multi resource instance will generate instance if not already exist. Note that this command can also write single resource instance in case of multi-resource instance.
- "GET_RESOURCE" – Get resource value from LwM2M tree. This can be a multiline reply (each describing single resource value) when query:
  - Object ID - return all the resource values of the object ID
  - Object-instances ID – return all the resource values of that Object-instances ID
  - Resource ID – return all the multi-resource values of that Resource ID
- "DEL_RESOURCE_INSTANCE" – Delete specific resource instance of multi-resource instance.

<param1>: decimal

- See definition of <ObjectID>

<param2>: decimal

- See definition of <ObjectInstanceID>

<param3>: decimal

- See definition of <ResourceID>

<param4>: decimal

- See definition of <ResourceInstanceID>

<param5>: string

- See definition of <val>

<ServerUri>: string

- The Server URI as defined in 6.2 of [1]

<ServerID>: decimal

- The Server Short ID as defined in 6.2 of [1]

<Liftime>: decimal

- The server registration period from the last registration date in seconds.

<binding>: decimal

- 0 – Unknown
- 1 – UDP (U)
- 2 – UDP queue mode (UQ)
- 3 – SMS (S)
- 4 – SMS queue mode (SQ)
- 5 – UDP with SMS (US)
- 6 – UDP queue mode with SMS (UQS)

<ServerStat>: decimal

- 0 - not registered or bootstrap not started

- 1- registration pending
- 2 - successfully registered
- 3 - last registration failed
- 4 - registration update pending
- 5 - deregistration pending
- 6 - bootstrap hold off time
- 7 - bootstrap request sent
- 8 - bootstrap on going
- 9 - bootstrap done
- 10 - bootstrap failed

<LastRegDate>: decimal

- The UTC time in 10msec units counted since 00:00:00 on 1 January, 1900).

<ObjectID>: decimal

- Specifies the LWM2M Object ID

<ObjectInstanceID>: decimal

- Specifies the LWM2M Instance ID of the object (Optional parameter)

<ResourceID>: decimal

- Specifies the LWM2M resource ID of the object instance (Optional parameter)

<ResourceInstanceID>: decimal

- Specifies the LWM2M resource Instance ID of the object instance (Optional parameter)

<val>: string

- Specifies the value of the resource (Optional parameter)

Type	Values
Boolean	"TRUE", "FALSE"
Integer/float/text	String within " "
Buffer (opaque field)	Data buffer delivered in chunks of 3000 Byte and formatted as "HEX" string.
Object link	"object;object-instance"
"Observe" Event	"pmin={minimum period}&pmax={maximum period}&gt={greater than}&lt={less than}&st={step}" All the parameter in the string are optional.

4.2.104 AT%LWM2MEV (unsolicited)

Command	Possible Response(s)
AT%LWM2MEV=<mode>	OK/ERROR
AT%LWM2MEV?	ERROR (not supported)

Command	Possible Response(s)
AT%LWM2MEV=?	OK
(unsolicited result code)	%LWM2MEV:<event>[,<package_name>[,<package_size>[,<error_type>]]]

Description

This unsolicited command notifies the host about the status of firmware upgrade. It also used to request the host confirmation to continue with the download/update process.

Defined Values

<mode> : a numeric parameter

- 0 – Disable unsolicited FOTA event indications
- 1– Enable unsolicited FOTA event indications

<event> : a numeric parameter

- 0 – PENDING DOWNLOAD
- 1 – PENDING UPDATE
- 2 – DOWNLOAD COMPLETE
- 3 – DOWNLOAD FAILED
- 4 – ALLOWD TO UPDATE
- 5 – FOTA CANCELD BY LWM2M SERVER
- 6– FOTA CANCELD BY LWM2M CLIENT
- 7-99 - Reserved

<package_name>: string

For PENDING DOWNLOAD:

- The file name of download package

For PENDING UPDATE:

- The file name of update package

<package_size>: decimal

For PENDING DOWNLOAD:

- The package size in bytes

<error_type>: integer

For DOWNLOAD FAILED

- 0 – NON FATAL – can be resumed by sending AT%LWM2MCMD="RESUME"
- 1 – FATAL (download resume is not possible, FOTA manager shall move to idle)

4.2.105 AT%PWRSVCMD

Command	Possible Response
AT%PWRSVCMD=<cmd>[,<mode>[,<timeout>]]	For "WAKECAUSE: • %PWRSVCMD: <cause> • OK or ERROR
AT%PWRSVCMD?	ERROR (not supported)
AT%PWRSVCMD=?	%PWRSVCMD: • (list of supported <cmd>s), • (list of supported <mode>s)

Description

The command is intended to manage user commanded power save mode.

Some <cmd> and <mode> combination are prohibited (see permitted combinations below). The call for such prohibited parameter pairs will return ERROR.

Optional timeout parameter defines the delta time to wakeup in seconds. It is only applicable to AT%PWRSVCMD= "FORCE" and AT%PWRSVCMD= "TEST",2(DH). If parameter is omitted, forever timeout will be applied. If non-zero <timeout> value is specified for other than DH power save (PS) test modes, it will be ignored, module will always stay forever in these modes. Reboot is expected to recover module from any running forever PS test mode.

Defined Values

<cmd>:

- "FORCE" – force specified power save mode

<mode> - PS mode:

- 1 – standby mode. Exit from this mode is executed by modem booting always

<timeout> - sleep time before wakeup in sec:

- 0 – forever
- 1 – 4294967295 sec

<cmd>:

- "TEST" – force specified power save mode

<mode> - PS mode:

- 2 – deep hibernation (DH)
- 3– lite hibernation (LH)
- 4 – deep sleep (DS)
- 5 – lite sleep (LS)

<timeout> - sleep time before wakeup in sec:

- 0 – forever

- 1 – 4294967295 sec, applicable only to <mode>=2

<cmd>:

- "WAKECAUSE" – get wakeup cause.

<cause> - wakeup cause:

- 0 – non-timeout wakeup
- 1 – timeout wakeup (by RTC counter)

Implementation Notes (not provided to customers)

The forever sleep will be configured into RTC counter as max integer: ~136 years.

Today standby and deep hibernation modes does not have any implementation difference, which means that:

AT%PWRSVCMD=”FORCE”,1 == AT%PWRSVCMD=”TEST”,2

Same internal procedure shall be used.

4.2.106 AT%PHYSRV

Command	Possible Response
AT%PHYSRV=<cmd>,[[<mode>][,<param>]]	OK or ERROR
AT%PHYSRV?	ERROR (not supported)
AT%PHYSRV=?	%PHYSRV: • (list of supported <cmd>s), • (list of supported <modes>)
(unsolicited)	%PHYSRVU:<cmd>,<result>

Description

This AT command provides PHY services for higher layer applications.

Some PHY services requires URC (unsolicited) result reporting in single-shot or periodic manner (FFU). The <mode> parameter is applicable for all services, which expects URC. For other services this parameter is optional and will be ignored, if present.

Defined Values

<cmd> - string:

- "ADC" – Command to get ADC value

<mode> - status of unsolicited result response presentation:

- 0 - disabled (default)
- 1 – enabled

<param>:

For "ADC" - integer:

- 0-2 - Aux ADC (AFE) input on Firefly (AFE_ VAINP0-2)

<result>:

For "ADC" – integer:

– 0-1023 - 10-bit value of ADC input

4.2.107 LWM2MOPEV (unsolicited)

Command	Possible Response(s)
AT%LWM2MOPEV=<mode>,<event>	OK/ERROR
AT%LWM2MOPEV?	ERROR (not supported)
AT%LWM2MOPEV=?	OK
(unsolicited result code)	%LWM2MEOPV:<event>,<ObjectID>[,<ObjectInstanceID>[,<ResourceID>[,<ResourceInstanceID>[,<val>]]]]

Description

This unsolicited command notifies the host about operations performed by the server on the LWM2M tree.

Note: In both command and response, a parameter which is not specified will be written as ",," URC will not notify security object events.

Defined Values

<mode> : a numeric parameter

- 0 – Disable unsolicited "server operation" event indications
- 1– Enable unsolicited "server operation" event indications

<event> : a numeric parameter

- 0 – Write
- 1 – Execute
- 2 – Create (Currently not supported)
- 3 – Delete (Currently not supported)
- 4 – Write Attributes (Currently not supported)
- 5 – Discover (Currently not supported)
- 6 – Read (Currently not supported)
- 7– Observe
- 8 – Cancel observation
- 9-99 - Reserved

<ObjectID> : a numeric parameter

- Specifies the LWM2M Object ID

<ObjectInstanceID> : a numeric parameter

- Specifies the LWM2M Instance ID of the object (Optional parameter)

<ResourceID> : a numeric parameter

- Specifies the LWM2M resource ID of the object instance (Optional parameter)

<ResourceInstanceID>" a numeric parameter

- Specifies the LWM2M resource Instance ID of the object instance (Optional parameter)

<val>: string

- Specifies the value of the resource (Optional parameter)

Type	Values
Boolean	"TRUE", "FALSE"
Integer/float/text	String within " "
Buffer (opaque field)	Data buffer delivered in chunks of 3000 Byte and formatted as "HEX" string.
Object link	"object;object-instance"
"Observe" Event	"pmin={minimum period}&pmax={maximum period}&gt={greater than}&lt={less than}&st={step}" All the parmeter in the string are optional.

Example

AT%LWM2MOPEV=1,0 //Enable notification for "Write"

OK

%LWM2MOPEV=0,0,0,0,"coaps://183.25.34.22:81", //Notification on writing "security object" instance 0 resource 0

4.2.108 AT%I2SCFG

Command	Possible Response(s)
AT%I2SCFG=<enable>[,<port>, <format>,<frm_rate>, <aud_mode>,<channel_width>, <in_edge>,<out_edge>,<endian>, < in_shift >, <out_shift]	OK or ERROR
AT%I2SCFG?	ERROR (not supported)
AT%I2SCFG=?	OK

Description

The command is intended to configure I2S driver and the group of IO pins to be used as the audio serial bus.

On ALT1160 there is an opportunity to select one of 3 available PCM ports (port is a set of pins).

The default wakeup functionality configuration of these pins is predefined in Linux Device Tree (GPIO ordinary).

Once command will be called with the “enable” option, the pins of selected port will be switched to the PCM/ function.

When command will be called with the “disable” option, the pins that were selected when the command was called with the “enable” option will be revert back to their wakeup functionality.

Defined Values

<enable>:

- 0 – enable
- 1 – disable

<port>:

- 0 – PCM0 (PinId#: 0-3 as per IOSYSBP enum)
- 1 – PCM1 (PinId#: 46-49 as per IOSYSBP enum)
- 2 – PCM2 (PinId#: 35-38 as per IOSYSBP enum)

<format> - audio format:

- 0 -
- 1 - PCM, reserved FFU

<frm_rate> - frame rate:

- 0 - 8KHz
- 1 - 16 KHz

<aud_mode> - audio mode:

- 0 – mono: left audio channel only
- 1 - dual mono: left and right, same data is transmitted on both audio channels. reserved FFU

<channel_width > - bits in channel:

In format – bits in one out of the 2 channels.

- 8
- 16

<in_edge> - input data latched on the rising or on the falling edge of SCLK:

- 0 – data is latched on the falling edge
- 1 – data is latched on the rising edge

<out_edge> - output data latched on the rising or on the falling edge of SCLK:

- 0 – data is latched on the falling edge
- 1 – data is latched on the rising edge

<endian> - data’s MSB or LSB transmitted first:

- 0 – most significant bit first
- 1 – least significant bit first

<in_shift > - number of SCLK cycles input data is shifted from frame sync start:

- 0 -7

<out_shift > - number of SCLK cycles output data is shifted from frame sync start:

- 0 - 7

4.2.109 AT%PPPCFG

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

Description

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

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

Defined Values

<cid> - decimal; PDP context id

<mode>:

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

<id> - decimal; CHAP challenge ID

<user_name> - string; client's username

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

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

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

4.2.110 AT%SCANCMD

Command	Possible Response
AT%SCANCMD=<cmd>[,<mode>]	OK or ERROR
AT%SCANCMD?	• [%SCANCMD: <earfcn>,<pci>,<cgi>,<mcc>,<mnc>,<RSRP>,<RSRQ>,<bw>,<tac>,<cstat> • [<CR><LF>%SCANCMD: <earfcn>,<pci>,<cgi>,<mcc>, • <mnc>,<RSRP>,<RSRQ>,<bw>,<tac>,<cstat>…]]
AT%SCANCMD=?	OK
(unsolicited report)	%SCANEND: <stat>

Description

The command is intended to handle for user-triggered scan procedure. Command is accepted only in detached (unregistered) mode.

The after-scan behavior may be different based on previous configuration defined by AT%SCANCFG:

- If run-time scan list is not defined (<sl_cfg>=0), no any additional scan is applied. Modem is already camped on legal cell after user-triggered scan procedure.
- If run-time scan list is defined and overrides default settings (<sl_cfg>=1), the scan of original band table/scan list is triggered automatically at the end of user scanning to camp on legal cell.

The read command is used to query last user-triggered scan results. It will be different from AT%SCAN results, which return last regular scanning results.

Any attempt to read user-triggered scan results before such scanning will return only OK.

Defined Values

<cmd>:

- 0 - set unsolicited result response presentation in accordance with <mode>

<mode> - status of unsolicited result response presentation of %SCANEND:

- 0 - disabled (default)
- 1 – enabled

<cmd>:

- 1 – start scan as predefined in AT%SCANCFG

<stat>:

- 0 - no cells to report
- 1 – scan succeeded to acquire one or more cells

Next params are as per 3GPP definition:

<earfcn>,<pci>,<cgi>,<mcc>,<mnc>,<RSRP>,<RSRQ>,<bw>,<tac>

<cstat> - cell status from SIB1:

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

4.2.111 AT%GPIOSEL

Command	Possible Response
AT%GPIOSEL=<pin>[,<pin>[,…]]	OK or ERROR
AT%GPIOSEL?	• [%GPIOSEL: <pin>=<dir>,<value> • [<CR><LF>%GPIOSEL:<pin>=<dir>,<value> • […]]]

Command	Possible Response
AT%GPIOSEL=?	OK

Description

The command is intended to predefine a list of GPIO pins in use, which will be reported in query command "AT%GPIOSEL?".

Altair chips have 80-120 pins, which may be configured as GPIO. This command is used to select part of them for pure GPIO usage. Specific for each Altair chip GPIO pin enumeration is defined in IOSYSBP file definition ([2] for Firefly series).

Command returns ERROR if one of pin numbers is invalid.

Read command returns a list of pre-selected GPIO pins. If there is not any pins selected, the query command returns only OK.

Note: For ALT1160 chip the command could use as GPIO only pins, which are muxed to GPIO functionality by default (see pad2ball chip definition) or configured to GPIO functionality in Device Tree. Otherwise, all GPIO selection and configuration operations will be silently ignored.

Defined Values

<pin>:

- 1-99 for Firefly (see [2]). Pin enumeration is not continuous.

<dir> - GPIO direction:

- 0 – input
- 1 - output

<value>:

- 0 or 1 physical value of input or output

Implementation Notes

Next implementation is expected:

- The execution AT%GPIOSEL command will call Linux export() to expose GPIO pins to User Space, if not exposed yet.
- The read AT%GPIOSEL? command will return gpio pin settings.

4.2.112 AT%GPIOCMD

Command	Possible Response
AT%GPIOCMD=<cmd>,<pin>[,<direction>[, <pull>[,<value>]]]	For <cmd>=0/2: %GPIOCMD: <pin>,<dir>,<pull>,<value>
AT%GPIOCMD?	ERROR (not supported)
AT%GPIOCMD=?	OK

Description

The command is intended to write IO output line and read any IO line. Specific for each chip GPIO pin enumeration is defined in IOSYSBP file definition ([2] for Firefly series).

Command returns ERROR if pin number is invalid.

Internal pulling shall be always disabled (0) for OUTPUT pin. Any other settings for <pull> parameter will be silently ignored.

Note: For ALT1160 chip the command could use as GPIO only pins, which are muxed to GPIO functionality by default (see pad2ball chip definition) or configured to GPIO functionality in Device Tree. Otherwise, all GPIO selection and configuration operations will be silently ignored.

Defined Values

<cmd>:

- 0 - configure and read INPUT pin
- 1 – configure and write OUTPUT pin
- 2 – read or readback (INPUT or OUTPUT pin), configuration parameters are ignored, if present
- 3 - write OUTPUT pin, configuration parameters are ignored, if present

<pin>:

- 1-99 for Firefly (see [2]). Pin enumeration is not continuous.

<dir> - GPIO direction:

- 0 – input
- 1 - output

<pull> - internal GPIO pull settings:

- 0 –disable pull up/down
- 1 – enable pull down
- 2 – enable pull up

<value> - physical value of input or output:

- 0 or 1

Examples

1. Configure and write pin value for GPIO8 (pin=9) on Firefly:

   AT%GPIOCMD=1,9,1,0,1

   OK
2. Readback same pin:

   AT%GPIOCMD=2,9

   %GPIOCMD=9,1,0,1

   OK
3. Configure input pin GPIO18 (pin=18) with default pull (omitted optional param) and read its value:

AT%GPIOCMD=0,18,0

%GPIOCMD=18,0,1,0

OK

Implementation Notes

Next implementation is expected:

- There is not required to call AT%GPIOSEL if pin group read is not expected.
- The execution AT%GPIOCMD command will check if pin is already exposed to User Space (by AT%GPIOSEL call or previous AT%GPIOCMD call). If not, the export() API shall be called first to expose pin to User Space before any further gpio pin operations.

The following operations (config/read/write) will use Kernel API:

- Existed API to set direction and value.
- New API for setting pull value
- Existed API to read or read-back value.

Direction and pull value read operation may be implemented as actual read from registers or as stored in local DB.

4.2.113 AT%OTPCMD

Command	Possible Response(s)
AT%OTPCMD=<cmd> [,<otp_object>,<value>]	For <cmd>=”RD” (query) • %OTPCMD: <otp_object>,<value> • OK or ERROR
AT%OTPCMD?	• %OTPCMD: error=<error>, • ENG=<lock_state>, • SW=<lock_state>,MCU=<lock_state>
AT%OTPCMD=?	%OTPCMD: (list of supported <cmd>s), (list of supported <otp_object>s)

Description

This command is used for OTP parameters filling at Production time.

The query command (“RD”) is supported for declared <otp_object>s not only at Production time.

For secured data the query command may return ERROR for some parameters at Production time too (for Master Key, for example).

If OTP memory is not locked at Production time, the OTP data may be filled into OTP memory at later stages (post-production, pre-sales).

Since improper OTP handling may cause OTP memory corruption and ALT1160 chip lost, the command is considered as very risky. For more protection from arbitrary OTP parameters write, the separate command to enable OTP modification shall be entered as pre-condition. This enabling command forces

customer to send a sequence of 2 AT commands to initiate first OTP parameter write.

Any OTP parameter may be written only once except of bypass flags.

The write command (“WR”) for some joined parameters has restricted order of writing to protect further device stuck at wakeup with partially filled joined parameters. There are a list of restrictions for writing order:

- Public Key -> Cold Boot Security Enable=1
- Public Key -> Bypass flags with Cold Boot Security Enable BIT =1

The “CFGFLAGS” parameter is encoded in the order as it is defiled in OTP data sheet of ALT1160 (and further chips). The MSB of <value> parameter will be the flags with smallest address (i.e. “Cold Boot Security Enabled” bit in ALT1160 use-case).

The SW OTP area may be only locked if next mandatory fields are written (non-zero):

- IMEI
- Master Key for SIM lock recovery

Defined Values

<cmd>:

- “EN” – Enable OTP writing. Once enabled, one or more OTP parameters may be written to non-locked OTP area.
- “WR” – Write new OTP parameter value
- “RD” – Query current OTP parameter value
- “LOCK” – Locks and disables further write operations to engineering (ENG) and SW OTP areas. Once locked, SW OTP area (production parameters and module OEM fields) is not writable any more.
- “LOCKMCU” – Locks and disables MCU OEM area of OTP writing. Once locked, MCU OEM area of OTP is not writable any more.

<otp_object> - string name of the field:

- “CFGFLAGS” – Primary and secondary bypass flags (8 bytes),
- “CBSECEN” – cold boot security enable (1 bit)
- “PUBKEY” – public key (128 bytes)
- “IMEI” – IMEI value (15 bytes).
- “MK” – Master Key value. (16 bytes)
- “JTAGDIS” – JTAG control (6 bits to write 2-bit value with 3-bit redundancy)
- “HVDIS” – high visibility disable, disables read operation from MCU customer area(1 bit)
- “BRPATCH” – Boot ROM patch (up to 220 bytes)
- “SFPATCH” – Serial flash patch (up to 92 bytes)
- “MODCUST” – Module OEM customer data (up to 88 bytes)
- “MCUCUST” – MCU OEM customer data (up to 252 bytes)

- "VDDMIN" – 8 bit two's complement value that is used to calculate the VDD minimum voltage, read only.
- "VDDVALID" – 1 bit value that states the validity of the VDDMIN field, read only
- "CHIPID"- chip ID (8 bit), read only.

<value> :

- hexadecimal format for byte memory blocks in quotes
- binary bit(s) value in quotes

For "JTAGDIS":

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

<lock_state>:

- 0 – unlocked
- 1 - locked

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

- 0 – no errors
- 1 – OTP access errors
- 2 – attempt to lock already locked OTP
- 3 – missed mandatory IMEI, returned on attempt to lock OTP1
- 4 – missed mandatory Master key, returned on attempt to lock OTP1
- 5 - attempt to write already written <otp_object>
- 6 – illegal write order
- 7 – illegal value

Example

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

1. Enable OTP write access first:
   AT%OTPCMD="EN"
   OK
2. Write public key value in hex format:
   AT%OTPCMD="WR","PUKEY","23f1d457…."
   OK
3. Write cold boot security value in bit format:
   AT%OTPCMD="WR","CBSECEN","1"
   OK
4. Repetitive write is prohibited:
   AT%OTPCMD="WR","CBSECEN","0"
   ERROR
5. Check failure:

AT%OTPCMD?

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

OK

6. Lock SW OTP:

   AT%OTPCMD=”LOCK”

   ERROR

7. Check failure and locking status:

   AT%OTPCMD?

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

   OK

8. 8-9. Write IMEI and Master Key
9. …
10. Lock SW OTP:

    %OTPCMD=”LOCK”

    OK

11. Check locking status:

    AT%OTPCMD?

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

    OK

4.2.114 AT%IMSCMD

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

Description

The command is used to block and unblock user data traffic in different conditions.

By default, all user data traffic is enabled.

Note that general user data transfer flag (toggled by “DISABLE”/ “ENABLE”) and data transfer at roaming flag (toggled by “DISABLEROAM”/ “ENABLEROAM”) may be independently enabled/disabled. Internally the flags will be applied together to data transfer as per next rules:

	“DISABLE”	“ENABLE”	“DISABLEROAM”	“ENABLEROAM”	Data Transfer
Home	0	1	0	1	Yes
	0	1	1	0	Yes

	"DISABLE"	"ENABLE"	"DISABLEROAM"	"ENABLEROAM"	Data Transfer
	1	0	0	1	No
	1	0	1	0	No
Roaming	0	1	0	1	Yes
	0	1	1	0	No
	1	0	0	1	No
	1	0	1	0	No

Defined Values

<cmd>:

- "DISABLE" – disable all user data
- "DISABLEROAM" – disable all user data at roaming
- "ENABLE" – enable all user data
- "ENABLEROAM" – enable all user data at roaming

<general_flag>:

- "DISABLE" – disable IMS connectivity
- "ENABLE" – enable IMS connectivity

<roaming_flag>:

- "DISABLEROAM" – disable IMS connectivity at roaming
- "ENABLEROAM" – enable IMS connectivity at roaming

4.2.115 AT%SCANCFG

Command	Possible Response
AT%SCANCFG=<rs_cfg>[,<sl_cfg[,<estart>,<estop>,<estep> [,<estart>,<estop>,<estep>]]…]	OK or ERROR
AT%SCANCFG?	ERROR (not supported)
AT%SCANCFG=?	OK

Description

The command is intended to configure changes in regular scan procedure for following user-triggered scan.

Rich Scan is a scan, which provides not only strongest cell on each mandated frequency, but also all intra cells, which can be acquired on same EARFCN.

Next configurations may be configured for user-triggered scan procedure:

- Regular scan over regular DOP scan settings (default)
- Regular scan over run-time scan list (RTSL)
- Rich scan over regular DOP scan settings

- Rich scan over run-time scan list (RTSL)

The EARFCN values of RTSL shall be a subset of bands defined in BSP (DOP) file and used for device calibration at wakeup time.

Defined Values

<rs_cfg> - Rich scan configuration:

- 0 – disable Rich scan (default)
- 1 – enable Rich scan

<sl_cfg> - run-time scan list (RTSL) configuration:

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

<estart> - Start EARFCN

<estop> - Stop EARFCN

<estep> - EARFCN step

Examples

1. If only Rich scan over default bands/scan list (defined in BSP) is required, configure rich scan once at wakeup:

   AT%SCANCFG=1

2. If list of scanned frequencies is changed dynamically, configure rich scan and RTSL before each single rich scan, for example:

   AT%SCANCFG=1,1,2620,2625,1

4.2.116 AT%SCANCMD

Command	Possible Response
AT%SCANCMD=<cmd>[,<mode>]	OK or ERROR
AT%SCANCMD?	• [%SCANCMD: <earfcn>,<pci>,<cgi>,<mcc>,<mnc>, <RSRP>,<RSRQ>,<bw>,<tac>,<cstat> • [<CR><LF>%SCANCMD: <earfcn>,<pci>,<cgi>,<mcc>, • <mnc>,<RSRP>,<RSRQ>,<bw>,<tac>,<cstat>…]]
AT%SCANCMD=?	OK
(unsolicited report)	%SCANEND: <stat>

Description

The command is intended to handle for user-triggered scan procedure. Command is accepted only in detached (unregistered) mode.

The after-scan behavior may be different based on previous configuration defined by AT%SCANCFG:

- If run-time scan list is not defined (<sl_cfg>=0), no any additional scan is applied. Modem is already camped on legal cell after user-triggered scan procedure.

- If run-time scan list is defined and overrides default settings (<sl_cfg>=1), the scan of original band table/scan list is triggered automatically at the end of user scanning to camp on legal cell.

The read command is used to query last user-triggered scan results. It will be different from AT%SCAN results, which return last regular scanning results.

Any attempt to read user-triggered scan results before such scanning will return only OK.

Defined Values

<cmd>:

- 0 - set unsolicited result response presentation in accordance with <mode>

<mode> - status of unsolicited result response presentation of %SCANEND:

- 0 - disabled (default)
- 1 – enabled

<cmd>:

- 1 – start scan as predefined in AT%SCANCFG

<stat>:

- 0 - no cells to report
- 1 – scan succeeded to acquire one or more cells

Next params are as per 3GPP definition:

<earfcn>,<pci>,<cgi>,<mcc>,<mnc>,<RSRP>,<RSRQ>,<bw>,<tac>

<cstat> - cell status from SIB1:

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

4.2.117 AT%SOCKETCMD

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 For “SSLINFO” command: • [%SOCKETCMD:<SSL_mode>,<ClientCerId>] • OK For “LASTERROR” command: • [%SOCKETCMD:<socket_err>] • OK For "ALLOCATE" command • %SOCKETCMD:<socket_id> • OK For “FASTSEND” command: • %SOCKETCMD:<wlength> • OK For other commands: • OK/ERROR
AT%SOCKETCMD?	Return 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)
(unsolicited)	%SOCKETEV:<event>,<socket_id>[,<connected_socket_id>]

Description

AT command to create and maintain socket by the device.

IP address formatting for using in this command:

- IPv4 format shall use the format (xxx.xxx.xxx.xxx). Where xxx is a decimal number from 0-255 and when the leading digits in each segment are 0, the number of digits is adjusted accordingly and output. Example: 192.0.2.1, 127.0.0.1 etc …
- IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx) where x is in hexadecimal notation.

Example: 2001:0db8:bd05:01d2:288a:1fc0:0001:10ee

When socket is opened (using "OPEN" or "LISTEN" command) the unsolicited %SOCKETEV is automatically enabled. The unsolicited is sent with <event> is sent in 4 cases:

- Rx buffer has more Bytes to read.
- Socket termination due to Idle timer expiration.
- Socket terminated by peer.
- New connected socket is accepted/spawned from listening socket.

There are 2 types of listener socket: “synchronous” and “asynchronous”:

- Synchronous: The connection had been established once “OK” is responded. The maximum waiting time for the connection establishment is deterministic.
- Asynchronous: The connection is not yet established even “OK” is responded. User must wait for URC, which can be happened at any time (or never).

Asynchronous listening socket is also called Parent Listening socket below. Parent listening socket and spawned from it connected sockets will have different IDs.

After activating of parent listening socket, %SOCKETEV=4 unsolicited response will be used to notify "accept incoming connection". This URC provides both listening and spawned from it connected sockets IDs.

Parent listening socket cannot be used for fast send operation. The ERROR will be returned on "FASTSEND" call for such socket.

If connected socket has been spawned from parent listening socket, the connected socket deactivation will close this connected socket completely.

Important Notes

- AT%SOCKETCMD command is blocking. This may cause blocking of the AT channel for long time in case of "OPEN" and "LISTEN" command. The "CLOSE" command is also blocking and can take time (The socket implementation may take about 8 sec to close the connection due to internal TCP FIN timer)

- The "CLOSE" command may be ordered 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 the AT%SOCKETCMD command (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.
- Number of supported sockets is operators/OEM specific configured with AT%SETACFG. It can be ranged from 1 socket to several ones.

Important Notes Related to SSL

- The network allocated SSL session ID is kept and maintained internally by the device per connection allocated "Session ID". The SSL session ID is kept even when the TCP connection is closed to allow reuse of the SSL session on new opened TCP connection.
- Upon “ACTIVATE” command, if SSL session ID is allocated by the network, then device will try first to recover the existing SSL session ID. If failed to recover SSL connection, then will open new one.
- "SSLALLOC" command will delete previously allocated SSL session-id.

Defined Values

<cmd>

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

<param1>: decimal

- The "Session ID" - a numerical numeric value defined in NP configuration file which point to the PDN on which the socket should be opened. "Session ID" is defined in AT%CGINFO

<param2>: string

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

<param3>: string

- "OPEN" – The socket open TCP/UDP connection with the peer
- "LISTEN" –The socket create TCP/UDP listener
- "LISTENP" –The socket create TCP/UDP parent listener socket. Once activated, multiple connected sockets could be spawned from it.

<param4>: string

Destination IPv4 or IPv6 address

<param5>: decimal

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

<param6>: string

- Source (local) UDP/TCP port number in the range 0-65535 (0 – means auto port selection by the socket and it is also used as the default value)

<param7>: decimal

Packet size to be used by the TCP/UDP/IP stack for data sending.

- 0 - select automatically default value (MTU based).
- 1- 1500 - packet size in bytes.

<param8>: decimal

TCP Connection setup timeout. If timer expires, then command return ERROR. Parameter range is 30–360sec (Default is 60 sec). Parameter is irrelevant for parent listening socket; it will be ignored if present.

- In case that connection type is "OPEN" the timeout event is: No SYN-ACK reply from the peer.
- In case that connection type is "LISTEN" the timeout event is: No SYN request from the peer.

<cmd>

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

<param1>: decimal

- The previously allocated socket id

<param2>: decimal

- SSL mode. See definition in <SSL_mode>

<param3>: decimal

- Client certificate ID. See definition in <ClientCerId>

<cmd>

- “ACTIVATE” – Activate the predefined socket

<param1>: decimal

- The socket ID (identifier) of the specified socket

<cmd>

- “INFO” – return the details of specific socket ID

<param1>: decimal

- The socket ID (identifier) for which info is requested

<cmd>

- “SSLINFO” – return the SSL details of specific socket ID

<param1>: decimal

- The socket ID (identifier) for which info is requested

<cmd>: string

- “DEACTIVATE” – Request to deactivate specific socket ID and release its resources

<param1>: decimal

- The socket ID (identifier) to be closed

<cmd>

- “FASTSEND” –This command activate the predefined socket, write to the socket and then deactivate it.

<param1>: decimal

- The socket ID (identifier) of the socket

<param2>: decimal

- The length in Bytes of the data which need to be written; range is 1 to 3000 and represent the length of the "HEX" string.

<param3>: string

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

<cmd>: string

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

<param1>: decimal

- The socket ID (identifier) to be closed

<cmd>: string

- “LASTERROR” – Request to get the last Socket error code

<param1>: decimal

- The socket ID (identifier)

<cmd>: string

- “SETOPT” – Set Socket options for specific socket ID

<param1>: decimal

- The socket ID (identifier) for which the option is set

<param2>: decimal

- TCP/UDP aggregation timer in msec (1-36000, default: 5000). This timer allows improved data transmission efficiency by aggregating several transmissions to single packet.

<param3>: decimal

- TCP/UDP TX buffer aggregation size in Bytes (1-2048, default: 1500). This aggregation allows improved data transmission efficiency by aggregating several transmissions to single packet.

<param4>: decimal

- TCP idle timer in seconds (0-300, default: 60). When there is no client/server activity over the predefined time, the socket is deactivated (Socket option TCP_KEEPINTVL)

<socket_id>: decimal

- The socket ID (identifier) of the specified socket

<socket_stat>: string

- "DEACTIVATED" – The socket is not active
- "ACTIVATED " – The socket is active

- "LISTENING" – The socket is listening

<socket_type>: string

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

<src_ip>: string

- Source IPv4 or IPv6 address

<dst_ip>: string

- Destination IPv4 or IPv6 address

<src_port>: string

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

<dst_port>: string

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

<socket_dir>: decimal, the direction of the TCP socket

- 0 – no set
- 1 – dialer
- 2 - Listener

<socket_to>: decimal

- TCP connection setup timeout as specified in "OPEN" command

<socket_err>: decimal

- Error values as defined by 3GPP TS 27.007 subclause 9.2 for <err> values with extension.

The following extensions are proposed (TBD):

- TCP connection setup failure.
- Tx Buffer Full
- TCP connection closed by peer
- TCP connection closed due to idle timer expiration
- Can't execute command because PDN disconnected
- etc…

Additional proposed errors related to SSL (TBD):

- Unknown internal TLS error
- Wrong format of certificate data
- Certificate validity period is in future
- Certificate validity period expired
- Peer certificate is not confirmed
- Wrong signature key format
- Unsupported signature key type
- Wrong protocol data format
- Wrong protocol data format
- No memory available for TLS

- Buffer error in TLS
- Wrong input data for RSA operation
- TLS/SSL protocol error
- Internat error in TLS
- Certificate format error
- The certificate does not exist
- Unknown TLS error code!
- etc ..

<SSL_mode>: decimal

- 0 – mutual authentication (default)
- 1 – authenticate client side only
- 2 – authenticate server side only

<ClientCerId>: decimal

- Client certificate ID (default is: 0). The ID of client certificate which should be sent by the client to the server to authenticate the client. The referenced certificate must be provisioned on the device file system and identified with ID

<event>: decimal

- 1 – Rx buffer has more Bytes to read
- 2 – Socket deactivate due to idle timer expiry.
- 3 – Socket terminated by peer
- 4 – New connected socket is accepted/spawned from parent listening socket

<connected_socket_id>: decimal

- The socket ID (identifier) of connected socket spawned from specified parent listening socket

<wlength>: decimal

- The actual length in Bytes of data written to the socket in "FASTSEND" command.

4.2.118 AT%SOCKETDATA

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

Description

AT command for to send/receive to/from the socket.

Note: When operation returns with ERROR this can be evidence that the TCP socket was closed (by user or by socket idle timer or by peer). There is unsolicited indication for socket closure by idle timer or by peer.

Also note that "SEND" command return "OK" after the actual transmission of the data, but before "ACK" reception from the peer. This can result with TX buffer fill-up and therefore further "SEND" command may result with ERROR.

The application can issue AT%SOCKET=“LASTERROR” to get the reason for the last failure.

Defined Values

<cmd>

- “SEND” –Write to the socket

<param1>: decimal

- The socket ID (identifier) of the socket

<param2>: decimal

- The length in Bytes of the data which need to be written; range is 1 to 3000 and represent the length of the "HEX" string.

<param3>: string

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

<cmd>

- “RECEIVE” –Read from the socket

<param1>: decimal

- The socket ID (identifier) of the socket

<param2>: decimal

- The maximal length of data buffer to be read from the socket; the range is 1 to 3000 and represent the length of the "HEX" string.

<socket_id>: decimal

- The socket ID (identifier) of the specified socket

<rlength>: decimal

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

<moreData>: decimal

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

<rdata>: string

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

<wlength>: decimal

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

4.2.119 AT%FTPCMD

Command	Possible Response(s)
AT%FTPCMD=<cmd>[,<param1>[,<param2>[,<param3>…]]]	For “GETSIZE” command: • [%FTPCMD:<file_size>] • OK/ERROR For "ALLOCATE" command • %FTPCMD:<socket_id> OK For “INFO” command: • [%FTPCMD:<dst_ip>,<dst_port>,<uname>,<passwd>,<ftpmode>] • OK For “SSLINFO” command: • [%FTPCMD:<SSL_mode>,<ClientCerId>] • OK For “FASTSEND” command: • %FTPCMD:<wlength> OK For other commands: • OK/ERROR
AT%FTPCMD?	ERROR (not supported)
AT%FTPCMD=?	%FTPCMD: (list of supported <cmd>s)

Description

AT command to enable FTP service. The IP address formatting for using in this command is as described in AT%SOCKETCMD command.

Note: In both command and response, a parameter which is not specified will be written as ",,"

Notes Related to SSL

- The network allocated SSL session ID is kept and maintained internally by the device. The SSL session ID is kept even when the TCP connection is closed to allow reuse of the SSL session on new opened TCP connection)
- Upon “OPEN” command, if SSL session ID is allocated by the network, then device will try first to recover the existing SSL session ID. If failed to recover SSL session, then will open new one.
- "SSLALLOC" command will delete previously allocated SSL session-id.

Defined Values

<cmd>

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

<param1>: string

- Destination (server) IPv4 or IPv6 address

<param2>: string

- Destination (service) port number in the range 1-65535

<param3>: string

- The username for the FTP login

<param4>: string

- The password for the FTP login

<param5>: decimal

The FTP transfer mode:

- 0: binary (default)
- 1: ASCII

<cmd>

- “SSLALLOC” – Add SSL for the FTP session allocation

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<param2>: decimal

- SSL mode. See definition in <SSL_mode>

<param3>: decimal

- Client certificate ID. See definition in <ClientCerId>

<cmd>

- “FASTSEND” – This command OPEN FTP connection PUT/APPEND data and then then close it.

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<param2>: string

Fast command (issue: open, PUT/APPEND, close):

- 0: PUT
- 1: APPEND

<param3>: decimal:

- The length of data in Bytes written by the FAST command; range 1 to 3000 and represent the length of the "HEX" string.

<param4>: string

- The file name with full path on the specified FTP site

<param5>: decimal

- The FTP data of the Fast command, in HEX format (in quotes)

<cmd>

- “OPEN” – Connect to FTP server

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<cmd>

- “CLOSE” – Close the FTP session

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<cmd>

- “GET” – Get file from the FTP server

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<param2>: string

- The file name with full path on the specified FTP site

<cmd>

- “GETSIZE” – Get file size from the FTP server

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<param2>: string

- The file name with full path on the specified FTP site

<cmd>

- “PUT” – Put file on the FTP server

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<param2>: string

- The file name with full path on the specified FTP site

<cmd>

- "APPEND" – Appends a local file to a file on the remote computer

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<param2>: string

- The file name with full path on the specified FTP site

<cmd>

- "DEL" – Delete file on the FTP server

<param1>: decimal

- The session ID (identifier) of the specified FTP allocation

<param2>: string

- The file name with full path on the specified FTP site

<file_size>: decimal

- The size of the specified file reported by the FTP server

<dst_ip>: string

- Destination IPv4 or IPv6 address

<dst_port>: string

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

<uname>: string

- The username for the FTP login

<passwd>: string

- The password for the FTP login

<ftpmode>: decimal

The FTP transfer mode:

- 0: binary (default)
- 1: ASCII

<SSL_mode>: decimal

- 0 – mutual authentication (default)
- 1 – authenticate client side only
- 2 – authenticate server side only

<ClientCerId>: decimal

- Client certificate ID (default is: 0). The ID of client certificate which should be sent by the client to the server to authenticate the client. The referenced certificate must be provisioned on the device file system and identified with ID

4.2.120 AT%FTPDATA

Command	Possible Response(s)
AT%FTPDATA=<cmd>[,<param1>[,<param2>[,<param3>…]]]	For “GET” command: • [%FTPDATA:<more2read>[,<rlength>[,rdata>]]] • OK/ERROR For “PUT” command: • [%FTPDATA:<wlength>] • OK/ERROR
AT%FTPDATA?	ERROR (not supported)
AT%FTPDATA=?	%FTPDATA: (list of supported <cmd>s)

Defined Values

<cmd>

- “PUT” –Write to the data to upload by the "PUT" command

<param1>: decimal

- The FTP session ID

<param2>: decimal

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

<param3>: decimal:

- The length of data in Bytes written by this command; range is 1 to 3000 and represent the length of the "HEX" string.

<param4>: decimal

- The FTP data, in HEX format (in quotes)

<cmd>

- “GET” –Read the data which received by the "GET" command

<param1>: decimal

- The FTP session ID

<param2>: decimal

- The maximal length of data in Bytes which requested to be read in this transaction; range is 1 to 3000 and represent the length of the "HEX" string.

<rlength>: decimal

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

<rdata>: string

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

<wlength>

- The actual length in Bytes of data written to the socket; Range is 1 to 3000 and represent the length of the "HEX" string.

<more2read>: decimal

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

4.2.121 AT%TSTSIM

Command	Possible Response
AT%TSTSIM=<cmd> [,<voltage>[,<sim_id>]]	OK
AT%TSTSIM?	ERROR (not supported)
AT%TSTSIM=?	% TSTSIM: (list of supported <cmd>s)[,(list of supported <voltage>s)[,(list of supported <sim_id>s]]

Description

This AT command provides opportunity to move SIM to Test mode and manipulate with SIM.

Command is not accepted in Operational mode (AT+CFUN=1) and Flight mode (CFUN=4), it returns ERROR. The modem shall be previously switched in non-operational mode by CFUN=0. The switch back from SIM test mode to Operational/Flight mode is not supported, device reboot is expected.

The "SW2TESTER" is blocking command and will return AT response only after whole switch procedure will be finished.

Defined Values

<cmd>:

“SW2TESTER” – switch to external on-Host Tester/Programmer.

<voltage>:

- 1 – 1.8v
- 2 – 3v

<sim_id>:

- 1 – SIM1
- 2 – SIM2

4.2.122 AT%PDNRDP

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

Description

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

Defined Values

<ext_sessionID>: Integer

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

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

4.2.123 AT%H

Command	Possible Response(s)
AT%H[=<cmd>]	OK/ERROR
AT%H?	ERROR (not supported)
AT%H=?	%H: (list of supported <cmd>s)
(unsolicited)	%HEVU:<event>

Description

AT command to halt PPP daemon on the device side (for PPP session between host and device). The AT commands is used also to enable/disable notification on PPP disconnection by the device.

Note: AT%H issued without <cmd> - This is used for requesting the device to halt the PPP daemon.

Defined Values

<cmd> : decimal

- 0 – Disable unsolicited notifications
- 1 – Enable unsolicited notifications

<event>: decimal

- 0 – PPP disconnected by the device.

4.2.124 AT%LOGSTOHOST

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

Description

AT command to control the device logging.

The device reboot after execution of this command.

Defined Values

<mode> : decimal

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

4.2.125 ATD*99***

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

Description

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

Defined Values

<ext_sessionID>

See definition in AT%PDNSET

4.2.126 AT%FILECMD

Command	Possible response(s)
AT%FILECMD=<cmd>,<param1>	OK/ERROR
AT%FILECMD?	ERROR (not supported)
AT%FILECMD=?	%FILECMD: (list of supported <cmd>s)
(unsolicited)	%FILECMDU:<event>

Description

AT command to read/write a file to the device (NP) storage. The file will be stored on preconfigured path. Upon execution, the command return OK/ERROR immediately, invoke file transfer protocol (implementation specific) and deliver file between host and the device.

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

Defined Values

<cmd>: string

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

<param1>: string

- The name of the file to be transferred

<cmd>: string

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

<param1>: decimal

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

<event>: decimal

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

4.2.127 AT%LTESYNC

Command	Possible Response(s)
AT%LTESYNC=<cmd>[,<config_source> [,<start_tti>,<repetition> [,<interval>[,<pulse_size>[,<alignment> [,<offset>,<offset_condition>]]]]]]	OK or ERROR
AT%LTESYNC?	ERROR (not supported)
AT%LTESYNC=?	OK

Description

Command is intended to configure, start and stop the pulse issued by UE and synchronized with LTE sub-frames. The HW output pin configuration is assumed as configured in BSP files.

Read command is not supported.

Defined Values

<cmd>:

- “START” – configure and start pulse
- “STOP”

<config_source> - integer:

- 1 – use BSP configuration
- 2 – use AT command config, if this parameter is selected, following 2 parameters are mandatory

<start_tti> - integer; TTI value to start first pulse

<repetition> - integer; pulse repetition value:

- 0 – forever
- 1 or more for final burst of pulses

<interval> - integer; interval in number if TTIs:

- 1 - 10240

<pulse_size> - integer; pulse duration in us (default: 200us, if parameter is omitted):

- 1-200

<alignment> - integer; pulse alignment to RX or TX (takes in account propagation delay):

- 0 – TX (default for ALT4800, if parameter is omitted)
- 1 – RX (default for ALT3800 and ALT1160, if parameter is omitted)

<offset> - signed integer; pulse alignment to any additional relative network timing offset from LTE TTI boundary (in us units). If parameter is omitted, no any additional offset is applied.

<offset_condition> - integer; offset adjustment condition:

- 0 – TDD
- 1 – FDD
- 2 – both TDD and FDD

4.2.128 AT%CMEEU (unsolicited)

Command	Possible Response(s)
(unsolicited result code)	%CMEEU: <n>

Description

Unsolicited event to inform higher layer Apps about last AT+CMEE settings. The URC is activated by any AT+CMEE command call.

Defined Values

<n>: integer type, same value as received in last AT+CMEE, see 27.007.

- 0 - disable +CME ERROR: <err> result code and use ERROR instead
- 1 - enable +CME ERROR: <err> result code and use numeric <err> values (refer subclause 9.2 of 27.007)
- 2 - enable +CME ERROR: <err> result code and use verbose <err> values (refer subclause 9.2 of 27.007)

4.2.129 AT%BSPIOCFG

Command	Possible Response(s)
AT%BSPIOCFG=<cmd> [,<pin>,<mode>,[<dir>],[<pull>],[<val>] [,<pin>,<mode>,[<dir>],[<pull>],[<val>][,…]]]	For "GET": [%BSPIOCFG:<pin>,<mode>,<dir>,<pull>,<val> [,<pin>,<mode>,<dir>,<pull>,<val>[,…]]] OK or ERROR
AT%BSPIOCFG?	ERROR (not supported)
AT%BSPIOCFG=?	OK

Description:

Execution set command is used to modify settings in IOSYSBP BSP file for some selected pins, which is permitted to modify at late production stage by product-maker.

To support this procedure module-maker shall mark what pins are permitted to be modified in IOSYSBP BSP file.

The updated IOSYSBP file will be written back to NV after this complete AT processing has been finished successfully.

In the case that AT command will try to modify any non-permitted in IOSYSBP pin, AT command will return ERROR.

Execution get command shows the status of these selected modifiable pins. They may be retrieved before and after modification. The list of modifiable pins may be empty. In such a case get command will return OK only.

For <mode>=0 (disable override), the <dir>, <pull> and <val> parameters may be omitted.

Defined Values

<pin>:

- 1-99 – PinID for ALT1160 (see [2]). Pin enumeration is not continuous).

<mode> - pin override mode:

- 0 – disable override
- 1 – enable override at Deep Sleep
- 2 – enable override at wakeup

<dir> - GPIO pin override direction:

- 1 - output
- 0 – input

<pull> - internal GPIO pin pull override settings:

- 0 –disable pull up/down
- 1 – enable pull down
- 2 – enable pull up

<value> - GPIO pin override value of output:

- 0 or 1

5 CMEE Error Codes Supported

The table below details the CMEE error codes supported by the FourGee-11XX system software solution, per release.

Table 3. Error codes supported for CMEE command on FourGee-11XX software

Error Code	Supported In Altair Release Stage	
	1	2
3 Operation not allowed	●	●
4 Operation not supported	●	●
10 SIM not inserted	●	●
11 SIM PIN required	●	●
12 SIM PUK required	●	●
13 SIM failure	●	●
15 SIM wrong	●	●
16 Incorrect password	●	●
17 SIM PIN2 required		●
18 SIM PUK2 required		●
30 No network service	●	●
31 Network timeout	●	●
32 Network not allowed - emergency calls only	●	●
40 Network personalization PIN required	●	●
41 Network personalization PUK required	●	●
50 Incorrect parameters	●	●
100 unknown	●	●

6 Extended Error Report

AT+CEER will always return the last error cause that was returned by the network. If no error cause was returned yet, the AT+CEER will return OK. In case that the error received by the network is different from the list below the returned error will be “others”.

In the following cases, AT+CEER will supply the error cause, if returned by the network:

- Attach reject
- Service reject
- Tracking area update reject
- Dedicated bearer activation failure
- Dedicated bearer deactivation failure

Table 4. Extended Error Report

Error code	Send by
IMSI_UNKNOWN_IN_HLR	EMM
ILLEGAL_UE	EMM
ILLEGAL_ME	EMM
EPS_SERVICES_NOT_ALLOWED	EMM
EPS_AND_NON_EPS_SERVICES_NOT_ALLOWED	EMM
UE_IDENTITY_CANNOT_BE_DERIVED_BY_THE_NETWORK	EMM
IMPLICITLY_DETACHED	EMM
PLMN_NOT_ALLOWED	EMM
TRACKING_AREA_NOT_ALLOWED	EMM
ROAMING_NOT_ALLOWED_IN_THIS_TRACKING_AREA	EMM
EPS_SERVICES_NOT_ALLOWED_IN_THIS_PLMN	EMM
NO_SUITABLE_CELLS_IN_TRACKING_AREA	EMM
MSC_TEMPORARILY_NOT_REACHABLE	EMM
NETWORK_FAILURE	EMM
CS_DOMAIN_NOT_AVAILABLE	EMM
MAC_FAILURE	EMM
SYNCH_FAILURE	EMM
CONGESTION	EMM
UE_SECURITY_CAPABILITIES_MISMATCH	EMM
SECURITY_MODE_REJECTED_UNSPECIFIED	EMM
NOT_AUTHORIZED_FOR_THIS_CSG	EMM

Error code	Send by
SEMANTICALLY_INCORRECT_MESSAGE	EMM
INVALID_MANDATORY_INFORMATION	EMM
MESSAGE_TYPE_NON_EXISTENT	EMM
MESSAGE_TYPE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STAT	EMM
INFORMATION_ELEMENT_NOT_EXISTENT	EMM
CONDITIONAL_IEI_ERROR	EMM
MESSAGE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE	EMM
PROTOCOL_ERROR_UNSPECIFIED	EMM
OPERATOR_DETERMINED_BARRING	ESM
INSUFFICIENT_RESOURCES	ESM
UNKNOWN_OR_MISSING_APN	ESM
UNKNOWN_PDN_TYPE	ESM
USER_AUTHENTICATION_FAILED	ESM
ACTIVATION_REJECTED_BY_SERVING_GW_OR_PDN_GW	ESM
ACTIVATION_REJECTED_UNSPECIFIED	ESM
SERVICE_OPTION_NOT_SUPPORTED	ESM
REQUESTED_SERVICE_OPTION_NOT_SUBSCRIBED	ESM
SERVICE_OPTION_TEMPORARILY_OUT_OF_ORDER	ESM
PTI_ALEARDY_IN_USE	ESM
REGULAR_DEACTIVATION	ESM
EPS_QoS_NOT_ACCEPTED	ESM
NETWORK_FAILURE	ESM
FEATURE_NOT_SUPPORTED	ESM
SEMANTIC_ERROR_IN_THE_TFT_OPERATION	ESM
SYNTACTICAL_ERROR_IN_THE_TFT_OPERATION	ESM
UNKNOWN_EPS_BEARER_CONTEXT	ESM
SEMANTIC_ERRORS_IN_PACKET_FILTERS	ESM
SYNTACTICAL_ERRORS_IN_PACKET_FILTERS	ESM
EPS_BEARER_CONTEXT_WITHOUT_TFT_ALREADY_ACTIVATED	ESM
PTI_MISMATCH	ESM
LAST_PDN_DISCONNECTION_NOT_ALLOWED	ESM
PDN_TYPE_IPV4_ONLY_ALLOWED	ESM
PDN_TYPE_IPV6_ONLY_ALLOWED	ESM

Error code	Send by
SINGLE_ADDRESS_BEARERS_ONLY_ALLOWED	ESM
ESM_INFORMATION_NOT_RECEIVED	ESM
PDN_CONNECTION_DOES_NOT_EXIST	ESM
MULTIPLE_PDN_CONNECTIONS_FOR_APN_NOT_ALLOWED	ESM
COLLISION_WITH_NETWORK_REQUEST	ESM
INVALID_PTI_VALUE	ESM
ESM_SEMANTICALLY_INCORRECT_MESSAGE	ESM
ESM_INVALID_MANDATORY_INFORMATION	ESM
MESSAGE_TYPE_NON_EXISTENT_OR_NOT_IMPLEMENTED	ESM
MESSAGE_TYPE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE	ESM
INFORMATION_ELEMENT_NON_EXISTENT_OR_NOT_IMPLEMENTED	ESM
CONDITIONAL_IE_ERROR	ESM
ESM_MESSAGE_NOT_COMPATIBLE_WITH_THE_PROTOCOL_STATE	ESM
ESM_PROTOCOL_ERROR_UNSPECIFIED	ESM
APN_RESTRICTION_VALUE_INCOMPATIBLE_WITH_ACTIVE_EPS_BEARER_CONTEXT	ESM

7 Altair Proprietary Error Codes

Next error codes are returned by CME ERROR in addition to what is defined in 27.007 in sec. 9.2:

- 513 - Bad Personalization File
- 514 - Not camped on cell
- 515 – PLMN busy
- 516 – Invalid EARFCN

8 Appendix A – AT Commands for VzW Application

8.1 AT Commands

The table below details the proprietary AT commands supported by the FourGee-11XX which are relevant for VzW application.

Table 5. Proprietary AT command set supported - VzW application

Name	Use	Description
VZWAPNE	AT+VZWAPNE	Command defined by Verizon to configure APN table
VZWRSRP	AT+VZWRSRP	Read command returns the RSRP values for all cells which the UE is measuring
VZWRSRQ	AT+VZWRSRQ	Read command returns the RSRQ values for all cells which the UE is measuring
DRCMD	AT%DRCMD	Command to manage VZW Data Retry mechanism

8.2 AT Commands Manual

8.2.1 AT+VZWAPNE

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

Description

Write command causes the APN table on the CFGM to be overwritten. One write command must be issued for each APN edit. If command fails, +CME ERROR: <err> is returned. Refer to 3GPP TS 27.007 sub clause 9.2 for <err> values.

The command is applicable only in “Lab mode”

Use

Read command queries the APN table that is currently on the DUT, starting from the first entry to the last. The numbers following each value (for example the numbers “1”, “2”, & “n” in the following cases: “<apncl>1”, “<apncl>2”, “<apncl>n”) indicate from which of the available APNs the entry is from (the maximum number of APNs being “n”).

If command fails, +CME ERROR: <err> is returned. Refer to 3GPP TS 27.007 sub clause 9.2 for <err> values.

Test command returns the supported entry values. If command fails, +CME ERROR: <err> is returned. Refer to 3GPP TS 27.007 sub clause 9.2 for <err> values.

See the APN’s section of the Verizon Wireless document “Device Requirements – LTE 3GPP Band 13 Network Access” for more information on the APN table.

Defined Values

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

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

<apncl> : Integer type; Indicates the APN Class. The maximum number of APNs being “n”:

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

<apnni> : String type; Indicates the Network Identifier

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

<apntype> : String type; APN type

- IPv6 - IPv6 type

- IPv4v6 - IPv4 and IPv6 type

<apnb> : String type; APN Bearer

- LTE - LTE bearer used

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

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

8.2.2 AT+VZWRSRP

Command	Possible Response(s)
AT+VZWRSRP=	ERROR
AT+VZWRSRP?	+VZWRSRP: <cellID>1,<EARFCN>1,<RSRP>1,<cellID>2,<EARFCN>2,<RSRP>2,…,<cellID>n,<EARFCN>n,<RSRP>n OK or +CME ERROR: <err>
AT+VZWRSRP=?	OK

Description

Execution command is not supported.

Read command returns the RSRP values for all cells which the UE is measuring.

The device shall support this command in both RRC_IDLE and RRC_CONNECTED modes.

If command fails, +CME ERROR: <err> is returned. If device is not in RRC_IDLE or RRC_CONNECTED mode, the "+CME ERROR: operation not allowed" is reported as per 3GPP TS 27.007 subclause 9.2 for <err> values.

Defined Values

<cellID>:

- Integer type; Cell ID where the format is XXX

<EARFCN>:

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

<RSRP>:

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

8.2.3 AT+VZWRSRQ

Command	Possible Response(s)
AT+VZWRSRQ=	ERROR

Command	Possible Response(s)
AT+VZWRSRQ?	+VZWRSRQ: <cellID>1,<EARFCN>1,<RSRQ>1,<cellID>2,<EARFCN>2,<RSRQ>2,…,<cellID>n,<EARFCN>n,<RSRQ>n OK or +CME ERROR: <err>
AT+VZWRSRQ=?	OK

Description

Execution command is not supported.

Read command returns the RSRQ values for all cells which the UE is measuring.

The device supports this command in both RRC_IDLE and RRC_CONNECTED modes.

If command fails, +CME ERROR: <err> is returned. If device is not in RRC_IDLE or RRC_CONNECTED mode, the "+CME ERROR: operation not allowed" is reported as per 3GPP TS 27.007 subclause 9.2 for <err> values.

Defined Values

<cellID>:

- Integer type; Cell ID where the format is XXX

<EARFCN>:

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

<RSRP>:

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

8.2.4 AT%DRCM

Command	Possible Response
AT%DRCMD=<cmd>[,<param>]	OK/ERROR
AT%DRCMD?	ERROR (OPRATION_NOT_ALLOWED)
AT%DRCMD=?	OK

Description

This AT command sends instructions to the VZW "Data Retry" mechanism, which run in the LTE modem.

Defined Values

<cmd>: integer

- 1 – Abort Data Retry
- 2 – Trigger specific LTE timer

<param>

For <cmd>=2(Trigger specific LTE timer) : string

- "T3402" – trigger T3402 timer

9 Appendix B - eMBMS API

9.1 AT Commands

9.1.1 AT%MBMSCMD

Command	Possible Response(s)
%MBMSCMD=<cmd>[,<param1>[,<param2>]…]	OK/ERROR
%MBMSCMD?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%MBMSCMD=?	%MBMSCMD: List of supported <cmd>

Description

AT command to manage MBMS reception.

In general the LTE network provides 2 types of information:

- Special channel which is broadcast on eMBMS and received by MW. The received information contains lists of SAI (Service Area ID) and Services (TMGI) on each SAI.
- Sib15 which is received by modem and contains SAI list - a list of SAI, EARFCN pairs, which can be supported by the network.

The MW gets input from the user about the requested service. The combination of these 2 lists allows the device to map the frequencies which can deliver this service:

Mode 1 – Frequency Mapping on Host

- Modem deliver SAI list received in SIB 15 to MW as a reply to AT%MBMSINFO.
- MW prioritize the SAI and send command with preferred frequencies: AT%MBMSCMD= INTEREST" , MBMS priority, Preferred EARFCN1 , Preferred EARFCN2 …
- The modem selects frequency from to MW frequency preference.

Mode 2 - Frequency Mapping on Modem

- MW send AT%MBMSCMD= "MBMS_PREFERENCE" to set the MBMS priority.
- MW send a list of preferred Service Area IDs by AT%MBMSCMD="INTEREST_SAI", SAI , SAI …
- The modem compares the requested Service Area IDs with the SAI list acquired from SIB 15 and select frequency accordingly.

Defined Values

<cmd>

- "ACTIVATE" - Activate specific <TMGI> on specific <AreaID>
- "DEACTIVATE" - Deactivate specific <TMGI> on specific <AreaID>

<param1>:

- AreaID (See details in <AreaID> description below)

<param2>:

- TMGI (See details in <TMGI> description below)

<cmd>:

- "DEACTIVATE_ALL" - Deactivate all running services

<cmd>

- "INTEREST" - Specify list of interested frequencies

<param1>:

- MBMS Priority
  - "1"- prioritize MBMS over UNICAST
  - "0" - prioritize UNICAST over MBMS

<param2>:

- Preferred EARFCN 1 as per 3GPP encoding for EARFCN.

<param3>:

- Preferred EARFCN 2 as per 3GPP encoding for EARFCN.

<param4>:

- Preferred EARFCN 3 as per 3GPP encoding for EARFCN.

<param5>:

- Preferred EARFCN 4 as per 3GPP encoding for EARFCN.

<param6>:

- Preferred EARFCN 5 as per 3GPP encoding for EARFCN.

<cmd>

- "SERVICE_EN" – Enable reception of eMBMS services

<param1>:

- 0 -Disable MBMS service (default setting)
- 1 -enable MBMS service

<cmd>

- "INTEREST_SAI" - Specify list of interested SAIs

<param1>: int

- SAI counter - Number of SAIs (Max allowed is 16)

<param2>: int

- Preferred Service Area Identity 1 (per definition in SIB 15)

<param3>: int

- Preferred Service Area Identity 2 (per definition in SIB 15)

<cmd>

- "MBMS_PREFERENCE" - specify the priority of MBMS / Unicast

<param1>:

- MBMS priority -
  - "1"- prioritize MBMS over UNICAST
  - "0" - prioritize UNICAST over MBMS

<cmd>

- "ACTIVATE_TEST" - UE will try to activate Service ID= 000 when it is available. The command can be activated only for test mode

<param1>: int

- Area ID as defined by <AreaID>

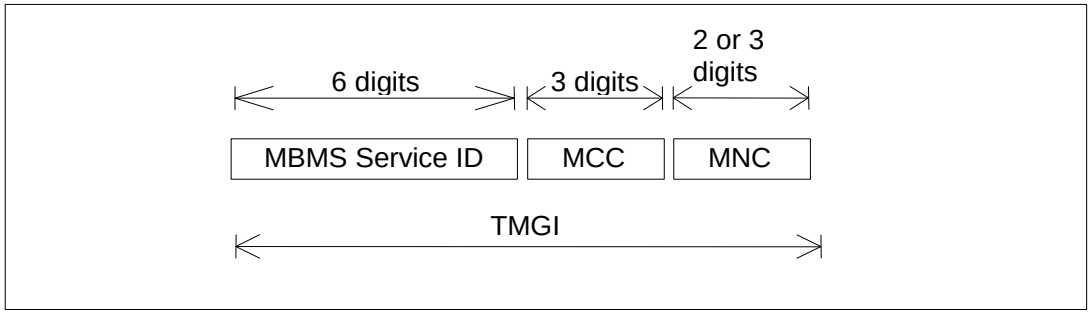
<AreaID>: int

Area in which participating cells transmit same synchronized content on the same frequency. Within MBSFN area, cells which don't participate on MBMS transmissions are not allowed to overlap the transmissions with their own content. The device can receive content from up to 8 Areas concurrently.

<TMGI>: string

TMGI (Temporary MBMS Group Identity) includes both service ID and PLMN ID. The service ID represent single "channel" which transmit content. Each area ID has its own services. Currently, the device can receive up to 29 services in total.

The format of TMGI is defined in 3GPP 23.003:



<SessionID>: int

SessionID is required higher level middleware functionality.

9.1.2 AT%MBMSINFO

Command	Possible Response(s)
%MBMSINFO=<type>	For “ACTIVE” and “AVAILABLE” query, return list of services: • %MBMSINFO: <AreaID>,<TMGI>,<MCS>[,<SessionID>] • %MBMSINFO: <AreaID>,<TMGI>,<MCS>[,<SessionID>] … • %MBMSINFO: <AreaID>,<TMGI>,<MCS>[,<SessionID>] • OK/ERROR For “SAILIST” query, return the SAI list: • %MBMSINFO: <AreaID>,<EARFCN> • %MBMSINFO: <AreaID>,<EARFCN> … • %MBMSINFO: <AreaID>,<EARFCN> • OK/ERROR For “INAREA” query, return the area status: • %MBMSINFO: 1 (in area) or 0 (out of area) • OK/ERROR For “AREASIB13” query, return the SIB13 Area list: • %MBMSINFO: <AreaID> • %MBMSINFO: <AreaID> … • %MBMSINFO: <AreaID> • OK/ERROR
%MBMSINFO?	ERROR (OPRATION_NOT_ALLOWED) Operation is not supported
%MBMSINFO=?	%MBMSINFO: List of supported <cmd>

Description

AT command to get detailed MBMS information. The command can return the whole available services or only the active list.

The “INAREA” type of query is used in case that the device supply empty list. This is required because in this case it is still not clear if device is within area but area has no services, or the device is completely out of area.

Defined Values

<type>:

- “ACTIVE” - supply the list of the activated services

- "AVAILABLE" – supply the list of all available services: activated and not-activated.
- "SAILIST" – Supply the SAI (Service Area Identities from SIB 15) list
- "INAREA"- indicates that device is within area (SIB13 is received) or out of area (SIB 13 not received).
- AREASIB13 – Supply a list of Area IDs received in SIB13

<AreaID>: int

- See description of AT%MBMSCMD

<EARFCN>: int

- As per 3GPP encoding for EARFCN.

<TMGI>: string

- See description of AT%MBMSCMD

<SessionID>: int

- See description of AT%MBMSCMD

<MCS>: int

- Indicates the value for parameter I_MCS in TS 36.213 Table 7.1.7.1-1, which defines the applicable Modulation and Coding Scheme (MCS)

9.1.3 AT%MBMSEV (unsolicited)

Command	Possible Response(s)
AT%MBMSEV=<cmd>	OK/ERROR
AT%MBMSEV?	ERROR (not supported)
AT%MBMSEV=?	%MBMSEV: List of supported <cmd>
(unsolicited result code)	%MBMSEV: <event>

Description

This unsolicited command indicates the host that there are changes in the MBMS services. The host may query for updated service list by using "AT%MBMSCMD?".

Defined Values

<cmd> : a numeric parameter

- 0 – Disable unsolicited MBMS indications
- 1 – Enable unsolicited MBMS indications

<event> : a numeric parameter

- 0 – Service change event
- 1 - SAI (Service Area Identities) list change
- 2-99 - Reserved

Examples

eMBMS Session Start

In this flow the user queries the available services. It then starts a service from the list.

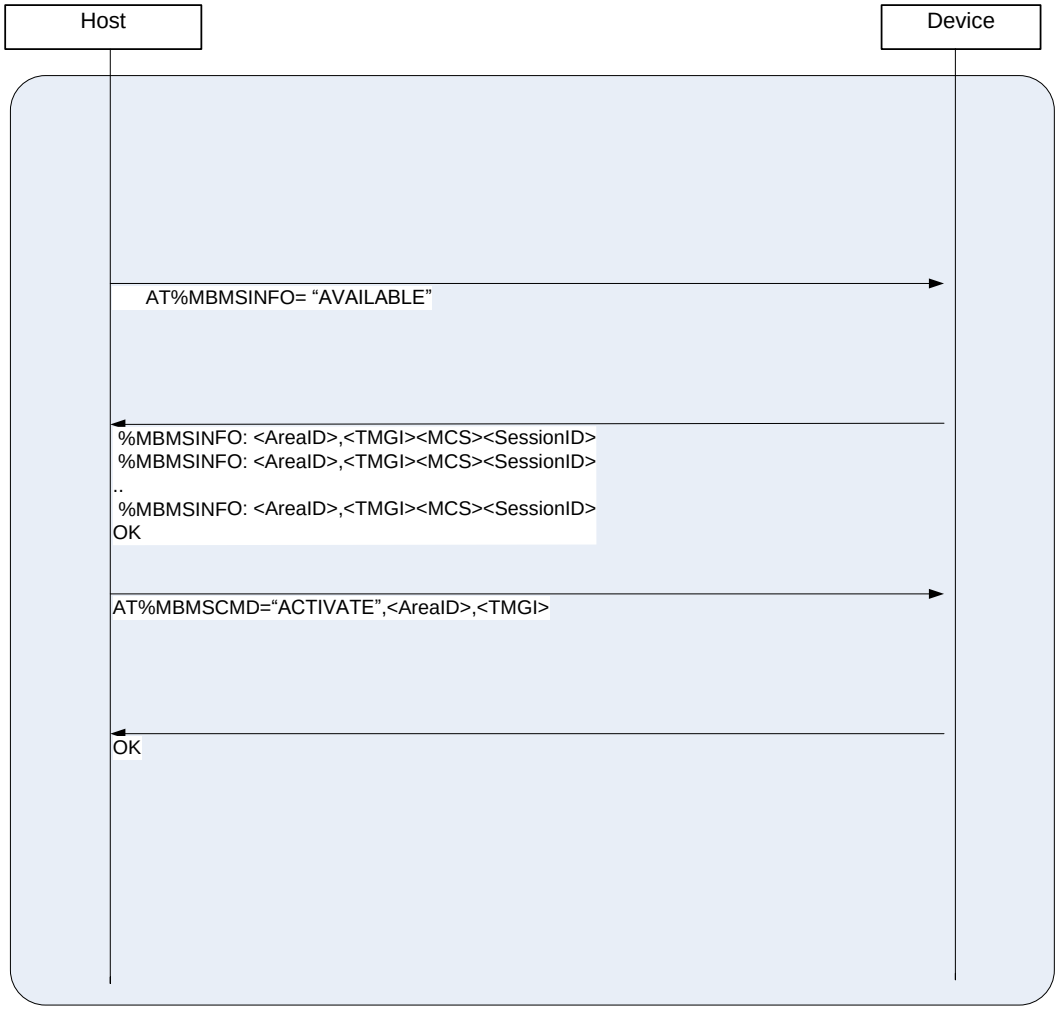


Figure 1. Session Start Flow

eMBMS Session Stop

In this flow the user queries the active services. It then stops a service from the list.

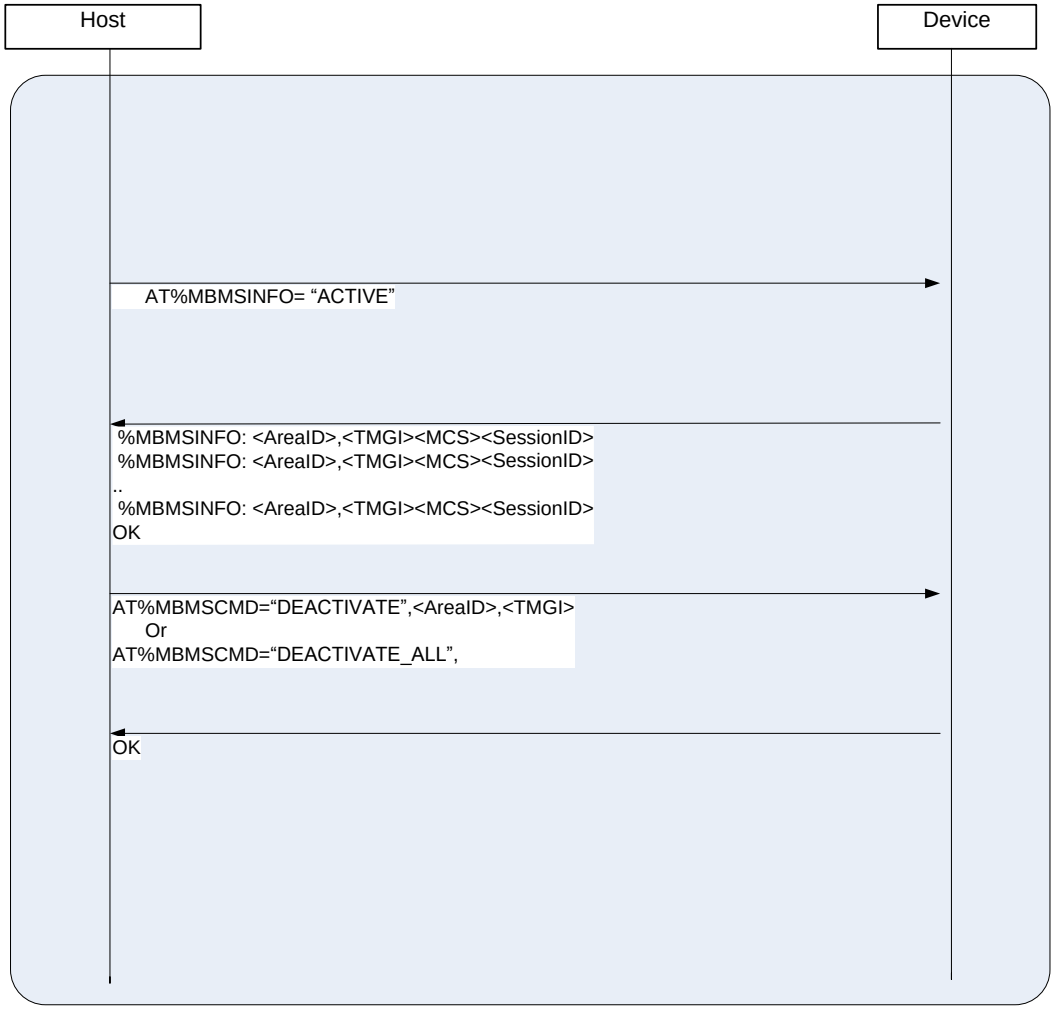


Figure 2. Session Stop Flow Initiated by User

eMBMS Service Change Notifications

In this flow the user gets notification that there is a change in available Areas or Services. The user may request the updated list and compare it with its own list to find out the “delta”.

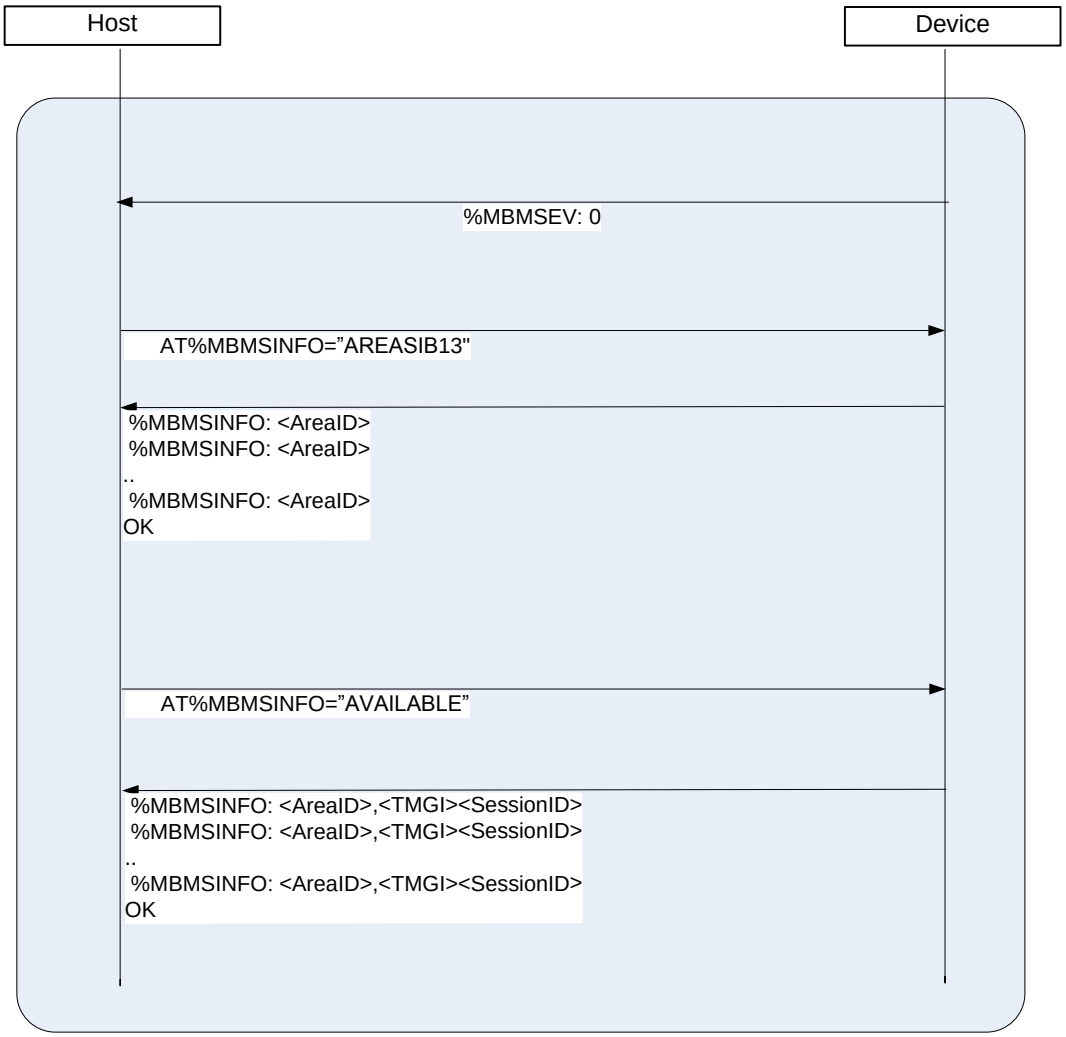


Figure 3. Service Change Notification from Network

eMBMS Neighbor Frequencies Area Change

In this flow the user gets notification on change on Area configuration in neighbor frequency. The user may request the updated Area list and compare it with its own list to find out the “delta”.

Based on the updated Area list, the user may request the modem to prefer another frequency.

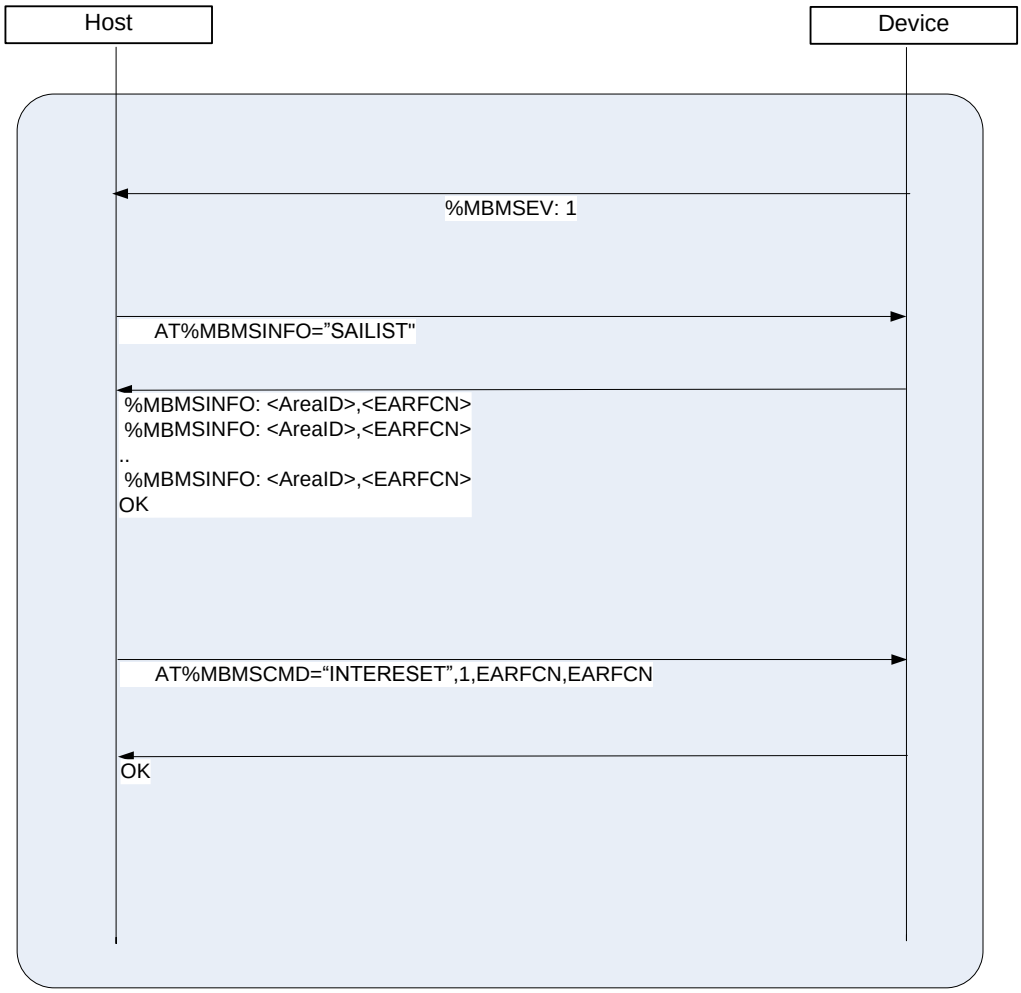


Figure 4. Neighbor Frequency Area Change Notification from Network