



H3-Family AT Commands User Manual

Version: V1.2.4

Date: 2013-12-23



offers this information as a service to its customers, to support application and engineering efforts that use the products designed by Fibocom. The information provided is based upon requirements specifically provided to Fibocom by the customers. All specifications supplied herein are subject to change. Disclosure of this information to other parties is prohibited without the written consent of Fibocom.

Copyright

Copy, Reproduce, Distribute and/or Edit of this document or part of it as well as utilization of its contents and communication thereof to others without express authorization are prohibited. Offenders will be held liable for payment of damages. All rights created by patent grant or registration of a utility model or design patent are reserved. Copyright ©2013 Fibocom Wireless Inc. All rights reserved.

Trademarks Notice



The FIBOCOM Logo is registered by Fibocom Wireless Inc. All other product or service names or logos are the property of their respective owners. Copyright ©2013 Fibocom Wireless Inc. All rights reserved.

Revision History

Version	Date	Remarks
V1.0.0	2012-05-30	Initial Version
V1.1.0	2012-06-29	Update product model name
V1.1.1	2012-07-31	Update any items: IPR, UART2 etc.
V1.1.2	2012-11-24	Update description in chapter14.6.2 and 14.6.3
		Delete GTEINT command, update mci, mcell command.
V1.1.3	2012-12-13	Add chapter 16. PCM Command
V1.1.4	2013-01-04	Update the name of this document
V1.1.5	2013-01-10	Add +XREG
V1.1.6	2013-01-23	Update +CMUX command
V1.1.7	2013-03-06	Change the default value of +cbaud and +ipr to 0
V1.1.8	2013-04-25	Update +GTSET command descriptions

V1.1.9	2013-05-10	Delete PS\PN\PU\PP\PC in section 8.1.5
V1.2.0	2013-05-22	Update MATONE and MTSM
V1.2.1	2013-06-18	Change the default value of +CBAUD and +IPR; Add Section 9.1.8 +CUBAND command; Update +XREG command
V1.2.2	2013-09-12	Update +CNMI and +CMT Add +GTCODECN Update +MAPATH Change the default value of S96 Update description of chapter 10.3 Update section 10.3.2 Update the name of the document Add H350
V1.2.3	2013-10-23	Add notes that H350 doesn't support +GPIO command in section 10.2.9. Add section 12.2.20.
V1.2.4	2013-12-23	Update +CFUN

Applicability Table

No.	Type	Note
1	H330	
2	H350	

Contents

1	Preface	12
1.1	Manual Scope	12
1.2	Target Audience	13
2	Introduction to AT Commands	14
2.1	AT Commands Overview	14
2.2	General System Abbreviations	14
2.3	AT Commands Protocol	14
2.4	AT Commands Structure	15
2.4.1	General Symbols Used in AT Commands Description	15
2.4.2	Command Structure	15
2.4.3	Results Code Structure	16
2.5	Command Syntax	16
3	Modem ID	18
3.1	+CGMI, +GMI, +FMI, Request Manufacturer ID	18
3.2	+CGMM, +GMM, +FMM, Request Model ID	18
3.3	+CGMR, +GMR, +FMR, Request Revision	19
3.4	+CGSN, +GSN, Request Product Serial Number Identification	19
3.5	+CSCS, Select Terminal Character Set	20
3.6	+CIMI, Request IMSI	21
3.7	+CFSN, Read Factory Serial Number	21
3.8	I, Request Identification Information	22
3.9	+CNUM, Request MSISDN(s)	22
3.10	+CLAC, List of All Available AT Commands	23
4	Modem Control and Status	25
4.1	Modem Register Commands	25
4.1.1	V, H3xx Response Format	25
4.1.2	Q, Result Code Suppression	26
4.1.3	E, Command Echo	27
4.1.4	X, Result Code Selection and Call Progress Monitoring Control	27
4.1.5	S, Bit Map Registers	28
4.1.6	S2	30
4.1.7	S12	30
4.1.8	&V, View Configuration	31
4.1.9	&F, Set to Factory Defined Configuration	32

4.1.10	Z, Reset to Default Configuration.....	32
4.1.11	&W, Store User Profile	33
4.1.12	&Y, Default User Profile.....	34
4.1.13	+CRSM, Restricted SIM Access	34
4.1.14	+GTUSIM, Checks for USIM Card.....	39
4.1.15	+CCID.....	39
4.2	Sleep Mode Commands.....	40
4.2.1	S24, Set Number of Seconds Delay Before H3xx Enters Sleep Mode	40
4.3	Error Handling Commands.....	41
4.3.1	+CMEE, Report Mobile Equipment Error.....	41
4.3.2	+CEER, Extended Error Report.....	42
5	Call Control.....	44
5.1	Managing a CSD (Data) Call.....	44
5.1.1	Simple Dialing	44
5.1.2	Switching From Data Mode to Command Mode.....	44
5.1.3	Hanging Up	45
5.2	Receiving a Data Call.....	45
5.3	Call Control AT Commands	45
5.3.1	D, Dial Command.....	45
5.3.2	D>, Direct Dialing from Phone Books	47
5.3.3	DL, Dial Last Number.....	48
5.3.4	H, Hang-up Call.....	49
5.3.5	A, Answer Incoming Call	50
5.3.6	+CRC, Cellular Result Codes and RING, +CRING - Incoming Call Indication.....	51
5.3.7	+CLIP, Calling Line Identification	54
5.3.8	+CLIP Indication.....	55
5.3.9	+CCWA, Call Waiting Command	56
5.3.10	+CCWA Indication	57
5.3.11	+CHLD, Call Related Supplementary Services Command.....	59
5.3.12	+CCFC, Call Forwarding Number and Conditions.....	62
5.3.13	+CLIR, Calling Line Identification Restriction.....	64
5.3.14	+CBST, Select Bearer Service Type	66
5.3.15	O, Return to Online Data State	69
5.3.16	+CHUP, Hang Up Call	70
5.3.17	+MDC, Selection of Desired Message to Be Displayed Upon Connection of a	

Voice Call	70
5.3.18 +MHUP, H3xx Hung UP call	71
5.4 Call Status Messages	72
5.4.1 +CPAS, Phone Activity Status	72
5.4.2 +CLCC, List Current Calls	73
5.4.3 +MCST, Call Status Messages	76
5.5 Call Advice of Charge Commands	77
5.5.1 +CAOC, Advice of Charge	77
5.5.2 +CACM, Accumulated Call Meter	80
5.5.3 +CAMM, Accumulated Call Meter Maximum	81
5.5.4 +CPUUC, Price per Unit and Currency Table	82
5.5.5 +CR, Service Reporting Control	83
5.6 Supplementary Services	84
5.6.1 +CSSN, Supplementary Service Notifications	84
5.6.2 +CUSD, Unstructured Supplementary Service Data	87
5.6.3 +COLP, Connected Line Identification Presentation	91
6 Phone Book and Clock	93
6.1 Directory Access Commands - Phone Book	93
6.1.1 +CPBS, Select Phone Book Memory	93
6.1.2 +CPBR, Read Phone Book Entries	95
6.1.3 +CPBF, Find Phone Book Entries	97
6.1.4 +CPBW, Write Phone Book Entry	99
6.1.5 +CSVM, Set Voice Mail Server	101
6.2 System Date and Time Access Commands	102
6.2.1 +CCLK, Read/Set System Date and Time	102
7 SMS	105
7.1 SMS Commands	105
7.1.1 +CSMS, Select Message Service	105
7.1.2 +CPMS, Preferred Message Storage	106
7.1.3 +CMGF, Message Format	107
7.1.4 +CSCA, Service Center Address	108
7.1.5 +CSMP, Set Text Mode Parameters	111
7.1.6 +CSDH, Show Text Mode Parameters	113
7.1.7 +CNMI, New Message Indications to Terminal	115
7.1.8 +CNMA, New Message Acknowledgment	118

7.1.9	+CMTI, Unsolicited Response (New SMS-DELIVER Receipt Indication)	120
7.1.10	+CMT, Unsolicited Response (New SMS-DELIVER Receipt)	120
7.1.11	+CBM, Unsolicited Response (New CB Message Receipt)	122
7.1.12	+CDSI, Unsolicited Response (New SMS-STATUS-REPORT Indication)	122
7.1.13	+CDS, Unsolicited Response (New SMS-STATUS-REPORT Receipt)	123
7.1.14	+CMGL, List Messages.....	124
7.1.15	+CMGR, Read Message	128
7.1.16	+CMSS, Send Message from Storage.....	131
7.1.17	+CMGW, Write Message to Memory	132
7.1.18	+CMGD, Delete Message	135
7.1.19	+CGSMS, Select Service for MO SMS Messages	136
7.1.20	+CMGS, Send SMS to Network.....	137
7.1.21	+CSCB, Cell Broadcast Messages	138
8	Access and security	141
8.1.1	A/, Repeat Last Command.....	141
8.1.2	AT, Check AT Communication	141
8.1.3	+CPIN, Enter PIN for Unlocking SIM or Enter PUK for Unlocking SIM	141
8.1.4	+TPIN, Query Number of Remaining SIM PIN/PUK Entering Attempts	145
8.1.5	+CPWD, Change Password.....	146
8.1.6	+CLCK, Facility Lock.....	148
9	Network	151
9.1	Network Commands.....	151
9.1.1	+CSQ, Signal Strength.....	151
9.1.2	+CRLP, Radio Link Protocol.....	152
9.1.3	+CREG, Network Registration Status	153
9.1.4	+CGREG, GPRS Network Registration	154
9.1.5	+COPS, Operator Selection.....	156
9.1.6	+CPOL, Preferred Operators	159
9.1.7	+CBAND, Change Radio Band	162
9.1.8	+CUBAND, Change 3G Radio Band	163
9.1.9	+XREG, Current Network Registration Status.....	165
9.1.10	+MCELL, H3xx Cell Description.....	166
9.1.11	+MCI, H3xx Cell Information	169
9.1.12	+GTRAT, Selection of Radio Access Technology	171
10	Hardware Information.....	173

10.1	Uart Parameter Commands	173
10.1.1	+CBAUD, Baud Rate Regulation	173
10.1.2	+IPR, Local Terminal Serial Port Rate	174
10.1.3	&K, RTS/CTS Flow Control.....	175
10.1.4	+IFC, RTS/CTS Flow Control.....	176
10.1.5	&C, Circuit 109 Behavior.....	177
10.1.6	&D, Circuit 108 Behavior.....	178
10.1.7	+ICF, DTE-DCE Character Framing.....	179
10.2	Other Parameter Commands	180
10.2.1	+CBC, Battery Charger Connection.....	180
10.2.2	+CFUN, Shut Down Phone Functionality.....	181
10.2.3	+CPWROFF Switch off MS.....	183
10.2.4	+MMAD, Query and Monitor ADC Value.....	183
10.2.5	+MTSM, Temperature Sensor Measurement.....	184
10.2.6	+WRIM, RI signal width setting	186
10.2.7	+MSTART, Start message notification.....	187
10.2.8	+MSMPD, Enable/Disable SIM card hot plug.....	188
10.2.9	+GPIO, Set and Read GPIO	189
10.3	UART2 configuration	190
10.3.1	UART2 use for AT command.....	190
10.3.2	+UARTSEND, Send data to UART2	190
11	Audio	192
11.1	Scope.....	192
11.2	General Audio Commands	192
11.2.1	+CRSL, Call Ringer Level	192
11.2.2	+CLVL, Loudspeaker Volume	192
11.2.3	+CMUT, Mute/Unmute Microphone and Speaker Path	193
11.2.4	S94, Sidetone Effect.....	194
11.2.5	S96, Echo Cancelling.....	194
11.2.6	+CALM, Alert Sound Mode	195
11.2.7	+VTD, Tone Duration.....	196
11.2.8	+VTS, Command-Specific Tone Duration	196
11.2.9	+VTA, Set play DTMF type.....	197
11.2.10	+MAPATH, Audio Path	198
11.2.11	+MAVOL, Volume Setting.....	200

11.2.12	+MATONE, Start or stop the tone play	202
11.2.13	+MMICG, Microphone Gain Value.....	205
11.2.14	+GTCODECN, CODEC Chip Selection	205
11.3	Multiplexer Feature.....	206
11.3.1	+CMUX, MUX Startup Command	206
12	GPRS	209
12.1	GPRS Functionality	209
12.2	GPRS Commands	209
12.2.1	+CGCLASS, GPRS Mobile Station Class.....	209
12.2.2	+CGDCONT, Define PDP Context	210
12.2.3	+CGQMIN, Quality of Service Profile (Min Acceptable).....	213
12.2.4	+CGQREQ, Quality of Service Profile (Requested)	214
12.2.5	+CGATT, GPRS Attach or Detach.....	216
12.2.6	D*99, Request GPRS Service "D"	217
12.2.7	+CGACT, PDP Context Activate or Deactivate	219
12.2.8	+CGPADDR, GPRS ADDResses.....	220
12.2.9	+CGANS, Manual response to a network request for PDP context activation....	221
12.2.10	+CGAUTO, Automatic Response to a Network Request for PDP Context Activation 223	
12.2.11	+CGEQMIN, 3G Quality of Service Profile (Minimum acceptable)	224
12.2.12	+CGEQREQ, 3G Quality of Service Profile (Requested).....	229
12.2.13	+CGEQNEG, G Quality of Service Profile (Negotiated)	234
12.2.14	+CGCMOD, PDP Context Modify.....	236
12.2.15	+CGDATA , Enter Data State	237
12.2.16	+CGDSCONT, Define Secondary PDP Context	238
12.2.17	+CGEREP, Packet Domain Event Reporting	240
12.2.18	+CGTFT Traffic Flow Template	241
12.2.19	+MGAUTH, Set type of authentication.....	245
12.2.20	+CGEV, Unsolicited Packet Domain Event Reporting	246
13	TCP/IP	248
13.1	+MIPCALL, Create a Wireless Link.....	248
13.2	+MIPOPEN, Open a Socket (UDP or TCP)	249
13.3	+MIPCLOSE, Close a Socket.....	252
13.4	+MIPSETS, Set Size and Timeout for Automatic Push.....	253

13.5	+MIPDSETS, Set Size and Timeout for Output Data.....	255
13.6	+MIPSEND, Send Data.....	256
13.6.1	Send Data at normal mode.....	256
13.6.2	Send Data at HEX Mode.....	257
13.7	+GTSET, Set receive data mode.....	259
13.8	+MIPPUSH, Push Data into Protocol Stack.....	260
13.9	+MIPFLUSH, Flush Data from Buffers.....	262
13.10	+MIPRUDP, Receive Data from UDP Protocol Stack.....	262
13.11	+MIPRTCP, Receive Data from TCP Protocol Stack.....	263
13.12	+MIPSTAT, Status Report.....	264
13.13	+MIPCONF - Configure Internal TCP/IP stack.....	264
13.14	+MPING, Start Ping Execution (ICMP Protocol).....	267
13.15	+MPINGSTAT, Status Update for +MPING Execution.....	270
13.16	+MSDNS, Set DNS IP Address.....	272
13.17	+MIPODM, Open a Socket (UDP or TCP) in Online Data Mode.....	274
13.18	+MIPXOFF, Flow Control - Xoff.....	276
13.19	+MIPXON, Flow Control - Xon.....	276
14	FTP Command.....	278
14.1	FTP Introduction.....	278
14.2	+FTPOPEN, Open a FTP Connection with FTP Server.....	278
14.3	+FTPCLOSE, Close Established FTP Connetion.....	280
14.4	+FTPINFO, FTP Unsolicited Indication Enable/Disable.....	280
14.5	+FTPCWD, Change Working Directory.....	282
14.6	+FTPMKD, Make Directory.....	282
14.7	+FTPRMD, Remove Directory.....	283
14.8	+FTPPWD, Print Working Directory.....	284
14.9	+FTPCDUP, Change Directory up.....	284
14.10	+FTPDEL, Delete the File.....	285
14.11	+FTPREN, Rename File.....	286
14.12	+FTPLIST, Request List.....	287
14.13	+FTPSTAT, Request Status.....	288
14.14	+FTPSYST, Request Operating System Type.....	289
14.15	+FTPNOOP, No Operation.....	289
14.16	+FTPSTOR, Store File on Remoter Server.....	290
14.17	+FTPRETR, Retrieve a File.....	291

14.18	+FTPGET, Enter the File Download Mode.....	292
14.19	+FTPGETV, Read Data through the Port.....	294
15	PCM Command.....	296
15.1	+MADIGITAL Enable Digital Audio or Disable Digital Audio	296
15.2	+MAI2SY, Set Digital Audio to Transmit Parameters	297
16	Error Code.....	299
16.1	CME Error.....	299
16.2	CMS Error.....	302
16.3	TCP/IP Error	305

1 Preface

1.1 Manual Scope

This manual introduces the H3xx AT command set, and describes how software developers can use these commands to communicate with the H3xx device, and to create software applications that communicate with the H3xx using these commands.

Note: The integrator should read the corresponding SW release notes for the H3xx version he is using to get information about differences from this manual.

1.2 Target Audience

This manual is intended for software developers who communicate with the H3xx device using the AT commands, and create applications to communicate with the H3xx device using the AT commands.

2 Introduction to AT Commands

2.1 AT Commands Overview

AT commands are sets of commands used for communication with the H3xx cellular modem. AT commands are comprised of assemblies of ASCII characters which start with the "AT" prefix (except the commands A/ and +++). The AT prefix is derived from the word Attention, which asks the modem to pay attention to the current request (command).

AT commands are used to request services from the H3xx cellular modem, such as:

- ◆ Call services: dial, answer and hang up
- ◆ Cellular utilities: send/receive SMS
- ◆ Modem profiles: Auto Answer
- ◆ Cellular Network queries: GSM signal quality

2.2 General System Abbreviations

The basic system configuration contains a modem and a terminal.

The H3xx is the modem and may be referred to as the DCE or TA, such as the phone, the mobile or the radio.

The terminal (PC or MCU) may be referred to as the DTE or the TE.

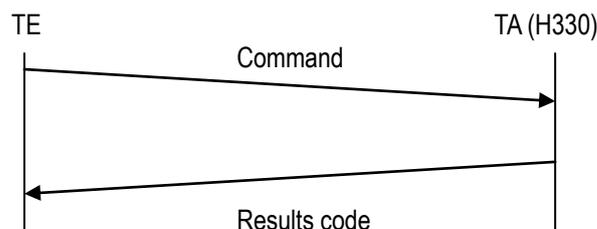
2.3 AT Commands Protocol

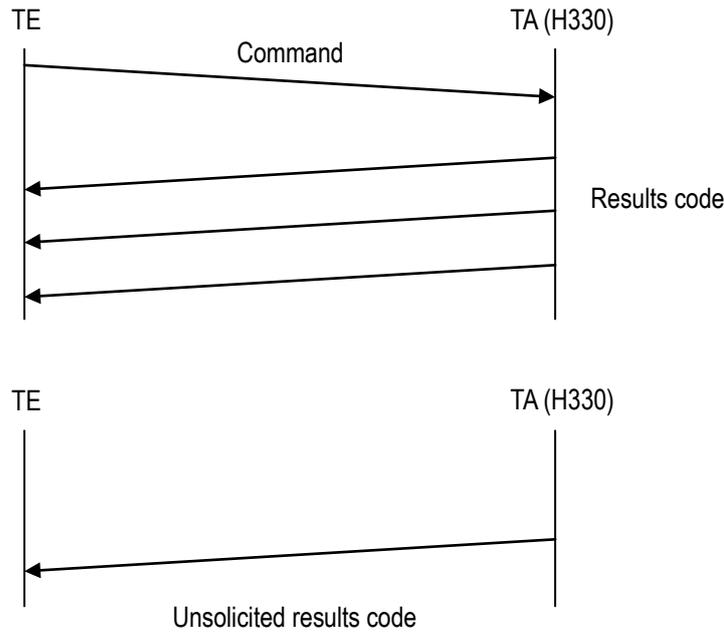
The AT commands interface is basically a Modem Services upon Request.

Communication (almost) always begins from the TE side. This means that any service should be requested from the TE. Thus a request is called a "Command".

Each command must be answered by a "Results code" from the TA. The results code reports the command status to the TE. Some commands may include several "Results code" to send data back to the TE. Some commands may initiate a mode in which, when specified events are generated in the H3xx, "Indicator" messages are sent data asynchronously. The "indicators" can be called "Unsolicited results code".

The H3xx can echo characters received from the TE (commands) back to the TE.





2.4 AT Commands Structure

2.4.1 General Symbols Used in AT Commands Description

The following syntax definitions apply in this chapter:

Syntax	Definition
<CR>	Carriage returns character, specified by the value of the S3-register.
<LF>	Line-feed character, specified by the value of the S4-register.
<...>	Name enclosed in angle brackets is a syntax element. The brackets themselves do not appear in the command line.
[...]	Optional sub-parameter of a command or an optional part of terminal information response, enclosed in square brackets. The brackets themselves do not appear in the command line. When the sub-parameter is not provided in the parameter type commands, the new value equals its previous value. In action type commands, the action should be performed on the basis of the recommended default setting of the sub-parameter.
//	Denotes a comment, and should not be included in the command.

2.4.2 Command Structure

Each AT command has the "AT" or "at" prefix string (except the commands A/ and +++).

Each AT command has the suffix <CR> (except the commands A/ and +++).

Example:

```
AT+CSQ<CR>
```

```
ATS24?<CR>
```

An AT command line may contain one or more commands. Delimiters are used to separate the commands from each other. The delimiter is either a semicolon ";" or none, meaning space (basic commands).

Example:

```
ATS0=1V1Q0E0<CR>
```

```
AT+IFC=0,0;+ICF=3,4;+CNMI=2,1,0,0,0<CR>
```

2.4.3 Results Code Structure

By default, the H3xx responds with verbose response codes. The results code prefix is <CR><LF>. The results code suffix is <CR><LF>.

Example:

```
<CR><LF>+CSQ: 99,99<CR><LF>
```

```
<CR><LF>OK<CR><LF>
```

The unsolicited results code is same as the Results code.

2.5 Command Syntax

Execute command syntax	AT+xxx ATxxx ATxxx;
Parameter set command syntax	AT+xxx=<Value> ATxxx=<Value>
Parameter read Command syntax	AT+xxx? ATxxx?
Parameter test Command syntax	AT+xxx=? ATxxx=?

<Value> consists of either a numeric constant or a string constant. <compound_value> consist of several <value> parameters separated by commas.

Example of compound_value: <value1>, <value2>, ..., <valueN>

◆ Numeric Constants

Numeric constants are expressed in decimal, hexadecimal, or binary form. In the H3xx, the definition of each command specifies which form is used for values associated with that command.

- ◆ String Constants

String constants consist of a sequence of characters, bounded at the beginning and end by the double-quote character (").

3 Modem ID

These commands allow the user to query the type of device that is attached, the technology used in the device, as well as basic operating information about the H3xx.

3.1 +CGMI, +GMI, +FMI, Request Manufacturer ID

These commands display manufacturer identification. The H3xx outputs a string containing manufacturer identification information.

Command	Response/Action
AT+CGMI AT+CGMI?	+CGMI: <manufacturer_ID> OK
AT+GMI AT+GMI?	+GMI: <manufacturer_ID> OK
AT+FMI AT+FMI?	+FMI: <manufacturer_ID> OK

Example:

```
AT+CGMI
+CGMI: "Fibocom"
OK
```

3.2 +CGMM, +GMM, +FMM, Request Model ID

These commands request the model identification. The H3xx outputs a string containing information about the specific model, including a list of the supported technology used, and the particular model number.

Command	Response/Action
AT+CGMM AT+CGMM?	+CGMM: <list of supported technologies>,<model> OK
AT+GMM AT+GMM?	+GMM: <list of supported technologies>,<model> OK
AT+FMM AT+FMM?	+FMM: <list of supported technologies>,<model> OK

Example:

AT+CGMM?

+CGMM: "WCDMA Quad Band", "H330"

+CGMM: "GSM1800", "GSM900", "GSM1900", "GSM850", "WCDMA2100", "WCDMA900", "WCDMA1900", "WCDMA850", "MODEL=H330"

OK

3.3 +CGMR, +GMR, +FMR, Request Revision

These commands request the revision identification. The H3xx outputs a string containing the revision identification information of the software version contained within the device.

Command	Response/Action
AT+CGMR AT+CGMR?	+CGMR: <revision> OK
AT+GMR AT+GMR?	+GMR: <revision> OK
AT+FMR AT+FMR?	+FMR: <revision> OK

Example:

AT+CGMR

+CGMR: "H330_V1H.00.08"

OK

3.4 +CGSN, +GSN, Request Product Serial Number Identification

This command displays the product serial number identification IMEI (International Mobile Equipment Identification). It can be used even when the SIM card is not inserted.

Command	Response/Action
AT+CGSN AT+CGSN?	+CGSN: <imei> OK
AT+GSN AT+GSN?	+GSN: <imei> OK

The following table shows the +CGSN, +GSN parameters.

<Parameter>	Description
<imei>	<p>The IMEI (International Mobile Station Equipment Identity) number is composed of 15 digits, as specified by 3GPP TS 23.003. IMEI numbers are composed of the following elements, all in decimal digits:</p> <p>Type Approval Code (TAC) - 8 digits</p> <p>Serial Number (SNR) - 6 digits</p> <p>Spare digit - 1 digit</p> <p>The TAC and SNR are protected against unauthorized changes.</p>

Example:

AT+CGSN?

+CGSN: "004400013805666"

OK

3.5 +CSCS, Select Terminal Character Set

This command selects the H3xx character set. The H3xx supports the following character sets: "IRA", "GSM", "UCS2", "HEX". The default value is "IRA".

Command	Syntax	Response/Action
Set	+CSCS=[<chset>]	OK or: +CMS ERROR: <err>
Read	+CSCS?	+CSCS: <selected character set> OK
Test	+CSCS=?	+CSCS: (<supported character sets>) OK

The following table shows the +CSCS parameter optional values.

<chset>	Character Set
"IRA"	International Reference Alphabet (ITU-T T.50)
"GSM"	GSM default alphabet (GSM 03.38 subclause 6.2.1)
"UCS2"	2-byte Universal Character Set, Unicode (ISO/IEC 10646 [32])
"HEX"	Character strings consist only of hexadecimal numbers from 00 to FF

Example:

```

AT+CSCS=?
+CSCS: ("UCS2", "IRA", "HEX", "GSM")
OK
AT+CSCS?
+CSCS: "IRA"
OK
AT+CPBS="SM"
OK
AT+CPBW=1,"8475763000",129,"Lin Zhao"
OK
AT+CSCS="UCS2"
OK
AT+CPBR=1
+CPCR: 1,"8475763000",129,"004C0069006E0020005A00680061006F"
OK

```

3.6 +CIMI, Request IMSI

This command displays the International Mobile Subscriber Identity number.

Command	Response/Action
AT+CIMI	+CIMI: <imsi>
AT+CIMI?	OK
	or:
	+CME ERROR: <err>

Example:

```

AT+CIMI
+CIMI: 314566320021400
OK

```

3.7 +CFSN, Read Factory Serial Number

This command is used to query the factory serial number.

Command	Response/Action
---------	-----------------

AT+CFSN	+CFSN: <fsn>
AT+CFSN?	OK

Example:

```
AT+CFSN
+CFSN: "1234567890"
OK
```

3.8 I, Request Identification Information

This command displays various H3xx information items.

Command	Response/Action
ATIn	<information item n> or: +CME ERROR: <err>

The following table shows the information items that are supported by the H3xx.

ATIn	Description	Output (Just Demo)	Remark
AT1	Same as AT10	".Built@Mar 23 2012:08:50:27"	
AT10	Build time	".Built@Mar 23 2012:08:50:27"	
AT11	Reserve	"Reserve"	
AT12	Reserve	"Reserve"	Note: For H350, it displays BOOT version: BOOT_00.07.
AT13	Product description	"Fibocom HSPA+ Module"	
AT14	Reserve	"Reserve"	
AT15	Platform	"XMM6260"	
AT16	Reserve	"Reserve"	
AT17	Product description	"H330 HSPA+ Module"	
AT18	Software version	"H330_V1H.00.09"	
AT19	Reserve	"H330_V1.1.0-6250"	

3.9 +CNUM, Request MSISDN(s)

This command displays up to 2 strings of text information that identify the H3xx. The output string contains double quotes.

On SIM cards that have EFmsisdn file, the string(s) returned are the MSISDN numbers and their associated data.

On SIM cards that don't have EFmsisdn file, the strings returned are the MSISDN numbers and their associated data stored in H3xx NVM.

Command	Response/Action
+CNUM +CNUM? (MSISDN supported)	+CNUM: [<MSISDN1_string>],<MSISDN1>,<MSISDN1_type><CR><LF> [+CNUM: [<MSISDN2_string>],<MSISDN2>,<MSISDN2_type>]<CR><LF> > [...] OK
+CNUM +CNUM? (MSISDN not supported)	+CNUM: <phone_number> OK

The following table shows the +CNUM parameters.

<Parameter>	Description
<MSISDN type>	Phone number type 129 Use for local call 145 Use "+" for international access code 128 Unknown

Example:

AT+CNUM?

+CNUM: "VoiceMail","13812345678",129

OK

3.10 +CLAC, List of All Available AT Commands

This command prints out all AT Commands supported by the H3xx.

Command	Syntax	Response/Action	Remarks
---------	--------	-----------------	---------

Execute	+CLAC	List of available AT commands	The Execute command displays a list of all the AT commands supported by the H3xx.
---------	-------	-------------------------------	---

4 Modem Control and Status

4.1 Modem Register Commands

The H3xx holds certain data items in selected memory space, named Software Registers (S-registers) and Modem Registers. Some of these registers are used as bitmaps, where one register holds more than one data item. All S-registers can be accessed using the S command, described in "S, Bit Map Registers". Some registers can also be accessed using dedicated commands, detailed below.

4.1.1 V, H3xx Response Format

This command determines the response format of the data adapter and the contents of the header and trailer transmitted with the result codes and information responses. This command also determines whether the result codes are transmitted in a numeric or an alphabetic ("verbose") form. The text portion of information responses is not affected by this setting.

The following table shows the effect that setting this parameter has on the format of information text and result codes.

V0	V1	Information Responses
<ATV0><cr><lf>	<ATV1><cr><lf>	0 - "OK"
<numeric code><cr>	<verbose code><cr><lf>	1 - "CONNECT" 2 - "RING" 3 - "NO CARRIER" 4 - "ERROR" 5 - "NO DIALTONE" 6 - "BUSY" 7 - "NO ANSWER"

Command	Syntax	Response/Action	Remarks
Set	ATV<value>	OK or: +CME ERROR: <err>	The Set command sets the format of information responses and result codes.

The following table shows the V parameters.

<Parameter>	Description
<value>	0 Transmits limited headers and trailers, and numeric text. 1 Transmits full headers and trailers, and verbose response text. The default value is 1.

Example:

```

ATV0
0
ATV1
OK

```

4.1.2 Q, Result Code Suppression

This command determines whether to output the result codes. Information text transmitted in response to commands is not affected by the setting of this parameter.

Command	Syntax	Response/Action	Remarks
Set	ATQ<value>	OK or: +CME ERROR: <err>	The set commands sets whether or not to output result codes.
Read	ATQ?	Q: <value> OK	

The following table shows the Qn parameters.

<Parameter>	Description
<value>	0 Transmit result codes. 1 Suppress result codes. The default value is 0.

Example:

```

ATQ0
OK
ATQ?
Q: 0
OK
ATQ4
ERROR
ATQ1     // No response because result codes are suppressed.
ATQ4     // No response because result codes are suppressed.

```

4.1.3 E, Command Echo

This command defines whether input characters are echoed to output. If so, these characters are echoed at the same rate, parity and format at which they were received.

Command	Syntax	Response/Action	Remarks
Set	ATE<value>	OK or: +CME ERROR: <err>	The Set command sets whether or not to echo characters.
Read	ATE?	<value> OK	The Test command for E is not defined by ITU, and therefore is not supported by the H3xx. The H3xx returns an error.

The following table shows the E parameters.

<Parameter>	Description
<value>	000 Does not echo characters 001 Echoes characters The default value is 001.

Example:

```
ATE?
001
OK
```

4.1.4 X, Result Code Selection and Call Progress Monitoring Control

This command defines the CONNECT result code format. It determines whether or not the H3xx transmits particular result codes to the user. It also controls whether the H3xx verifies the presence of dial tone when it first goes off-hook to begin dialing, and whether the engaged tone (busy signal) detection is enabled.

Command	Syntax	Response/Action	Remarks
Set	ATX<value>	OK or: +CME ERROR: <err>	The Set command sets the result code and call progress monitoring control.
Read	ATX?	<value> OK	

The following table shows the X parameters.

<Parameter>	Description
<value>	<p>0 CONNECT result code given upon entering online data state: Dial tone detection - Disabled Busy detection - Disabled</p> <p>1 CONNECT <text> result code given upon entering online data state: Dial tone detection - Disabled Busy detection - Disabled</p> <p>2 CONNECT <text> result code given upon entering online data state: Dial tone detection - Enabled Busy detection - Disabled</p> <p>3 CONNECT <text> result code given upon entering online data state: Dial tone detection - Disabled Busy detection - Enabled</p> <p>4 CONNECT <text> result code given upon entering online data state: Dial tone detection - Enabled Busy detection – Enabled</p> <p>The default value is 4.</p>

4.1.5 S, Bit Map Registers

This command reads/writes values of the S-registers. The H3xx supports this command for various S values, according to official specifications (ITU-I, ETSI, or manufacturer specific).

Command	Syntax	Response/Action	Remarks
Set	ATSn=<value>	OK or: +CME ERROR: <err>	The Set command is allowed for read/write S-registers, and not allowed for read-only S-registers.
Read	ATSn?	<current value of S-register n> OK or: +CME ERROR: <err>	
Test			The Test command for Sn is not defined by ITU, and therefore is not supported by the H3xx. The H3xx

			returns an error.
--	--	--	-------------------

The following table shows the different S-registers and their associated values.

Sn	Description	Min Value	Max Value	Default Value
S0	Sets/gets number of rings before auto answer.	0	255	0
S2	Sets/gets escape code character.	1	255	43
S3	Sets/gets carriage return code character.	0	127	13
S4	Sets/gets line feed code character.	0	127	10
S5	Sets/gets command line editing character (backspace).	0	127	8
S6	Sets/gets the amount of time in seconds, that the DCE waits between connecting to the line and dialing, when dial tone is not implemented or enabled.	2	10	2
S7	Sets the number of seconds in which connection must be established before the call is disconnected.	1	255	60
S8	Sets/get the amount of time in seconds, that the DCE shall pause, during dialing, when a "," dial modifier is encountered in a dial string.	0	255	2
S12	Sets/get guard time (in units of 50 msec) for the escape character during CSD connections	0	255	20

Note: S0 (Auto Answer) should work regardless of the DTR HW line state. This is a deviation from the ITU V. 25-ter standard.

Example:

```

ATS0?
000
OK
ATS0=3
OK
ATS0?
003
OK

```

4.1.6 S2

This command handles the selection of the escape characters, which are stored in S-Register 2, and specifies the escape character used in CSD connections.

Command	Syntax	Response/Action	Remarks
Set	S2=<escape_character>	OK +CME ERROR: <err>	The Set command sets the CSD escape character value if all parameters are valid.
Read	S2?	<escape_character> OK	The Read command displays the currently defined escape character for CSD connections.

The following table shows the S2 parameters.

<Parameter>	Description
<escape_character>	CSD escape character. Range is 1 to 255. The default value is 43 ("+").

4.1.7 S12

This command handles the selection of the guard time, which is stored in S-Register 12, and specifies the behavior of escape characters during CSD connection.

Note: For a guard time specified by S-Register 12, no character should be entered before or after "++". The duration between escape codes must be smaller than the guard time.

Command	Syntax	Response/Action	Remarks
Set	S12=<guard_time>	OK +CME ERROR: <err>	The Set command sets the CSD escape character guard time value if all parameters are valid.
Read	S12?	<guard_time> OK	The Read command displays the current CSD escape character guard time.

The following table shows the S12 parameters.

<Parameter>	Description
<guard_time>	CSD escape character guard time (units of 50 msec). Range is 0 to 255. The default value is 20.

4.1.8 &V, View Configuration

This command reports the current S-registers and the stored user profile.

Command	Syntax	Response/Action	Remarks
Execute	&V	ACTIVE PROFILE: ... (profile data) STORED PROFILE 0: ... (profile data) STORED PROFILE 1: ... (profile data) OK or +CME ERROR: <err>	The Execute command displays the current active configuration and stored user profiles.

Example:

AT&V

ACTIVE PROFILE:

&C1, &D2, &K3, E1, Q0, V1, X0, Y0, S00:000, S02:043, S03:013, S04:010, S05:008,
 S07:030, S12:020, +CBST:007, 000, 001, +CRLP:061, 061, 048, 006, +CR:000, +CRC:000

STORED PROFILE 0:

&C1, &D2, &K3, E0, Q0, V1, X0, S00:000, S02:043, S03:013, S04:010, S05:008,
 S07:030, S12:020, +CBST:007, 000, 001, +CRLP:061, 061, 048, 006, +CR:000, +CRC:000

STORED PROFILE 1:

&C1, &D2, &K3, E1, Q0, V1, X0, S00:000, S02:043, S03:013, S04:010, S05:008,
 S07:030, S12:020, +CBST:007, 000, 001, +CRLP:061, 061, 048, 006, +CR:000, +CRC:000

OK

4.1.9 &F, Set to Factory Defined Configuration

This command restores the factory default configuration profile. The H3xx only supports one factory default profile, 0.

Command	Syntax	Response/Action	Remarks
Set	AT&F<value> >	OK or: +CMS ERROR: <err>	
Read	AT&F?	<current profile number>	
Test			The Test command for &F is not defined by ITU, and therefore is not supported by the H3xx. The H3xx returns an error.

The following table shows the &F parameters.

<Parameter>	Description
<value>	0 Factory default configuration profile. This is the only value supported.

Example:

AT&F?

&F: 0

OK

4.1.10Z, Reset to Default Configuration

This command drops the current call, and resets the values to default configuration.

Command	Syntax	Response/Action	Remarks
Set	ATZ<value>	OK or: +CMS ERROR: <err>	
Read		ERROR	The Read command for Z is not defined, and therefore is not supported by the H3xx. The H3xx returns an error.
Test		ERROR	The Test command for Z is not defined, and therefore is not supported by the H3xx. The H3xx returns an error.

The following table shows the Z parameters.

<Parameter>	Description
<value>	0 Set to user profile 0 1 Set to user profile 1 The default value is 0.

Example:

ATZ0

OK

4.1.11 &W, Store User Profile

This command saves in internal memory from the active profile to one of two user profiles.

Note: The user must power off the module in regular process. Otherwise, this command cannot be in effect.

Command	Syntax	Response/Action	Remarks
Set	&W[<n>]	OK or: +CME ERROR: <err>	Set command stores the current active configuration to user profile 0 or 1.

The following table shows the &W parameters.

<Parameter>	Description
<n>	User's profile number: 0 Store to user's profile 0 1 Store to user's profile 1

Example:

AT&W0

OK

AT&W1

OK

4.1.12 &Y, Default User Profile

This command decides which user profile will be used after a power up cycle.

Command	Syntax	Response/Action
Set	&Y[<n>]	OK or: +CME ERROR: <err>

The following table shows the &Y parameters.

<Parameter>	Description
<n>	User's profile number: 0 Selects power-up configuration to user's profile 0 1 Selects power-up configuration to user's profile 1 The default value is 0.

Example:

AT&Y1

OK

4.1.13 +CRSM, Restricted SIM Access

This command provides limited access to the Elementary Files on the SIM. Access to the SIM database is restricted to the commands which are listed at <command>. All parameters of AT+CRSM are used as specified by 3GPP TS 51.011(2G) and TS 31.101(3G). As response to the command, the H3xx sends the actual SIM information parameters and response data. Error result code "+CME ERROR" may be returned if the command cannot be transferred to the SIM, e.g. if the SIM is not inserted, or defected, or PIN1/PUK authentication required, or required input parameters not present. However, failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters.

Some of the AT+CRSM commands require PIN/PIN2 authentication.

Command	Syntax	Response/Action	Remarks
Set	AT+CRSM= <command> [,<file_id>[,<P1>,<P2>,<P3>[,<data> [,<pathid>]]]]	+CRSM: <sw1>,<sw2>[,<response>] OK or: +CME ERROR: <err>	Set command transmits the SIM <command> and its required parameters to the ME. ME sends the actual SIM information parameters and response data.
Command	Syntax	Response/Action	Remarks

Test	AT+CRSM =?	+CRSM: (list of supported<command>s), (possible <file_id>s range value),(possible <P1> range value), (possible <P2> range value),(possible <P3>range value), OK or: +CME ERROR: <err>	The test command returns the possible ranges of CRSM Parameters.
------	---------------	---	--

The following table shows the +CRSM parameters.

<Parameter>	Description
<command>	Integer type. Command passed on by the ME to the SIM. 176 Read BINARY 178 Read RECORD 192 Get RESPONSE 214 Update BINARY 220 Update RECORD 242 STATUS
<file_id>	Integer type. This is the identifier of a elementary data file on SIM. Mandatory for every <command> except of STATUS.
<P1>,<P2>,<P3>	Integer type. Parameters passed on by the ME to the SIM. These parameters are man-datory for every command, except GET RESPONSE and STATUS. READ BINARY <P1> Offset high (0...255) <P2> Offset low (0...255) <P3> Length (0...255) READ BINARY <P1> Rec. No. (0...255) <P2> Mode "02" = next record "03" = previous record "04" = absolute mode/current mode, the record number is given in P1 with P1='00' denoting the current record.

	<p><P3> Length (0...255)</p> <p>GET RESPONSE</p> <p><P1> "00"</p> <p><P2> "00"</p> <p><P3> Length (0...255)</p> <p>UPDATE BINARY</p> <p><P1> Offset high (0...255)</p> <p><P2> Offset low (0...255)</p> <p><P3> Length (0...255)</p> <p>UPDATE RECORD</p> <p><P1> Rec. No. (0...255)</p> <p><P2> Mode "02" = next record "03" = previous record "04" = absolute mode/current mode, the record number is given in P1 with P1='00' denoting the current record.</p> <p><P3> Length (0...255)</p> <p>STATUS</p> <p><P1> "00"</p> <p><P2> "00"</p> <p><P3> Length (0...255)</p>
<data>	Information which shall be written to the SIM (hexadecimal character format). Man-datory for UPDATE BINARY and UPDATE RECORD.
<pathid>	String type; contains the path of an elementary file on the SIM/USIM in hexadecimal format as defined in ETSI TS 102 221 [60] (e.g. "7F205F70" in SIM and USIM case).
<sw1> <sw2>	<p>Integer character format. Information, from the SIM, about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command.</p> <p><sw1>, <sw2></p> <p>integer type containing the SIM information and can be:</p> <p>0x90 0x00 normal entry of the command</p> <p>0x9F 0xXX length XX of the response data</p> <p>0x92 0x0X update successful but after using an internal retry routine X times</p> <p>0x92 0x40 memory problem</p> <p>0x94 0x00 no EF selected</p>

0x94 0x02 out of range (invalid address)
0x94 0x04 file ID not found; pattern not found
0x94 0x08 file is inconsistent with the command
0x98 0x02 no CHV initialized
0x98 0x04 access cond. Not fulfilled / unsucc. CHV verify authent.failed
0x98 0x08 in contradiction with CHV status
0x98 0x10 in contradiction with invalidation status
0x98 0x40 unsucc. CHV-verif. Or UNBLOCK CHF / CHV blocked /UNBL.blocked
0x98 0x50 increases can not be performed. Max. value reached
0x61 0xXX SW2 indicates the number of response bytes still available. Use GET RESPONSE to access this data.
0x62 0xXX Warning - state unchanged
0x62 0x00 Warning - no information provided
0x62 0x81 Warning - part of returned data may be corrupt
0x62 0x82 Warning - end of file/record reached (bad cmd)
0x62 0x83 Warning - selected file invalidated
0x62 0x84 Warning - bad file control information format
0x63 0xXX Warning - state unchanged
0x63 0x00 Warning - no information provided
0x63 0x81 Warning - file filled up with last write
0x63 0xCx Warning - counter value is x
0x64 0xXX Error - state unchanged
0x65 0xXX Error - state changed
0x65 0x00 Error - no information provided
0x65 0x81 Error - memory failure 66 xx Security Error
0x66 0xXX Security Error
0x67 0xXX incorrect parameter P3
0x68 0xXX Check Error - CLA function not supported
0x68 0x00 Check Error - no information provided
0x68 0x81 Check Error - logical channel not supported
0x68 0x82 Check Error - secure messaging not supported
0x69 0xXX Check Error - command not allowed
0x69 0x00 Check Error - no information provided

	<p>0x69 0x81 Check Error - command incompatible with file structure</p> <p>0x69 0x82 Check Error - security status not satisfied</p> <p>0x69 0x83 Check Error - authentication method blocked</p> <p>0x69 0x84 Check Error - referenced data invalidated</p> <p>0x69 0x85 Check Error - conditions of use not satisfied</p> <p>0x69 0x86 Check Error - command not allowed (no current EF)</p> <p>0x69 0x87 Check Error - expected SM data objects missing</p> <p>0x69 0x88 Check Error - SM data objects incorrect</p> <p>0x6A 0xXX Check Error - wrong parameters</p> <p>0x6A 0x00 Check Error - no information provided</p> <p>0x6A 0x80 Check Error - incorrect parameters in data field</p> <p>0x6A 0x81 Check Error - function not supported</p> <p>0x6A 0x82 Check Error - file not found</p> <p>0x6A 0x83 Check Error - record not found</p> <p>0x6A 0x84 Check Error - not enough memory space in the file</p> <p>0x6A 0x85 Check Error - Lc inconsistent with TLV structure</p> <p>0x6A 0x86 Check Error - inconsistent parameters P1-P2</p> <p>0x6A 0x87 Check Error - Lc inconsistent with P1-P2</p> <p>0x6A 0x88 Check Error - referenced data not found</p> <p>0x6B 0xXX incorrect parameter P1 or P2</p> <p>0x6C 0xXX Check Error - wrong length - xx is the correct length</p> <p>0x6D 0xXX unknown instruction code given in the command</p> <p>0x6E 0xXX wrong instruction class given in the command</p> <p>0x6F 0xXX technical problem with no diagnostic given</p>
<response>	<p>Response of a successful completion of the command previously issued (hexadecimal character uppercase format). STATUS and GET RESPONSE return data, which gives information about the current elementary data file_id. This information includes the type of file and its size (refer to GSM 11.11). After READ BINARY or READ RECORD command the requested data will be returned. <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command.</p>

Example:

AT+CRSM=176,28478,0,0,20

+CRSM: 145,165,"FF"

AT+CRSM=192,12258

+CRSM: 144,0,"62168202412183022FE28A01058B032F06038002000A8800"

OK

AT+CRSM=?

+CRSM: (176,178,192,214,220,242),(12037-28599),(0-255),(0-255),(0-255)

OK

4.1.14+GTUSIM, Checks for USIM Card

This command is used to check whether the current SIM is a 2G or 3G sim.

Command	Syntax	Response/Action	Remarks
Set	AT+GTUSIM	+GTUSIM: <state> OK	State=0: 2G SIM State=1: 3G SIM
Read	AT+GTUSIM?	+GTUSIM: <state> OK	State=0: 2G SIM State=1: 3G SIM

4.1.15+CCID

This command returns the card identification number in SIM (SIM file EFICCID, see GSM 11.11 Chap.10.1.1) as string type.

Command	Syntax	Response/Action
Set	AT+CCID	+CCID: <ID> OK or: +CME ERROR: <err>
Read	AT+CCID?	Same as above
Test	AT+CCID=?	OK

Example:

AT+CCID

```
+CCID: 89860018190839008096
OK
AT+CCID=?
OK
AT+CCID?
+CCID: 89860018190839008096
OK
```

4.2 Sleep Mode Commands

When the H3xx is connected using UART connection to external device, a sleep mechanism is available. In order to improve the power consumption, the H3xx supports a low-power consumption mode, called "Sleep mode". The H3xx has internal decision conditions for entering and exiting sleep mode. As the terminal and the H3xx operate in a combined system, and as the communication between the H3xx and the terminal must be reliable, there should be a mechanism agreed upon by both the H3xx and the terminal to coordinate their separate sleep mode entering and exiting sequences. The H3xx will not enter sleep mode unless the terminal enables the H3xx by AT commands.

The following are the Sleep mode AT commands:

- **ATS24:** Activates/deactivates Sleep mode.

The H3xx receives a request to activate or deactivate Sleep mode.

4.2.1 S24, Set Number of Seconds Delay Before H3xx Enters Sleep Mode

This command activates/disables the Sleep mode. The terminal sends `ATS24=5`, and if there are no radio and UART activities, the H3xx enters sleep mode in 5 seconds.

Note: For H350, this command doesn't take effect by default. If you want to use this command, please send `AT+GTSET="LPMODE",1`

Command	Syntax	Response/Action	Remarks
Set	<code>ATS24=[<value>]</code>	OK	The Set command sets the amount of time, in seconds, the H3XX should wait before entering Sleep mode.
Read	<code>ATS24?</code>	<value> OK	The Read command returns the current value.

The following table shows the S24 parameters.

<Parameter>	Description
-------------	-------------

<code><value></code>	Number of seconds (0 <= n <= 255) 0 Disable Sleep mode >0 Enable Sleep mode The default value is 000.
----------------------------	--

Note: H3xx can not enter sleep mode in 30 seconds at the beginning of power up.

Example:

```

ATS24?
000
OK
ATS24=5
OK
ATS24?
005
OK

```

(If there are no Radio activities Radio and Data transmission on UART, the H330 will enter sleep mode in 5 seconds)

4.3 Error Handling Commands

4.3.1 +CMEE, Report Mobile Equipment Error

The Set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the H3XX. When enabled, H3xx -related errors cause a +CME ERROR: <err> final result code instead of the regular ERROR final result code. Usually, ERROR is returned when the error is related to syntax, invalid parameters or terminal functionality.

For all Accessory AT commands besides SMS commands, the +CMEE set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the H3xx. When enabled, H3xx related errors cause a +CME ERROR: <err> final result code instead of the regular ERROR result code.

For all SMS AT commands that are derived from GSM 07.05, the +CMEE Set command disables or enables the use of result code +CMS ERROR: <err> as an indication of an error relating to the functionality of the H3XX. When enabled, H3xx -related errors cause a +CMS ERROR: <err> final result code instead of the regular ERROR final result.

Command	Syntax	Response/Action	Remarks
Set	AT+CMEE =[<n>]	OK or:	The Set command enables or disables the use of result code +CME ERROR: <err> as an indication of an error

		+CME ERROR: <err>	relating to the functionality of the H3xx.
Read	AT+CMEE ?	+CMEE: <n> OK	The Read command returns the current setting format of the result code.
Test	AT+CMEE =?	+CMEE: (list of supported <n>s) OK	The Test command returns values supported by the terminal as a compound value.

The following table shows the +CMEE parameters.

<Parameter>	Description
<n>	<p>0 Disable the +CME ERROR: <err> result code and use ERROR.</p> <p>1 Enable the +CME ERROR: <err> or +CMS ERROR: <err> result codes and use numeric <err> values or +STK ERROR: <err> result codes and use numeric <err> values.</p> <p>2 Enable the +CME ERROR: <err> or +CMS ERROR: <err> result codes and use verbose <err> values or +STK ERROR: <err> result codes and use numeric <err> values.</p> <p>The default value is 0.</p>

Example:

```

AT+CMEE=0 //+CME ERROR is not used
OK
AT+VTD
ERROR
AT+CMEE=1 //Use numeric <err>
OK
AT+VTD
+CME ERROR: 1
AT+CMEE=2 //Use verbose <err>
OK
AT+VTD
+CME ERROR: operation not supported

```

4.3.2 +CEER, Extended Error Report

This execution command returns an extended error report containing one or more lines of information text <report>, determined by the manufacturer, providing reasons for the following errors:

- ◆ Failure in the last unsuccessful call setup (originating or answering) or the in-call modification.

◆ Last call release.

Typically, the text consists of a single line containing the reason for the error according to information given by GSM network, in textual format.

Command	Syntax	Response/Action
Execute	AT+CEER	+CEER: <category>[,<cause>,<description>] OK
Test	AT+CEER=?	OK

The following table shows the +CEER parameters.

<Parameter>	Description
<category>	“No report available” “CC setup error” “CC modification error” “CC release” “SM attach error” “SM detach” “SM activation error” “SM deactivation” “SS – network error cause” “SS – network reject cause” “SS – network GSM cause”
<cause>	contains a digit representing the error cause sent by network or internally
<description>	Is a verbose string containing the textual representation of the Cause

5 Call Control

5.1 Managing a CSD (Data) Call

The H3xx working modes can be divided into two modes of operation.

- ◆ Data Mode: In this mode, once the H3XX has established a link with the remote modem, it does not respond to any data passing through it (except for the Escape Sequence search). The H3xx becomes a transparent link, connecting the terminal with the remote side.
- ◆ Command Mode: In this mode, the H3xx responds to the AT commands issued by the terminal. This is the default working mode.

Note: It is possible to switch between the operating modes. The operating modes can operate simultaneously using the Mux and using multi-channels operation.

5.1.1 Simple Dialing

In order to instruct the modem to dial a remote modem from an ordinary tone-dialing telephone line, enter the Dial command followed by the phone number. For example, type the following command:

```
ATD 876-5555 <Enter>
```

Note: If you receive characters which were sent, you can disable this with using the Echo command (ATE0 <Enter>).

After issuing the Dial command, and if the remote modem answers the call, the two modems send high-pitched carrier tones to one another which establish the transmission speed and other parameters for the data connection. This process is called negotiation.

After the negotiation process, the message, "CONNECT" followed by the connection speed, is received. If the other phone line is busy, the message "BUSY" is received.

If the other modem does not answer, the message "NO CARRIER" is received.

Once a connection has been established, the modem is ready to immediately begin transmitting and receiving data. This may vary from sending messages to each other, sending or receiving files, logging on to an information service, or any other data communication task you wish to perform.

5.1.2 Switching From Data Mode to Command Mode

To switch the connection from Data mode to Command mode, send the Escape Sequence command (+++).

If the modem responds with "OK" to the Escape command, the modem is in Command mode and the dial connection is still active, and you can use the AT command set.

Note:

- The character '+' in the Escape Sequence pattern can be changed using the S2 S-register.
- Escape is detected only by the H3xx and not by the remote side. The remote side stays in the Data mode.
- The behavior of Escape Sequence command (+++) is affected by AT&D setting. Please refer to the description of AT&D.

5.1.3 Hanging Up

If you are using a communications program, use the "Hang up" or "Disconnect" AT command in the program to disconnect the call.

When using computers in the "Dumb Terminal mode", return to the Command mode by typing the Escape Sequence (+++) and then hang up by typing the Hang up command as follows:

```
ATH <Enter>  
OK  
NO CARRIER
```

If the H3xx responds with "OK" and "NO CARRIER", the dial connection is closed.

5.2 Receiving a Data Call

```
ATA <Enter>
```

This command instructs the modem to be the "answering modem". Either party may be the answering or the originating modem, but both parties cannot be the same modem at the same time.

You hear the modem handshake and see the result code "CONNECT" "OK".

Note:

- Outgoing Voice Call during CSD Call, when switching to Command mode.
- If using Dial Command to make Outgoing Voice Call, currently active CSD Call is dropped and the new Voice Call is generated.

5.3 Call Control AT Commands

5.3.1 D, Dial Command

This command places a DATA/VOICE call on the current network.

The default call type is a data call (CSD).

There must be an explicit request in order to make a VOICE call.

If a DATA call was originated and answered by the remote side, a "OK" notification is sent to the terminal from the H3xx, and it moves to the online Data state.

For more information about call failure, should use the AT+CEER command.

Note: If there is an active voice call and the terminal sends another ATD voice call command to the H3xx, the active call is put on hold and the new number is called.

Command	Response/Action
ATD<number>[:]	VOICE CALL: 1st response - Voice call place begins OK 2nd response - Voice call connected: OK DATA: 1st response only - Data call connected CONNECT When MO call fails: 1. Connection Failure - NO CARRIER or BUSY or NO ANSWER 2. General Failure - ERROR 3. Security reason (such as SIM not present) - OPERATION NOT ALLOWED 4. Unknown reason - UNKNOWN CALLING ERROR

The following table shows the D parameters.

<Parameter>	Description
<number>	Valid phone digits are: 0 1 2 3 4 5 6 7 8 9 * # + The following characters are ignored: A B C D - () / and <space>.
semicolon (;)	When given after <number string>, a voice call is originated to the given address, otherwise a data call is originated.

The control of supplementary services through the Dial command is not supported as these are controlled through the specific supplementary service commands (CCFC, CLCK, and so on.)

Initiating a GPRS connection is done through ATD*99#, as described in "D*99".

Example:

```

atd44345678; //VOICE call (with semicolon)
OK
OK
atd44345678 //DATA call (without semicolon)
CONNECT //Move to online Data state
  
```

5.3.2 D>, Direct Dialing from Phone Books

This command places a DATA/VOICE call on the current network by dialing directly from the H3xx phone book.

Note:

- "+CME ERROR: not found" is returned when no match is found in an existing phone book.
- FD phone book supports the (?) wild card character. Telephone numbers containing this character cannot be dialed directly from the phone book.
- "+CME ERROR: Invalid index" is returned when entry <n> is out of the requested Phonebook range.

The following table shows a detailed description for the D> commands.

Command	Detailed Description
D><alpha>[:;]	Originates a call to a phone number with the corresponding alphanumeric field <alpha>. The Current Phone Book (Set by +CPBS) is searched for the entry that begins with the alphanumeric pattern <alpha>.
D>mem<n>[:;]	Originates a call to a phone number in memory (phone book) mem and stored in entry location <n>.
D><n>[:;]	Originates a call to a phone number from entry location <n> in the Current Phone Book (Set by +CPBS).

Note: Current used memory (phone book) set/read is done through the memory command +CPBS=/+CPBS? respectively.

The following table shows the D> parameters.

<Parameter>	Description
<"alpha">	String type value, which should be equal to an alphanumeric field in a phone book entry. The used character set should be the one selected with Select Terminal Character Set +CSCS. <alpha> is case-sensitive, and should be placed in quotes ("alpha").
<n>	This parameter is also called "speed dial location". It is an integer type memory location. <n> should be in the range of locations available in the memory used.
<mem>	This parameter is not case-sensitive.

Example:

```
AT+CPBS="SM"
OK
```

```

AT+CSCS="IRA"
OK
AT+CPBW=1,"035659090",129,"VoiceMail"
OK
AT+CPBR=1
+CPBR: 001,"035659090",129,"VoiceMail"
OK
atd>"VoiceMail"; //Phonebook by name
OK
OK
ath
OK
NO CARRIER

```

5.3.3 DL, Dial Last Number

The DL command places a voice call to the last number dialed. The call progress information (success/failure) is reported in the same way as for the Dial command.

Command	Detailed Description
ATDL[;]	Initial Response - Last Number retrieved: ATDL: <DIAL DIGITS> 1st response - Voice call placement begins OK 2nd response - Voice call connected OK

The following table shows the DL parameters.

<Parameter>	Description
semicolon (;)	If the semicolon (;) is given, a voice call is originated to the last dialed number. If the semicolon (;) is not given, a Data call is originated. Note: The last dialed call type is irrelevant to the DL command.

Note:

When ATDL is issued after a dialed number with comma digit:

- ATDL; (Voice) dials the exact number that was last dialed, including the DTMF tones sent.
- If ATDL is sent before any Dial command was issued (mainly after Power On, when the last number is an empty field), the H3xx will return NO CARRIER, as mentioned in the ITU V.25-ter standard.

- CCFC (*#21#) ,CCWA (*#43#) ,CLIP (*#30#) ,CLIR(*#31#),COLP(*#76#) will be treat as call number and dail it again.

Example:

```
atdl;
ATDL: 035658278
OK
OK //VOICE call
```

5.3.4 H, Hang-up Call

This command hangs up a call. The H3xx terminates the call whether it is a data or voice call, and whether it is an incoming, originating, waiting, or connected call.

A NO CARRIER message is returned to the terminal after the regular OK approval.

Note:

- To terminate (hang-up) a MO data call while call is placed: Any character sent from the terminal to the H3xx causes the Data call termination, and NO CARRIER is sent from the H3xx to the terminal.
- To terminate a held Voice call or to terminate a call out of a MTPY call, refer to “+CHLD, Call Related Supplementary Services Command”.

The following table shows the call states of the H command.

Call State	Response/Action
IDLE	Error ("operation not allowed")
Single Active	Call released
MTPY Active	Call released (all calls)
Incoming call (RING)	Call released
Single Active and Waiting Call	Single Active released (waiting not affected)
MTPY Active and Waiting Call	MTPY Active released (waiting not affected)
Single (or MTPY) Active and Single (or MTPY) Held	Single (or MTPY) Active released
Held (Single or MTPY) and Waiting Call	Waiting call released
Single (or MTPY) Active and Single (or MTPY) Held & Waiting call	Single (or MTPY) Active released

Example:

```
RING //Incoming call
```

```
RING //Incoming call
ath //Hang-up incoming call
OK
NO CARRIER //Incoming call has been terminated - user determined user busy
RING
ata
OK //Voice call connected
ath //Hang-up connected call
OK
NO CARRIER //Active call has been hung-up - terminated
(... Active multi party call, with 3 numbers ...)
ath
OK
NO CARRIER
NO CARRIER
NO CARRIER
atd035659260;
OK
ath //Terminate MO voice call while placed
OK
NO CARRIER
```

Example - Hanging up a data call:

```
atd035659260
CONNECT//Data call connected - Online Data mode
...
+++ //ESC Sequence is sent from the terminal to the H3xx
OK //The H3xx is in Command mode
ath //Terminate Data call
OK
NO CARRIER
```

5.3.5 A, Answer Incoming Call

This command answers an incoming VOICE/DATA call after a RING/+CRING indication is sent to the terminal.

If the incoming call is answered (CSD connected), the H3xx sends a CONNECT notification to the terminal.

If the MT call fails, the possible notifications are:

- ◆ NO CARRIER - Connection Failure
- ◆ ERROR - General Failure

Note: A waiting call (an incoming call while a call is in progress) is announced by +CCWA rather than RING. A waiting call can be answered only if it is a voice call. The waiting voice call should be answered using the ATA command, which will put the active call on hold and will connect the waiting call, making it the active call. This ATA action is the same action as AT+CHLD=2.

Example:

Example - Answering a voice call:

```
AT+CRC=1
+CRING: VOICE
+CRING: VOICE
ata
OK //VOICE call connected - H3xx is in Command mode
ath
OK
NO CARRIER
```

Example - Answering a data call:

```
+CRING: REL ASYNC
+CRING: REL ASYNC
ata
... //Connecting (dots are not displayed)
OK //DATA call connected - H3xx is in Online Data mode
```

Note: In a CSD call, call release is not valid during the phase of call negotiation (from OK until connect call).

5.3.6 +CRC, Cellular Result Codes and RING, +CRING - Incoming Call Indication

This command controls whether or not to present the extended format of an incoming call indication. The RING/+CRING indication is sent from the H3xx to the terminal when the H3xx is alerted by an incoming call from the network. Once this indication is sent, information is available on the calling line via +CLIP. When +CRC is disabled, the indication is RING, and when +CRC is enabled, the indication is +CRING.

Command	Syntax	Response/Action	Remarks
Set	+CRC=<n> >	OK	The Set command enables/disables the extended format of an incoming call indication. When enabled, an incoming call is indicated to the terminal with an unsolicited result code +CRING: <type> instead of the normal RING.
Read	+CRC?	+CRC: <n> OK	The Read command queries the current settings for the cellular result code.
Test	+CRC=?	+CRC: (list of supported <n>s)	The Test command returns the possible <n> values.

RING/+CRING Indication

+CRING: <type>

or:

RING

The following table shows the +CRC parameters.

<Parameter>	Description
<n>	0 Extended format disabled 1 Extended format enabled The default value is 0.
<type> ASYNC [,<priority>,<subaddr>,<satype>] SYNC [,<priority>,<subaddr>,<satype>] REL ASYNC [,<priority>,<subaddr>,<satype>] REL SYNC [,<priority>,<subaddr>,<satype>] VOICE [,<priority>,<subaddr>,<satype>] VOICE/XXX [,<priority>,<subaddr>,<satype>] ALT VOICE/XXX [,<priority>,<subaddr>,<satype>]	Type of incoming call: asynchronous transparent synchronous transparent asynchronous non-transparent synchronous non-transparent normal voice (TS 11) voice followed by data (BS 81) (XXX is ASYNC,

<p>GPRS <PDP_type>,<PDP_addr>[,<L2P>][,<APN>]]</p> <p>VGC <GCA>, <Gid>, <ackflag>[,<priority>]</p> <p>VBC <GCA>, <Gid>, <ackflag>[,<priority>]</p>	<p>SYNC,REL SYNC,REL ASYNC)</p> <p>alternating voice/data, voice first (BS 61)</p> <p>alternating voice/data, data first (BS 61)</p> <p>GPRS network request for PDP context activation</p> <p>voice group call (TS 91)</p> <p>voice broadcast call (TS 92)</p>
<p>The optional <priority> indicates the EMLPP priority level of the incoming call by paging, notification or setup message.</p> <p><subaddr>: string type subaddress of format specified by <satype></p> <p><satype>: type of subaddress octet in integer format</p> <p><PDP_type> ,<PDP_addr> and <APN> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.250 online data state) the MT shall reject the request. No corresponding unsolicited result code shall be issued when the MT returns to a command state.</p> <p><GCA> is a part of the group call reference and indicates group call area.</p> <p><Gid> is a part of the group call reference and indicates group call identification.The <ackflag>=1 proposes that a predefined confirmation procedure is to be used after the call is ended. For <ackflag>=0 no confirmation procedure is required</p>	

Example:

```

AT+CRC?
+CRC: 0
OK
AT+CRC=?

```

+CRC: (0-1)

OK

Example - RING/+CRING indication

(..Incoming Data Call..)

RING

RING

RING

AT+CRC=1 //Enable extended ring format

OK

+CRING: REL ASYNC

+CRING: REL ASYNC

ath

OK

AT+CRC=1

OK

+CRING: ALT Voice/Data

NO CARRIER

5.3.7 +CLIP, Calling Line Identification

This command controls the Calling Line Identity (CLI) presentation indication to the terminal when an incoming call is detected by the H3xx.

This command allows the user to query the provisioning status of the CLI by the network and by the H3xx. The command also allows the user to enable/disable the CLI presentation by the H3xx to the terminal.

The +CLIP indication information varies depending on what is provided by the network and what information is stored in the H3xx phone book.

Command	Syntax	Response/Action	Remarks
Set	AT+CLIP=[<n>]	OK or: +CME ERROR: <err>	The Set command enables or disables the presentation of the CLI indication from the H3xx to the terminal. Note: The Set command does not address the network.
Read	AT+CLIP?	+CLIP: <n>, <m> OK	The Read command returns the +CLIP enable/disable state in the H3xx as well as in the network provisioning state of the CLI presentation.
Command	Syntax	Response/Action	Remarks

Test	AT+CLIP=?	+CLIP: (0,1) OK	The Test command returns the Set command options (0,1).
------	-----------	--------------------	---

5.3.8 +CLIP Indication

When the CLI presentation indication is enabled by the H3xx (<n>=1), this unsolicited indication is sent to the terminal after the RING indication.

+CLIP: <number>,<type>[,<subaddr>,<satype>[[,<alpha>]],<CLI validity>]]]

The following table shows the +CLIP parameters.

<Parameter>	Description
<n>	Enables/disables the CLI presentation indication after the ring indication: 0 Disable CLI presentation 1 Enable CLI presentation The default value is 0.
<m>	Shows the subscriber CLIP service status in the network: 0 CLIP not provisioned 1 CLIP provisioned 2 Unknown (for example, no network and so on)
<"number">	Calling line number. The number format is specified by <type>.
<type>	Type of address octet in integer format: 145 Default when the dialing string includes the international access code character "+". 129 Default when making a local call. 128 Type of number is unknown (usually the output when the number itself is unknown).
<subaddr>	NULL, field not used (String type subaddress of format specified by <satype>)
<satype>	Field not used. Value is always 128 (unknown) - type of sub address octet in integer format.
<"alpha">	Name of the calling party (if provided by the network).
<CLI validity>	The Validity of the Calling Line Identity presentation: 0 CLI valid. 1 CLI has been withheld by the originator. 2 CLI is not available due to networking problems or limitations of the originating network.

Example:

AT+CLIP=?

+CLIP: (0,1)//CLI presentation is disabled by the H3xx (0) and is enabled by the network (1)

OK

AT+CLIP=1

OK

Example +CLIP indication:

(...incoming call...)

RING

+CLIP: "13510503472",129,,,"",0

Example +CLIP indication with restricted CLI:

AT+CLIP=1

OK

(...incoming call..., caller restricted the CLI presentation (used AT+CLIR)...)

+CRING: VOICE

+CLIP: "",128,,128,"",1

5.3.9 +CCWA, Call Waiting Command

This command controls the Call Waiting supplementary service, including the settings and the queries of the H3xx and the network.

When the Call Waiting indication is enabled by the H3xx and there is a waiting call, a +CCWA: indication is sent from the H3xx to the terminal. The indication will appear one time

Note: The H3xx supports only one of the services at a time: Voice or Data. Multiparty is a voice-only functionality.

A CCWA indication is sent to the terminal only during a voice call-waiting event. A CCWA indication is not sent for a data call during in a voice session.

Command	Syntax	Response	Remarks
---------	--------	----------	---------

Set	+CCWA=[<n>[,<mode>[,<class>]]]	OK If <mode>=2 and the command succeeds: +CCWA: <status>,<class>[<CR><LF> +CCWA: <status>,<class> [...]] OK	The Set command enables/disables the Call-Waiting indication in the H3xx and in the network. Activation, deactivation and status query are supported. Note: When the <mode> parameter is set to 2 (network query), the <n> parameter is ignored. This means that no enable/disable action is performed while querying the network.
Read	+CCWA?	+CCWA: <n> OK	The Read command returns the enable/disable status of the call waiting indication in the H3xx (<n>).
Test	+CCWA=?	+CCWA: (list of supported <n>s) OK	The Test command returns <n> values supported by the H3xx as a compound value.

The following table shows the <class> parameters.

<Class>	Description
1	Voice (telephony)
2	data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)
4	Fax (facsimile services)
8	short message service
16	data circuit sync
32	data circuit async
64	dedicated packet access
128	dedicated PAD access

5.3.10+CCWA Indication

When a call-waiting indication is enabled by the H3xx (<n>=1), the following unsolicited indication is sent to the terminal from the H3xx:

+CCWA: <number>,<type>,<class>[,<alpha>] [,<CLI validity>]

The following table shows the +CCWA parameters.

<Parameter>	Description
<n>	Enables/disables the call waiting indication to the terminal by the H3xx.

	<p>0 - Disable</p> <p>1 - Enable</p> <p>The default value is 0.</p>
<mode>	<p>Call waiting service request to the network. When the <mode> parameter is not given, the network is not interrogated.</p> <p>0 - Disable</p> <p>1 - Enable</p> <p>2 - Query status</p>
<class>	<p>Sum of integers each representing a class of information.</p> <p>Please see class table in +CCWA command.</p> <p>The default value is 7.</p>
<number>	<p>Calling line number. The number format is specified by <type>.</p>
<type>	<p>Type of address octet in integer format:</p> <p>145 - Default when the dialing string includes the international access code character "+".</p> <p>129 - Default when making a local call.</p> <p>128 - Type of number is unknown (usually the output when the number itself is unknown)</p>
<status>	<p>Call waiting support by the network (output for <mode>=2).</p> <p>0 - Not active</p> <p>1 - Active</p>
<alpha>	<p>Name of the calling party (if provided by the network).</p>
<CLI validity>	<p>The Validity of the Calling Line Identity presentation:</p> <p>0 - CLI valid.</p> <p>1 - CLI has been withheld by the originator.</p> <p>2 - CLI is not available due to networking problems or limitations of the originating network.</p>

Note: When the parameter <mode> is 2 (Query status), the first parameter is ignored and the third parameter is always treated as class = 1 unless it was set in Set Mode.

Example:

```

AT+CCWA=1           //Enable call waiting on H3xx
OK
AT+CCWA=?

```

```
+CCWA: (0,1)
```

```
OK
```

```
AT+CCWA?
```

```
+CCWA: 1
```

```
OK
```

Examples of +CCWA set command - network interrogation

```
AT+CCWA=1,2 //Class parameter is considered as 7
```

```
+CCWA: 1,1 //Call waiting is active for class 1, voice
```

```
OK
```

```
AT+CCWA=1,2,2 //Class parameter is 2
```

```
+CCWA: 0,2 //Call waiting is not active for class 2, data
```

```
OK
```

```
AT+CCWA=1,1
```

```
OK //Enable the call waiting feature in the network, and in the H3xx
```

Example +CCWA indication

```
atd9311234567; //Originate a voice call
```

```
OK
```

```
OK //Voice call connected
```

```
(...conversation...)
```

```
(... call waiting indication received by the H3xx ...)
```

```
+CCWA: "+358317654321",145,1,"Bob"
```

```
AT+CHLD=0 //Release the waiting call
```

```
OK
```

```
NO CARRIER
```

```
AT+CRC=1 //RING indication is not relevant to CCWA indication
```

```
OK
```

```
(...waiting call..., caller restricted to its CLI presentation (used AT+CLIR)...)
```

```
+CCWA: "",128,1,"",1 //CLI is restricted, but call type recognized as voice
```

5.3.11+CHLD, Call Related Supplementary Services Command

This command controls the Call Hold and Multiparty Conversation services. This command manipulates voice calls only. The Set command allows the control of the following call related services:

- ◆ Call HOLD: A call can be temporarily disconnected from the H3xx, but the connection is retained by the network.
- ◆ MTPY (Multi party) Conversation: Conference calls.

The network does not reserve more than one traffic channel for a mobile station, therefore the H3xx can have only one call on hold at a time.

Note: Only voice calls can be put on HOLD.

A precondition for the multi-party service is that the H3xx is in control of one active call and one call on hold. In this situation, the H3xx can request the network to begin the MTPY (Multi Party) service. Once a MTPY call is active, remote parties may be added, disconnected or separated (removed from the MTPY call, but remain connected to the served mobile subscriber). The maximum number of remote parties is 5.

In this command, the term CALL refers to a single or MTPY call.

A single Active call is considered a MTPY call with one call index numbered as 1.

Command	Response/Action
+CHLD=<n>	If the call is terminated: OK (approve request was submitted) NO CARRIER If the call state is changed (link, split, from active to hold, and so on): OK (approve request was done) If the call is terminated and another call is answered OK (call answered and is now connected) NO CARRIER

Command	Syntax	Response/Action	Remarks
Test	+CHLD =?	+CHLD: (list of supported <n>s) OK	The Test command returns <n> values supported by the H3xx to the terminal

The following table shows the +CHLD parameters.

Parameter n	Description
0	Release all held calls or set User Determined User Busy for a waiting\incoming call; if both exists then only the waiting call will be rejected.

1	Releases all active calls and accepts the held or waiting call Note: In the scenario: An active call, a waiting call and held call, when the active call is terminated, we will make the Waiting call as active.
1x	Release a specific call (x specific call number as indicated by +CCLC)
2	Place all active calls (if exist) on hold and accepts the other call (held or waiting\incoming). If only one call exists which is active, place it on hold and if only held call exists make it active call
2x	Place all active calls on hold except call x with which communication is supported
3	Adds a held call to the conversation
4	Connects the two calls and disconnects the subscriber from both calls (Explicit Call Transfer)
6	Puts an active call on hold or an held call to active, while another call is waiting
7	Disconnect users in multiparty without accepting incoming call
8	release all calls

Example:

```

AT+CHLD=?
+CCHLD: (0,1,1x,2,2x,3,4,6,7,8)
OK
AT+CCWA=1 //Enable call waiting
OK
atd9311234567; //Originate a voice call
OK
OK (...conversation...)
+CCWA: "+358317654321 ",145,1,"Bob" //Awaiting call alerts
AT+CHLD=2 //Put first call on hold and answer the second call
OK (...conversation...)
AT+CHLD=3 //Add the held call to the conversation
OK
(...MTPY conversation...)
AT+CHLD=22 //Split: Place the MO active call on hold, MT call remains active
OK
AT+CHLD=0 //Release the held call
OK
NO CARRIER

```

```

ath //Release the active call
OK
NO CARRIER
atd9311234567; //Originate a voice call
OK
OK
+CCWA: "055728386",129,1," ",0 //Waiting call alerts
AT+CHLD=1 //Release the active call, accept the waiting call
OK
NO CARRIER //Active 9311234567 was released
OK //Waiting 055728386 was answered

```

5.3.12+CCFC, Call Forwarding Number and Conditions

This command enables control of the call-forwarding supplementary service. Registration, erasure, activation, deactivation, and status query are supported.

Command	Syntax	Response/Action	Remarks
Set	+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<subaddr>[,<satype>[,<time>]]]]]]]]	<p>If the command succeeds:</p> <p>+CCFC: <status>,<class>[,<number>,<type>[,<subaddr>,<satype>[,<time>]]] [<cr><LF></cr></p> <p>+CCFC: <status>,<class>[,<number>,<type>[,<subaddr>,<satype>[,<time>]]] [...]</p> <p>+CCFC: (list of supported <reason>s)</p>	<p>The Set command instructs the H3xx which call forwarding settings to request from network. The Set command, in query mode, interrogates the network about the subscriber current call forwarding status.</p>
Test	+CCFC=?	+CCFC: <reason> OK	The Test command returns <reason> values supported by the H3xx to the terminal.

The following table shows the +CCFC parameters.

<Parameter>	Description
<reason>	0 - Unconditional 1 - Mobile busy 2 - No reply

	3 - Not reachable 4 - All call forwarding 5 - All conditional call forwarding
<mode>	0 - Disable 1 - Enable 2 - Query status 3 - Registration 4 - Erasure
<number>	Calling line number. The number format is specified by <type>.
<type>	Type of address octet in integer format- 145 Default when dialing string includes international access code character "+". 129 Default when making a local call.
<subaddr>	NULL, field not used (String type subaddress of format specified by <satype>).
<satype>	Field not used. Value is always 128 (unknown) - type of sub address octet in integer format.
<class>	The sum of integers, each representing a class of information. Please see class table in +CCWA command. The default value is 7.
<time>	1-30 - The number of seconds to wait before calls are forwarded, when "no reply" is enabled or queried. The default value is 20. Note: The parameter must be a multiple of 5, for example, 5, 10, 15 and so on.
<status>	0 - Not active 1 - Active

Note: A forward-to phone <number> (and the optional fields <type>, <subaddr> and <satype>) are tied to a <reason> and a <class>. This means that there can be a different <number> for the same <reason> because of a different <class>. When registering without mentioning a <class>, <class>=7 is selected.

A <number> field is mandatory when registering (<mode>=3) and it is irrelevant (ignored) in all other <mode>s.

Example:

AT+CCFC=?

+CCFC: (0,1,2,3,4,5)

OK

AT+CCFC=0,3,"01256316830",129,1

```
OK
AT+CCFC=1,3,"0545658278",129,1 //Register UC forward-to of all classes.
OK
AT+CCFC=1,1 //Activate UC forward-to of all classes.
OK
AT+CCFC=1,2 //Interrogate reason not-reachable of all classes.
+CCFC: 1,1,"+97254151200",145
+CCFC: 0,2,"",0
+CCFC: 0,4,"",0
OK //For <reason>=3, forward only voice calls is activated.
AT+CCFC=4,2 //Interrogate reason all-call-forwarding for all classes.
+CME ERROR: no network service//Interrogation of <reason>=30 is not supported by network.
AT+CCFC=2,3,"+972545658278"
OK
AT+CCFC=2,0 //Disable call-forwarding for reason no-reply of all classes.
OK
AT+CCFC=2,2
+CCFC: 0,1,"+972545658278",145,,25
+CCFC: 0,2,"+972545658278",145,,25
+CCFC: 0,4,"+972545658278",145,,25
OK
```

5.3.13+CLIR, Calling Line Identification Restriction

This command instructs the H3xx to query, enable or disable the presentation of the CLI (calling line ID) of a MO call to the called party. The restriction of the CLI (disable presentation) is dependent both on the H3xx and on the network.

The network enables three possible provisions of CLIR:

- ◆ Not provisioned (CLIR Off - presentation allowed)
- ◆ Provisioned permanently
- ◆ Provisioned with Temporary mode

The provision is fixed and cannot be changed by an AT command. Temporary Mode:

Temporary mode can be in one of two states:

- ◆ A - Presentation restricted (CLIR On) as default.
- ◆ B - Presentation allowed (CLIR Off) as default. A subscriber to Temporary mode always has a default subscription to state A or B. Temporary-mode provisioning means that the terminal can request the H3xx to switch the default mode from A to B, and vice versa.

Note: When a service is in state A, and the terminal wants to enable the CLI presentation (turn CLIR off) for a single call, it can do so using the ATD command. This does not change the Temporary mode state. This can also be done when the service is in state B and the terminal wants

to disable the CLI presentation (turn CLIR on) for a single call.

Command	Syntax	Response/Action	Remarks
Set	+CLIR=<n> >	OK or: +CME ERROR: <err>	The Set command instructs the H3xx to enable/disable CLI restriction for all MO calls.
Read	+CLIR?	+CLIR: <n>,<m> OK	The Read command returns the current setting of CLIR on the network <m> and on the H3xx <n>.
Test	+CLIR=?	+CLIR: (list of supported<n>s)	The Test command returns <n> values supported by the H3xx.

The following table shows the +CLIR parameters.

<Parameter>	Description
<n>	Adjustment for outgoing calls 0 - Presentation indicator is used according to the subscription of the CLIR service 1 - CLIR invocation 2 - CLIR suppression The default value is 2.
<m>	Subscriber CLIR service status in the network 0 - CLIR not provisioned 1 - CLIR provisioned in permanent mode 2 - Unknown (for example, no network and so on) 3 - CLIR Temporary mode presentation restricted (can be the default) 4 - CLIR Temporary mode presentation allowed (can be the default)

Example:

```

AT+CLIR=?
+CLIR: (0-2)
OK
AT+CLIR?
+CLIR: 0,0
AT+CLIR=2
OK
atd054565195; //MO voice call
OK
(... calling ...)

```

(... a H3xx that has 054565195 SIM and is CLIP enabled will receive the following on the terminal:

```
RING
+CLIP: "",128,,128,"",1
RING
+CLIP: "",128,,128,"",1)
ath
NO CARRIER
OK
AT+CLIR=0
OK
atd054565195; //MO voice call
OK
```

(... calling ...)

(... a H3xx that has 054565195 SIM and is CLIP enabled will receive the following on the terminal:

```
RING
+CLIP: "054565006",129,,128,"",0
RING
+CLIP: "054565006",129,,128,"",0 ...)
ath
OK
NO CARRIER
```

5.3.14+CBST, Select Bearer Service Type

This command sets the bearer service (data circuit duplex asynchronous and synchronous). It chooses one of the bearer services, the data rate of the service (actually the modulation when modem IWFs are used), and enables or disables the Radio Link Protocol.

Command	Syntax	Response/Action	Remarks
Set	AT+CB ST=[<s peed>[, <name >[,<ce>]	OK +CME ERROR: <err>	The Set command selects the bearer service <name> with data rate <speed> and the connection element <ce> to be used when data calls are originated (refer to GSM 02.02). Values may also be used during

]]		mobile terminated data call setup, especially in the case of single numbering scheme calls. Note: For incoming calls, the bearer service will be taken automatically from incoming parameters and not according to the CBST Set command. The H3xx does not change the output, but for incoming calls, the phone works in automatic mode.
Read	AT+CBST?	+CBST: <speed>,<name>,<ce> OK	
Test	AT+CBST=?	+CBST: (list of supported <speed>s), (list of supported <name>s), (list of supported <ce>s) OK	The Test command returns values supported by the MA as compound values.

The following table shows the +CBST parameters.

<Parameter>	Description
<speed>	0 - Auto-bauding (automatic selection of the speed; this setting is possible in case of 3.1 kHz modem and non-transparent service) 4 -2400 bps (V.22bis) 5 -2400 bps (V.26ter) 6 - 4800 bps (V.32) 7 - 9600 bps (V.32) 12 -9600 bps (V.34)

	<p>14 -14400 bps (V.34)</p> <p>15 -19200 bps (V.34)</p> <p>16 -28800 bps (V.34)</p> <p>17 -33600 bps (V.34)</p> <p>39 -9600 bps (V.120)</p> <p>43 -14400 bps (V.120)</p> <p>47 -19200 bps (V.120)</p> <p>48 -28800 bps (V.120)</p> <p>49 -38400 bps (V.120)</p> <p>50 -48000 bps (V.120)</p> <p>51 -56000 bps (V.120)</p> <p>68 -2400 bps (V.110 or X.31 flag stuffing)</p> <p>70 - 4800 bps (V.110 or X.31 flag stuffing)</p> <p>71 - 9600 bps (V.110 or X.31 flag stuffing)</p> <p>75 -14400 bps (V.110 or X.31 flag stuffing)</p> <p>79 -19200 bps (V.110 or X.31 flag stuffing)</p> <p>80 -28800 bps (V.110 or X.31 flag stuffing)</p> <p>81 -38400 bps (V.110 or X.31 flag stuffing)</p> <p>82 -48000 bps (V.110 or X.31 flag stuffing)</p> <p>83 -56000 bps (V.110 or X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI or RDI service in order to get FTM)</p> <p>84 -64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM)</p> <p>115 -56000 bps (bit transparent)</p> <p>116 -64000 bps (bit transparent)</p> <p>120 -32000 bps (PIAFS32k)</p> <p>121 -64000 bps (PIAFS64k)</p> <p>130 -28800 bps (multimedia)</p> <p>131 -32000 bps (multimedia)</p> <p>132 -33600 bps (multimedia)</p> <p>133 -56000 bps (multimedia)</p> <p>134 -64000 bps (multimedia)</p> <p>The default value is 7.</p>
<name>	0 - Data circuit asynchronous (UDI or 3.1 kHz modem)

	<p>The default value is 0.</p> <p>1 - data circuit synchronous (UDI or 3.1 kHz modem)</p> <p>4 - data circuit asynchronous (RDI)</p> <p>5 - data circuit synchronous (RDI)</p>
<ce>	<p>0 - Transparent</p> <p>1 - Non-transparent (default)</p> <p>2 - both, transparent preferred</p> <p>3 - both, non-transparent preferred</p>

Example:

```

AT+CBST=?
+CBST: (0,4-7,12,14-17,68,70-71,75,79-84,115-116,120-121,130-134),(0-1,4-5),(0-3)
OK
AT+CBST?
+CBST: 7,0,1
OK
AT+CBST=6
OK
AT+CBST?
+CBST: 6,0,1
OK

```

5.3.150, Return to Online Data State

This command returns the H3xx from the Command mode to the Online Data mode and issues a CONNECT or CONNECT <text> result code.

After dialing or answering (atd/ata commands and connect), the phone enters the Online Data mode where it is able to transfer data, but not to enter AT commands.

The ESC command +++, transfers the phone to the Command mode (able to input AT commands, while preserving the Data call). The O command returns the phone to the fully Online Data mode (as it was before using the ESC command).

Note: The escape character '+' can be changed using the S2-register. The time delay between consecutive escape characters is configured using the S 12-register.

Command	Syntax	Response/Action
Execute	ATO	CONNECT +CME ERROR: <err> If phone is not in Data Call

		NO CARRIER: If connection is not successfully resumed.
--	--	--

Example:

```

ATD035684072 //Calling a remote modem - data call
CONNECT //H3xx is in Data mode
//Escaping back to Command mode using the +++ sequence
OK
AT //H3xx is in Command mode
OK
ATO //Returning to Data mode
CONNECT

```

5.3.16+CHUP, Hang Up Call

This command causes the H3xx to hang up the current call.

Command	Syntax	Response/Action	Remarks
Set	+CHUP	OK or: +CME ERROR <err>	The Set command hangs up the current GSM call.

Example:

```

atd15986784172;
OK
OK
At+CHUP
OK
NO CARRIER

```

5.3.17+MDC, Selection of Desired Message to Be Displayed Upon Connection of a Voice Call

This AT command enables you to select the desired messages to be displayed upon connection of a voice call with a remote party. The OK and CONNECT messages are available.

Command	Syntax	Response/Action	Remarks
Set	+MDC=<mode>	OK or: +CME ERROR: <err>	The Set command selects which of the supported messages will be displayed upon connection of a voice call. <mode> Command Parameters:

			0 - Display OK on voice call connection 1 - Display CONNECT on voice call connection Default Values: Power Up - As previously saved in NVM 0 - Before Set command is first used
Read	+MDC?	+MDC: <mode> OK	The Read command should return the current selection of <mode>.
Test	+MDC=?	+MDC: (list of supported <mode>s) OK	The Test command returns the possible <mode> values.

Example:

```

AT+MDC=?
+MDC: (0-1)
OK
AT+MDC=1
OK
ATD<number>;
OK
CONNECT
AT+MDC?
+MDC: 1
OK
AT+MDC=0
OK
ATD<number>;
OK
OK
AT+MDC?
+MDC: 0
OK
  
```

5.3.18+MHUP, H3xx Hung UP call

This command hung up specific call or all calls, and reported a specific disconnect cause to the NW.

Command	Syntax	Response/Action	Remarks
---------	--------	-----------------	---------

Set	AT+MHUP=<cause>[,<call_id>]	OK or: +CME ERROR: <err>	
Test	AT+MHUP=?	+MHUP: (1,16,17,18,27,31),(0-7) OK	Show list of supported <cause>'s and list of supported <call_id>'s.

The following table shows the +MHUP parameters.

<Parameter>	Description
<cause>	Cause description, send to the NW in the "disconnect" message. 1 "Unassigned (unallocated) number" 16 "Normal call clearing" 17 "User busy" 18 "No user responding" 27 "Destination out of order" 31 "Normal, unspecified"
<call_id>	Index of the call id (same as <idx> in +CLCC command) 0 All calls (default). 1-7 Specific call id.

Example:

```

AT+MHUP=?
+MHUP: (1,16,17,18,27,31),(0-7)
OK
AT+MHUP = 16,3 //Hung up call #3, and send cause "Normal call clearing"
OK
NO CARRIER
AT+MHUP = 17 //Hung up all calls, and send cause "User busy"
OK
NO CARRIER
AT+MHUP = 17,0 //Hung up all calls, and send cause "User busy"
OK
NO CARRIER
  
```

5.4 Call Status Messages

5.4.1 +CPAS, Phone Activity Status

This command displays the current activity status of the H3xx; like call in progress, or ringing.

Command	Syntax	Response/Action	Remarks
Execute/Read	AT+CPAS	+CPAS: <pas> OK or: +CME ERROR: <err>	The Execute and Read commands return the activity status <pas> of the H3xx. They can be used to interrogate the H3xx.
Test	AT+CPAS=?	+CPAS: (list of supported <pas>s) OK	

The following table shows the +CPAS parameters.

<Parameter>	Description
<pas>	0 - Ready - The H3xx allows commands from the terminal 1 - unavailable(MT does not allow commands from TA/TE) 2 - Unknown - The H3xx is not guaranteed to respond to instructions 3 - Ringing (MT calls) - The H3xx is ready for commands from the terminal, but the ringer is active 4 - Call in progress - The H3xx is ready for commands from the terminal, but a call is in progress 5 - asleep(MT is unable to process commands from TA/TE because it is in a low functionality state)

Example:

```

AT+CPAS
+CPAS: 0
OK
AT+CPAS=?
+CPAS: (0-5)
OK
AT+CPAS?
+CPAS: 4
OK
AT+CPAS//Voice call active state
+CPAS: 4
OK

```

5.4.2 +CLCC, List Current Calls

This command displays a list of all current H3xx calls and their statuses, and also enables/disables the unsolicited indication of the call list. (If no calls are received, no information response is sent to the terminal.)

If the command succeeds but no calls are available, no information response is sent to the terminal.

The maximum number of simultaneous multiparty calls is 5+1 (5 in active group and 1 on hold).

Command	Syntax	Response/Action	Remarks
Set	AT+CLC C=<state> >	OK or: +CME ERROR: <err>	The Set command enables/disables unsolicited indications.
Execute	AT+CLC C	+CLCC: <idx>,<dir>,<call state>,<mode>,<mpy>,<number>,<type> [<CR><LF> + CLCC: <idx>,<dir>,<call state>,<mode>,<mpy>,<number>,<type> [...]] OK	The Execute command enables the receiving of data about current calls.
Read	AT+CLC C?	+CLCC: <state> OK or: +CME ERROR <err>	The Read command returns the call status.
Command	Syntax	Response/Action	Remarks
Test	AT+CLC C=?	+CLCC: (List of supported <state>s) OK or: +CME ERROR <err>	

The following table shows the +CLCC parameters.

<Parameter>	Description
<state>	0 Disable CLCC unsolicited indication
	1 Enable CLCC unsolicited indication The default value is 0.
<idx>	Integer type, call identification number
<dir>	0 Mobile originated call (MO)
	1 Mobile terminated call (MT)
<call state>	The state of the call 0 Active 1 Held 2 Dialing (MO call)

	3 Alerting (MO call) 4 Incoming (MT call) 5 Waiting (MT call) 6 Released
<mode>	Bearer/Teleservice 0 Voice Call 1 Data
<mpty>	Multiparty status 0 Call is not part of a multiparty call 1 Call is one of multiparty call parties
<number>	Phone number in the format specified by <type>. Contains a string of up to 32 characters.
<type>	Phone number display format. Type of address octet in integer format (refer to GSM 04.08 subclause 10.5.4.7) 129 Local number 145 International number with access character +

Note: When a mobile-originated call is routed to PSTN (PABX), no ALERT indication is prompted.

Example:

```

AT+CLCC=?
+CLCC: (0,1)
OK
AT+CLCC
+CLCC: 1,0,0,0,0,"01256316830",129
OK
AT+CLCC?
+CLCC: 0
OK
AT+CLCC=1 //Example with unsolicited indication
OK
ATD055490698;
OK
+CLCC: 1,0,2,0,0,"055490698",129
+CLCC: 1,0,3,0,0,"055490698",129
  
```

```

OK
+CLCC: 1,0,0,0,0,"055490698",129
ATH
NO CARRIER
OK
+CLCC: 1,0,6,0,0,"055490698",129

```

5.4.3 +MCST, Call Status Messages

This command displays the current state of the call processing, and also enables/disables the unsolicited indication of any change in the call processing state.

Command	Syntax	Response/Action	Remarks
Set	+MCS T=<n>	OK or: +CME ERROR: <err>	The Set command Enables/Disables the unsolicited call status messages.
Read	+MCS T?	+MCST: <state> OK	The Read command returns the current call processing state.

When a change in call state occurs and the +MCST is set to n=1 the H3xx will give the following indication:

```

+MCST: <state>
+MCST Parameters

```

The following table shows the +MCST parameters.

<Parameter>	Description
<n>	0 - Disable MCST unsolicited indication 1 - Enable MCST unsolicited indication
<state>	1 - Idle call state 2 - Single incoming call 3 - Single call active 4 - Multi-party call active 5 - Single call held 6 - Multi-party call held 7 - Dual call (fully connected active call and held call) 8 - Dual multi-party call active 9 - Dual multi-party call held

	10 - Single active call plus call waiting
	11 - Multi-party call active plus call waiting
	12 - Single call held plus call waiting
	13 - Multi-party call held plus call waiting
	14 - Dual calls plus call waiting
	15 - Dual multi-party calls active plus call waiting
	16 - Dual multi-party calls held plus call waiting
	17 - Call control busy
	64 - Calling
	68 - No Service
	69 - No Redial
	72 - Security Fail

Example:

```

AT+MCST?
+MCST: // <idle>
AT+MCST=1
OK
atd035684423;
+MCST: 17
OK
+MCST: 17
OK
+MCST: 3
+MCST: 17
NO CARRIER
+MCST: 1

```

5.5 Call Advice of Charge Commands

This set of commands enables GSM operators to offer Advice of Charge (AoC) services that calculate call charges. These charges are expressed in terms of home units.

5.5.1 +CAOC, Advice of Charge

This command displays information about the cost of calls. If supported, this command also activates/deactivates unsolicited event reporting of the CCM (Current Call Meter) information.

The unsolicited report +CCCM: <ccm> is sent when the CCM value changes, but not more than once every 10 seconds.

Note: The CCM value depends on the network properties (charge for MO or/and MT calls).

- ◆ There are two states in which the command can be activated:
- ◆ In IDLE state - returns the last call cost.
- ◆ A voice/data state - returns the accumulated cost, including the current call.

Command	Syntax	Response/Action	Remarks
Set	+CAOC[=<mode>]	[+CAOC: <ccm>] OK or: +CME ERROR: <err>	The Set command returns the CCM value from the H3xx, or activates/deactivates unsolicited reports.
Read	+CAOC? +CAOC	+CAOC: <mode> OK or: [+CAOC: <ccm>] or: +CME ERROR: <err>	The Read command returns the current CAOC mode.
Command	Syntax	Response/Action	Remarks
Test	+CAOC=?	+CAOC: (list of supported <mode>s) OK	The Test command returns the supported mode values.

The following table shows the +CAOC parameters.

<Parameter>	Description
<mode>	0 Queries the CCM value 1 Deactivates unsolicited reporting of the CCM value 2 Activates unsolicited reporting of the CCM value

Note: <CCM>: String type value representing three bytes of the current call meter value in hexadecimal format (for example, "00001E" indicates decimal value 30).

Example:

Example with prepaid SIM card with 56700.00L prepaid before the test.

AT

OK

AT+CAOC=2

OK

atd+97254565190;

OK

OK

+CCCM: "000000"

+CCCM: "000006"

AT+CAOC

+CAOC: "000009"

OK

+CCCM: "00000e"

+CCCM: "000016"

AT+CAOC

+CAOC: "00001d"

OK

+CCCM: "00001e"

+CCCM: "000027"

AT+CAOC=0

+CAOC: "00002d"

OK

AT+CAOC=2

OK

+CCCM: "00003d"

AT+CAOC

+CAOC: "00003f"

OK

+CCCM: "000046"

AT

+CCCM: "00004e"

+CAOC

+CAOC: "00004f"

OK

+CCCM: "000056"

AT+CAOC

+CAOC: "00005d"

OK

+CCCM: "00005e"

NO CARRIER

AT+CAOC

+CAOC: "000066"

OK

//567 (prepaid SIM value) - 102 (price per call unit by provider) x 66 (call units) = 465 left in

There is now 46500.00L prepaid remaining on the SIM card.

Note: The above example shows first time activation of the AOC feature using the H3xx. Therefore, the accumulated cost is equal to the current call cost.

5.5.2 +CACM, Accumulated Call Meter

This command resets the Advice of Charge accumulated call meter value in the SIM file, EFACM. ACM contains the total number of home units for both the current call and preceding calls.

Command	Syntax	Response/Action	Remarks
Set	+CACM =<pass wd>	OK +CME ERROR: <err>	The Set command resets the accumulated call meter value. SIM PIN2 is required.
Read	+CACM ?	+CACM: <acm> +CME ERROR: <err>	The Read command displays the current value of ACM.
Command	Syntax	Response/Action	Remarks
Test	+CACM =?	OK	The Test command indicates whether the +CACM command is functioning.

The following table shows the +CACM parameters.

<Parameter>	Description
<passwd>	SIM PIN2 password Maximum string length is 8 characters. If this value is exceeded, the command terminates in an error. If PIN2 is incorrect, "+CME ERROR: incorrect password" is displayed.
<acm>	Accumulated call meter maximum value (similar to CCM; Refer to "+CAOC, Advice of Charge"). The default value is 0. <ccm> String type; three bytes of the current call meter value in hexadecimal format (for example, 00001E indicates a decimal value of 30). Value is given in home units; bytes are similarly coded as the ACMmax value in the SIM.

Example:

AT+CACM=?

OK

AT+CACM?

+CACM: "000000"

OK

AT+CACM="2222"

OK

5.5.3 +CMM, Accumulated Call Meter Maximum

This command sets the Advice of Charge accumulated call meter maximum value in the SIM file, EFACMmax. ACMmax contains the maximum number of home units the subscriber is able to consume. When the ACM (Refer to "+CACM, Accumulated Call Meter") reaches ACMmax, additional calls (mobile-originated and mobile-terminated calls that incur charges) are prohibited, except for emergency calls. Refer to GSM 02.24.

Command	Syntax	Response/Action	Remarks
Set	+CMM =[<acm_max>, <passwd>]	OK +CME ERROR: <err>	The Set command sets the accumulated call meter maximum value. SIM PIN2 is required. The value that is set remains after a power cycle. Note: This command is activated if Advice of Charge is supported by the network.
Command	Syntax	Response/Action	Remarks
Read	+CMM ?	+CMM: <acmmax> OK	The Read command displays the current value of ACMmax.
Test	+CMM =?	OK	The Test command indicates whether the +CMM command is functioning.

The following table shows the +CMM parameters.

<Parameter>	Description
<acmmax>	Accumulated call meter maximum value (similar to CCM; Refer to "+CAOC, Advice of Charge") <ccm> String type; three bytes of the current call meter value in hexadecimal format (for example, 00001E indicates a decimal value of 30). Value is given in home units; bytes are similarly coded as the ACMmax value in the SIM. Range is from 00001 to FFFFFFF. 0 Disables ACMmax (default)
<passwd>	SIM PIN2 password Maximum string length is 8 characters. If this value is exceeded, the command terminates in an error. If PIN2 is incorrect, "+CME ERROR: incorrect password" is displayed.

Example:

```

AT+CAMM=?
OK
AT+CAMM="FFFFFF","2222"
OK
AT+CAMM?
+CAMM: "FFFFFF"
OK

```

5.5.4 +CPUC, Price per Unit and Currency Table

This command sets the parameters of the Advice of Charge-related price per unit and currency table found in the SIM file, EFPUCT. PUCT information is used to convert the home units (used in +CAOC, +CACM and +CAMM) into currency units.

Command	Syntax	Response/Action	Remarks
Set	+CPUC= <currency>,<ppu> ,<passwd> >	OK +CME ERROR: <err>	The Set command sets the price per unit and the currency table. SIM PIN2 is required. The new value is retained after a power cycle.
Read	+CPUC?	+CPUC: <currency>,<ppu> OK	The Read command displays the current price per unit and currency table.
Test	+CPUC= ?	OK	The Test command indicates whether the +CPUC command is functioning.

The following table shows the +CPUC parameters.

<Parameter>	Description
<currency>	Currency code character set (3 characters) defined by +CSCS command. (Refer to "+CSCS, Select Terminal Character Set") If the string begins with an alphanumeric character, it may be entered with or without quotation marks, for example, "GBP", "DEM".
<ppu>	Price per unit A dot is used as a decimal separator (precision of 1/1000; 15 digit maximum), for example,"2.667". [See notes below]

<passwd>	SIM PIN2 password Maximum string length is 8 characters. If this value is exceeded, the command terminates in an error. If PIN2 is incorrect, "+CME ERROR: incorrect password" is displayed.
----------	--

Example:

```

AT+CPUC=?
OK
AT+CPUC="GBP","0.125","2222"
OK
AT+CPUC?
+CUPUC: "GBP","0.125"
OK

```

Note:

- If <ppu> contains a dot, a maximum of three digits may appear after the dot, otherwise an error is generated. For example, if <ppu>=0.61, the Read command displays 0.610. <ppu>=1 .2345 terminates in an error.
- If <ppu> does not contain a dot, the number is divided by 1000. For example, if <ppu>=1, the Read command displays 0.001.
- Due to storage constraints, the <ppu> value is limited to a range of 0 to 4095. Values beyond this range may result in rounding errors. For example, if <ppu>=4095, the Read command displays 4.095. However, if <ppu>=4096, the Read command displays 4.090 (the last digit is replaced by 0). If <ppu>=456789, the Read command displays 456.000.

5.5.5 +CR, Service Reporting Control

This command controls whether or not the extended format of an outgoing call is displayed or not. The +CR indication is sent from the H3xx to the terminal whenever a data call is initiated by the H3xx.

Command	Syntax	Response/Action	Remarks
Set	+CR=[<mode>]	OK	The Set command enables/disables the extended format of an outgoing data call. When enabled, the outgoing data call is indicated to the terminal through the unsolicited result code +CR: <serv>. When the command is disabled, no +CR is sent to the terminal.
Read	+CR?	+CR: <mode> OK	The Read command displays the current service reporting control setting.

Test	+CR=?	+CR: <mode> OK	The Test command displays the list of supported CR modes.
------	-------	-------------------	---

The following table shows the +CR parameters.

<Parameter>	Description
<mode>	0 Extended format disabled (default) 1 Extended format enabled
<serv>	Type of outgoing data calls: ASYNC - Asynchronous transparent SYNC - Synchronous transparent REL ASYNC - Asynchronous non-transparent REL SYNC - Synchronous non-transparent

Example:

AT+CR=1 //Enable reporting OK

ATD1234567890

+CR: REL ASYNC

5.6 Supplementary Services

This set of commands enables control over supplementary service notifications, including Structured and Unstructured Supplementary Service Data (USSD) data.

5.6.1 +CSSN, Supplementary Service Notifications

This command handles the enabling and disabling of supplementary service-related, network-initiated, notifications.

Command	Syntax	Response/Action	Remarks
Set	+CSSN =[<n>[, <m>]]	OK or: +CME ERROR: <err>	The Set command enables/disables the display of notification result codes to the TE. When <n>=1 and a supplementary service notification is received after a mobile-originated call setup, the +CSSI: notification is sent to the TE before any other mobile-originated call setup result codes. When several different notifications are received from the network, each of them receives its own +CSSI result code.

			<p>When <m>=1 and a supplementary service notification is received during a mobile-terminated call setup or during a call, or when a forward check supplementary service notification is received, the unsolicited result code +CSSU: is sent to the TE. In case of a mobile-terminated call setup, a CSSU is sent after every +CLIP result code (“+CLIP, Calling Line Identification”). When several different events are received from the network, each of them receives its own +CSSU result code.</p> <p>Note: The values for <n> and <m> are not saved after power cycle.</p>
Read	+CSSN ?	+CSSN: <n>,<m> OK	The Read command displays the current supplementary service notification setting.
Command	Syntax	Response/Action	Remarks
Test	+CSSN =?	+CSSN: (0-1), (0-1) OK	The Test command displays the list of supported CSSN values.

The following table shows the +CSSN parameters.

<Parameter>	Description
<n>	<p>Sets/displays the +CSSI result code presentation status. This value must be specified.</p> <p>0 Disable (default)</p> <p>1 Enable</p>
<m>	<p>Sets/displays the +CSSU result code presentation status. This value is optional, but cannot be specified without <n>.</p> <p>0 Disable (default)</p> <p>1 Enable</p>

Value	Description	H3xx Support
0	Unconditional call forwarding is active	Yes
1	Some conditional call forwarding is active	Yes
2	Call has been forwarded	Yes
3	Call is waiting	Yes (GSM only)

4	CUG call (<index> is present)	Yes
5	Outgoing calls are barred	Yes
6	Incoming calls are barred	Yes
7	CLIR suppression rejected	Yes
8	Call has been deflected	No

Value	Description	H3xx Support
0	This is a forwarded call (mobile-terminated call setup)	Yes
1	CUG call (<index> is present; mobile-terminated call setup).	Yes
2	Call has been put on hold (during a voice call)	Yes
3	Call has been retrieved (during a voice call)	Yes
4	Multiparty call has been entered(during a voice call)	Yes
Value	Description	H3xx Support
5	Call on hold has been released(during a voice call; not a supplementary service notification)	Yes
6	Forward check supplementary service message received (can be received at any time)	Yes
7	Call is being connected with the remote party in an alerted state using an explicit call transfer operation (during a voice call).	Yes
8	Call has been connected with the other remote party using an explicit call transfer operation (during a voice call or during mobile-terminated call setup).Number and subaddress parameters may be present: <number>String type phone number of format defined by <type> <type>Type of address octet in integer format (refer to GSM04.08, subclause 10.5.4.7) <subaddr>String type subaddress of format defined by <satype> <satype>Type of subaddress octet in integer format (refer to GSM 04.08, subclause10.5.4.8)	Yes
9	Deflected call (mobile-terminated call setup)	YES
10	additional incoming call forwarded	YES

Example:

```

AT+CSSN=? // test command
+CSSN: (0-1),(0-1)
OK
AT+CSSN=0,0 // disable both options
OK
AT+CSSN=1,0 // set n value as enabled, m disabled
OK
AT+CSSN?
+CSSN: 1,0 // display the current n & m values
OK
+CSSI: 1 // displayed after mobile originated call setup of call forward and n enable
+CSSU: 2 //displayed when a call has been placed on hold (during the call) using the
+CHLD AT command and m enable

```

5.6.2 +CUSD, Unstructured Supplementary Service Data

This command allows control of Unstructured Supplementary Service Data (US SD), according to GSM 02.90.

Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD: <m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session. When <str> is given, a mobile initiated USSD-string or a response USSD-string to a network initiated operation is sent to the network. The response USSD-string from the network is returned in a subsequent unsolicited +CUSD result code.

Command	Syntax	Response/Action	Remarks
Set	AT+CUSD =[<n>[,<str>[,<dcs>]]]	OK or: +CME ERROR: <err>	The Set command enables/disables the display of the unsolicited result code.
Unsolicited Report		+CUSD: <m>[,<str>[,<dsc>]]]	The USSD response from the network.
Read	+CUSD?	+CUSD: <n> OK	The Read command displays the current value of <n>.
Test	+CUSD=?	+CUSD: (list of supported <n>s) OK	The Test command displays the supported values of <n>.

The following table shows the +CUSD parameters.

<Parameter>	Description
-------------	-------------

<n>	<p>0 Disable the result code presentation in the TA.</p> <p>1 Enable the result code presentation in the TA.</p> <p>2 Cancel session (not applicable to read command response).</p>
<str>	<p>String type USSD-string (when <str> parameter is not given, network is not interrogated):</p> <p>If <dc> indicates that GSM 03.38 default alphabet is used:</p> <ul style="list-style-type: none"> • If TE character set other than "HEX" (refer command Select TE Character Set +CSCS): ME/TA converts GSM alphabet into current TE character set according to rules of GSM 07.05 Annex A. • If TE character set is "HEX": ME/TA converts each 7-bit character of GSM alphabet into two IRA character long hexadecimal number (e.g. character ? (GSM 23) is presented as 17 (IRA 49 and 55)). <p>If <dc> indicates that 8-bit data coding scheme is used: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).</p>
<Parameter>	Description
<dc>	<p>GSM 03.38 - Cell Broadcast Data Coding Scheme in integer format. The supported value are:</p> <p>17 - USC2 Language Indicator. (The first character in a USC2 Lang IND has the language ID in it. This situation is not defined by the GSM 7.07 or the 3GPP 27.007 so the assuming that the first character should have the correctly formatted and packed language ID already in it).</p> <p>72 - USC2 (16 bit).</p> <p>68 - 8 bit.</p> <p>Each other value except of 96, 80, and 240 are 7 bit.</p> <p>Not supported values are: 96, 80, 240</p> <p>The default value is 15 (7 bit).</p>
<m>	<p>0 No further user action required (network initiated US SD-Notify, or no further information needed after mobile Initiated operation).</p> <p>1 Further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation).</p> <p>2 USSD terminated by network. the reason for the termination is indicated by the index, as described in CUSD Termination Cause Table Index.</p> <p>3 Other local client has responded.</p> <p>4 Operation not supported</p> <p>5 Network time out</p>

CUSD Termination Cause Table Index:

Termination Cause	Index
NO_CAUSE	0
CC_BUSY	1
PARAMETER_ERROR	2
INVALID_NUMBER	3
OUTGOING_CALL_BARRED	4
TOO_MANY_CALLS_ON_HOLD	5
NORMAL	6
DROPPED	10
NETWORK	12
INVALID_CALL_ID	13
NORMAL_CLEARING	14
Termination Cause	Index
TOO_MANY_ACTIVE_CALLS	16
UNASSIGNED_NUMBER	17
NO_ROUTE_TO_DEST	18
RESOURCE_UNAVAILABLE	19
CALL_BARRED	20
USER_BUSY	21
NO_ANSWER	22
CALL_REJECTED	23
NUMBER_CHANGED	24
DEST_OUT_OF_ORDER	25
SIGNALING_ERROR	26
NETWORK_ERROR	27
NETWORK_BUSY	28
NOT_SUBSCRIBED	29
SERVICE_UNAVAILABLE	31
SERVICE_NOT_SUPPORTED	32
PREPAY_LIMIT_REACHED	33
INCOMPATIBLE_DEST	35
ACCESS_DENIED	43
FEATURE_NOT_AVAILABLE	45
WRONG_CALL_STATE	46

SIGNALING_TIMEOUT	47
MAX_MPTY_PARTICIPANTS_EXCEEDED	48
SYSTEM_FAILURE	49
DATA_MISSING	50
BASIC_SERVICE_NOT_PROVISIONED	51
ILLEGAL_SS_OPERATION	52
SS_INCOMPATIBILITY	53
SS_NOT_AVAILABLE	54
SS_SUBSCRIPTION_VIOLATION	55
INCORRECT_PASSWORD	56
TOO_MANY_PASSWORD_ATTEMPTS	57
Termination Cause	Index
PASSWORD_REGISTRATION_FAILURE	58
ILLEGAL_EQUIPMENT	59
UNKNOWN_SUBSCRIBER	60
ILLEGAL_SUBSCRIBER	61
ABSENT_SUBSCRIBER	62
USSD_BUSY	63
CANNOT_TRANSFER_MPTY_CALL	65
BUSY_WITH_UNANSWERED_CALL	66
UNANSWERED_CALL_PENDING	68
USSD_CANCELED	69
PRE_EMPTION	70
OPERATION_NOT_ALLOWED	71
NO_FREE_BEARER_AVAILABLE	72
NBR_SN_EXCEEDED	73
NBR_USER_EXCEEDED	74
Call Control by SIM Causes	
NOT_ALLOWED_BY_CC	75
MODIFIED_TO_SS_BY_CC	76
MODIFIED_TO_CALL_BY_CC	77
CALL_MODIFIED_BY_CC	78
App. Cause	
FDN_FAILURE	90

Example:

```

AT+CUSD=1,"*00*0549598743#"
+CUSD: 0,"Connecting...",15
+CUSD: 0,"Connected",15
+CLCC: 1,1,4,0,0,"0545550099",129 > Call from USSD server
RING
ATA > answer to the server (when answered, the server call to 0549598743)
OK
+CLCC: 1,1,0,0,0,"0545550099",129
NO CARRIER
+CLCC: 1,1,6,0,0,"0545550099",129

```

5.6.3 +COLP, Connected Line Identification Presentation

This command relates to the GSM supplementary service called COLP (Connected Line Identification Presentation), which enables a calling subscriber to obtain the connected line identity (COL) of the called party after setting up a mobile-originated call with the H3xx. For example, after setting up a mobile-originated call to one number that is forwarded to another number, the calling party will see the number of that third party.

When this command is enabled (and the called subscriber permits it), the following intermediate result code is returned:

```
+COLP: <number>,<type>[,<subaddr>,<satype>].
```

Note: This command is activated when COLP is supported by the network.

Command	Syntax	Response/Action	Remarks
Set	+COL P=[<n >]	OK +CME ERROR: <err>	The Set command enables/disables the display of the COL at the TE on the H3xx. It has no effect on the execution of the COLR supplementary service on the network. The value set by this command is not retained after a power cycle.
Read	+COL P?	+COLP: <n>,<m> OK	The Read command displays the status of <n>. It also initiates a query of the COLP service provision status and displays <m>.
Test	+COL P=?	+COLP: (list of supported <n>s) OK	The Test command displays the supported values of <n>.

The following table shows the +COLP parameters.

<Parameter>	Description
<n>	Sets/displays the result code presentation status of the H3xx. 0 Disable (default) 1 Enable
<m>	Displays the subscriber's COLP service status in the network. 0 COLP not provisioned 1 COLP provisioned 2 Unknown (for example, no network, and so on)
<number>	Sets the phone number, using the format specified by <type>.
<Parameter>	Description
<type>	Sets the address octet type in integer format (refer to GSM 04.08 subclause 10.5.4.7). 129 Unknown 145 International (used when dialing string includes "+" international access code character)
<subaddr>	Sets the subaddress, using the format specified by <satype>.
<satype>	Sets the address octet type in integer format (refer to GSM 04.08 subclause 10.5.4.8).

Example:

AT+COLP=0

OK

AT+COLP=2

+CME ERROR: operation not supported

6 Phone Book and Clock

6.1 Directory Access Commands - Phone Book

This set of commands enables read/write access to the phone book contained within the H3xx, including both the numeric and the alpha information contained in the location. The presentation is according to GSM 07.07.

In some cases, it may be possible to use these commands to access the dialed and received call stacks. However, as these phone books cannot be edited, the +CPBW command does not work on them.

6.1.1 +CPBS, Select Phone Book Memory

This command handles the selection of the memory to be used for reading and writing entries in the H3xx's phone books' memory.

Command	Syntax	Response/Action	Remarks
Set	AT+CPBS=<storage>[,<pin2>] <pin2>is optional while <storage> = "FD" only	OK or: +CME ERROR: <err>	The Set command selects the phone book memory storage which is to be used by other phone book commands.
Read	+CPBS?	+CPBS: <storage> [,<used>,<total>] OK	The Read command returns the currently selected phone book memory, number of used entries and total number of entries in the phone book memory.
Test	+CPBS=?	+CPBS: (list of supported<storage>s) OK	Test command returns the supported storages as a compound value.

The following table shows the +CPBS parameters.

<Parameter>	Description
<storage>	List of supported phone books and their storage IDs FD: SIM Fixed dialing phone book.
	ON: Own numbers (MSISDNs) list (reading this storage is also available through +CNUM). SM: SIM phone book. LD: SIM last-dialing phonebook BL: Blacklist phonebook (delete only) EC: SIM emergency-call-codes phonebook (read only) AP: Selected application phonebook. BN: SIM barred-dialling-number phonebook (only valid with PIN2) SN: SIM service-dialling-number phonebook The default phone book is SM.
<used>	Integer type value indicating the number of used locations in the selected memory.
<total>	Integer type value indicating the total number of entries in the selected phone book memory.
<pin2>	String type. PIN2 password 4 - 8 digits.

Example:

```

AT+CPBS="SM"
OK
AT+CPBR=?
+CPBS: ("SM","FD","SN","LD","ON","EC","BL")
OK
AT+CPBR=1
OK
AT+CPBR=1,3 //There is nothing written in entry 1,2,3
OK
AT+CPBS="FD","<correct pin2>"
OK // +CPBW pin2 unlocked
AT+CPBW=1,"034546565",129,"xyz"// Write into FD storage
OK
AT+CPBS="FD","<wrong pin2>"
+CME ERROR: incorrect password
  
```

AT+CPBS="FD", "<pin2 longer then 8 chars>"

+CME ERROR: text string too long

6.1.2 +CPBR, Read Phone Book Entries

This command recalls phone book entries from a specific entry number or from a range of entries. If only one entry is specified, and that entry is empty, OK is returned. If a range of entries is requested, all entries that contain data within that range are returned. If a listing fails in a H3xx error, +CME ERROR: <err> is returned.

This command can also be used to obtain information about the number of entries and the maximum size of a phone number and alpha tag fields in the phone book.

This command acts on the currently active phone book, as selected with the +CPBS command.

Command	Syntax	Response/Action	Remarks
Set	+CPBR =<index 1>,<ind ex2>]	[+CPBR: <index1>,<number>,<type>,<text >,<hidden>][,<group>][,<adnumb er>][,<adtype>][,<secondtext>][,<e mail>] [<CR><LF> +CPBR: <index2>,<number>,<type>,<text >,<hidden>][,<group>][,<adnumb er>][,<adtype>][,<secondtext>][,<e mail>]]] OK or: +CME ERROR: <err>	The Set command returns phone book entries.
Test	+CPBR =?	+CPBR: (list of supported<index>s)[,<nlength>], [<tlength>],[<glength>], [<alength>],[<slength>],[<elength>] OK	The Test command returns the entry range supported by the current storage as a compound value and the maximum lengths of the <number> and <text> fields.

The following table shows the +CPBR parameters.

<Parameter>	Description
-------------	-------------

<index1> <index2>	Index for a given phone book entry
<number>	Phone number of a given entry
<type>	The address type of a phone number 129 Use for local call 145 Use "+" for international access code 128 Unknown "128" is used to represent an email address or a mailing list. In this case, <ph_type> can be used to further differentiate between the two.
<text>	Text identifier for a phone book entry, according to the character set as specified by command +CSCS.
<nlength>	The maximum number of digits in the <number>.
<tlength>	The maximum number of characters in the <text> entry
<hidden>	indicates if the entry is hidden or not – only available, if a UICC with an active USIM application is present 0 phonebook entry not hidden 1 phonebook entry hidden
<group>	string type field of maximum length <glength>.character set as specified by command Select TE Character Set +CSCS
<adnumbe>	string type phone number of format <adtype>
<adtype>	type of address octet in integer format (refer TS 24.008 subclause 10.5.4.7)
<secondtex>	string type field of maximum length <slength>.character set as specified by command Select TE Character Set +CSCS
<email>	string type field of maximum length <elength>.character set as specified by command Select TE Character Set +CSCS
<glength>	integer type value indicating the maximum length of field <number>
<alength>	integer type value indicating the maximum length of field <adnumber>
<slength>	integer type value indicating the maximum length of field <secondtext>
<elength>	integer type value indicating the maximum length of field <email>

Example:

AT+CPBS="SM"

```

OK
AT+CPBR=?
+CPBR: (1-250),20,14
OK
At+CPBR=1
OK
AT+CPBR=1,3 //There is nothing written in entry 1,2,3
OK

AT+CPBR=4
+CPBR: 4,"18888888",129,"Tom"
OK

```

6.1.3 +CPBF, Find Phone Book Entries

This execution command enables the user to search for a particular entry, by name, in the currently active phone book. If no matching entry is found, the command returns OK. If multiple matches are found, all are returned.

Command	Syntax	Response/Action
Set	+CPBF=<findtext>	<pre> [+CPBR: <index1>,<number>,<type>,<text>[,<hidden>][,<group>][,<adnumber>][,<adtype>][,<secondtext>][,<email>] [<CR><LF> +CPBR: <index2>,<number>,<type>,<text>[,<hidden>][,<group>][,<adnumber>][,<adtype>][,<secondtext>][,<email>]]] OK or: +CME ERROR: <err> </pre>
Test	AT+CPBF=?	<pre> +CPBF: [<nlength>][,<tlength>][,<glength>][,<slength>][,<elength>] OK </pre>

The following table shows the +CPBF parameters.

<Parameter>	Description
-------------	-------------

<findtext>	Case-sensitive text substring to search for, according to the character set specified by the +CSCS command.
<index1> <index2>	Index for a given phone book entry
<number>	Phone number of a given entry
<type>	The address type of a phone number 129 Use for local call 145 Use "+" for international access code 128 Unknown Note: "128" is used to represent an email address or a mailing list. In this case, <ph_type> can be used to further differentiate between the two.
<text>	Text identifier for a phone book entry that starts with the substring <findtext>, according to the character set as specified by command +CSCS.
<hidden>	indicates if the entry is hidden or not – only available, if a UICC with an active USIM application is present 0 phonebook entry not hidden 1 phonebook entry hidden
<group>	string type field of maximum length <glength>.character set as specified by command Select TE Character Set +CSCS
<adnumbe>	string type phone number of format <adtype>
<adtype>	type of address octet in integer format (refer TS 24.008 subclause 10.5.4.7)
<secondtext>	string type field of maximum length <slength>.character set as specified by command Select TE Character Set +CSCS
<email>	string type field of maximum length <elength>.character set as specified by command Select TE Character Set +CSCS
<glength>	integer type value indicating the maximum length of field <number>
<alength>	integer type value indicating the maximum length of field <adnumber>
<slength>	integer type value indicating the maximum length of field <secondtext>
<elength>	integer type value indicating the maximum length of field <email>

Example:

```

AT+CPBS="SM" //Selecting phone book
OK
AT+CPBF="Lin"
+CPBF: 1,"18888888",129,"Linzha0"
OK
AT+CPBF="Voice" //Searching for string "Voice" and finding Voice Mail
+CPBF: 2,"+8613800138000",145,"Voicemail"
OK
AT+CPBF="" //Searching for everything in phone book, and finding all entries
+CPBF: 1,"18888888",129,"Linzha0"
+CPBF: 2,"+8613800138000",145,"Voicemail"
+CPBF: 3,"18888888",129,"abc"
OK

```

6.1.4 +CPBW, Write Phone Book Entry

This command enables the user to store a new entry in the phone book, or edit/delete an existing entry from the phone book. A particular entry in the phone book can be stored, or the next available entry is used.

This command writes the entry in the currently active phone book, selected with the +CPBS command (Refer to “+CPBS, Select Phone Book Memory”). The entry is selected by <index>, the phone number is entered into the <number> field and text associated with the number is entered into the <text> field. If these fields are omitted, the phone book entry is deleted. If the <index> field is omitted, but a number is entered in the <number> field, the phone number is entered into the first available entry in the phone book. If the writing fails in a H3xx error, +CME ERROR: <err> is returned.

Note: The "FD" phone book supports single wild card characters (?) and prefixes of a number in the telephone number field. In cases of fixed dialing, these entries in the "FD" phone book define a group of permitted numbers.

Call indications related to a fixed dialing entry containing wild cards or only a prefix of a number do not display any <alpha> identifier.

Command	Syntax	Response/Action	Remarks
Set	AT+CPBW=[<index>][, <number>[,<type>[,<text>[,<group>[,<adnumber>[,<adtype>[,<secondtext>[,<email>[,<sip_uri>[,<tel_uri>[,<hidden>]]]]]]]]]]	OK or: +CME ERROR: <err>	
Command	Syntax	Response/Action	Remarks
Test	AT+CPBW=?	+CPBW: (list of supported<index>s)[,<nlen>	This command queries the allowable

	th>),(list of supported<type>s)[,<tlength>],[<glength>],[<alength>],[<slength>],[<elength>] OK	command field and sizes.
--	---	--------------------------

The following table shows the +CPBW parameters.

<Parameter>	Description
<index>	Index for a given phone book entry
<number>	Phone number of a given entry
<type>	The address type of a phone number 129 Use for local call 145 Use "+" for international access code 128 Unknown Note: "128" is used to represent an email address or a mailing list. In this case, <ph_type> can be used to further differentiate between the two.
<text>	Text identifier for a phone book entry, according to the character set as specified by command +CSCS.
<nlength>	The maximum size of a phone number, in digits. There is a limited number of PB records that can be stored with this length. The number of "long" PB records depends on the size of the SIM card EXT1 extension file. If the extension file is full, an attempt to store a new record with more than 20 digits returns an error.
<tlength>	The maximum number of characters in the <text> entry. This applies to GSM standard characters only. Non-GSM standard character sets and extended GSM characters require additional space in storage. In some cases, when using such characters the text cannot be stored. In this case, the H3xx returns a "text string too long"error.
<hidden>	indicates if the entry is hidden or not – only available, if a UICC with an active USIM application is present 0 phonebook entry not hidden 1 phonebook entry hidden
<group>	string type field of maximum length <glength>.character set as specified by command Select TE Character Set +CSCS
<adnumbe>	string type phone number of format <adtype>
<Parameter>	Description
<adtype>	type of address octet in integer format (refer TS 24.008 subclause 10.5.4.7)
<secondtext >	string type field of maximum length <slength>.character set as specified by command Select TE Character Set +CSCS

<email>	string type field of maximum length <elength>.character set as specified by command Select TE Character Set +CSCS
<glength>	integer type value indicating the maximum length of field <number>
<alength>	integer type value indicating the maximum length of field <adnumber>
<slength>	integer type value indicating the maximum length of field <secondtext>
<elength>	integer type value indicating the maximum length of field <email>

Example:

```
at+cpbw=1,"15986784172",129,
```

```
OK
```

```
at+cpbr=1
```

```
+CPBR: 1,"15986784172",129,"",0
```

```
OK
```

6.1.5 +CSVM, Set Voice Mail Server

This command handles the selection of the number to the voice mail server. The new value should also remain after power cycle.

Command	Syntax	Response/Action	Remarks
Set	+CSVM=<mode>[,<number>[,<type>]]	OK +CME ERROR: <err>	The Set command sets the number to the voice mail server.
Read	+CSVM?	+CSVM: <mode>,<number>, <type> OK	The Read command displays the currently selected voice mail number and status (enabled or disabled).
Test	+CSVM=?	+CSVM: (list of supported <mode>s), (list of supported <type>s) OK	The Test command displays the list of supported <mode>s and <type>s.

The following table shows the +CSVM parameters.

<Parameter>	Description
<mode>	0 Disables the voice mail number (default)

	1 Enables the voice mail number
<number>	Voice mail number in string. String can be of up to 32 characters long, starting with a digit, "r"+"". Other allowed characters are digits (0..9), * and #.
<type>	Address octet type. 129 ISDN/telephony marketing plan; national/international number unknown 145 ISDN/telephony numbering plan; international number When the dialing string includes the international access code character (+), the default is 145. Otherwise, the default <type> is 129.

Note: If <mode> is set to 0, <number> and <type> are ignored. If <mode> is set to 1, <number> is mandatory.

Example:

```
AT+CSVM=?
+CSVM: (0,1),(129,145)
OK
AT+CSVM=1,"+97255512356",145
OK
AT+CSVM?
+CSVM: 1,"97255512356",145
OK
```

6.2 System Date and Time Access Commands

6.2.1 +CCLK, Read/Set System Date and Time

This command reads and sets the H3xx current date, time and time zone.

Command	Syntax	Response/Action	Remarks
Set	+CCLK=<time>	OK or: +CME ERROR: <err>	The Set command sets the date, time and time zone of the system clock. Note: Set Command sets user defined system clock values and saves them in the NVM memory. These saved values are kept after power-cycle as well.
Command	Syntax	Response/Action	Remarks
Read	+CCLK?	+CCLK: <time> OK or: +CME ERROR:	The Read command returns the current date, time and time zone setting. By default, <time> will represent the network updated time.

		<err>	<p>If the user has used the Set command once, then <time> will represent the Set command setting.</p> <p>Note: If network operator does not support System Clock Update Message, the initial date, time and time zone, displayed by CCLK Read Command could be invalid (user's responsibility to set date, time and time zone by CCLK Set Command).</p> <p>Note: See Execute Command for how-to enable back network update time.</p>
Test	+CCLK=?	+CCLK (list of supported <time>s) OK	The Test command returns valid parameters for the +CCLK Set command.

The following table shows the +CCLK parameters.

<Parameter>	Description
<time>	<p>ASCII string of format:</p> <p>yy/MM/dd, hh: mm: ss±zz</p> <p>or</p> <p>yy/MM/dd, hh: mm: ss</p> <p>or</p> <p>yy/MM/dd, hh: mm</p> <p>yy - 2-digit year [2000-2069] MM - 2-digit month [01-12] dd - 2-digit day of month [00-31] hh - 2-digit hour [00-23] mm - 2-digit minute [00-59] ss - 2-digit seconds [00-59] zz - (optional) time zone offset from GMT, in quarter-hours [-47...+48]. If this value is not specified, the time zone offset will be 0.</p>

Example:

AT+CCLK=?

+CCLK: "88/12/31, 23: 59: 59, (-47-+48)"

OK

AT+CCLK="01/01/01, 01: 01: 01-08"



OK

AT+CCLK?

+CCLK: "01/01/01, 01 : 01 : 01-08"

OK

AT+CCLK="02/02/02, 02: 02: 02"

OK

Power cycling...

AT+CCLK?

+CCLK: "02/02/02, 02: 02: 02+00"

OK

7 SMS

7.1 SMS Commands

H3xx supports SMS PDU and SMS TEXT mode according to ETSI specifications 3GPP TS 27.005 & 3GPP TS 03.40/23.0400.

7.1.1 +CSMS, Select Message Service.

This command handles the selection of the messaging service. It returns the types of messages that are supported by the H3xx.

Command	Syntax	Response/Action	Remarks
Set	+CSMS =<service>	+CSMS: <mt>,<mo>,<bm> OK or: +CMS ERROR: <err>	The Set command sets the type of service and returns the types of messages supported by the H3xx.
Read	+CSMS ?	+CSMS: <service>,<mt>,<mo>,<bm> OK	The Read command returns the supported message types along with the current service setting.
Test	+CSMS =?	+CSMS: <service> OK	The Test command returns a list of all the services supported by the terminal.

The following table shows the +CSMS parameters.

<Parameter>	Description
<service>	Integer that defines the type of service 0:SMS AT command grammar is compatible with GSM Phase 2 1:SMS AT command grammar is compatible with GSM Phase 2+
<mt>	Mobile terminated messages 0 Not supported by the H3xx 1 Supported by the H3xx
<mo>	Mobile originated messages 0 Not supported by the H3xx 1 Supported by the H3xx
<bm>	Broadcast type messages 0 Not supported by the H3xx 1 Supported by the H3xx

Example:

AT+CSMS?
+CSMS: 1,1,1,1
OK

7.1.2 +CPMS, Preferred Message Storage

This command handles the selection of the preferred message storage area. The message storage area is divided into three parts, mem1, mem2 and mem3.

Command	Syntax	Response/Action	Remarks
Set	+CPMS=<mem1>[,<mem2>[,<mem3>]]	+CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> OK or: +CMS ERROR: <err>	The Set command sets the memory storage.
Read	+CPMS?	+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> OK or: +CMS ERROR: <err>	The Read command displays the selected memory storage type for the three memory areas.
Test	+CPMS=?	+CPMS: (list of supported<mem1>s),(list of supported <mem2>s),(list of supported <mem3>s) OK or: +CMS ERROR: <err>	The Test command lists the supported memory storage for <mem1>, <mem2> and <mem3>.

The following table shows the +CPMS parameters.

<Parameter>	Description
<mem1>	Memory from which messages are read and deleted. Supported values are: "SM", "BM", "ME", "SR". The default value at power-up is "SM".
<mem2>	Memory to which writing operation is made. Supported value is: "SM", "ME". The default value at power-up is "SM".
<mem3>	Memory to which received SMS are stored (unless forwarded directly to TE). Supported value is: "SM", "BM", "ME", "SR". The default value at power-up is "SM".
"BM"	Broadcast message storage
"SM"	(U)SIM message storage
"ME"	ME message storage
"SR"	status report storage

Example:

```
AT+CPMS="SM"
+CPMS: 5,50,5,50,5,50
OK
AT+CPMS?
+CPMS: "SM",5,50,"SM",5,50,"SM",5,50
OK
```

7.1.3 +CMGF, Message Format

This command is a basic command.

The Set command handles the selection of the message format used with send, list, read and write commands, as well as the format of unsolicited result codes resulting from message receipts.

The H3xx supports both PDU mode (where entire TP data units are used) and text mode (where the body of the message and its headers are given as separate parameters).

Command	Syntax	Response/Action	Remarks
Set	+CMGF= mode>	OK or: +CMS ERROR: <err>	The Set command sets the message format to use.
Command	Syntax	Response/Action	Remarks

Read	+CMGF? F?	+CMGF: <mode> OK	The Read command displays the current message format.
Test	+CMGF=? F=?	+CMGF: (list of supported mode>s) OK	The Test command lists all the supported message formats.

The following table shows the +CMGF parameters.

<Parameter>	Description
<mode>	Message format: 0 PDU mode (default) 1 Text mode

Example:

```

AT+CMGF=1
OK
AT+CMGF?
+CMGF: 1
OK
AT+CMGF=?
+CMGF: (0,1)
OK

```

7.1.4 +CSCA, Service Center Address

This command enables to write/read SCA to/from SIM. In SMS text mode, SCA stored in SIM is added to any stored and sent SMS. In SMS pdu mode, SCA stored in SIM is added to stored SMS and send SMS only when SCA address length coded in PDU equals zero.

Command	Syntax	Response/Action	Remarks
Set	+CSCA=<sc a>[,<tosca>]	OK or: +CMS ERROR: <err>	Sets service center address stored in SIM (EF-SMSp -Short message service parameters). <tosca> is optional parameter, When <sca> is prefixed with '+' it indicates that <tosca> is set to 145(International number), otherwise is 129(local number).
Read	+CSCA?	+CSCA: <sca>,<tosca> OK	Read command displays <sca> and <tosca> stored in SIM*EF-SMSp).
Test			The Test command for +CSCA is not defined by ETSI.

The following table shows the +CSCA parameters.

<Parameter>	Description
<sca>	<p>Service Center Address</p> <p>"+" character prefix of <sca> indicates <tosca> of 145.</p> <p>Minimum 1 and up to 20 characters, where each character is represented by semi octets (excluding '+' character).</p> <p>If <sca> contains an odd number of digits, bits 4 to 7 of the last octet shall be filled with an end mark coded "1111".</p>
<tosca>	<p>Type of service center address.</p> <p><tosca> of 129 is mostly use for local number and 145 for International.</p> <p><tosca> of 129 is default value.</p> <p><tosca> values are in range of 0-255.</p> <p>Valid values are defined according to:</p> <p>GSM03.40 v7.4.0 section 9.1.2.5 as follow:</p> <p>Bit 7 is 1</p> <p>Bits 6,5-4 - Present Type of number as follow:</p> <p>Bits 6 5 4</p> <p>0 0 0 Unknown</p> <p>0 0 1 International number</p> <p>0 1 0 National number</p> <p>0 1 1 Network specific number</p> <p>1 0 0 Subscriber number</p> <p>1 0 1 Alphanumeric, (coded according to GSM TS 03.38 7-bit default alphabet)</p> <p>1 1 0 Abbreviated number</p> <p>1 1 1 Reserved for extension</p> <p>Numbering-plan-identification (applies for Type-of-number = 000,001,010)</p> <p>Bits 3 2 1 0</p> <p>0 0 0 0 Unknown</p> <p>0 0 0 1 ISDN/telephone numbering plan (E.164/E.163)</p> <p>0 0 1 1 Data numbering plan (X.121)</p> <p>0 1 0 0 Telex numbering plan</p> <p>1 0 0 0 National numbering plan</p> <p>1 0 0 1 Private numbering plan</p> <p>1 0 1 0 ERMES numbering plan (ETSI DE/PS 3 01-3)</p> <p>1 1 1 1 Reserved for extension.</p> <p>All other values are reserved.</p>

+CSCA <SCA> parameters.

Following table describes +CSCA <SCA> valid parameters including the conversion when using stored <SCA> in SMS PDU mode (editing SMS via +CMGW or +CMGS without SCA). This is according to 24.008V031000P Table 10.5.118/GSM 24.008V031000P: Called party BCD number:

<SCA> Character in SMS (Text mode)	Mapped character for SMS PDU mode
Digits: 0-9	Digits: 0-9
'+'	0x91
'*'	'A'
'#'	'B'
'A'	'C'
'B'	'D'
'C'	'E'

Example:

AT+CSCA?

+CSCA: "+97212356",145 // Read SCA address and TOSCA stored in SIM (EF-smsp)

OK

AT+CSCA="97212356"

OK

AT+CSCA?

+CSCA: "97212356",129

OK

AT+CSCA?

+CSCA: "*AC#",129

OK

AT+CMGW=13

> 0481ABCD1211640A8150224902450000A700 // '*->'A', 'A'->'B', 'B'->'C', '#->'D'

+CMGW: 15

OK

AT+CMGR=15

+CMGR: 2,,13

0481ABCD1211640A8150224902450000A700 // SCA read as stored for current SMS

OK

AT+CSCA?

```

+CSCA: "*AC#",129 // Read command remained // SCA settings didn't change
OK
AT+CSCA?
+CSCA: "*AC#",129
OK
AT+CMGW=
> 0011640A8150224902450000A700
+CMGW: 16
OK
AT+CMGR=16
+CMGR: 2,,13
0481CAEDFB11640A8150224902450000A700 // SCA is: ACDEB in pdu, mapped to *ABC#
OK
AT+CMGW=13
> 0381AB1211640A8150224902450000A700 // Set SCA to BA21
+CMGW: 17
OK
AT+CMGR=17
+CMGR: 2,,13
0381AB1211640A8150224902450000A700 // SCA is set correctly only for current SMS but
+CSCA setting didn't changed
OK
AT+CSCA?
+CSCA: "*AC#",129 /SCA didn't change in storage
OK

```

7.1.5 +CSMP, Set Text Mode Parameters

This command is a basic command and is used to select values for additional parameters needed when SMS is sent to the network or placed in storage when TEXT mode is selected.

Command	Syntax	Response/Action	Remarks
Set	+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]	OK or: +CMS ERROR: <err>	The set command selects values for additional parameters needed when SMS is sent to the network or placed in storage when text format message mode is selected.
Command	Syntax	Response/Action	Remarks
Read	AT+CSMP?	+CSMP: <fo>,<vp>,<pid>,<dcs>	The read command returns the current parameters value.

		OK	
Test	AT+ CSMP =?	OK	The test command just returns OK.

The following table shows the +CSMP parameters.

<Parameter>	Description
<fo>	<p>First octet of GSM 03.40. Integer format. For details see +CMGW definitions.</p> <p>The default value at power-up is 17. (Message type is: SMS-SUBMIT and relative VP format).</p>
<vp>	<p>Validity Period, depending on SMS-SUBMIT <fo>, TP-Validity-Period-Format bits setting.</p> <p>If there is no correlation between the VPF and the VP value. an error message will be returned.</p> <p>Either in integer format (see Table) or in time-string format ("yy/MM/dd, hh:mm:ss±zz"). If in integer format the vp will write to SIM EF and read form SIM EF when use it.</p>
<pid>	<p>Protocol-Identifier. The one octet information element by which the SM-TL either refers to the higher layer protocol being used, or indicates interworking with a certain type of telematic device.</p> <p>"0 - no interworking, SME-to-SME protocol (default) "Any value between 0-255 will be accepted.</p> <p>The SC may reject messages with a TP-Protocol-Identifier containing a reserved value or one, which is not supported.</p>
<dcs>	<p>One octet of Data Coding Scheme, indicates the data coding scheme of the DATA, and may indicate a message class.</p> <p>Note:</p> <p>For DCS expanded information, see section "DCS handling".</p> <p>default alphabet: 00xx00xx, 111 100xx, 1 101xxxx</p> <p>8 bit data: 00xx01xx, 111101xx</p> <p>UCS2: 00xx10xx, 1110xxxx</p> <p>reserved: 00xx11xx, 0100xxxx-1011xxxx</p> <p>The default value at power-up is 0 - Default alphabet.</p>

The following table shows the VP format.

<Parameter>	Description
0 to 143	(TP-VP + 1) x 5 minutes (i.e. 5 minutes intervals up to 12 hours)

144 to 167	12 hours + ((TP-VP - 143) x 30 minutes)
168 to 196	(TP-VP - 166) x 1 day
197 to 255	(TP-VP - 192) x 1 week

Example:

```

AT+CSMP?
+CSMP: 17,167,0,0 (default values for SMS-SUBMIT)
OK
AT+CSMP= 1,256,0,0
+CMS ERROR: numeric parameter out of bounds
AT+CSMP=?
OK
AT+CSDH=1
OK
AT+CMGF=1
OK
AT+CMGW="15820447141"
> ABC (^Z)
+CMGW: 6
OK
AT+CMGR=6
+CMGR: "STO UNSENT","15820447141","",129,17,0,0,167,"+8613800755500",145,3
ABC
OK

```

7.1.6 +CSDH, Show Text Mode Parameters

This command controls whether detailed header information is shown in text mode result codes.

Command	Syntax	Response/Action	Remarks
Set	+CSDH=[<show>]	OK or:	The set command controls whether detailed header information is shown in text mode result codes.

		+CMS ERROR: <err>	
Read	AT+CSDH?	+CSDH: (<show>) OK	The read command returns the current <show> parameter value.
Test	AT+CSDH=?	+CSDH: (list of supported <show>s) OK	

The following table shows the +CSDH parameters.

<Parameter>	Description
<show>	0 - Means do not show header values defined in commands +CSCA and +CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <toa> in +CMT, +CMGL, +CMGR result codes for SMS- DELIVERs and SMS-SUBMITs in text mode; for SMS-COMMANDs in +CMGR result code, do not show <pid>,<mn>, <da>, <toda>, <length> or <cdata> (default). 1 - Means show the values in result codes.

Example:

```

AT+CSDH=?
+CSDH: (0-1)
OK
AT+CSDH?
+CSDH: 0
OK
AT+CMGR=160// SMS-SUBMIT
+CMGR: "STO UNSENT","0544565034",
ABC
OK
AT+CSDH=1
OK
AT+CMGR=160
+CMGR: "STO UNSENT","0544565034",,81,29,0,0,"04/11/04,09: 48:
36+08", "+97254120032",145,3
ABC
OK

```

7.1.7 +CNMI, New Message Indications to Terminal

This command handles enabling of unsolicited notifications to the terminal when an SMS is received by the H3xx.

After sending an unsolicited response to the TE, the H3xx will expect a +CNMA (new message acknowledgement) from the TE within a predefined timeout of 15 seconds. Within the timeout the H3xx will not send another unsolicited response to the TE before the previous one is acknowledgement. If the H3xx does not receive acknowledgment within the required time, CNMI parameters will NOT be reset automatically and the unsolicited response will send to the TE again.

Command	Syntax	Response/Action
Set	+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]	OK or: +CMS ERROR: <err>
Read	+CNMI?	+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr> OK
Test	+CNMI=?	+CNMI: (list of supported <mode>s), (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s), (list of supported <bfr>s) OK

The following table shows the +CNMI parameters.

<Parameter>	Description	
<mode>	0	Buffer unsolicited result codes in the TA; if the TA buffer is full, the oldest indication may be discarded and replaced with the new received indications (ring buffer).
	1	Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved; otherwise forward them directly to the terminal.
	2	Buffer unsolicited result codes in the TA when the serial link is busy (e.g. data-transfer); otherwise forward them directly to the terminal.
<mt>	0	No SMS-DELIVER indications are routed to the terminal (default)
	1	If SMS-DELIVER is stored in the H3xx, the memory location indication is routed to the terminal using the unsolicited result code: +CMTI: <mem>,<index>
	2	SMS-DELIVER (except class2 SMS) are routed directly to the TE using the unsolicited result code: +CMT: [<alpha>,<length><CR><LF><pdu> (in PDU mode) or +CMT:

		<p><oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dc>,<sca>,<tosca>,<length>]<CR><LF></p> <p>If ME has its own display device then class 0 SMS and SMS in the message waiting indication group (discard message) may be copied to both ME display and to terminal. In this case ME shall send the acknowledgement to the network. Class 2 SMSs and messages in the message waiting indication group (storage message) result in indication as defined in <mt>=1</p>
	3	Class 3 SMS-DELIVERs are routed directly to terminal using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1.
<bm>	0	No CBM indications are routed to the terminal (default)
	1	if CBM is stored in RAM/NVRAM by ATC/DR, an indication of memory location is routed to DTE unsolicited result code +CBMI: <mem>,<index>
	2	new CBMs are routed directly to the terminal using unsolicited result code: +CBM: <length><CR><LF><pdu (when PDU-mode enabled) or +CBM: <sn>,<mid>,<dc>,<page>,<pages><CR><LF><data>
	3	Class 3 CBMs are routed directly to TE using unsolicited result codes defined in <bm>=2. If CBM storage is supported, messages of other classes result in indication as defined in <bm>=1.
<ds>	0	No SMS-STATUS-REPORT indications are routed to the terminal (default)
	1	SMS-STATUS-REPORT is routed directly to the terminal
	2	If SMS-STATUS-REPORT is stored in the H3xx, the memory location indication is routed to the terminal using the unsolicited result code: +CDSI: <mem>,<index>
<bfr>	0	TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes).
	1	TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1. ...3 is entered.

Example:

AT+CNMI=?

+CNMI: (0-2),(0-3),(0-3),(0-2),(0-1)

OK

AT+CNMI?

+CNMI: 0,0,0,0

```
OK
AT+CNMI=2,1
OK
AT+CMSS=142,"0544565034" // send to myself
+CMSS: 72
OK
+CMTI: "SM",15
AT+CNMI=1,2
OK
AT+CSDH=1
OK
AT+CMSS=142,"054565034" // send to myself
+CMSS: 73
OK
+CMT: "+972544565034",,"04/11/04,09: 48: 36+08",145,4,0,0,"+97254120032",145,3
ABC
AT+CSMP=49,167 //Set first octet to status report.
// See status report parameters in CMGW.
OK
AT+CSMP?
+CSMP: 49,167,0,0
OK
AT+CNMI=1,,1
OK
AT+CNMI?
+CNMI: 1,0,0,1,0
OK
AT+CNMI=1,0,0,1,0
OK
AT+CMGS="0524680592"
> HELLO
+CMGS: 168
OK
+CDS: 6,168,"+972524680592",145,"05/08/02,15: 20: 12+08","05/08/02,15: 20: 14+08",0
AT+CNMI=1,0,0,2
OK
AT+CMSS=296
+CMSS: 185
OK
```

7.1.8 +CNMA, New Message Acknowledgment

This command acknowledges the receipt of a +CMT and +CDS response from the terminal to the H3xx. A +CMT response receipt confirms the correct reception of a new SMS-DELIVER message, which was routed directly to the terminal. A +CDS response receipt confirms the correct reception of a new SMS-STATUS-REPORT message, which was routed directly to the terminal.

When the H3xx sends a +CDS response to the terminal, it waits a predefined timeout of 15 seconds for the +CNMA acknowledgment. The H3xx will not send another +CDS result code to the terminal before the previous one is acknowledged, or the timeout expires.

When the H3xx sends a +CMT response to the terminal, it waits a predefined timeout of 15 seconds for the +CNMA acknowledgment. The H3xx will not send another +CMT result code to the terminal before the previous one is acknowledged, or the timeout expires. Upon receipt of the +CNMA command, the H3xx sends RP-ACK to the network. The acknowledged SMS will not be saved in message storage. If the command is executed but no acknowledgment is expected, or some other H3xx related error occurs, the final result code +CMS ERROR: <err> is returned.

Note: AT+CNMA send acknowledgment to network, Two conditions must be met AT+CSMS=1 command set <service> to 1, AT+CNMI=,2 command set <mt> to 2 or AT+CNMI=,1 command set <ds> to 1. After the two conditions are met, If the H3xx does not receive acknowledgment after receiver a SMS within the required time, CNMI parameters will NOT be reset automatically and the +CMT or +CDS unsolicited response will send to the TE again.

Command	Syntax	Response/Action	Remarks
Set	AT+CNMA	OK or: +CMS ERROR: <err>	For text mode (+CMGF=1).
Set	AT+CNMA[=<n>[,<length>[<CR> PDU<ctrl-Z/ESC >]]]	OK or: +CMS ERROR: <err>	For PDU mode (+CMGF=0). Note: All parameters (<n>, <length> and PDU) are optional.
Read			The Read command for +CNMA is not defined by ETSI, and therefore is not supported by the H3xx. The H3xx returns an error.
Command	Syntax	Response/Action	Remarks
Test	AT+CNMA=?	OK	+CNMA: (list of supported <n>s) in PDU mode

The following table shows the +CNMA parameters.

<Parameter>	Description
<n>	0 command operates similarly as defined for the text mode

	1 send RP-ACK 2 send RP-ERROR
<length>	Length of the PDU in PDU mode

Example:

```

AT+CNMI=2,2
OK
AT+CMSS=142,"054565132" // send to myself
+CMSS: 74
OK
+CMT: "+97254565132",,"03/04/09,17: 14: 33+08"
new message text
AT+CNMA
OK
AT+CNMI?
+CNMI: 2,2,0,0
OK
AT+CNMI=1,0,0,1
OK
AT+CSMP=49,167
OK
AT+CSMP?
+CSMP: 49,167,0,0
OK
AT+CNMI?
+CNMI: 1,0,0,1,0
OK
AT+CMSS=295
+CMSS: 184
OK
+CDS: 6,184,"+972524680592",145,"05/08/02,17: 19: 23+08",,"05/08/02,17: 19: 24+08",0
AT+CNMA
OK
AT+CNMI?
+CNMI: 1,0,0,1,0
OK

```

7.1.9 +CMTI, Unsolicited Response (New SMS-DELIVER Receipt Indication)

The +CMTI unsolicited response is sent to the TE upon receipt of a new SMS-DELIVER SMS, if the +CNMI parameter <mt> is set to 1. Refer to “+CNMI, New Message Indications to Terminal”.

This unsolicited message indicates that a new SMS-DELIVER message was received, and is stored in location <index>:

+CMTI: <mem>,<index>

The following table shows the +CMTI parameters.

<Parameter>	Description
<mem>	Message memory space. "SM" - SIM memory storage.
<index>	Location of the new message.

Example:

```
AT+CNMI=2,1
OK
AT+CMGS=18 //send to my self
> 079179521201009511000c917952428650290004AA0441424344
+CMTI: "SM",4
```

7.1.10+CMT, Unsolicited Response (New SMS-DELIVER Receipt)

The +CMT unsolicited response is sent to the TE upon receipt of a new SMS-DELIVER SMS if the +CNMI parameter <mt> is set to 2. Refer to “+CNMI, New Message Indications to Terminal”.

This unsolicited message displays the received SMS-DELIVER message:

In text mode: (+CMGF=1):

+CMT: <oa>,<[alpha]>,<scts>,<[tooa]>,<[fo]>,<[pid]>,<[dcs]>,<[sca]>,<[tosca]>,<[length]> <CR><LF><data>

(about parameters in italics, refer command Show Text Mode Parameters +CSDH).

In PDU mode: (+CMGF=0):

+CMT: <[alpha]>,<[length]><CR><LF><pdu>

The following table shows the +CMT parameters.

<Parameter>	Description
<oa>	Message origination address.
<scts>	Service center time stamp.

<tooa>	Type of origination address
<fo>	First octet of the SMS
<pid>	Protocol Identifier
<dcs>	Data Coding Scheme
<sca>	Service Center Address
<tosca>	Type of Service Center Address
<data>	Message contents.
<alpha>	Alpha ID of message.
<length>	In PDU mode: Size of message, in octets, excluding SMSC data. In TEXT mode: number of characters included in the <data>
<pdu>	Message header and contents in PDU mode format. See description in "+CMGR, Read Message".

After sending a +CMT unsolicited response to the TE, the H3xx will expect a +CNMA (new message acknowledgement) from the TE within a predefined timeout of 15 seconds. Within the timeout the H3xx will not send another +CMT unsolicited response to the TE before the previous one is acknowledged. If the +CMT is acknowledged within the timeout, the new SMS is not saved in the message storage. If the H3xx does not receive acknowledgment after receiver a SMS within the required time, CNMI parameters will NOT be reset automatically and the +CMT unsolicited response will send to the TE again.

Example:

```

AT+CNMI=1,2
OK
AT+CSDH=1
OK
AT+CMSS=142,"054565034" // send to myself
+CMSS: 74
OK
+CMT: "+972544565034",,"04/11/04,09: 48: 36+08",145,4,0,0,"+97254120032",145,3
ABC
AT+CNMA
OK
AT+CMGF=0
OK
AT+CMGS=18 // send to myself
> 079179521201009511000c917952446505430004AA0441424344
+CMGS: 70

```

OK

+CMT: ,23

0791795212010095040C917952446505430004502032115430800441424344

7.1.11 +CBM, Unsolicited Response (New CB Message Receipt)

The +CBM unsolicited response is sent to the TE upon receipt of a new cell broadcast message if +CNMI parameter <bm> is set to 2. Refer to “+CNMI, New Message Indications to Terminal”.

This unsolicited message displays the received CB message. The displayed CBM is not saved in message storage.

Unsolicited Response

In text mode: (+CMGF=1):

+CBM: <sn>,<mid>,<dc>,<page>,<pages><CR><LF><data>

In PDU mode: (+CMGF=0):

+CBM: <length><CR><LF><pdu>

The following table shows the +CBM parameters.

<Parameter>	Description
<sn>	Message serial number.
<mid>	Message ID.
<page>	Current page number.
<pages>	Total number of pages.
<data>	Message contents in text mode.
<length>	Size of message in PDU mode format, in octets.
<pdu>	Message header and contents in PDU mode format. See description in “+CMGR,, Read Message”.

7.1.12 +CDSI, Unsolicited Response (New SMS-STATUS-REPORT Indication)

The +CDSI unsolicited response is sent to the TE upon receipt of a new SMS-STATUS-REPORT SMS, if the +CNMI parameter <ds> is set to '2'.

This unsolicited message indicates that a new SMS-STATUS-REPORT message was received, and is stored in location <index>.

Unsolicited Response

+CDSI: <mem>,<index>

The following table shows the +CDSI parameters.

<Parameter>	Description
<mem>	Message memory space. "SM" - SIM memory storage.

<index>	Location of the new message.
---------	------------------------------

Example:

```

AT+CMGF=1
OK
AT+CSMP=49,165 /*Set Message type to Status Report, see +CMGW*/
OK
AT+CSMP?
+CSMP: 49,167,0,0
OK
AT+CNMI=1,0,0,2
OK
AT+CMGS="052468000"
> Hello
+CMGS: 188
OK
+CDSI: "SM",14

```

7.1.13+CDS, Unsolicited Response (New SMS-STATUS-REPORT Receipt)

The +CDS unsolicited response is sent to the TE upon receipt of a new mobile-terminated SMS if the +CNMI parameter <ds> is set to '1'.

This unsolicited message displays the received SMS-DELIVER message.

Unsolicited Response

In text mode: (+CMGF=1):

```
+CDS: <fo>,<mr>[,<ra>][,<tora>],<scts>,<dt>,<st><CR><LF>
```

In PDU mode: (+CMGF=0):

```
+CDS: <length><CR><LF><pdu>
```

The following table shows the +CDS parameters.

<Parameter>	Description
<fo>	First octet of the SMS
<mr>	Message Reference
<ra>	Message Recipient address
<tora>	Type of Recipient address
<scts>	Service center time stamp

<dt>	Discharge-Time
<st>	Status

After sending a +CDS unsolicited response to the TE, the H3xx will expect a +CNMA (new message acknowledgement) from the TE within a predefined timeout of 15 seconds. Within the timeout the H3xx will not send another +CDS unsolicited response to the TE before the previous one is acknowledged. If the +CDS is acknowledged within the timeout, the new SMS is not saved in the message storage. If the H3xx does not receive acknowledgment within the required time, CNMI parameters will NOT be reset automatically and the +CDS unsolicited response will send to the TE again.

Example:

```

AT+CMGF=1
OK
AT+CSMP=49,167
OK
AT+CSMP?
+CSMP: 49,167,0,0
OK
AT+CNMI=1,0,0,1
OK
AT+CMGS="052468000"
> Hello
+CMGS: 187
OK
+CDS: 6,187,"+97252468000",145,"05/08/03,08: 56: 34+08","05/08/03,08: 56: 34+08",70
AT+CNMA
OK

```

7.1.14+CMGL, List Messages

These commands display a list of all SMS with the status value <stat>, from the H3xx message storage <mem1> (selected using the +CPMS command). The command returns a series of responses, one per message, each item containing the message index, status, and data. If the status of a message is "RECEIVED UNREAD", execution of the +CMGL command changes the status of the message to "RECEIVED READ".

Command	Syntax	Response/Action	Remarks
Set	+CMGL[=<stat>]	If text mode (+CMGF=1) command execution is successful and	

		<p>SMS-SUBMITs and/or SMS-DELIVERs:</p> <p>+CMGL: <index>,<stat>,<oa/da>[,<scts>][,<tooa/to da>,<length>]<CR><LF><data>[<CR><LF></p> <p>+CMGL: <index>,<stat>,<da/oa>[,<scts>][,<tooa/t oda>,<length>]<CR><LF><data>[...]</p> <p>The parameters <tooa/toda>,<length> refer command shows the Text Mode Parameters +CSDH and will be shown according to +CSDH settings.</p> <p>If text mode (+CMGF=1) command execution is successful and SMS-COMMANDs:</p> <p>+CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF></p> <p>+CMGL: <index>,<stat>,<fo>,<ct>[...]</p> <p>If text mode (+CMGF=1), command execution is successful and CBM storage:</p> <p>+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[<CR><LF></p> <p>+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[...]</p> <p>If text mode (+CMGF=1) command execution is successful and SMS-STATUS_REPORTs:</p> <p>+CMGL: <index>,<stat>,<fo>,<mr>[,<ra>][,<tora>],<scts>,<dt>,<st>[<CR><LF></p> <p>+CMGL: <index>,<stat>,<fo>,<mr>[,<ra>][,<tora>],<scts>,<dt>,<st>[...]</p> <p>In PDU mode (+CMGF=0):</p> <p>+CMGL: <index>,<stat>[,<alpha>],<length><CR><LF><pdu>[<CR><LF></p> <p>+CMGL: <index>,<stat>[,<alpha>],<length><CR><</p>	
--	--	---	--

		LF><pdu>[...]] Or +CMS ERROR: <err>	
Test	+CMGL=?	+CMGL: (list of supported <stat>s)	The Test command lists all the supported <stats>

The following table shows the +CGML parameters.

<Parameter>	Description																		
<index>	1-352 Index of message in storage.																		
<stat>	Status of message in memory: <table border="1"> <thead> <tr> <th>PDU mode</th> <th>Text mode</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>“REC UNREAD”</td> <td>Received unread messages</td> </tr> <tr> <td>1</td> <td>“REC READ”</td> <td>Received read messages</td> </tr> <tr> <td>2</td> <td>“STO UNSENT”</td> <td>Stored unsent messages</td> </tr> <tr> <td>3</td> <td>“STO SENT”</td> <td>Stored sent message</td> </tr> <tr> <td>4</td> <td>“ALL”</td> <td>All messages</td> </tr> </tbody> </table> <p>For fault tolerance, Two mode can be trade off</p>	PDU mode	Text mode	Description	0	“REC UNREAD”	Received unread messages	1	“REC READ”	Received read messages	2	“STO UNSENT”	Stored unsent messages	3	“STO SENT”	Stored sent message	4	“ALL”	All messages
PDU mode	Text mode	Description																	
0	“REC UNREAD”	Received unread messages																	
1	“REC READ”	Received read messages																	
2	“STO UNSENT”	Stored unsent messages																	
3	“STO SENT”	Stored sent message																	
4	“ALL”	All messages																	
<oa/da>	Original/destination address.																		
<data>	Message contents in text mode																		
<length>	In PDU mode: Size of message, in octets, excluding SMSC data. In TEXT mode: Number of characters included in <data>.																		
<pdu>	Message header and contents in PDU mode format. See description in “+CMGR, Read Message”.																		
<toda/toda>	Type of origination address / destination address																		
<fo>	First octet of the SMS																		
<mr>	Message Reference																		
<ra>	Recipient-Address																		
<tora>	Type of Recipient address																		
<scts>	Service center time stamp																		
<ct>	Command type																		
<sn>	Message serial number																		
<mid>	Message ID																		
<page>	Current page number																		
<pages>	Total number of pages																		

<dt>	Discharge-Time
<st>	Status

Example:

```

AT+CMGL=?
+CMGL: ("REC UNREAD","REC READ","STO UNSENT","STO SENT","ALL")
OK
AT+CPMS="SM" // read messages from SIM.
+CPMS: 2,20,11,61,2,20
OK
AT+CMGL // read "rec-unread" messages with changing message stat
+CMGL: 1,"REC UNREAD","+972544565034",,"05/01/01,09: 21 : 22+08"
message text
OK
AT+CMGL
OK // the message stat was changed. No "rec-unread" messages.
AT+CPMS="ME"
+CPMS: 11,61,11,61,2,20
OK
AT+CMGL="sto sent"
+CMGL: 142,"STO SENT","054565034",,,
message text
OK
AT+CSDH=1
OK
AT+CMGL="STO SENT"
+CMGL: 142,"STO SENT","054565034",,,81,<message length>
message text
OK
AT+CMGS=18 //send to myself
> 079179521201009511000c917952446505430004AA0441424344
+CMGS: 68
OK
AT+CPMS="sm" // change to SIM to read the incoming messages
+CPMS: 2,20,11,61,2,20
OK

```

7.1.15+CMGR, Read Message

These commands handle the reading of SMS. The command displays the message in location <index> of the preferred message storage <mem1> (selected using the +CPMS command). If the status of the message is "RECEIVED UNREAD", the +CMGR command changes the status to "RECEIVED READ".

Command	Syntax	Response/Action	Remarks
Set	+CMGR=<index>	<p>If text mode (+CMGF=1) command execution is successful and SMS-DELIVER:</p> <p>+CMGR:</p> <p><stat>,<oa>[,<alpha>],<scts>[,<toa>,<fo>,<pid>,<dc>,<sca>,<tosca>,<length>]h>]<CR><LF><data></p> <p>If text mode (+CMGF=1) command execution is successful and SMS-SUBMIT:</p> <p>+CMGR:</p> <p><stat>,<da>[,<alpha>][,<toda>,<fo>,<pid>,<dc>,<vp>],<sca>,<tosca>,<length>]<CR><LF><data></p> <p>If text mode (+CMGF=1) command execution is successful and SMS-COMMAND:</p> <p>+CMGR:</p> <p><stat>,<fo>,<ct>[,<pid>[,<mn>][,<da>][,<toda>],<length><CR><LF><cdata>]</p> <p>If text mode (+CMGF=1) command execution is successful and CBM storage:</p> <p>+CMGR:</p> <p><stat>,<sn>,<mid>,<dc>,<page>,<pages><CR><LF><data></p> <p>If text mode (+CMGF=1) command execution is successful and SMS-STATUS-REPORT:</p> <p>+CMGR:</p> <p><stat>,<fo>,<mr>[,<ra>][,<tora>],<scts>,<dt>,<st></p> <p>If PDU mode (+CMGF=0) and command execution is successful:</p> <p>+CMGR:</p> <p><stat>[,<alpha>],<length><CR><LF><pdu></p> <p>otherwise:</p>	The Set command reads the SMS located at <index> in the H3xx message storage and displays it

		+CMS ERROR: <err>	
--	--	-------------------	--

The following table shows the +CMGR parameters.

<Parameter>	Description																		
<index>	Index in storage of the message to be retrieved.																		
<stat>	Status of message in memory:																		
	<table border="1"> <thead> <tr> <th>PDU mode</th> <th>Text mode</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>"REC UNREAD"</td> <td>Received unread messages</td> </tr> <tr> <td>1</td> <td>"REC READ"</td> <td>Received read messages</td> </tr> <tr> <td>2</td> <td>"STO UNSENT"</td> <td>Stored unsent messages</td> </tr> <tr> <td>3</td> <td>"STO SENT"</td> <td>Stored sent message</td> </tr> <tr> <td>4</td> <td>"ALL"</td> <td>All messages</td> </tr> </tbody> </table>	PDU mode	Text mode	Description	0	"REC UNREAD"	Received unread messages	1	"REC READ"	Received read messages	2	"STO UNSENT"	Stored unsent messages	3	"STO SENT"	Stored sent message	4	"ALL"	All messages
PDU mode	Text mode	Description																	
0	"REC UNREAD"	Received unread messages																	
1	"REC READ"	Received read messages																	
2	"STO UNSENT"	Stored unsent messages																	
3	"STO SENT"	Stored sent message																	
4	"ALL"	All messages																	
<alpha>	Alpha ID of message (not present).																		
<length>	In PDU mode: Size of message, in octets, excluding SMSC data. In TEXT mode: Number of characters included in <data>.																		
<pdu>	Message header and contents in PDU mode format. See description in the table below.																		
<oa/da>	Original/destination address.																		
<data>	Message contents in text mode																		
<toda/toda>	Type of origination address / destination address																		
<fo>	First octet of the SMS																		
<pid>	Protocol Identifier																		
<dcs>	Data Coding Scheme																		
<sca>	Service Center Address																		
<tosca>	Type of Service Center Address																		
<vp>	Validity Period. Either in integer format or in time-string format ("yy/MM/dd,hh: mm: ss±zz")																		
<mr>	Message reference																		
<scts>	Service center time stamp																		
<ct>	Command type																		
<sn>	Message serial number																		
<mn>	Message Number																		
<cdata>	Command-Data																		
<mid>	Message ID																		
<page>	Current page number																		
<pages>	Total number of pages																		

<mr>	Message reference
<ra>	Message Recipient address
<tora>	Type of Recipient address
<scts>	Service center time stamp
<dt>	Discharge-Time
<st>	Status

Example:

```

AT+CPMS?
+CPMS: "SM",13,50,"SM",13,50,"SM",13,50
OK
AT+CMGR=1
+CMS ERROR: invalid index
AT+CMGR=142
+CMGR: "STO SENT","054565034",
message text
OK
AT+CSDH=1
OK
AT+CMGR=142
+CMGR: "STO SENT","054565034",,129,25,0,0,"05/04/03,21 : 22: 23+08","+
97254120032",145,<message length>
message text
OK
AT+CMGW=18
> 079179521201009511000c917952428650290004AA0441424344
+CMGW: 143
OK
AT+CMGR=143
+CMGR: 2,,23
0791795212010095040C917952428650290004502032110201800441424344
OK
AT+CPMS="SM" // change to SM to read SMS-DELIVER messages.
+CPMS: 2,20,11,61,2,20
OK
AT+CMGR=1
+CMGR: "REC READ","+972544565034",,"05/02/23,11 : 20:

```

```

10+08",145,4,0,4,"+97254120032",145,4 41424344
OK
AT+CMGF=0
OK
AT+CMGR=1
+CMGR: 0,,23
0791 07917952140230F2040C917952446505430004502032110201800441424344
OK
AT+CMGR=14
+CMGR: 0,,25
079179521201009506BC0B917952428600F0508030807512805080308075128046
// SMS-STATUS-REPORT message in PDU mode
OK
AT+CMGF=1
OK
AT+CMGR=14 // SMS-STATUS-REPORT message in Text mode
+CMGR: "REC READ",6,188,"+97252468000",145,"05/08/03,08: 57: 21+08","05/08/03,08: 57:
21+08",70
OK

```

7.1.16+CMSS, Send Message from Storage

This command sends a pre-stored message, written previously using the +CMGW command. The <da>, < toda> parameters are optional. If a DA is given, the message is sent to that address. Otherwise the message is sent to the DA it was stored with (if any was entered). If no DA is found, an error occurs.

When the given index is an incoming message index the header settings will be as follows:

- ◆ <first-octet> will be SMS-SUBMIT and VPF - relative.
- ◆ The TP-RP and TP-UDHI settings will be taken from the incoming message's first octet.
- ◆ <vp> - will be set to the default value -167 - as defined in 03.40.
- ◆ <sca>,<tosca>, <pid> and < dcs> will be set according the incoming message parameters.
- ◆ If <da> and/or < toda> are not given by the command, the <oa> and < tooa> will be set instead.

Command	Syntax	Response/Action	Remarks
Set	+CMSS=<ind ex>[,<da>[,<t oda>]]	+CMSS: <mr> or: +CMS ERROR: <err>	The Set command sends a message from storage to the network.

The following table shows the +CMSS parameters.

<Parameter>	Description
<index>	1-352 Index in storage of the message to be sent.
<da>	Destination address in quoted string. This field contains a single phone number.
<toda>	Type of DA. Value between 128-255 (according to GSM 03.40, 9.1.2.5). If this field is not given and first character of <da> is '+', <toda> will be 145, otherwise 129.
<mr>	Sent message reference number.

Example:

```
AT+CMSS=7
```

```
+CMSS: 12
```

```
OK
```

```
AT+CMSS=7,"054565132",129
```

```
+CMSS: 13
```

```
OK
```

Note: Any character sent by TE to H3xx before H3xx has reported a result of AT+CMSS operation, will abort AT+CMSS command execution. However, if SMS was already sent to network and sending operation was successful, the result of operation "+CMSS <mr>" will be reported by H3xx. If after aborting AT+CMSS command execution and before result of operation was reported by H3xx, a second AT+CMSS command is executed, then the result of the second AT+CMSS operation only will be reported by H3xx.

7.1.17+CMGW, Write Message to Memory

This command is used to write and save a message to <mem2>. The message is saved in memory, and the message index is displayed to the user.

By default, messages are saved with the status of "STO UNSENT", but status "STO SENT" can be applied using the <stat> parameter.

In TEXT mode, the header parameters will be set according to CSMP settings.

Command	Syntax	Response/Action	Remarks
Set	If text mode (+CMGF=1): +CMGW[=<da>,<toda>[,<stat>]]<CR> text is entered<ctrl-Z/ESC> if PDU mode (+CMGF=0): +CMGW=<length>[,<stat>]<CR>	+CMGW: <index> or: +CMS ERROR: <err>	The Set command writes a message and stores it.

Example:

```
AT+CMGF=1
OK
AT+CMGW="5124335432"
>This is the message body <CTRL+Z> //<CTRL+Z> ends the prompt text mode and returns to
regular AT command mode
+CMGW: 126
OK
AT+CMGW
> TEST <CTRL+Z>
+CMGW: 195
OK
AT+CMGF=0
OK
AT+CMGW=24
>079179521201009511FF0B917962543940F20008001400410042004300440045 <CTRL+Z>
+CMGW: 128
OK
AT+CMGR=128
+CMGR: 2,,24
079179521201009511FF0B917962543940F20008001400410042004300440045
OK
AT+CMGF=1
OK
AT+CSDH=1
OK
AT+CMGR=128
+CMGR: "STO UNSENT", "+97264593042",,145,17,0,8,0,"+972521100059",145,5
00410042004300440045
OK
AT+CSMP=25,"05/03/15,21 : 22: 23+08",0,0
OK
AT+CMGW="0544565034"
A<CTRL+Z>
+CMGW: 129
OK
```

```
AT+CMGR=129
+CMGR: "STO UNSENT", "0544565034",,129,25,0,0,"05/03/15,21 : 22:
    23+08", "+972521100059",145,1
OK
AT+CMGF=0
OK
AT+CMGR=129
+CMGR: 2,,20
079179521201009519FF0A8150446505430000503051122232800141
AT+CMGW=18
> 0011000c917952428650290004AA0441424344 // SCA is not given
+CMGW: 130
OK
AT+CMGR=130
+CMGR: 2,,18
079179521201009511000C917952428650290004AA0441424344
OK
AT+CMGW=19
> 079179521201009511000c917952428650290004AA0441424344 //Invalid length (19)
+CMS ERROR: invalid PDU mode parameter
AT+CMGW=19
> 079179521201009511000c917952428650290004AA044142434477 //UDL is not equal to UD
    length
+CMS ERROR: invalid PDU mode parameter
AT+CMGW=17
> 079179521201009501000c9179524286502900040441424344 //No VP in PDU message
+CMGW: 131
OK
AT+CMGR=131
+CMGR: 2,,17
079179521201009501000C9179524286502900040441424344
OK
AT+CMGW=14
> 07917952140230F212000000000c9179524286502900 //SMS Command
+CMGW: 132
OK
AT+CMGR=132
+CMGR: 2,,14
07917952140230F212000000000C9179524286502900
```

```

OK
AT+CMGF=1
OK
AT+CMGR=132
+CMGR: "STO UNSENT",18,0,0,0,"+972524680592",145,0
OK

```

7.1.18+CMGD, Delete Message

This command handles deletion of a single message from memory location <index>, or multiple messages according to <delflag>. If the optional parameter <delflag> is entered, and is greater than 0, the <index> parameter is practically ignored. If deletion fails, result code +CMS ERROR: <err> is returned.

Note: The deletion of multiple commands is a time-consuming process that may require more than 60 seconds to complete.

Command	Syntax	Response/Action	Remarks
Set	+CMGD=<index>[,<delflag>]]	OK or: +CMS ERROR: <err>	
Read			The Read command for +CMGD is not defined by ETSI, and therefore is not supported by the H3xx. The H3xx returns an error.
Test	+CMGD=?	+CMGD: (list of valid<index>s), (list of valid<delflag>s)	The Test command displays the supported values of <index>, it list the index where have stored the SMS.

The following table shows the +CMGD parameters.

<Parameter>	Description
<index>	1-352 Index in the SMS memory of the message to be deleted.
<delflag>	0 Deletes the message specified in <index> 1 Deletes all read messages 2 Deletes all read messages and sent MO messages 3 Deletes all read messages, sent and unsent MO messages 4 Deletes all messages

Example:

AT+CMGD=4

OK

AT+CMGD=1,3

OK

7.1.19+CGSMS, Select Service for MO SMS Messages

This command handles the selection of the service or service preference used by the H3xx to send mobile-originated SMS messages.

Note: The Set command selects the service or service preference used to send SMS messages. The value that is set is retained after a power cycle.

Command	Syntax	Response/Action	Remarks
Set	+CGSM S=[<service>]	OK +CME ERROR: <err>	The Set command selects the service or service preference used to send SMS messages. The value that is set is retained after a power cycle.
Read	+CGSM S?	+CGSMS: <service> OK	The Read command displays the current SMS service preference setting.
Test	+CGSM S=?	+CGSMS: (list of currently available <service>s) OK	The Test command displays a list of currently available <service>s on the network.

The following table shows the +CGSMS parameters.

<Parameter>	Description
<service>	Indicates the service or service preference to be used. 0 GPRS 1 Circuit switched (default) 2 GPRS preferred (use circuit switched if GPRS is not available) 3 Circuit switched preferred (use GPRS if circuit switched is not available) Other values are reserved and will result in an ERROR response to the Set command.

Example:

AT+CGSMS=?

CGSMS: (0-3)

OK

AT+CGSMS?

CGSMS: 1

OK

7.1.20+CMGS, Send SMS to Network

This command sends an SMS from the H3xx to the network. The message reference value <mr> is returned to the H3xx upon successful delivery of the message.

Valid <toda> will be any value between 128-255.

The header parameters in TEXT mode will be set according to CSMP settings.

Command	Syntax	Response/Action	Remarks
Set	<p>If text mode (+CMGF=1):</p> <p>+CMGS=<da>[,<toda>]<CR>text is entered<ctrl-Z/ESC></p> <p>If PDU mode (+CMGF=0):</p> <p>+CMGS=<length><CR></p> <p>PDU is entered<ctrl-Z/ESC></p>	<p>+CMGS: <mr></p> <p>OK</p> <p>or:</p> <p>+CMGS ERROR: <err></p>	The Set command validates the input parameters, sends the SMS to network and reports the result of the operation to the H3xx.

The following table shows the +CMGS parameters.

<Parameter>	Description
<da>	Destination address in quoted string. This field contains a single MIN number.
<toda>	Type of DA. Value between 128-255 (according to GSM 03.40, 9.1.2.5). If this field is not given and first character of <da> is '+', <toda> will be 145, otherwise 129.
<length>	Size of message in PDU mode format, in octets, excluding SMSC data.
<mr>	Sent message reference number.
PDU	Message header and contents in PDU mode format. See description in "+CMGW, Write Message to Memory".

Example:

```

AT+CMGS="064593042",129
>This is the message body <CTRL+Z> //<CTRL+Z> ends the prompt text mode and returns to
    regular AT command mode
OK
AT+CMGF=0
OK
AT+CMGS=24
>079179521201009511FF0B917962543940F20008001400410042004300440045 <CTRL+Z>
+CMGS: 128
OK
    
```

Note: Any character sent by TE to H3xx before H3xx has reported a result of AT+CMGS operation, will abort AT+CMGS command execution. However, if SMS was already sent to network and sending operation was successful, the result of operation "+CMGS <mr>" will be reported by H3xx.

If after aborting AT+CMGS command execution and before result of operation was reported by H3xx, a second AT+CMGS command is executed, then the result of the second AT+CMGS operation only will be reported by H3xx.

If AT+CSCS="HEX" , the SMS cannot be sent (CMGS).

7.1.21+CSCB, Cell Broadcast Messages

This command handles the selection of cell broadcast message types and data coding schemes received by the H3xx.

Command	Syntax	Response/Action	Remarks
Set	+CSCB=[<mode>[, <mids>[, <dcss>]]]	If mode=0 and <mids>is not specified, then no channels are accepted, and the H3xx channel/mid list is cleared. OK or: +CME ERROE: <err>	The Set command sets the cell broadcast message type and data coding scheme.
Read	+CSCB?	+CSCB: <mode>,<mids>,<dcss> OK	The Read command displays the current MID and DCS settings.
Test	+CSCB= ?	+CSCB: (list of supported <mode>s) OK	The Test command displays the supported values of <mode>.

Note: The Channel and DCS list is saved to the SIM card.

The maximum number of active channels is SIM dependent.

The AT+CSCB set command is not available when the phone is either in "Emergency Only" or "No Service" status.

The following table shows the AT+CSCB parameters.

<Parameter>	Description
<mode>	The current broadcast message mode: 0 MIDs and DCSs accepted 1 MIDs and DCSs not accepted
<mids>	Cell broadcast message identifiers 0-65534
<dcss>	Cell broadcast message data coding schemes 0-255

Note:

- A combination of discrete values or intervals can be entered for <mids> and <dcss>, for example, "0,1,5,320-324,922".
- The default value for missing <mode> is 1.
- The string type lists <mids> and <dcss> may include only numbers (0-9), comma and minus (-) characters.
- <mids> = 1-5 is equivalent to five channels.
- The dcscs specified refers to all incoming messages, and not only to mids specified in the same AT command.

Example:

Testing the modes supported:

AT+CSCB=?

+CSCB: (0,1)

OK

Reading the current mid and dcs lists: AT+CSCB?

+CSCB: 0,"", ""

OK

Adding channels 3, 4,5,6,22 to mid list and languages 1,8 to dcs list:

AT+CSCB=0,"3-6,22","1,8"

OK

AT+CSCB?

+CSCB: 0,"3-6,22","1,8"

OK

AT+CSCB=1,"4,6","1"



OK

AT+CSCB?

+CSCB: 1,"4,6","1"

OK

8 Access and security

8.1.1 A/, Repeat Last Command

This command repeats the last command. It is not necessary to press <Enter> after this command.

Note: Only “AT” will not be repeated.

Command	Syntax	Response/Action
Execute	A/	Repeats last command Command “AT” will ignore

Example:

```
AT&D?
&D: 2
OK
A/
&D: 2
OK
```

8.1.2 AT, Check AT Communication

This command only returns OK.

Command	Syntax	Response/Action
Execute	AT	OK

Example:

```
AT
OK
```

8.1.3 +CPIN, Enter PIN for Unlocking SIM or Enter PUK for Unlocking SIM

This command unlocks the SIM card when the proper SIM PIN is provided and unblocks the SIM card when the proper SIM PUK is provided.

The SIM card is unlocked only once the provided pin is verified as the SIM PIN. If the required PIN (determined by the error code returned from the requested operation or the Read command) is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old

pin in the SIM card. When entering the pin, a <new pin> is not required.

A SIM card related error is returned if an AT command operation is unsuccessful due to a SIM card problem. The following table shows the SIM card errors.

Error	Description
10 SIM not inserted	SIM Card is not inserted
11 SIM PIN required	SIM Card waiting for SIM PIN to be entered
12 SIM PUK required	SIM PIN is blocked
13 SIM failure	SIM Card is permanently blocked
17 SIM PIN2 required	SIM Card is waiting for SIM PIN2 to be entered
18 SIM PUK2 required	SIM PIN2 is blocked

Command	Syntax	Response/Action	Remarks
Set	AT+CPI N=[<puk > or <pin>],[<newpin >]	OK or: +CME ERROR: <err>	The Set command sends the password to the H3xx that is necessary before it can be operated (SIM PIN or SIM PUK). If there is no PIN request pending, no action is taken towards the H3xx, and an error message, +CME ERROR, is returned to the terminal. The Set command issued gives the code (SIM PIN or SIM PUK) corresponding to the error code required or returned as the result of the Read command. For example, if the SIM PIN is blocked, the error code 11 or "SIM PIN required" is returned. The user must then issue the Set command with the SIM PIN.
Read	AT+CPI N?	+CPIN: <code> OK or: +CME ERROR: <err>	The Read command returns an alphanumeric string indicating the status of the SIM card, and whether a password is required or not. This is an independent SIM card lock status check only, and does not check the phone lock status.
Test	AT+CPI N=?	OK	

The following table shows the +CPIN parameters.

<Parameter>	Description	
<puk>	PUK code for unblocking a blocked phone	
<pin>	Current PIN for unlocking a locked phone	
<newpin>	New PIN (after changing or after entering PUK) 4 - 8 digits	
<code>	READY	MT is not pending for any password
	SIM PIN	MT is waiting SIM PIN to be given
	SIM PUK	MT is waiting SIM PUK to be given
	PH-SIM PIN	MT is waiting phone-to-SIM card password to be given
	PH-FSIM PIN	MT is waiting phone-to-very first SIM card password to be given
	PH-FSIM PUK	MT is waiting phone-to-very first SIM card unblocking password to be given
	SIM PIN2	MT is waiting SIM PIN2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered right after the failure, it is recommended that MT does not block its operation)
	SIM PUK2	MT is waiting SIM PUK2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR: 18); if PUK2 and new PIN2 are not entered right after the failure, it is recommended that MT does not block its operation)
	PH-NET PIN	MT is waiting network personalization password to be given
	PH-NET PUK	MT is waiting network personalization unblocking password to be given
	PH-NETSUB PIN	MT is waiting network subset personalization password to be given
	PH-NETSUB PUK	MT is waiting network subset personalization unblocking password to be given
	PH-SP PIN	MT is waiting service provider personalization password to be given

	PH-SP PUK	MT is waiting service provider personalization unblocking password to be given
	PH-CORP PIN	MT is waiting corporate personalization password to be given
	PH-CORP PUK	MT is waiting corporate personalization unblocking password to be given
SIM PIN	AT+CPIN=<pin>	
SIM PUK	AT+CPIN=<puk>,<newpin>	
SIM PUK2	AT+CPIN=<puk2>,<newpin2>	
SIM PIN 2	AT+CPIN=<pin2>	

Example:

AT+CPIN=?

OK

AT+CLCK="SC",1,"<correct PIN>" //Not case-sensitive

OK

The facility is enabled by the +CLCK command (Refer to "+CLCK, Facility Lock")

AT+CPIN?

+CPIN: SIM PIN

OK

AT+CPIN="<correct PIN>"

OK

AT+CPIN?

+CPIN: READY

OK

The status of the SIM is still enabled, but the PIN is READY for this session.

The SIM is enabled per session. After power-up SIM must be unlocked again by using the +CLCK command.

The following case shows an example of three unsuccessful attempts at entering the PIN:

AT+CPIN?

+CPIN: SIM PIN

OK

AT+CPIN="<wrong pin>"

+CME ERROR: incorrect password

AT+CPIN="<wrong pin>"

+CME ERROR: incorrect password

AT+CPIN="<wrong pin>"

+CME ERROR: SIM PUK required

```

AT+CPIN?
+CPIN: SIM PUK      //PIN is blocked. The PUK is needed for unblocking.
OK
AT+CPIN="<PUK>","<NEW PIN>"    //Enter PUK and new PIN
OK
AT+CLCK="FD",1,"<wrong PIN2>"
+CME ERROR: incorrect password
AT+CLCK="FD",1,"<wrong PIN2>"
+CME ERROR: incorrect password
AT+CLCK="FD",1,"<wrong PIN2>"
+CME ERROR: SIM PUK2 required
AT+CPIN?
+CPIN: SIM PUK2      //PIN2 is blocked. The PUK2 is needed for unlocking.
OK
AT+CPIN="<PUK2>","<NEW PIN2>"    //Enter PUK2 and new PIN2
OK

```

8.1.4 +TPIN, Query Number of Remaining SIM PIN/PUK Entering Attempts

This command returns the number of remaining attempts of entering the PIN and PUK for the SIM card in use. The command returns the number of remaining attempts for PIN1 (CHV1), PIN2 (CHV2), PUK1 (unlock CHV1) and PUK2 (unlock CHV2).

Number of available attempts is provider dependant. Typically it is 3 attempts for PIN, 10 attempts for PUK.

This command will return error if SIM is not inserted.

Command	Syntax	Response/Action	Remarks
Read	AT+TPIN?	+TPIN: <chv1>,<unb1_chv1>,<chv2>,<unb1_chv2> or: +CME ERROR: <err>	

The following table shows the +TPIN parameters.

<Parameter>	Description
<chv1>	Number of remaining PIN attempts
<chv2>	Number of remaining PIN2 attempts
<unbl_chv1>	Number of remaining PUK attempts
<unbl_chv2>	Number of remaining PUK2 attempts

Example:

AT+TPIN?

+TPIN: 3,10,3,10

OK

AT+CPIN="7777"

+CME ERROR: incorrect password

AT+TPIN?

+TPIN: 2,10,3,10

OK

8.1.5 +CPWD, Change Password

This command sets a new password for the facility lock. The password can only be changed once the required facility is enabled by the +CLCK command.

A password can be changed only if the provided password <oldpwd> has been verified. The entered password <newpwd> must also comply to the password rules. The facility value <fac> is not case-sensitive. In the password value, letters are not allowed.

Command	Syntax	Response/Action	Remarks
Set	AT+CPWD=<fac>,<oldpwd>,<newpwd>	OK or: +CME ERROR: <err>	Set a new password for the facility lock.
Read	AT+CPWD?	+CME ERROR: <err>	
Test	AT+CPWD=?	+CPWD: list of Supported (<fac>,<pwdlength>)s OK or: +CME ERROR: <err>	The Test command returns a list of pairs which represent the available facilities, and the maximum length of their passwords.

The following table shows the <fac> parameters.

<fac>	Description
SC	SIM (lock SIM/UICC card) (SIM/UICC asks password in MT power-up and when this lock command issued)
FD	SIM card or active application in the UICC (GSM or USIM) fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as <passwd>)
AO	BAOC (Bar All Outgoing Calls)
OI	BOIC (Bar Outgoing International Calls)
OX	BOIC-exHC (Bar Outgoing International Calls except to Home Country)
AI	BAIC (Bar All Incoming Calls)
IR	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
AB	All Barring services (applicable only for <mode>=0)
AG	All outgoing barring services (applicable only for <mode>=0)
AC	All incoming barring services (applicable only for <mode>=0)
P2	SIM PIN2

The following table shows the +CPWD parameters.

<Parameter>	Description
<fac>	List of supported facilities. All the facility messages, except for SC and P2, are sent to the network. (The facilities are not case-sensitive.) Please see <fac> Table.
<oldpwd>	String type, 4-8 character old password specified for the facility from the H3xx user interface.
<newpwd>	String type, 4-8 character new password specified by the user.
<pwd length>	Maximum length of the facility password. Integer type.

Example:

AT+CPWD =?

+CPWD: ("SC",8),("AO",8),("OI",8),("OX",8),("AI",8),("IR",8),("AB",8),("AG",8), ("AC",8),("P2",8)

OK

AT+CPWD?

+CME ERROR: operation not supported

AT+CLCK="sc",1,"current pin password"

OK

AT+CPWD="sc","incorrect old password","new password"

+CME ERROR: incorrect password

```

AT+CLCK="sc",2
+CLCK: 0
OK
AT+CPWD="sc","old password","new password"
+CME ERROR: operation not allowed
AT+CLCK="fd",1,"current pin2 password"
AT+CPWD="p2","old password","new password"
OK
AT+CLCK="ai",2
+CLCK: 0,1
+CLCK: 0,2
+CLCK: 0,4
OK
AT+CLCK="ai",1,"correct password"
OK
AT+CLCK="ai",2
+CLCK: 1,1
+CLCK: 1,2
+CLCK: 1,4
OK
AT+CPWD="ai","old password","new password"
OK

```

8.1.6 +CLCK, Facility Lock

This command locks, unlocks or interrogates a H3xx or a network facility <fac> (any kind of call barring program).

A password is mandatory for performing locking and unlocking actions, but not for querying. The features of the H3xx that are affected by this are fixed dialing list.

When querying the status of a single call barring program <mode>=2, the <status> for each call type will be returned.

For <fac>="SC", SIM Card PIN setting and for <fac>="FD", SIM Fixed Dialing memory setting, the <class> is irrelevant (For more information about <class>, refer to the following table shows the +CLCK parameters.). For "SC", the <passwd> is SIM PIN. For "FD", the <passwd> is SIM PIN2.

Command	Syntax	Response/Action	Remarks
Set	+CLCK=<fac> ,<mode>[,<passwd>[,<class>	For <fac> where <class> is irrelevant(SC, FD):	The Set command performs the specified <mode> action on the

	x>]]	+CLCK=<fac>,2 +CLCK: <status> For <fac> with several supported <class>es: +CLCK=<fac>,2 +CLCK: <status>,<class1> [<CR><LF> +CLCK: <status>,<class2> [...]] OK	specified <fac>.
Read	+CLCK?	ERROR	
Test	+CLCK=?	+CLCK: (list of supported <fac>s)	The Test command returns the list of supported facilities.

The following table shows the +CLCK parameters.

<Parameter>	Description
<fac>	Please see <fac> Table in +CPWD command.
<passwd>	String type, 4-8 character password. Shall be the same as password specified for the facility with command Change Password +CPWD
<mode>	0 Unlock 1 Lock 2 Query status (<passwd> does not apply) Note: Query mode return only the active <fac>. In case no <fac> is active the query will return the default (7).
<class>	Sum of integers, each representing a class of information. Please see class table in +CCWA command. The default value is 7.
<status>	0 Inactive 1 Active

Example:

```

AT+CLCK=?
+CLCK: ("SC","AO","OI","OX","AI","IR","AB","AG","AC","FD")
OK
AT+CLCK="SC",2
+CLCK: 0
OK

```

AT+CLCK="SC",1

+CME ERROR: operation not allowed

AT+CLCK="SC",1,"incorrect password"

+CME ERROR: incorrect password

AT+CLCK="SC",1,"correct password"

OK

(From now SIM Card is locked and PIN is requested on power up)

AT+CLCK="AB",0,"incorrect password"

+CME ERROR: incorrect password

AT+CLCK="IR",2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

+CLCK: 0,8

OK

AT+CLCK="IR",1,"correct password" //<classx> is defaulted to 7 when not specified

OK

AT+CLCK="IR",2

+CLCK: 1,1

+CLCK: 1,2

+CLCK: 1,4

+CLCK: 0,8

OK

AT+CLCK="OI",1,"correct password",3

OK

(Voice and data international calls barred, fax and SMS not barred.)

AT+CLCK="OI",2

+CLCK: 1,1

+CLCK: 1,2

+CLCK: 0,4

+CLCK: 0,8

OK

9 Network

9.1 Network Commands

9.1.1 +CSQ, Signal Strength

This command displays the received signal strength indication <rss> and channel bit error rate <ber> from the H3xx.

Command	Syntax	Response/Action
Execute/Read	AT+CSQ	+CSQ: <rss>,<ber>
	AT+CSQ?	OK
Test	AT+CSQ=?	+CSQ: (list of supported <rss>s),(list of supported <ber>s) OK

The following table shows the +CSQ parameters.

<Parameter>	Description
<rss>	0 through 31 - covers the range of -113 dbm (or less) to -51 dbm (or greater) 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>	Channel bit error rate (in percent) 0-7 RXQUAL values in the TS 45.008 table 99 Unknown or not detectable

Example:

AT+CSQ

+CSQ: 23,99

OK

AT+CSQ=?

+CSQ: (0-31,99),(0-7,99)

OK

9.1.2 +CRLP, Radio Link Protocol

This command displays the Radio Link Protocol parameters that are used when non-transparent data calls are originated.

Command	Syntax	Response/Action	Remarks
Set	+CRLP=[<iws>[,<mws>[,<T1>[,<N2>]]]	OK or: +CME ERROR: <err>	The Set command enables you to change the RLP parameters.
Read	+CRLP?	+CRLP= <iws>,<mws>,<T1>,<N2> OK	
Test	+CRLP=?	+CRLP= (list of supported <iws>s), (list of supported <mws>s), (list of supported <T1>s), (list of supported <N2>s) OK	

The following table shows the +CRLP parameters.

<Parameter>	Description
<iws>	IWF to MS window size. 10-61. The default value is 61.
<mws>	MS to IWF window size. 10-61. The default value is 61.
<T1>	Acknowledgement timer T1. 39-255. The default value is 48.
<N2>	Retransmission attempts N2 in integer format (refer to GSM 04.22 subclause 5.4.3) The default value is 6.

Example:

```
AT+CRLP=?
+CRLP: (10-61),(10-61),(39-255),(1-255)
OK
AT+CRLP?
+CRLP: 61,61,48,6
OK
```

9.1.3 +CREG, Network Registration Status

This command is used to read current Network registration status and serving cell information.

Command	Syntax	Response/Action	Remarks
Set	AT+CREG =[<n>]	OK or: +CME ERROR: <err>	The Set command controls the presentation of an unsolicited result code and the result of the Read operation.
Read	AT+CREG ?	+CREG: <n>,<stat>[,<lac>,<ci>[,<AcT>]] OK	The Read command returns the status of the result code presentation whether the network has indicated the registration of H3xx. Location information elements <lac> and <ci> are returned only when <n>=2 and the H3xx is registered in the network.
Test	AT+CREG =?	+CREG: (list of supported <n>s) OK	

The following table shows the +CREG parameters.

<Parameter>	Description
<n>	0 Disables the network registration unsolicited result code. 1 Enables the network registration unsolicited result code +CREG: <stat>. 2 Enables the network registration and location information in unsolicited reports and Read command +CREG: <stat>[,<lac>,<ci>[,<AcT>]]. The default value is 0.
<stat>	0 Not registered, and the ME is not currently searching for a new operator to register. 1 Registered, home network. 2 Not registered, but the ME is currently searching for a new operator to register. 3 Registration denied. 4 Unknown. 5 Registered, roaming.
<lac>	Two-byte location area code in hexadecimal format.
<ci>	Four-byte cell ID in hexadecimal format.
<AcT>	0 GSM 2 UTRAN 3 GSM w/EGPRS

	4 UTRAN w/HSDPA 5 UTRAN w/HSUPA 6 UTRAN w/HSDPA and HSUPA Note: <Act> is supporting only in R7 Protocol Stack. AcT values 3,4,5,6 options are supported only in R8 PS.
--	---

Example:

```

AT+CREG=?
+CREG: (0-2)
OK
AT+CREG?
+CREG: 0,1
OK
AT+CREG=2
OK
AT+CREG?
+CREG: 2,1,"A52F","01603413",6
OK
AT+CREG=1
OK
AT+CREG?
+CREG: 1,1
OK
AT+CREG=0
OK

```

9.1.4 +CGREG, GPRS Network Registration

This command gives the information of state of GPRS network registration.

Command	Syntax	Response/Action	Remarks
Set	AT+CGREG=<n>	OK or: +CME ERROR: <err>	The Set command controls the presentation of an unsolicited result code "+CGREG: " and the result of the Read operation.
Command	Syntax	Response/Action	Remarks
Read	AT+CGREG?	+CGREG: <n>,<stat>[,<lac>,<ci>	The Read command returns the status of the result code presentation and shows whether

		>[,<AcT>,<rac>]] OK	the network has currently indicated the GPRS registration of the H3xx. Location information elements <lac> and <ci> are returned only when <n>=2 and the H3xx is registered in the network.
Test	AT+CGREG=?	+CGREG: (list of supported <n>s) OK	The Test command displays the supported values of <n>.

The following table shows the +CGREG parameters.

<Parameter>	Description
<n>	<p>0 Disables the network registration unsolicited result code.</p> <p>1 Enables the network registration unsolicited result code +CGREG: <stat>.</p> <p>2 Enables the network registration and location information in unsolicited result code and Read command +CGREG: <stat>[,<lac>,<ci>].</p> <p>The default value is 0.</p>
<stat>	<p>0 Not registered, and the ME is not currently searching for a new operator to register.</p> <p>1 Registered, home network.</p> <p>2 Not registered, but the ME is currently searching for a new operator to register.</p> <p>3 Registration denied.</p> <p>4 Unknown.</p> <p>5 Registered, roaming.</p>
<lac>	Two-byte location area code in hexadecimal format.
<ci>	Four-byte cell ID in hexadecimal format.
<AcT>	<p>It is a Release 7 feature and describes access technology of the registered network. Possible values of <AcT> are:</p> <p>0 GSM</p> <p>1 GSM Compact</p> <p>2 UTRAN</p>
<rac>	It is Release 7 feature, string type; one byte routing area code in hexadecimal format Intel Mobile.

Example:

at+cgreg=?

```

+CGREG: (0-2)
OK
AT+CGREG=2
OK
AT+CGREG?
+CGREG: 2,1,"A52F","0160358F",6,"02"
OK
AT+CGREG=1
OK
AT+CGREG?
+CGREG: 1,1
OK
AT+CGREG=0
OK

```

9.1.5 +COPS, Operator Selection

This command enables accessories to access the network registration information, and the selection and registration of the GSM/UMTS network operator.

The H3xx is registered in the Home network.

The Enhanced Operator Name String (EONS) feature enables the H3xx to return the operator name displayed on the handset.

This feature allows the SIM card to store a mapping of MCC/MNC code pairs to the displayed operator name. As a result, several operators can share a single network while having their handsets display their own name as the network operator.

Testing the enhanced ONS feature requires a "SIM ONS" SIM card.

Command	Syntax	Response/Action	Remarks
Set	AT+COPS =[<mode> de>[,<format> at> [,<oper>[,< AcT>]]]]	OK or: +CME ERROR: <err>	The Set command can force an attempt to select and register a specific GSM network operator. The <mode> selects whether this is done automatically by the H3xx or whether the selection is forced to an operator <oper> (given in format <format>). If the selected operator is not available, no other operator is selected (except when the <mode> is set to 4). <mode>=2 forces an attempt to deregister from the network. <mode>=3 sets the operator format to all further Read commands (+COPS?) as well. The selected mode applies to future network

			registrations, for example, once you deregister from the network, the H3xx remains unregistered until you select <mode>=0, <mode>=1, or <mode>=4
Read	AT+COPS ?	+COPS: <mode>[,<format>,<oper>[,<AcT>]] OK Or +CME ERROR: <err>	The Read command returns the current mode and the currently selected operator.
Test	AT+COPS =?	+COPS: [list of supported (<stat>, long alpha numeric <oper>,<short alphanumeric<oper>, numeric<oper>)] [,<list of supported <mode>s,(list of supported<format>s)] OK	<p>The Test command returns a list of quadruplets, each representing an operator present in the network. A quadruplet consists of an integer indicating the availability of the operator <stat>, long and short alphanumeric format of the name of the operator, and numeric format representation of the operator. If any of the formats are unavailable, there is an empty field.</p> <p>The list of operators is in the following order: home network, networks referenced in SIM or active application in the UICC (GSM or USIM) in the following order: HPLMN selector, User controlled PLMN selector, Operator controlled PLMN selector and PLMN selector (in the SIM or GSM application), and other networks.</p> <p>After the operator list, the H3xx returns lists of the supported <mode>s and <format>s. These lists are separated from the operator list by two commas.</p>

The following table shows the +COPS parameters.

<Parameter>	Description
<mode>	Determines whether what is displayed is defined by <oper>, or is done automatically by the H3xx.

	<p>0 Automatic (<oper> field is ignored)</p> <p>1 Manual (<oper> field is present)</p> <p>2 De-register from network</p> <p>3 Set only <format> (<oper> field is ignored); used for Read command only, do not attempt registration/deregistration</p> <p>4 Manual/automatic (<oper> field is present; if manual selection fails, use automatic mode)</p> <p>The default value is 0.</p>
<format>	<p>The operator format type:</p> <p>0 Long alphanumeric</p> <p>1 Short alphanumeric</p> <p>2 Numeric</p> <p>The default value is 0.</p>
<stat>	<p>0 Unknown</p> <p>1 Available</p> <p>2 Current</p> <p>3 Forbidden</p>
<oper>	<p>Operator name displayed.</p> <p>The long alphanumeric format can be up to 16 characters long. The short alphanumeric format can be up to 8 characters long.</p> <p>The numeric format is the GSM Location Area Identification number (refer to GSM 04.08 subclause 10.5.1.3), consisting of a three BCD digit country code (as per ITU-T E.212 Annex A), plus a two BCD digit network code, which is administration specific.</p> <p>The returned <oper> is not in BCD format, but in IRA characters converted from BCD, and therefore the number has the following structure:</p> <p>(country code digit 3) (country code digit 2) (country code digit 1) (network code digit2) (network code digit 1)</p>
<AcT>	<p>Indicates the radio access technology and values can be:</p> <p>0 GSM</p> <p>2 UMTS</p>
<Parameter>	Description

<plmn_list>	<p>Indicates whether the PLMN is present on the EHPLMN list, the User Controlled PLMN List or the Operator Controlled PLMN List.</p> <p>0 PLMN is present on the EHPLMN list</p> <p>1 PLMN is present on the User Controlled PLMN List</p> <p>2 PLMN is present on the Operator Controlled PLMN List</p>
-------------	--

Example:

AT+COPS=?

+COPS:

(2,"CHN-UNICOM","UNICOM","46001",2),(2,"CHN-UNICOM","UNICOM","46001",0),(3,"CHINA MOBILE","CMCC","46000",0,)

OK

AT+COPS?

+COPS: 1,0,"CHN-UNICOM",2

OK

AT+COPS=2

OK

AT+CREG=2

OK

+CREG: 3

AT+COPS=4,2,"46001"

+CREG: 3

+CREG: 2

+CREG: 1,"27A0","0DEB"

OK

AT+COPS?

+COPS: 1,2,"46001",2

OK

9.1.6 +CPOL, Preferred Operators

This command is used to edit the PLMN selector lists in the SIM card or active application in the UICC (GSM or USIM).

If no list has been previously selected, the EFPLMNwAcT - user controlled PLMN selector with Access Technology list, is the one accessed by default.

Command	Syntax	Response/Action	Remarks
---------	--------	-----------------	---------

Set	AT+CPO L= [<index>][,<format> [,<oper>[, <GSM_A cT>,<GS M_Comp act_AcT> ,<UTRAN _AcT>]]]	OK or: +CME ERROR: <err>	Note: In case the index already exists in the list, the new entry will erase the old one and replace it in the list. The H3xx may also update this list automatically when new networks are selected.
Read	AT+CPO L?	+CPOL: <index1>,<format>,<op er1> [,<GSM_AcT1>,<GSM _Compact_AcT1>,<UT RAN_AcT1>][<CR><L F>+CPOL: <index2>,<format>,<op er2> [,<GSM_AcT2>,<GSM _Compact_AcT2>,<UT RAN_AcT2>] [...]] OK or +CME ERROR: <err>	
Test	AT+CPO L=?	+CPOL: (list of supported<index>s),(lis t of supported<format>s) OK or: +CME ERROR: <err> * Index range is SIM dependent	The Test command displays the entire index range supported by the SIM.

The following table shows the +CPOL parameters.

<Parameter>	Description
<indexn>	Order number of network operator in the SIM preferred operator list
<format>	Defines the <oper> format: 0 Long alphanumeric format (up to 16 characters) (default) 1 Short alphanumeric format (up to 8 characters) 2 Numeric
<oper>	Name of the network operator string type; <format> indicates if the format is alphanumeric or numeric (see +COPS)
<GSM_AcTn>	GSM access technology 0 access technology not selected 1 access technology selected
<GSM_Compact_AcTn>	GSM compact access technology 0 access technology not selected 1 access technology selected
<UTRA_AcTn>	UTRA access technology 0 access technology not selected 1 access technology selected

Note1:

- If <index> is given but <oper> is left out, entry is deleted.
- If <oper> is given but <index> is left out, <oper> is put in the next free location.
- If only <format> is given, the format of the <oper> in the read command is changed.

Note2:

- User is prevented from editing index No. 0. This index is reserved for the HPLMN record and can not be modified.
- When entering a new item with an <index> to a full list, the H3xx deletes the last item, stores the new item in the requested entry, and shifts the rest of the list down.
- When entering a new item without an <index> to a full list, the H3xx replaces the last entry with the new item.

Note3: MT may also update the User controlled PLMN selector with Access Technology list - EFPLMNwAcT, automatically when new networks are selected.

Note4: The Operator controlled PLMN selector with Access Technology EFOPLMNwAcT and HPLMN selector with Access Technology - EFHPLMNwAcT can not be written since the access conditions is Administrative.

Note5: The command is implemented according to 3GPP TS 27.007 without acceptance in attention the <GSM_Act2>, <GSM_Compact_Act2>, <UTRAN_Act2>] bits since the H3xx device

not using this bits to get the best PLMN.

Example:

```
AT+CPOL=?  
+CPOL: (001-032),(000-002)  
OK  
AT+CPOL?  
+CPOL: 000,002,"42501"  
OK  
AT+CPOL=,0  
OK  
AT+CPOL?  
+CPOL: 000,000,"IL ORANGE"  
OK  
AT+CPOL=?  
+CPOL: (001-032),(000-002)  
OK  
AT+CPOL=1,2,"42502"  
OK  
AT+CPOL?  
+CPOL: 000,000,"IL ORANGE"  
+CPOL: 001,000,"IL Cellcom"  
OK  
AT+CPOL=1  
OK  
AT+CPOL?  
+CPOL: 000,000,"IL ORANGE"  
OK
```

9.1.7 +CBAND, Change Radio Band

This command allows switching from automatic band selection to selection of one or more (up to four) bands from the following:

- 850 MHz
- 900 MHz
- 1800 MHz
- 1900 MHz

Command	Syntax	Response/Action
---------	--------	-----------------

Set	AT+CBAND=[<band_1>[,<band_2>[,<band_3>[,<band_4>]]]]	OK or CME ERROR: <err>
Read	AT+CBAND?	+CBAND: [<band_1>[,<band_2>[,<band_3>[,<band_4>]]]] OK
Test	AT+CBAND=?	+CBAND: (list of supported bands) OK

The following table shows the +CBAND parameters.

<Parameter>	Description	
<band_1> or <band_2> or <band_3> or <band_4>	0	Automatic band selection(entering every time possible,display improbable)
	850	Selection of 850 MHz band
	900	Selection of 900 MHz band
	1800	Selection of 1800 MHz band
	1900	Selection of 1900 MHz band

Note: This command only for 2G network.

Example:

```

AT+CBAND?
+CBAND: 900,1800
OK
AT+CBAND=?
+CBAND: (0,900,1800)
OK
AT+CBAND=900
OK
AT+CBAND?
+CBAND: 900
OK

```

9.1.8 +CUBAND, Change 3G Radio Band

This command allows the automatically selected band switch to the bands in the following list(at

most four bands):

- UMTS_BAND_I 2100 MHz
- UMTS_BAND_II 1900 MHz
- UMTS_BAND_V 850 MHz
- UMTS_BAND_VIII 900 MHz

Command	Syntax	Response/Action
Set	AT+CUBAND=[<"band_1">[,<"band_2">[,<"band_3">[,<"band_4">]]]]	OK or CME ERROR: <err>
Read	AT+CUBAND?	+CUBAND: [<"band_1">[,<"band_2">[,<"band_3">[,<"band_4">]]] OK
Test	AT+CUBAND=?	+CUBAND: (list of supported bands) OK

The following table shows the +CUBAND parameters.

<Parameter>	Description	
<band_1> or	0	Automatic band selection
<band_2> or	UMTS2100	Selection of UMTS_BAND_I, 2100MHz band
<band_3> or	UMTS1900	Selection of UMTS_BAND_II, 1900MHz band
<band_4>	UMTS850	Selection of UMTS_BAND_V, 850MHz band
	UMTS900	Selection of UMTS_BAND_VIII, 900MHz band

Note: For registering 3G network only.

Example:

AT+CUBAND?

+CUBAND: "UMTS2100", "UMTS1900", "UMTS850", "UMTS900"

OK

AT+CUBAND=?

+CUBAND: (0, "UMTS2100", "UMTS1900", "UMTS850", "UMTS900")

OK

AT+CUBAND="UMTS2100"

OK

AT+CUBAND?

9.1.9 +XREG, Current Network Registration Status

This command reports where the device is attached to.

URC syntax +XREG: <Status>, <Band>.

Command	Syntax	Response/Action	Remarks
Set	AT+XREG=<n> >	OK or CME ERROR: <error>	Set command enables/disables network registration status unsolicited result code +XREG. URC same as read syntax.
Read	AT+XREG?	+XREG: <n>,<State>,<Band> OK	Read command gives the status of registration.
Test	AT+XREG=?	+XREG: (list of supported <n>s) OK	Test command returns list of supported <n>.

The following table shows the +XREG parameters.

<Parameter>	Description
<n>	0: disable network registration attach status unsolicited result code 1: enable network registration attach status unsolicited result code +XREG
<State>	0: not registered 1: registered, GPRS attached 2: registered, EDGE attached 3: registered, WCDMA attached 4: registered, HSDPA attached //with DFS22.21.00. DFSD23.09.01 5: registered, HSUPA attached //with DFS22.21.00. DFSD23.09.01 6: registered, HSUPA and HSDPA attached 7: registered, GSM 8: registered, HSPA+ attached
<Band>	900: selection of 900 MHz band 1800: selection of 1800 MHz band 1900: selection of 1900 MHz band 850: selection of 850 MHz band 450: selection of 450 MHz band

	<p>480: selection of 480 MHz band</p> <p>750: selection of 750 MHz band</p> <p>380: selection of 380 MHz band</p> <p>410: selection of 410 MHz band</p> <p>710: selection of 710 MHz band</p> <p>810: selection of 810 MHz band</p> <p>BAND_UMTS_I: BAND_UMTS_I</p> <p>BAND_UMTS_II: BAND_UMTS_II</p> <p>BAND_UMTS_III: BAND_UMTS_III</p> <p>BAND_UMTS_IV: BAND_UMTS_IV</p> <p>BAND_UMTS_V: BAND_UMTS_V</p> <p>BAND_UMTS_VI: BAND_UMTS_VI</p> <p>BAND_UMTS_VII: BAND_UMTS_VII</p> <p>BAND_UMTS_VIII: BAND_UMTS_VIII</p> <p>BAND_UMTS_IX: BAND_UMTS_IX</p> <p>BAND_UMTS_X: BAND_UMTS_X</p> <p>BAND_UMTS_XI: BAND_UMTS_XI</p> <p>BAND_UMTS_XII: BAND_UMTS_XII</p> <p>BAND_UMTS_XIII: BAND_UMTS_XIII</p> <p>BAND_UMTS_XIV: BAND_UMTS_XIV</p> <p>BAND_UMTS_XV: BAND_UMTS_XV</p> <p>BAND_UMTS_XVI: BAND_UMTS_XVI</p> <p>BAND_UMTS_XVII: BAND_UMTS_XVII</p> <p>BAND_UMTS_XVIII: BAND_UMTS_XVIII</p> <p>BAND_UMTS_XIX: BAND_UMTS_XIX</p> <p>BAND_UMTS_XX: BAND_UMTS_XX</p> <p>BAND_UMTS_XXI: BAND_UMTS_XXI</p> <p>BAND_UMTS_XXII: BAND_UMTS_XXII</p>
--	---

9.1.10+MCELL, H3xx Cell Description

This command only support when module register GSM net,UMTS not supported.This command displays information about the Cellular Network. The information is divided throughout 20 screens, each of them with different parameters data.

Command	Syntax	Response/Action	Remarks
---------	--------	-----------------	---------

Set	+MCELL=<mode>,<screen_num>	OK or: +CME ERROR: <err>	The Set command will return "OK" only. The relevant <screen_info> will return back with +MCELL format few seconds later.
Read	+MCELL?	OK	The Read command just returns OK and does nothing.
Test	+MCELL=?	+MCELL: (list of supported <mode>s), (list of supported <screen_num>s) OK	The Test command returns the possible <mode> & <screen_num> values.

The following table shows the +MCELL parameters.

<Parameter>	Description
<mode>	0 One shot requested.
<screen_num>	The requested screen number - An integer number. 1 Serving Idle Information screen 2 Circuit Switched Serving Cell Information screen 3 Miscellaneous Information screen 4 Uplink Data Transfer screen 5 Downlink Data Transfer screen 6 Neighbor 1 Cell Information screen 7 Neighbor 2 Cell Information screen 8 Neighbor 3 Cell Information screen 9 Neighbor 4 Cell Information screen 10 Neighbor 5 Cell Information screen 11 Neighbor 6 Cell Information screen 12 Neighbor Cells Summary screen 13 Re-selection screen 14 Hopping Information screen 15 PDP1 Context Information screen 16 PDP2 Context Information screen 17 PDP3 Context Information screen 18 PDP4 Context Information screen 19 Serving Cell paging parameters 20 Optional SYSINFOS

+MCELL Indication:

After AT+MCELL command, the information about the Cellular Network will return back by this +MCELL indication format few seconds later.

+MCELL: <screen_title><CR><LF><screen_info><CR><LF>

The following table shows the +MCELL parameters.

<Parameter>	Description
<screen_title>	The requested screen title is written on the first line of each screen.
<screen_info>	The requested screen information.

<screen title>	Description	<screen num>
Serving Idle/PI	Idle/Packet Idle mode; Serving Cell Information screen.	1
Serving CS/TBF	Circuit Switched mode; Serving Cell Information screen.	2
Serving Misc	Idle/Packet Idle mode; Miscellaneous Information screen.	3
Uplink Transfer	Dedicated/TBF modes; Uplink Data Transfer screen.	4
Downlink Transfer	Dedicated/TBF modes; Downlink Data Transfer screen.	5
Adjacent Cell x	Neighbor Cell Information screen. x - index cell.	6-11
Neighbors	Neighbor Cells Summary screen.	12
Reselection	Re-selection screen.	13
Hopping Info	Dedicated/TBF modes; Hopping Information screen.	14
PDP Context	PDP Context Information screen	15-18
GPRS-Parameters	Idle/Packet Idle mode; GPRS parameters.	19
SysInfos	Idle/Packet Idle mode; Optional SYSINFO.	20

Example:

AT+MCELL?

OK

AT+MCELL=?

+MCELL: 0,(1-20)

OK

```
AT+MCELL=0,3
OK
```

```
+MCELL: Serving Misc
(P)BCCH ARFCN:00536,BSIC:056,RxLev:037,Cell ID:03583,(PD)TCH
ARFCN:INVALID_ARFCN,Timeslot:00,CBA:000,CBQ:000,T3314:00
```

```
AT+MCELL=0,19
OK
```

```
+MCELL: GPRS-Parameters:
(P)BCCH ARFCN:00536,BSIC:056,RxLev:039,Cell ID:03583,(PD)TCH
ARFCN:INVALID_ARFCN,Timeslot:00,BS_PA_MFRMS:02,BS_AG_BLK_RES:01,BS_PAG
_BLK_RES: 0,BS_PBCCH_BLOCKS:1
```

9.1.11 +MCI, H3xx Cell Information

This command only support when module register GSM net,UMTS not supported.This command returns neighbor cell information.

The command returns ARFCN, BSIC and RX level of serving and adjacent cells. In case H3xx is registered, adjacent cells are from registered PLMN. In case H3xx is in Emergency Mode, adjacent cells are physical neighbors. BSIC is displayed only in case SCH (Synchronization Channel) is decoded.

The parameter <enable_TA> determines whether <TA> will be reported by +MCI command. <TA> is defined for serving cell only. This value will be displayed only in Dedicated mode.

The command output is <Filter>dependent. In case the command output should be filtered to include just cells of a specific GSM band (one or more) the filter parameter should be set accordingly.

The filtering will apply to the neighbor's cells only – the serving cell info will always be returned.

Using the set command without a parameter will return output according to the currently set <Filter> value.

Command	Syntax	Response/Action	Remarks
Set Execute	AT+MCI=<Filter>[,<enable_TA>] or: AT+MCI	OK or: +CME ERROR: <err>	This command will return “OK” only. The neighbor cell information will return back with +MCI format few seconds later.
Read	AT+MCI?	+MCI: <Filter>,	The Read command returns the

		<enable_TA> OK	current set <Filter> and <enable_TA> values.
Test	AT+MCI=?	+MCI: (List of supported <Filter>s), (Range of supported <enable TA>s) OK	The Test command returns the ranges of <Filter>'s supported values and <enable TA> supported values.

The following table shows the +MCI parameters.

<Parameter>	Description
<Filter>	The requested GSM band's ARFCNs. This is an integer which can be a combination of all (1-15): 1 - GSM 850 2 - GSM 900 4 - GSM 1800 8 - GSM 1900 The default value is 15.
<enable TA>	This parameter defines whether <TA> will be reported by +MCI command. Defined values: 0 - Do not report <TA> value. 1 - Report <TA> value. The default value is 0.

+MCI Indication

After AT+MCI command, the neighbor cell information will return back by this +MCI indication format few seconds later.

+MCI: <-serving cell ARFCN>,<-serving cell BSIC>,<signal strength>[,<TA>][,<neighbor 1ARFCN>[,<neighbor 1 BSIC>],<signal strength>[,<neighbor 2 ARFCN>[,<neighbor 2 BSIC>],<signal strength>[,<neighbor 3 ARFCN>[,<neighbor 3 BSIC>],<signal strength>[,<neighbor 4 ARFCN>[,<neighbor 4 BSIC>],<signal strength>[,<neighbor 5 ARFCN>[,<neighbor 5 BSIC>],<signal strength>[,<neighbor 6 ARFCN>[,<neighbor 6 BSIC>],<signal strength>]]]]]]

The following table shows the +MCI parameters.

<Parameter>	Description
<ARFCN>	Absolute Radio Frequency Channel Number Range: [1-124], [128-251], [512-885], [975-1023].

<BSIC>	Base transceiver Station Identity Code Range: [0 - 63]
<signal strength>	Range: -110 - (-48) dBm. For serving cell signal strength is defined as: <ul style="list-style-type: none"> • In dedicated mode - TCH Rx level • In idle mode average BCCH Rx level For adjacent cells, signal strength is defined as the average Rx level in the both modes.
<TA>	TA (Timing Advance) is defined for serving cell only. This value will be reported only in Dedicated and TBF modes. Valid value range is from 0 to 63.

Example:

AT+MCI?

+MCI: 15,0

OK

AT+MCI=1

OK

+MCI: 712,33,-93

AT+MCI=1,0

OK

+MCI: 712,33,-92

AT+MCI=1,1

OK

+MCI: 712,33,-93,

AT+MCI=2,1

OK

+MCI: 712,33,-93, ,97,255,-110,110,255,-110,112,255,-110

AT+MCI=2,0

OK

+MCI: 712,33,-93,97,255,-110,110,255,-110,112,255,-110

AT+MCI=?

+MCI: (1-15),(0-1)

OK

9.1.12+GTRAT, Selection of Radio Access Technology

This command forces the selection of the Radio Access Technology (RAT) in the protocol stack. On a later network registration (+COPS, +CGATT) this RAT is used.

This command is available for phones supporting Dual Mode.

In case of GSM / UMTS DualMode is selected additionally a preferred RAT can be configured, which is stored in NVRAM selecting which RAT shall be attached first.

Note: Dual mode means GSM and UMTS Access Technology will be active and full InterRAT measurements and handovers are provided.

- Set command is used to set RAT and proffered RAT value used for further network registration (at+cops=0).
- Read command returns the previously set of <Act> and <PreferredAct> values.
- Test command returns the range of supported <Act> and <PreferredAct> values.

Command	Syntax	Response/Action	Remarks
Set	AT+GTRAT=<AcT> [, <PreferredAct>]	OK or CME ERROR: <error>	
Read	AT+GTRAT?	+GTRAT : <Act>,<PreferredAct> OK	.
Test	AT+GTRAT=?	+GTRAT: (0-2),(0,2) OK	Note: i.e. list of supported <Act>s and list supported <PreferredAct>s

Defined values

<AcT> indicates the radio access technology and may be

- 0 GSM single mode
- 1 GSM / UMTS Dual mode
- 2 UTRAN (UMTS)

< PreferredAct > This parameter is used for network registration in case of <AcT>=1.

- 0 RAT GSM
- 2 RAT UMT

10 Hardware Information

10.1 Uart Parameter Commands

10.1.1 +CBAUD, Baud Rate Regulation

This command sets the uniquely UART baud rate. The baud rate of H3xx will be change/set to the request value <rate> which is get from the command.

Specifying a value of 0 ,1 or 9 allows operation only at rates automatically detectable by H3xx. The specified rate takes effect following the issuing of any result code(s) associated with the current command line.

Note: ATZ and AT&F command sets H3xx to default baud rate – 0.

In auto baud, must sent an AT command to H3xx firstly. After sent any AT command, the module will lock on single baud rate (this AT command will be lost and can not get reponse from H3xx). Read command can feedback the currently baud rate.

The module can not be changed to auto baud without send AT+CBAUD=0 ,1 or 9 command or after power cycle. H3xx auto baudrate detect supports the next baudrates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400.

The parameter can't be saved after power up.

Command	Syntax	Response/Action
Set	+CBAUD=<n> +CBAUD=<rate>	OK or: +CME ERROR: <err>
Read	+CBAUD?	+CBAUD: <rate> OK
Test	+CBAUD=?	+CBAUD: (list of supported <n>s, list of supported <rate>s) OK

The following table shows the +CBAUD parameters.

<Parameter>	Description	
<n> <rate>	0	Auto baud rate
	1	Auto baud rate
	2	300
	3	1200
	4	2400
	5	4800

	6	9600
	7	19200
	8	38400
	9	Auto baud rate
	10	57600
	11	115200
	12	230400
	13	460800
	14	921600
The default value is 115200.		

10.1.2+IPR, Local Terminal Serial Port Rate

This command is responsible for setting and saving the request baud rate. The numeric extended-format parameter specifies the data rate at which the H3xx accepts. Specifying a value of 9 disables the function and allows automatically rate detectable only. The specified rate takes effect following the issuing of any result code(s) associated with the current command line.

The specified <rate> value is the rate in bits per second at which the terminal-H3xx interface operates, for example, 19200 or 115200. The rates supported by-H3xx are manufacturer-specific. However, the +IPR parameter permits setting any rate supported by H3xx during online operation.

The UART is configured to rates of 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800 , 921600 bits per second according to the parameters of the +IPR command.

Using AT+IPR=<rate> with a <rate> value other than 0,1 or 9 disables the auto baud rate detection feature. The entered baud rate is stored in H3xx and is restored after power up. The H3xx auto baudrate detect supports the next baudrates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400.

Note: +IPR is similar to +CBAUD, but has the ability to save after power down.

Command	Syntax	Response/Action
Set	+IPR=<n> +IPR=<rate>	OK or: +CME ERROR: <err>
Read	+IPR?	+IPR: <rate> OK
Test	+IPR=?	+IPR: (list of supported <rate>s), OK

Note: Read mode returns the current baud rate rather than the value that was set by Set Mode.

The following table shows the +IPR parameters.

<Parameter>	Description	
<n> <rate>	0	Auto baud rate
	1	Auto baud rate
	2	300
	3	1200
	4	2400
	5	4800
	6	9600
	7	19200
	8	38400
	9	Auto baud rate
	10	57600
	11	115200
	12	230400
	13	460800
	14	921600
The default value is 115200.		

Note: The platform we use supports more than 14 baudrates those has been listed above, but the high speed baudrate is hard to test, we can not make sure it can be support or not, so we list the baudrates we tested here, but leave all support baudrates in test command return string.

Example:

AT+IPR=7

OK

AT+IPR?

+IPR: 19200

OK

AT+IPR=?

+IPR: (0-20,300,1200,2400,4800,9600,19200,38400,57600,115200,230400,460800,921600)

OK

10.1.3&K, RTS/CTS Flow Control

This command configures the flow control. RTS (Request To Send) is an input line. The RTS signal

is received from the terminal and a low level indicates that H3xx can send more data. CTS (Clear To Send) is an output line. The CTS signal is sent to the terminal and a low level indicates that more data can be sent to H3XX.

The RTS and CTS line together make up what is called RTS/CTS or “hardware” flow control. Both lines are used when “hardware flow control” is enabled in both the terminal and H3xx devices. When the terminal is ready and able to receive data, it puts the RTS line in an active (low) condition to indicate this to the H3xx. If the terminal is not able to receive data (typically because its receive buffer is almost full), it puts the RTS line in an inactive (high) condition as a signal to the H3xx to stop sending data. When the terminal is ready to receive more data (for example, after data has been removed from its receive buffer), it places this line back in the active condition. The RTS line complements the CTS line. The H3XX puts the CTS line in an active condition to tell the terminal that it is ready to receive the data. Likewise, if the H3xx is unable to receive data, it places the CTS line in an inactive condition.

Command	Syntax	Response/Action
Set	AT&K<param>	OK or: +CME ERROR: <err>
Read	AT&K?	&K: <param> OK
Test	AT&K=?	&K: (list of supported <param>s) OK

The following table shows the &K parameters.

<Parameter>	Description
<param>	0 Disable all terminal/H3xx flow control 3 Enable CTS/RTS terminal/H3xx flow control The default value is 0.

10.1.4+IFC, RTS/CTS Flow Control

This parameter controls the operation of the local flow control between the terminal and H3xx during the data state when V.42 error control is used, or when fallback to non-error control mode is specified to include buffering and flow control. It accepts two numeric subparameters:

- <DCE_by_DTE>: Specifies the method to be used by the terminal to control the flow of received data from H3xx.
- <DTE_by_DCE>: Specifies the method to be used by the H3xx to control the flow of transmitted data from the terminal.

Command	Syntax	Response/Action
Set	AT+IFC=[<DCE_by_DT	OK

	E>[,DTE_by_DCE]]	or: ERROR
Read	AT+IFC?	+IFC: <rate> OK
Test	AT+IFC=?	+IFC: (list of supported < DCE_by_DTE >s, list of supported < DTE_by_DCE >s) OK

The following table shows <DCE_by_DTE> and <DTE_by_DCE> parameters.

<Parameter>	Description
<DCE_by_DTE>	0 None
	2 Circuit 133 (RTS)
<DTE_by_DCE>	0 None
	2 Circuit 106 (CTS)

Example:

AT+IFC?

+IFC: 0,0

OK

AT+IFC=2,2

OK

10.1.5&C, Circuit 109 Behavior

This parameter determines how the state of the DCD line relates to the detection of the received line signal from the distant end. Changing the parameters will take effect immediately in both the command and online command states.

The DCD line is an output line that indicates the following:

In Circuit Switch Data mode an active (low) indicates that a valid carrier (data signal) was detected by H3xx (CONNECT message is received), and inactive (high) indicates idle. The AT&C command always puts the DCD command ON, when set to 0. If the AT&C command is set to 1 then the "+++" escape command sets the DCD signal to an inactive state and the ATO command is set to active. AT&C set to 2 sets the DCD signal OFF.

In GPRS mode, the DCD line indicates the PDP context status. PDP context active sets the DCD to active (low); PDP context inactive sets the DCD to inactive (high). DCD is activated only when the PDP context is achieved. DCD is de-activated when the PDP context is off.

In Local Link mode, the DCD line indicates the Local Link data status.

When AT&C is set to 0, the DCD signal is always ON. When AT&C is set to 1, the DCD is activated in online mode. When AT&C is set to 2, the DCD is activated only when the PDP context is achieved (temporary IP address is received).

Note: If &C is set to 2 when a CSD call is set, DCD will always remain OFF.

Command	Syntax	Response/Action
Set	AT&C<param>	OK
Read	AT&C?	&C: <param>
Test	AT&C=?	&C: (list of supported <param>s)

The following table shows the &C parameters.

<Parameter>	Description
<param>	<p>DCD signal ON</p> <p>0 DCD is forced ON at all times.</p> <p>1 DCD is set to ON when:</p> <ul style="list-style-type: none"> a A CSD carrier is detected. b A GPRS external session is being established: <p>H3xx enters PPP mode TE is about to send an LCP configure-request to H3xx (GPRS connection is not yet established).</p> <p>DCD is set to OFF when:</p> <ul style="list-style-type: none"> a No CSD carrier is detected. b H3xx has lost its GPRS connection with the network (PDP context was deactivated and the IP address is cancelled). <p>2 DCD is set to ON when H3xx establishes a GPRS connection with the network (PDP context is activated and the IP address is received from the network).</p> <p>DCD is set to OFF when H3xx has lost its GPRS connection with the network (PDP context was deactivated and the IP address is cancelled).</p> <p>The default value is 1.</p>

10.1.6&D, Circuit 108 Behavior

This command determines how the H3xx responds when the DTR (Data Terminal Ready) status is changed from ON to OFF during the online data state. DTR is an input line that indicates that the terminal is ready.

The DTR line must be active (low) for the H3xx to recognize the terminal. This signal is raised by the terminal when a process activates the serial port. If DTR is not used by the application, it should connect this line to ground (DTR active). The default value is active (low).

In case of local link during initial PPP retries, DTR change will be ignored.

Command	Syntax	Response/Action
Set	AT&D<param>	OK
Read	AT&D?	&D: <param>

Test	AT&D=?	&D: (list of supported <param>s)
------	--------	----------------------------------

The following table shows the &D parameters.

<Parameter>	Description
<param>	<p>H3xx's reaction when the DTR status is changed from ON to OFF.</p> <p>In CSD calls:</p> <ul style="list-style-type: none"> 0 Ignore DTR changes 1 Switches the CSD call to asynchronous command mode (the call remains connected) 2 Disconnects the call and returns to the command mode <p>In GPRS calls (The behavior of '+++’ is same as DTR signal changed from ON to OFF):</p> <ul style="list-style-type: none"> 0 Ignore DTR changes and '+++’ command. 1 Switch the GPRS session to asynchronous command mode (the session remains connected) 2 Deactivate GPRS and returns to command mode <p>The default value is 2.</p>

10.1.7+ICF, DTE-DCE Character Framing

This command determines the local serial port start/stop (asynchronous) character framing used by the DCE when accepting DTE commands and transmitting information text and result codes, whenever these are not done automatically. Auto detect for framing is not supported.

Command	Syntax	Response/Action	Remarks
Set	+ICF=[<format>[,<parity>]]	OK +CME ERROR: <err>	The Set command determines the local serial port start/stop character framing.
Read	+ICF?	+ICF: <format>,<parity> +CME ERROR: <err>	The Read command displays the currently selected character framing.
Test	+ICF=?	+ICF:(list of supported <format> values),(list of supported <parity> values) +CME ERROR: <err>	The Test command displays a list of supported <format> and <parity> values.

The following table shows the +ICF parameters.

<Parameter>	Description
<format>	Determines the number of bits in the data bits, the presence (or absence) of a parity bit, and the number of stop bits in the start/stop

	frame. 1 8 Data, 2 Stop - can be set only with <parity> 4 2 8 Data, 1 Parity, 1 Stop - can be set with <parity> of 0 or 1 3 8 Data, 1 Stop (default) - can be set only with <parity> 4 7 8 Data, 1 Parity, 2 Stop - can be set with <parity> of 0 or 1
<parity>	Determines how the parity bit is generated and checked (if present). 0 Odd 1 Even 4 No parity (default)

Example:

```

AT+ICF?
+ICF: 3,4
OK
AT+ICF=?
+ICF: (1-3,7),(0,1,4)
OK
AT+ICF=3,4
OK
  
```

10.2 Other Parameter Commands

10.2.1 +CBC, Battery Charger Connection

This command is used for user to query the battery voltage level.

Command	Syntax	Response/Action
Read	+CBC	+CBC: <bcs>,<bcl> OK

The following table shows the +CBC parameters.

<Parameter>	Description
<bcs>	Battery status value 0 Battery powered

	1 Externally powered - not implemented in H3xx Note: The H3xx input power source is connected via the battery pins only, so it is always battery powered.
<bcl>	VBAT voltage value. A decimal number represents the digital value. The input level is multiplied by 1000.

Note: H3xx does not support the usage of battery power detect. The power supply of H3xx is connected via the battery pins. However, users can use this command to verify the level of H3xx input power source.

Example:

```
AT+CBC
+CBC: 0,3802
```

OK

10.2.2+CFUN, Shut Down Phone Functionality

This command shuts down the phone functionality of smart phones and PDAs with phone capabilities in order to prevent interference from a nearby environment. This enables other functionality to be used continuously in environments where phone use is either impractical or not permitted. For example, on airplanes the use of cellular phones is forbidden during the entire flight, but the use of computers is allowed during much of the flight. This command enables other functionality to continue while preventing use of phone functionality.

Command	Syntax	Response/Action	Remarks
Set	+CFUN=<fun>	OK +CME ERROR: <err>	The Set command selects the level of functionality <fun> in the smart phone or PDA incorporating H3xx.
Read	+CFUN?	+CFUN: <power mode>, <STK_mode> OK	The Read command displays the current level of functionality.
Test	+CFUN=?	+CFUN: (list of supported <fun>s) OK	The Test command displays the list of supported functionality settings.

The following table shows the AT+CFUN parameters.

<Parameter>	Description
<fun>	Functionality levels:

	<ul style="list-style-type: none"> 0 Turn off (With logging out network). 1 Full functionality meaning start up MS(from offline mode) 4 Disables phone transmit & receive RF circuits – Flight mode. 6 Enables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card. 7 Disables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card. 8 Disable fetching of proactive commands by SIM-APPL from the SIM-card. 15 Hardware reset. (Need power cycle the module)
<power mode>	<ul style="list-style-type: none"> 1 MS is switched on 2 Invalid mode 4 Flight mode
<STK_mode>	<ul style="list-style-type: none"> 0 Inactive state 6 Enables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card. 7 Disables the SIM-toolkit interface and fetching of proactive commands by SIM-APPL from the SIM-card. 8 Disable fetching of proactive commands by SIM-APPL from the SIM-card.

Example:

```

AT+CFUN=?
+CFUN: (0,1,4,6,7,8,15)
OK
AT+CFUN?
+CFUN: 1,0
OK
AT+CFUN=4 //Disable phone transmit and receive RF circuits
OK
AT+CFUN?
+CFUN: 4
Power cycling...
AT+CFUN?
+CFUN: 4,0
AT+COPS?
+COPS: 2

```

```

OK
AT+CFUN=1 // Enable phone transmit and receive RF circuits through '1' OK
OK
AT+CFUN?
+CFUN: 1,0
OK
AT+COPS?
+COPS: 0,0,"CHINA MOBILE"
OK

```

10.2.3+CPWROFF Switch off MS

This command allows to switches off the H3xx (shutdown the system).

Command	Syntax	Response/Action	Remarks
Set	AT+CPWROFF	OK or +CME ERROR: <error>	Shutdown the system
Test	AT+CPWROFF=?	OK	

10.2.4+MMAD, Query and Monitor ADC Value

This command intends to query and monitor ADC value. H3xx supports 2 ADC channel converter. This command returns the current ADC values for the requested channel. The values received from the first converter represent the DC voltage levels of the input pin.

The returned value is a multiplication of the input level by 1000 (e.g. input level of 0.56V will return 560).

Command	Syntax	Response/Action	Remarks
Execute	AT+MMAD	+MMAD: <Converter_number>,<Converted_Value> OK Or: +CME ERROR: <err>	
Read	AT+MMAD?		Same as AT+MMAD

The following table shows the +MMAD parameters.

<Parameter>	Description
<Converter Number>	1-2 Select the A2D converter.
<Converted Value>	A decimal value represents the returned digital value.

	The input level multiplied by 1000.
--	-------------------------------------

Example:

AT+MMAD

+MMAD: 1,500 // 500mV, must less than 1000

+MMAD: 2,375 // 375mV, must less than 1000

OK

10.2.5+MTSM, Temperature Sensor Measurement

This command measures the current temperature sensor value in Celsius degrees.

This temperature is taken from a Thermistor internally.

All the parameters restore to default values when H3xx restart.

All the parameter default value is 0.

Note: In case that AT parameters are set and executed, and a reset or a power-cycle occurs, the H3xx continues with the execution of the AT command using the saved parameters, until the user changes the settings.

Command	Syntax	Response/Action	Remarks
Set	+MTSM=<Report>[,<Rate>][,<Low>,<High>]	For <Report>=0 OK For <Report>=1 +MTSM: <Temp> OK For <Report>=2 or 3 OK +MTSM: <Temp> ... +MTSM: <Temp> or: ERROR: <error code>	Read the temperature.
Command	Syntax	Response/Action	Remarks
Read	+MTSM?	+MTSM=<Report>,<Rate>,<Low>,<High> OK	Read the setting parameters.
Test	+MTSM=?	+MTSM: (range of <Report>),(range of	

		<Rate>),(range of <Low>/<High> OK	
--	--	---	--

The following table shows the +MTSM parameters.

<Parameter>	Description
<Temp>	-40 - 125; Temperature measurements in Celsius degrees.
<Report>	0: Deactivate unsolicited report. 1: Report once the current temperature. 2: Activate unsolicited report. 3: Activate unsolicited report only for out-off boundaries events. 6: Report the temperature of BBIC 7: Report the temperature of RF 8: Report the temperature of PCB(Not support yet) 9: Report the temperature of BAT
<Rate>	1-255; Select the time interval in seconds between the unsolicited reports. (Default value = 1 Second).
<Low>	(-)-0 - 125; The lowest boundary level of the temperature value for unsolicited report. (Default value = 0 Celsius). Setting corresponding <Low> and <High> temperature boundaries for <Report>=3 only.
<High>	(-)-0 - 125; The Highest boundary level of the temperature value for unsolicited report. (Default value = 0 Celsius). Setting corresponding <Low> and <High> temperature boundaries for <Report>=3 only.

Example:

AT+MTSM=? // Test the range of the parameters.

+MTSM: (0-3,6-9),(1-255),(-40-125)

OK

AT+MTSM=1 // Set to read for once the current temperature measurement.

+MTSM: 35 // Current temperature is +35 Celsius degree.

OK

```

AT+MTSM=2,5 // Set to unsolicited temperature reports to TE for every 5 seconds.
OK
+MTSM: -10 // Current temperature measure report -10 Celsius.
+MTSM: -5 // Unsolicited temperature report -5 Celsius after 5 seconds.
+MTSM: 7 // Unsolicited temperature measure report +7 Celsius after 10 seconds.
+MTSM: 20 // Unsolicited temperature measure report +20 Celsius after 15 seconds.
...
+MTSM: 50 // Unsolicited temperature measure report +50 Celsius after Nx5 seconds.

```

```

AT+MTSM=0 // Set to stop the unsolicited report.
OK

```

```

AT+MTSM=3,30,-10,40 // Set to out-off boundary (-10 to +40 Celsius) unsolicited
reports for every 30 seconds.
OK
+MTSM: -20 // Unsolicited current report out-off the Low boundary.
+MTSM: -12 // Unsolicited report out-off the Low boundary after 30 seconds.
+MTSM: 47 // Unsolicited report out-off the High boundary after Nx30 seconds

```

```

AT+MTSM? // Read the current setting.
+MTSM: 3,30,-10,40
OK

```

```

AT+MTSM=0 // Set to stop the unsolicited report.
OK

```

```

AT+MTSM? // Read the current setting.
+MTSM: 0
OK

```

10.2.6+WRIM, RI signal width setting

In IDLE Mode, H3xx's RI pin is High voltage level. When H3xx receive a SMS or Call, This pin can output a Low voltage pulse. This command defines the width of pulse can be set.

Command	Syntax	Response/Action	Remarks
Set	+WRIM=<type>,<width>	OK or: ERROR	Set width
Read	+WRIM?	+WRIM: <type>,<width>	The read command returns the

		OK or: ERROR	current parameter of RI pin.
Test	+WRIM=?	+WRIM: <type>,<width> OK or ERROR	The test command displays the list of supported <type> and <width> values.

The following table shows the +WRIM parameters.

<Parameter>	Description
< type >	0: make effective on Call 1: make effective on SMS
<width>	0: default value. // (0,1000) and (1,150) 1~2000: 1~2000ms

Example:

```

AT+WRIM=?
+WRIM: (0-1),(0-2000)
OK
AT+WRIM=1,1000
OK
AT+WRIM?
+WRIM: 0,1000
+WRIM: 1,1000
OK
    
```

10.2.7+MSTART, Start message notification

This command can Enable/Disable H3xx output start message when power up.

Command	Syntax	Response/Action
Set	+MSTART=<at start>,<sim ready>	OK or: ERROR
Read	+ MSTART?	+MSTART: <at start>,<sim ready> OK
Test	+MSTART=?	+MSTART: (0-1,0-1) OK

The following table shows the +MSTART parameters.

<Parameter>	Description
<at start>	0: Do not output "AT command ready" from UART 1: Output "AT command ready" from UART (default value)
<sim ready>	0: Do not output "+SIM READY" after SIM init OK 1: Output "+SIM READY" after SIM init OK (default value)

Notes: "AT command ready" can not output from USB port even if set to 1. "+SIM READY" can output from UART and USB port according to setting.

Example:

```

AT+MSTART=?
+MSTART: (0-1,0-1)
OK
AT+MSTART=1,1
OK
AT+MSTART?
+MSTART: 1,1
OK

```

10.2.8+MSMPD, Enable/Disable SIM card hot plug

This command can Enable/Disable SIM card hot plug feature. The default status is disable this feature. The parameter will be saved in NVM and can restore at power cycle.

Command	Syntax	Response/Action	Remarks
Set	AT+MSMPD=< status>	OK Or: +CME ERROR: <err>	Enable/Diasble SIM card hot plug
Read	AT+MSMPD?	+MSMPD: <status> OK	Read the current status

The following table shows the +MSMPD parameters.

<Parameter>	Description
<status>	0: Disable the SIM card hot plug feature 1: Enable the SIM card hot plug feature The default value is 0 Note: For H350, the default value is 1.

10.2.9+GPIO, Set and Read GPIO

This command intends to configure supported GPIO pins and gets value from input pin. H3xx support 11 GPIO pins. H350 doesn't support this command currently. All these pins can be set to output and input mode. The default configuration is input, but it's better to set direction before use. The high voltage level is 1.8V.

Command	Syntax	Response/Action	Remarks
Set	AT+GPIO=<pin>,<direct>,<value>	OK Or: +CME ERROR: <err>	Used to set direction and output value.
Read	AT+GPIO?	+GPIO: <pin>,<direct>,<value> OK Or ERROR	Return all the pin state here.
Test	AT+GPIO=?	+GPIO: <pin>,<direct>,<value> OK or ERROR	Return supported values

The following table shows the +GPIO parameters.

<Parameter>	Description
<pin>	23,52,53,73,74,75,76,89,106,107,108 The value is pin number on module.
<direct>	0: Input 1: Output 2: Query output value of the single pin
<value>	0: Low level 1: High level

Example:

```
AT+GPIO=23,1,1
```

```
OK
```

```
AT+GPIO?
```

```
+GPIO:
```

```
23,0,1
```

```

52,0,1
..... //Leave out some value here
107,0,0
108,0,0
OK
AT+GPIO=23,2
+GPIO: 1
OK
AT+GPIO=?
+GPIO: (23,52,53,73,74,75,76,89,106,107,108),(0-2),(0,1)
OK

```

10.3 UART2 configuration

There are two UARTs in H3xx module. One is primary called UART1 and the other is assisted called UART2.

UART2 have two type of work mode. One is for AT command, another is for send/receive user data. The default mode is for AT command.

Please use AT+GTSET="UARTMODE",<mode> to switch work mode.

The following table shows the UARTMODE parameters.

<Parameter>	Description
<mode>	0 – Uart2 use for AT command (default) 1 – Uart2 use for send/receive data

10.3.1 UART2 use for AT command

When UART2 use for AT command, it supports all AT commands except AT+CMUX.

Note: UART2 can not support HW flow control. No CTS, RTS, DTR, DSR, DCD, RI pin. The MUX feature can not support in UART2.

10.3.2+UARTSEND, Send data to UART2

When UART2 use for send/receive data. Please use AT+GTSET="UARTREV",<mode> at the port which you want data receive.

The following table shows the UARTREV parameters.

<Parameter>	Description
<mode>	0 – When receive data, only report data length (default) 1 – When receive data, report all data by +UARTREV

This command intends to send data to UART2. This command can be used in UART1 or USB ports to send data to UART2.

The data format is in hex. As the input command can only be character, so here use two characters to indicate one hex number. Eg: "35" means 0x35. Module will change the format internally.

Command	Syntax	Response/Action	Remarks
Set	AT+UARTSEND =<source>,<data> >	OK Or: +CME ERROR: <err>	Used to send data to UART2.
Test	AT+UARTSEND =?	+UARTSEND: <source>,<data> OK or ERROR	Return supported values

The following table shows the +GPIO parameters.

<Parameter>	Description
<source>	3 (For internal reason 3 indicates UART2 here, and only 3 is supported)
<data>	0-F (The data should be wrap up with "", and the valid character is 0-F)

Example:

```
AT+UARTSEND=3,"30313233"
OK //UART2 will output "0123"
```

```
AT+UARTSEND=?
+UARTSEND: (3),("data")
```

11 Audio

11.1 Scope

This section describes the Audio features, which includes the following configuration items:

Path: Selection of microphone and speaker to be used.

Gain: Control of volume levels for rings, voice, etc.

Algorithm: Activation of audio algorithms (echo cancellation, noise suppression and sidetone).

Audio Control of Path, Gain and Algorithms is available by these two different modes sets of commands. It is advised to select the audio mode according to the application needs.

11.2 General Audio Commands

The following audio commands can be used in audio modes: +VTD, +VTS, +CALM,+MMICG

11.2.1+CRSL, Call Ringer Level

This command handles the selection of the incoming call ringer sound level on the current speaker of the H3xx. The new value remains after power cycle.

Command	Syntax	Response/Action	Remarks
Set	+CRSL=<level> >	OK or: +CME ERROR: <err>	The Set command sets the call ringer and alert (SMS) level.
Read	+CRSL?	+CRSL: <level> OK	The Read command displays the current ringer alert (SMS) sound level setting.
Test	+CRSL=?	+CRSL: (list of supported <level>s) OK	The Test command displays the list of supported sound level settings.

The following table shows the +CRSL parameters.

<Parameter>	Description
<level>	0-7 Manufacturer-specific volume range. 0 is lowest volume (not mute). The default value is 4.

11.2.2+CLVL, Loudspeaker Volume

This command sets the volume of the internal loudspeaker of the H3xx.

Note: In this command, the new value remains after power cycle. The +CLVL command can be

used even when the SIM is not inserted.

Command	Syntax	Response/Action	Remarks
Set	+CLVL=<level>	OK or: +CME ERROR: <err>	The Set command sets the internal loudspeaker volume level.
Read	+CLVL?	+CLVL: <level> OK	The Read command displays the current internal loudspeaker volume setting.
Test	+CLVL=?	+CLVL: (list of supported <level>s) OK	The Test command displays the possible loudspeaker volume settings.

The following table shows the +CLVL parameters.

<Parameter>	Description
<level>	0-7 Manufacturer-specific volume range. 0 is lowest volume (not mute). The default value is 4.

11.2.3+CMUT, Mute/Unmute Microphone and Speaker Path

This command is used to mute/unmute the currently active Microphone and Speaker path by overriding the current mute state. The CMUT setting should take effect only for the current call or for the next call once the command setting was typed in idle mode.

Command	Syntax	Response/Action	Remarks
Set	+CMUT=<state>	OK or: +CME ERROR: <err>	The Set command enables/disables uplink and downlink voice muting during a voice call.
Read	+CMUT?	+CMUT: <state> OK	The Read command returns the current uplink and downlink voice mute/unmute state.
Test	+CMUT=?	+CMUT: (list of supported <state>s) OK	The Test command returns the possible <state> values.

The following table shows the +CMUT parameters.

<Parameter>	Description
<state>	0 Unmute microphone and speaker path (default)
	1 Mute microphone path, Unmute speaker path
	2 Unmute microphone, mute speaker path
	3 Mute microphone path, mute speaker path

Example:

```

AT+CMUT=?
+CMUT:(0-3)
OK
AT+CMUT?
+CMUT: 0 //uplink voice is unmuted
OK
AT+CMUT=1 //uplink voice is muted
OK
AT+CMUT?
+CMUT: 1
OK
AT+CMUT=4
+CME ERROR: <err>

```

11.2.4S94, Sidetone Effect

This command reduces the microphone audio input that is routed to the selected speaker, so that people speaking will hear themselves talking.

Command	Syntax	Response/Action	Remarks
Set	ATS94=<n>	OK or: +CME ERROR: <err>	The Set command sets the sidetone status.
Read	ATS94?	<n> OK	The Read command returns the sidetone status.

The following table shows the S94 parameters.

<Parameter>	Description
<n>	0-7 Sidetone range. 0 is lowest sidetone (not mute). The default value is 004.

11.2.5S96, Echo Cancelling

This command suppresses a large amount of the output sound picked up by the input device

(cancels all echo).

Command	Syntax	Response/Action	Remarks
Set	ATS96=<n>	OK or: +CME ERROR: <err>	The Set command sets the echo cancelling status.
Read	ATS96?	<n> OK	The Read command returns the echo cancelling status.

The following table shows the S96 parameters.

<Parameter>	Description
<n>	0-7 echo cancelling range. 0 is lowest echo cancelling (not mute). The default value is 0.

11.2.6+CALM, Alert Sound Mode

This command handles the selection of the H3xx's alert sound mode. The value of the command is saved after a power cycle.

Command	Syntax	Response/Action	Remarks
Set	+CALM=<callmode>,<smsmode>	OK or: +CME ERROR: <err>	The Set command sets the alert sound mode.
Read	+CALM?	+CALM: <mode> OK	The Read command displays the current alert sound mode setting.
Test	+CALM=?	+CALM: (list of supported <callmode>,<smsmode> >s) OK	The Test command displays the list of supported modes.

The following table shows the +CALM parameters.

<Parameter>	Description
-------------	-------------

<callmode>	Alert sound mode of the H3xx.	
	0	new call play tone(default)
	1	new call Silent mode (ring prevented)
<smsmode>	0 new sms play tone	
	1	new sms Silent mode (ring prevented)

Note: Selecting the ring mode with this command retrieves the current alert volume level setting.

11.2.7+VTD, Tone Duration

This command handles the selection of tone duration. An integer <n> defines the length of tones emitted as a result of the +VTS command. This command does not affect the D (dial) command. In this command, the new value is saved after power down.

Note: In GSM, the tone duration value can be modified depending on the specific network.

Command	Syntax	Response/Action	Remarks
Set	+VTD=<n>	OK or: +CME ERROR: <err>	The Set command sets the tone duration.
Read	+VTD?	+VTD: <n> OK	The Read command displays the current tone duration.
Test	+VTD=?	+VTD: (list of supported <n>s) OK	The Test command displays the list of supported tone durations.

The following table shows the +VTD parameters.

<Parameter>	Description
<n>	Defines the length of tones emitted by the +VTS command. 1-10 100mS to 1S adjustable.

11.2.8+VTS, Command-Specific Tone Duration

This command transmits a string of DTMF tones when a voice call is active. DTMF tones may be used, for example, when announcing the start of a recording period.

The duration does not erase the VTD duration

Note: In GSM, the tone duration value can be modified depending on the specific network.

If the active call is dropped in the middle of playing a DTMF tone, the following unsolicited message transfers to TE: +VTS: "Call termination stopped DTMF tones transmission".

Command	Syntax	Response/Action	Remarks
Set	+VTS=<DTM	OK	The Set command sets the

	F>[,<duration >]	or: +CME ERROR: <err>	tone and duration (if entered).
Test	+VTS=?	+VTS: (list of supported <DTMF>),(list of supported <duration>s) OK	The Test command displays the list of supported DTMF tones and tone lengths.

The following table shows the +VTS parameters.

<Parameter>	Description
<DTMF>	String of ASCII characters (0-9, #, *) String length is up to 32 characters long.
<duration>	A DTMF tone of different duration from that set by the +VTD command. 1-10 100mS to 1S adjustable..

Note: The duration defined by +VTS is specific to the DTMF string in this command only. It does not erase the duration defined by the +VTD command, and is erased when the H3xx is powered down.If <duration> is not defined, the +VTD value is used.

11.2.9+VTA, Set play DTMF type

This command enable/disable play DTMF tone at local side when send DTMF to the network by VTS.

Command	Syntax	Response/Action	Remarks
Set	+VTA=<para>	OK or: ERROR	Enable/Disable play DTMF at local side.
Read	+VTA?	+VTA: <para> OK or: ERROR	Query status
Test	+VTA=?	+VTA: <para> OK or: ERROR	

The following table shows the +VTA parameters.

<Parameter>	Description
<para>	0: Disable play DTMF tone at local side

	1: Enable play DTMF tone at local side (Default value)
--	--

Example:

AT+VTA?

+VTA: 1

OK

AT+VTA=?

+VTA: (0,1)

OK

11.2.10 +MAPATH, Audio Path

This command sets/requests the active input accessory, and the output accessory for each feature. On power up, the default path, mic, speaker and alert speaker are restored. As CODEC supports two chips, which are CS42L73 and ALC5621, so the configuration of this parameter is related to command +GTCODECN.

Command	Syntax	Response/Action	Remarks
Set	+MAPATH= <direct>,<accy>	OK or: +CME ERROR: <err>	The Set command sets the audio path mode. The mode indicates which I/O accessories are now active for the different audio features. The <features> field is only used for outputs (direct=1).
Read	+MAPATH?	+MAPATH: 1(mode in),<accy><CR><LF>+MAPATH: 2(mode out),<accy><CR><LF>OK or +MAPATH: 1(mode in and out),<accy><CR><LF>OK	The Read command returns the active input audio accessory and the output accessory for each feature. If +GTCODECN choose chip ALC5621, it return +MAPATH: 1(mode in and out),<accy><CR><LF>OK If CS42L73 is selected, it return +MAPATH: 1(mode in),<accy><CR><LF>+MAPATH: 2(mode out),<accy><CR><LF>OK
Test	+MAPATH=?	+MAPATH: (list of supported directions),(list of supported accessories) OK	The Test command returns the supported audio directions (input/output), accessories and features. The results is related to the chip

		selection of +GTCODECN.
--	--	-------------------------

The following table shows the +MAPATH parameters.

<Parameter>	Description
<direct>	<p>If you use ALC5621,</p> <ol style="list-style-type: none"> 1 Audio channel input and output H3xx (default) <p>If you use CS42L73,</p> <ol style="list-style-type: none"> 1 Audio channel input H3xx. 2 Audio channel output from H3xx
<accy>	<p>Audio channel input module.</p> <p>If you use ALC5621,</p> <ol style="list-style-type: none"> 1 1st channel MIC+/MIC- and AUXI+/AUXI- (Default) 2 2nd channel MIC+/MIC- and AUXI+/AUXI- <p>If you use CS42L73,</p> <ol style="list-style-type: none"> 1 1st channel MIC+/MIC- (Default) 2 2nd channel AUXI+/AUXI- <p>Audio channel output from H3xx:</p> <ol style="list-style-type: none"> 1 1st channel SPK+/SPK- (Default) 2 2nd channel AUXO+/AUXO- 3 Both 1st and 2nd

Example:

```

at+gtcodecn=0 // ALC5621 codec
OK
at+mapath?
+MAPATH: 1,1
OK
at+mapath=1,2 // Swith to 2nd audio channel
OK
at+mapath=?
+MAPATH: (1),(1,2)
OK

at+gtcodecn=2 //CS42L73 codec
OK

```

at+mapath?

+MAPATH: 1,1

+MAPATH: 2,1

OK

at+mapath=1,2 ///Swith to 2nd audio channel

OK

at+mapath=2,2

OK

at+mapath?

+MAPATH: 1,2

+MAPATH: 2,2

OK

at+mapath=?

+MAPATH: (1,2),((1,2)(1,2,3))

OK

11.2.11 +MAVOL, Volume Setting

This command enables you to determine a volume level for a particular feature via a particular accessory. The gain levels are saved in NVM. Therefore, upon power up, the path active (mic, speaker and alert speaker) will have these saved gain levels.

Note: The SMS MT volume is adjusted using the +MAVOL command with type "ring". The RING value is related to the SMS alert, the MT call, and so on.

Command	Syntax	Response/Action	Remarks
Set	+MAVOL=<accy>,<feature>,<vol>	OK or: +CME ERROR: <err>	The Set command sets the volume level <n> to a certain<feature> through a certain <accy>.
Read	+MAVOL?	(Current path volume) +MAVOL: <accy>,<feature1>,<vol> +MAVOL: <accy>,<feature2>,<vol> +MAVOL: <accy>,<feature4>,<vol> +MAVOL: <accy>,<feature8>,<vol>	The Read command returns the volume level of all the features in the current active accessories.

		OK	
Test	+MAVOL=?	+MAVOL: (supported accessories),(supported features combinations),(supported volume levels)	Test command returns the supported range of volume levels, accessories and features.

The following table shows the +MAVOL parameters.

<Parameter>	Description	
<accy> (1-3)	1	1 st channel SPK+/SPK-
	2	2 nd channel AUXO+/AUXO-
	3	1 and 2
6<feature> (1-7)	1	Voice
	2	Tone
	3	1 and 2
	4	Midi
	5	1 and 4
	6	2 and 4
	7	1 and 2 and 4
<vol>	Volume level 0-7	

Example:

AT+MAVOL?

+MAVOL: 1,1,4

+MAVOL: 1,2,1

+MAVOL: 1,4,4

OK

AT+MAVOL=?

+MAVOL: (1-3),(1-7),(0-7)

OK

AT+MAVOL=1,7,3 //Modified all the features in the 1st channel

OK

AT+MAVOL?

+MAVOL: 1,1,3

+MAVOL: 1,2,3

+MAVOL: 1,4,3

OK

AT+MAVOL=3,7,3 //Modified all the features within the 1st channel and 2nd channel

OK

11.2.12 +MATONE, Start or stop the tone play

This command can play tone and stop play.

Command	Syntax	Response/Action
Set	+MATONE=<state>,<tone_id>,<nof_play_times>,<mix_factor>	OK or: +CME ERROR: <err>
Read	+MATONE?	+ MATONE: <result>, <aud_ret_code> OK
Test	+MATONE=?	+ MATONE: <state>,<tone_id>,<nof_play_times>,<mix_factor> OK

The following table shows the +MATONE parameters.

<Parameter>	Description
<state>	0 : stop When state=0,<tone_id>=0,<nof_play_times>=0,<mix_factor>=0,means the tone is stop 1 : start
<tone_id>	<tone_id> integer indicating the audio tone ID and may be: 0: aud_tone_DTMF_0 1: aud_tone_DTMF_1 2: aud_tone_DTMF_2 3: aud_tone_DTMF_3 4: aud_tone_DTMF_4 5: aud_tone_DTMF_5

6: aud_tone_DTMF_6
7: aud_tone_DTMF_7
8: aud_tone_DTMF_8
9: aud_tone_DTMF_9
10: aud_tone_DTMF_hash
11: aud_tone_DTMF_asterix
12:uta_audio_key_tone_1
13:uta_audio_key_tone_2
14:uta_audio_key_tone_3
15:uta_audio_key_tone_4
16:uta_audio_key_tone_5
17: aud_tone_sv_subscriber_busy
18: aud_tone_sv_congestion
19: aud_tone_sv_radio_path_ack
20: aud_tone_sv_radio_path_not_avail
21: aud_tone_sv_error_info
22: aud_tone_sv_call_waiting
23: aud_tone_info_free_tone
24:uta_audio_tone_sv_free_tone
25:uta_audio_tone_sv_connection
26:uta_audio_tone_sv_disconnect
27:uta_audio_tone_sv_device_in
28:uta_audio_tone_sv_device_out
29:uta_audio_tone_sv_msg_full
30:uta_audio_tone_sv_ussd
31:uta_audio_tone_sv_minutte_minder
32:uta_audio_tone_sv_error_1
33:uta_audio_tone_sv_error_2
34:uta_audio_tone_sv_sms_in_call
35:uta_audio_tone_sv_broadcast_in_call
36:uta_audio_tone_sv_alarm_in_call
37:uta_audio_tone_sv_low_bat_in_call
38:uta_audio_tone_sv_power_off
39:uta_audio_tone_sv_power_on

	<p>40:uta_audio_tone_sv_single_beep</p> <p>41:uta_audio_tone_sv_positive_acknowledgement</p> <p>42:uta_audio_tone_sv_negative_acknowledgement</p> <p>43:uta_audio_tone_sv_auto_redial</p> <p>44:uta_audio_tone_sv_network_attention</p> <p>45:uta_audio_tone_sv_dial_tone</p> <p>46:uta_audio_tone_sv_low_bat</p> <p>47:uta_audio_tone_sv_test_call</p>
<nof_play_t i mes>	Integer indicating the amount of tone repetitions; range 0 .. 32767 (0x7FFF); 0 means repeats for ever; for other values a response is returned when the tone generation is finished. See further DWD Audio driver interface specification.
< mix_fac tor>	<mix_factor> integer indicating the kind of volume for tone generation; range 1 .. 7
<result>	<p><result>integer indicating the overall result of the command, may be:</p> <p>0: RESULT_OK</p> <p>1: RESULT_PARAM_OUT_OF_RANGE</p> <p>2: RESULT_DRV_NOT_SUPPORTED</p> <p>3: RESULT_AUD_RESOURCE_NOT_AVAI L</p> <p>4: RESULT OTHER ERROR</p>
<aud_ret_code>	<p><aud_ret_code> integer value indicating the return code of the audio driver function call and may be:</p> <p>0: aud_rc_ok</p> <p>1: aud_rc_resource_in_use</p> <p>2: aud_rc_resource_conflict</p> <p>3: aud_rc_handle_not_used</p> <p>4: aud_rc_no_hw_support</p> <p>5: aud_rc_sharing_violation</p> <p>6: aud_rc_parameter_out_of_range</p> <p>7: aud_rc_audio_driver_disabled</p> <p>8: aud_rc_missing_dsp_resou rces</p> <p>10: aud_rc_format_not_supported</p> <p>11: aud_rc_no_playback</p> <p>12: aud_rc_unknown_position</p> <p>13: aud_rc_request_error</p> <p>14: aud_rc_syntax_error</p>

15: aud_rc_tone_error
16: aud_rc_storage_problems
17: aud_rc_performance_problems
18: aud_rc_ram_buffer_used
19: aud_rc_suspend_resume_error
20: aud_rc_info

11.2.13 +MMICG, Microphone Gain Value

This command handles the selection of microphone gain values of MIC. The new value remains after power cycle.

Command	Syntax	Response/Action	Remarks
Set	+MMICG=<gain>	OK or: +CME ERROR: <err>	The Set command sets the microphone gain value.
Read	+MMICG?	+MMICG: <gain> OK	The Read command displays the current microphone gain.
Test	+MMICG=?	+MMICG: (list of supported <gain>s) OK	The Test command displays the list of supported gain values.

The following table shows the +MMICG parameters.

<Parameter>	Description
<gain>	Microphone gain values: 0-15 0 is lowest gain value (not mute); The default value is 8.

11.2.14 +GTCODECN, CODEC Chip Selection

This command is used for configuring the internal CODEC and external CODEC, internal CODEC is built-in, the chip model is ALC5621, external CODEC supports CS42L73 and ALC5621, the parameters can be saved if power is off, and the changes takes effect when it is restarted. The default value is 0.

Note: For H350, the default value is 2.

Command	Syntax	Response/Action	Remarks
Set	+GTCODECN= <choice>	OK or:	Set internal/external codec selection

		+CME ERROR: <err>	
Read	+GTCODECN?	+GTCODECN: <CR><LF>OK	Check the current codec
Test	+GTCODECN= ?	+GTCODECN: (list of supported choice) OK	Check the supported parameters range

The following table shows the +GTCODECN parameters.

<Parameter>	Description
< choice >	0 choose the codec comes with the module, model number is ALC5621 1 choose external codec, the module number is ALC5621 2 choose external codec, the module number is CS42L73

Example:

AT+GTCODECN?

+GTCODECN: 0

OK

AT+GTCODECN=2

OK

AT+GTCODECN=?

+GTCODECN: (0-2)

OK

11.3 Multiplexer Feature

The MUX provides multiple logical communication channels between the DTE and H3xx over one physical RS232 or USB connection. This service enables the DTE device to run multiple applications (such as GPRS, CSD, SMS and voice calls) while communicating simultaneously with the H3xx.

The H3xx can be supports the multiplexing protocol control channel as defined in GSM07.10 and only basic mode.

11.3.1 +CMUX, MUX Startup Command

This command is used to start the GSM MUX multiplexing protocol stack. When the H3xx received a

valid +CMUX command, it returns OK and changes its state to MUX-Init. If the parameters are left out, the default value is used.

Command	Syntax	Response/Action	Remarks
Set	+CMUX=<mode>[,<subset>[,<port_speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]]]	+CME ERROR: <err>	The Set command requests the H3xx to open the MUX stack with various parameters. This command works only in PREMUX state.
Read	+CMUX?	+CMUX: <mode>, [<subset>], <port_speed>,<N1>, <T1>, <N2>, <T2>, <T3>,<K>+CME ERROR: <err>	The Read command displays the current mode and settings. This command works only in MUX state.
Test	+CMUX=?	+CMUX: (list of supported <mode>s),(list of supported <subset>s),(list of supported <port_speed>s),(list of supported <N1>s),(list of supported <T1>s),(list of supported <N2>s),(list of supported <T2>s),(list of supported <T3>s),(list of supported <k>s)	The Test Command displays a list of supported modes and parameters. This command works in both PREMUX and MUX states.

The following table shows the +CMUX parameters.

<Parameter>	Description
<mode>	MUX mode: 0 Basic
<subset>	Defines how the MUX control channel is set up. The virtual channel is set up according to this setting. 0 UIH frames used only
<port_speed>	1 9600 bit/sec

	<p>2 19200 bit/sec</p> <p>3 38400 bit/sec</p> <p>4 57600 bit/sec</p> <p>5 115200 bit/sec(default)</p> <p>6 230400 bit/sec</p> <p>7 1 Mbit/s</p>
<N1>	<p>Maximum frame size: 1—1509;</p> <p>The default value is 31 in Basic mode.</p>
<T1>	<p>Acknowledgement timer (in units of 10 ms).</p> <p>1-255 The default value is 10 (100 ms)</p>
<N2>	<p>Maximum number of retransmissions.</p> <p>0-5 The default value is 3.</p>
<T2>	<p>Response timer for the DLC0 (in unit of 10 ms). <T2> must be longer than <T1>.</p> <p>2-255 The default value is 30 (300 ms).</p>
<T3>	<p>Wake up response timer (in seconds).</p> <p>1-255 The default value is 10.</p>
<k>	<p>Reserve for Advanced operation with Error Recovery options.</p>

12GPRS

12.1 GPRS Functionality

GSM 07.07 defines commands that a TE may use to control a GPRS ME via a non-multiplexed character-stream interface. This places certain limitations on the functionality of the interface. For example, it is not possible for the ME to send control information to the TE or for the TE to send commands to the ME whilst the interface is in the online data state, unless the layer 2 protocol itself supports this feature (GSM 07.60-12). However, H3xx-specific escape mechanism (DTR) is provided to enable the TE to switch the H3xx into limited online command state.

The use of a multiplexed interface, (GSM 07.10), is not considered here (See “Multiplexer Feature”). The H3xx-specific escape mechanism use DTR as an escape signal (following &D parameters) and designed for limited non network related commands. This specific mechanism purpose is to give the user a way to retrieve the signal strength. The time limit of consecutive DTR toggles is a minimum of 90 seconds. The H3xx-specific is not designed to support online command and data states both at the same time, therefore any wrong or extreme usage can cause unexpected behaviors. The basic GPRS concept is be “always connected” and there is no charge for being connected (only per real data transferred).

12.2 GPRS Commands

This section defines commands that a terminal may use to control a GPRS ME. GPRS MTs vary widely in functionality. A class A ME might support multiple PDP-types as well as circuit-switched data, and use multiple external networks QoS profiles. At the other extreme, a class C ME might support only a single PDP-type using a single external network, and rely on the HLR to contain the PDP context definition. A comprehensive set of GPRS-specific commands is defined below to provide the flexibility needed by the more complex ME. The commands are designed to be expandable to accommodate new PDP types and interface protocols, merely by defining new values for many of the parameters. Multiple contexts may be activated if the interface link-layer protocol is able to support them. The commands use the extended information and error message capabilities described in this specification. For MTs of intermediate complexity, most commands have simplified forms where certain parameters may be omitted. For the simplest MTs, and for backwards compatibility with existing communications software, it is possible to control access to the GPRS using existing modem-compatible commands. This "modem compatible" mode of operation is described below.

12.2.1 +CGCLASS, GPRS Mobile Station Class

This command is used to set the H3xx to operate according to the specified GPRS mobile class.

If the requested class is not supported, an ERROR or +CME ERROR response is returned.

Extended error responses are enabled by the +CMEE command.

Command	Syntax	Response/Action	Remarks
Set	AT +CGCLASS=<c lass>	OK or: +CME ERROR: <err>	Set command is used to set the MT to operate according the specified mode of operation
Read	AT +CGCLASS?	+CGCLASS: <class> OK	The Read command returns the current GPRS mobile class.
Test	AT +CGCLASS=?	+CGCLASS: (list of supported <class>s) OK	The Test command is used for requesting information on the supported GPRS mobile classes.

Note: Issuing GPRS actions over a poor-quality connection may cause protocol errors and harm data validity. To prevent these problems, H3xx is equipped with a protection mechanism that confirms GPRS signal strength before issuing GPRS network-related commands.

The following table shows the +CGCLASS parameters.

<Parameter>	Description
<class>	String parameter that indicates the GPRS mobile class: A class A // only supported if UMTS_SUPPORT is enabled B meaning mobile class B CC class C in GPRS mode CG class C in circuit switched mode

Example:

```
AT+CGCLASS=?
+CGCLASS: ("A","B","CC","CG")
OK
```

Note: If a SIM card without GPRS allowance is used:

```
AT+CGCLASS=?
+CGCLASS: (CC) //Note that CC is a not supported value.
```

12.2.2+CGDCONT, Define PDP Context

This command specifies the PDP (Packet Data Protocol) context.

This command allows specifying specific PDP context parameter values for a PDP context, identified by the local context identification parameter <cid>.

If the command is used only with the one parameter <cid>, it means that the corresponding PDP context becomes undefined.

Command	Syntax	Response/Action	Remarks
Set	AT+CGDCONT=[<cid> [, <PDP_type> [, <APN> [, <PDP_addr> [, <d_comp> [, <h_comp> [, <pd1> [... [, pdN]]]]]]]]]]	OK or: +CME ERROR: <err>	The Set command specifies the context identification parameter values for a PDP context. A special form of the Set command, +CGDCONT=<cid> causes the values for context number <cid> to become undefined.
Read	AT+CGDCONT?	+CGDCONT: <cid>, <PDP_type>, <APN>,<PDP_addr>, <d_comp>, <h_comp>[,<pd1>[,...[, pdN]]] OK	The read command returns the current settings for each defined context. It will be read only "OK" without any set command.
Test	AT+CGDCONT=?	+CGDCONT: (range of supported <cid>s), <PDP_type>, , , (list of supported <d_comp>s), (list of supported <h_comp>s) OK	The Test command returns the values supported as a compound value. If the ME supports several PDP types, <PDP_type>, the parameter value ranges for each <PDP_type> are returned on a separate line.

The following table shows the +CGDCONT parameters.

<Parameter>	Description
<cid>	Numeric parameter specifying a particular PDP context definition (PDP Context Identifier). The parameter is local to the Terminal-Mobile Terminal interface and is used in other PDP context-related commands. The value is from 1 to 10
<"PDP_type"> (Packet data protocol type)	String parameter (in quotation marks) specifying the type of packet data protocol: IP IP Internet Protocol (IETF STD 5) IPV6 Internet Protocol, version 6 (IETF RFC 2460)
<"APN"> (Access Point Name)	String parameter (in quotation marks), which is a logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, the subscription value is requested.
<"PDP_address">	String parameter (in quotation marks), which identifies the ME in the address space applicable to the PDP.

	<p>If the value is null or omitted, a value may be provided by the terminal during the PDP startup procedure or, failing that, a dynamic address is requested.</p> <p>The Read form of the command continues to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the +CGPADDR command.</p> <p>The default value is 0.</p>
<d_comp>	<p>Numeric parameter that controls PDP data compression.</p> <p>0 off (default if value is omitted)</p> <p>1 on (manufacturer preferred compression)</p> <p>2 V.42 bis</p> <p>Other values are reserved. The default value is 0.</p>
<h_comp>	<p>a numeric parameter that controls PDP header compression</p> <p>0 off (default if value is omitted)</p> <p>1 on (manufacturer preferred compression)</p> <p>2 RFC1144 (applicable for SMDCP only)</p> <p>3 RFC2507</p> <p>4 RFC3095 (applicable for PDCP only)</p> <p>Other values are reserved.</p>
<pd1>...<pdN>	<p><pd1>...<pdN> zero to N string parameters whose meanings are specific to the <PDP_type></p>

Example:

```

AT+CGDCONT?
OK // Only without any set command.
AT+CGDCONT=1, "IP", "CMNET"
OK
AT+CGDCONT=2, "IP", "CMWAP"
OK
AT+CGDCONT?
+CGDCONT: 1, "IP", "CMWAP", "0.0.0.0", 0, 0
+CGDCONT: 2, "IP", "CMNET", "0.0.0.0", 0, 0
OK

AT+CGACT=1
OK

```

```
AT+CGDCONT?
+CGDCONT: 1,"IP","CMWAP","10.230.50.116",0,0
+CGDCONT: 2,"IP","CMNET","10.3.97.156",0,0
OK
```

```
AT+CGDCONT=?
+CGDCONT: (1-10),("IP"),,(0),(0,1)
OK
```

12.2.3+CGQMIN, Quality of Service Profile (Min Acceptable)

This command enables the terminal to specify the minimum acceptable profile which is checked by the ME against the negotiated profile returned in the Activate PDP Context Accept message.

Command	Syntax	Response/Action	Remarks
Set	AT+CGQMIN=<cid>[,<precedence>[,<delay>[,<reliability.>[,<peak>[,<mean>]]]]]	OK or: +CME ERROR: <err>	The Set command specifies a profile for the context identified by the (local) context identification parameter,<cid>. As this is the same parameter that is used in the +CGDCONT command, the +CGQMIN command is effectively an extension of the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.
Read	AT+CGQMIN?	+CGQMIN: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>[<CR><LF> +CGQMIN: <cid>,<precedence>,<delay>,<reliability.>,<peak>,<mean>[...]] OK or: +CME ERROR: <err>	The Read command returns the current settings for each defined context.

Command	Syntax	Response/Action	Remarks
Test	AT+CGQMIN=?	+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s) OK or: +CME ERROR: <err>	The Test command returns the parameter value ranges for each <PDP_type>

The following table shows the +CGQMIN parameters.

<Parameter>	Description
<cid>	A numeric parameter that specifies a particular PDP context definition. The value is from 1 to 10 For <cid> refer to defined values under +CGDCONT command.
<precedence>	A numeric parameter that specifies the precedence class.
<delay>	A numeric parameter that specifies the delay class.
<reliability>	A numeric parameter that specifies the reliability class.
<peak>	A numeric parameter that specifies the peak throughput class.
<mean>	A numeric parameter that specifies the mean throughput class.

Example:

```

AT+CGQMIN=?
+CGQMIN: "IP",(0-3),(0-4),(0-5),(0-9),(0-18)
OK
AT+CGQMIN?
+CGQMIN: 1,2,4,3,9,10
+CGQMIN: 2,2,4,3,9,10
OK

```

12.2.4+CGQREQ, Quality of Service Profile (Requested)

This command enables the terminal to specify a Quality of Service Profile that is used when the ME sends an Activate PDP Context Request message to the network.

Command	Syntax	Response/Action	Remarks
---------	--------	-----------------	---------

Set	AT+CGQREQ=<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]	OK or: +CME ERROR: <err>	The Set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. As this is the same parameter that is used in the +CGDCONT command, the +CGQREQ command is effectively an extension of the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value. A special form of the Set command, +CGQREQ= <cid>, causes the requested profile for context number <cid> to become undefined.
Read	AT+CGQREQ?	+CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean> OK	The Read command returns the current settings for each defined context.
Test	AT+CGQREQ=?	+CGQREQ: <PDP_type>,(list of supported<precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s) OK	The Test command returns values supported as a compound value. If the ME supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

The following table shows the +CGQREQ parameters.

<Parameter>	Description
<cid>	A numeric parameter that specifies a particular PDP context definition. The value is from 1 to 10
<precedence>	A numeric parameter that specifies the precedence class.
<delay>	A numeric parameter that specifies the delay class.
<reliability>	A numeric parameter that specifies the reliability class.
<peak>	A numeric parameter that specifies the peak throughput class.
<mean>	A numeric parameter that specifies the mean throughput class.

Example:

```

AT+CGQREQ=?
+CGQREQ: ("IP"),(0-3),(0-4),(0-5),(0-9),(1-18,31)
OK
AT+CGQREQ?
+CGQREQ: 1,2,4,3,9,10
+CGQREQ: 2,2,4,3,9,10
OK
AT+CGQREQ=1,0,,0,0,10
OK
AT+CGQREQ?
+CGQREQ: 1,0,4,0,0,10
+CGQREQ: 2,2,4,3,9,10
OK

```

12.2.5 +CGATT, GPRS Attach or Detach

This command attaches/detaches the ME to/from the GPRS service. When the command has completed, the ME remains in V.25ter command state. If the ME is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

Command	Syntax	Response/Action	Remarks
Set	AT+CGATT= <state>	OK or: +CME ERROR: <err>	The Set command attaches/detaches the ME to/from the GPRS service.
Read	AT+CGATT?	+CGATT: <state> OK	The Read command returns the current GPRS service state.
Test	AT+CGATT=?	+CGATT: (list of supported <state>s) OK	The Test command requests information on the supported GPRS service states.

Note: This command has the characteristics of both the V.25ter action and parameter commands. Therefore, it has the Read form in addition to the Execution/Set and Test forms.

The following table shows the +CGATT parameters.

<Parameter>	Description
<state>	Indicates the state of the GPRS attachment: 0 Detached. 1 Attached.

Example:

```

AT+CGATT=?
+CGATT: (0,1)
OK
AT+CGATT?
+CGATT: 0
OK
AT+CGATT=0
OK

```

12.2.6D*99, Request GPRS Service "D"

This command enables the ME to perform the actions necessary for establishing communication between the terminal and the external Packet Data Network (PDN).

The ITU V.25ter 'D' (Dial) command causes the ME to enter the ITU V.25ter Online Data state and together with the terminal, to start the specified layer 2 protocol. The ME returns CONNECT to confirm acceptance of the command prior to entering the ITU V.25ter Online Data state. No further commands may follow on the AT command line.

The detailed behavior after the Online Data state has been entered is dependent on the PDP type, and is described briefly. GPRS attachment and PDP context activation procedures may take place prior to, or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

When the layer 2 protocols have terminated, either as a result of an orderly shut down of the PDP or an error, the ME enters the ITU V.25ter command state and returns the NO CARRIER final result code.

If <called address> is supported and provided, the ME automatically sets up a virtual call to the specified address after the PDP context has been activated.

If <L2P> and <cid> are supported, the +CGDCONT, +CGQREQ and other such commands may then be used in the modem initialization AT command string to set values for PDP type, APN, QoS and so on.

If <L2P> is not supported, or is supported but omitted, the ME uses a layer 2 protocol appropriate to the PDP type.

If <cid> is not supported, or is supported but omitted, the ME attempts to activate the context using one of the following:

- Any information provided by the terminal during the PDP startup procedure. For example, the terminal may provide a PDP type and/or PDP address to the ME.
- A prior knowledge, for example, the ME may implement only one PDP type.

Using the "Empty PDP type" No PDP address or APN is sent in this case and only one PDP context subscription record is present in the HLR for this subscriber.

This command may be used in both normal and modem compatibility modes.

Command	Syntax	Response/Action
Set	ATD*<GPRS_SC> [* [<called_address>] [*<L2P>] [*<cid>]]#	CONNECT or: ERROR

The following table shows the D*99 parameters.

<Parameter>	Description
<GPRS_SC> (GPRS Service Code)	Digit string (value 99) which identifies a request to use GPRS.
called_addresses>	String that identifies the called party in the address space applicable to the PDP. For communications software that does not support arbitrary characters in the dial string, a numeric equivalent may be used. Also, the comma character "," may be used as a substitute for the period character ".". For PDP type OSP: IHOSS, the following syntax may be used for <called_address>: [<host>] [@<port>] [@<protocol>]]] where <host>, <port> and <protocol> are defined in "+CGDCONT,Define PDP Context". For communications software that does not support arbitrary characters in the dial string, a numeric value equivalent to the hostname may be used. However, this should be avoided if at all possible.
<L2P>	String variable which indicates the layer 2 protocol to be used. For communications software that does not support arbitrary characters in the dial string, the following numeric equivalents are used: 0 NULL 1 PPP 2 PAD 3 X25 9 yyyy M-xxxx

	Other values are reserved and result in an ERROR response to the Set command. Note: V.250 (and certain communications software) do not permit arbitrary characters in the dial string. The <L2P> and <called_address> strings are therefore specified as containing digits (0-9) only.
<cid>:	Digit string which specifies a particular PDP context definition (See "+CGDCONT, Define PDP Context").

Example:

ATD*99# //Try connecting to GPRS according to the first <cid>, defined in +CGDCONT

12.2.7+CGACT, PDP Context Activate or Deactivate

This command activates/deactivates the specified PDP context(s).

Command	Syntax	Response/Action	Remarks
Set	AT+CGACT =[<state>[,<cid>[,<cid>[,]]]]	OK or: NO CARRIER or: +CME ERROR: <err>	The Set command activates/deactivates the specified PDP context(s). When the command is completed, the ME remains in V.25 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the requested state for any specified context cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. If the ME is not GPRS-attached when the activation form of the command is executed, the ME first performs a GPRS attach and then attempts to activate the specified contexts. If the attach fails, the ME responds with an ERROR or, if extended error responses are enabled, with the appropriate failure-to-attach error message.
Read	AT+CGACT ?	+CGACT: <cid>,<state><CR><LF> +CGACT: <cid>,<state><CR><LF> +CGACT: <cid>,<state> OK	The Read command returns the current activation states for all the defined PDP contexts.

Command	Syntax	Response/Action	Remarks
Test	AT+CGACT =?	+CGACT: (list of supported <state>s) OK	The Test command requests information on the supported PDP context activation states.

The following table shows the +CGACT parameters.

<Parameter>	Description
<state>	Indicates the activation state of the context: 0 Non-active 1 Active
<cid>	1-10 A numeric parameter that specifies a particular PDP context definition

Example:

```

AT+CGACT=?
+CGACT: (0,1)
OK
AT+CGACT?
OK
AT+CGACT=1
ERROR //GPRS network not present.

```

Note:

In some GPRS networks, +CGACT is not supported. the ATD*99 # command can be used to establish a connection.

Activating a context can take up to 150 seconds.

Deactivating a context can take up to 40 seconds.

When aborting a +CGACT Set command, the context is closed. This can take up to 40 seconds

12.2.8+CGPADDR, GPRS ADDResses

This command reads the allocated PDP addresses for the specified context identifiers.

Command	Syntax	Response/Action	Remarks
Set	AT+CGPADDR=[<cid>[,<cid>[,]]]	+CGPADDR: <cid>,<PDP_addr>[<CR> <LF> +CGPADDR: <cid>,<PDP_addr>[...]] OK or: +CME ERROR: <err	The Set command returns a list of PDP addresses for the specified context identifiers.
Test	AT+CGPADDR=?	+CGPADDR: (list of defined <cid>s) OK	The Test command returns the list of defined <cid>s.

The following table shows the +CGPADDR parameters.

<Parameter>	Description
<cid>	A numeric parameter that specifies a particular PDP context definition. If no <cid> is specified, the addresses for all defined context are returned.
<PDP_address>	A string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. <PDP_address> is omitted if none is available.

Example:

```
AT+CGPADDR=?
+CGPADDR: (1,2)
OK
AT+CGPADDR=1
+CGPADDR: 1,"0.0.0.0"
OK
```

12.2.9+CGANS, Manual response to a network request for PDP context activation

This command requests the MT to respond to a network request for Packet Domain PDP context activation which has been signalled to the TE by the RING or +CRING unsolicited result code.

Command	Syntax	Response/Action	Remarks
Set	AT+CGANS=[<response>,[<L2P> ,[<cid>]]]	OK Or CME ERROR : <error>	The set command requests the MT to respond to a network request for Packet Domain PDP context activation which has been signalled to the TE by the RING or +CRING unsolicited result code.
Test	AT+CGANS= ?	+CGANS: (list of supported <response>s), (list of supported <L2P>s)	The test command returns the values of <response> and <L2P> supported by the MT as compound values.

The following table shows the +CGANS parameters.

<Parameter>	Description
<response>	A numeric parameter which specifies how the request should be responded to. 0 reject the request 1 accept and request that the PDP context be activated If <response> is omitted it is assumed to be 0. Other values are reserved and will result in the ERROR response.
<L2P>	A string parameter which indicates the layer 2 protocol to be used (see +CGDATA command).
<cid>	A numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).

The <response> parameter allows the TE to accept or reject the request. If <response> is 0, the request is rejected and the MT returns OK to the TE. If <response> is 1, the following procedure is followed by the MT.

Commands following the +CGANS command in the AT command line shall not be processed by the MT.

If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.250 online data state.

If no <cid> is given or if there is no matching context definition, the MT will attempt to activate the context using the values for PDP type and PDP address provided by the network, together with any other relevant information known to the MT. The other context parameters will be set to their default values.

If the activation is successful, data transfer may proceed

Example:

AT+CGANS=?

+CGANS: (0,1), (PPP,M-OPT-PPP,M-HEX,M-RAW_IP)

OK

Note: This is not the same as if the MT issues a +CGDATA (or +CGACT) command after receiving a +CRING unsolicited result code. A +CGDATA (or +CGACT) does not command the MT to acknowledge the network request but rather to make a new request for context activation. The network request would be ignored.

12.2.10 +CGAUTO, Automatic Response to a Network Request for PDP Context Activation

The set command disables or enables an automatic positive or negative response (auto-answer) to the receipt of a NWinitiated Request PDP Context Activation message from the network in UMTS/GPRS and a NW-initiated Request EPS Bearer Activation/ Modification Request messages in EPS. It also provides control over the use of the V.250 basic commands 'S0', 'A' and 'H' for handling network requests for PDP context activation. The setting does not affect the issuing of the unsolicited result code RING or +CRING.

Command	Syntax	Response/Action	Remarks
Set	AT+CGAUTO = [<n>]	OK Or CME ERROR : <error>	The set command disables or enables an automatic positive or negative response (auto-answer) to the receipt of a NW initiated Request PDP Context Activation message from the network.
Read	AT+CGAUTO?	+CGAUTO: <n> OK	The read command returns the current setting for the auto-answer whether it's enabled or disabled.
Test	AT+CGAUTO= ?	+CGAUTO: (list of supported <n>s) OK	The test command returns the values of <n> supported by MT as a compound value.

The following table shows the +CGAUTO parameters.

<Parameter>	Description
<n>	Is a numeric parameter which indicates the setting for the auto-answer to be used 0 Turn off automatic response for Packet Domain only Packet Domains network requests are manually accepted or rejected by the +CGANS command. 1 Turn on automatic response for Packet Domain only Packet Domain network requests are automatically accepted according to the description above. 2 Modem compatibility mode, Packet Domain only Automatic acceptance of Packet Domain network requests is controlled by the

	<p>'S0' command. Manual control uses the 'A' and 'H' commands, respectively, to accept and reject Packet Domain requests. (+CGANS may also be used.) Incoming circuit switched calls can be neither manually nor automatically answered.</p> <p>3 Modem compatibility mode, Packet Domain and circuit switched calls (default) Automatic acceptance of both Packet Domain network requests and incoming circuit switched calls is controlled by the 'S0' command. Manual control uses the 'A' and 'H' commands, respectively, to accept and reject Packet Domain requests. (+CGANS may also be used.) Circuit switched calls are handled as described elsewhere in this specification.</p> <p>4 Turn on automatic negative response for Packet Domain only Packet Domain network requests are automatically rejected.</p>
--	---

Example:

```

AT+CGAUTO=0
OK
AT+CGAUTO=1
OK
AT+CGAUTO=4
OK
AT+CGAUTO=5
ERROR
AT+CGAUTO=?
+CGAUTO: (0-4)
OK

```

Note: When the +CGAUTO=1 command is received, the MT shall attempt to perform a PS attach if it is not already attached. Failure will result in ERROR or, if enabled, +CME ERROR being returned to the TE. Subsequently, when the MT announces a network request for PDP context activation by issuing the unsolicited result code RING or +CRING to the TE, this is followed by the intermediate result code CONNECT. The MT then enters V.250 online data state and follows the same procedure as it would after having received a +CGANS=1 with no <L2P> or <cid> values specified.

12.2.11 +CGEQMIN, 3G Quality of Service Profile (Minimum acceptable)

This command allows the TE to specify a minimum acceptable profile, which is checked by the MT against the negotiated profile returned in the Activate/Modify PDP Context Accept message.

		error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [,<Source statistics descriptor> ,<Signalling indication>] [...]]	
Test	AT+CGEQMIN =?	+CGEQMIN: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s) ,(list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s) ,(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [, (list of supported <Source statistics descriptor>s) ,(list of supported <Signalling indication>s)] [<CR><LF>+CGEQMIN: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s) ,(list of supported <Guaranteed bitrate UL >s), (list of supported<Guaranteed bitrate DL >s) ,(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) [, (list of supported <Source statistics descriptor>s) ,(list of supported <Signalling indication>s)] [...]]	Test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

The following table shows the +CGEQMIN parameters.

<Parameter>	Description
<cid>	A numeric parameter which specifies a particular PDP context definition (see +CGDCONT and +CGDSCONT commands).
<Traffic class>	<p><Traffic class> a numeric parameter that indicates the type of application for which the UMTS bearer service is onformat.</p> <p>0 conversational</p> <p>1 streaming</p> <p>2 interactive</p> <p>3 background</p> <p>Other values are reserved.</p>
<Maximum bitrate UL>	A numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Maximum bitrate DL>	A numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Guaranteed bitrate UL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Guaranteed bitrate DL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32, ...) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Delivery order>	<p>A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.</p> <p>0 no</p> <p>1 yes</p> <p>Other values are reserved.</p>
<Maximum SDU size>	A numeric parameter (1,2,3,...) that indicates the maximum allowed SDU size in octets(refer 3GPP TS 24.008 subclause 10.5.6.5).
<SDU error ratio>	A string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQMIN=..., "5E3",...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Parameter>	Description
<Residual bit error ratio>	A string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQMIN=..., "5E3",...) (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Delivery of erroneous SDUs>	A numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not. 0 no 1 yes 2 no detect Other values are reserved.
<Transfer delay>	A numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Traffic handling priority>	A numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Source Statistics Descriptor>	Supported in R7 P S a numeric parameter that specifies characteristics of the source of the submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5). 0 Characteristics of SDUs is unknown (default value) 1 Characteristics of SDUs corresponds to a speech source Other values are reserved.
<Signalling Indication>	Supported in R7 PS a numeric parameter used to indicate confirmat content of submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as interactive (refer 3GPP TS 24.008 subclause 10.5.6.5). 0 PDP context is not optimized for confirmat (default value) 1 PDP context is optimized for confirmat
<PDP_type>	(See +CGDCONT and +CGDSCONT commands). If a value is omitted for a particular class then the value is considered to be unspecified.

Example:

AT+CGEQMIN?

+CGEQMIN: 1,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0

```

+CGEQMIN: 6,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
+CGEQMIN: 4,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
+CGEQMIN: 3,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
+CGEQMIN: 2,0,0,0,0,0,0,0,"0E0","0E0",0,0,0,0,0
OK
AT+CGEQMIN=?
+CGEQMIN: "IP",(0-3),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps
steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps,
8700-16000 in 100 kbps steps), (1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in
64 kbps steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps,
8700-16000 in 100 kbps steps),
(0-1),(10-1500,1502,1510,1520),("1E6","1E5","1E4","1E3","7E3","1E2","1E1"),("6E8","1E6",
"1E5","1E4","5E3","4E3","1E3","5E2","1E2"),(0-2),(10-150 in 10 ms steps, 200-950 in 50 ms
steps, 1000-4000 in 50 ms steps),(0-3),(0-1),(0-1)
OK

```

12.2.12 +CGEQREQ, 3G Quality of Service Profile (Requested)

This command allows the TE to specify a UMTS Quality of Service Profile that is used when the MT sends an Activate PDP Context Request message to the network.

Command	Syntax	Response/Action	Remarks
Set	AT+CGEQREQ=[<cid> > [,<Traffic class> [,<Maximum bitrate UL> [,<Maximum bitrate DL> [,<Guaranteed bitrate UL> [,<Guaranteed bitrate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority> [,<Source statistics descriptor> [,<Signalling	OK ERROR	Set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. The specified profile will be stored in the MT and sent to the network only at activation or MS-initiated modification of the related context. Parameter value ranges for each PDP type are returned on a separate line.

		descriptor>s) ,(list of supported <Signalling indication>s)] [<CR><LF>+CGEQREQ: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s)] [(list of supported <Source statistics descriptor>s) ,(list of supported <Signalling indication>s)]	
--	--	--	--

The following table shows the +CGEQREQ parameters.

<Parameter>	Description
<cid>	A numeric parameter which specifies a particular PDP context definition (see +CGDCONT and +CGDSCONT commands).
<Traffic class>	A numeric parameter that indicates the type of application for which the UMTS bearer service is onformat. 0 conversational 1 streaming 2 interactive 3 background subscribed value If the Traffic class is specified as conversational or streaming, then the Guaranteed and Maximum bitrate parameters should also be provided. Other values are reserved.
<Maximum bitrate UL>	A numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32 kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP

	TS 24.008 subclause 10.5.6.5).
<Maximum bitrate DL>	A numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32 kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Guaranteed bitrate UL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Guaranteed bitrate DL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Delivery order>	A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not. 0 no 1 yes 2 subscribed value. Other values are reserved.
<SDU error ratio>	a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQREQ=..., "5E3",...). '0E0' means subscribed value (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Residual bit error ratio>	a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQREQ=..., "5E3",...). '0E0' means subscribed value (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Delivery of erroneous SDUs>	a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.

	<p>0 no</p> <p>1 yes</p> <p>2 no-detect</p> <p>3 subscribed value</p> <p>Other values are reserved.</p>
<Transfer delay>	a numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds. If the parameter is set to '0' the subscribed value will be requested (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Traffic handling priority>	a numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers. If the parameter is set to '0' the subscribed value will be requested (refer 3GPP TS 24.008 subclause 10.5.6.5).
<Source Statistics Descriptor>	<p>Supported in R7 P S a numeric parameter that specifies characteristics of the source of the submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 subclause 10.5.6.5).</p> <p>0 Characteristics of SDUs is unknown (default value)</p> <p>1 Characteristics of SDUs corresponds to a speech source</p> <p>Other values are reserved.</p>
<Signalling Indication>	<p>Supported in R7 P S a numeric parameter used to indicate confirmat content of submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as interactive (refer 3GPP TS 24.008 subclause 10.5.6.5).</p> <p>0 PDP context is not optimized for confirmat (default value)</p> <p>1 PDP context is optimized for confirmat<PDP_type>: (see +CGDCONT and +CGDSCONT commands)</p>

Example:

AT+CGEQREQ=?

+CGEQREQ: "IP",(0-4),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps, 8700-16000 in 100 kbps steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps),(1-63 in 1 kbps steps, 64-568 in 8 kbps steps, 576-8640 in 64 kbps steps, 8700-16000 in 100 kbps steps),(0-1),(10-1500,1502,1510,1520),("1E6","1E5","1E4","1E3","7E3","1E2","1E1"),("6E8","1E6","1E5","1E4","5E3","4E3","1E3","5E2","1E2"),(0-2),(10-150 in 10 ms steps, 200-950 in 50 ms steps, 1000-4000 in 50 ms steps),(0-3),(0-1),(0-1)

12.2.13 +CGEQNEG, G Quality of Service Profile (Negotiated)

This command allows the TE to retrieve the negotiated QoS profiles returned in the Activate PDP Context Accept message.

Command	Syntax	Response/Action	Remarks
Set	AT+CGEQNEG =[<cid>[,<cid>[, ...]]]	+CGEQNEG: <cid>, <Traffic class> ,<Maximum bitrate UL>, <Maximum bitrate DL> ,<Guaranteed bitrate UL>, <Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [<CR><LF>+CGEQNEG: <cid>, <Traffic class> ,<Maximum bitrate UL>, <Maximum bitrate DL> ,<Guaranteed bitrate UL>, <Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority> [...]]	Set command allows the TE to retrieve the negotiated QoS profiles returned in the Activate PDP Context Accept message.
Test	AT+CGEQNEG =?	+CGEQNEG: (list of <cid>s associated with active contexts)	Test command returns a list of <cid>s associated with active contexts.

The following table shows the +CGEQNEG parameters.

<Parameter>	Description
<cid>	A numeric parameter which specifies a particular PDP context definition (see +CGDCONT and +CGDSCONT commands).
<Traffic class>	A numeric parameter that indicates the type of application for which the UMTS bearer service is optimised. 0 conversational 1 streaming 2 interactive 3 background Other values are reserved.
<Maximum bitrate UL>	A numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32

	kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...) (refer TS 24.008 subclause 10.5.6.5).
<Parameter>	Description
<Maximum bitrate DL>	A numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP As an example a bitrate of 32 kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...) (refer TS 24.008 subclause 10.5.6.5)
<Guaranteed bitrate UL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...) (refer TS 24.008 subclause 10.5.6.5).
<Guaranteed bitrate DL>	A numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32 kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...) (refer TS 24.008 subclause 10.5.6.5).
<Delivery order>	A numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not. 0 no 1 yes Other values are reserved.
<Maximum SDU size>	A numeric parameter that (1,2,3,...) indicates the maximum allowed SDU size in octets (refer TS 24.008 subclause 10.5.6.5).
	<SDU error ratio> a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:..., "5E3",...) (refer TS 24.008 subclause 10.5.6.5).
<Residual bit error ratio>	A string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:..., "5E3",...) (refer TS 24.008 subclause 10.5.6.5).
<Delivery of erroneous SDUs>	A numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not. 0 no 1 yes

	2 no detect Other values are reserved.
<Parameter>	Description
<Transfer delay>	A numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds (refer TS 24.008 subclause 10.5.6.5).
<Traffic handling priority>	A numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers (refer TS 24.008 subclause 10.5.6.5)

Example:

AT+CGEQNEG=?

+CGEQNEG: ()

OK

12.2.14 +CGCMOD, PDP Context Modify

The execution command is used to modify the specified PDP context (s) with respect to QoS profiles and TFTs.

Command	Syntax	Response/Action	Remarks
Set	+CGCMOD=[<cid>[,<cid>[,...]]]	OK Or CME ERROR : <error>	The set command is used to modify the specified PDP context (s) with respect to QoS profiles and TFTs.
Test	+CGCMOD=?	+CGCMOD: (list of <cid>s associated with active contexts) OK	The test command returns a list of <cid>s associated with active contexts.

The following table shows the +CGCMOD parameters.

<Parameter>	Description
<cid>	A numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands)

Example:

AT+CGDCONT?

+CGDCONT: 1,"IP","CMNET","172.29.107.202",0,0

+CGDCONT: 2,"IP","", "0.0.0.0",1,1

+CGDCONT: 3,"IP","CMNET","0.0.0.0",0,0

```

+CGDCONT: 4,"IP","CMNET","0.0.0.0",0,0
+CGDCONT: 6,"IPV6","CDOE","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0
OK
AT+CGCMOD=1,1,
OK
AT+CGCMOD=1,1,6
OK
AT+CGDCONT?
+CGDCONT: 1,"IP","CMNET","172.29.107.202",0,0
+CGDCONT: 2,"IP","", "0.0.0.0",1,1
+CGDCONT: 3,"IP","CMNET","0.0.0.0",0,0
+CGDCONT: 4,"IP","CMNET","0.0.0.0",0,0
+CGDCONT: 6,"IPV6","CDOE","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0
OK
AT+CGCMOD=?
+CGCMOD: (1,2,3,4,6)
OK

```

12.2.15 +CGDATA , Enter Data State

This execution command causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more GPRS PDP types. This may include performing a GPRS attach and one or more PDP context activations. If the parameters are accepted, MT displays the intermediate result code CONNECT on TE and enters the online data state; thereafter data transfer may proceed. No other commands following +CGDATA in the command line will be processed.

Command	Syntax	Response/Action	Remarks
Set	+CGDATA = [<L2P> ,[<cid> [,<cid> [...]]]]	CONNECT It follows data transfer or CME ERROR: <error>	Set command specifies the <L2P> and <cid> to establish data call (csd connection state)
Test	+CGDATA=?	+CGDATA: (list of supported <L2P>s) OK	Test command returns values supported as a compound value.

The following table shows the +CGDATA parameters.

<Parameter>	Description
<L2P>	<p>a string parameter that indicates the layer 2 protocol to be used between the TE and MT</p> <p>NULL none, for PDP type OSP: IHOSS (Obsolete)</p> <p>PPP Point-to-point protocol for a PDP such as IP</p> <p>PAD character stream for X.25 character (triple X PAD) mode (Obsolete)</p> <p>X25 X.25 L2 (LAPB) for X.25 packet mode (Obsolete).</p> <p>M-OPT-PPP MS supports manufacturing specific protocol</p> <p>M-HEX MS supports manufacturing specific protocol</p> <p>M-RAW_IP MS supports manufacturing specific protocol.</p>
<cid>	<p>A numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).</p>

Note: After data transfer is complete, the MT re-enters the command state and the final result code is displayed on TE. In error case the final result code NO CARRIER or CME ERROR :<error> is displayed. PS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

If no <cid> is given or if there is no matching context definition, the MT shall attempt to activate the context with whatever information is available to the MT. The other context parameters shall be set to their default values.

If the activation is successful, data transfer may proceed. After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the V.250 command state is re-entered and the MT returns the final result code OK.

Example:

```

AT+CGDATA=ppp
CONNECT
.....
.....
AT+CGDATA=?
+CGDATA: (PPP,M-OPT-PPP,M-HEX,M-RAW_IP,PAD,X25)
OK

```

12.2.16 +CGDSCONT, Define Secondary PDP Context

This command is used to define a secondary PDP context by specifying the PDP context parameter values for a <cid> (local context identification parameter). If the command is used only with the one parameter <cid>, it means that the corresponding PDP context becomes undefined.

Command	Syntax	Response/Action	Remarks
Set	+CGDSCONT =[<cid>, <p_cid> [,<d_comp>[, <h_comp>]]]	OK Or ERROR	Set command specifies PDP context parameter values for a Secondary PDP context identified by the (local) context identification parameter, <cid>.
Read	+CGDSCONT ?	+CGDSCONT: <cid>, <p_cid>, <d_comp>, <h_comp> OK	Read command returns the current settings for each defined context.
Test	+CGDSCONT =?	+CGDSCONT: (range of <cid>s),(list of <cid>s for defined primary contexts),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s) [<CR><LF>+CGDSCONT: (range of <cid>s),(list of <cid>s for defined primary contexts),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s) [...] OK	Test command returns values supported as a compound value.

The following table shows the +CGDSCONT parameters.

<Parameter>	Description
<cid>	(PDP Context identifier) It is a numeric parameter, which specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. The range of the permitted values is 1-10.
<p_cid>	(Primary PDP context identifier) It is a numeric parameter which specifies a particular PDP context definition which has been specified by use of the +CGDSCONT command. The parameter is local to the TE-MT interface. The list of permitted values is returned by the test form of the command.
<d_comp>	(A numeric parameter that controls PDP data compression (applicable for SMDCP only)) 0 off (default if value is omitted) 1 on (manufacturer preferred compression) 2 V.42 bis

	Other values are reserved.
<Parameter>	Description
<h_comp>	(A numeric parameter that controls PDP header compression) 0 off (default if value is omitted) 1 on (manufacturer preferred compression) 2 RFC1144 (applicable for SMDCP only) 3 RFC2507 4 RFC3095 (applicable for PDCP only) Other values are reserved.

Example:

```

AT+CGDSCONT?
+CGDSCONT: 2,1,0,0
OK
AT+CGDSCONT=1,1
ERROR
AT+CGDSCONT=2,1,1,3
OK
AT+CGDSCONT?
+CGDSCONT: 2,1,1,3
OK
AT+CGDSCONT=?
+CGDSCONT: (1-20),(),"IP",,,(0-2), (0,1,2,3,4)
+CGDSCONT: (1-20),(),"IPV6",,,(0-2), (0,1,2,3,4)
OK
  
```

12.2.17 +CGEREP, Packet Domain Event Reporting

This command is used to enable or disable sending of unsolicited result codes, +CGEV: XXX from MT to TE in the case of events occurring in the Packet Domain

Command	Syntax	Response/Action	Remarks
Set	+CGEREP=[<mode>,<bfr>]	OK	The Set command enables or disables sending of unsolicited result codes, +CGEV: XXX from MT to TE in the case of certain events occurring in the Packet Domain MT or the network.
Read	+CGEREP?	+CGEREP: <mode>,<bfr> OK	The read command returns the current value of <mode> and <bfr> parameters.
Command	Syntax	Response/Action	Remarks

Test	+CGEREP=?	+CGEREP: (list of supported <mode>s),(list of supported <bfr>s) OK	The test command lists the supported values for <mode> and for <bfr>.
------	-----------	---	---

The following table shows the +CGEREP parameters.

<Parameter>	Description
<mode>	<p>0 buffer unsolicited result codes in the MT; if MT result code buffer is full, the oldest ones can be discarded. No codes are forwarded to the TE.</p> <p>1 discard unsolicited result codes when MT-TE link is reserved (e.g. in on-line data mode); otherwise forward them directly to the TE</p> <p>2 buffer unsolicited result codes in the MT when MT-TE link is reserved (e.g. in on-line data mode) and flush them to the TE when MT-TE link becomes available; otherwise forward them directly to the TE</p>
<bfr>	<p>0 MT buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered</p> <p>1 MT buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1 or 2 is entered (OK response shall be given before flushing the codes)</p> <p>2 circuit switched preferred (use Packet Domain if circuit switched not available)</p>

Example:

```
AT+CGEREP=1,0
```

```
OK
```

```
AT+CGEREP=2,2
```

```
ERROR
```

```
AT+CGEREP=?
```

```
+CGEREP: (0-2),(0-1)
```

```
OK
```

```
AT+CGEREP=2,0
```

```
AT+CGEREP?
```

```
+CGEREP: 2,0
```

```
OK
```

12.2.18 +CGTFT Traffic Flow Template

This command allows the TE to specify a Packet Filter – PF for a Traffic Flow Template – TFT that is used in the GGSN for routing of down-link packets onto different QoS flows towards the TE.

Command	Syntax	Response/Action	Remarks
---------	--------	-----------------	---------

Set	<p>+CGTFT=[<cid>, [<packet filter identifier>, <evaluation precedence index> [<source address and subnet mask> [<protocol number (ipv4) / next header (ipv6)> [<destination port range> [<source port range> [<ipsec security parameter index (spi)> [<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask> [<flow label (ipv6)>]]]]]]]]]]</p>	<p>OK ERROR</p>	<p>The set command specifies a Packet Filters that is to be added to the TFT stored in the MT and used for the context identified by the (local) context identification parameter, <cid>.</p>
Read	+CGTFT?	<p>+CGTFT: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label (ipv6)> [<CR><LF>+CGTFT: <cid>, <packet filter identifier>, <evaluation precedence index>, <source address and subnet mask>, <protocol number (ipv4) / next header (ipv6)>, <destination port range>, <source port range>, <ipsec security parameter index (spi)>, <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>, <flow label (ipv6)> [...]]</p>	<p>The read command returns the current settings for all Packet Filters for each defined context.</p>

Command	Syntax	Response/Action	Remarks
Test	+CGTFT=?	+CGTFT: <PDP_type>, (list of supported <packet filter identifier>s), (list of supported <evaluation precedence index>s), (list of supported <source address and subnet mask>s), (list of supported <protocol number (ipv4) / next header (ipv6)>s), (list of supported <destination port range>s), (list of supported <source port range>s), (list of supported <ipsec security parameter index (spi)>s), (list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>s), (list of supported <flow label (ipv6)>s) [<CR><LF>+CGTFT: <PDP_type>, (list of supported <packet filter identifier>s), (list of supported <evaluation precedence index>s), (list of supported <source address and subnet mask>s), (list of supported <protocol number (ipv4) / next header (ipv6)>s), (list of supported <destination port range>s), (list of supported <source port range>s), (list of supported <ipsec security parameter index (spi)>s), (list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6)	The test command returns values supported as a compound value.

		and mask>s), (list of supported <flow label (ipv6)>s) [...]]	
--	--	--	--

The following table shows the +CGTFT parameters.

<Parameter>	Description
<cid>	a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).
<packet filter identifier>	Numeric parameter, value range from 1 to 8.
<source address and subnet mask>	Consists of dot-separated numeric (0-255) parameters on the form 'a1.a2.a3.a4.m1.m2.m3.m4', for Ipv4 and 'a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16', for Ipv6.
<protocol number (ipv4) / next header (ipv6)>	Numeric parameter, value range from 0 to 255.
<destination port range>	Consists of dot-separated numeric (0-65535) parameters on the form 'f.t'.
<source port range>	Consists of dot-separated numeric (0-65535) parameters on the form 'f.t'.
<ipsec security parameter index (spi)>	Hexadecimal parameter, value range from 00000000 to FFFFFFFF
<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>	Dot-separated numeric (0-255) parameters on the form 't.m
<flow label (ipv6)>	Hexadecimal parameter, value range from 00000 to FFFFF. Valid for Ipv6 only.
<evaluation precedence index>	Numeric parameter, value range from 0 to 255

Example:

AT+CGTFT?

+CGTFT: 0, 0, 0, 0.0.0.0[0.0.0.0], 0, 0.0, 0.0, 00000000, 0.0, 00000

AT+CGTFT=?

+CGTFT: IP, (1 - 8), (0 - 255), (0.0.0.0[0.0.0.0] - 255.255.255.255[255.255.255.255]), (0 - 255), (0.0 - 65535.65535), (0.0 - 65535.65535), (00000000 - ffffffff), (0.0 - 255.255), (00000 - 00000)

OK

12.2.19 +MGAUTH, Set type of authentication

This command allows to enter the type of authentication for a user-name (using a password) for the specified PDP context

Command	Syntax	Response/Action
Set	AT+MGAUTH=<cid>,<auth>,<name>,<pwd>	OK or: +CME ERROR: <err>
Read	AT+MGAUTH?	+MGAUTH: <cid>,<auth> ... OK
Test	AT+MGAUTH=?	+MGAUTH: (1-10),(0-2),64,64 OK

The following table shows the +MGAUTH parameters.

Parameter	Description
cid	PDP context identifier, must be defined by AT+CGDCONT firstly. Range from 1-10.
auth	Authentication may be: 0 -- Meaning authentication protocol not used (NONE) 1 -- Meaning personal authentication protocol (PAP) 2 -- Meaning handshake authentication protocol (CHAP)
name	User name as string with length
pwd	Password as string with maximum length

Example:

```
at+mgauth=1,1,"gsm","1234"
```

```
OK
```

```
at+mgauth?
```

```
+MGAUTH: 1,1
```

```
OK
```

12.2.20 +CGEV, Unsolicited Packet Domain Event Reporting

This unsolicited event is sent by the H3xx to the terminal for packet domain event reporting.

The following table shows the format and parameters of +CGEV.

<Parameter>	Description
+CGEV: NW DEACT <PDP_type>, <PDP_addr>, [<cid>]	The network has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT
+CGEV: ME DEACT <PDP_type>, <PDP_addr>, [<cid>]	The mobile termination has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT.
+CGEV: NW DETACH	The network has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately. ETSI 3GPP TS 27.007 version 7.6.0 Release 7 147 ETSI TS 127 007 V7.6.0 (2010-04)
+CGEV: ME DETACH	The mobile termination has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.
+CGEV: NW CLASS <class>	The network has forced a change of MT class. The highest available <class> is reported (see +CGCLASS).
+CGEV: ME CLASS <class>	The mobile termination has forced a change of MT class. The highest available <class> is reported (see +CGCLASS).
+CGEV: ME PDN ACT <cid>[,<reason>[,<cid_other>]]	<p>The mobile termination has activated a context. The context represents a PDN connection in LTE or a Primary PDP context in GSM/UMTS. The <cid> for this context is provided to the TE. This event is sent either in result of explicit context activation request (+CGACT), or in result of implicit context activation request associated to attach request (+CGATT=1). The format of the parameters <cid>, <cid_other> are found in command +CGDCONT.</p> <p><reason> integer type parameter indicates the reason why the context activation request for PDP type IPv4v6 was not granted. This parameter is only included if the requested PDP type associated with <cid> is IPv4v6, and the PDP type assigned by the network for <cid> is either IPv4 or IPv6.</p> <ul style="list-style-type: none"> 0 IPv4 only allowed 1 IPv6 only allowed 2 single address bearers only allowed. 3 single address bearers only allowed and MT initiated context

	activation for a second address type bearer was not successful.
--	---

13 TCP/IP

13.1 +MIPCALL, Create a Wireless Link

This command sets up a PPP (Point to Point Protocol) connection with the GGSN (Gate GPRS Support Node), and returns a valid dynamic IP for the H3xx.

Command	Syntax	Response/Action
Set	+MIPCALL=<Operation>[,<APN>/<cid>	OK +MIPCALL: <local IP address> or: ERROR: <err> +MIPCALL: 0
Read	+MIPCALL?	+MIPCALL: <status>[,<IP>]
Test	+MIPCALL=?	+MIPCALL: (list of supported <operation>s)

Notes:

- The +MIPCALL command does not have a general ABORT mechanism, therefore a command cannot be issued until the previous command ends.
- When a call exists the dynamic IP address will be returned.
For example:
AT+MIPCALL?
+MIPCALL: 1,172.17.237.80
- Activating a context can take up to 150 seconds. Deactivating a context can take up to 40 seconds.
- If use AT+MIPCALL=1, APN to activate PDP. The cid=1 can not be activated.
- If use AT+MIPCALL=1, cid to activate PDP. The APN must be set by AT+CGDCONT command.

The following table shows the +MIPCALL parameters.

<Parameter>	Description
operation	0 disconnect a link 1 establish GPRS link
<status>	0 Disconnect 1 Connected
"APN"	APN of service provider (in quotation marks). Contact your service provider for details.
cid	1-10, set by cgdcont
Local IP-address	IP address given by server after PPP negotiation.

Example:

```
AT+MIPCALL=1,"internet" //Connecting the provider 'Orange' and getting an IP
OK
+MIPCALL: 1,123.145.167.230
AT+MIPCALL=0 //The terminal hangs up the link
OK
```

13.2 +MIPOPEN, Open a Socket (UDP or TCP)

This command causes the H3xx module to initialize a new socket that waits for a connection from a remote machine or opens a common connection with a remote side (according to received parameters).

Each socket allocates two accumulating buffers, 2048 bytes for sending and 8192 bytes for receiving.

The +mipopen command returns a +MIPOPEN unsolicited event to indicate that the operation is success or not, and if any error occurs after a socket was opened, a unsolicited event +MIPSTAT would be send.

Note: This command will return in 60 sec when DNS is error.

Command	Syntax	Response/Action	Remarks
Set	AT+MIPOPEN=<Socket_ID>,<Source_Port>,<Remote_IP>,<Remote_Port>,<Protocol>	OK or: +MIPOPEN: <Socket_ID>,<State>[,<Remote_IP>,<RemotePort>] or: +MIPSTAT: <Socket_ID>,<Status> or: ERROR: <err>	The Set command returns <Remote IP> and <Remote Port> parameters only for sockets opened in Listen mode.
Read	AT+MIPOPEN?	+MIPOPEN: [<Socket_ID>] for each socket that can be opened OK or: +MIPOPEN: 0 OK if there are no free sockets.	The Read command returns the numbers of the sockets that can be opened.

Command	Syntax	Response/Action	Remarks
Test	AT+MIOPEN=?	+MIOPEN: (list of supported<socket_ID>s),(list of supported<source_port>s),(list of supported<"Destination_IP">s), (list of <destination_port>s),(list of supported <protocol>s) OK	

Example:

AT+MIOPEN?

+MIOPEN: 1,2,3,4 //All sockets closed

OK

AT+MIOPEN?

+MIOPEN: 1,3,4 //Socket 2 opened

OK

The following table shows the +MIOPEN parameters.

<Parameter>	Description
Socket_ID	A unique number that identifies a connection. Valid socket numbers - 1,2,3 and 4
Source_Port	Port of source site. Port range: 1-65535 (decimal digits)
Remote_IP	IP: IP of the remote site in the format "AAA.BBB.CCC.DDD". The range of each octet is 0-255. Value can be written in 1, 2, or 3 digits. Host name: The host-name convention should meet the rules as describe in RFC-1035 section: 2.3 Conventions. Syntax is not validated, except the maximum length (255 characters).
Remote_Port	Port of remote site. Port range: 1-65535 (decimal digits) for outgoing connection. Port 0 for incoming connection.
Protocol	Type of protocol stack. 0 TCP 1 UDP
State	0 Inactive

	1 Active
--	----------

Note: It's recommended not to use port numbers below 1024; those numbers are reserved for OS use.

Example:

```
AT+MIOPEN=1,1200,"123.245.213.012",1234,0 //Opening socket 1, using TCP protocol,
      from port 1200, targeting 123.245.213.012 port 1234
AT+MIOPEN=2,1300,"123.133.074.192",1242,1 //Opening socket 2, using UDP
      protocol, from port 1300, targeting 123.133.074.192 port 1242
AT+MIOPEN=1,1222,"123.245.213.012",1234,0 //Opening socket 1, using TCP protocol,
      from port 1222, targeting 123.245.213.012 port 1234
AT+MIOPEN? //Terminal checking the free sockets
+MIOPEN: 3,4
OK
AT+MIOPEN=1,0,"WWW.GOOGLE.COM",80,0 //TCP
OK
+MIOPEN: 1,1
AT+MIOPEN=2,0,"www.google.com",80,1 //UDP
OK
+MIOPEN: 2,1
// Listen socket over TCP:
AT+MIOPEN=1,1100,"0.0.0.0",0,0 // Listens to any port at any IP.
OK
+MIOPEN: 1,1,122.221.32.64,1200 // Remote side connected to the listen socket.
AT+MIOPEN=3,3212,"122.1.222.134",0,0 // Listen to any port at specific IP.
OK
+MIOPEN: 3,1,122.1.222.134,1222 // Remote side connected to the listen socket.
OK
```

13.3 +MIPCLOSE, Close a Socket

This command causes the H3xx to free the socket accumulating buffer and to close the socket.

Note: All data stored in the accumulating buffer will be lost.

Command	Syntax	Response/Action
Set	+MIPCLOSE=<Socket_ID>[,<Mode>]]	OK +MIPCLOSE: <Socket_ID>[,<number_of_acknowledged_bytes>],<close_type> or: ERROR
Read	+MIPCLOSE?	+MIPCLOSE: [<socket_ID>] OK (for all ACTIVE sockets) or: +MIPCLOSE: 0 OK (if no active sockets)
Test	+MIPCLOSE=?	+MIPCLOSE: (1-4),(0-2) OK

The following table shows the +MIPCLOSE parameters.

<Parameter>	Description
<Socket_ID>	Unique number that identifies a connection. Valid socket numbers - 1, 2, 3 and 4
<Mode>	This value only used for TCP connection. 0 – Wait FIN ack from Server (default) 1 -- Do not wait FIN reponse from server 2 – Wait 2MSL
<number_of_acknowledged_bytes >	Total number of bytes that were acknowledged.
<close_type>	Connection close type: 0 - Connection was closed correctly. 1 - The remote side didn't reply, so connection closed by close timeout. 2 - Other (The remote side replied with RST, retransmission timeout occurred, etc.).

Example:

```
AT+MIPCLOSE=?
+MIPCLOSE: (1-4),(0-2)
OK
AT+MIPCLOSE?
+MIPCLOSE: 0 //No opened sockets
OK
AT+MIPCLOSE=1
OK
+MIPCLOSE: 1,0 // Socket 1 closed. The remote side replies with ACK. Need wait few
seconds.
AT+MIPCLOSE=1,1
+MIPCLOSE: 1,2 // Socket 1 closed immediately. The <close type> indicate 2.
OK
AT+MIPCLOSE=3 //The terminal closes the opened socket
OK
+MIPCLOSE: 3,1024,2 //Socket 3 closed. Ack indication enabled - 1024 bytes were acked.
AT+MIPCLOSE? //Sockets 1 and 2 are opened
+MIPCLOSE: 1,2
OK
```

13.4 +MIPSETS, Set Size and Timeout for Automatic Push

This command causes the H3xx to set a watermark in the accumulating buffer and set timeout. When the watermark is reached, data is pushed from the accumulating buffer into the protocol stack.

Timeout is used to define interval of time between MIPSEND command and time when data will be automatically pushed from the accumulating buffer into the protocol stack.

Data chunks between the terminal and the H3xx are limited to be smaller than 1024 bytes (2048 characters in coded form). In order to reduce the overhead of sending small amounts of data over the air, the H3xx uses an accumulating buffer. The terminal can specify a watermark within the accumulating buffer size limits to indicate how much data should be accumulated.

The data in accumulating buffer will be push into the protocol stack either the buffer is full or the data length reach the watermark.

Arriving data to accumulating buffer triggers a start of time (defined in timeout) countdown. When counter reaches zero, data is moved into the protocol stack. If new data arrived before time is reached zero, it is re-initialized. If data in accumulating buffer reached watermark it is pushed to the accumulating buffer as usual, but if after automatic push there is some remaining data, time countdown is started.

Note: If there is data in the accumulating buffer, the +MIPSETS command will be rejected.

Command	Syntax	Response/Action	Remarks
Set	+MIPSETS=<Socket_ID>,<Size>[,<Timeout>]	OK or: ERROR +MIPSETS: <err>	Timeout is defined in milliseconds.
Read	+MIPSETS?	+MIPSETS: [<Socket_ID>,<Current Size Settings>,< Timeout>] OK For all ACTIVE sockets.	
Test	+MIPSETS=?	+MIPSETS: (1-4),(list of supported <size>s),),(list of supported <Timeout>s) OK	

The following table shows the +MIPSETS parameters.

<Parameter>	Description
Size	Size of the buffer 1 <= size <= 2048 The default value is 2048.
Timeout	0 - 1000 0 means no timeout is used (default).
Extended err	3 Operation not allowed

Example:

```

AT+MIPSETS=1,340 //Asks the H3xx to accumulate 340 bytes on socket 1 prior to sending
                (socket should be activated by the +mipopen command)
+MIPSETS: 0
OK
AT+MIPSETS=2,400 //Asks the H3xx to accumulate 400 bytes on socket 2 prior to sending
+MIPSETS: 0
OK
AT+MIPSETS=?
+MIPSETS: (1-4),(1-2048),(0-1000)
OK
AT+MIPSETS?
+MIPSETS: 1,200,0//Information provided only for active sockets
+MIPSETS: 2,400,0//Information provided only for active sockets

```

OK

AT+MIPSETS=1,200,50 //Asks the H3xx to send all accumulated data after 50 msec of receiving data in mipsend command.

+MIPSETS: 0

OK

AT+MIPSETS?

+MIPSETS: 1,200,50

+MIPSETS: 2,400,0

OK

13.5 +MIPDSETS, Set Size and Timeout for Output Data

This command causes the H3xx to set a max length and time span when send received data to TE. The max length means the data which H3xx send to TE must less than this length. Time span is used to define interval of time between two package when send data to TE.

Command	Syntax	Response/Action	Remarks
Set	+MIPDSETS=<Socket_ID>,<Size>[,<Time span>]	OK or: ERROR +MIPDSETS: <err>	Time span is defined in milliseconds.
Read	+MIPDSETS?	+MIPDSETS: [<Socket_ID>,<Current Size Settings>,< Time span>] OK For all ACTIVE sockets.	
Test	+MIPDSETS=?	+MIPDSETS: (1-4),(list of supported <size>s),),(list of supported <Timespan>s) OK	

The following table shows the +MIPDSETS parameters.

<Parameter>	Description
Size	Size of the buffer 128 <= size <= 2048 The default value is 2048.
Time span	0 - 1000 The default value is 0.

Example:

```

AT+MIPDSETS=1,512
OK
AT+MIPDSETS=?
+MIPDSETS: (1-4),(128-2048),(0-1000)
OK

```

13.6 +MIPSEND, Send Data

13.6.1 Send Data at normal mode

This command causes the H3xx to store the data that the terminal provides in the accumulating buffer, and then send this data using protocol stack when the amount of data reaches the predefined amount (see “+MIPSETS, Set Size and Timeout for Automatic Push” on. Before sending data, a valid connection must be created using the +MIPCALL and +MIPOPEN commands.

Recommends that the terminal sets the watermark in the accumulating buffer prior to this command, using the +MIPSETS command. By default, the watermark is set to 2048 bytes of data.

Command	Syntax	Response/Action	Remarks
Set	+MIPSEND=<Socket_ID>,<Data>	ERROR +MIPSEND: <Socket_ID>,<status>,<FreeSize>	Data in the +MIPSEND command is limited to 1024 characters (2048 in coded form).
Read	+MIPSEND?	+MIPSEND <Socket_ID>,<FreeSize>[<Socket_ID>,<FreeSize>]<CR><LF> OK For all ACTIVE sockets.	

The following table shows the +MIPSEND parameters.

<Parameter>	Description
<socket_ID>	1,2,3,4 Number of valid socket
<status>	0 – Send data to socket buffer OK 1 – MIPXOFF received before, send failed.
<FreeSize>	Free space in current buffer. Free size is calculated from the 2048. 0< Free Size < 2048
<Data>	User data string is sent encoded with 0-F hexadecimal digits (String ends with a <CR>)

Example:

```

(Socket 4 was not opened using +MIPOPEN AT command)
AT+MIPSEND=4,"4444"
ERROR
AT+MIPSEND=1,"4444"
+MIPSEND: 1,2046           //2048- 2 chars 'DD' = 2046
OK
AT+MIPSEND=?
ERROR
AT+MIPSEND?
+MIPSEND: 1,2048
+MIPSEND: 2,2048         //Sockets 1 and 2 were opened using + MIPOPEN AT command
OK

```

13.6.2 Send Data at HEX Mode

Base on the basic mode, H3xx achieve the TCP/IP stack by AT command. In addition to the basic Mode, the H3xx supports TCP/IP Stack Hex Mode. The data will be sent in HEX when we use +MIPSEND command.

There are two methods: send data at unfixed length and send data at fixed length.

Send data at unfixed length, data end with Ctrl-Z. Ctrl-Z character (0x1A) can not be send at this method.

Command	Syntax	Response/Action	Remarks
Set	+MIPSEND=<Socket_ID>	+MIPPUSH: <Socket_ID>,<Status>,<pushed data length> +MIPSEND: <Socket_ID>,<Status>,<FreeSize> or: ERROR	After command received, H3xx will respond "><CR><LF>". Send any data in HEX. The data buffer range is 0<buffer<=1400 bytes. <CTRL+Z> ends the prompt HEX mode and returns to regular AT command mode.

Notes: If there is any data in the buffer (sent by previous +mipsend), H3xx will reply ERROR to TE.

Example:

(Socket 2 already open)

AT+MIPSEND=2

>This is the data in HEX<CTRL+Z> //<CTRL+Z> ends the prompt HEX mode and returns to regular AT command mode

OK

+MIPPUSH: 2,0

+MIPSEND: 2,0,2048

OK

Send data at unfixed length, data end with timeout. Ctrl-Z character (0x1A) can not be send at this method.

Command	Syntax	Response/Action	Remarks
Set	+MIPSEN D=<Socket _ID>	+MIPPUSH: <Socket_ID>,<Status>,<pushed data length> +MIPSEND: <Socket_ID>,<Status>,<FreeSiz e> or: ERROR	After command received, H3xx will respond "><CR><LF>". Send any data without incode. The data buffer range is 0<buffer<=2048 bytes. After timeout, the data will be push automatic and returns to regular AT command mode. The default timeout is 12s.

Notes: If there is any data in the buffer (sent by previous +mipsend), H3xx will reply ERROR to TE.

Example:

Opening socket 2 already.

AT+MIPSEND=2

>This is the data in HEX<timeout>

OK

+MIPPUSH: 2,0

+MIPSEND: 2,0,2048

OK

Send data at fixed length. All characters can be send at this method.

Command	Syntax	Response/Action	Remarks
Set	+MIPSEN D=<Socket _ID>,<Dat a_len>	+MIPPUSH: <Socket_ID>,<Status>,<p ushed data length> +MIPSEND: <Socket_ID>,<Status>,<F reeSize> or: ERROR	After command received, H3xx will respond "><CR><LF>". Send any data in HEX. The data buffer range is 0<data_len<=2048 bytes. When H3xx receive the corresponding length data, the data will be push automatic and returns to regular AT command mode. Notes: The redundant data will be lost.

Notes: If there is any data in the buffer (sent by previous +mipsend), H3xx will reply ERROR to TE.

Example:

Opening socket 2 already.

```
AT+MIPSEND=2,10
>0123456789abc           // "abc" lost
OK
+MIPPUSH: 2,0
+MIPSEND: 2,0,2048
OK
```

13.7 +GTSET, Set receive data mode

Command	Syntax	Response/Action
Set	+GTSET=<ParamName>,<value>,<value1>	OK or: ERROR

The following table shows the +GTSET parameters related HEX mode.

<Parameter>	Description
< ParamName>	"SENDTIME": Set the auto push timeout. See description of <value> below
<value>	1-30 seconds The default value is 12.
< ParamName>	"IPRFMT" : The format of received data. See description of <value> below
<value>	0: Received data with "+MIPRTCP:" and the data is incode. 1: Received data only and the data is without incode. In received character string, 2: Received data format is "<CR><LF>+MIPRTCP: sid,len,data", and the data is without incode. 3: Received data format is "<CR><LF>+MIPRTCP: sid,len<CR>data", and the data is without incode. The default value is 0.
<value1>	0: ending with <CR><LF> 1: ending without <CR><LF> The default value is 0

Example:

Opening socket 2 already.

```
AT+GTSET="IPRFMT",0,0
```

```
OK
```

```
AT+MIPSEND=2,10
```

```
>0123456789abc
```

```
OK
```

```
+MIPPUSH: 2,0
```

```
+MIPSEND: 2,0,2048
```

```
OK
```

```
<CR><LF>+MIPRTCP: 2,0,30313233343536373839<CR><LF> //Same as basic mode.
```

```
AT+GTSET="IPRFMT",1,0
```

```
OK
```

```
AT+MIPSEND=2,10
```

```
>0123456789abc
```

```
OK
```

```
+MIPPUSH: 2,0
```

```
+MIPSEND: 2,0,2048
```

```
OK
```

```
0123456789<CR><LF> //Only data without any information.
```

```
AT+GTSET="IPRFMT",2,0
```

```
OK
```

```
AT+MIPSEND=2,10
```

```
>0123456789abc
```

```
OK
```

```
+MIPPUSH: 2,0
```

```
+MIPSEND: 2,0,2048
```

```
OK
```

```
<CR><LF>+MIPRTCP: 2,10,0123456789<CR><LF>
```

13.8 +MIPPUSH, Push Data into Protocol Stack

This command causes the H3xx to push the data accumulated in its accumulating buffers into the protocol stack. It is assumed that before using this command, some data should exist due to previous +MIPSEND commands. The “destination IP” and “destination port” can be used only for

UDP listen mode.

Command	Syntax	Response/Action	Remarks
Set	+MIPPU SH=<Socket_ID>[,<"Destination_IP" >,<Destination_Port>]	+MIPPUSH: <Socket_ID>,<Status>[,<accumulated_sent_length>] OK or: ERROR	Optional parameters are used only for UDP connections. If the Destination IP and Destination Port are not provided by the user, a datagram is sent to the last target (or the default target provided by the +MIPOPEN command). <accumulated_sent_length> - this parameter counts how many bytes were sent to the remote side by the H3xx TCP/IP stack. When user open socket, <accumulated_sent_length> initialized to zero. Size of <accumulated_sent_length> is four octets unsigned digit (0-4294967295). <Status>: 0 - Success 1 - socket is flowed off 2 - there is no data in socket to send
Read	+MIPPU SH?	MIPPUSH: [<socket_ID>] OK	
Test	+MIPPU SH=?	MIPPUSH=<socket_ID>,<IP>,<Port> OK	

The following table shows the +MIPPUSH parameters.

<Parameter>	Description
Socket_ID	1,2,3,4Number of valid socket
Destination_IP	IP of destination site in the format AAA.BBB.CCC.DDD. The value can be written in 1, 2 or 3 digits.
Destination_Port	0-65535Port of destination site. Written in decimal digits.

Example:

AT+MIPPUSH=1 //Terminal asks the H3xx to flush the buffer in socket 1 (was opened using the +MIPOPEN command)

+MIPPUSH: 1,0,10 //10 bytes has been pushed into protocol stack

13.9 +MIPFLUSH, Flush Data from Buffers

This command causes the H3xx to flush (delete) data accumulated in its accumulating buffers.

Command	Syntax	Response/Action
Set	+MIPFLUSH = <Socket_ID>	+MIPFLUSH: <Socket_ID> OK or: ERROR
Read	+MIPFLUSH?	+MIPFLUSH: [<socket_ID>] OK
Test	+MIPFLUSH=?	+MIPFLUSH=(<Socket_ID>) OK

The following table shows the +MIPFLUSH parameters.

<Parameter>	Description
Socket_ID	1,2,3,4 - Number of valid sockets

Example:

```

AT+MIPFLUSH=2      //Socket number 2 was previously opened using the +MIOPEN
                    command
+MIPFLUSH: 2
OK
AT+MIPFLUSH=5
ERROR
AT+MIPFLUSH?
+MIPFLUSH: 1 2
OK
    
```

13.10 +MIPRUDP, Receive Data from UDP Protocol Stack

This unsolicited event is sent by the H3xx to the terminal when data is received from the UDP protocol stack.

Set Command Event

```
+MIPRUDP: <Source_IP>,<Source_Port><socket_ID>,<Left or SDL>,<Data>
```

The following table shows the +MIPRUDP parameters.

<Parameter>	Description
Source_IP	IP of the source
Source_Port	Port of the source
Socket_ID	1,2,3,4 - Number of valid sockets.
Left	Size of received Data still left in protocol stack.
SDL	Subsequent data length
Data	Data string received with 0-F hexadecimal digits. String ends with a <CR>.

Note:

- This unsolicited event will change the destination IP and destination port , it means that when a +MIPRUDP unsolicited event coming, if you do not specify IP and port using +MIPRUDP, data left in the buffer will be sent to this new destination by default.
- If "IPRFRMT" parameter has been set by AT+GTSET, the received data will be response at different format.

13.11 +MIPRTCP, Receive Data from TCP Protocol Stack

This unsolicited event is sent by the H3xx to the terminal when data is received from the TCP protocol stack.

Set Command Event

+MIPRTCP: <socket_ID>,<Left or SDL >,<Data>

The following table shows the +MIPRTCP parameters.

<Parameter>	Description
Socket_ID	1,2,3,4 - Number of valid sockets.
Left	Size of received Data still left in protocol stack.
SDL	Subsequent data length
Data	Data string received with 0-F hexadecimal digits. String ends with a <CR>.

Note:

- This unsolicited event will change the destination IP and destination port , it means that when a +MIPRUDP unsolicited event coming, if you do not specify IP and port using +MIPRUDP, data left in the buffer will be sent to this new destination by default.
- If "IPRFRMT" parameter has been set by AT+GTSET, the received data will be response at different format.

Example:

+MIPRTCP: 3,0,7171

13.12 +MIPSTAT, Status Report

This unsolicited event is sent to the terminal indicating a change in status. Currently there are two possible sources of failure, a broken logical connection or a broken physical connection.

Syntax

+MIPSTAT: <socket_ID>,<n>[,<number_of_acknowledged_bytes >]

The following table shows the +MIP STAT parameters.

<Parameter>	Description
<Socket_ID>	A unique number that identifies a connection. Valid socket numbers - 1, 2, 3 and 4
<n>	0 - ACK indication 1 - Broken protocol stack 2 - Connection closed automatically due to non – fatal alert
<number_of_acknowledged_bytes >	Total number of bytes that were acknowledged

Example:

+MIPSTAT: 1,2

13.13 +MIPCONF - Configure Internal TCP/IP stack

This command allows configuring TCP stack parameters, such as retransmissions number, upper and bottom limits of retransmission timeout, close delay. It can be used to configure TCP socket parameters before socket activation. Configuration values will be stored in H3xx module until power cycle.

This command must be use after MIPCALL is executed.

Command	Syntax	Response/Action	Remarks
Set	AT+MIPCONF=<socket_ID>[[,<retr_num>],[<min_TO>],[<max_TO>],[<max_close_dela y>] [<is_nack_ind_req>]]	OK or: +CME ERROR: <err>	The Set command updates TCP stack configuration parameters.
Command	Syntax	Response/Action	Remarks
Read	+MIPCONF?	+MIPCONF: 1,<retr_num>,<min_TO>,<max_TO>,<max_close_del ay>,<is_nack_ind_req><CR	The read command returns current settings of TCP stack parameters.

		<pre>><LF> +MIPCONF: 2,<retr_num>,<min_TO>,< max_TO>,<max_close_del ay>,<is_nack_ind_req><CR ><LF> +MIPCONF: 3,<retr_num>,<min_TO>,< max_TO>,<max_close_del ay>,<is_nack_ind_req><CR ><LF> +MIPCONF: 4,<retr_num>,<min_TO>,< max_TO>,<max_close_del ay>,<is_nack_ind_req><CR ><LF> OK</pre>	
Test	+MIPCONF=?	<pre>+MIPCONF: (1-4),(1-12),(1-10),(10-600), (1-75),(0-2) OK</pre>	<p>The Test command returns the possible parameters values.</p> <p>Time values can be inserted with resolution of 100 milliseconds.</p>

Parameter	Description
<socket_ID>	Number of configured TCP socket (1 to 4)
<retr_num>	Number of retransmissions (1 to 12 default : 12)
<min_TO>	Bottom limit to retransmit timeout (100 ms to 1 sec. default : 500 ms)
<max_TO>	Upper limit to retransmit timeout (1 sec. to 60 sec.default : 60 sec)
<max_close_delay>	Closing delay required by RFC 793 (100 ms to 7500 ms default : 7500 ms)
<is_nack_ind_req>	<p>NACK/ACK TCP indication feature.</p> <p>Activating this parameter enables H3xx to report the user, in case of losing a TCP connection, what data was received by the remote TCP layer.</p> <p>0 - feature inactive.</p> <p>1 - NACK indication active.</p> <p>2 - ACK indication active.</p>

Example:

```
AT+MIPCONF=2,5,10,600,75,2
OK
AT+MIOPEN=2,0,"66.249.87.99",80,0
OK
+MIOPEN: 2,1
AT+MIPSETS=2,10
+MIPSETS: 0
OK
AT+MIPSEND=2,"474554202F20485454502F312E300D0A486F73743A207777772E676F6F67
6C652E636
F6D0D0A0D0A"
+MIPPUSH: 2,0,40
+MIPSEND: 2,0,1372
OK
+MIPXOFF: 2
AT+MIPSEND=2,"474554202F20485454502F312E300D0A486F73743A207777772E676F6F67
6C652E636
F6D0D0A0D0A"
+MIPSEND: 2,1,1372
OK
+MIPSTAT: 2,0,30
+MIPXON: 2
+MIPSTAT: 2,0,40
+MIPRTCP:
2,530,485454502F312E312033303220466F756E640D0A4C6F636174696F6E3A206874
74703A2F2F7777772E676F6F676C652E636F2E696C2F63786665723F633D50524546253344
3A544D25334
43131313935
+MIPRTCP:
2,450,31343833323A5325334467384A637631426A5458472D30636A5926707265763D
2F0D0A5365742D436F6F6B69653A20505245463D49443D3639303762623837353138626632
33373A43523D
313A544D3D
+MIPRTCP:
2,370,313131393531343833323A4C4D3D313131393531343833323A533D644F656476
7A6C34765F7059475A384A3B20657870697265733D53756E2C2031372D4A616E2D3230333
82031393A31
343A30372047
```

+MIPRTCP:

2,290,4D543B20706174683D2F3B20646F6D61696E3D2E676F6F676C652E636F6D0D0A436
F6E74656E74

2D547970653A20746578742F68746D6C0D0A5365727665723A204757532F322E310D0A436
F6E74656E

+MIPRTCP:

2,210,742D4C656E6774683A203231370D0A446174653A205468752C203233204A756E20323
030352030383

+MIPRTCP:

2,130,484541443E3C5449544C453E333032204D6F7665643C2F5449544C453E3C2F484541
443E3C424F44

593E0A3C48313E333032204D6F7665643C2F48313E0A54686520646F63756D656E7420686
173206D

+MIPRTCP:

2,50,6F7665640A3C4120485245463D22687474703A2F2F777772E676F6F676C652E636F2E
696C2F63786

665723F633D505245462533443A544D253344313131393531343833323A5325334467384A63
7631

+MIPRTCP:

2,0,426A5458472D30636A5926616D703B707265763D2F223E686572653C2F413E2E0D0A3C
2F424F44593

E3C2F48544D4C3E0D0A

+MIPSTAT: 2,1,40

13.14 +MPING, Start Ping Execution (ICMP Protocol)

This command allows verifying IP connectivity to another remote machine (computer) by sending one or more Internet Control Message Protocol (ICMP) Echo Request messages.

The receipt of corresponding Echo Reply messages are displayed, along with round trip times.

Valid IP address must be obtained using AT+MIPCALL command prior to starting ping execution. Only one ping request execution will be allowed at any given moment.

Command	Syntax	Response/Action	Remarks
Set	+MPING=<mode>[,<"Destination_IP/hostname">[,<count>[,<size>[,<TTL>[,<TOS>[,<TimeOut>]]]]	OK or: +CME ERROR: <err>	The set command shall send a <count> Internet Control Message Protocol (ICMP) Echo Request Messages to a target node defined by <"Destination IP/hostname"> parameter. If <mode> is equal 0, no parameters trailing <mode> parameter are allowed, otherwise ERROR message will be reported to DTE. If <mode> is equal 0, MS will abort sending Echo Request messages if ping request is in process, otherwise ERROR message will be reported to DTE.
Unsolicited Response		+MPING: <"Destination_IP">[,<type>[,<code>[,<RTT>]]]	The receipt of corresponding ICMP Echo Reply messages will be displayed within unsolicited responses, along with round trip times.
Read	+MPING?	+MPING: <count>[,<size>[,<TTL>[,<TOS>[,<TimeOut>]]] OK	The read command displays currently selected parameters values for +MPING set command. If ping sending procedure is currently in process then user selected parameters for AT+MPING command will be displayed, otherwise default parameter values will be displayed
Test	+MPING=?	+MPING: <count>[,<size>[,<TTL>[,<TOS>[,<TimeOut>]]] OK	The test command displays all supported parameters values for +MPING set command.

The following table shows the +MPING command parameters.

<Parameter>	Description
<mode>	0 - Abort current ping request execution. 1 - Launch new ping request. There is no default value - appropriate ERROR will be displayed if parameter is not supplied.
<"Destination_IP/hostname">	Specifies the target machine (computer), which is identified either by IP address 4 octets long in dotted decimal notation or by host name of maximum 255 (not including double quotes) characters long in dotted notation. Each octet of IP address has valid value range of 0 to 255. Host names are not case sensitive and can contain alphabetic or numeric

	letters or the hyphen. There is no default value - appropriate ERROR will be displayed if parameter is not supplied.
<Parameter>	Description
<count>	Specifies a number of Internet Control Message Protocol (ICMP) Echo Request messages to send. Valid value range is from 1 to 255. The default value is 4.
<size>	Specifies the length, in bytes, of the Data field in the Echo Request messages sent. The minimum size is 0. The maximum size is 1372. The default value is 32.
<TTL>	Time To Live (TTL). Specifies number of hops (hop is one step, from one router to the next, on the path of a datagram on an IP network), which the Echo Request message may be routed over. The value is set by using TTL field in IP header. Valid value range is from 1 to 255. The default value is 64.
<TOS>	The Type Of Service (TO S) is for internet service quality selection. The type of service is specified along the abstract parameters precedence, delay, throughput, and reliability. These abstract parameters are to be mapped into the actual service parameters of the particular networks the datagram traverses. Minimum and maximum values for TOS are 0 and 255 respectively. Refer to RFC 791 and RFC 2474 which obsoletes RFC 791 for TOS defined values. The default value is 0.
<TimeOut>	Specifies the amount of time, in milliseconds, to wait for the Echo Reply message that corresponds to a sent Echo Request message, measured after Echo Request message was sent. If the Echo Reply message is not received within the time-out, +MPINGSTAT

The following table shows the +MPING unsolicited response parameters.

<Parameter>	Description
<"Destination_IP">	Specifies the message sender machine (computer), which is identified by IP address 4 octets long in dotted decimal notation. Each octet of IP address has valid value range of 0 to 255. The message sender machine (computer) may be either the target of Echo Request message (if a response was an Echo Reply message) or a gateway (router) in a path of Echo Request message passage for any other ICMP response message.
<type>	The first octet of the ICMP header is a ICMP type field, which specifies the format of the ICMP message. Refer to IETF RFC 792 for <type> valid values.
<code>	The reasons for the non-delivery of a packet are described by code field value of ICMP header. Every <type> has its own defined <code> values. Refer to IETF RFC 792 for <code> valid values.
<RTT>	Specifies Round Trip Time (RTT) measured in milliseconds. This parameter will be reported in command response only if Echo Reply message was

	received.
--	-----------

Note: Ping request is being executed from the moment the valid AT+MPING set command was received by H3xx until +MPINGSTAT unsolicited report with <status> equal either to 0 or 2 is sent to DTE or ping request execution was aborted with AT+MPING=0 command. Refer to description of +MPINGSTAT unsolicited response for details.

In some cases, the reply message for an Echo Request message might be not an Echo Reply messages but rather some other ICMP message, which is reporting an error in datagram processing. For purpose of reporting an exact type of response for sent Echo Request message, unsolicited response includes <type> and <code> fields. The first octet of the data portion of the IP datagram is an ICMP <type> field. The value of this field determines the format of the remaining data. The <type> and <code> fields jointly define ICMP message type.

For example, a case when an Echo Request message encapsulated in IP datagram to be forwarded by a gateway has exceeded TTL (equal zero). In this case the gateway must discard the datagram and may return an ICMP Time Exceeded message.

Example:

```

AT+MIPCALL=1,"internet"
OK
+MIPCALL: 10.170.4.111
AT+MPING=1,"10.170.4.112" // Ping remote computer using default parameters
OK
+MPING: "10.170.4.112",0,0,400 //Echo Reply message received, RTT is 400 ms.
+MPING: "10.170.4.112",0,0,420
+MPING: "10.170.4.112",0,0,440
+MPING: "10.170.4.112",0,0,410
//Ping request execution is completed. Four Echo Request messages were sent, and four
//Echo Reply messages were received. Average RTT is 417 milliseconds.
+MPINGSTAT: 0,"10.170.4.112",4,4,417
    
```

13.15 +MPINGSTAT, Status Update for +MPING Execution

This is the unsolicited response that the H3xx sends to the terminal to inform of ping execution status update and provides summary statistics of ping request when ping request execution is completed.

Command	Syntax	Response/Action	Remarks
Unsolicited Response		+MPINGSTAT: <status>[,<"Destinatio n_IP">,<SentMessag	The unsolicited response that the H3xx sends to the terminal to inform it with ping execution status update. This response also provides a

		es>,<ReceivedMessages>[,<AverageRTT>]]	statistics summary of ping request when ping request execution is completed.
--	--	--	--

The following table shows the +MPINGSTAT unsolicited response parameters.

<Parameter>	Description
<status>	<p>Specifies a status of ping request execution.</p> <p>Defined values:</p> <p>0 - The unsolicited response with this <status> will be sent to DTE upon completion of ping request. If ping request was aborted or socket connection was terminated for any reason, this unsolicited response will not be reported to DTE.</p> <p>1 - The unsolicited response with this <status> will be sent to DTE if no ICMP reply message was received within timeout.</p> <p>2 - The unsolicited response with this <status> will be sent to DTE if socket connection was terminated for any reason. This status essentially means that ping request execution was aborted.</p> <p>3 - Flow Control OFF. The unsolicited response with this <status> will be sent to DTE if phone doesn't have enough memory to process sending an Echo Request message.</p> <p>4 - Flow Control ON. The unsolicited response with this <status> will be sent to DTE if phone has enough memory to send an Echo Request message after flow control was OFF.</p>
<"Destination_IP">	Specifies the target machine (computer) for ping request, which is identified by IP address 4 octets long in dotted decimal notation. Each octet of IP address has valid value range of 0 to 255.
<SentMessages>	Specifies a total number of sent Echo Request messages.
<ReceivedMessages>	Specifies a total number of received Echo Reply messages corresponding to Echo Request messages.
<AvarageRTT>	Specifies average Round Trip Time (RTT) for this ping request. This value will be reported if and only if <ReceivedMessages> value is greater than zero. Calculation of this value comprises of accumulating all RTT values and dividing total accumulated RTT by <ReceivedMessages> value. Only an integral part of a result will be reported and any digits of a fraction part will be truncated.

Example:

AT+MIPCALL=1,"internet"

OK

```

+MIPCALL: 10.170.4.111
//Ping host www.sohu.com 3 times with <TTL>=255. All other parameters are default.
AT+MPING=1,"www.sohu.com",3,,255 OK
//ICMP Echo Reply message received, RTT is 522 ms.
+MPING: "121.14.0.17",0,0,522
+MPINGSTAT: 1 // No corresponding reply within timeout.
+MPINGSTAT: 3 // Flow Control OFF.
+MPINGSTAT: 4 // Flow Control ON, a new Echo Request message is sent immediately.
+MPING: "121.14.0.17",0,0,638
//Ping request execution is completed. Statistics displayed to terminal. Three Echo Request
messages were sent, and two Echo Reply messages were received. Average RTT is 580
milliseconds.
+MPINGSTAT: 0," 121.14.0.17",3,2,580
//Ping host www.sohu.com 1 time with <TTL>=1 and <size>=1372.
AT+MPING=1,"www.sohu.com",1,1372,1
OK
//ICMP Time Exceeded message received. TTL expired in transit.
+MPING: "192.168.252.65",11,0
//Ping request execution is completed.
+MPINGSTAT: 0," 121.14.0.17",1,0

```

13.16 +MSDNS, Set DNS IP Address

This command set/read DNS (Domain Name Server) IP address (primary/secondary) for each socket. If the user doesn't specify DNS servers by AT+MSDNS, H3xx will use default DNS from NW. The defined value(s) will be saved during disconnect PDP context (can be used in next PDP context), but will reset after power cycle.

Command	Syntax	Response/Action
Set	AT+MSDNS=[<Socket_ID>[,<Primary_DNS_server_IP> [,<Secondary_DNS_server_IP>]]]	OK or: +CME ERROR: <err>
Read	AT+MSDNS?	+MSDNS: 1,<Primary_DNS_server_IP>,<Secondary_DNS_server_IP><CR><LF> +MSDNS: 2,<Primary_DNS_server_IP>,<Secondary_DNS_server_IP><CR><LF> +MSDNS: 3,<Primary_DNS_server_IP>,<Secondary_DNS_server_IP><CR><LF>

		<pre> rver_IP><CR><LF> +MSDNS: 4,<Primary_DNS_server_IP>,<Secondary_DNS_server_IP><CR><LF> +MSDNS: 5,<Primary_DNS_server_IP>,<Secondary_DNS_server_IP><CR><LF> <CR><LF> OK </pre>
Test	AT+MSDNS=?	<pre> +MSDNS: (List of supported <Socket_id>s),(<IP>),(<IP>) OK </pre>

The following table shows the +MSDNS parameters.

<Parameter>	Description
<Socket_ID>	<p>A unique number that identifies a connection (provided by the terminal application).</p> <p>0 - Invalid socket number</p> <p>1,2,3,4 - Valid socket number</p> <p>5 - Valid socket number dedicated to +MPING.</p>
<Primary_DNS_server_IP>,<Secondary_DNS_server_IP>	<p>IP of the destination site in the format "AAA.BBB.CCC.DDD". The range of each octant is 0-255. The value can be written in 1, 2, or 3 digits.</p>

Example:

```

AT+MSDNS=?
+MSDNS: (1-5),(<IP>),(<IP>)
OK
AT+MSDNS?           // read when MIPCALL is disconnected
+MSDNS: 1,"0.0.0.0","0.0.0.0"
+MSDNS: 2,"0.0.0.0","0.0.0.0"
+MSDNS: 3,"0.0.0.0","0.0.0.0"
+MSDNS: 4,"0.0.0.0","0.0.0.0"
+MSDNS: 5,"0.0.0.0","0.0.0.0"
OK
AT+MSDNS=2,"212.150.49.10","206.49.94.234" //set socket 2 prim & sec DNS
OK
AT+MSDNS=4,"62.120.55.10"                //set socket 4 prim DNS only

```

```

OK
AT+MSDNS=5,"212.150.49.10","206.49.94.234" //set socket 5 prim & sec DNS
OK
AT+MSDNS? // read when MIPCALL is disconnected
+MSDNS: 1,"0.0.0.0","0.0.0.0"
+MSDNS: 2,"212.150.49.10","206.49.94.234"
+MSDNS: 3,"0.0.0.0","0.0.0.0"
+MSDNS: 4,"62.120.55.10","0.0.0.0"
+MSDNS: 5,"212.150.49.10","206.49.94.234"
OK

```

13.17 +MIPODM, Open a Socket (UDP or TCP) in Online Data Mode

This command causes the H3xx to initialize a new socket that waits for a connection from a remote machine or opens a common or TCP connection with a remote side (according to received parameters) and switch it to Online (raw data transfer) Data Mode and open a connection with a remote side.

Notes: Online Data Mode allows the user to transfer raw data from terminal to Network and vice versa over a GPRS channel. Currently, only RS232 connection to terminal with hardware flow control is supported.

Each socket allocates two accumulating buffers, 8192 bytes for sending and 16384 bytes for receiving. When the user sends amount of data less than buffer size, the data is being sent to Network after a spooling timeout (50 mS), otherwise the data is being sent to Network immediately.

Only one socket is allowed at the same time in Online Data Mode.

The +MIPODM command returns a +MIPSTAT <Socket_ID><Error> unsolicited event if it fails. For example, if it was rejected by the remote side.

Command	Syntax	Response/Action	Remarks
Set	AT+MIPODM= <Socket_ID>, <Source Port>, <Remote IP>, <Remote Port>, <Protocol>	OK or: +MIPODM: <Socket_ID>, <State>[, <Remote IP>, <Remote Port>] or: +MIPSTAT: <Socket_ID>,<Status> or: ERROR: <err>	The Set command returns <Remote IP> and <Remote Port> parameters only for sockets opened in Listen mode.
Read	AT+MIPODM?	+MIPODM:[<Socket_ID>]	When a socket opens in

		for each socket that can be opened or: +MIPODM 0,0 if there are no free sockets.	Online Data Mode, the command returns actual Socket_ID value a'd'1' value (active). H3xx will be in pseudo-command mode for receiving the command.
Test	AT+MIPODM=?	+MIPODM: (list of supported <socket_ID>s),(list of supported <source port>s),(list of support"d<"Destination"IP">s), (list of <destination port>s),(list of supported <protocol>s), (list of supported <Pseudo-Command Mode state>s)	

The following table shows the +MIPODM parameters.

<Parameter>	Description
Socket_ID	A unique number that identifies a connection. Valid socket numbers - 1,2,3 and 4
Source Port	Port of source site. Port range: 1-65535 (decimal digits)
Remote IP	IP of the remote site in the form "t "AAA.BBB.CCC."DD". The range of each octet is 0-255. The value can be written in 1, 2, or 3 digits. Host-name of remote site. The host-name convention should meet the rules as describe in RFC-1035 section: 2.3 Conventions. Syntax is not validated, except the maximum length (255 characters).
Remote Port	Port of remote site. Port range: 1-65535 (decimal digits) for outgoing connection. Port 0 for incoming connection.
Protocol	Type of protocol stack. 0 TCP 1 UDP
State	0 Inactive 1 Active

Note: It's recommended not to use port numbers below 1024, those numbers are reserved for OS use.

Example:

Opening socket 1 in Online Data Mode, using TCP protocol, from port 1104, designation IP 123.245.213.012, designation port 1124:

```
AT+MIPODM=1,,"172.90.237.21",1124,0
```

```
OK
```

```
+MIPODM: 1,1
```

```
Enter invalid command format:
```

```
AT+MIPODM
```

```
ERROR
```

Check opened in Online Data Mode socket state when H3xx is pseudo-command mode:

```
AT+MIPODM?
```

```
+MIPODM: 1,1
```

```
OK
```

Listen socket over TCP:

```
AT+MIPODM=1,,"0.0.0.0",0,0 // Listens to any port at any IP.
```

```
OK
```

```
+MIPODM: 1,1,122.221.32.64,1200 // Remote side connected to the listen socket.
```

13.18 +MIPXOFF, Flow Control - Xoff

This command is the unsolicited response that the H3xx sends to the terminal to stop sending data when it does not have enough memory to process new +MIPSEND requests. The H3xx uses the accumulating buffer prior to pushing data into the protocol stack. This memory resource is protected by a Xoff_upper watermark.

Event:

```
+MIPXOFF: <Socket ID>
```

Example:

```
+MIPXOFF: 1 //The H3xx detects that the accumulating buffer 1 has reached its Xoff watermark.
```

From this point, the terminal is not allowed to send data, until it receives the +MIPXON command.

13.19 +MIPXON, Flow Control - Xon

This command is the unsolicited event that the H3xx sends to the terminal when it detects that it has free memory in the accumulating buffer and can process new +MIPSEND requests, after the +MIPXOFF event.

Event:

```
+MIPXON: <Socket ID>
```

Example:

+MIPXON: 1 //The H3xx pushed the data into the protocol stack on socket 1 and is able to handle more data from the terminal.

14 FTP Command

14.1 FTP Introduction

File Transfer Protocol (FTP) is a standard network protocol used to transfer files from one host to another host provided by TCP/IP, it is an application protocol of TCP/IP protocol which makes it possible for sharing the data among different hosts. FTP use C/S mode, the client can download files and upload files as well. Of course, FTP gives the user certain authority; user can only use it under authority. There are many types of FTP Server currently (like commonly used SERV-U), as well as client program (like CuteFTP). WINDOWS also provided a FTP client program.

14.2 +FTPOPEN, Open a FTP Connection with FTP Server

This command is used for opening the connection between the module and FTP Server by sending user and password authentication.

Note:

- Only one FTP connection can be in progress each time.
- After the connection is opened, there is going to be a 120 seconds timeout exit if no FTP operation exists.

Command	Syntax	Response/Action	Remarks
Set	+FTPOPEN= <"destination_ip/url">,<"username">,<"password">[,<"account">,<source_control_port>,<destination_control_port>,<source_data_port>]	OK +FTPOPEN: <connection_status> Or: ERROR: <error_code>	Command execution result (connection status) return to the user as an unsolicited response: 1 - connection success 0 - connection fail
Read	+FTPOPEN?	+FTPOPEN: <connection_status> OK	Returns FTP connection status: 1 - connection success 0 – no connection
Test	+FTPOPEN=?	+FTPOPEN: (<destination_ip/url>), (<username>),(<password>) [,(<account>), (range of supported port's), (range of supported port's), (range of supported port's)] OK	Returns command format.

The following table shows the +FTPOPEN parameters.

<Parameter>	Description
destination_ip/url	IP or URL of remote FTP site. The range of IP address is 0-255, IP address format: XXX.XXX.XXX.XXX, URL format: www.XXX.com , string format: the max length is 255 octets.
username	Registered Username for FTP Server, string, the max length is 255 octets.
password	Registered Password for FTP Server, string, the max length is 255 octets.
account	User Account. Some FTP server not only need username password, but also need account, input this information if it is required. String, the max length is 255 octets.
source_control_port	Port for FTP control connection on source side, the default value is 20. Range: 0-65535.
destination_control_port	Port for FTP control connection on remote side. Range: 0-65535.
source_data_port	Port for FTP data connection on source side, the default value is 21. Range: 0-65535.

Example:

```

at+MIPCALL=1,"UNINET"      create a wireless connection
OK
+MIPCALL: 10.209.215.129
AT+FTPOPEN="ftp.adobe.com","anonymous","ftpuser@adobe.com"      open FTP connection
OK
+FTPOPEN: 1                connection success
at+ftpclose                close connection
OK
+FTPCLOSE: 1              close connection fails
AT+FTPOPEN="ftp23233.adobe.com","anonymous","ftpuser@adobe.com"
//launch a connection with a non-existing server
OK
+FTPOPEN: 0                open connection fails
AT+FTPOPEN?                Query connection status
+FTPOPEN: 0                return: no connection

```

14.3 +FTPCLOSE, Close Established FTP Connection

This command is used for closing the connection between the H3xx module and the FTP server, it only takes effect when there is no data transmission or no FTP command executed. DTR interruption can close FTP connection as well.

Command	Syntax	Response/Action	Remarks
Set	+FTPCLOSE	OK +FTPCLOSE: <connection_status> Or: ERROR: <error_code>	Command return: 1 - connection success 0 - connection fail
Read	+FTPCLOSE?	ERROR	Not supported
Test	+FTPCLOSE=?	ERROR	Not supported

Example:

```

at+ftpclose      close connection
OK
+FTPCLOSE: 1    close successful
at+ftpclose
ERROR           close error
at+cme=2
OK
at+ftpclose
+CME ERROR: FTP session is inactive  FTP is inactive.

```

14.4 +FTPINFO, FTP Unsolicited Indication Enable/Disable

This command can enable or disable FTP unsolicited indication, when it is enabled, it will print the command send by FTP and data information returned by FTP Server. This is only used for indentifying the problem when FTP is abnormal; if FTP works fine, unsolicited indication is disabled.

Command	Syntax	Response/Action	Remarks
Set	+FTPINFO=<indication>	OK Or: ERROR: <error_code>	Enables/disables FTP unsolicited indication: 0 - Indication disabled

			1 - Indication enabled When indication is enabled, module will send user all FTP commands and response by the following format: +FTPINFO:< data >
Command	Syntax	Response/Action	Remarks
Read	+FTPINFO?	+FTPINFO: <indication> OK	Returns FTP indication status: 0 - Indication disabled 1 - Indication enabled
Test	+FTPINFO=?	+FTPINFO: (range of supported <indication_statuses>) OK	Return command format.

The following table shows the +FTPINFO parameter.

<Parameter>	Description
Indication status	Enable/disable FTP unsolicited indication, the range of the value: 0-1

Example:

```

at+ftpinfo=1   enable unsolicited indication print
OK
AT+FTPOPEN="ftp.adobe.com","anonymous","ftpuser@adobe.com"
OK
+FTPINFO: 220-ftp.adobe.com           // unsolicited indication returned by the server
+FTPINFO: 220-Adobe Systems, Inc.
+FTPINFO: 220-
+FTPINFO: 220-By downloading software of Adobe Systems Incorporated or its
+FTPINFO: 220-subsiidiaries from this site, you agree to the terms and
+FTPINFO: 220-conditions described in ftp://ftp.adobe.com/license.txt
+FTPINFO: 220-
+FTPINFO: 220-Web browser users:  Click on Web_User_Click_Here.html
+FTPINFO: 220-
+FTPINFO: 220-FTP client users:  To connect, use "anonymous" as the login,
+FTPINFO: 220-and use your e-mail address as the password.  For example,
+FTPINFO: 220-login: anonymous
+FTPINFO: 220-password: ftpuser@adobe.com
+FTPINFO: 220-

```

```
+FTPIINFO: 220-
+FTPIINFO: 220
+FTPIINFO: USER anonymous //send username
+FTPIINFO: 331 Please specify the password. //please enter the password
+FTPIINFO: PASS ftpuser@adobe.com //send password
+FTPIINFO: 230 Login successful.
+FTPOPEN: 1
```

14.5 +FTPCWD, Change Working Directory

This command is used for changing the server's current working directory.

Command	Syntax	Response/Action	Remarks
Set	+FTPCWD=<directory_name>	OK +FTPCWD: <result> Or: ERROR: <error_code>	<directory_name> parameter consists of the directory name as well as the directory path (optional). The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success
Read	+FTPCWD?	ERROR	Not supported
Test	+FTPCWD=?	+FTPCWD: (<"directory name">) OK	Returns command format.

The following table shows the +FTPCWD parameter.

<Parameter>	Description
Directory name	Open file directory or file name, String, max length is 255 octets.

Example:

```
AT+FTPCwd="Acrobat"
```

```
OK
```

```
+FTPCWD: 1
```

14.6 +FTPMKD, Make Directory

This command is used for creating a specified directory in a path name (for absolute path name) or subdirectory of current working directory (for relative path name).

Command	Syntax	Response/Action	Remarks
Set	+FTPMKD=<directory_name >	OK +FTPMKD: <result> Or: ERROR:	<directory_name> parameter is the directory name need to be created,

		<error_code>	The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success
Command	Syntax	Response/Action	Remarks
Read	+FTPMKD?	ERROR	Not supported
Test	+FTPMKD=?	+FTPMKD: (<"directory name">) OK	Returns command format.

The following table shows the +FTPMKD parameter.

<Parameter>	Description
Directory name	The name of file directory need to be created, string, the max length is 255 octets

Example:

AT+FTPMKD="1234"

OK

+FTPMKD: 1

14.7 +FTPRMD, Remove Directory

This command is used for removing a specified directory in a path name (for absolute path name) or subdirectory of current working directory (for relative path name).

Command	Syntax	Response/Action	Remarks
Set	+FTPRMD=<directory_name>	OK +FTPRMD: <result> Or: ERROR: <error_code>	<directory_name> parameter consists of directory path or subdirectory of current path. The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success
Read	+FTPRMD?	ERROR	Not supported
Test	+FTPRMD=?	+FTPRMD: (<"directory name">) OK	Returns command format.

The following table shows the +FTPRMD parameter.

<Parameter>	Description
Directory name	The name of file directory need to be removed, string, the max length is 255 octets.

Example:

```
AT+FTPRMD="1234"
+FTPINFO: RMD 1234
OK
+FTPINFO: 250 RMD command successful.
+FTPRMD: 1
```

14.8 +FTPPWD, Print Working Directory

This command is used for requesting the server to return name of current working directory.

Command	Syntax	Response/Action	Remarks
Set	+FTPPWD	OK ... +FTPPWD: <result>[,<directory _name>] or ERROR: <error_code>	<directory_name> indicates the current working directory, The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success 2- String follows is the current working directory.
Read	+FTPPWD?	ERROR	Not supported
Test	+FTPPWD=?	ERROR	Not supported

Example:

```
AT+FTPPWD
+FTPINFO: PWD
OK
+FTPINFO: 257 "/export/home/test" is current directory.
+FTPPWD: 2, "/export/home/test" is current directory.
+FTPPWD: 1
```

14.9 +FTPCDUP, Change Directory up

This command changes the current directory to root directory of remote file system, there is no need to change the login, account information or transmission parameter.

Command	Syntax	Response/Action	Remarks
Set	+FTPCDUP	OK ... +FTPCDUP: <result> or ERROR: <error_code>	The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success

Read	+FTPCDUP?	ERROR	Not supported
Test	+FTPCDUP=?	ERROR	Not supported

Example:

```

AT+FTPPWD
+FTPINFO: PWD
OK
+FTPINFO: 257 "/export/home/test/1234" is current directory.
+FTPPWD: 2, "/export/home/test/1234" is current directory.
+FTPPWD: 1
AT+FTPCDUP
+FTPINFO: CDUP
OK
+FTPINFO: 250 CWD command successful.
+FTPCDUP: 1
AT+FTPPWD
+FTPINFO: PWD
OK
+FTPINFO: 257 "/export/home/test" is current directory.
+FTPPWD: 2, "/export/home/test" is current directory.
+FTPPWD: 1

```

14.10 +FTPDEL, Delete the File

This command is used for delete the file on server sites.

Command	Syntax	Response/Action	Remarks
Set	+FTPDEL=<file_name>	OK ... +FTPDEL: <result> or ERROR: <error_code>	<file_name> is a complete qualified path and file name on server sites. The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success
Read	+FTPDEL?	ERROR	Not supported
Test	+FTPDEL=?	+FTPDEL: (<"file name">) OK	Return command format

The following table shows the +FTPDEL parameter.

<Parameter>	Description
File name	The file name need to be deleted, string, the max length is 255 octets.

Example:

```
AT+FTPDEL="1234.txt"
+FTPINFO: DELE 1234.txt
OK
+FTPINFO: 250 Delete operation successful.
+FTPDEL: 1
```

14.11 +FTPREN, Rename File

This command is used for rename the file or folder of current directory.

Command	Syntax	Response/Action	Remarks
Set	+FTPREN=<file_name_from>,<file_name_to> OK	+FTPREN: <result> or ERROR: <error_code>	<file_name_from> indicates the file need to be named, <file_name_to> indicates the file after named, The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success
Read	+FTPREN?	ERROR	Not supported
Test	+FTPREN=?	+FTPREN: (<"file name from">), (<"file name to">) OK	Return command format

The following table shows the +FTPREN parameters.

<Parameter>	Description
File name from	Old name of file to be renamed, String, max length is 255 octets.
File name to	New name of file to be renamed, String, max length is 255 octets.

Example:

```
AT+FTPREN="1234.txt","12345.txt"
+FTPINFO: RNFR 1234.txt
OK
+FTPINFO: 350 Ready for RNTD.
+FTPINFO: RNTD 12345.txt
```

+FTPINFO: 250 Rename successful.

+FTPREN: 1

14.12 +FTPLIST, Request List

This command makes the server send a list to the client.

Note: If path name specified a directory or other file groups, the server will send a list of the files in the specified directory. If the path name specified a file, then the server should send the current information of this file.No parameter means current working directory or default.

Command	Syntax	Response/Action	Remarks
Set	+FTPLIST [=<file/directory name>]	OK ... +FTPLIST: <result> <list of directory/files> ... +FTPLIST: <result> or ERROR: <error_code>	Parameter consists of the file/directory name as well as the file/directory path (optional). The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success 2 -data follows
Read	+FTPLIST?	ERROR	Not supported
Test	+FTPLIST=?	+FTPLIST: (<"file/directory name">) OK	Return command format

The following table shows the +FTPLIST parameters.

<Parameter>	Description
File/directory name	This is a valid path and file standard in the server system, string, the max length is 255 octets.
File name to	Rename as, string, the max length is 255 octets.

Example:

AT+FTPLIST

+FTPINFO: TYPE A

OK

+FTPINFO: 200 Switching to ASCII mode.

+FTPINFO: PASV

+FTPINFO: 227 Entering Passive Mode (183,232,65,2,168,231)

+FTPINFO: LIST

+FTPLIST: 2

-rw-r--r-- 1 602 404 184 Jul 14 08:17 1234.txt

-rw-r--r-- 1 602 404 92 Jul 14 08:12 12345.txt

-rw-r--r-- 1 602 404 1048663 Jul 13 10:10 1M

```

drwxr-xr-x    2 602    404          4096 Jul 13 03:45 TEST
drwxr-xr-x    2 602    404          4096 Jul 13 08:25 ghttest
+FTPINFO: 150 Here comes the directory listing.
+FTPINFO: 226 Directory send OK.
+FTPLIST: 1

```

14.13 +FTPSTAT, Request Status

This command can send out a status as a response by control connection.

Note: This command can include a parameter field, if a complete path name is specified; STAT is similar with LIST command, except the data transmitted by control connection. If a local path is specified, the server will response by a file or properties list related with the specified item. If no parameter is specified, the sever will return the general status information of this FTP process, which include the value and connection status of all current transmission parameters.

Command	Syntax	Response/Action	Remarks
Set	+FTPSTAT[=<file /directory name>]	OK ... +FTPSTAT: <result>[,<status>] or ERROR: <error_code>	Parameter is optional, can be a file name or a file path name, The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success 2 - data follows
Read	+FTPSTAT?	ERROR	Not supported
Test	+FTPSTAT=?	+FTPSTAT: (<"file/directory name">) OK	Return command format

The following table shows the +FTPSTAT parameter.

<Parameter>	Description
File/directory name	A file name or a file path name, string, the max length is 255 octets.

Example:

```

+FTPLIST: 1
AT+FTPstat="usr"
OK
+FTPSTAT: 2, 213-Status follows:
+FTPSTAT: 2, drwxr-x--x    5 ftp      ftp          4096 Apr 22  2001 usr
+FTPSTAT: 2, 213 End of status

```

```

+FTPSTAT: 1
AT+FTPstat
OK
+FTPSTAT: 2, 211-FTP server status:
+FTPSTAT: 2,      Connected to 221.179.37.21
+FTPSTAT: 2,      Logged in as ftp
+FTPSTAT: 2,      TYPE: ASCII
+FTPSTAT: 2,      No session bandwidth limit
+FTPSTAT: 2,      Session timeout in seconds is 120
+FTPSTAT: 2,      Control connection is plain text
+FTPSTAT: 2,      Data connections will be plain text
+FTPSTAT: 2,      At session startup, client count was 226
+FTPSTAT: 2,      vsFTPD 2.0.5 - secure, fast, stable
+FTPSTAT: 2, 211 End of status
+FTPSTAT: 1

```

14.14 +FTPSYST, Request Operating System Type

This command is used for requesting the operating system type of the server.

Command	Syntax	Response/Action	Remarks
Set	+FTPSYST	OK ... +FTPSYST: <result>[,<system>] or ERROR: <error_code>3	The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success 2 - data follows
Read	+FTPSYST?	ERROR	Not supported
Test	+FTPSYST=?	ERROR	Not supported

Example:

```

AT+FTPSYST
OK
+FTPSYST: 2, UNIX Type: L8 Version: SUNOS
+FTPSYST: 1

```

14.15 +FTPNOOP, No Operation

This is a no operation command, which means it doesn't do anything.

Note: FTPNOOP doesn't affect any parameter or earlier command. It doesn't do anything except request the server to send a response.

Command	Syntax	Response/Action	Remarks
Set	+FTPNOOP	OK ... +FTPNOOP: <result> or ERROR: <error_code>	The command execution result return to the user as an unsolicited response: 0 - operation fails 1 - operation success
Read	+FTPNOOP?	ERROR	Not supported
Test	+FTPNOOP=?	ERROR	Not supported

Example:

AT+FTPNOOP

+FTPINFO: NOOP

OK

+FTPINFO: 200 NOOP command successful.

+FTPNOOP: 1

14.16 +FTPSTOR, Store File on Remoter Server

This command makes the server receive a file from data connection. The data end of transmission character of this command is hexadecimal value 0 x03. If the data to be transferred is hexadecimal value 0 x03 and 0 x10, then escape characters 0 x10 must be added in front. For example, send hexadecimal 03 10 11 03, then should send 10 03 10 10 11 10 03.

Note: FTPSTOR command makes the server receive the data transmitted by data connection, and store the data as file on the server site. If the specified file in the path name already exists on the server site, then this file will be replaced by transmitted data, otherwise, a new file will be created.

Command	Syntax	Response/Action	Remarks
Set	+FTPSTOR=<file_name>[,<file_type>][,<Offset>]]	OK ... +FTPSTOR: <result> or ERROR: <error_code>	<file_name> is a complete qualified path and file name on the server site. <Offset> is the file offset address already exists on the server, this means the server support file transfer resume. The command execution result return to the user as an unsolicited response: 0 - operation fails 1- operation success 2- connected already, can upload data
Command	Syntax	Response/Action	Remarks
Read	+FTPSTOR?	ERROR	Not supported
Test	+FTPSTOR=?	+FTPSTOR: (<"file name">)[,(0-1)][,(0-0xFFFFFFFFE)]	Return command format

		OK	
--	--	----	--

The following table shows the +FTPSTOR parameters.

<Parameter>	Description
File name	A file name or a file path name, string, the max length is 255 octets.
File type	File type (ASCII or Binary), numeric, in the range of 0 - 1(0 = ASCII, 1 = Binary).
Offset	Strat upload offset address, range: 0-0xFFFFFFFF

Example:

AT+FTPSTOR="123.TXT" store data to file123.TXT

OK

+FTPSTOR: 2

+FTPSTOR: 1

AT+FTPSTOR="123.TXT",0,10 start to resume from the No.10 characters of offset address

OK

+FTPSTOR: 2

+FTPSTOR: 1

14.17 +FTPRETR, Retrieve a File

This command makes the server send a copy file in the path name to the client. It won't affect the file status and contents on the server site. Hexadecimal data 03 and 10 will be translated, add 10 in the front, like server hexadecimal data 03 10 11 10 will be translated to 10 03 11 10 10.

Command	Syntax	Response/Action	Remarks
Set	+FTPRETR=<file_name>[,<file_type>][,<Offset>]]	OK ... +FTPRETR:<result> or ERROR:<error_code>	<file_name> is a complete qualified path and file name on the server site. <Offset> is the file offset address already exists on the server, this means the server support file transfer resume. The command execution result return to the user as an unsolicited response: 0 - operation fails 1- operation success 2- connected already, start to download data, data follows is the downloaded data
Command	Syntax	Response/Action	Remarks
Read	+FTPRETR?	ERROR	Not supported
Test	+FTPRETR=?	+FTPRETR: (<"file	Return command format

		name">],[,(0-1)] [,,(0-0xFFFFFFFF)] OK	
--	--	--	--

The following table shows the +FTPGET parameters.

<Parameter>	Description
File name	A file name or a file path name, string, the max length is 255 octets.
File type	File type (ASCII or Binary), numeric, in the range of 0 - 1(0 = ASCII,1 =Binary).
Offset	Strat upload offset address, range: 0-0xFFFFFFFF

Example:

```

AT+FTPGET="123.TXT"
OK
+FTPGET: 2 // start to download transmit data, data follows are the downloaded contents
I love you !
I love you !
+FTPGET: 1 // download successfully
AT+FTPGET="123.TXT",0,4 //start to download from the No.4 character of the offset address
OK
+FTPGET: 2 // start to download transmit data, data follows are the downloaded contents
I love you !
I love you !
+FTPGET: 1 // download successfully

```

14.18 +FTPGET, Enter the File Download Mode

By executing this command the program will start data connection process, download the specified file data from the server, and stay in this command mode all the time. When the data downloading is completed or the buffer is full in the module, it will exit from this mode. In this command mode, if only response to FTPGET command and other non FTP command, it only shows ERROR when executes other FTP command. After the module receives the data, it doesn't transfer to the serial port directly; instead, it stores the data in the cache. If the user wants to get the downloaded data, please use FTPGET command. When the buffer is full in the module, it will exit from the command module, after get all data by FTPGET, it will enter this mode again and fill buffer, then exit from FTPGET module, the cycle repeats, until the file read successfully.

After return OK, it still cannot get the data, as it need a procedure to establish the connection and download to buffer. AT+FTPGET can be used for reading data after +FTPGET:2 comes up, can first use AT+FTPGET? to request the data size of current buffer. So far the size of buffer is 30k.

Command	Syntax	Response/Action	Remarks
---------	--------	-----------------	---------

Set	+FTPGET=<filename>,[<viewmode>],[<offset>]]	OK or: ERROR	<file_name> is a complete qualified path and file name on the server site. <Offset> is the file offset address already exists on the server, this means the server support file transfer resume. The command execution result return to the user as an unsolicited response: 0 - operation fails 1- operation success 2 – already download data to cache
Read	+FTPGET?	+FTPGET: <filename>,<viewmode>,<eof> OK	Read the command mode state
Test	+FTPGET =?	+FTPGET: ("file name"),(0-1)],(0-0xFFFFFEE) OK	Return command format

The following table shows the +FTPGET parameters.

<Parameter>	Description
<filename >	A file name or a file path name, string, the max length is 255 octets.
< viewmode >	Download mode 0: text mode 1: binary mode
<offset>	Download offset address range: 0-0xFFFFFEE
<eof>	0: file downloading 1: All file data have been downloaded

Example:

```
at+ftpget="123.txt",0 //download 123.txt
```

```
OK
```

```
+FTPGET: 2 //data is downloaded
```

```
+FTPGET: 1 // download successfully
```

```

at+ftpget="123.txt",0,283800 //download 123.txt , start to download from offset address
283800
OK
+FTPGET: 2
+FTPGET: 1 // download successfully
OK
at+ftpget="123.txt",0,293800
OK
+FTPGET: 0 //download failed, the offset may higher then the max length

```

14.19 +FTP_RECV, Read Data through the Port

This command needs to be used with FTPGET command together; it can output the data in the buffer from the port, different from FTPRETE command, it is pure output, no escape character. So before output the data, it will show the length of the output data, if the buffer is empty, then the data length will show 0.

Note:

- FTPGET command must be executed before use this command, otherwise, there is no data output.
- The data in cache will be cleared if use FTPGET command again. So before you use FTPGET again, please make sure the data in the buffer are fetched to avoid losing data.
- The data in the buffer will be cleared when FTP is closed.
- FTP connection will be closed automatically and buffer will be closed if the data cannot be fetched in 2 minutes.

Command	Syntax	Response/Action	Remarks
Set	+FTP_RECV=<LENGTH>	+FTP_RECV: LENGTH DATA OK or: ERROR:	Shows the actual data length by serial port, after enter, the output data stores in the buffer, after the data output completed, shows OK.
Read	AT+FTP_RECV?	+ FTP_RECV: <available> OK	Read the data length stored in current buffer
Test	AT+FTP_RECV=?	+ FTP_RECV : (1-3000(LENGTH))	Test the format of this command.

The following table shows the +FTP_RECV parameters.

<Parameter>	Description
< available >	Length of the data stored in current buffer, range: 0-30720
<LENGTH>	Length of the data need to be output, range: 1-3000

Example:

```
at+ftpget="123.txt",0 //download 123.txt
```

```
OK
```

```
+FTPGET: 2
```

```
at+ftprecv=30 //read 30 bytes
```

```
+FTP_RECV: 30
```

```
e U8 nvm_dynamic.adr_nv_m_d
```

```
OK
```

```
+FTPGET: 1 // GET file downloading completed
```

```
at+ftpget="123.txt",0,283800 // start to download from offset address 283800
```

```
OK
```

```
at+ftprecv=3000 //read 3000 bytes data
```

```
+FTP_RECV: 8 //it already downloaded when read 8 bytes file
```

```
.agps_nv
```

```
+FTPGET: 1 // GET file downloading completed
```

```
OK
```

15 PCM Command

15.1 +MADIGITAL Enable Digital Audio or Disable Digital Audio

This command is used for enable digital audio or disable digital audio, CS42L73 CODEC chip is installed in the module, if the clients do not want to use the internal CODEC, this command can output the digital signals directly.

Command	Syntax	Response/Action	Remarks
Set	+MADIGITAL=<X >	OK or: ERROR	Configure use internal CODEC or not use internal CODEC, output the digital signal directly, X set to be 0, use internal CODEC, X equals to 1, output the digital signal directly.
Read	+ MADIGITAL?	+ MADIGITAL: X OK	Return to the original settings, return 0 if no configuration.
Test	+ MADIGITAL =?	+ MADIGITAL: (0,1) OK	Return OK if empty.

The following table shows the +MADIGITAL parameters:

<Parameter>	Description
<X >	X: 0: use internal CODEC 1: output digital audio directly

Example:

```
AT+MAIDIGITAL=0 // use inside CODEC,
OK
```

AT+MAIDIGITAL=1 //output digital signal directly

OK

AT+MAIDIGITAL?

+MAIDIGITAL: 1

OK

AT+MAIDIGITAL=?

+MAIDIGITAL: (0,1)

OK

Note:

- AT+MAIDIGITAL set to 1, MAPATH is invalid.
- AT+MAIDIGITAL set to 0, MAI2SY is invalid.
- The setting is invalid when calling.

15.2 +MAI2SY, Set Digital Audio to Transmit Parameters

This command is used for setting digital audio to transmit the parameters, including master mode and slave mode, transmission mode, sampling rate and word width.

The setting is invalid when +MADIGITAL is 0.

Command	Syntax	Response/Action	Remarks
Set	+ MAI2SY = <master>,<tran_m ode>,<sample>,< width>	OK or: ERROR	Notice that it match with the module parameters when use external CODEC, otherwise, the external CODEC may cannot receive the audio data correctly.
Read	+ MAI2SY?	+ MAI2SY: <master>,<tran_mode>,<samp le>,<width> OK	Read the current parameter value
Test	+ MAI2SY =?	+ MAI2SY: <0,1>,<0,1>,<0,1,2,3,4>,<0,1,2 > OK	Parameter range.

The following table shows the +MAI2SY parameters:

<Parameter>	Description
<master >	Set data transmission to master mode or slave mode 0: module is in master mode, external CODEC is in slave mode 1: module is in slave mode, external CODEC is in master mode
< tran_mode >	Data Transimisson Mode 0: I2S mode 1: PCM mode
< sample >	Sampling rate 0: 8k 1: 16k 2: 24K 3: 32K 4: 44.1K
< width >	Word width: 0: 16BIT 1: 24BIT 2: 32BIT

Example:

```
AT+MAI2SY=0,0,0,0 //set the module to master mode, I2S, sampling rate to 8K, width to
16BIT
OK
```

```
AT+MAI2SY?
```

```
+MAI2SY :0,0,0,0
OK
```

```
AT+MAI2SY=?
```

```
+MAI2SY : (0,1), (0,1),(0,1,2,3,4),(0,1,2)
OK
```

Note:

- AT+MAIDIGITAL set to 0, MAI2SY is invalid.
- The setting is invalid when calling.

16 Error Code

The list below is a draft List and is still TBD.

16.1 CME Error

Parameter	Description
<Err>	0, "phone failure"
	1, "no connection to phone"
	2, "phone-adaptor link reserved"
	3, "operation not allowed"
	4, "operation not supported"
	5, "PH-SIM PIN required"
	6, "PH-FSIM PIN required"
	7, "PH-FSIM PUK required"
	10, "SIM not inserted"
	11, "SIM PIN required"
	12, "SIM PUK required"
	13, "SIM failure"
	14, "SIM busy"
	15, "SIM wrong"
	16, "incorrect password"
	17, "SIM PIN2 required"
	18, "SIM PUK2 required"
	19, "incorrect PUK1"
	20, "memory full"
	21, "invalid index"
	22, "not found"
	23, "memory failure"
	24, "text string too long"
	25, "invalid characters in text string"
	26, "dial string too long"
	27, "invalid characters in dial string"
	30, "no network service"
	31, "network timeout"

32,	"network not allowed - emergency calls only"
40,	"network personalisation PIN required"
41,	"network personalisation PUK required"
42,	"network subset personalisation PIN required"
43,	"network subset personalisation PUK required"
44,	"service provider personalisation PIN required"
45,	"service provider personalisation PUK required"
46,	"corporate personalisation PIN required"
47,	"corporate personalisation PUK required"
48,	"hidden key required" (NOTE: This key is required when accessing hidden phonebook entries.)
49,	"EAP method not supported"
50,	"Incorrect parameters"
100,	"unknown"
103,	"Illegal MS"
106,	"Illegal ME"
107,	"GPRS services not allowed"
111,	"PLMN not allowed"
112,	"location area not allowed"
113,	"roaming not allowed in this location area"
114,	"GPRS services not allowed in this PLMN"
116,	"MSC temporarily not reachable"
117,	"Network failure"
132,	"Service not supported"
133,	"Service not subscribed"
134,	"service option temporarily out of order"
135,	"NS-api already used"
148,	"Unspecified GPRS error"
149,	"PDP authentication error"
150,	"invalid mobile class"
244,	"Attach failure"
257,	"Invalid error mapping"
258,	"APN not listed in APN Control List (ACL)"
701,	"incorrect security code"

702, "max attempts reached"
1001, "Unassigned (unallocated) number"
1003, "No route to destination"
1006, "Channel unacceptable"
1008, "Operator determined barring"
1016, "Normal call clearing"
1017, "User busy"
1018, "No user responding"
1019, "User alerting, no answer"
1021, "Call rejected"
1022, "Number changed"
1026, "Non selected user clearing"
1027, "Destination out of order"
1028, "Invalid number format (incomplete number)"
1029, "Facility rejected"
1030, "Response to STATUS ENQUIRY"
1031, "Normal, unspecified"
1034, "No circuit/channel available"
1038, "Network out of order"
1041, "Temporary failure"
1042, "Switching equipment congestion"
1043, "Access information discarded"
1044, "requested circuit/channel not available"
1047, "Resources unavailable, unspecified"
1049, "Quality of service unavailable"
1050, "Requested facility not subscribed"
1055, "Incoming calls barred within the CUG"
1057, "Bearer capability not authorized"
1058, "Bearer capability not presently available"
1063, "Service or option not available, unspecified"
1065, "Bearer service not implemented"
1068, "ACM equal to or greater than ACMmax"
1069, "Requested facility not implemented"
1070, "Only restr. digital information bearer capability"

1079, "Service or option not implemented, unspecified"
1081, "Invalid transaction identifier value"
1087, "User not member of CUG"
1088, "Incompatible destination"
1091, "Invalid transit network selection"
1095, "Semantically incorrect message"
1096, "Invalid mandatory information"
1097, "Message type non-existent or not implemented"
1098, "Message type not compatible with protocol state"
1099, "Information element non-existent or not implemented"
1100, "Conditional IE error"
1101, "Message not compatible with protocol state"
1102, "Recovery on timer expiry"
1111, "Protocol error, unspecified"
1127, "Interworking, unspecified"
1279, "Number not allowed"
1283, "CCBS possible"

16.2 CMS Error

Parameter	Description
<Err>	1, "Unassigned (unallocated) number"
	8, "Operator determined barring"
	10, "Call barred"
	17, "Network failure"
	21, "Short message transfer rejected"
	22, "Memory capacity exceeded"
	27, "Destination out of service"
	28, "Unidentified subscriber"
	29, "Facility rejected"
	30, "Unknown Subscriber"
	38, "Network out of order"
	41, "Temporary failure"
	42, "Congestion"

47, "Resources unavailable, unspecified"
50, "Requested facility not subscribed"
69, "Requested facility not implemented"
81, "Invalid short message reference value"
95, "Invalid message, unspecified"
96, "Invalid mandatory information"
97, "Message type non-existent or not implemented"
98, "Message not compatible with short message protocol state"
99, "Information element non-existent or not implemented"
111, "Protocol error, unspecified"
127, "Interworking unspecified"
128, "Telematic interworking not supported"
129, "Short message type 0 not supported"
130, "Cannot replace short message"
143, "Unspecified TP-PID error"
144, "Data coding scheme (alphabet) not supported"
145, "Message class not supported"
159, "Unspecified TP-DCS error"
160, "Command cannot be actioned"
161, "Command unsupported"
175, "Unspecified TP-Command error"
176, "TPDU not supported"
192, "SC busy"
193, "No SC subscription"
194, "SC system failure"
195, "Invalid SME address"
196, "Destination SME barred"
197, "SM Rejected-Duplicate SM"
198, "TP-VPF not supported"
199, "TP-VP not supported"
208, "SIM SMS storage full"
209, "No SMS storage capability in SIM"
210, "Error in MS"
211, "Memory Capacity Exceeded"

212, "SIM Application Toolkit Busy"
213, "SIM data download error"
224, "TP_FCS_APPL_ERR_START"
254, "TP_FCS_APPL_ERR_STOP"
255, "TP_FCS_UNSPECIFIED"
300, "ME failure"
301, "SMS service of ME reserved"
302, "operation not allowed"
303, "operation not supported"
304, "Invalid PDU mode param"
305, "invalid text mode parameter"
310, "SIM not inserted"
311, "SIM PIN required"
312, "PH-SIM PIN necessary"
313, "SIM failure"
314, "SIM busy"
315, "SIM wrong"
317, "SIM PIN2 required"
318, "SIM PUK2 required"
319, "incorrect PUK1"
320, "memory failure"
321, "invalid memory index"
322, "memory full"
330, "SMSC address unknown"
331, "no network service"
332, "network timeout"
340, "no +CNMA acknowledgement expected"
512, "MN_SMS_RP_ACK"
513, "MN_SMS_TIMER_EXPIRED"
514, "MN_SMS_FORW_AVAIL_FAILED"
515, "MN_SMS_FORW_AVAIL_ABORTED"
516, "MS invalid TP-Message-Type-Indicator"
517, "MS no TP-Status-Report in Phase 1"
518, "MS no TP-Reject-Duplicate in Phase 1"

519, "MS no TP-Reply-Path in Phase 1"
520, "MS no TP-User-Data-Header in Phase 1"
521, "MS missing TP-Validity-Period"
522, "MS invalid TP-Service-Centre-Time-Stamp"
523, "MS missing TP-Destination-Address"
524, "MS invalid TP-Destination-Address"
525, "MS missing Service-Centre-Address"
526, "MS invalid Service-Centre-Address"
527, "MS invalid alphabet"
528, "MS invalid TP-User-Data-Length"
529, "MS missing TP-User-Data"
530, "MS TP-User-Data too long"
531, "MS no Command-Request in Phase 1"
532, "MS Cmd-Req invalid TP-Destination-Address"
533, "MS Cmd-Req invalid TP-User-Data-Length"
534, "MS Cmd-Req invalid TP-User-Data"
535, "MS Cmd-Req invalid TP-Command-Type"
536, "MN MNR creation failed"
537, "MS CMM creation failed"
538, "MS network connection lost"
539, "MS pending MO SM transfer"
540, "RP-Error OK"
541, "RP-Error OK no icon display"
542, "SMS-PP Unspecified"
543, "SMS rejected By SMS CONTROL"

16.3 TCP/IP Error

Parameter	Description
<Err>	2000, "TCPIP Param wrong "
	2001, "TCPIP not supported in ppp mode"
	2002, "TCPIP dns convert to ip fail"
	2003, "TCPIP socket number limited"
	2004, "TCPIP invalid operation"

2005, "TCPIP protol error"
2006, "TCPIP send data too long"
2007, "TCPIP send data memory failed"
2008, "TCPIP service not in correct state "
2009, "TCPIP pdp not defined "
2010, "TCPIP new socket failed"
2011, "TCPIP socket bind fail"
2012, "TCPIP socket connect fail"
2013, "TCPIP socket send fail "
2014, "TCPIP socket close fail"
2015, "TCPIP get socket receive buffer failed"
2016, "TCPIP receive data failed"
2017, "TCPIP socket used"
2018, "TCPIP get send buffer size failed"
2019, "TCPIP socket send data failed"
2020, "TCPIP socket send data size limited"
2021, "TCPIP socket set listening mode failed"
2022, "TCPIP socket listen fail"
2023, "TCPIP socket error"
2024, "TCPIP socket not opened "
2025, "TCPIP tcp stack confige failed"
2026, "TCPIP socket no data to send "
2027, "TCPIP socket send invalid data state"
2028, "TCPIP socket close client"
2029, "TCPIP ping error "
2030, "TCPIP ppp not connected "
2031, "TCPIP mipcall not active"
2032, "TCPIP etcpip not active"
2033, "TCPIP not def4 "