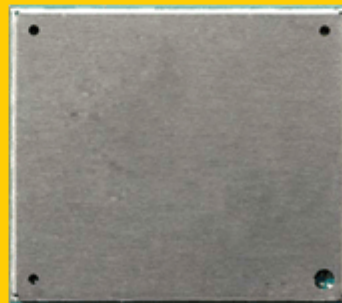




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AT Command Set

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Contents

1. Introduction.....	12
1.1 Scope of the document	12
1.2 Related documents	13
1.3 Glossary of Terms.....	15
1.4 Document Conventions	16
1.4.1 Quick Reference Table	16
1.4.2 Superscript Notation for Parameters And Values	17
1.5 AT Command Interpreter.....	18
1.6 AT Command Syntax	19
1.6.1 Using Parameters	19
1.7 Communication between Customer Application and PHS8-P.....	20
1.8 Supported character sets	21
1.8.1 GSM alphet tables and UCS2 character values	23
1.8.2 UCS2 and GSM character coding and conversion	25
1.8.2.1 Output of SIM data (UE to TE).....	25
1.8.2.2 Input of SIM data (TE to UE)	26
1.9 Unsolicited Result Code Presentation.....	27
1.9.1 Common URCs.....	28
1.10 Errors and Messages	29
1.11 Serial Interface Flow Control.....	30
1.11.1 Software Flow Control (XON/OFF Handshake).....	30
1.11.2 Hardware Flow Control (RTS/CTS Handshake).....	30
2. Configuration Commands.....	31
2.1 AT&F Reset AT Command Settings to Factory Default Values	31
2.2 AT&V Display current Configuration.....	32
2.2.1 AT&V Response	32
2.3 AT&W Store AT Command Settings to User Defined Profile	33
2.4 ATQ Result Code Presentation Mode	34
2.5 ATV Result code format mode	35
2.5.1 Verbose and numeric result codes	35
2.6 ATX CONNECT Result Code Format	36
2.7 ATZ Restore AT Command Settings from User Defined Profile	37
2.8 AT+CFUN PHS8-P Functionality Level.....	38
2.9 AT^SMSO Switch Off PHS8-P	40
2.10 AT+GCAP Capabilities List	41
2.11 AT+CMEE Error Message Format	42
2.11.1 CME/CMS Error Code Overview	43
2.12 AT+CSCS Character Set	46
2.13 AT^SCFG Extended Configuration Settings	47
2.14 AT^SDPORT Configure Interface Allocation.....	61
3. Status Control Commands	63
3.1 AT^SIND Extended Indicator Control.....	63
3.2 AT+CEER Extended Error Report.....	70
3.2.1 List of status codes for extended error report.....	71

3.3	AT+CPAS Activity Status	76
3.4	AT+WS46 Select wireless network	77
4.	Serial Interface Control Commands.....	78
4.1	ATQ Flow Control.....	78
4.2	AT&C Set Data Carrier Detect (DCD) line mode.....	79
4.3	AT&D Set Data Terminal Ready (DTR) line mode	80
4.4	AT&S Set Data Set Ready (DSR) line mode.....	81
4.5	ATE AT Command Echo	82
4.6	AT+IPR Bit Rate.....	83
4.7	AT+CMUX Multiplex mode.....	85
4.7.1	Restrictions while using Multiplex mode	86
4.8	AT^SQPORT Query Port Type	87
5.	Security Commands	88
5.1	AT+CLCK Facility Lock	88
5.2	AT+CPIN PIN Authentication	94
5.2.1	What to do if PIN or password authentication fails?	96
5.3	AT+CPWD Change Password	97
5.4	AT^SCSL Customer SIM Lock	100
5.5	AT^SPIC Display PIN Counter	103
6.	Identification Commands.....	108
6.1	ATI Display product identification information	108
6.2	AT+CGMI Request manufacturer identification.....	110
6.3	AT+GMI Request manufacturer identification	110
6.4	AT+CGMM Request model identification	111
6.5	AT+GMM Request model identification.....	111
6.6	AT+CGMR Request revision identification of software status.....	112
6.7	AT+GMR Request revision identification of software status	112
6.8	AT+CGSN Request International Mobile Equipment Identity (IMEI).....	113
6.9	AT+GSN Request International Mobile Equipment Identity (IMEI)	113
6.10	AT+CIMI Request International Mobile Subscriber Identity (IMSI).....	114
7.	Call related Commands.....	115
7.1	ATA Connect to Incoming Call	115
7.2	ATD Mobile originated call to specified number	116
7.3	ATD<<mem><index> Mobile originated call using specific memory and index number	118
7.4	ATD<<index> Mobile originated call from active memory using index number	120
7.5	ATD<<str> Mobile originated call from memory using corresponding string.....	121
7.6	ATH Disconnect existing data connection.....	122
7.7	AT+CHUP Hang up call	123
7.8	AT^SHUP Hang up call(s) indicating a specific 3GPP TS 24.008 release cause	124
7.9	ATS0 Automatic Answer	125
7.10	ATS6 Set pause before blind dialing.....	126
7.11	ATS7 Set number of seconds to wait for connection completion	127
7.12	ATS8 Comma Dial Pause Time	128
7.13	ATS10 Set disconnect delay after indicating the absence of data carrier	129
7.14	ATO Switch from command mode to data mode	130
7.15	+++ Escape from Data Mode to AT Command Mode	131
7.16	AT+CLCC List of current calls.....	132

7.17	AT^SLCC	Extended list of current calls	134
7.18	AT+CR	Service reporting control	137
7.19	AT+CRC	Set Cellular Result Codes for incoming call indication	138
7.20	AT+CBST	Select Bearer Service Type	140
7.20.1		Parameter configurations supported by AT+CBST	141
7.21	AT+CRLP	Configure RLP Parameters for Outgoing Non-Transparent Data Calls	142
7.22	ATP	Select pulse dialing	144
7.23	ATT	Select tone dialing	144
7.24	AT+ES	Synchronous Data Mode Configuration	145
7.25	AT+ESA	Synchronous Access Mode Configuration	146
7.26	AT+CSTA	Select type of address	148
8.	Network Service Commands		149
8.1	AT+COPN	Read operator names	149
8.2	AT+COPS	Operator Selection	150
8.3	AT^SOPS	Extended Operator Selection	153
8.4	AT+CREG	Network Registration Status	155
8.5	AT+CSQ	Signal quality	157
8.6	AT+CPLS	Select Preferred Operator List	158
8.7	AT+CPOL	Preferred Operator List	159
8.8	AT^SMONI	Monitoring Serving Cell	161
8.8.1		AT^SMONI Responses	161
8.8.2		AT^SMONI Enhanced Responses	163
8.8.3		Service states	165
8.9	AT^SMONP	Monitoring Neighbour Cells	167
8.9.1		AT^SMONP Responses	167
8.9.2		AT^SMONP Enhanced Responses	169
9.	Supplementary Service Commands		172
9.1	AT+CACM	Accumulated call meter (ACM) reset or query	172
9.2	AT+CAMM	Accumulated call meter maximum (ACMmax) set or query	173
9.3	AT+CAOC	Advice of Charge Information	174
9.4	AT+CCUG	Closed User Group	175
9.5	AT+CCFC	Call forwarding number and conditions control	177
9.6	AT+CCWA	Call Waiting	181
9.7	AT+CHLD	Call Hold and Multiparty	184
9.8	AT+CLIP	Calling Line Identification Presentation	186
9.9	AT+CLIR	Calling Line Identification Restriction	188
9.10	AT+COLP	Connected Line Identification Presentation	189
9.11	AT+CPUC	Price per unit and currency table	191
9.12	AT+CSSN	Supplementary service notifications	192
9.13	AT+CUSD	Unstructured Supplementary Service Data	194
10.	Packet Domain Related Commands		196
10.1	AT+CGATT	PS Attach or Detach	196
10.2	AT+CGACT	PDP Context Activate or Deactivate	197
10.3	AT+CGCMOD	PDP Context Modify	199
10.4	AT+CGDATA	Enter Data State	200
10.4.1		Automatic deactivation of PDP context during dial-up PPP	201
10.5	AT+CGDCONT	Define PDP Context	202

10.6	AT+CGPADDR Show PDP Address	204
10.7	AT+CGQMIN Quality of Service Profile (Minimum acceptable)	205
10.8	AT+CGEQMIN 3G Quality of Service Profile (Minimum acceptable)	208
10.9	AT+CGREG Packet Domain Network Registration Status	212
10.10	AT+CGQREQ Quality of Service Profile (Requested)	214
10.11	AT+CGEQREQ 3G Quality of Service Profile (Requested)	217
10.12	AT+CGSMS Select Service for MO Short Messages	221
10.13	ATD*99# Request Packet Domain service.....	222
10.14	AT^SGAUTH Set Type of Authentication for PDP-IP Connections.....	223
10.15	AT^SGCONF Configuration of GPRS related Parameters	225
11.	Short Message Service (SMS) Commands.....	227
11.1	SMS parameters	227
11.2	AT+CMGC Send an SMS command.....	232
11.3	AT+CMGD Delete short message.....	233
11.4	AT+CMGF Select SMS message format	234
11.5	AT+CMGL List SMS messages from preferred store.....	235
11.6	AT+CMGR Read SMS messages	237
11.7	AT+CMGS Send Short Message	239
11.8	AT+CMGW Write Short Messages to Memory	240
11.9	AT+CMMS More Messages to Send.....	241
11.10	AT+CMSS Send short messages from storage	242
11.11	AT+CNMA New Message Acknowledgement to UE/TE	243
11.12	AT+CNMI SMS Event Reporting Configuration	244
11.13	AT+CPMS Preferred SMS message storage.....	247
11.14	AT+CSCA SMS Service Center Address.....	249
11.15	AT+CSCB Select Cell Broadcast Message Indication	250
11.16	AT+CSDH Show SMS text mode parameters.....	252
11.17	AT+CSMP Set SMS Text Mode Parameters	253
11.18	AT+CSMS Select Message Service.....	255
11.19	AT^SMGL List Short Messages from preferred store without setting status to REC READ	257
11.20	AT^SCML List Concatenated Short Messages from preferred store	258
11.21	AT^SCMR Read Concatenated Short Messages	259
11.22	AT^SCMS Send Concatenated Short Messages.....	260
11.23	AT^SCMW Write Concatenated Short Messages to Memory.....	261
12.	Internet Service Commands	262
12.1	AT^SICS Internet Connection Settings	263
12.2	AT^SISS Internet Service Setup Profile	265
12.3	AT^SISO Internet Service Open	268
12.4	AT^SISC Internet Service Close	270
12.5	AT^SISR Internet Service Read Data	271
12.6	AT^SISW Internet Service Write Data.....	273
12.7	AT^SIST Transparent Access Mode	275
12.8	AT^SISX Internet Service Execution.....	277
12.9	AT^SISE Internet Service Error Report.....	280
12.10	Internet Service URC	281
12.10.1	Information Elements Related to the Service Application.....	281
12.11	Examples of how to Configure and Use Internet Service Profiles.....	284
12.11.1	Configuring an Internet Connection Profile.....	284

12.11.2	Configuring a Service Profile for TCP Service	284
12.11.3	Using TCP Service on Dedicated Multiplex Channel.....	285
12.11.4	Using TCP Service on Modem Interface	286
12.11.5	Configuring and Using UDP Client	287
12.11.6	Ping.....	288
12.11.7	Resolving DNS Host Name to IP Address.....	289
13.	USIM related Commands	290
13.1	AT+CRSM Restricted USIM Access	290
13.2	AT+CSIM Generic USIM Access	293
13.3	AT^SCKS Query USIM and Chip Card Holder Status	295
13.4	AT^SSET USIM Data Ready Indication	297
13.5	AT^SCID USIM Identification Number	298
14.	USIM Application Toolkit (USAT) Commands.....	299
14.1	Usage of Remote-SAT	301
14.1.1	Automatic Response Mode (AR Mode)	301
14.1.2	Explicit Response Mode (ER Mode).....	301
14.1.3	Character Sets.....	301
14.1.4	USIM Update Initiated by the Network.....	301
14.1.5	Icon Handling.....	302
14.1.6	Using SMS Related AT Commands	302
14.2	Remote-SAT States	303
14.2.1	Remote-SAT State Transition Diagram	304
14.2.2	Remote-SAT State Transition Table.....	305
14.3	Remote-SAT Command Types	307
14.4	AT^SSTA Remote-SAT Interface Activation	308
14.5	^SSTN SAT Notification	310
14.6	AT^SSTGI SAT Get Information	312
14.7	AT^SSTGI SAT Get Information - Refresh (1)	313
14.8	AT^SSTGI SAT Get Information - Set Up Event List (5)	315
14.9	AT^SSTGI SAT Get Information - Set Up Call (16).....	316
14.10	AT^SSTGI SAT Get Information - Send SS (17).....	318
14.11	AT^SSTGI SAT Get Information - Send USSD (18)	319
14.12	AT^SSTGI SAT Get Information - Send Short Message (19)	320
14.13	AT^SSTGI SAT Get Information - Send DTMF (20)	321
14.14	AT^SSTGI SAT Get Information - Launch Browser (21).....	322
14.15	AT^SSTGI SAT Get Information - Play Tone (32).....	324
14.16	AT^SSTGI SAT Get Information - Display Text (33)	326
14.17	AT^SSTGI SAT Get Information - Get Inkey (34)	328
14.18	AT^SSTGI SAT Get Information - Get Input (35)	330
14.19	AT^SSTGI SAT Get Information - Select Item (36).....	332
14.20	AT^SSTGI SAT Get Information - Set up Menu (37)	334
14.21	AT^SSTGI SAT Get Information - Set up Idle Mode Text (40).....	336
14.22	AT^SSTGI SAT Get Information - Language Notification (53)	337
14.23	AT^SSTR SAT Response	338
14.24	AT^SSTR SAT Response - Refresh (1)	340
14.25	AT^SSTR SAT Response - Set Up Event List (5).....	341
14.26	AT^SSTR SAT Response - Set Up Call (16)	342
14.27	AT^SSTR SAT Response - Send SS (17)	343

14.28	AT^SSTR	SAT Response - Send USSD (18)	344
14.29	AT^SSTR	SAT Response - Send Short Message (19)	345
14.30	AT^SSTR	SAT Response - Send DTMF (20)	346
14.31	AT^SSTR	SAT Response - Launch Browser (21)	347
14.32	AT^SSTR	SAT Response - Play Tone (32)	348
14.33	AT^SSTR	SAT Response - Display Text (33)	349
14.34	AT^SSTR	SAT Response - Get Inkey (34)	350
14.35	AT^SSTR	SAT Response - Get Input (35)	352
14.36	AT^SSTR	SAT Response - Select Item (36)	354
14.37	AT^SSTR	SAT Response - Setup Menu (37)	355
14.38	AT^SSTR	SAT Response - Set Up Idle Mode Text (40)	356
14.39	AT^SSTR	SAT Response - Language Notification (53)	357
14.40	AT^SSTR	SAT Event - Menu Selection (211)	358
14.41	AT^SSTR	SAT Event - User Activity (232)	359
14.42	AT^SSTR	SAT Event - Idle Screen Available (233)	360
14.43	AT^SSTR	SAT Event - Language Selection (235)	361
14.44	AT^SSTR	SAT Event - Browser Termination (236)	362
14.45	AT^SSTR	SAT Event - Terminate Command (254)	363
14.46		Examples for Using Remote-SAT	364
15.	Phonebook Commands		367
15.1	AT+CNUM	Read own numbers	367
15.2	AT+CPBF	Find phonebook entries	368
15.3	AT+CPBR	Read from phonebook	370
15.4	AT+CPBS	Select phonebook memory storage	373
15.5	AT+CPBW	Write into phonebook	376
16.	GPS Commands		379
16.1	^SGPSE	GPS Event Notification	380
16.2	AT^SGPSC	GPS Configuration	381
16.2.1		Power Saving Considerations	386
16.2.1.1		Dynamic Power Optimization (DPO)	386
16.2.1.2		On-Demand Power Mode (ODP)	386
16.3	AT^SGPSS	GPS Switch	388
16.4		Examples of How to Configure and Use GPS	390
16.4.1		Loading Xtra.Bin File and Activating A-GPS Start Mode	390
16.4.2		Trying to Load Invalid Xtra.Bin File	391
16.4.3		Starting GPS without Aiding	391
16.4.4		Using the GPS Buffering Mechanism	391
17.	Audio Commands		393
17.1	ATL	Set monitor speaker loudness	393
17.2	ATM	Set monitor speaker mode	393
17.3	AT+CMUT	Mute control	394
17.4	AT+VTS	DTMF and tone generation	395
17.5	AT^SAIC	Audio Interface Configuration	396
17.6	AT^SNFI	Set microphone path parameters	398
17.7	AT^SNFO	Set audio output parameter (loudspeaker path)	400
17.8	AT^SNFS	Select audio hardware set	402
17.9	AT^SNFTTY	Signal TTY/CTM audio mode capability	404

17.10	AT^SRTC Ring tone configuration	406
18.	Hardware related Commands	408
18.1	AT+CCLK Real Time Clock.....	408
18.2	AT^SAD Antenna Configuration.....	409
18.3	AT^SBV Battery/Supply Voltage	410
18.4	AT^SCTM Critical Operating Temperature Monitoring.....	411
18.5	AT^SLED LED Feature	413
19.	Miscellaneous Commands.....	415
19.1	A/ Repeat Previous Command Line	415
19.2	ATS3 Command Line Termination	416
19.3	ATS4 Response Formatting	417
19.4	ATS5 Command Line Editing.....	418
19.5	AT^SBNW Binary Write.....	419
19.6	AT^SFDL Enter Firmware Download Mode	421
20.	Appendix	422
20.1	Restricted access to SIM data after SIM PIN authentication.....	422
20.2	Star-Hash (*#) Network Commands.....	423
20.3	Available AT Commands and Dependency on SIM PIN	426
20.4	Availability of AT Commands Depending on Operating Mode of ME	432
20.5	AT Command Settings storable with AT&W.....	438
20.6	Factory Default Settings Restorable with AT&F	440
20.7	Summary of Unsolicited Result Codes (URC).....	442
20.8	AT Commands Supported Only on the Modem Interface	444
20.9	Alphabetical List of AT Commands	445

List of Tables

Table 1.1:	Symbols used to mark the type of parameters	17
Table 1.2:	Symbols used to indicate storage options or correlations with other commands	17
Table 1.3:	Symbols used to mark different types of default values of parameters	17
Table 1.4:	Types of AT commands and responses	19
Table 1.5:	Exemplary escape sequences generated by PHS8-P for its non-UCS2 output	22
Table 2.1:	AT&V Response	32
Table 2.2:	General "CME ERROR" Codes (3GPP TS 27.007)	43
Table 2.3:	GPRS related "CME ERROR" Codes (3GPP TS 27.007)	44
Table 2.4:	Enhanced "CME ERROR" Codes	44
Table 2.5:	SMS related "CMS ERROR" Codes (3GPP TS 27.005)	45
Table 7.1:	Parameter configurations supported by AT+CBST	141
Table 12.1:	Applicability of AT^SICS <conParmTag> values	263
Table 12.2:	Applicability of AT^SISS <srvParmTag> values	265
Table 14.1:	State: RESET description	305
Table 14.2:	State: OFF description.....	305
Table 14.3:	State: IDLE description	305
Table 14.4:	State: PAC description.....	306
Table 14.5:	State: WAIT description.....	306
Table 14.6:	Command Type Table	307
Table 18.1:	PHS8-P Status and Mode Indication via LED	413
Table 20.1:	Star-Hash (*#) Command Overview	423
Table 20.2:	Abbreviations of Codes and Parameters used in Table 20.1	424
Table 20.3:	Star-Hash Command Response Parameters	424
Table 20.4:	Star-Hash Commands for Supplementary Services	425
Table 20.5:	Available AT Commands and Dependency on SIM PIN.....	426
Table 20.6:	Availability of AT Commands Depending on Operating Mode of ME	432
Table 20.7:	Settings Stored to User Profile	438
Table 20.8:	Factory Default Settings Restorable with AT&F	440
Table 20.9:	Summary of Unsolicited Result Codes (URC).....	442
Table 20.10:	AT Commands Supported Only on the Modem Interface.....	444
Table 20.11:	Alphabetical List of AT Commands.....	445

List of Figures

Figure 1.1:	Main character table of GSM 7 bit default alphabet.....	23
Figure 1.2:	Extension character table of GSM 7 bit default alphabet.....	24
Figure 14.1:	Remote-USAT Context Diagram	300
Figure 14.2:	Remote-SAT State Transition Diagram	304

1. Introduction

1.1 Scope of the document

This document presents the AT Command Set for
PHS8-P GSM/UMTS Engine, Release 02.003.

Before using the PHS8-P or upgrading to a new firmware version please read the latest product information provided in "[PHS8-P Release Notes, Version 02.003](#)".

More information is available at <http://www.cinterion.com>.

1.2 Related documents

- [1] PHS8-P Release Notes, Version 02.003
- [2] PHS8-P Hardware Interface Description, Version 02.003
- [3] User's Guide: Getting Started with PHS8-P
- [4] Multiplexer User's Guide
- [5] [3GPP TS 27.010](#) (descendant of 3GPP TS 07.10): Terminal Equipment to User Equipment (TE-UE) multiplexer protocol
- [6] Multiplex Driver Developer's Guide
- [7] Multiplex Driver Installation Guide
- [8] Application Note 02: Audio Interface Design
- [9] Application Note 16: Updating PHS8-P Firmware
- [10] Application Note 22: Using TTY / CTM equipment with PHS8-P
- [11] Application Note 37: GPS Antenna Integration for PHS8-P
- [12] Application Note 39: USB Interface Description for PHS8-P
- [13] Application Note 43: Customizing PHS8-P Applications
- [14] [3GPP TR 21.905](#) (descendant of 3GPP TR 01.04): Vocabulary for 3GPP Specifications
- [15] International Organization for Standardization (ISO): [ISO/IEC10646](#): Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane.
This international standard is [closely related](#) to the [Unicode Standard](#) published by the [Unicode Consortium](#)
- [16] The [Unicode Consortium](#): [Mapping of ETSI GSM 03.38 7-bit default alphabet characters into Unicode \[.TXT!\]](#)
- [17] ITU-T Recommendation V.24: List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)
- [18] ITU-T Recommendation V.250: Serial asynchronous automatic dialling and control
- [19] [3GPP TS 11.11](#): Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
- [20] [3GPP TS 31.101](#): UICC-terminal interface; Physical and logical characteristics
- [21] [3GPP TS 31.102](#): UICC-terminal interface; Physical and logical characteristics
- [22] [ETSI TS 102 221](#): Smart Cards; UICC-Terminal interface; Physical and logical characteristics
- [23] [3GPP TS 11.14](#): Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
- [24] [3GPP TS 31.111](#): Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)
- [25] [ETSI TS 102 223](#): Smart Cards; Card Application Toolkit (CAT)
- [26] [3GPP TS 22.002](#) (descendant of 3GPP TS 22.02): Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)
- [27] [3GPP TS 22.004](#) (descendant of 3GPP TS 02.04): General on supplementary services
- [28] [3GPP TS 22.030](#) (descendant of 3GPP TS 02.30): Man-Machine Interface (MMI) of the Mobile Station (MS)
- [29] [3GPP TS 22.060](#) (descendant of 3GPP TS 02.60): General Packet Radio Service (GPRS); Service description; Stage 1
- [30] [3GPP TS 23.060](#) (descendant of 3GPP TS 03.60): General Packet Radio Service (GPRS); Service description; Stage 2
- [31] [3GPP TS 22.081](#) (descendant of 3GPP TS 02.81): Line Identification Supplementary Services; Stage 1
- [32] [3GPP TS 22.082](#) (descendant of 3GPP TS 02.82): Call Forwarding (CF) Supplementary Services; Stage 1
- [33] [3GPP TS 22.083](#) (descendant of 3GPP TS 02.83): Call Waiting (CW) and Call Holding (HOLD); Supplementary Services; Stage 1
- [34] [3GPP TS 22.085](#) (descendant of 3GPP TS 02.85): Closed User Group (CUG) supplementary services; Stage 1
- [35] [3GPP TS 22.088](#) (descendant of 3GPP TS 02.88): Call Barring (CB) supplementary services; Stage 1

-
- [36] [3GPP TS 22.090](#) (descendant of 3GPP TS 02.90): Unstructured Supplementary Service Data (USSD); Stage 1
 - [37] [3GPP TS 23.038](#) (descendant of 3GPP TS 03.38): Alphabets and language specific information
 - [38] [3GPP TS 23.040](#) (descendant of 3GPP TS 03.40): Technical realization of the Short Message Service (SMS)
 - [39] [3GPP TS 23.041](#) (descendant of 3GPP TS 03.41): Technical realization of Cell Broadcast Service (CBS)
 - [40] [3GPP TS 23.107](#): Quality of Service (QoS) concept and architecture
 - [41] [3GPP TS 24.011](#) (descendant of 3GPP TS 04.11): Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface
 - [42] [3GPP TS 24.008](#) (descendant of 3GPP TS 04.08): Mobile radio interface Layer 3 specification; Core network protocols; Stage 3
 - [43] [3GPP TS 24.080](#) (descendant of 3GPP TS 04.80): Mobile radio interface layer 3 supplementary services specification; Formats and coding
 - [44] [3GPP TS 25.133](#) Requirements for support of radio resource management
 - [45] [3GPP TS 25.304](#) User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode
 - [46] [3GPP TS 27.005](#) (descendant of 3GPP TS 07.05): Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
 - [47] [3GPP TS 27.007](#) (descendant of 3GPP TS 07.07): AT command set for User Equipment (UE)
 - [48] [3GPP TS 27.060](#) (descendant of 3GPP TS 07.60): Mobile Station (MS) supporting Packet Switched Services
 - [49] [3GPP TS 22.101](#) (descendant of 3GPP TS 02.07 and 3GPP TS 02.40): Service principles
 - [50] [Common PCN Handset Specification \(CPHS\) v4.2 \[.ZIP!\]](#)
 - [51] [3GPP TS 45.008](#) (descendant of GSM 05.08): Radio subsystem link control
 - [52] [Universal Serial Bus Revision 2.0 Specification \[.ZIP!\]](#).
 - [53] [USB Language Identifiers \(LANGIDs\) \[.PDF!\]](#).
 - [54] USB Class Definitions for Communication Devices, Version 1.1 January 19, 1999

1.3 Glossary of Terms

Acronym	Definition
GSM	Global System for Mobile Communications ...
PLMN	Public Land Mobile Network ...
UMTS	Universal Mobile Telecommunications System ...

1.4 Document Conventions

Throughout this document PHS8-P is also referred to as GSM/UMTS Engine or short UE, ME (Mobile Engine), MS (Mobile Station) or Mobile Terminal (MT). In related documents the equivalent term DCE (Data Communication Equipment) may be found.

AT Commands are used to control the PHS8-P. The controlling device is referred to as Customer Application or short TE. Related documents may use the equivalent term DTE (Data Terminal Equipment).

All abbreviations and acronyms used throughout this document are based on GSM or 3GPP specifications. For additional definitions please refer to 3GPP TR 21.905 [14].

1.4.1 Quick Reference Table

Each AT command description includes a table similar to the example shown below. The table is intended as a quick reference to indicate the following functions:

PIN:	Is the AT command PIN protected? + Yes - No ± Usage is dependent on conditions specified for the command, or not all command types are PIN protected (for example write command PIN protected, read command not). Note: The table provided in Section 20.3, Available AT Commands and Dependency on SIM PIN uses the same symbols.
MDM:	Is the AT command supported on the Modem interface? + Yes - No
APP:	Is the AT command supported on the Application interface? + Yes - No
→	Is the AT command supported in AIRPLANE mode? + Yes - No ± In AIRPLANE mode, not all described functions are available. For example, the test or read command is usable, the write or execute command is not. Furthermore, only some of the listed parameters can be changed in AIRPLANE mode. A typical example is AT^SCFG that controls different features.
Last:	If commands are concatenated, this AT command must be the last one. + Yes - No Note: See also Section 1.6, AT Command Syntax for details on concatenated AT commands.

Example:

PIN	MDM	APP	→	Last
-	+	+	-	-

1.4.2 Superscript Notation for Parameters And Values

Table 1.1: Symbols used to mark the type of parameters

Parameter type	Meaning
<param> ^(num)	Parameter value must be numeric type
<param> ^(str)	Parameter value must be string type enclosed in quotation marks.

Table 1.2: Symbols used to indicate storage options or correlations with other commands

Parameter option	Meaning
<param> ^(+CSCS)	Parameter value has to be (is) coded according to current setting of <charSet> (see AT+CSCS for details)
<param> ^(&W)	Parameter value is stored to user profile in non-volatile memory after executing AT&W
<param> ^(&V)	Parameter value is displayed by AT&V
<param> ^(NV)	Parameter is stored in non-volatile memory.

Table 1.3: Symbols used to mark different types of default values of parameters

Value option	Meaning
[x]	Default value set if parameter is omitted.
x ^(&F)	Factory value restored by AT&F
x ^(P)	Powerup value of a parameter not stored in non-volatile memory.
x ^(D)	Delivery value of a parameter which may be overridden from non-volatile setting (refer to symbol ^(NV) and symbol ^(&W) above).

1.5 AT Command Interpreter

PHS8-P features two interfaces for processing AT commands: Modem interface and Application interface. Both AT command interfaces can be assigned to the various physical and virtual interfaces of PHS8-P. Their allocation is dependent on the setting of [AT^SDPORT](#) and whether the multiplexer is active or not.

This section describes the functions of the Modem interface and the Application interface as well as their allocation to the module's physical and virtual interfaces:

- *Modem interface:*

This interface is referred to as "Modem" if queried with [AT^SQPORT](#). In the quick reference tables it is named MDM.

The Modem interface is intended particularly for circuit and packet switched transmission (HSDPA, GPRS, CSD).

All URCs are normally issued on the Application interface. URCs related to data calls (RING, NO CARRIER) as well as the "[^SYSSTART](#)" URC are additionally issued on the Modem interface. For further detail on URCs please refer to Section 1.9, [Unsolicited Result Code Presentation](#), and the configuration command [AT^SCFG](#), parameter [<urcDestIfc>](#).

The Modem interface can be assigned to one of these PHS8-P interfaces, with only a single dial-up connection possible at the same time over the Modem interface:

 - Asynchronous serial interface ASC0
 - A logical channel of the USB composite device. In Windows XP, Windows Vista or Windows 7, for example, it is set up as "Cinterion PHS8-P HSDPA USB Modem" listed in the *Windows Device Manager* under *Modems*.
 - First multiplex channel if Multiplex mode is activated.
- *Application interface:*

This interface is referred to as "Application" if queried with [AT^SQPORT](#). In the quick reference tables it is named APP.

The Application interface is designed especially for controlling the PHS8-P, i.e. for entering AT commands, receiving URCs, or sending and receiving short messages. It cannot be used as data interface for HSDPA, GPRS, CSD.

The Application interface can be assigned to one of these PHS8-P interfaces:

 - A logical channel of the USB composite device. In Windows XP, Windows Vista or Windows 7, for example, it is set up as "Cinterion PHS8-P USB Com Port" listed in the *Windows Device Manager*, under *Ports (COM&LPT)*.
 - Second multiplex channel if Multiplex mode is activated.

Please note that URCs are normally indicated only on this interface, no matter whether the Modem interface or the Application interface was used to send the AT commands for activating their presentation. This URC management scheme is the default configuration recommended for a typical PHS8-P application. For further detail on URCs please refer to Section 1.9, [Unsolicited Result Code Presentation](#), and the configuration command [AT^SCFG](#), parameter [<urcDestIfc>](#).

Bear in mind that the Modem interface and the Application interface are handled by the same AT command interpreter. As a result, AT commands entered on both interfaces are not executed in parallel but sequentially, one after the other. So, an AT command issued on one interface will be buffered on this interface to be executed after the other interface has completed processing earlier AT command(s).

When a data connection is established over the Modem interface, the Application interface can be used simultaneously for any control functions. This eliminates the need for the user to enter AT commands, such as +++ and ATO, to switch back and forth between command and online mode when working on one interface only.

For further detail on Multiplex mode refer to [AT+CMUX](#).

1.6 AT Command Syntax

The "AT" or "at" prefix must be set at the beginning of each command line. To terminate a command line enter <CR>. Commands are usually followed by a response that includes "<CR><LF><response><CR><LF>". Throughout this document, only the responses are presented, <CR><LF> are omitted intentionally.

Table 1.4: Types of AT commands and responses

AT command type	Syntax	Function
Test command	AT+CXXX=?	The mobile equipment returns the list of parameters and value ranges set with the corresponding Write command or by internal processes.
Read command	AT+CXXX?	This command returns the currently set value of the parameter or parameters.
Write command	AT+CXXX=<...>	This command sets user-definable parameter values.
Exec(ution) command	AT+CXXX	The execution command reads non-variable parameters determined by internal processes in the UE.

1.6.1 Using Parameters

- Optional parameters are enclosed in square brackets. If optional parameters are omitted, the current settings are used until you change them.
- Optional parameters or subparameters can be omitted unless they are followed by other parameters. If you want to omit a parameter in the middle of a string it must be replaced by a comma. See also example 1.
- A parameter value enclosed in square brackets represents the value that will be used if an optional parameter is omitted. See also example 2.
- When the parameter is a character string, e.g. <text> or <number>, the string must be enclosed in quotation marks, e.g. "Charlie Brown" or "+49030xxxx". Symbols in quotation marks will be recognized as strings.
- All spaces will be ignored when using strings without quotation marks.
- It is possible to omit the leading zeros of strings which represent numbers.
- If an optional parameter of a ITU-T V.250 command is omitted, its value is assumed to be 0.

Example 1: Omitting parameters in the middle of a string

```

AT+CCUG?                               Query current setting
+CCUG: 1,10,1
OK
AT+CCUG=,9                             Set only the middle parameter
OK
AT+CCUG?                               Query new setting
+CCUG: 1,9,1
OK
    
```

1.7 Communication between Customer Application and PHS8-P

After power-up or restart ensure that the UE is in ready state before trying to send any AT command or data. For detailed information on timing conditions, signal states and particularly the startup behavior of the PHS8-P's signal lines refer to the Hardware Interface Description [2].

Leaving hardware flow control unconsidered the Customer Application (TE) is coupled with the PHS8-P (UE) via a receive and a transmit line.

Since both lines are driven by independent devices collisions may (and will) happen. For example, if the TE issues an AT command and the PHS8-P starts sending a URC. This will probably cause the TE to misinterpret the URC being part of the AT command's response. To avoid this conflict the following measures must be taken:

- If an AT command is finished (with "OK" or "ERROR") the TE shall always wait at least 100 ms before sending the next one.
The pause between two AT commands gives the PHS8-P the opportunity to the transmission of pending URCs and get necessary service.
- The TE shall communicate with the PHS8-P using activated echo ([ATE1](#)), i.e. the PHS8-P echoes characters received from the TE.
Hence, when the TE receives the echo of the first character "A" of the AT command just sent by itself it has control both over the receive and the transmit paths.

Using Backspace at command line:

- As the standard GSM alphabet does not provide a backspace functionality the PHS8-P is designed to use the character "08" (hex 0x08) as backspace for command line input. This allows the user to easily erase the last character when writing an AT command. On the other hand, this solution requires entering the escape sequence \08 for writing the "ò" character in GSM character string parameters.
- If command echo is enabled ([ATE1](#)) Backspace may cause 08 - 32 - 08 (decimal) character sequence or no echo, depending on serial interface and speed of character input.

1.8 Supported character sets

PHS8-P supports three character sets: *GSM 7 bit*, also referred to as GSM alphabet or SMS alphabet (3GPP TS 23.038 [37]) *UCS2 16 bit* (ISO-10646 [15]), and *IRA* (International Reference Alphabet, ITU T T.50). See [AT+CSCS](#) for information about selecting the character set. Character tables can be found below.

Explanation of terms

- **Escape Character**

There are two types of escape sequences which lead to an alternative interpretation on subsequent characters by the UE:

- **AT command interface**
Escape sequences starting with character value 0x5C are used for the UE's non-UCS2 input and output.
- **GSM 7 bit default alphabet**
The escape sequence used within a text coded in the GSM 7 bit default alphabet is starting with character value 0x1B and needs to be correctly interpreted by the TE, both for character input and output. To the PHS8-P, an escape sequence appears like any other byte received or sent.

For SMS user data input after the prompt '>' in text mode ([AT+CMGF](#))=1 and [AT+CSCS](#)="GSM" the character 0x1A is interpreted as 'CTRL-Z'. The character 0x1B (interpreted as 'ESC') as well as the escape character 0x5C (is interpreted as 'Ö'), therefore both escape mechanisms are not supported in this case.

- **TE Character Set**

The character set currently used by the Customer Application is selected with [AT+CSCS](#). It is recommended to select UCS2 setting.

- **Data Coding Scheme (DCS)**

DCS is part of a short message and is saved on the SIM. When writing a short message to the SIM in text mode, the DCS stored with [AT+CSMP](#) is used and determines the coded character set.

- **International Reference Alphabet (IRA)**

The International Reference Alphabet is equivalent to ASCII (American Standard Code for Information Interchange) and ISO 646, i.e. it defines a 7-bit coded character set. The mapping can be obtained from the character set tables below (UCS2 values 0x0000 to 0x007F).

When you enter characters that are not valid characters of the supported alphabets the behavior is undefined. If GSM alphabet is selected, all characters sent over the serial line (between TE and UE) must be in the range from 0 to 127 (7 bit range).

Note: If the UE is configured for GSM alphabet, but the Customer Application (TE) uses ASCII, bear in mind that some characters have different code values, such as the following:

- "@" character with GSM alphabet value 0 is not displayable by an ASCII terminal program, e.g. Microsoft® Hyperterminal®.
- "@" character with GSM alphabet value 0 will terminate any C string! This is because value 0 is defined as C string end tag. Therefore, the GSM Null character will cause problems on application level when using 'C'-functions, e.g. "strlen()". Using an escape sequence as shown in the table below solves the problem. By the way, this may be the reason why even network providers sometimes replace '@' with "@=" in their SIM application.
- Some other characters of the GSM alphabet may be misinterpreted by an ASCII terminal program. For example, GSM "ö" (as in "Börse") is assumed to be "l" in ASCII, thus resulting in "B|rse". This is because in both alphabets there are different characters assigned to value 7C (hexadecimal).

If the TE sends characters differently coded or undefined in ASCII or GSM (e.g. Ä, Ö, Ü) it is possible to use escape sequences. The UE's input parser translates the escape sequence to the corresponding GSM character value.

Note:

The UE also uses escape sequences for its non-UCS2 output: Quotation mark (") and the escape character itself (\, respectively Ö in GSM alphabet) are converted, as well as all characters with a value below 32 (hexadecimal 0x20).

Hence, the input parser of the Customer Application needs to be able to translate escape sequences back to the corresponding character of the currently used alphabet.

Table 1.5: Exemplary escape sequences generated by PHS8-P for its non-UCS2 output

Character Value	ASCII Character	GSM Character	UCS2 Character	Escape Sequence	Numeric Escape Sequence
0x5C	\	Ö	00D6	\5C	0x5C 0x35 0x43
0x22	"	"	0022	\22	0x5C 0x32 0x32
0x00	NULL	@	n/a	\00	0x5C 0x30 0x30

Usually terminal programs are not able to recognize escape sequences, and thus, handle them as normal characters.

To prevent misinterpretation of control characters or special characters it is recommended to always use USC2 alphabet and PDU mode.

1.8.1 GSM alphabet tables and UCS2 character values

This section provides tables for the GSM default alphabet (3GPP TS 23.038 [37]) supported by the PHS8-P. Below any GSM character find the corresponding two byte character value of the UCS2 alphabet. For details refer to "ETSI GSM 03.38 mapping into Unicode" [16].

Main character table of GSM 7 bit default alphabet				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@ 0040	Δ 0394	SP 0020	0 0030	i 00A1	P 0050	¿ 00BF	p 0070
0	0	0	1	1	£ 00A3	_ 005F	! 0021	1 0031	A 0041	Q 0051	a 0061	q 0071
0	0	1	0	2	\$ 0024	Φ 03A6	" 0022	2 0032	B 0042	R 0052	b 0062	r 0072
0	0	1	1		3	¥ 00A5	Γ 0393	# 0023	3 0033	C 0043	S 0053	c 0063
0	1	0	0	4	è 00E8	Λ 039B	* 00A4	4 0034	D 0044	T 0054	d 0064	t 0074
0	1	0	1		5	é 00E9	Ω 03A9	% 0025	5 0035	E 0045	U 0055	e 0065
0	1	1	0	6	ù 00F9	Π 03A0	& 0026	6 0036	F 0046	V 0056	f 0066	v 0076
0	1	1	1		7	ì 00EC	Ψ 03A8	' 0027	7 0037	G 0047	W 0057	g 0067
1	0	0	0	8	ò ³⁾ 00F2	Σ 03A3	(0028	8 0038	H 0048	X 0058	h 0068	x 0078
1	0	0	1	9	ç 00E7	Θ 0398) 0029	9 0039	I 0049	Y 0059	i 0069	y 0079
1	0	1	0	10 /A	LF [LF] ²⁾	ϋ 039E	* 002A	: 003A	J 004A	Z 005A	j 006A	z 007A
1	0	1	1	11 /B	ø 00D8	¹⁾	+ 002B	; 003B	K 004B	Ä 00C4	k 006B	ä 00E4
1	1	0	0	12 /C	ø 00F8	Æ 00C6	, 002C	< 003C	L 004C	Ö 00D6	l 006C	ö 00F6
1	1	0	1	13 /D	CR [CR] ²⁾	æ 00E6	- 002D	= 003D	M 004D	Ñ 00D1	m 006D	ñ 00F1
1	1	1	0	14 /E	Ä 00C5	ß 00DF	. 002E	> 003E	N 004E	Ü 00DC	n 006E	ü 00FC
1	1	1	1	15 /F	ä 00E5	É 00C9	/ 002F	? 003F	O 004F	Ş 00A7	o 006F	à 00E0

Figure 1.1: Main character table of GSM 7 bit default alphabet

- 1) This code is an escape to the following extension of the 7 bit default alphabet table.
- 2) This code is not a printable character and therefore not defined for the UCS2 alphabet. It shall be treated as the accompanying control character.
- 3) See Section 1.7 for further details on using backspace and "ò" character.

Extension character table of GSM 7 bit default alphabet				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0								
									007C			
0	0	0	1	1								
0	0	1	0	2								
0	0	1	1	3								
0	1	0	0	4		^						
						005E						
0	1	0	1	5						€ ²⁾		
										20AC		
0	1	1	0	6								
0	1	1	1	7								
1	0	0	0	8			{					
							007B					
1	0	0	1	9			}					
							007D					
1	0	1	0	10 /A	³⁾	[LF]						
1	0	1	1	11 /B		⁴⁾						
1	1	0	0	12 /C				[
								005B				
1	1	0	1	13 /D				~				
								007E				
1	1	1	0	14 /E]				
								005D				
1	1	1	1	15 /F			\					
							005C					

Figure 1.2: Extension character table of GSM 7 bit default alphabet

- 1) This code value is reserved for the extension to another extension table. On receipt of this code, a receiving entity shall display a space until another extension table is defined.
- 2) This code represents the EURO currency symbol. The code value is the one used for the character 'e'. Therefore a receiving entity which is incapable of displaying the EURO currency symbol will display the character 'e' instead.
- 3) This code is defined as a Page Break character and may be used for example in compressed CBS messages. Any mobile which does not understand the 7 bit default alphabet table extension mechanism will treat this character as Line Feed.

If the Customer Application receives a code where a symbol is not represented in Figure 1.2, [Extension character table of GSM 7 bit default alphabet](#) it shall display the character shown in the main GSM 7 bit default alphabet table (see Figure 1.1, [Main character table of GSM 7 bit default alphabet](#)).

1.8.2 UCS2 and GSM character coding and conversion

This section provides basic information on how to handle input and output character conversion, e.g. for SMS text mode and Remote SAT, if the character representation of UE and Customer Application differ, i.e. if the Data Coding Scheme and the TE character set use different mappings.

1.8.2.1 Output of SIM data (UE to TE)

Used character set	DCS = 7 bit GSM	DCS = 8 bit Data	DCS = 16 bit UCS2
GSM	Case 1 GSM (1:1)	Case 2 8 bit to IRA (1:2)	Case 3 UCS2 to IRA (2:4)
UCS2	Case 4 GSM to IRA (1:4)	Case 5 8 bit to IRA (1:4)	Case 6 UCS2 to IRA (2:4)

Note: The ratio of SIM bytes to output bytes is given in parentheses.

Case 1

Every GSM character is sent to the TE as it is (8-bit value with highest bit set to zero).
Example: 47'H, 53'H, 4D'H → 47'H, 53'H, 4D'H, displayed as "GSM"

Case 2

Every data byte is sent to the TE as 2 IRA characters each representing a halfbyte.
Example: B8'H (184 decimal) → 42'H, 38'H, displayed as "B8"

Case 3

Every 16-bit UCS2 value is sent to the TE as 4 IRA characters.
Example: C4xA7'H (50343 decimal) → 43'H, 34'H, 41'H, 37'H, displayed as "C4A7"
Problem: An odd number of bytes leads to an error because there are always two bytes needed for each USC2 character

Case 4

Every GSM character is sent to the TE as 4 IRA characters to show UCS2 in text mode.
Example: 41'H ("A") → 30'H, 30'H, 34'H, 31'H, displayed as "0041"

Case 5

Every data byte is sent to the TE as IRA representation of UCS2 (similar to case 4).
Example: B2'H → 30'H, 30'H, 42'H, 32'H, displayed as "00B2"

Case 6

Every 16-bit value is sent to the TE as IRA representation of it. It is assumed that number of bytes is even.
Example: C3x46'H → 43'H, 33'H, 34'H, 36'H, displayed as "C346"

1.8.2.2 Input of SIM data (TE to UE)

Used character set	DCS = 7 bit GSM	DCS = 8 bit Data	DCS = 16 bit UCS2
GSM	Case 1 GSM (1:1)	Case 2 IRA to 8 bit (2:1)	Case 3 IRA to 16 bit (4:2)
UCS2	Case 4 UCS2 to GSM (4:1)	Case 5 UCS2 to 8 bit (4:1)	Case 6 UCS2 to 16 bit (4:2)

Note: The ratio between the number of input characters and bytes stored on the SIM is given in parentheses.

Case 1

Every character is sent from TE to UE as GSM character (or ASCII with standard terminal emulation, e.g. Hyperterminal®).

Character value must be in range from 0 to 127 because of 7-bit GSM alphabet.

To reach maximum SMS text length of 160 characters in 140 bytes space characters will be compressed on SIM. This must be set using the parameter `<dcsc>` of `AT+CSMP` (add 64).

Example: "ABCDEFGH" typed is sent and stored uncompressed as → 4142434445464748'H (stored compressed as 41E19058341E91'H)

Case 2

Every data byte is sent as 2 IRA characters.

Maximum text length is 280 IRA characters which will be converted into 140 bytes SMS binary user data

Example: "C8" typed is sent as 43'H, 38'H → stored as C8'H

Case 3

Every 16-bit value is sent as 4 IRA characters.

Maximum text length is 280 IRA characters which will be converted into 70 UCS2 characters (16-bit each)

Number of IRA characters must be a multiple of four because always 4 half bytes are needed for a 16-bit value

Example: "D2C8" typed is sent as 44'H, 32'H, 43'H, 38'H → stored as D2C8'H

Case 4

Every GSM character is sent as 4 IRA characters representing one UCS2 character.

Example: To store text "ABC" using UCS2 character set you have to type "004100420043".

This is sent as 30'H,30'H,34'H,31'H, 30'H,30'H,34'H,32'H, 30'H,30'H,34'H,33'H → detected as IRA representation of 3 UCS2 characters, converted to GSM character set and stored as 41'H, 42'H, 43'H.

Maximum input is 640 IRA characters representing 160 UCS2 characters when compression is active. These are converted to 160 GSM 7-bit characters.

Without compression only 140 GSM characters can be stored which are put in as 560 IRA characters.

Values of UCS2 characters must be smaller than 80'H (128 decimal) to be valid GSM characters.

Number of IRA characters must be a multiple of four. Problems:

- "41" → Error, there are four IRA characters (two bytes) needed
- "0000" → Error, not an UCS2 character
- "4142" → Error, value of UCS2 character > 7F'H
- "008B" → Error, value of UCS2 character > 7F'H

This affects the maximum input length of a string)

Case 5

Every UCS2 character is sent as 4 IRA characters and is converted into two 8-bit values. This means that the first two characters have to be '00'.

Example: UCS2 character 009F'H typed as "009F" is sent as 30'H,30'H,39'H,46'H → converted into 8-bit value 9F'H.

Maximum number of UCS2 characters is 140 which are represented by 560 IRA characters. Number of IRA characters must be a multiple of four.

Case 6

Every UCS2 character is sent as 4 IRA characters each and is converted into a 16-bit value again.

Example: UCS2 character 9F3A'H typed as "9F3A" is sent as 39'H,46'H,33'H,41'H → converted into 9F3A'H.

Maximum number of UCS2 characters is 70 which are represented by 280 IRA characters. Number of IRA characters must be a multiple of four.

Invalid UCS2 values must be prevented.

1.9 Unsolicited Result Code Presentation

URC stands for Unsolicited Result Code and is a report message issued by the PHS8-P without being requested by the TE, i.e. a URC is issued automatically when a certain event occurs. Hence, a URC is not issued as part of the response related to an executed AT command.

Typical events leading to URCs are incoming calls ("RING"), waiting calls, received short messages, changes in temperature, network registration etc. For most of these messages, the UE needs to be configured whether or not to send a URC. Descriptions of these URCs are provided with the associated AT command. Only the URCs related to automatic undervoltage and overvoltage shutdown are not user definable. These URCs are described in Section 1.9.1, [Common URCs](#). A summary of all URCs can be found in Section 20.7, [Summary of Unsolicited Result Codes \(URC\)](#).

As specified in Section 1.5, [AT Command Interpreter](#) the Modem interface is dedicated for data transmission (HSDPA, GPRS, CSD), whereas the Application interface is designed primarily for control functions. This implies that all URCs are issued on the Application interface, no matter which of the AT interfaces was used to send the AT command for activating their presentation. URCs related to data calls (RING, NO CARRIER) are additionally issued on the Modem interface to ensure compatibility with existing modem applications. The "[^SYSSTART](#)" URC will also be output both on the Application and Modem interface.

Enabled by default when the UE is powered up, the above URC management scheme is the recommended approach for a typical PHS8-P application. However, as an alternative to this approach, [AT^SCFG](#), "URC/DstIfc", [<urcDestIfc>](#) provides the option to determine the interface used for URC output.

Important: If the interface used for URC output is reserved by an active data connection or a long running AT command, URCs are buffered internally and will be issued after the interface becomes idle again. A pending URC will be signaled on the URC output interface via RING line or BREAK transmission. This allows to systematically suspend any longer data connection (refer [+++](#) and [ATO](#)) to check for pending URCs after being signaled! For detailed information regarding configuration of URC signaling refer to [AT^SCFG](#): "MEopMode/RingOnData", [<ringlineSig>](#) and [AT^SCFG](#), "URC/Datamode/Ringline", [<urcSigType>](#) and [AT^SCFG](#), "URC/Ringline", [<urcRinglineCfg>](#).

1.9.1 Common URCs

This section contains all URCs not associated to a certain AT command. They cannot be defined by the user and appear automatically when the required conditions described below occur. Please refer to [2] for specifications regarding the minimum and maximum operating voltage limits. The automatic shutdown procedure is usually equivalent to the Power-down initiated with the `AT^SMSO` command, except when the voltage threshold is exceeded very quickly.

URC 1

`^SBC: Undervoltage`

The URC indicates that the UE is close to the undervoltage threshold. If undervoltage persists the UE keeps sending the URC several times before switching off automatically.

URC 2

`^SBC: Overvoltage Warning`

Supply voltage is close to overvoltage threshold. The URC is sent once.

URC 3

`^SBC: Overvoltage Shutdown`

Overvoltage threshold exceeded. Module switches off within 5 seconds after sending the URC.

1.10 Errors and Messages

The command result codes "+CME ERROR: <err>" and "+CMS ERROR: <err>" indicate errors related to mobile equipment or network functionality.

The format of <err> can be either numeric or verbose and is selectable via [AT+CMEE](#).

A result error code terminates the execution of the command and prevents the execution of all remaining commands that may follow on the same command line.

Using the wrong command syntax may result in errors: For example, using the execute command syntax although the command has no execute format, causes "ERROR" to be returned. Likewise, using the write command syntax although the command has no write format causes "+CME ERROR: <err>" to be returned.

See also:

- Section [2.11.1](#), [CME/CMS Error Code Overview](#)
- Section [2.5.1](#), [Verbose and numeric result codes](#)
- Section [3.2](#), [AT+CEER](#)

1.11 Serial Interface Flow Control

Flow control is essential to prevent loss of data or avoid errors when, in a data call, the sending device is transferring data faster than the receiving side is ready to accept. When the receiving buffer reaches its capacity, the receiving device should be capable to cause the sending device to pause until it catches up.

There are basically two approaches to regulate data flow: Software flow control and hardware flow control. The High Watermark (HWM) of the input/output buffer should be set to approximately 60% of the total buffer size, the Low Watermark (LWM) is recommended to be about 30%. The data flow should be stopped when the buffer capacity rises close to the High Watermark and resumed when it drops below the Low Watermark. The time required to cause stop and go results in a hysteresis between the High and Low Watermarks.

1.11.1 Software Flow Control (XON/OFF Handshake)

Software flow control can be used to control the data flow in both directions, from Customer Application to PHS8-P and vice versa, i.e. UE to TE. Software flow control uses different characters to stop (XOFF, decimal 19) and resume (XON, decimal 17) data flow. Hence, all data that represent XON or XOFF characters will be interpreted as control characters. This applies also to characters included within the data stream to be transmitted (usually plain ASCII text files do not include such characters). The only advantage of software flow control is that three wires would be sufficient on the serial interface.

1.11.2 Hardware Flow Control (RTS/CTS Handshake)

Hardware flow control sets or resets the RTS/CTS wires. This approach is faster and more reliable, and therefore, the better choice. When the HWM is reached, CTS is set inactive. When the LWM is passed, CTS goes active again. To achieve smooth data flow, ensure that the RTS/CTS lines are present on your application platform.

Configuring hardware flow control

- Hardware flow control must be set on both sides: with `AT\Q3` in the UE and an equivalent RTS/CTS handshake option in the host application.
- `AT\Q` has no read command. To verify the current setting of `AT\Q`, simply check the settings of the active profile with `AT&V`.

2. Configuration Commands

The AT Commands described in this chapter allow the external application to determine the PHS8-P's behaviour under various conditions.

2.1 AT&F Reset AT Command Settings to Factory Default Values

AT&F resets AT command settings to their factory default values. However, the command does not change the current bit rate of PHS8-P's asynchronous serial interface (UART). Every ongoing or incoming call will be terminated. For a list of affected parameters refer to Section 20.6, [Factory Default Settings Restorable with AT&F](#).

Syntax

Exec Command					
AT&F[<value>]					
Response(s)					
OK					
PIN	MDM	APP	→	Last	Reference(s)
+	+	+	+	-	V.250

Parameter Description

<value> ^(num)	
[0]	Reset parameters in Section 20.6, Factory Default Settings Restorable with AT&F to their factory default values.

2.2 AT&V Display current Configuration

[AT&V](#) returns the setting of several AT command parameters applicable to the current operating mode, including the single-letter AT command parameters which are not readable otherwise.

Syntax

```
Exec Command
AT&V
Response(s)
ACTIVE PROFILE:
... (see Section 2.2.1, AT&V Response)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

2.2.1 AT&V Response

Table 2.1: AT&V Response

```
ACTIVE PROFILE:
E1 Q0 V1 X0 &C1 &D2 &S0 \Q0
S0:000 S3:013 S4:010 S5:008 S6:002 S7:000 S8:002 S10:014
+CBST: 0,0,1
+CRLP: 61,61,48,6,0
+CRLP: 61,61,48,6,1
+CRLP: 240,240,52,6,2
+CR: 0
+CRC: 0
+CMGF: 0
+CSDH: 0
+CNMI: 0,0,0,0,1
+IPR: 115200
+CMEE: 2
+CSMS: 0,1,1,1
^SLCC: 0
^SCKS: 0,1
^SSET: 0
+CREG: 0,1
+CLIP: 0
+CAOC: 0
+COPS: 0[,<format>,<operator>,<rat>]
+CGSMS: 3
OK
```


2.3 AT&W Store AT Command Settings to User Defined Profile

[AT&W](#) stores the current AT command settings to a user defined profile in non-volatile memory of PHS8-P. The AT command settings will automatically be restored from the user defined profile during power-up or if [ATZ](#) is used. [AT&F](#) restores AT command factory default settings. Hence, until first use of [AT&W](#), [ATZ](#) works as [AT&F](#). A list of parameters stored to the user profile can be found at Section [20.5, AT Command Settings storable with AT&W](#).

Syntax

```
Exec Command
AT&W[<value>]
Response(s)
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Reference(s)
V.250

Parameter Description

<value> ^(num)
[0] User Profile Number

2.4 ATQ Result Code Presentation Mode

ATQ controls if the PHS8-P transmits any result code to the TE. Other information text transmitted as response is not affected.

Syntax

Exec Command				
ATQ[<n>]				
Response(s)				
If <n>=0:				
OK				
If <n>=1:				
(none)				
PIN	MDM	APP	→	Last
+	+	+	+	-
Reference(s)				
V.250				

Parameter Description

<n> ^{(num)(&V)(&W)}	
Result Code Presentation Mode. It is not recommended to change this value.	
[0] ^{(&F)(D)}	UE transmits result code.
1	Result codes are suppressed and not transmitted.

2.5 ATV Result code format mode

This command determines the contents of header and trailer transmitted with AT command result codes and information responses. Possible responses are described in Section 2.5.1, [Verbose and numeric result codes](#).

Syntax

Exec Command		
ATV[<value>]		
Response(s)		
OK		
ERROR		
PIN	MDM	APP
-	+	+
		→ Last
		Reference(s)
		ITU-T V.250 [18]

Parameter Description

<value> ^{(num)(&V)(&W)}	
[0]	Information response: <text><CR><LF> Short result code format: <numeric code><CR>
1 ^{(&F)(D)}	Information response: <CR><LF><text><CR><LF> Long result code format: <CR><LF><verbose code><CR><LF>

2.5.1 Verbose and numeric result codes

Verbose format	Numeric format	Meaning
OK	0	command executed, no errors
CONNECT	1	link established
RING	2	ring detected
NO CARRIER	3	link not established or disconnected
ERROR	4	invalid command or command line too long
NO DIALTONE	6	no dial tone, dialling impossible, wrong mode
BUSY	7	remote station busy
NO ANSWER	8	no answer
CONNECT 9600	49	link with 9600 bps
CONNECT 14400	50	link with 14400 bps
CONNECT 28800	51	link with 28800 bps
CONNECT 32000	52	link with 32000 bps
CONNECT 38400	53	link with 38400 bps
CONNECT 56000	54	link with 56000 bps
CONNECT 64000	55	link with 64000 bps

2.6 ATX CONNECT Result Code Format

ATX determines whether or not the PHS8-P transmits particular result codes to the TE.

ATX also controls whether or not the UE verifies the presence of a dial tone when it begins dialing, and if engaged tone (busy signal) detection is enabled.

The CONNECT or CONNECT <text> result code indicates that the UE has changed from command state to online data state.

Syntax

Exec Command					
ATX[<value>]					
Response(s)					
OK					
ERROR					
PIN	MDM	APP	→	Last	Reference(s)
+	+	+	+	-	ITU-T V.250 [18]

Parameter Description

<value> ^{(num)(&V)(&W)}	Description
[0] ^{(&F)(D)}	CONNECT result code only returned. Dial tone and busy detection are disabled.
1	CONNECT <text> result code returned. Dial tone and busy detection are disabled.
2	CONNECT <text> result code returned. Dial tone detection is enabled, busy detection is disabled.
3	CONNECT <text> result code returned. Dial tone detection is disabled, busy detection is enabled.
4	CONNECT <text> result code returned. Dial tone and busy detection are both enabled.

2.7 ATZ Restore AT Command Settings from User Defined Profile

First [ATZ](#) resets the AT command settings to their factory default values, similar to [AT&F](#). Afterwards the AT command settings are restored from a user defined profile in non-volatile memory of PHS8-P, if one was stored with [AT&W](#) before. Any additional AT command on the same command line may be ignored. A delay of 300 ms is required before next AT command is sent.

However, [ATZ](#) does not change the current bit rate of PHS8-P's asynchronous serial interface (UART). [ATZ](#) does not change the PDP context profiles.

Syntax

Exec Command					
ATZ[<value>]					
Response(s)					
OK					
PIN	MDM	APP	→	Last	Reference(s)
+	+	+	+	-	V.250

Parameter Description

<value> ^(num)	
[0]	User Profile Number

2.8 AT+CFUN PHS8-P Functionality Level

[AT+CFUN](#) controls PHS8-P's functionality level. It can also be used to reset the UE.

Syntax

<p>Test Command</p> <p>AT+CFUN=?</p> <p>Response(s)</p> <p>+CFUN: (list of supported <fun>s), (list of supported <rst>s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Read Command</p> <p>AT+CFUN?</p> <p>Response(s)</p> <p>+CFUN: <fun></p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Write Command</p> <p>AT+CFUN=<fun>[, <rst>]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<table border="1"><thead><tr><th>PIN</th><th>MDM</th><th>APP</th><th>→</th><th>Last</th></tr></thead><tbody><tr><td>-</td><td>+</td><td>+</td><td>+</td><td>-</td></tr></tbody></table>	PIN	MDM	APP	→	Last	-	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
-	+	+	+	-							

Unsolicited Result Codes

URC 1

^SYSSTART

Indicates that the UE has entered normal functionality level.

The URC will be issued when the UE restarts if [AT+CFUN=1](#) was set before shutdown or if the reset command [AT+CFUN=1,1](#) was used. The URC will also appear when returning from Airplane mode to normal functionality level with [AT+CFUN=1](#).

URC 2

^SYSSTART AIRPLANE MODE

This URC indicates that the UE has entered Airplane mode. In this mode, only the AT commands listed in [Section 20.4, Availability of AT Commands Depending on Operating Mode of ME](#) can be used. If the subscriber tries to use an AT command not available in Airplane mode the response "+CME ERROR: operation not supported" is returned.

The URC will be issued after activating Airplane mode either with [AT+CFUN=0](#) or 4. It will also be issued if the UE was powered down in Airplane mode and switched on again with IGT.

Parameter Description

`<fun>`^(num)

Keep in mind that the mode entered after switching on the UE depends on the `<fun>` level selected before powering down the UE with `AT^SMSO`. The reset command always uses `<fun>` level = 1 and therefore leads to normal functionality level.

0	Minimum functionality level. Shut down TX and RX RF-circuits whereby PHS8-P logs off from the network and enters Airplane mode indicated as " <code>^SYSSTART AIRPLANE MODE</code> ". The USIM will be powered down (like an unplugged USIM). Airplane mode shuts down the radio part of the UE (PA and receiver), causes the UE to log off from the network and disables all AT commands whose execution requires a radio connection. The benefit of Airplane mode is that, at locations where no RF emission is allowed (typically airplanes, hospitals etc.), the subscriber can continue using network-independent features rather than powering off the entire device (e.g. a PDA or smartphone). A list of AT commands supported during Airplane mode can be found in Section 20.4, Availability of AT Commands Depending on Operating Mode of ME . If the subscriber tries to use an AT command not available in Airplane mode the response "+CME ERROR: operation not supported" is returned.
1	Normal functionality level.
4	Minimum functionality level. Shut down TX and RX RF-circuits whereby PHS8-P logs off from the network and enters Airplane mode indicated as " <code>^SYSSTART AIRPLANE MODE</code> ". A connected USIM remains accessible for network independent functions.

`<rst>`^(num)

[0]	UE switches to <code><fun></code> level without reset.
1	UE resets and restarts. After this, PIN 1 authentication may be necessary (<code>AT+CPIN</code>). Restart is only possible with <code><fun>= 1</code> which activates normal functionality.

Note

- For compatibility with other products or earlier PHS8-P releases, Airplane mode can also be enabled/disabled by using the deprecated `AT^SCFG` subcommand "MEOpMode/Airplane". Please note that the mode enabled by the "MEOpMode/Airplane" subcommand corresponds to `AT+CFUN=4` (SIM functions remain accessible).

2.9 AT^SMSO Switch Off PHS8-P

`AT^SMSO` initiates PHS8-P's power-off procedure. Do not send any other AT command after this.

Syntax

Test Command

```
AT^SMSO=?
```

Response(s)

```
OK
```

Exec Command

```
AT^SMSO
```

Response(s)

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	+

2.10 AT+GCAP Capabilities List

[AT+GCAP](#) displays a list of basic capabilities supported by the PHS8-P. This allows the TE to determine which groups of extended-syntax AT commands can be used with the UE.

Syntax

Test Command	
AT+GCAP=?	
Response(s)	
OK	
Exec Command	
AT+GCAP	
Response(s)	
+GCAP: <name>	
OK	
PIN MDM APP → Last	Reference(s)
+ + + + -	ITU-T V.250 [18]

Parameter Description

<name> ^(str)
e.g. +CGSM

2.11 AT+CMEE Error Message Format

AT+CMEE controls the format of error result codes that indicates errors related to PHS8-P functionality. Format can be selected between plain "ERROR" output, error numbers or verbose "+CME ERROR: <err>" and "+CMS ERROR: <err>" messages.

Possible error result codes are listed in Table 2.2, General "CME ERROR" Codes (3GPP TS 27.007), Table 2.3, GPRS related "CME ERROR" Codes (3GPP TS 27.007) and Table 2.5, SMS related "CMS ERROR" Codes (3GPP TS 27.005).

The AT+CMEE exec command performs a write command with factory default parameter setting.

Syntax

<p>Test Command</p> <p>AT+CMEE=?</p> <p>Response(s)</p> <p>+CMEE: (list of supported<errMode>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CMEE?</p> <p>Response(s)</p> <p>+CMEE: <errMode></p> <p>OK</p>											
<p>Exec Command</p> <p>AT+CMEE</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Write Command</p> <p>AT+CMEE=<errMode></p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47], 3GPP TS 27.005 [46]</p>
PIN	MDM	APP	→	Last							
-	+	+	+	-							

Parameter Description

<errMode> ^{(num)(&V)(&W)}	
0(&F)(D)	Disable result code, i.e. only "ERROR" will be displayed.
1	Enable error result code with numeric values.
2	Enable error result code with verbose (string) values.

2.11.1 CME/CMS Error Code Overview

Table 2.2: General "CME ERROR" Codes (3GPP TS 27.007)

<err> Code	Text (if AT+CMEE=2)
0	phone failure
1	no connection to phone
2	phone adapter 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
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 personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
100	unknown

Table 2.3: GPRS related "CME ERROR" Codes (3GPP TS 27.007)

<err> Code	Text (if AT+CMEE=2)
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
132	service option not supported
133	requested service option not subscribed
134	service option temporary out of order
148	unspecified GPRS error
149	PDP authentication failure
150	invalid mobile class
273	minimum TFTs per PDP address violated
274	TFT precedence index not unique
275	invalid parameter combination

Table 2.4: Enhanced "CME ERROR" Codes

<err> Code	Text (if AT+CMEE=2)
256	operation temporary not allowed
257	network rejected request
258	retry operation
259	invalid deflected to number
260	deflected to own number
261	unknown subscriber
262	service not available
263	unknown class specified
264	unknown network message
300	resource limitation
301	subscription violation
302	TeleService not provisioned
303	error BearerService not provisioned
304	system failure
305	data missing
306	unknown alphabet
307	unexpected data value
308	unrecognized component
309	mistyped component
310	badly structured component
311	mistyped parameter
312	initiating release
320	call barred

<err> Code	Text (if AT+CMEE=2)
330	SMSC address unknown
343	parameters error
767	operation failed

Table 2.5: SMS related "CMS ERROR" Codes (3GPP TS 27.005)

<err> Code	Text (if AT+CMEE=2)
0	none
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network timeout
340	no +CNMA acknowledgement expected
500	unknown error
512	user abort
538	invalid parameter

2.12 AT+CSCS Character Set

AT+CSCS write command informs the PHS8-P which character set is used by the TE. This enables the UE to convert character strings correctly between TE and UE character sets. Please also refer to Section 1.8, [Supported character sets](#).

Syntax

<p>Test Command</p> <p>AT+CSCS=?</p> <p>Response(s)</p> <p>+CSCS: (list of supported<charSet>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CSCS?</p> <p>Response(s)</p> <p>+CSCS: <charSet></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CSCS=<charSet></p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
-	+	+	+	-							

Parameter Description

<charSet> ^(str)	
"GSM" ^{(&F)(P)}	GSM default alphabet (3GPP TS 23.038 [37] , subclause 6.2.1).
"UCS2"	16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]). UCS2 character strings are converted to hexadecimal numbers in the range 0000 to FFFF; e.g. "004100620063" equates three 16-bit characters with decimal values 65, 98 and 99.
"IRA"	International reference alphabet (ITU T T.50).

2.13 AT^SCFG Extended Configuration Settings

AT^SCFG can be used to query and configure various settings of the PHS8-P.

AT^SCFG read command returns a list of all supported parameters and their current values.

AT^SCFG write command queries a configuration parameter (if no value is entered) or sets its value(s).

If not stated otherwise, then all string parameters of this command are IRA encoded, independent of the current AT+CSCS setting.

Syntax

Test Command

AT^SCFG=?

Response(s)

```
^SCFG: "Call/ECC", (list of supported <ecc>s)
^SCFG: "Call/Speech/Codec", (list of supported <scs>s)
^SCFG: "GPRS/Auth", (list of supported <gauth>s)
^SCFG: "GPRS/AutoAttach", (list of supported <gaa>s)
^SCFG: "GPRS/MaxDataRate/HSDPA", (list of supported <MaxDataRateHsdpa>s)
^SCFG: "GPRS/MaxDataRate/HSUPA", (list of supported <MaxDataRateHsupa>s)
^SCFG: "Ident/Manufacturer", (max. string length of <manufacturer>)
^SCFG: "Ident/Product", (max. string length of <product>)
^SCFG: "MEopMode/Airplane", (list of supported <airplane>s)
^SCFG: "MEopMode/CregRoam", (list of supported <mrs>s)
^SCFG: "MEopMode/PowerMgmt/LCI", (list of supported <lci>s)
^SCFG: "MEopMode/PowerMgmt/VExt", (list of supported <vext>s)
^SCFG: "MEopMode/PwrSave", (list of supported <PwrSaveMode>s), (list of supported
<PwrSaveTimeout>s), (list of supported <PwrSaveDelay>s)
^SCFG: "MEopMode/RingOnData", (list of supported <ringlineSig>s)
^SCFG: "MEopMode/RingUrcOnCall", (list of supported <ringUrcOnCall>s)
^SCFG: "MEShutdown/OnIgnition", (list of supported <msi>s)
^SCFG: "Radio/Band", (list of supported <rba>s), (list of supported <rbe>s)
^SCFG: "Radio/NWSM", (list of supported <nwsm>s)
^SCFG: "Radio/OutputPowerReduction", (list of supported <ropr>s)
^SCFG: "Serial/USB/DDD", (list of supported <usbDeviceDescr>s), (list of supported
<usbDescrIndex>s), (max. string length of <usbLangId>), (max. string length of <usbVendorId>),
(max. string length of <usbProductId>), (max. string length of <usbManufacturer>), (max. string length
of <usbProduct>), (max. string length of <usbSerialNo>)
^SCFG: "URC/Dstlfc", (list of supported <urcDestIfc>s)
^SCFG: "URC/Datamode/Ringline", (list of supported <urcSigType>s)
^SCFG: "URC/Ringline", (list of supported <urcRinglineCfg>s)
^SCFG: "URC/Ringline/ActiveTime", (list of supported <urcRinglineDuration>s)
OK
```

Read Command

AT^SCFG?

Response(s)

```
^SCFG: "Call/ECC", <ecc>
^SCFG: "Call/Speech/Codec", <scs>
^SCFG: "GPRS/Auth", <gauth>
^SCFG: "GPRS/AutoAttach", <gaa>
^SCFG: "GPRS/MaxDataRate/HSDPA", <MaxDataRateHsdpa>
^SCFG: "GPRS/MaxDataRate/HSUPA", <MaxDataRateHsupa>
^SCFG: "Ident/Manufacturer", <manufacturer>
^SCFG: "Ident/Product", <product>
^SCFG: "MEopMode/Airplane", <airplane>
^SCFG: "MEopMode/CregRoam", <mrs>
```

Read Command

(Continued)

AT^SCFG?

Response(s)

```
^SCFG: "MEopMode/PowerMgmt/LCI", <lci>
^SCFG: "MEopMode/PowerMgmt/VExt", <vext>
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSaveTimeout>, <PwrSaveDelay>
^SCFG: "MEopMode/RingOnData", <ringlineSig>
^SCFG: "MEopMode/RingUrcOnCall", <ringUrcOnCall>
^SCFG: "MESHutdown/OnIgnition", <msi>
^SCFG: "Radio/Band", <rba>
^SCFG: "Radio/NWSM", <nwsm>
^SCFG: "Radio/OutputPowerReduction", <ropr>
^SCFG: "Serial/USB/DDD", <usbDeviceDescr>, <usbDescrIndex>, <usbLangId>, <usbVendorId>,
<usbProductId>, <usbManufacturer>, <usbProduct>, <usbSerialNo>
^SCFG: "URC/DstIfc", <urcDestIfc>
^SCFG: "URC/Datamode/Ringline", <urcSigType>
^SCFG: "URC/Ringline", <urcRinglineCfg>
^SCFG: "URC/Ringline/ActiveTime", <urcRinglineDuration>
OK
```

Write Command

Query/Configure Emergency numbers for USIM without ECC field.

AT^SCFG="Call/ECC"[, <ecc>]

Response(s)

```
^SCFG: "Call/ECC", <ecc>
OK
ERROR
+CME ERROR: <err>
```

Write Command

Speech Codec Configuration for voice calls.

AT^SCFG="Call/Speech/Codec"[, <sc>]

Response(s)

```
^SCFG: "Call/Speech/Codec", <sc>
OK
ERROR
+CME ERROR: <err>
```

Write Command

Configure PPP authentication.

AT^SCFG="GPRS/Auth"[, <gauth>]

Response(s)

```
^SCFG: "GPRS/Auth", <gauth>
OK
ERROR
+CME ERROR: <err>
```

Write Command

Automatic GPRS attach.

AT^SCFG="GPRS/AutoAttach"[, <gaa>]

Response(s)

```
^SCFG: "GPRS/AutoAttach", <gaa>
OK
ERROR
+CME ERROR: <err>
```


Write Command

Configure HSDPA data rates.

```
AT^SCFG="GPRS/MaxDataRate/HSDPA"[, <MaxDataRateHsdpa>]
```

Response(s)

```
^SCFG: "GPRS/MaxDataRate/HSDPA", <MaxDataRateHsdpa>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Configure HSUPA data rates.

```
AT^SCFG="GPRS/MaxDataRate/HSUPA"[, <MaxDataRateHsupa>]
```

Response(s)

```
^SCFG: "GPRS/MaxDataRate/HSUPA", <MaxDataRateHsupa>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Configure manufacturer name.

```
AT^SCFG="Ident/Manufacturer"[, <manufacturer>]
```

Response(s)

```
^SCFG: "Ident/Manufacturer", <manufacturer>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Configure product name.

```
AT^SCFG="Ident/Product"[, <product>]
```

Response(s)

```
^SCFG: "Ident/Product", <product>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Enable/disable Airplane mode.

```
AT^SCFG="MEopMode/Airplane"[, <airplane>]
```

Response(s)

```
^SCFG: "MEopMode/Airplane", <airplane>
```

OK

ERROR

+CME ERROR: <err>

Write Command

```
AT^SCFG="MEopMode/CregRoam"[, <mrs>]
```

Response(s)

```
^SCFG: "MEopMode/CregRoam", <mrs>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Power Management control by Low Current Indicator (LC_IND pin).

```
AT^SCFG="MEopMode/PowerMgmt/LCI", <lci>
```

Response(s)

```
^SCFG: "MEopMode/PowerMgmt/LCI", <lci>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Power Management control of pin VEXT.

```
AT^SCFG="MEopMode/PowerMgmt/VExt", <vext>
```

Response(s)

```
^SCFG: "MEopMode/PowerMgmt/Vext", <vext>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Extended power saving control.

```
AT^SCFG="MEopMode/PwrSave", [<PwrSaveMode>][, <PwrSaveTimeout>][, <PwrSaveDelay>]
```

Response(s)

```
^SCFG: "MEopMode/PwrSave", <PwrSaveMode>, <PwrSaveTimeout>, <PwrSaveDelay>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Subcommand controls whether ring line signalization is used by the UE in case it can't output data due to a blocked interface.

```
AT^SCFG="MEopMode/RingOnData", <ringlineSig>
```

Response(s)

```
^SCFG: "MEopMode/RingOnData", <ringlineSig>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Subcommand controls whether "RING" type URCs are presented to indicate incoming voice or data calls.

```
AT^SCFG="MEopMode/RingUrcOnCall", <ringUrcOnCall>
```

Response(s)

```
^SCFG: "MEopMode/RingUrcOnCall", <ringUrcOnCall>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Enable/disable shutdown by ignition line.

```
AT^SCFG="MESHutdown/OnIgnition", <msi>
```

Response(s)

```
^SCFG: "MESHutdown/OnIgnition", <msi>
```

OK

ERROR

+CME ERROR: <err>

Write Command

Enable/disable radio bands.

```
AT^SCFG="Radio/Band"[, <rba>][, <rbe>]
```

Response(s)

```
^SCFG: "Radio/Band", <rba>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

Network selection mode.

```
AT^SCFG="Radio/NWSM"[, <nwsm>]
```

Response(s)

```
^SCFG: "Radio/NWSM", <nwsm>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

Radio output power reduction.

```
AT^SCFG="Radio/OutputPowerReduction"[, <ropr>]
```

Response(s)

```
^SCFG: "Radio/OutputPowerReduction", <ropr>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

USB Device Descriptor.

```
AT^SCFG="Serial/USB/DDD" [, <usbDeviceDescr>, [<usbDescrIndex>], [<usbLangId>],  
<usbVendorId>, <usbProductId>, [<usbManufacturer>], [<usbProduct>], [<usbSerialNo>]]
```

Response(s)

```
^SCFG: "Serial/USB/DDD", <usbDeviceDescr>, <usbDescrIndex>, <usbLangId>, <usbVendorId>,  
<usbProductId>, <usbManufacturer>, <usbProduct>, <usbSerialNo>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

Subcommand controls which interface will be used for URC presentation.

```
AT^SCFG="URC/DstIfc"[, <urcDestIfc>]
```

Response(s)

```
^SCFG: "URC/DstIfc", <urcDestIfc>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

Subcommand controls whether RING line or BREAK is used for URC signalization while UE-TE link is reserved or idle.

```
AT^SCFG="URC/Datamode/Ringline"[, <urcSigType>]
```

Response(s)

```
^SCFG: "URC/Datamode/Ringline", <urcSigType>  
OK
```

Write Command (Continued)

Subcommand controls whether RING line or BREAK is used for URC signalization while UE-TE link is reserved or idle.

AT^SCFG="URC/Datamode/Ringline"[, <urcSigType>]

Response(s)

ERROR
 +CME ERROR: <err>

Write Command

Subcommand controls the behaviour of the RING line if it is selected for URC signalization.

AT^SCFG="URC/Ringline"[, <urcRinglineCfg>]

Response(s)

^SCFG: "URC/Ringline", <urcRinglineCfg>
 OK
 ERROR
 +CME ERROR: <err>

Write Command

Subcommand controls duration of active RING line if it is selected for URC signalization.

AT^SCFG="URC/Ringline/ActiveTime"[, <urcRinglineDuration>]

Response(s)

^SCFG: "URC/Ringline/ActiveTime", <urcRinglineDuration>
 OK
 ERROR
 +CME ERROR: <err>

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<ecc>^{(str)(NV)}

Emergency call numbers on non-ECC USIM

Setting specifies emergency call numbers on a USIM without ECC field. It has no influence on the commonly used emergency numbers 112 and 911 which are always supported.

Also refer to Section 7.2, ATD where you can find a list of emergency call numbers supported if no USIM is inserted.

The value range of <ecc> is "0"... "255". To select or deselect an emergency number calculate the sum of the values of all desired numbers and use the resulting value. For example, for "08" (2) and "118" (8) please enter the value (10).

Setting takes effect after next UE restart or USIM insertion.

0 ^(D) ...255	Bitmask setting:
"0"	No additional emergency numbers
"1"	000
"2"	08
"4"	110
"8"	118
"16"	119
"32"	999
"64"	Reserved

"128" Reserved
"255" All additional emergency call numbers are supported.

<SCC>^{(str)(NV)}

Speech Codec Configuration for voice calls

This parameter can be used to configure the speech version indications in the bearer capabilities in case of voice calls (see 3GPP TS 24.008).

If you change this parameter the command returns "OK", but a new setting takes effect the next time the UE is restarted (after power-cycle).

Parameter is global for all interfaces, non-volatile and will not be reset by AT&F.

"0"^(D) All supported speech codecs are enabled for voice calls.
"1" The speech codecs GSM HR, GSM HR AMR and GSM AMR are disabled for voice calls.

<gauth>^(str)

PPP authentication mechanism

Setting can be used to configure which authentication algorithm the AT+CGDATA or ATD*99# commands will apply, during the PPP startup phase, for PDP contexts not yet activated.

For contexts activated with AT+CGACT please use the AT command AT^SGAUTH to configure the authentication method.

"0" CHAP only
"1" PAP only
"2"^(P) Try CHAP first, then PAP

<gaa>^{(str)(NV)}

GPRS with AutoAttach

Setting can be used to control whether or not the UE will perform a GPRS attach immediately after power-up and registering to the network. If the setting is changed to "enabled" and the UE is not attached yet, it will not initiate an attach immediately but after the next restart and registration to the network.

Setting is global for all interfaces.

"disabled"^(D) GPRS auto attach is disabled
"enabled" GPRS auto attach is enabled

<MaxDataRateHsdpa>^{(str)(NV)}

GPRS with HSDPA data rates

Downlink data rates of 14.4 Mbps and 7.2 Mbps will be supported. A new setting takes effect the next time the UE is restarted (after power-cycle).

"0"^(D) 14.4 Mbps is supported
"1" 7.2 Mbps is supported

<MaxDataRateHsupa>^{(str)(NV)}

GPRS with HSUPA data rates

Uplink data rates of 5.76 Mbps and 2.0 Mbps will be supported. A new setting takes effect the next time the UE is restarted (after power-cycle).

"0"^(D) 5.76 Mbps is supported
"1" 2.0 Mbps is supported

<manufacturer>^{(str)(NV)}

Manufacturer name

Setting can be used to configure the name of the manufacturer which is displayed with the commands [ATI](#), [AT+GMI](#) and [AT+CGMI](#). Maximal length of the Manufacturer name is 25 characters (or less if you use multibyte characters).

“Cinterion”^(D)

<product>^{(str)(NV)}

Product name

Setting can be used to configure the name of the product which is displayed with the commands [ATI](#), [AT+GMM](#) and [AT+CGMM](#). Maximal length of the product name is 25 characters (or less if you use multibyte characters).

“PHS8-P”^(D)

<airplane>^{(str)(NV)}

Airplane Mode

Parameter can be used to enable or disable the Airplane mode. Please note that the parameter is deprecated and only supported for compatibility with other products or earlier PHS8-P releases. To control Airplane mode it is recommended to use only the [AT+CFUN](#) command. The mode enabled with [AT^SCFG](#) "MEOpMode/Airplane" corresponds to [AT+CFUN=4](#) (SIM functions remain accessible).

Parameter <airplane> takes effect immediately.

“on” Activates Airplane mode and shuts down the radio part of the UE. See [AT+CFUN](#), parameter <fun> 4.

“off”^(D) Deactivates Airplane mode, wakes up the radio part of the UE and restores access to network-dependent AT commands.

<mrs>^(str)

Modified Roaming Status

This parameter enables or disables the modified roaming status displayed by [AT+CREG](#). If it is enabled, the registration status is "registered to home network" instead of "registered, roaming", when the registered PLMN and the Home PLMN from USIM Elementary File EF_{IMSI} are mapped to the same network name in the PHS8-P internal operator list.

Parameter is global for all interfaces, non-volatile and will not be reset by [AT&F](#).

Please consider this configuration has no influence to the commands [AT^SIND="roam"](#) and [AT+CGREG!](#)

“0”^(D) Disable the Modified Roaming Status Display.

“1” Enable the Modified Roaming Status Display.

<lci>^(str)

Low Current Indicator

Setting can be used to enable or disable the Low Current Indicator. (LC_IND line). For details refer to "[PHS8-P Hardware Interface Description, Version 02.003](#)".

“disabled”^(P) Low Current Indicator is disabled.

“enabled” Low Current Indicator is enabled.

<vext>^{(str)(NV)}

External voltage

Setting can be used to drive 50mA to the host application. For details refer to "[PHS8-P Hardware Interface Description, Version 02.003](#)".

- "high"^(D) VEXT is configured to high power mode (i.e. 50mA is available)
- "low" VEXT is not configured to high power mode (best for power saving)

<PwrSaveMode>^{(str)(NV)}

Power Save Mode

[AT^SCFG "MeOpMode/PwrSave"](#) settings allow to control the PHS8-P's power saving behaviour. [<PwrSaveMode>](#) enables or disables the UE's use of its power save mode. For details refer to "[PHS8-P Hardware Interface Description, Version 02.003](#)".

- "disabled" Power save mode is disabled. Under no circumstances the UE will enter its power save (SLEEP) state. [<PwrSaveTimeout>](#) value is reset to zero.
- "enabled"^(D) Power save mode is enabled. While inactive, the UE stays in power save (SLEEP) state, waking up only temporarily to meet basic technical demands, e.g. network requirements (such as regularly listening to paging messages from the base station). [<PwrSaveTimeout>](#) value determines whether or not to employ a timeout for power saving intervals during power save (SLEEP) state.

<PwrSaveTimeout>^{(str)(NV)}

Timeout for Power Saving Intervals

[AT^SCFG "MeOpMode/PwrSave"](#) settings allow to control the PHS8-P's power saving behaviour. If [<PwrSaveMode>](#) is "enabled" [<PwrSaveTimeout>](#) setting determines whether or not the UE shall use a timeout to control the power saving intervals during power save (SLEEP) state.

- "0"^(D) No timeout set. The duration of power saving intervals during power save (SLEEP) state is determined by "technical demands", for example network paging requests.
The default setting "0" may be retained for applications controlling the UE via USB (see [AT^SDPORT](#) settings for USB).
For applications controlling the UE via UART (see [AT^SDPORT](#) settings for ASC0) value "0" is not recommended. This is because setting the [<PwrSaveTimeout>](#) to "0" may lead to unintentional operating states on the ASC0 interface if technical demands to cyclically stop power saving are not effective: for example, when the radio interface is switched off (see [AT+CFUN](#) or [<airplane>](#) parameter for [AT^SCFG "MEopMode/Airplane"](#)) and hardware flow control is used on ASC0, but the Customer Application has no direct access to its RTS line (e.g. Windows/Linux application using the standard device driver).
- 1...600 Timeout for power saving intervals in 1/10 seconds (with tolerance). A recommended value is 52, i.e. 5.2 seconds, but depending on the reaction time of the Customer Application other values may be more suitable.
The timeout is recommended for applications controlling the UE from the UART (ASC0). Each time when the specified timeout expires the UE will temporarily wake up from power saving. In other words, the timeout enables the UE to cyclically stop and resume power saving. The benefit is that the AT command interface regularly becomes accessible.

<PwrSaveDelay>^(str)

Minimum UE activity period after last UART communication

AT^SCFG, "MeOpMode/PwrSave" settings allow to control the PHS8-P's power saving behaviour. <PwrSaveDelay> setting determines the period PHS8-P remains active after last UART communication.

1...50^(P)...36000 Minimum activity period in 1/10 seconds. However, it is not guaranteed that the UE enters power save (SLEEP) state immediately after this delay due to other pending activities.

<ringlineSig>^(str)

Parameter determines whether ring line signalization is used by the UE in case it can't output data due to a blocked interface. Interface blocking may be caused by an unplugged USB cable or by an inactive RTS line on ASC0, e.g. if the TE is in power save mode.

This functionality serves to fine-tune the conditions under which the UE signals service request to the TE.

For details about URC presentation and related hardware signalization refer to Section 1.9, [Unsolicited Result Code Presentation](#). See also parameters <urcRinglineCfg>, <urcSigType> and <urcRinglineDuration>.

Setting is global for all interfaces.

"on" Ring line signalization is enabled if data can't be sent by the UE due to a blocked interface.

"off"^(P) No Ring line signalization if interface is blocked.

<ringUrcOnCall>^(str)

Parameter determines whether "RING" type URCs are presented to indicate incoming voice or data calls. In this way, the TE is able to inhibit an activation of the UE's RING line on incoming calls.

This functionality serves to fine-tune the conditions under which the UE signals service request to the TE.

For details about URC presentation and related hardware signalization refer to Section 1.9, [Unsolicited Result Code Presentation](#).

Setting is global for all interfaces.

"on"^(P) "RING" URC presentation is enabled.

"off" "RING" URC presentation and related RING line signalization are disabled.

<msi>^{(str)(NV)}

Parameter determines the switching mode of the ignition line (IGT): The line may either be used only to switch on the UE, or to toggle it on and off. For details refer to "[PHS8-P Hardware Interface Description, Version 02.003](#)".

"on" Ignition line (IGT) can be used to switch on and off the UE.

"off"^(D) Ignition line (IGT) can be used to switch on the UE.

<rba>^{(str)(NV)}

Parameter determines frequency band usage of the UE.

Please note that the band selection implementation of PHS8-P is based on a single band group that includes all frequency bands it is capable to use.

Factory default of <rba> is the combination of all available bands meaning that all supported bands are allowed. If AT+COPS equals "0" (automatic mode) this solution allows the subscriber to take advantage of a full-featured automatic network selection when trying to register.

Therefore, changes to the band configuration are recommended only if the subscriber wishes to restrict the allowed bands to a specific band or band combination, in particular to speed up the network search, and thus, to reduce the power consumption. In such case, <rba> may be one of the supported single values listed below or the sum of the values of all desired bands. For example, for GSM 900 MHz (1) and GSM 1800 MHz (2) please enter the value 3.

When changing the <rba> value you can use the additional <rbe> parameter to make the changes take effect

immediately without reboot being required (`<rbe>="1"`) or after reboot only (`<rbe>="0"`).
If you wish to configure a specific band or band configuration take care that the selected value complies with the `<rat>` value selected with `AT+COPS`. Otherwise, if the settings of `<rba>` and `<rat>` are incompatible all bands supported by PHS8-P will be enabled after power-up.

"1"	GSM 900
"2"	GSM 1800
"4"	GSM 850
"8"	GSM 1900
"16"	WCDMA 2100 (BC1)
"32"	WCDMA 1900 (BC2)
"64"	WCDMA 850 (BC5)
"128"	WCDMA 900 (BC8)
"256"	WCDMA 800 (BC6)

`<rbe>`^(str)

Radio/Band: Set frequency band(s) immediately effective

The additional `<rbe>` parameter determines when a changed `<rba>` value becomes effective.

"0"	<code><rba></code> takes effect after next restart.
"1"	<code><rba></code> takes effect immediately and will also be effective after next restart. Setting a new <code><rba></code> value and <code><rbe>= 1</code> causes the UE to restart a network search and to deregister and re-register. If old and new <code><rba></code> are the same the command will be accepted without triggering a network search and without effect on the registration.

`<nwsm>`^{(str)(NV)}

Network Selection Mode

This parameter allows network selection within different modes.

Parameter is global for all interfaces, non-volatile and will not be reset by `AT&F`.

In order to comply with AT&T requirements regarding network selection, the Customer Application controlling the UE will have to send this AT command during the initialization phase.

"0" ^(D)	Network selection compliant with the 3GPP standards.
"1"	Network selection for networks with any MNC without considering the MCC.
"2"	When the UE is registered to a network with MCC 310-316, 302, 334 or 348, and regardless of the MNC, the UE may select HPPLMNs from any country in this set of MCCs during the HPPLMN scan.

`<ropr>`^(str)

Radio Output Power Reduction

According to 3GPP TS 45.005, it is permissible to reduce the the maximum (E)GPRS output power. The amount of the maximum (E)GPRS power reduction is configurable for the case of 4TX.

Setting takes effect after next restart.

"4"	No power reduction with GMSK and 8PSK.
"5"	2 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.
"6"	4 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.
"7"	6 dB power reduction with GMSK (with 4 Tx), no power reduction for 8PSK.
"8" ^(D)	Max. power reduction for GSMK and 8PSK (6dB for 4 Tx).

<usbDeviceDescr>^{(str)(+CSCS)(NV)}

Device Descriptor

Parameter determines whether to use the UE's standard USB Device Descriptor configuration (default) or a Device Descriptor configuration customized by the Customer Application manufacturer.

Setting takes effect after next USB interface enumeration (depending on the [AT^SDPORT](#) settings either as USB CDC-ACM device or USB composite device).

A more detailed description of how to customize your product can be found in [\[13\]](#)

“0”^(D) Standard USB Device Descriptor of the UE.
If <usbDeviceDescr>=0 is set all other parameters related to "Serial/USB/ DDD" cannot be changed.

“1” Customer specific USB Device Descriptor.
If <usbDeviceDescr>=1 is set all other parameters related to "Serial/USB/ DDD" can be changed.
Customizing the USB Device Descriptor configuration requires a unique Vendor ID obtained from the USB Implementers Forum. For information please refer to <http://www.usb.org>.

<usbDescrIndex>^{(str)(+CSCS)(NV)}

Descriptor Index

“0”^(D) Not to be changed. Use always 0.

<usbLangId>^{(str)(+CSCS)(NV)}

Language ID

Please refer to USB.ORG [\[53\]](#) to find the language IDs currently defined for USB devices. If parameter <usbLangId> is not specified, the default value of the UE's standard USB Device Descriptor configuration applies (US English).

Parameter shall be given in HEX format, maximum 4 characters. It can be changed only if <usbDeviceDescr> equals 1.

Setting takes effect after next USB interface enumeration.

<usbVendorId>^{(str)(+CSCS)(NV)}

Vendor ID

This parameter represents the Vendor ID obtained from the USB Implementers Forum. The Vendor ID will, together with the Product ID, be transmitted to the host during USB enumeration.

Parameter shall be given in HEX format, maximum 4 characters. It can be changed only if <usbDeviceDescr> equals 1.

Setting takes effect after next USB interface enumeration.

<usbProductId>^{(str)(+CSCS)(NV)}

Product ID

Product ID (PID) defined by the Customer Application manufacturer to identify the USB device.

The Product ID will, together with the Vendor ID, be transmitted to the host during USB enumeration.

Parameter shall be given in HEX format, maximum 4 characters. It can be changed only if <usbDeviceDescr> equals 1.

Setting takes effect after next USB interface enumeration.

<usbManufacturer>^{(str)(+CSCS)(NV)}

Manufacturer name

Optional manufacturer string defined by the Customer Application manufacturer.

Parameter length: maximum 63 characters. It can be changed only if <usbDeviceDescr> equals 1.

Setting takes effect after next USB interface enumeration.

`<usbProduct>`^{(str)(+CSCS)(NV)}

Product string

Optional product name defined by the Customer Application manufacturer.

Parameter length: maximum 63 characters. It can be changed only if `<usbDeviceDescr>` equals 1. Setting takes effect after next USB interface enumeration.

`<usbSerialNo>`^{(str)(+CSCS)(NV)}

Device's serial number

Optional serial number. Empty string if not used, like in the case of the UE'S standard USB Device Descriptor configuration.

A serial number enables the host to assign the same virtual COM port to the USB device even though the device is connected to another USB port. This eliminates the need for the host to load the driver again.

Parameter length: maximum 4 characters. It can be changed only if `<usbDeviceDescr>` equals 1. Setting takes effect after next USB interface enumeration.

`<urcDestIfc>`^(str)

Parameter determines which interface will be used for URC presentation. Note that the recommended approach for a typical PHS8-P application is using the default configuration. If changing the configuration please carefully read Section 1.5, [AT Command Interpreter](#) and Section 1.9, [Unsolicited Result Code Presentation](#).

If the application port is not available, then it is not possible to select it.

If `AT^SDPORT` is set to "2", then the powerup value is "mdm", otherwise "app".

If Multiplex mode is started with `AT+CMUX` and `AT^SDPORT` is set to "2", then automatically the value "app" will be selected.

If the modem interface is used, keep in mind, that if the interface is blocked by an active data connection, this connection should be periodically suspended to check for pending URCs!

"mdm" Use modem interface to output URCs.

"app"^(D) Use application interface to output URCs.

`<urcRinglineCfg>`^(str)

Parameter specifies the ring line to be used for signaling URCs both for idle interface and, if accordingly configured by parameter "URC/Datamode/Ringline", while interface is reserved, i.e. while busy on AT command execution or data transmission. See also parameter `<ringlineSig>`. See also parameter `<ringUrcOnCall>`. This functionality serves to fine-tune the conditions under which the UE signals service request to the TE.

For details about URC presentation and related hardware signalization refer to Section 1.9, [Unsolicited Result Code Presentation](#). For details on using the RING0 or WAKEUP line to wake up the TE refer to "[PHS8-P Hardware Interface Description, Version 02.003](#)".

Setting is local for every interface.

"off" URCs are not indicated by a ring line.

"local"^(D) URCs are indicated by an activated ring line on the same interface where the URC appears: This is the RING0 line (active low) if the URC appears on ASC0 and a virtual ring line if the URC appears on the USB Modem interface. Since the USB Application interface has no virtual ring line, the virtual ring line of the USB Modem interface will be activated to signalize URCs on the USB Application interface.

"asc0" URCs are indicated by activated RING0 line of the ASC0 interface (low active).

"wakeup" URCs are indicated by activated WAKEUP line (high active).

`<urcSigType>`^(str)

Parameter determines whether ring line or BREAK is used for URC signaling. This functionality serves to fine-tune the conditions under which the UE signals service request to the TE. For details about URC presentation and related hardware signalization refer to Section 1.9, [Unsolicited Result Code Presentation](#). Setting is global for all interfaces.

- “off” URC signalization is done by sending a BREAK when the UE-TE link is reserved (e.g. during circuit-switched data calls, in packet switched data mode, during the execution of an AT command).
- “on”^(D) URC signalization is done by activating the ring line when the UE-TE link is reserved (e.g. during circuit-switched data calls, in packet switched data mode, during execution of an AT command) or in idle state. This setting can be selected if URC signaling by ring line is enabled with parameter "URC/Ringline" (`<urcRinglineCfg>`).

`<urcRinglineDuration>`^(str)

Parameter determines how long the ring line shall be activated for URC signalization. The type of ring line depends on parameter `<urcRinglineCfg>`. This functionality serves to fine-tune the conditions under which the UE signals service request to the TE. For details about URC presentation and related hardware signalization refer to Section 1.9, [Unsolicited Result Code Presentation](#). Setting is global for all interfaces.

- “0” Ring line will be activated for a time between 4.6 and 9.2 ms.
- “1”^(D) Ring line will be activated for about 100ms.
- “2” Ring line will be activated for about 1s.
- “keep” Ring line will be activated until UE enters its power save (SLEEP) state; for details on activation refer to `AT^SCFG` subcommand "MEopMode/PwrSave". The TE may use this setting to remain in power save mode itself until the PHS8-P recovers full functionality and indicates service request by activating its ring line again. However, this functionality is only supported while parameter `<urcRinglineCfg>` is set to values "asc0" or "wakeup". For other settings of parameter `<urcRinglineCfg>` the behavior of UE's ring line is undefined. For details refer to chapter "Power Saving" in "[PHS8-P Hardware Interface Description, Version 02.003](#)".

2.14 AT^SDPORT Configure Interface Allocation

[AT^SDPORT](#) can be used to query and configure the allocation of the PHS8-P's interfaces. A detailed description of Modem interface and Application interface can be found in Section 1.5, [AT Command Interpreter](#).

The WWAN interface is enabled when the USB composite communication device is enumerated. The WWAN interface is no AT command interface. Guidelines for using the WWAN interface can be found in [\[3\]](#).

Changing the [AT^SDPORT](#) setting may affect the used USB enumeration: If the USB enumeration currently used differs from the USB enumeration used in the newly selected mode, the device will change its USB enumeration immediately.

Changing the [AT^SDPORT](#) setting may also affect the URC output: If the interface currently used for URC output does not exist in the newly selected mode, the URC interface will be switched to an existing interface. It is recommended to adjust the URC interface setting after changing the [AT^SDPORT](#) setting using [AT^SCFG](#), "URC/DstIfc", [<urcDestIfc>](#).

During Multiplex mode ([AT+CMUX](#)) the [AT^SDPORT](#) write command is not supported and will return an [<error>](#) response.

As soon as Multiplex mode ([AT+CMUX](#)) is started, Modem, Application and NMEA interfaces are available via Multiplexer channels only. For details refer to Section 1.5, [AT Command Interpreter](#).

Syntax

Test Command

```
AT^SDPORT=?
```

Response(s)

```
^SDPORT: (range of supported <mode>s)  
OK
```

Read Command

```
AT^SDPORT?
```

Response(s)

```
^SDPORT: <mode>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

```
AT^SDPORT=<mode>
```

Response(s)

```
OK  
ERROR  
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<mode>^{(num)(NV)}

Any change takes effect immediately.

- | | |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | The Modem interface is available on ASC0. The USB composite communication device is completely enumerated but no logical channel of the USB device is usable. Therefore, if URC output was active on an interface which is no longer usable due to change of <code>AT^SDPORT</code> setting, it is redirected to the Modem interface as could normally be done via <code>AT^SCFG</code> , "URC/DstIfc", <code><urcDestIfc></code> . |
| 3 | Modem, Application and NMEA interfaces are all available as logical channels of the USB composite communication device. ASC0 is not usable. |
| 4 | Application interface is available on ASC0. Modem and NMEA interfaces are available as logical channels of the USB composite communication device. |
| 5 | NMEA interface is available on ASC0. Modem and Application interfaces are available as logical channels of the USB composite communication device. |
| 6 ^(D) | Application interface is available on ASC0. Modem interface is available as logical channel of the USB CDC-ACM device. |

3. Status Control Commands

The AT Commands described in this chapter allow the external application to obtain various status information from the PHS8-P.

3.1 AT^SIND Extended Indicator Control

AT^SIND controls the presentation of indicator event URCs. You can enable or disable URCs to be issued by the PHS8-P each time the value of the related indicator changes, you can request the current status of all indicators, and you can also query the status of a single indicator.

Syntax

```

Test Command
AT^SIND=?
Response(s)
^SIND: (<indDescr>, list of supported <indValue>s)[, (<indDescr>, list of supported <indValue>s)[, ...]], (list of supported <mode>s)
OK

Read Command
AT^SIND?
Response(s)
^SIND: <indDescr>, <mode>[, <indValue>]
[^SIND: <indDescr>, <mode>[, <indValue>]]
...

In case of <indDescr>="eons"
^SIND: "eons", <mode>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>

In case of <indDescr>="nitz"
^SIND: "nitz", <mode>, <nitzUT>, <nitzTZ>, <nitzDST>
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SIND=<indDescr>, <mode>
Response(s)
^SIND: <indDescr>, <mode>[, <indValue>]

In case of: <indDescr>="eons" and <mode>=2
^SIND: <indDescr>, <mode>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>

In case of: <indDescr>="nitz" and <mode>=2
^SIND: <indDescr>, <mode>, <nitzUT>, <nitzTZ>, <nitzDST>
OK
ERROR
+CME ERROR: <err>
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Unsolicited Result Codes

URC 1

Format of the standard indicator:

+CIEV: <indDescr>, <indValue>

Value of an indicator has changed.

URC 2

Format of the "simdata" indicator follows AT^SSTGI response:

+CIEV: <indDescr>, <cmdType>, <commandDetails>[, <pathLen>, <fileNum>, <fileList>]

This URC is issued if PHS8-P is in Remote-USAT Autoresponse mode (AT^SSTA) and the USIM sent a USAT REFRESH command (i.e. <cmdType>=1) indicating that the content of one or more Elementary Files has been changed.

The UE holds a limited storage available to keep numerous "simdata" events received while AT^SIND setting was not enabled or UE-TE link was reserved, e.g. in online data mode. In case of storage overflow a special URC "+CIEV: simdata,1,254" is issued.

URC 3

Format of the "eons" indicator:

+CIEV: <indDescr>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>

One URC is issued for each new LAI (Location Area Information) broadcast by the network.

URC 4

Format of the "nitz" indicator:

+CIEV: <indDescr>, <nitzUT>, <nitzTZ>, <nitzDST>

Parameter Description

<indDescr>^(str)

String values and their <indValue> ranges.

"signal"	Channel bit error rate of the signal received: The parameter is always set to value 99. See also AT+CSQ.
"service"	Service availability: 0 Not registered to any network. 1 Registered to home network or, if "roam"=1 then registered to another network.
"sounder"	Sounder activity: Reports every event that causes the UE to generate a tone. 0 Tone generator not active. 1 Tone generator active. Value 1 means for example: Incoming call - UE is ringing. Note that in this case the URC "+CIEV: sounder" will be output only if ringing tones are enabled with AT^SRTC. Waiting call - UE generates waiting call tone (if call waiting is enabled). Outgoing call - UE generates BUSY tone. Playback of ringing tones when tested with AT^SRTC.
"message"	Unread short message at memory location <mem1>. Refer to AT+CPMS. 0 No unread message(s) available. 1 Unread message(s) available.

"call"	Call in progress: 0 No call. 1 At least one MO or MT call is in state "active" (connection established).
"roam"	Roaming indicator: 0 Registered to home network or not registered. 1 Registered to other network.
"smsfull"	Capacity of storage for received short messages: 0 The short message memory location <mem3> is still free or has just become free again. Refer to AT+CPMS . 1 All memory locations of <mem3> are used up.
"rsqi"	Received signal (field) strength: 0 Signal strength \leq -112 dBm 1 - 4 Signal strength in 15 dB steps 5 Signal strength \geq -51 dBm 99 Signal strength not known or not detectable Received signal (field) strength can also be obtained with AT+CSQ . However, the signal strength is scaled to value range 0..31 by this command.
"audio"	Activity of the built-in audio unit: 0 Audio unit not active. 1 Audio unit is active, for example: MO voice call: Indicator is output with value 1 when dialing starts. MT voice call: Indicator is output with value 1 when call is answered.
"simdata"	USIM notifies of changed Elementary File data: All data provided by the USIM is stored in one of many of its so-called Elementary Files. This data can be queried by the TE directly via AT+CRSM or implicitly via many AT commands presented by this document. For instance the USIM's identification number (IMSI) can be queried via AT+CIMI , but actually is stored in EF _{IMSI} , as defined in 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21]. However, be aware that this Elementary File data can be changed at any time by the network provider or an application running on the USIM. For details refer to USAT feature "Data Download to USIM" in 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25]. If this happens the TE urgently needs to refresh its internal representation (i.e. copy) of the changed data to ensure its safe and consistent use! Therefore, a "+CIEV: "simdata"" URC is issued if PHS8-P is in Remote-USAT Autoreponse mode (AT^SSTA) and the USIM sent a USAT REFRESH command indicating that the content of one or more Elementary Files has been changed.
"eons"	Enhanced Operator Name String (EONS) Indication: The Enhanced Operator Name String indicator feature allows the PHS8-P to output various operator names for different PLMN identities via URC. It also allows the output of a different operator name based on a subset of the registered network by using a range of Location Area Codes (LACs) or a single LAC. The presentation of the "eons" indicator is determined by network activity. For example, the indicator appears every time a location update occurs or a NITZ information is sent, no matter whether or not the status of the EONS information has changed. This means that the same EONS information may be reported several times. The EONS tables are stored in the USIM and will be read at power-up. Following are the USIM Elementary Files that are affected by the introduction of EONS feature in the USIM: EF _{SST} (USIM Service Table) - describes which features are active. EF _{OPL} (Operator PLMN List) - contains the PLMN identification and location ID together with the index of the corresponding PNN record EF _{PNN} (PLMN Network Name) - contains the full and short form version of the network name for the registered PLMN

If the Operator Name Source is CPHS Operator Name String long and short form, refer to `<indValue>`, the following two USIM Elementary Files will be used:

EF_{ONString} (Operator Name String) - contains the name of the PLMN operator who issued the USIM.

EF_{OPShort} (Operator Name Short form) - contains a short form of the name of the PLMN operator who issued the USIM.

“nitz“

Network Identity and Time Zone indication:

This indicator shows the time relevant information elements of an MM Information (MMI) or GMM Information (GMMI) message received from the network (see 3GPP TS 24.008 [42], ch. 9.2.15a and 9.4.19). The network usually sends a NITZ indicator when the mobile attaches to the network, when it enters a location area with different time zone or when a daylight change occurs.

A NITZ indicator may consist of the following parameters: Universal Time (UT), local Time Zone (TZ), Daylight Saving Time (DST). All information elements of MMI/GMMI are optional and therefore, the presentation of the parameters `<nitzUT>`, `<nitzTZ>`, `<nitzDST>` varies with the network. For example, the network may send all three parameters UT, TZ, DST, or only UT and TZ or only TZ.

UT is indicated in usual date/time format and represents the current world time (GMT) at the moment when sent.

TZ is given as a positive (east) or negative (west) offset from UT in units of 15 minutes.

DST shows the number of hours added to the local TZ because of daylight saving time (summertime) adjustment. Usually DST is 1 hour but it can be also 2 hours in certain locations.

Example for time and time zone with DST:

+CIEV: nitz,"04/07/23,13:39:20",-28,1

In this example TZ is -28, showing a time offset of -7 hours (west) to Universal Time/GMT (which never changes for DST). DST is 1 which indicates that one hour was added to TZ because of Daylight Saving Time. If a network does not send the DST parameter the TZ value would be -32 (8 hours west) as would be done in winter:

+CIEV: nitz,"04/11/23,13:39:20",-32

Please be aware that although the last NITZ value can be looked up again via "AT^SIND=nitz,2" the returned values may be out of date. Especially the UT value is obsolete because there is no internal NITZ clock and therefore no continuation of UT.

NITZ values are lost when the UE detaches from network. Also when a manual network selection fails and the UE automatically falls back to the previous network the NITZ values cannot be recalled. Nevertheless an indicated time zone is valid until a new MMI/GMMI will trigger another NITZ indication.

“simstatus“

USIM Status Indication:

The USIM status indicator allows the PHS8-P to output the status of the Universal Subscriber Identity Module via URC.

0 USIM removed.

Note: Another way to verify the USIM connection is the "`^SCKS`" URC enabled with `AT^SCKS`.

1 USIM inserted.

5 USIM initialization completed - UE has finished reading USIM data.

“psinfo“

Packet Switched Status Indication

"psinfo" indicates the status of the UE related to packet switched data calls. Please consider that some providers don't support the indication of HSDPA/HSUPA.

0 GPRS/EGPRS not available in currently used cell

- 1 GPRS available in currently used cell
- 2 GPRS attached
- 3 EGPRS available in currently used cell
- 4 EGPRS attached
- 5 camped on WCDMA cell
- 6 WCDMA PS attached
- 7 camped on HSDPA capable cell
- 8 PS attached in HSDPA capable cell
- 9 camped on HSDPA/HSUPA capable cell
- 10 PS attached in HSDPA/HSUPA capable cell

“ratmode“

Radio Access Technology mode Indication:
"ratmode" indicates the value of the AT&T specific USIM Elementary File $EF_{RATmode}$.

- 0 RAT mode dual (GSM/WCDMA)
- 1 RAT mode GSM only
- 2 RAT mode WCDMA only
- 99 RAT mode not known or USIM Elementary File $EF_{RATmode}$ not accessible

The contents of the USIM Elementary File $EF_{RATmode}$ may be changed by the network in the background at any time via [USIM Application Toolkit \(USAT\)](#) procedure "Data download to USIM". For a detailed description please refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

“pacsp“

PLMN Mode Bit status Indication:
"pacsp" indicates the parsed PLMN Mode Bit value of the USIM Elementary File EF_{CSP} (Customer Service Profile) according to Common PCN Handset Specification (CPHS) [50].

- 0 CSP PLMN mode bit off
- 1 CSP PLMN mode bit on
- 99 CSP PLMN mode bit not defined or USIM Elementary File EF_{CSP} not accessible

The contents of the USIM Elementary File EF_{CSP} may be changed by the network in the background at any time via [USIM Application Toolkit \(USAT\)](#) procedure "Data download to USIM". For a detailed description please refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

Please note, that URC presentation `<mode>` for this indicator is stored non-volatile with [AT&W](#), restored with [ATZ](#) and reset to '0' (disabled) by [AT&F](#).

“steerroam“

Steering-of-roaming Indication:
The "steerroam" Indication supports so called "steering-of-roaming" ("SOR") techniques of some providers.

If a UE roaming within a certain country tries to register to a VPLMN (visited PLMN), the VPLMN will ask the HLR of the subscribers home operator for authorization credentials of the subscriber. Steering-of-roaming means that instead of sending those credentials, the HLR sends back an error message which will make the VPLMN send back a location update reject to the UE. This location updating procedure is described in 3GPP TS 24.008 [42] chapter 4.4.4.9.

When UE is attempting to register into a PLMN and get updating rejected with reject cause 17 then UE stays in limited service on the configured network, UE may reattempt network registration four times, and after that UE will inform the TE via Steering-of-roaming Indication URC "steerroam" that the registration attempt has failed.

When the UE is in manual PLMN selection mode (see [AT+COPS](#)) the TE has to start a new manual PLMN search to select a different network or switch to automatic PLMN selection mode.

When UE is in automatic PLMN selection mode (see [AT+COPS](#)) UE itself attempts a PLMN search to select a different network.

`<indValue>(num)`

Integer type value in the range stated above for the corresponding `<indDescr>`.

Notes specific to the EONS feature:

If the indicator is "eons", the `<indValue>` is a type associated to the operator name according to 3GPP TS 22.101 [49]. This type depends on the source of the operator name.

Priority of types associated to the operator names is defined as follows (the type listed first has the highest priority). If a type cannot be indicated the next one will be used.

- | | |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | Not registered. |
| 1 | EF _{OPL} and EF _{PNN} (alphanumeric format, can contain up to 24 characters.) |
| 2 | Operator Name String in long and short format according to Common PCN Handset Specification (CPHS) [50] (alphanumeric format, can contain up to 16 characters). |
| 3 | Name information received by the NITZ service long and short form (alphanumeric format, can contain up to 16 characters). The short form will be displayed only if EF _{OPShort} from CPHS is available. |
| 4 | Any operator name stored internal to the UE (alphanumeric format, can contain up to 16 characters). |
| 5 | Broadcast MCC-MNC (numeric format which consists of a 3-digit country code plus a 2- or 3-digit network code). |

If the type is 2, 4 or 5, `AT+COPS` with the appropriate `<mode>` displays the same operator name.

`<mode>(num)`

Set or query URC presentation mode of a specific indicator `<indDescr>`.

Please note, that for the indicator "pacsp" the setting is stored non-volatile with `AT&W`, restored with `ATZ` and reset to '0' (disabled) by `AT&F`.

- | | |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 ^(P) | Disables the presentation of a specific URC. |
| 1 | Enables the presentation of a specific URC.
The URC will be buffered in the UE when the UE-TE link is reserved (e.g. in online data mode), and flushed to the TE when the UE-TE link is free again. Otherwise, the URC will be forwarded directly to the TE. |
| 2 | Requests the presentation mode of the URC status and the current value of a single indicator type. |

`<eonsOperator>(str)(+CSCS)`

Operator in format which depends on the type associated to the operator name. Refer to `<indValue>`.

`<servProvider>(str)(+CSCS)`

Service Provider Name according to the status settings (USIM Service No. 17) in the USIM Service Table (SST) of the USIM.

Service Provider Name (SPN) will be read from EF_{SPN}. Service Provider Display Information (SPDI) will be read from EF_{SPDI} list.

`<servProviderType>(num)`

Service Provider Type according to Registered Public Land Mobile Network (RPLMN) and Home Public Land Mobile Network (HPLMN).

- | | |
|---|-----------------------------------------------------------------------------------------------|
| 0 | No Service Provider Information available. |
| 1 | Service Provider Name will be displayed. RPLMN is the HPLMN. |
| 2 | Service Provider Display Information will be displayed. One list entry is equal to the RPLMN. |

<nitzUT>^{(str)(+CSCS)}

Universal Time delivered as part of the "nitz" Indicator. Refer to [<indDescr>](#).

<nitzTZ>^(num)

Time Zone delivered as part of the "nitz" Indicator. Refer to [<indDescr>](#).

<nitzDST>^(num)

Adjustment for Daylight Saving Time as part of the "nitz" Indicator. Refer to [<indDescr>](#).

3.2 AT+CEER Extended Error Report

[AT+CEER](#) returns an extended error report regarding the reason of the last

- call release
- failure to set up a call (both mobile originated or terminated)
- failure to modify a call by using Supplementary Services
- failed attempt to activate, register, query, deactivate or deregister a Supplementary Service
- unsuccessful PS attach or unsuccessful PDP context activation
- PS detach or PDP context deactivation

The release cause report `<report>` is a single line containing the cause information given by the network in textual format.

Syntax

<p>Test Command</p> <pre>AT+CEER=?</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<p>Exec Command</p> <pre>AT+CEER</pre> <p>Response(s)</p> <pre>+CEER: <report> OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CEER=[<reset>]</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR</pre>											
<table border="1"><thead><tr><th>PIN</th><th>MDM</th><th>APP</th><th>→</th><th>Last</th></tr></thead><tbody><tr><td>+</td><td>+</td><td>+</td><td>+</td><td>-</td></tr></tbody></table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47] 3GPP TS 24.008 [42]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

`<report>`^(str)
release cause report
Reason for the last call release or call failure. See Section 3.2.1, [List of status codes for extended error report](#). Both CS and PS domain call types are reported. Cause data is captured from Call Manager events and cached locally to later use by this command.

`<reset>`^(str)
"0"
Reset the extended error report to initial value.

3.2.1 List of status codes for extended error report

CS internal cause lookup
no cause information available (default)
phone is offline
no service available
network release, no reason given
received incoming call
client ended call
UIM not present
access attempt already in progress
access failure, unknown source
concur service not supported by network
no response received from network
GPS call ended for user call
SMS call ended for user call
data call ended for emergency call
rejected during redirect or handoff
lower-layer ended call
call origination request failed
client rejected incoming call
client rejected setup indication
network ended call
no funds available
no service available
full service not available
maximum packet calls exceeded
video connection lost
video protocol closed after setup
video protocol setup failure
internal error
CS network cause lookup
unassigned/unallocated number
no route to destination
channel unacceptable
operator determined barring
normal call clearing
user busy
no user responding
user alerting, no answer

CS network cause lookup
call rejected
number changed
non selected user clearing
destination out of order
invalid/incomplete number
facility rejected
responseto status enquiry
normal, unspecified
no circuit/channel available
network out of order
temporary failure
switching equipment congestion
access information discarded
requested circuit/channel not available
resources unavailable, unspecified
quality of service unavailable
requested facility not subscribed
incoming calls barred within the CUG
bearer capability not authorized
bearer capability not available
service/option not available
bearer service not implemented
ACM >= ACM max
requested facility not implemented
only RDI bearer is available
service/option not implemented
invalid transaction identifier value
user not member of CUG
incompatible destination
invalid transit network selection
semantically incorrect message
invalid mandatory information
message non-existent/not implemented
message type not compatible with state
IE non-existent/not implemented
conditional IE error
message not compatible with state
recovery on timer expiry
protocol error, unspecified
interworking, unspecified

CS network reject lookup
IMSI unknown in HLR
illegal MS
IMSI unknown in VLR
IMEI not accepted
illegal ME
GPRS services not allowed
GPRS and non GPRS services not allowed
MS identity cannot be derived
implicitly detached
PLMN not allowed
location area not allowed
roaming not allowed
GPRS services not allowed in PLMN
no suitable cells in location area
MSC temporary not reachable
network failure
MAC failure
synch failure
congestion
GSM authentication unacceptable
service option not supported
requested service option not subscribed
service option temporary out of order
call cannot be identified
no PDP context activated
semantically incorrect message
invalid mandatory information
message type non-existent
message type not compatible with state
information element non-existent
message not compatible with state
RR release indication
RR random access failure
RRC release indication
RRC close session indication
RRC open session failure
low level failure
low level failure no redial allowed
invalid SIM
no service
timer T3230 expired

CS network reject lookup

no cell available

wrong state

access class blocked

abort message received

other cause

timer T303 expired

no resources

release pending

invalid user data

PS internal cause lookup

invalid connection identifier

invalid NSAPI

invalid primary NSAPI

PDP establish timeout

invalid field

SNDCP failure

RAB setup failure

no GPRS context

PDP activate timeout

PDP modify timeout

PDP inactive max timeout

PDP lowerlayer error

PDP duplicate

access technology change

PDP unknown reason

CS PS network cause lookup

LLC or SNDCP failure

insufficient resources

missing or unknown APN

unknown PDP address or PDP type

user authentication failed

activation rejected by GGSN

activation rejected, unspecified

service option not supported

requested service option not subscribed

service option temporary out of order

NSAPI already used (not sent)

regular deactivation

QoS not accepted

network failure

CS PS network cause lookup
reactivation required
feature not supported
semantic error in the TFT operation
syntactical error in the TFT operation
unknown PDP context
PDP context without TFT already activated
semantic errors in packet filter
syntactical errors in packet filter
invalid transaction identifier
semantically incorrect message
invalid mandatory information
message non-existent/not implemented
message type not compatible with state
IE non-existent/not implemented
conditional IE error
message not compatible with state
protocol error, unspecified

3.3 AT+CPAS Activity Status

AT+CPAS execute command queries PHS8-P's activity status.

Syntax

<p>Test Command</p> <p>AT+CPAS=?</p> <p>Response(s)</p> <p>+CPAS: (list of supported<pas>s)</p> <p>OK</p>											
<p>Exec Command</p> <p>AT+CPAS</p> <p>Response(s)</p> <p>+CPAS: <pas></p> <p>OK</p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
-	+	+	+	-							

Parameter Description

<pas> ^(num)	
0	Ready
3	Incoming call (ringing)
4	Call in progress

3.4 AT+WS46 Select wireless network

The [AT+WS46](#) command is intended for reading the current status of the network selection. The write command has no effect. To select the network please use the [AT+COFS](#) command.

Syntax

Test Command											
AT+WS46=?											
Response(s)											
+WS46: (list of supported<n>s)											
OK											
Read Command											
AT+WS46?											
Response(s)											
<n>											
OK											
Write Command											
AT+WS46=[<n>]											
Response(s)											
OK											
ERROR											
+CME ERROR: <err>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-	Reference(s) 3GPP TS 27.007 [47]
PIN	MDM	APP	→	Last							
-	+	+	+	-							

Parameter Description

<n> ^(num)	Description
12	GSM Digital Cellular Systems (GERAN only)
22	UTRAN only
25	3GPP Systems (both GERAN and UTRAN)

4. Serial Interface Control Commands

The AT Commands described in this chapter allow the external application to determine various settings related to the PHS8-P's serial interface.

4.1 AT\Q Flow Control

[AT\Q](#) allows to configure flow control on the PHS8-P's asynchronous serial interface ASC0 (UART). It is strongly recommended to always use RTS/CTS hardware flow control.

The [AT\Q](#) setting is always common for all interfaces and can be changed, for compatibility reasons, on each interface, but is only applicable to the ASC0 interface. [AT\Q](#) settings have no effect on the USB ports because the USB protocol integrates a flow control mechanism of its own.

Syntax

```
Exec Command
AT\Q[<n>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<n> ^{(num)(&V)(&W)}	
[0]	Disable flow control
1	XON/XOFF software flow control
2	This value is not supported and will be mapped to RTS/CTS hardware flow control
3 ^{(&F)(D)}	RTS/CTS hardware flow control

Notes

- When using XON/XOFF flow control ([AT\Q1](#)) in online mode, **+++** should not be used while the data transmission is paused with XOFF. Before entering the command mode with **+++** the paused transmission should be resumed using the XON character.
- For compatibility reasons, [AT\Q](#) can be used in Multiplex mode ([AT+CMUX](#)), though the settings will not take effect. However, be aware that whenever you use the [AT\Q](#) write command in Multiplex mode and then save the current configuration to the user profile with [AT&W](#), the changed [AT\Q](#) setting will become active after restart.

4.2 AT&C Set Data Carrier Detect (DCD) line mode

AT&C controls the behavior of the UE's DCD line.

Syntax

Exec Command

```
AT&C[<value>]
```

Response(s)

```
OK
```

PIN	MDM	APP	→	Last
+	+	-	+	-

Parameter Description

<value>^{(num)(&V)(&W)}

[0]	DCD line shall always be on.
1(&F)(D)	DCD line shall be on only when data carrier signal is present.
2	DCD line shall be always on. Only when a data call is released the line shall briefly switch off.

4.3 AT&D Set Data Terminal Ready (DTR) line mode

[AT&D](#) determines how the UE responds if DTR line is changed from ON to OFF state during data mode.

Syntax

```
Exec Command
AT&D[<value>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
+	+	-	+	-

Parameter Description

<value> ^{(num)(&V)(&W)}	Description
[0]	ME ignores status of DTR line.
1	ON->OFF on DTR: Change to command mode while retaining the connected call.
2 ^{(&F)(D)}	ON->OFF on DTR: Disconnect data call (CSD or PPP) and change to command mode. During OFF state of the DTR line the auto-answer function (see ATS0) is disabled.

4.4 AT&S Set Data Set Ready (DSR) line mode

AT&S determines how the UE sets the DSR line depending on its communication state.

Syntax

Exec Command					
AT&S[<value>]					
Response(s)					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	-	+	-	V.250

Parameter Description

<value> ^{(num)(&V)(&W)}	
[0] ^{(&F)(D)}	DSR line is always ON
1	ME in command mode: DSR is OFF. ME in data mode: DSR is ON.

4.5 ATE AT Command Echo

ATE controls if the PHS8-P echoes characters received from TE during AT command state.

Syntax

Exec Command					
ATE[<value>]					
Response(s)					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	V.250

Parameter Description

<value> ^{(num)(&V)(&W)}	
0	Echo mode off
[1] ^{(&F)(D)}	Echo mode on

4.6 AT+IPR Bit Rate

AT+IPR allows to query and set the bit rate of the PHS8-P's asynchronous serial interface (UART). The test command returns the values of supported fixed bit rates. The read command returns the currently set `<rate>` value. The write command determines the bit rate to be used for the interface. Delivery bit rate value (`<rate>`) is 115200bps. `<rate>` setting will not be restored with **AT&F**.

If using a fixed bit rate, make sure that both UE and TE are configured to the same rate. A selected fixed bit rate takes effect after the write command returns "OK" and is stored in the non-volatile memory. It is not recommended to set bit rates lower than 9600 bps in order to avoid timing problems (see Section 1.7, [Communication between Customer Application and PHS8-P](#) for details about timing).

When using **AT+IPR** on a USB channel or during Multiplex mode (**AT+CMUX**) the **AT+IPR** write command responds with "OK", but will not have any effect. However, the **AT+IPR** read command always returns the current setting dedicated to the UART channel.

It is highly recommended to use **AT+IPR** as a standalone AT command.

The current setting of **AT+IPR** will be preserved after firmware download (i.e. a firmware update does not restore the factory setting) or in the event of power failure.

Syntax

<p>Test Command</p> <pre>AT+IPR=?</pre> <p>Response(s)</p> <pre>+IPR: () , (list of supported selectable <rate>s)</pre> <p>OK</p>											
<p>Read Command</p> <pre>AT+IPR?</pre> <p>Response(s)</p> <pre>+IPR: <rate></pre> <p>OK</p>											
<p>Write Command</p> <pre>AT+IPR=<rate></pre> <p>Response(s)</p> <pre>OK</pre> <pre>ERROR</pre> <pre>+CME ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-	<p>Reference(s)</p> <p>V.250</p>
PIN	MDM	APP	→	Last							
-	+	+	+	-							

Parameter Description

<p><code><rate></code>^{(num)(&V)(NV)}</p> <p>Bit rate per second (bps)</p> <p>9600</p> <p>14400</p> <p>19200</p> <p>28800</p> <p>38400</p> <p>57600</p>

115200
230400
460800
921600

4.7 AT+CMUX Multiplex mode

Multiplex mode according to 3GPP TS 27.010 [5] enables a serial interface to be partitioned into virtual channels. It can be used either on PHS8-P's USB interface or its asynchronous serial interface ASC0.

Multiplex mode can be started only on the Modem interface. This may be either the virtual modem port of the USB composite device or the ASC0 interface. In either case the Modem interface will be mapped to the first multiplex channel, and the Application interface will be mapped to the second multiplex channel. As a result, the functions of the first and second multiplex channels are the same as described in Section 1.5, [AT Command Interpreter](#) for the Modem and Application interfaces. The third multiplex channel is dedicated to GPS and will be used if NMEA output is switched on with [AT^SGPSC](#) or [AT^SGPSS](#) while Multiplex mode is active. Multiplex channels 5 and 6 are dedicated for the Transparent TCP/IP service and can be used for data exchange with [AT^SIST](#). For more details on number and usage of multiplex channels refer to "[Multiplexer User's Guide](#)".

PHS8-P offers an internal multiplexer and thus integrates all functionality needed to implement full-featured multiplex solutions. For the application on top, customers have the flexibility to create their own multiplex programs conforming to the multiplexer protocol. To help system integrators save the time and expense of designing multiplexer applications, Cinterion Wireless Modules GmbH offers WinMux, a ready-to-use multiplex driver for Windows XP and Windows Vista. Another approach is to develop customized solutions based on the sources of the WinMux driver.

Refer to "[Multiplexer User's Guide](#)" which provides a detailed description of the multiplex architecture and step-by-step instructions of how to install and configure the Multiplex mode. The WinMux driver and its source files can be supplied on request. Please contact your local distributor to obtain the latest installation software and user's guide.

[AT+CMUX](#) write command is used to enter Multiplex mode. Setup of the logical channels is initiated by the TE, i.e. the TE acts as initiator. This means that the TE shall ensure that logical channels are established before any further actions on the channels can be started. There is a timeout of five seconds, if the multiplexer protocol is enabled but no multiplexer control channel is established. Afterwards PHS8-P returns to AT command mode. The parameter maximum frame size (N1) according to 3GPP TS 27.010 [5] is implemented as 98 bytes by default. All other parameters are not available. Refer to "[Multiplexer User's Guide](#)" for further details regarding frame size.

Syntax

Test Command

```
AT+CMUX=?
```

Response(s)

```
+CMUX: (list of supported<mode>s)  
OK
```

Read Command

```
AT+CMUX?
```

Response(s)

```
+CMUX: <mode>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

```
AT+CMUX=<mode>
```

Response(s)

```
OK  
ERROR  
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	-	+	+

Reference(s)
3GPP TS 27.007 [47]
3GPP TS 27.010 [5]

Parameter Description

<mode> ^(num)	
Enable Multiplex mode.	
0	Basic option

4.7.1 Restrictions while using Multiplex mode

If used on the ASC0 interface the following restrictions apply to Multiplex mode:

1. Before starting Multiplex mode, ensure that the bit rate set with [AT+IPR](#) is not lower than 57600 bps. For using data services in Multiplex mode it is recommended to set at least 115200 bps.
2. In Multiplex mode [AT+IPR=<rate>](#) has no effect but always responds with "OK".
3. It is recommended to set hardware flow control ([AT\Q3](#)) before starting Multiplex mode. XON/XOFF flow control ([AT\Q1](#)) is not supported in Multiplex mode. See note regarding [AT\Qn](#) settings stored with [AT&W](#) if Multiplex mode is active.

4.8 AT^SQPORT Query Port Type

[AT^SQPORT](#) enables the host application to query the type of interface it is connected to. Further details on the different types of PHS8-P interfaces can be found in Section 1.5, [AT Command Interpreter](#).

Syntax

```
Test Command
AT^SQPORT=?
Response(s)
OK

Read Command
AT^SQPORT?
Response(s)
<type>
OK

Exec Command
AT^SQPORT
Response(s)
<type>
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<type> ^(str)	
“Modem“	The interface operates as Modem, mainly intended for circuit or packet switched transmission (HSDPA, GPRS, CSD).
“Application“	The interface operates as Application interface. It is recommended that this interface be used for controlling the PHS8-P, e.g. for entering AT commands, receiving URCS, or sending and receiving short messages. For further detail on URCS please refer to Section 1.9, Unsolicited Result Code Presentation .

“PS“	<p>PH SIM (lock PHone to SIM/UICC card). UE asks for <password> when other than current SIM/UICC card is inserted. <password>: PH-SIM PIN. This 8-digit code is unique for each device. The PH-SIM PIN is necessary to lock the UE to a SIM/UICC. To find out the PH-SIM PIN it is necessary to execute the AT+CLCK write command with <facility>="PS", <mode>=3. Keep in mind that if a lock is set, reading the <password> with <mode>=3 is no longer possible. To allow for any later changes, it is the responsibility of the manufacturer to hold a database with the module specific passwords. To avoid unauthorized use, the PH-SIM PIN should not be provisioned to end users. Parameter <class> is not applicable.</p>
“FD“	<p>SIM Fixed Dialing lock. If "FD" lock is enabled numbers or public MMI *# codes can be used only if they start with matching numbers or characters stored in the "FD" phonebook. Numbers stored to the "FD" phonebook must not contain the call modifiers "I","i","*31#", "#31#". The capacity of the "FD" phonebook is depending on the SIM card. <password>: SIM PIN2. Any attempt to dial a string not specified in the "FD" phonebook will be denied, causing an error result code. The type of result code varies depending on the type of service: "+CME ERROR: call barred" for voice calls, packet switched connections and *# codes for Supplementary Services and USSD. "NO CARRIER" for circuit switched data calls. "+CMS ERROR: operation not allowed" for SMS.</p> <p>If "FD" lock is enabled the following applies:</p> <ul style="list-style-type: none">• Handling of AT+CCFC: The "FD" lock is effective only for AT+CCFC <mode> 3 (registering the CF destination number). All other functions provided by AT+CCFC are not restricted by the "FD" lock.• Handling of USSD: Access to Unstructured Supplementary Services is possible with ATD if the ATD dial string starts with a matching *# code stored in the "FD" phonebook. The USSD command AT+CUSSD, however, is not barred by an "FD" lock.
“PN“	<p>Network Personalization. This feature allows application manufacturers to lock a mobile to specific operators by activating a Network Personalization ("PN"). If the lock is enabled the mobile will accept only SIM/UICC cards from the given operators. The lock is activated by specifying the mobile country codes and mobile networks codes on command line. The Customer SIM Lock feature is protected by depersonalization key. UE asks for <password> when other than specified operator SIM/UICC card is inserted. <password>: PH-NET PIN. To allow for any later changes, it is the responsibility of the manufacturer to hold a database with the module specific passwords. To avoid unauthorized use, the PH-NET PIN should not be provisioned to end users. Parameter <class> is not applicable. Network Personalisation ("PN") is also applicable with AT^SCSL command.</p>

Supplementary Service Call Barring:

Supplementary Service "Call Barring" allows to specify conditions under which calls will be disallowed by the network.

The availability of the Supplementary Services varies with the network. To benefit from call barring the client will need to subscribe them, though a limited number of call barring types may be included in the basic tariff package.

When you attempt to set a <facility> or <class> which is not provisioned, not yet subscribed to, or not supported by the module, the setting will not take effect regardless of the response returned. The responses in these

cases vary with the network (for example "OK", "+CME ERROR: operation not allowed", "+CME ERROR: operation not supported" etc.). To make sure check the extended error response with [AT+CEER](#) and the lock status with `<mode>=2`.

`<password>`: Network password supplied from the provider or operator. Usually there is one password which applies to all call barring options. For details contact your provider.

"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 <code><mode>=0</code>)
"AG"	All outGOing barring services (applicable only for <code><mode>=0</code>)
"AC"	All inCOming barring services (applicable only for <code><mode>=0</code>)

`<mode>`^(num)

0	Unlock
1	Lock
2	Query status
3	Request the PH-SIM PIN, allowed if phone lock to SIM card <code><facility></code> "PS" has not already been programmed. Otherwise returns "+CLCK: ERROR". Required parameters: <code><facility>="PS",<mode>=3</code> .

`<status>`^(num)

0	Lock is inactive
1	Lock is active

`<password>`^(str)

Password string used to lock and to unlock a `<facility>`. Length and authority for passwords depend on the `<facility>` in question and are therefore listed in the section on parameter `<facility>`. Passwords which can be modified see [AT+CPWD](#). Password for Network Personalisation ("PN") see [AT^SCSL](#) command.

`<class>`^(num)

Integer or sum of integers each representing a class of information, i.e. a bearer service, telecommunication service or bearer service group as defined in 3GPP TS 22.004 [27].

1	Voice
2	Class 2 ("Data") comprises all those individual data classes between 16 and 128, that are supported both by the network and the MS. This means, a setting made for class 2 applies to all individual data classes (if supported). In addition, you can assign a different setting to a specific class. For example, you can activate Call Forwarding for all data classes, but deactivate it for data class 64, "dedicated packet access".
4	Fax (only for compatibility reasons, not supported by PHS8-P)
8	SMS
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access

1...[7]...255 Combination of some of the above classes.
For example, the default setting 7 represents the sum of the integers 1, 2 and 4 for voice, data and fax (fax only for compatibility reasons) .
The value 255 covers all classes.
If parameter "class" is omitted, the default value 7 is used.

<data>^(str)

Data of the allowed network operators. Parameter is mandatory for Network Personalization ("PN"). Each operator code consists of the "Mobile Country Code" MCC and the "Mobile Network Code" MNC, both separated by a dot, e.g. MCC1.MNC1 . If more than one operator is entered on the same line, then a colon must be set between each operator code, e.g. MCC1.MNC1:MCC2.MNC2:MCC3.MNC3 . For example, for the three operators T-Mobile D1, Vodafone D2 and E-Plus you would enter the following data: 262.01:262.02:262.03
New operator entries will not be added to an existing list, but overwrite the all old entries. If you need to add new operator entries please send the complete list once again. Network Personalisation ("PN") is also applicable with [AT^SCSL](#) command.

Notes

- The [AT+CLCK](#) command offers the full range of [<class>](#) parameters according to the 3GPP Technical Specifications. However, when you attempt to use a service option which is not provisioned or not yet subscribed to, the setting will not take effect regardless of the response returned. The responses in these cases vary with the network (for example "OK", "Operation not allowed", "Operation not supported" etc.). To make sure check the extended error response with [AT+CEER](#) and the lock status with [<mode>=2](#).
- The command has been implemented with the full set of [<class>](#) parameters according to 3GPP TS 27.007 [47]. For actual applicability of a desired Call barring service to a specific service or service group (a specific [<class>](#) value) please consult table A.1 of 3GPP TS 22.004 [27].
- If an outgoing Data Call is rejected due to an active [<facility>="FD"](#) barring supplementary service, the call will be terminated with result code NO CARRIER. Under the same conditions, an outgoing Voice call will be terminated with result code NO DIALTONE.
- If an invalid [<password>](#) is entered several times in succession, a delay incremented after each failed attempt will increase the time to wait before the input of the [<password>](#) is accepted. To avoid blocking the serial interface the running [AT+CLCK](#) command is aborted after a short timeout and returns "+CME ERROR: unknown" (+CME ERROR: 100). If then the [AT+CLCK](#) command is issued once again execution is denied with "+CME ERROR: operation temporary not allowed" (+CME ERROR: 256). For details regarding the delay see Section 5.2.1, [What to do if PIN or password authentication fails?](#)
- If the user tries to set a lock although it is already active or, the other way round, tries to unlock an inactive lock, the response will be OK, but the [<password>](#) will not be checked or verified.
- In the airplane mode the write command version for the network related [<facility>](#) (AO, OI, OX, AI, IR, AB, AG and AC) is not supported. For remaining facilities the command is fully functional then.
- As stated above [<class>](#) 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries the lock refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.
- The parameter [<class>](#) will not be sent to the network if [<mode>=2](#). Therefore it may happen that the response of the query command contains information about classes which were not requested, or it shows only the inactive status of the class 1 or 255. This means that the status is valid for all classes.
- For PN (Network Personalisation) value of [<facility>](#) parameter refer to [AT^SCSL](#) command.
- Upper-case and lower-case characters cannot be used together for the [<facility>](#) parameter. For example, you can write either "FD" or "fd", but not "Fd".
- Parameter [<class>](#) is also allowed by [<mode>=2](#).

Examples

EXAMPLE 1

Lock SIM card ([<facility>="SC"](#))

AT+CLCK="SC",1,"9999"	The "SC" parameter enables or disables the SIM PIN authentication (PIN1) when you power up the UE
OK	SIM card locked. As a result, SIM PIN1 must be entered to enable UE to register to the network.

AT+CLCK="SC",0,"9999"	Unlocks SIM card.
OK	When powered up, UE registers to the network without requesting SIM PIN1.
	Note: Depending on the services offered by the provider, this feature is not supported by all SIM card types. If so, the command returns "ERROR" when you attempt to unlock the card.

To query the status of the SIM card lock:

AT+CLCK="SC",2	Query the status of SIM card lock.
+CLCK: 1	SIM card is locked. SIM PIN1 must be entered to enable UE to register to the network.
OK	

EXAMPLE 2

Phone locked to SIM card (<facility>="PS"):

AT+CPIN?	Make sure that PIN1 authentication is valid.
OK	

To lock the UE to the currently inserted SIM card, first read the password for <facility> "PS":

AT+CLCK="PS",3	Read the <facility> "PS" password.
+CLCK: 55555555	
OK	

Then, activate the phone locked to SIM card:

AT+CLCK="PS",1,"55555555"	Locks the UE to the current SIM card.
OK	

Optionally, query the status of the phone locked to SIM card:

AT+CLCK="PS",2	
+CLCK: 1	
OK	

To operate the UE with the SIM card for which "PS" lock was activated:

AT+CPIN?	
+CPIN: SIM PIN	
OK	
AT+CPIN="9999"	
OK	No additional password is required for operation (SIM recognized by UE).

To operate the UE with other SIM card than the one used for the "PS" lock:
Enter SIM PIN of present card, followed by "PS" lock password.

AT+CPIN?	
+CPIN: SIM PIN	
OK	
AT+CPIN="1111"	
OK	PIN authentication accepted.
AT+CPIN?	
+CPIN: PH-SIM PIN	"PS" phone lock password is required.
OK	
AT+CPIN="55555555"	
OK	"PS" phone lock password has been accepted. UE is fully operational now.

To deactivate the phone locked to SIM card:

AT+CLCK="PS",0,"55555555"
OK

"PS" phone lock password has to be provided again.
Now the UE can be used with any SIM card, without the need of the
phone lock password.

5.2 AT+CPIN PIN Authentication

[AT+CPIN](#) controls network authentication of the PHS8-P.

The [AT+CPIN](#) read command returns an alphanumeric string indicating whether or not network authentication is required.

The write [AT+CPIN](#) command allows the PHS8-P to store the entered password. This may be for example the SIM PIN1 to register to a GSM or UMTS network, or the SIM PUK1 to replace a disabled SIM PIN1 with a new one, or the PH-SIM PIN if the client has taken precautions for preventing damage in the event of loss or theft etc.

If no PIN1 request is pending (for example if PIN1 authentication has been done and the same PIN1 is entered again) PHS8-P responds "+CME ERROR: operation not allowed"; no further action is required.

Each time a password is entered with [AT+CPIN](#) the module starts reading data from the USIM. The duration of reading varies with the USIM card. This may cause a delay of several seconds before all commands which need access to USIM data are effective. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.

Syntax

Test Command	
AT+CPIN=?	
Response(s)	
OK	
Read Command	
AT+CPIN?	
Response(s)	
+CPIN: <code>	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
AT+CPIN=<pin>[, <new pin>]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN MDM APP → Last	Reference(s)
- + + + -	3GPP TS 27.007 [47]

Parameter Description

<pin>^(str)

Password (string type), usually SIM PIN1.

If the requested password was a PUK, such as SIM PUK1 or PH-FSIM PUK or another password, then <pin> must be followed by <new pin>.

<new pin>^(text)

If the requested code was a PUK: specify a new password or restore the former disabled password. See Section 5.2.1, [What to do if PIN or password authentication fails?](#) for more information about when you may need to enter the PUK.

<code>^(text)

SIM PIN authentication

READY	PIN has already been entered. No further entry needed.
SIM PIN	UE is waiting for SIM PIN1.
SIM PUK	UE is waiting for SIM PUK1 if PIN1 was disabled after three failed attempts to enter PIN1.
SIM PIN2	UE is waiting for PIN2.
SIM PUK2	UE is waiting for PUK2 to unblock a disabled PIN2.
Phone security locks set by client or factory	
PH-SIM PIN	UE is waiting for phone-to-SIM card password if "PS" lock is active and the client inserts other USIM, card than the one used for the lock. ("PS" lock is also referred to as phone or antitheft lock).
PH-FSIM PIN	UE is waiting for phone-to-very-first-SIM card. Necessary when "PF" lock was set. When powered up the first time, UE locks itself to the first USIM card put into the card holder. As a result, operation of the mobile is restricted to this one USIM card (unless the PH-FSIM PUK is used as described below).
PH-FSIM PUK	UE is waiting for phone-to-very-first-USIM card unblocking password to be given. Necessary when "PF" lock is active and other than first USIM card is inserted.
PH-NET PIN	UE is waiting for network personalisation password
PH-NET PUK	UE is waiting for network personalisation unblocking password
PH-NETSUB PIN	UE is waiting for network subset personalisation password
PH-NETSUB PUK	UE is waiting for network subset unblocking password
PH-SP PIN	UE is waiting for service provider personalisation password
PH-SP PUK	UE is waiting for service provider personalisation unblocking password
PH-CORP PIN	UE is waiting for corporate personalisation password
PH-CORP PUK	UE is waiting for corporate personalisation un-blocking password

Notes

- Successful PIN authentication only confirms that the entered PIN was recognized and correct. The output of the result code OK does not necessarily imply that the mobile is registered to the desired network. Typical example: PIN was entered and accepted with OK, but the UE fails to register to the network. This may be due to missing network coverage, denied network access with currently used USIM card, no valid roaming agreement between home network and currently available operators etc. PHS8-P offers various options to verify the present status of network registration: For example, the [AT+COPS](#) command indicates the currently used network. With [AT+CREG](#) you can also check the current status and activate an unsolicited result code which appears whenever the status of the network registration changes (e.g. when the UE is powered up, or when the network cell changes).
- [<pin>](#) and [<new pin>](#) can also be entered in quotation marks (e.g. "1234").
- See [AT+CPWD](#) for information on passwords.
- See [AT+CLCK](#) for information on lock types.
- See [AT+CPBS](#) for information on write access to the FD phonebook with PIN2
- PIN2 can be entered after at least first usage of protected functionality or along with the command used for accessing the PIN2 dependent feature.

5.2.1 What to do if PIN or password authentication fails?

PIN1 / PUK1:

After three failures to enter PIN1, the USIM card is blocked (except for emergency calls). After having entered two times the wrong PIN1 by using `AT+CPIN=PIN1` the PHS8-P responds "+CME ERROR: SIM PUK required". This will prompt the client to unblock the USIM card by entering the associated PUK (= PIN Unblocking Key / Personal Unblocking Key). After ten failed attempts to enter the PUK, the USIM card will be invalidated and no longer operable. In such a case, the card needs to be replaced. PIN1 consists of 4 to 8 digits, PUK1 is an 8-digit code only.

To unblock a disabled PIN1 you have two options:

- You can enter `AT+CPIN=PUK1,new PIN1`.
- You can use the `ATD` command followed by the star-hash command `**05*PUK*newPIN*newPIN#;`.

PIN2 / PUK2:

PIN2 prevents unauthorized access to the features listed in `AT+CPIN`. The handling of PIN2 varies with the provider. PIN2 may either be a specific code supplied along with an associated PUK2, or a default code such as 0000. In either case, the client is advised to replace it with an individual code. Incorrect input of PUK2 will permanently block the additional features subject to PIN2 authentication, but usually has no effect on PIN1. PIN2 consists of 4 digits, PUK2 is an 8-digit code only.

To unblock a disabled PIN2 you have two options:

- You can enter `AT+CPIN=PUK2,new PIN2`.
- You can use the `ATD` command followed by the star-hash command `**052*PUK2*newPIN2*newPIN2#;`.

USIM locks:

These are factory set locks, such as "PF", "PN", "PU", "PP", "PC". An 8-digit unlocking code is required to operate the mobile with a different USIM card, or to lift the lock. The code can only be obtained from the provider.

If incorrectly input, the password is governed by a specific timing algorithm: $(n-1) * 256$ seconds (see table below).

Number of failed attempts	Time to wait before next input is allowed
1st failed attempt	No time to wait
2nd failed attempt	4 seconds
3rd failed attempt	3 * 256 seconds
4th failed attempt	4 * 256 seconds
5th failed attempt	5 * 256 seconds
6th failed attempt and so forth	6 * 256 seconds and so forth

Call barring:

Supported modes are "AO", "OI", "OX", "AI", "IR", "AB", "AG", "AC". If the call barring password is entered incorrectly three times, the client will need to contact the service provider to obtain a new one.

Related sections:

"+CME ERROR: <err>" values are specified at Section 2.11.1, [CME/CMS Error Code Overview](#). For further instructions and examples see [AT+CLCK](#) and [AT+CPWD](#).

For a complete list of Star-Hash codes please refer Section 20.2, [Star-Hash \(*#\) Network Commands](#).

5.3 AT+CPWD Change Password

AT+CPWD allows to define a new password for a password protected <facility> lock function. Each password is a string of digits, the length of which varies with the associated <facility>. The test command returns a list of pairs which represent the available facilities and the maximum length of the associated password. See AT commands AT+CLCK for more information on the various lock features.

To delete a password use the following syntax: at+cpwd=<facility>,<old password>

Syntax

<p>Test Command</p> <p>AT+CPWD=?</p> <p>Response(s)</p> <p>+CPWD : list of supported (<facility>, <password length>)</p> <p>OK</p>											
<p>Write Command</p> <p>AT+CPWD=<facility>, <old password>[, <new password>]</p> <p>Response(s)</p> <p>New password has been registered for the facility lock function.</p> <p>OK</p> <p>If parameter <old password> was not correct:</p> <p>+CME ERROR: 16 (+CME ERROR: incorrect password)</p> <p>If the password for the selected <facility> has been invalidated due to too many failed attempts:</p> <p>+CME ERROR: ...</p> <p>If the network provider or network operator doesn't supply the Network Password:</p> <p>+CME ERROR: 258 (+CME ERROR: retry operation)</p> <p>If error is related to ME functionality:</p> <p>+CME ERROR: <err></p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>±</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	±	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	±	-							

Parameter Description

<facility> ^(str)	
Phone security locks set by client or factory:	
Primarily intended for the client to take safety precautions, passwords "SC" (SIM PIN) and "P2" (SIM PIN2) are usually predefined, but can be configured individually.	
"SC"	SIM PIN. SIM requests password upon ME power-up and when this lock command is issued. If incorrectly entered three times, the SIM PUK is required to perform authentication. Input of the SIM PUK password is possible only with AT command AT+CPIN or ATD. For further details please refer to Section 5.2.1, What to do if PIN or password authentication fails? <password length>: 4 to 8 digits.
"P2"	SIM PIN 2, e.g. required for authentication with facility lock "FD" (cf. AT+CLCK). If incorrectly entered three times, the SIM PUK 2 is required to perform authentication. Input of the SIM PUK 2 password is possible only with AT command AT+CPIN or ATD. For further detail please refer to Section 5.2.1, What to do if PIN or password authentication fails? <password length>: 4 to 8 digits.

Supplementary Service Call Barring:

The call barring supplementary service allows to specify conditions under which calls will be disallowed by the network.

The availability of the supplementary services varies with the network. To benefit from call barring the client will need to subscribe them, though a limited number of call barring types may be included in the basic tariff package.

`<password length>`: ThenNetwork password needs to be supplied from the network provider or network operator. Usually there is one 4 digit password which applies to all call barring options. For details contact your provider.

"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
"AG"	All outGoing barring services
"AC"	All inComing barring services

`<password length>`^(num)

4...8 Length of password. The range of permitted length for a password depends on the associated `<facility>`. It is available from the test command response, or in the description of parameter `<facility>`. If the entered password is longer then the maximum password length it will be stripped to the maximum length and the remaining digits will be ignored.

`<old password>`^(str)

Password specified for the facility.

Parameter `<old password>` can be ignored if no old password was allocated to the facility.

Take into account that a password may have already been set by factory, or that the service is subject to a password issued by the provider. See notes above or contact provider.

`<new password>`^(str)

New password. Mandatory, if `<old password>` was an unblocking key (PUK).

Notes

- In the airplane mode the write command version for the network related `<facility>` (AO, OI, OX, AI, IR, AB, AG and AC) is not supported. For remaining facilities the command is fully functional then.
- As stated above there is usually a one 4-digit password for all call barring facilities. To change the password please use only the "AB" `<facility>` (All Barring services).

Examples

EXAMPLE 1

To change PIN2

```
AT+CPWD="P2", "0000", "8888"  
OK
```

(where "0000" = old PIN2 and "8888" = new PIN2)
PIN2 password has been changed to "8888"

EXAMPLE 2

To set the password used to enable or disable Call Barring:

AT+CPWD="AB", "0000", "3333"

OK

Requests the network to change the password for the call barring supplementary service. Even though issued for "AB" only the request applies to all other call barring services, too.

5.4 AT^SCSL Customer SIM Lock

The `AT^SCSL` command controls the Customer SIM Lock feature. This feature allows application manufacturers to lock a mobile to specific operators by activating a Network Personalization ("PN"). If the lock is enabled the mobile will accept only SIM cards from the given operators.

The lock is activated by specifying the mobile country codes and mobile networks codes on command line. The Customer SIM Lock feature is protected by a depersonalization key.

If a SIM card is inserted `AT^SCSL` is SIM PIN protected, i.e., changing or querying any settings requires SIM PIN authentication. If no SIM card is inserted `AT^SCSL` is not SIM PIN protected, i.e., all settings can be changed and queried without SIM PIN authentication. The benefit for application manufacturers is that Customer SIM Lock can be set during production.

Syntax

```

Test Command
AT^SCSL=?
Response(s)
OK

Write Command
AT^SCSL=<facility>, <action>[, <password>, <data>]
Response(s)
If <action>= 2 and no Customer SIM Lock has been programmed yet:
^SCSL: ""
If <action>= 2, Customer SIM Lock is effective and command is successful:
^SCSL: <data>[: <data>: <data>: ...]
If <action>= 4 and no Customer SIM Lock has been programmed yet:
^SCSL: <password>
If <action>= 5 and no Customer SIM Lock has been programmed yet:
^SCSL: <password>,<PH-NET PUK>
If <action>= 4 and Customer SIM Lock is set:
^SCSL: ERROR
If <action>= 5 and Customer SIM Lock is set:
^SCSL: ERROR
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
±	+	+	+	-

Parameter Description

<code><facility></code> ^(str)	"PN"	Network Personalisation (= Customer SIM Lock).
<code><action></code> ^(num)	0	Delete programmed SIM lock data and disable the personalization. Required parameters: <code><facility>="PN",<action>=0,<password></code> . Removing the Customer SIM Lock deletes all <code><data></code> , i.e. the entire list of operators.
	1	Program given Customer SIM Lock data and activate lock. Required parameters: <code><facility>="PN",<action>=1,<password>,<data></code> .

- 2 Request Customer SIM Lock status.
Required parameters: `<facility>="PN",<action>=2`.
- 3 Set Customer SIM Lock into prepared state (Autolock). In this case, the SIM lock data will be read from the first inserted SIM card and stored.
Required parameters: `<facility>="PN",<action>=3,<password>`.
Setting the lock into prepared state will remove all `<data>`, i.e. the entire list of operators.
- 4 Request the depersonalization key, allowed if Customer SIM Lock has not already been programmed. Otherwise returns "`^SCSL: ERROR`".
Required parameters: `<facility>="PN",<action>=4`.
- 5 Request the depersonalization key and PH-NET PUK, allowed if Customer SIM Lock has not already been programmed. Otherwise returns "`^SCSL: ERROR`".
Required parameters: `<facility>="PN",<action>=5`.

`<password>`^(str)

8-digit depersonalization key associated with the device.

The depersonalization key is necessary for programming a Customer SIM Lock. It can also be used to unblock a Customer SIM Lock in order to operate the mobile with a SIM other than the one associated with the Customer SIM Lock. See note below.

The `<password>` is unique for each device. To find out the `<password>` it is necessary to execute the `AT^SCSL` write command with `<action>=4`.

Keep in mind that if a SIM lock is set, reading the `<password>` with `<action>=4` is no longer possible, and will only return "`^SCSL: ERROR`". To allow for any later changes, it is the responsibility of the manufacturer to hold a database with the module specific passwords. To avoid unauthorized use, the `<password>` should not be provisioned to end users.

The password is not needed for `<action>=2` and `<action>=4`.

`<data>`^(str)

Data of the allowed network operators.

Each operator code consists of the "Mobile Country Code" MCC and the "Mobile Network Code" MNC, both separated by a dot, e.g. MCC1.MNC1 . If more than one operator is entered on the same line, then a colon must be set between each operator code, e.g. MCC1.MNC1:MCC2.MNC2:MCC3.MNC3 . For example, for the three operators T-Mobile D1, Vodafone D2 and E-Plus you would enter the following data: 262.01:262.02:262.03

New operator entries will not be added to an existing list, but overwrite the all old entries. If you need to add new operator entries please send the complete list once again.

`<PH-NET PUK>`^(str)

8-digit `<PH-NET PUK>` key associated with the device.

The `<PH-NET PUK>` key is necessary for unblocking the Customer SIM Lock `<password>` when entering 10 times the wrong `<password>` for the Customer SIM Lock feature. The `<PH-NET PUK>` is unique for each device. To find out the `<PH-NET PUK>` it is necessary to execute the `AT^SCSL` write command with `<action>=5`. The response is the `<password>` and the `<PH-NET PUK>`. To unblock the Customer SIM Lock `<password>` use the `AT+CPIN` write command.

Keep in mind that if a SIM lock is set, reading the `<PH-NET PUK>` with `<action>=5` is no longer possible, and will only return "`^SCSL: ERROR`". To allow for any later changes, it is the responsibility of the manufacturer to hold a database with the module specific passwords. To avoid unauthorized use, the `<PH-NET PUK>` should not be provisioned to end users.

The password is not needed for `<action>=2`, `<action>=4` and `<action>=5`.

Notes

- Usage of the Customer SIM Lock features may be restricted by existing facility locks, such as a factory set SIM lock.
- Reprogramming an active SIM lock is possible, but overwrites previous settings.

- As described above the depersonalization key `<password>` is needed for programming a Customer SIM Lock with `AT^SCSL`.

It can also be used to unblock an existing Customer SIM Lock in order to operate the mobile with a SIM other than the one associated with the Customer SIM Lock. In such case, if the user inserts an unsupported SIM and enters PIN1 the ME returns OK, although access to SIM related commands (such as dialing out, access to phonebooks, SMS etc.) will be denied. If then the read command `AT+CPIN?` is executed the ME will request the PH-NET PIN, i.e. the `<password>`. After entering the `<password>` the ME can be operated with the new SIM. To avoid unauthorized use, the `<password>` should not be provisioned to end users.

Example

The example shows how to read out the `<password>` or the `<password>` and the `<PH-NET PUK>` first. After this, configuring, removing and unblocking the Customer SIM Lock is possible.

<pre>AT^SCSL="PN",4 ^SCSL: 12345678 OK AT^SCSL="PN",5 ^SCSL: 12345678,87654321 OK AT^SCSL="PN",2 ^SCSL: "" OK AT^SCSL="PN",1,"12345678","262.01:262.02" OK AT^SCSL="PN",2 ^SCSL: "262.01:262.02" OK AT^SCSL="PN",4 ^SCSL: ERROR AT^SCSL="PN",5 ^SCSL: ERROR AT^SCSL="PN",0,"12345678" OK AT^SCSL="PN",1,"11111111","262.01:262.02" ^SCSL: ERROR AT+CPIN? +CPIN: PH-NET PUK OK AT+CPIN="87654321" OK AT+CPIN? +CPIN: READY OK</pre>	<p>Check the <code><password></code>. If no Customer SIM Lock has been programmed yet the module specific <code><password></code> will be returned.</p> <p>Check the <code><password></code> and the <code><PH-NET PUK></code>. If no Customer SIM Lock has been programmed yet the module specific <code><password></code> and <code><PH-NET PUK></code> will be returned.</p> <p>Request status. SIM lock disabled.</p> <p>Program Customer SIM Lock.</p> <p>Request status SIM lock is enabled.</p> <p>Checking the <code><password></code> will now return "<code>^SCSL: ERROR</code>" only.</p> <p>Checking the <code><password></code> and the <code><PH-NET PUK></code> will now return "<code>^SCSL: ERROR</code>" only.</p> <p>Remove Customer SIM Lock.</p> <p>Program Customer SIM Lock with wrong <code><password></code>.</p> <p>After having entered the wrong <code><password></code> 10 times the Customer SIM Lock is blocked.</p> <p>Check status of PIN authentication. The mobile is waiting for the PH-NET PUK.</p> <p>PH-NET PUK is given with <code>AT+CPIN</code>. This action unblock the Customer SIM Lock <code><password></code>.</p> <p>Query status of PIN authentication.</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

5.5 AT^SPIC Display PIN Counter

The `AT^SPIC` command can be used to find out whether the ME is waiting for a password and, if so, how many attempts are left to enter the password.

The execute command returns the number of attempts still available for entering the currently required password, for example the PIN, PUK, PH-SIM PIN etc. .

The read command `AT^SPIC?` indicates which password the number of attempts stated by the execute command actually refers to. Also, the write command may be used to query the counter for a specific password. It indicates the number of attempts still available for entering the password identified by `<facility>`, for example the PIN, PIN2, PH-SIM PIN etc. .

To check whether or not you need to enter a password use the read commands `AT+CPIN?` or `AT^SPIC?` . If the response to `AT+CPIN?` is "READY" the counter of the execute command `AT^SPIC` relates to PIN2. See [last example](#). If PIN and PIN2 (e. g. `AT+CPBS="FD","PIN2"`) are entered successful no password is currently required and the referrer of the read and execute command `AT^SPIC` return only OK.

Syntax

Test Command

```
AT^SPIC=?
```

Response(s)

```
OK
```

Read Command

```
AT^SPIC?
```

Response(s)

```
^SPIC: <code>
```

```
OK
```

Exec Command

```
AT^SPIC
```

Response(s)

```
^SPIC: <counter>
```

```
OK
```

Write Command

```
AT^SPIC=<facility>[, <puk>]
```

Response(s)

```
^SPIC: <counter>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

`<counter>`^(num)

Number of attempts left to enter the currently required password. This number will be counted down after each failure.

`<facility>`^(str)

Password for which the corresponding PIN counter is to be displayed.

“SC“	SIM PIN when no parameter <code><puk></code> or set <code><puk></code> to 0. SIM PUK when parameter <code><puk></code> is set 1.
“PS“	PH-SIM PIN when no parameter <code><puk></code> or set <code><puk></code> to 0. PH-SIM PUK when parameter <code><puk></code> is set 1. For details see AT command AT+CLCK .
“P2“	SIM PIN2 when no parameter <code><puk></code> or set <code><puk></code> to 0. SIM PUK2 when parameter <code><puk></code> is set 1.
“PN“	Network Personalisation. PH-NET PIN when no parameter <code><puk></code> or set <code><puk></code> to 0. PH-NET PUK when parameter <code><puk></code> is set 1. For details see AT command AT^SCSL .

`<puk>`^(num)

PUK is displayed.

Is a display of the PUK count from `<facility>` required?

[0]	Show PIN count from the corresponding <code><facility></code> .
1	Show PUK count from the corresponding <code><facility></code> .

`<code>`^(text)

Identification of the currently required password.

SIM PIN	ME is waiting for SIM PIN1.
SIM PUK	ME is waiting for SIM PUK1 if PIN1 was disabled after three failed attempts to enter PIN1.
SIM PIN2	ME is waiting for PIN2, when the attempt to access PIN2 requiring features was acknowledged with "+CME ERROR: SIM PIN2 required" (e.g. if the user attempts to edit the FD phonebook by using AT+CPBS="FD","PIN2").
SIM PUK2	ME is waiting for PUK2 to unblock a disabled PIN2. Necessary if preceding command was acknowledged with "+CME ERROR: SIM PUK2 required".
PH-SIM PIN	ME is waiting for 8-digit code to unlock the UE to a SIM/UICC if "PS" lock is active and user inserts other SIM card than the one used for the lock. For details see AT+CLCK="PS" .
PH-SIM PUK	ME is waiting for 8-digit code to unblock the UE, if the above "PS" lock password was incorrectly entered 32 times.
PH-NET PIN	ME is waiting for Network Personalisation <code><password></code> . For details see AT^SCSL="PN",4 .
PH-NET PUK	ME is waiting for Network Personalisation unblocking password <code><PH-NET PUK></code> . For details see AT^SCSL="PN",5 .

Notes

- Whenever the required password changes, `<counter>` changes to reflect that change. Please refer to the examples below.
- See also chapters [AT+CLCK](#), [AT+CPIN](#), [AT+CPWD](#) and [AT^SCSL](#) for further information on locks and passwords.

Examples

EXAMPLE 1

The user fails to provide a correct SIM PIN three times. The counter decreases each time. After the counter reaches zero, the SIM PUK is required. After each failure to enter a correct SIM PUK, the counter decreases.


```
at+cpin?  
+CPIN: SIM PIN  
OK  
at^spic?  
^SPIC: SIM PIN  
OK  
at^spic  
^SPIC: 3  
OK  
at+cpin=9999  
+CME ERROR: incorrect password  
at^spic  
^SPIC: 2  
OK  
at+cpin=9999  
+CME ERROR: incorrect password  
OK  
at^spic  
^SPIC: 1  
OK  
at+cpin=9999  
+CME ERROR: incorrect password  
at+cpin?  
+CPIN: SIM PUK  
OK  
at^spic  
^SPIC: 10  
OK  
at+cpin=01234567,1234  
+CME ERROR: incorrect password  
at^spic  
^SPIC: 9  
OK
```

Currently required password is PIN1.
Currently required password is PIN1.
3 attempts left.
2 attempts left.
1 attempt left.
Now required password is PUK1.
10 attempts left for PUK1.
9 attempts left for PUK1.

EXAMPLE 2

Though a mobile is locked to Network Personalisation ("PN"), the user attempts to operate it with another SIM card. The user correctly enters the SIM PIN of the SIM card currently inserted, but then fails to give the "PN" unblock password (PH-NET PUK):

```
at+cpin=9999  
OK  
at+cpin?  
+CPIN: PH-NET PIN  
OK  
at^spic  
^SPIC: 10  
OK  
at+cpin=11110000  
+CME ERROR: incorrect password  
at^spic?  
^SPIC: 9  
OK  
at+cpin=11111111  
+CME ERROR: incorrect password  
and so on ...  
at^spic  
^SPIC: 1
```

ME is waiting for the Network Personalisation password.
10 attempts left.
9 attempts left.
1 attempt left.

```
OK
at^spic?
^SPIC: PH-NET PIN
OK

at+cpin=11119999
+CME ERROR: incorrect password
at^spic
^SPIC: 32
OK
at^spic?
^SPIC: PH-NET PUK
OK

at+cpin=22220000
+CME ERROR: incorrect password
at^spic
^SPIC: 31
OK
```

Displayed counter refers to Network Personalisation password.

Displayed counter refers to Network Personalisation unblock password.

EXAMPLE 3

This example shows that after successful SIM PIN1 authentication the counter of the `AT^SPIC` execute and read command refers to SIM PIN2, i.e. it does not reflect the status of SIM PIN1. This may be a problem if the user enters a wrong PIN1 and is not aware that the number of attempts left to enter SIM PIN1 is counted down.

```
+CREG: 0
at+cpin=1234
OK
+CREG: 2

+CREG: 1
at+cpin?
+CPIN: READY

at^spic
^SPIC: 3

OK
AT^SPIC?

^SPIC: SIM PIN2
OK
at+clck="SC",0,456789
+CME ERROR: incorrect password
at^spic
^SPIC: 3

at+clck="SC",0,456789
+CME ERROR: incorrect password
at^spic
^SPIC: 3

at+clck="SC",0,456789
+CME ERROR: incorrect password

+CREG: 0
```

The mobile is properly registered to the network.

The `AT+CPIN?` read command confirms that SIM PIN1 authentication was successful.

As SIM PIN1 authentication was successful, the counter relates to SIM PIN2 and correctly indicates that the user has 3 attempts to enter SIM PIN2.

Likewise, the read command notifies that the ME is waiting for SIM PIN2.

First attempt to enter a wrong SIM PIN1.

SIM PIN1 authentication is still valid, and the counter relates to SIM PIN2.

Second attempt to enter a wrong SIM PIN1.

SIM PIN1 authentication is still valid, and the counter relates to SIM PIN2.

Third attempt to enter a wrong SIM PIN1.

SIM PIN1 authentication is no longer valid.

```
at^spic  
^SPIC: 10
```

This time, after the SIM PIN1 code has been disabled, the counter indicates the status of SIM PIN1 and notifies that 10 attempts are left to enter the SIM PUK.

To avoid conflicts we recommend to use the [AT^SPIC](#) read and write commands rather than the execute command only. The read command clearly states the currently required password, and the write command may be used to get the counter for a specific [<facility>](#), in this case for example "P2".

6. Identification Commands

The AT Commands described in this chapter allow the external application to obtain various identification information related to the PHS8-P and linked entities.

6.1 ATI Display product identification information

The [ATI](#) execute command delivers a product information text.
The 'Revision' information consists of the following parts: Version xx and variant yy of software release.

Syntax

<pre>Exec Command ATI[<value>] Response(s) Cinterion PHS8-P REVISION xx.yyy OK</pre>													
<pre>Exec Command ATI1 Response(s) Cinterion PHS8-P REVISION xx.yyy A-REVISION xx.zzz.cc OK</pre>													
<pre>Exec Command ATI2 Response(s) UICC Application Identification <applId> OK ERROR +CME ERROR: <err></pre>													
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>±</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	±	+	+	+	-	<table border="1"> <thead> <tr> <th>Reference(s)</th> </tr> </thead> <tbody> <tr> <td>V.250</td> </tr> </tbody> </table>	Reference(s)	V.250
PIN	MDM	APP	→	Last									
±	+	+	+	-									
Reference(s)													
V.250													

Parameter Description

<value>^(num)
Values are not supported and only return OK.

<applId>^(num)
UICC application types. A single value or a combination of the following values is possible.
For example, the response value 0x03 represents the sum of the integers 0x01 and 0x02 (GSM application and USIM application).

0x01	GSM application
------	-----------------

0x02	USIM application
0x04	ISIM application

Notes

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Manufacturer", then instead of "Cinterion" the changed value will be returned (for details please refer to description of parameter [<manufacturer>](#)).
- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Product", then instead of "PHS8-P" the changed value will be returned (for details please refer to description of parameter [<product>](#)).
- "A-REVISION xx.zzz.cc" information consists of the following parts:
Application Revision Number 'xx' as an assignment to customer application. '01' indicates no customer application.
Application Revision Version 'zzz' as an assignment to changes in customer application.
'cc' as an additional number, e.g. defined by customer.

6.2 AT+CGMI Request manufacturer identification

[AT+CGMI](#) returns a manufacturer identification text. See also: [AT+GMI](#).

Syntax

Test Command					
AT+CGMI=?					
Response(s)					
OK					
Exec Command					
AT+CGMI					
Response(s)					
Cinterion					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	3GPP TS 27.007 [47]

Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Manufacturer", then instead of "Cinterion" the changed value will be returned (for details please refer to description of parameter [<manufacturer>](#)).

6.3 AT+GMI Request manufacturer identification

[AT+GMI](#) returns a manufacturer identification text. See also: [AT+CGMI](#).

Syntax

Test Command					
AT+GMI=?					
Response(s)					
OK					
Exec Command					
AT+GMI					
Response(s)					
Cinterion					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	ITU-T V.250 [18]

Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Manufacturer", then instead of "Cinterion" the changed value will be returned (for details please refer to description of parameter [<manufacturer>](#)).

6.4 AT+CGMM Request model identification

[AT+CGMM](#) returns a product model identification text. Command is identical with [AT+GMM](#).

Syntax

Test Command					
AT+CGMM=?					
Response(s)					
OK					
Exec Command					
AT+CGMM					
Response(s)					
PHS8-P					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	3GPP TS 27.007 [47]

Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Product", then instead of "PHS8-P" the changed value will be returned (for details please refer to description of parameter [<product>](#)).

6.5 AT+GMM Request model identification

[AT+GMM](#) returns a product model identification text. Command is identical with [AT+CGMM](#).

Syntax

Test Command					
AT+GMM=?					
Response(s)					
OK					
Exec Command					
AT+GMM					
Response(s)					
PHS8-P					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	ITU-T V.250 [18]

Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Product", then instead of "PHS8-P" the changed value will be returned (for details please refer to description of parameter [<product>](#)).

6.6 AT+CGMR Request revision identification of software status

[AT+CGMR](#) delivers a product firmware version identification. Command is identical with [AT+GMR](#).

Syntax

Test Command	
AT+CGMR=?	
Response(s)	
OK	
Exec Command	
AT+CGMR	
Response(s)	
REVISION <xx.yyy>	
OK	
PIN MDM APP → Last	Reference(s)
- + + + -	3GPP TS 27.007 [47]

Parameter Description

<xx.yyy> ^(str)
Version xx and variant yyy of software release.

6.7 AT+GMR Request revision identification of software status

[AT+GMR](#) delivers a product firmware version identification. Command is identical with [AT+CGMR](#).

Syntax

Test Command	
AT+GMR=?	
Response(s)	
OK	
Exec Command	
AT+GMR	
Response(s)	
REVISION <xx.yyy>	
OK	
PIN MDM APP → Last	Reference(s)
- + + + -	ITU-T V.250 [18]

Parameter Description

<xx.yyy> ^(text)
Version xx and variant yyy of software release.

6.8 AT+CGSN Request International Mobile Equipment Identity (IMEI)

[AT+CGSN](#) returns the International Mobile Equipment Identity (IMEI). Command is identical with [AT+GSN](#).

Syntax

Test Command					
AT+CGSN=?					
Response(s)					
OK					
Exec Command					
AT+CGSN					
Response(s)					
<sn>					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	3GPP TS 27.007 [47]

Parameter Description

<sn> ^(str)
IMEI used to identify mobile equipment when used on a mobile network

6.9 AT+GSN Request International Mobile Equipment Identity (IMEI)

[AT+GSN](#) returns the International Mobile Equipment Identity (IMEI). Command is identical with [AT+CGSN](#).

Syntax

Test Command					
AT+GSN=?					
Response(s)					
OK					
Exec Command					
AT+GSN					
Response(s)					
<sn>					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	ITU-T V.250 [18]

Parameter Description

<sn> ^(str)
IMEI used to identify mobile equipment when used on a mobile network

6.10 AT+CIMI Request International Mobile Subscriber Identity (IMSI)

[AT+CIMI](#) delivers the International Mobile Subscriber Identity (IMSI). The IMSI permits the TE to identify the individual SIM attached to the UE.

Syntax

Test Command	
AT+CIMI=?	
Response(s)	
OK	
Exec Command	
AT+CIMI	
Response(s)	
<imsi>	
OK	
ERROR	
+CME ERROR: <err>	
PIN MDM APP → Last	Reference(s)
+ + + + -	3GPP TS 27.007 [47]

Parameter Description

<imsi> ^(str)
International Mobile Subscriber Identity (string without quotes).

7. Call related Commands

The AT Commands described in this chapter are related to Mobile Originated (MOC, i.e. outgoing) Calls and Mobile Terminated (MTC, i.e. incoming) Calls.

7.1 ATA Connect to Incoming Call

[ATA](#) connects the PHS8-P to an incoming voice or data call indicated by a "RING" URC. [AT+CRC](#) allows to customize the format of the incoming call URC.

Additional AT commands on the same command line are ignored.

The command may be aborted by any character sent from the TE to the UE during execution. It cannot be aborted in some connection setup states, such as handshaking.

Syntax

Exec Command				
ATA				
Response(s)				
In case of incoming data call, if successfully connected, UE switches to data mode:				
CONNECT <text>				
In case of voice call, if successfully connected:				
OK				
When UE returns to command mode after data call release:				
OK				
If incoming call is not available, i.e. already disconnected or hung up:				
NO CARRIER				
PIN	MDM	APP	→	Last
+	+	+	-	+
Reference(s)				
ITU-T V.250				[18]

Parameter Description

<text> ^(str)
Connection speed
Presented only if ATX parameter setting is greater 0. For possible connection speed values see AT+CBST . In the UTRAN lu mode the theoretical data transfer rates are limited to 14.4 kbps, 28.8 kbps and 57.6 kbps.

7.2 ATD Mobile originated call to specified number

ATD can be used to set up outgoing voice and data calls. Supplementary Services can also be controlled with ATD. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services. For data calls the semicolon ";" must be omitted.

The command may be aborted by any character sent from the TE to the UE during execution. It cannot be aborted in some connection setup states, such as handshaking.

Response modes:

- For data connections, call setup always terminates when the call has been established (indicated by the CONNECT result code, or when it fails (indicated by "NO CARRIER" or "BUSY") at the modem port.
- For voice calls the UE returns "OK" once call setup is completed either successfully or unsuccessfully.
- See ATX for setting result code and call monitoring parameters.

Syntax

Exec Command	
ATD<n>[<mgsm>][:]	
Response(s)	
If successfully connected and non-voice call, UE switches to online data mode indicated by: CONNECT or CONNECT <text>	
If voice call successful or not: OK	
When sending *# sequences response is specific to *# sequence. For details see Section 20.2, Star-Hash (*#) Network Commands	
If no dialtone (parameter setting ATX3 or ATX4): NO DIALTONE	
If busy (parameter setting ATX3 or ATX4): BUSY	
If a connection cannot be set up: NO CARRIER NO ANSWER OK	
PIN MDM APP → Last	Reference(s)
± + ± - -	ITU-T V.250 [18]

Parameter Description

<n>^(text)

String of dialing digits and optional V.250 modifiers: 0-9, *, #, +, A, B, C, D, p
The following V.250 modifiers are ignored: ,(comma), T, !, W, @

DTMF transmission: If the dial string <n> contains the call modifier "p" the digits after this call modifier till the end are handled as DTMF tones, which are transmitted at connect state for voice calls. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected. When encountering the DTMF separator subsequently, the module will insert a pause.

<mgsm>^(str)

- Modifier characters:
- I Activates CLIR (disables presentation of own phone number to called party, *#31#-code will be ignored)
 - i Deactivates CLIR (enables presentation of own phone number to called party, *#31#-code will be ignored)
 - G Activate Closed User Group explicit invocation for this call only.
 - g Deactivate Closed User Group explicit invocation for this call only.

Notes

- The UE is equipped with a "Blacklist" function according to GSM02.07 Annex A:
After a predefined number of failed call attempts, the dialed number is entered into a read-only phonebook called "blacklist" (phonebook "BL"). Call attempts to numbers contained in the blacklist will be barred by UE and not signalled to the network.
An attempt to start a voice call to a barred phone number will be stopped with a "+CME ERROR: call barred".
An attempt to start a data call to a barred phone number will be answered immediately with result code "NO CARRIER".
The barred numbers are automatically removed from the blacklist according to the timing conditions specified in GSM02.07 Annex A.
- Emergency calls:
If no SIM is inserted, call numbers 000, 08, 110, 112, 118,119, 911 and 999 cause an emergency call setup.
If a SIM with ECC file is inserted, 112 and 911 and all additional call numbers stored in the ECC file cause an emergency call setup.
If a SIM without ECC file is inserted, call numbers 112 and 911 and in addition all call numbers enabled with [AT^SCFG](#), "Call/ECC", parameter `<ecc>` will cause an emergency call setup.

7.3 ATD><mem><index> Mobile originated call using specific memory and index number

This ATD command variant can be used to dial a number by specifying the phonebook and an index stored in this phonebook. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services. For data calls the semicolon ";" must be omitted.

The command may be aborted by any character sent from the TE to the UE during execution. Abortion is not possible during some states of connection setup such as handshaking.

See [ATX](#) for setting result code and call monitoring parameters.

Syntax

Exec Command

```
ATD>"<mem><index>" [;]
```

Response(s)

If successfully connected and non-voice call (UE switches to online data mode):
CONNECT <text>

If voice call successful or not:
OK

When sending *# sequences:
Response specific to *# sequence. For details see Section 20.2, [Star-Hash \(*#\) Network Commands](#).

If no dialtone (parameter setting [ATX3](#) or [ATX4](#)):
NO DIALTONE

If busy (parameter setting [ATX3](#) or [ATX4](#)):
BUSY

If connection cannot be set up:
NO CARRIER
NO ANSWER
ERROR
+CME ERROR: <err>

PIN	MDM	APP	→	Last
+	+	+	-	-

Reference(s)

[ITU-T V.250 \[18\]](#)

Parameter Description

<code><mem></code> ^(text)	
Phonebook storage: For detailed description of storages see AT+CPBS .	
FD	Fixed dialing phonebook
SM	SIM phonebook
ON	MSISDN list
ME	Mobile Equipment Phonebook
LD	Last number dialed phonebook
MC	Missed (unanswered received) calls list
RC	Received calls list
EN	Emergency numbers
DC	Dialed calls list

<index>^(num)

Integer type memory location in the range of locations available in the selected memory, i.e. the index number returned by [AT+CPBR](#).

DTMF transmission: If the dial string stored in the memory contains the call modifier "p" the digits after this call modifier till the end are handled as DTMF tones, which are transmitted at connect state for voice calls. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

Examples

EXAMPLE 1

To query the location number of a phonebook entry:

```
AT+CPBR=1,15
+CPBR: 1,"+999999",145,"Charlie"
+CPBR: 2,"+777777",145,"Bill"
...
+CPBR: 15,"+888888",145,"Arthur"
```

UE returns the entries stored in the active phonebook.

EXAMPLE 2

To dial a number from the SIM phonebook, for example the number stored to location 15:

```
ATD>"SM15";
OK
```

EXAMPLE 3

To dial a phone number stored in the last dial memory on the SIM card:

```
ATD>"LD9";
OK
```

EXAMPLE 4

To dial a number from the ME phonebook, for example the number stored to location 15:

```
ATD>"ME15";
OK
```

7.4 ATD><index> Mobile originated call from active memory using index number

This ATD command variant can be used to dial a number by selecting an index from the active phonebook. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services. For data calls the semicolon ";" must be omitted.

The command may be aborted by any character sent from the TE to the UE during execution. Abortion is not possible during some states of connection setup such as handshaking.

See [ATX](#) for setting result code and call monitoring parameters.

Syntax

Exec Command	
ATD><index>[:;]	
Response(s)	
If successfully connected and non-voice call (UE switches to online data mode):	
CONNECT <text>	
If voice call successful or not:	
OK	
When sending *# sequences:	
Response specific to *# sequence. For details see Section 20.2, Star-Hash (*#) Network Commands .	
If no dialtone (parameter setting ATX3 or ATX4):	
NO DIALTONE	
If busy (parameter setting ATX3 or ATX4):	
BUSY	
If connection cannot be set up:	
NO CARRIER	
NO ANSWER	
ERROR	
+CME ERROR: <err>	
PIN MDM APP → Last	Reference(s)
+ + + - -	ITU-T V.250 [18]

Parameter Description

<index>^(num)

Integer type memory location in the range of locations available in the active memory, i.e. the index number returned by [AT+CPBR](#).

DTMF transmission: If the dial string stored in the memory contains the call modifier "p" the digits after this call modifier till the end are handled as DTMF tones, which are transmitted at connect state for voice calls. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

7.5 ATD><str> Mobile originated call from memory using corresponding string

This ATD command variant can be used to search all PHS8-P phonebooks for a given string and dial the found number. The termination character ";" is mandatory to set up voice calls or to send *# codes for Supplementary Services. For data calls the semicolon ";" must be omitted.

The command may be aborted by any character sent from the TE to the UE during execution. Abortion is not possible during some states of connection setup such as handshaking.

See [ATX](#) for setting result code and call monitoring parameters.

Syntax

Exec Command	
ATD><str>[:;]	
Response(s)	
If successfully connected and non-voice call (UE switches to online data mode):	
CONNECT <text>	
If voice call successful or not:	
OK	
When sending *# sequences:	
Response specific to *# sequence. For details see Section 20.2, Star-Hash (*#) Network Commands .	
If no dialtone (parameter setting ATX3 or ATX4):	
NO DIALTONE	
If busy (parameter setting ATX3 or ATX4):	
BUSY	
If connection cannot be set up:	
NO CARRIER	
NO ANSWER	
ERROR	
+CME ERROR: <err>	

PIN	MDM	APP	→	Last
+	+	+	-	-

Reference(s)
ITU-T V.250 [18]

Parameter Description

<str>^{(str)(+CSCS)}

String type value ("x"), which should equal to an alphanumeric field in at least one phonebook entry in the searched memories. The string must contain at least one character. Used character set should be the one selected with [AT+CSCS](#). **<str>** can contain escape sequences as described in chapter "[Supported character sets](#)".

If [AT+CSCS](#) is set to "UCS2", with respect to the coding of UCS2-characters only phonebook entries that contain an alphanumeric string with a size less than the half of the parameter **<tlength>** from [AT+CPBW](#) can be dialed.

DTMF transmission: If the dial string stored in the memory contains the call modifier "p" the digits after this call modifier till the end are handled as DTMF tones, which are transmitted at connect state for voice calls. The command returns OK after the transmission of DTMF tones has been completed, even if the call is already connected.

7.6 ATH Disconnect existing data connection

ATH disconnects circuit switched data calls.
For voice calls use [AT+CHUP](#) or [AT^SHUP](#).

Syntax

Exec Command				
ATH[<n>]				
Response(s)				
OK				
PIN	MDM	APP	→	Last
+	+	-	-	-
Reference(s)				
ITU-T V.250 [18]				

Parameter Description

<n> ^(num)	
[0]	Disconnect from line and terminate data call.

7.7 AT+CHUP Hang up call

[AT+CHUP](#) cancels all voice calls in state Active, Waiting, Held.
For data connections use [ATH](#) or [AT^SHUP](#).

Syntax

Test Command				
AT+CHUP=?				
Response(s)				
OK				
ERROR				
+CME ERROR: <err>				
Exec Command				
AT+CHUP				
Response(s)				
OK				
ERROR				
+CME ERROR: <err>				
PIN	MDM	APP	→	Last
-	+	+	-	-
Reference(s)				
3GPP TS 27.007 [47]				

7.8 AT^SHUP Hang up call(s) indicating a specific 3GPP TS 24.008 release cause

The [AT^SHUP](#) write command terminates calls known to the UE and indicates a specific 3GPP TS 24.008 [42] release cause specified by the user. The command can be used for voice and data calls. Calls will be terminated regardless of their current call status, which may be any of the states listed with [AT+CLCC](#).

Syntax

Test Command
AT^SHUP=?
Response(s)
OK
Write Command
AT^SHUP=<cause>[, <cn>]
Response(s)
OK
ERROR
NO CARRIER
PIN MDM APP → Last
+ + ± - -

Parameter Description

<cause>^(num)

Release cause

3GPP TS 24.008 [42] release cause to be indicated to the network. The PHS8-P will release the selected connection(s) with release cause indication "cause" and location "user" (0) in the "disconnect" protocol message to the network. It depends on the network whether or not the release cause will be forwarded to the remote party.

1	Send 3GPP TS 24.008 [42] release cause "unassigned (unallocated) number"
16	Send 3GPP TS 24.008 [42] release cause "normal call clearing "
17	Send 3GPP TS 24.008 [42] release cause "user busy "
18	Send 3GPP TS 24.008 [42] release cause "no user responding "
21	Send 3GPP TS 24.008 [42] release cause "call rejected"
27	Send 3GPP TS 24.008 [42] release cause "destination out of order "
31	Send 3GPP TS 24.008 [42] release cause "normal, unspecified"
88	Send 3GPP TS 24.008 [42] release cause "incompatible destination"

<cn>^(num)

Call number


The "call number" is an optional index used in the list of current calls indicated by [AT+CLCC](#). The [AT^SHUP](#) command will terminate the call identified by the given call number. The default call number "0" is not assigned to any call, but signifies "all calls". As "0" is the default value, it may be omitted.

[0]	Terminate all known calls. However, if circuit switched data calls and voice calls occur together, the command only terminates the CSD calls.
1...7	Terminate the specific call number <cn>.

7.9 ATSO Automatic Answer

[ATSO](#) controls automatic answering mode for MT data calls.

Syntax

Read Command	
ATSO?	
Response(s)	
<n> OK ERROR	
Write Command	
ATSO= <n>	
Response(s)	
OK ERROR	
PIN MDM APP  Last	Reference(s)
+ + + - -	ITU-T V.250 [18]

Parameter Description

<n> ^{(num)(&V)(&W)}	
000 ^{(&F)(D)}	Automatic answering mode is disabled.
001-255	Enable automatic answering after specified number of rings.

Notes

- If [<n>](#) is set to higher values, the calling party may hang up before the call is automatically answered.
- While the DTR line is in OFF state (see [AT&D](#)) automatic answering is disabled.

7.10 ATS6 Set pause before blind dialing

ATS6 is implemented for compatibility reasons only, and has no effect.

Syntax

Read Command

ATS6?

Response(s)

<n>

OK

Write Command

ATS6=<n>

Response(s)

OK

ERROR

PIN	MDM	APP	→	Last
+	+	+	+	-

Reference(s)

ITU-T V.250 [18]

Parameter Description

<n>^{(num)(&V)(&W)}

7.11 ATS7 Set number of seconds to wait for connection completion

[ATS7](#) specifies the number of seconds the UE will wait for the completion of the call setup when answering or originating a data call. Also referred to as "no answer timeout". To put it plainly, this is the time to wait for the carrier signal. If no carrier signal is received within the specified time, the UE hangs up.

Syntax

Read Command					
ATS7?					
Response(s)					
<n>					
OK					
Write Command					
ATS7= <n>					
Response(s)					
OK					
ERROR					
PIN	MDM	APP	→	Last	Reference(s)
+	+	+	+	-	ITU-T V.250 [18]

Parameter Description

<n> ^{(num)(&V)(&W)}	
Number of seconds to wait for connection completion	
000 ^(&F)	Feature is disabled.
001-255	Number of seconds.

7.12 ATS8 Comma Dial Pause Time

ATS8 is implemented for compatibility reasons only, and has no effect.

Syntax

Read Command

ATS8?

Response(s)

<n>

OK

Write Command

ATS8=<n>

Response(s)

OK

PIN	MDM	APP	→	Last
+	+	+	+	-

Reference(s)

ITU-T V.250 [18]

Parameter Description

<n>^{(num)(&V)(&W)}

7.13 ATS10 Set disconnect delay after indicating the absence of data carrier

[ATS10](#) determines the amount of time, that the UE remains connected in absence of a data carrier. If the data carrier is detected before disconnect, the UE remains connected.

Syntax

Read Command					
ATS10?					
Response(s)					
<n>					
OK					
Write Command					
ATS10= <n>					
Response(s)					
OK					
ERROR					
PIN	MDM	APP	→	Last	Reference(s)
+	+	+	+	-	ITU-T V.250 [18]

Parameter Description

<n> ^{(num)(&V)(&W)}	
001...014 ^(&F) ...255	Number of tenths of seconds to wait before disconnecting after UE has indicated the absence of received line signal

7.14 ATO Switch from command mode to data mode

ATO is the corresponding command to the **+++** escape sequence: If the UE is in command mode during a data connection **ATO** causes the UE to return to data mode.

Syntax

Exec Command				
ATO[<n>]				
Response(s)				
If connection is not successfully resumed:				
NO CARRIER				
or				
UE returns to data mode from command mode				
CONNECT <text>				
Note: <text> output only if ATX parameter setting with value > 0.				
PIN	MDM	APP	→	Last
+	+	-	-	-
Reference(s)				V.250

Parameter Description

<n> ^(num)	
[0]	Switch from command mode to data mode

7.15 +++ Escape from Data Mode to AT Command Mode

+++ escape sequence is only available during a circuit switched data (CSD) call or a packet switched connection. The +++ character sequence causes the PHS8-P to pause data mode and return to AT command mode. This allows to enter AT commands while maintaining the data connection to the remote device. By the way the same task can be performed by toggling the DTR line if [AT&D](#) is set to 1. [ATO](#) is used to resume data or PPP online mode.

To prevent the +++ character sequence from being misinterpreted as data, it must be preceded and followed by a pause of at least 1000 ms. The +++ characters must be entered in quick succession, all within 1000 ms.

Syntax

Exec Command					
+++					
Response(s)					
OK					
PIN	MDM	APP	→	Last	Reference(s)
-	+	-	-	-	ITU-T V.250 [18]

Note

- In Multiplex mode the +++ sequence does not work. Therefore, if required in Multiplex mode, the escape sequence needs to be implemented in the Customer Application. Design solutions, for example using the DTR signal or a modem status command (MSC), can be found in [\[4\]](#), Section "Escape Sequence". Also refer to Section [4.7](#), [AT+CMUX](#).

7.16 AT+CLCC List of current calls

The execute command lists all current calls. If the command is successful, but no calls are available, no information response is sent to the TE.

Syntax

<p>Test Command</p> <pre>AT+CLCC=?</pre> <p>Response(s)</p> <pre>OK</pre>	<p>Exec Command</p> <pre>AT+CLCC</pre> <p>Response(s)</p> <pre>[+CLCC: <idx>, <dir>, <stat>, <mode>, <empty>[, <number>, <type>[, <alpha>]]] [+CLCC: <idx>, <dir>, <stat>, <mode>, <empty>[, <number>, <type>[, <alpha>]]] [+CLCC: ...] OK ERROR +CME ERROR: <err></pre>										
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	-	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	-	-							

Parameter Description

<idx>^(num)	
Call identification number as described in 3GPP TS 22.030 [28], subclause 6.5.5.1; this number can be used in AT+CHLD command operations	
<dir>^(num)	
0	Mobile originated call (MOC)
1	Mobile terminated call (MTC)
<stat>^(num)	
State of the call	
0	Active
1	Held
2	Dialing (MOC)
3	Alerting (MOC)
4	Incoming (MTC)
5	Waiting (MTC)
<mode>^(num)	
Bearer/teleservice	
0	Voice
1	Data
2	Fax (only for compatibility reasons, not supported by PHS8-P)

<mpty>^(num)

0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

<number>^(str)

Phone number in format specified by <type>

<type>^(num)

Type of address octet

128	Restricted <number> includes unknown type and format.
161	National <number>. Network support of this type is optional.
145	Dialing string <number> includes international access code character '+'
129	Otherwise

<alpha>^{(str)(+CSCS)}

Alphanumeric representation of <number> corresponding to the entry found in phonebook.
The maximum displayed length of <alpha> is 14 characters.

Note

- For alphanumeric representation the number stored in phonebook must be identical to the number transported over the network, then the associated name will be recognized.

7.17 AT^SLCC Extended list of current calls

AT^SLCC covers essentially the same information as the 3GPP TS 27.007 [47] command AT+CLCC, with the following extensions:

- The additional write command allows to activate event reporting for the list of current calls.
- The additional read command returns an indication whether event reporting is active for the current interface.
- The exec command returns, like AT+CLCC, a list of current calls. If the command is successful, but no calls are available, no information response is sent to the TE.

Syntax

```

Test Command
AT^SLCC=?
Response(s)
^SLCC: (list of supported<n>s)
OK

Read Command
AT^SLCC?
Response(s)
^SLCC: <n>
OK

Exec Command
AT^SLCC
Response(s)
[^SLCC:<idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]]
[^SLCC:<idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]]
[^SLCC:...]
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SLCC=[<n>]
Response(s)
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
+	+	+	-	-

Unsolicited Result Code

Unsolicited Call Status information

if the list of current calls is empty:

^SLCC:

if one or more calls are currently in the list:

```

^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]
[^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]]
[... ]

```

^SLCC:

URC "[^SLCC](#)" displays the list of current calls as displayed with the execute command [AT^SLCC](#). The list is displayed in the state it has at the time of display, not in the state it had when the signal was generated.

The URC's occurrence indicates call status changes for any of the calls in the list of current calls.

If multiple displays of identical list configurations occur, this happens because of short intermediate states of the list, that have already been overridden by new transitions and states. Thus, it is guaranteed that the configuration displayed is always the current configuration at the time of the last display.

The list of active calls displayed with this URC will always be terminated with an empty line preceded by prefix "[^SLCC](#): ", in order to indicate the end of the list.

Parameter Description

[<n>](#)^(num)([&V](#))([&W](#))

0(&F)(D)	Presentation of URC " ^SLCC " disabled
1	Presentation of URC " ^SLCC " enabled

[<idx>](#)^(num)

Call identification number as described in subclause 6.5.5.1 of 3GPP TS 22.030 [\[28\]](#) . This number can be used in [AT+CHLD](#) command operations.

[<dir>](#)^(num)

0	Mobile originated call (MOC)
1	Mobile terminated call (MTC)

[<stat>](#)^(num)

State of the call

0	Active
1	Held
2	Dialing (MOC)
3	Alerting (MOC)
4	Incoming (MTC)
5	Waiting (MTC)

[<mode>](#)^(num)

Bearer/teleservice

0	Voice
1	Data
2	Fax (only for compatibility reasons, not supported by PHS8-P)

[<mpty>](#)^(num)

0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

[<Reserved>](#)^(num)

0	Reserved
---	----------

[<number>](#)^(str)

Phone number in format specified by [<type>](#)

`<type>`^(num)

Type of address octet as defined by 3GPP TS 24.008 [42], subclause 10.5.4.7. For possible values see the `<type>` parameters specified for phonebook related AT commands, for example `AT+CPBR` and `AT+CPBW`.

145	Dialing string <code><number></code> includes international access code character '+'
161	National number
128	Number is restricted
129	Otherwise

`<alpha>`^{(str)(+CSCS)}

Alphanumeric representation of `<number>` corresponding to the entry found in phonebook (see for example `AT+CPBW`, parameter `<text>`).

Due to time constraints on the necessary evaluation of the phonebook, this parameter may show a default value during early call phases (e.g. for `<stat>`= "dialing", "incoming" or "alerting"), even if a phonebook entry is present for the number concerned.

Notes

- Some parameters of the `AT+CHLD` command, as well as some situations where the call status in the network changes very quickly (e.g. the transition between `<stat>`= "unknown", "dialing" and "alerting" for a call to a reachable subscriber within the registered network) may lead to quasi-simultaneous changes to the states of one or several calls in the list, possibly leading to multiple displays of identical list configurations.
- If multiple displays of identical list configurations occur, this happens because of intermediate states of the list, that have already been overridden by new transitions and states. Thus, it is guaranteed that the configuration displayed in such cases is the current configuration at the time of the last display.
- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.
- If a multiparty call is established, the transmission of DTMF tones is not possible anymore till the call is released. This behaviour is caused due to an ambiguity between the different transaction identifiers.

7.18 AT+CR Service reporting control

AT+CR configures the PHS8-P whether or not to transmit an intermediate result code +CR: <serv> to the TE when a call is being set up.
<mode>=1 may lead to connection failure, if the application waits for default result code/URC.

Syntax

<p>Test Command</p> <p>AT+CR=?</p> <p>Response(s)</p> <p>+CR: (list of supported<mode>s)</p> <p>OK</p> <p>ERROR</p>											
<p>Read Command</p> <p>AT+CR?</p> <p>Response(s)</p> <p>+CR: <mode></p> <p>OK</p> <p>ERROR</p>											
<p>Write Command</p> <p>AT+CR=<mode></p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p>											
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Intermediate Result Code

If enabled, an intermediate result code is transmitted during connect negotiation when the PHS8-P has determined speed and quality of service to be used, before any error control or data compression reports are transmitted, and before any final result code (e.g. CONNECT) appears.

+CR: <serv>

Parameter Description

<mode> ^{(num)(&V)(&W)}	
0(&F)(D)	Disable
1	Enable
<serv> ^(str)	
"REL ASYNC"	Asynchronous non-transparent
"GPRS"	GPRS
"SYNC"	Fax call (Fax only for compatibility reasons, not supported by PHS8-P)

7.19 AT+CRC Set Cellular Result Codes for incoming call indication

AT+CRC controls whether or not to use the extended format of incoming call indication.
<mode>=1 may lead to connection failure, if the application waits for default result code/URC.

Syntax

<p>Test Command</p> <p>AT+CRC=?</p> <p>Response(s)</p> <p>+CRC: (list of supported<mode>s)</p> <p>OK</p> <p>ERROR</p>											
<p>Read Command</p> <p>AT+CRC?</p> <p>Response(s)</p> <p>+CRC: <mode></p> <p>OK</p> <p>ERROR</p>											
<p>Exec Command</p> <p>AT+CRC</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p>											
<p>Write Command</p> <p>AT+CRC=[<mode>]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Unsolicited Result Codes

URC 1

RING

Indicates incoming call to the TE if <mode>=0.

URC 2

+CRING: <type>

Indicates incoming call to the TE if <mode>=1.

Parameter Description

<mode> ^{(num)(&V)(&W)}	
0(&F)(D)	Disable extended format
1	Enable extended format

<type>^(str)

“REL ASYNC“	Asynchronous non-transparent
“FAX“	Fax call (Fax only for compatibility reasons, not supported by PHS8-P)
“VOICE“	Voice

7.20 AT+CBST Select Bearer Service Type

AT+CBST write command selects the bearer service `<name>`, the data rate `<speed>` and the connection element `<ce>` to be used when data calls are originated. The settings also apply to mobile terminated data calls. See 3GPP TS 22.002 [26].

Syntax

<p>Test Command</p> <p>AT+CBST=?</p> <p>Response(s)</p> <p>+CBST: (list of supported<speed>s), (list of supported<name>s), (list of supported<ce>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CBST?</p> <p>Response(s)</p> <p>+CBST: <speed>, <name>, <ce></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CBST=<speed>[, <name>[, <ce>]]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p>											
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47], 3GPP TS 22.002 [26]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<code><speed></code> ^{(num)(&V)(&W)}	
[0] ^{(&F)(D)}	Automatic Speed Selection
7	9600 bps (V.32)
12	9600 bps (V.34)
14	14400 bps (V.34)
16	28800 bps (V.34)
17	32000 bps (V.34)
39	9600 bps (V.120)
43	14400 bps (V.120)
48	28800 bps (V.120)
51	56000 bps (V.120)
71	9600 bps (V.110)
75	14400 bps (V.110)
80	28800 bps (V.110 or X.31 flag stuffing)
81	38400 bps (V.110 or X.31 flag stuffing)
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)

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)
116	64000 bps (bit transparent)
134	64000 bps (multimedia)

<name>_{(num)&V)&W}

0(&F)(D)	Asynchronous Modem
1	Synchronous Modem
4	Asynchronous Modem (RDI)

<ce>_{(num)&V)&W}

0	Transparent
1(&F)(D)	Non-transparent

7.20.1 Parameter configurations supported by AT+CBST

Table 7.1: Parameter configurations supported by [AT+CBST](#)

<speed>	GSM	WCDMA	SYNC.	ASYNC.	ASYNC. (RDI)	TRANSP.	NON- TRANSP.
0	+	+		+			+
7	+			+			+
12	+			+			+
14	+	+		+			+
16		+		+			+
17		+		+			+
39	+			+			+
43	+	+		+			+
48		+		+			+
51		+		+			+
71	+			+			+
75	+	+		+			+
80	+	+		+			+
81	+	+		+			+
83	+	+		+	+		+
84		+		+			+
116		+	+			+	
134		+	+			+	

7.21 AT+CRLP Configure RLP Parameters for Outgoing Non-Transparent Data Calls

AT+CRLP write command sets radio link protocol (RLP) parameters used when non-transparent data calls are originated. The read command returns the current settings for the supported RLP version 0 till 2.

Syntax

<p>Test Command</p> <pre>AT+CRLP=?</pre> <p>Response(s)</p> <pre>+CRLP: (list of supported<iws>s), (list of supported<mws>s), (list of supported<T1>s), (list of supported<N2>s), <ver> +CRLP: (list of supported<iws>s), (list of supported<mws>s), (list of supported<T1>s), (list of supported<N2>s), <ver> +CRLP: (list of supported<iws>s), (list of supported<mws>s), (list of supported<T1>s), (list of supported<N2>s), <ver> OK</pre>											
<p>Read Command</p> <pre>AT+CRLP?</pre> <p>Response(s)</p> <pre>+CRLP: <iws>, <mws>, <T1>, <N2>, <ver> +CRLP: <iws>, <mws>, <T1>, <N2>, <ver> +CRLP: <iws>, <mws>, <T1>, <N2>, <ver> OK</pre>											
<p>Write Command</p> <pre>AT+CRLP=[<iws>[, <mws>[, <T1>[, <N2>[, <ver>]]]]</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<p><iws>^{(num)(&W)}</p> <p>Interworking window size (IWF to MS)</p> <p>0...61^(&F)</p> <p>0...240^(&F)...488 for <ver>=2</p>
<p><mws>^{(num)(&W)}</p> <p>Mobile window size (MS to IWF)</p> <p>0...61^(&F)</p> <p>0...240^(&F)...488 for <ver>=2</p>
<p><T1>^{(num)(&W)}</p> <p>Acknowledgement timer (T1 in 10 ms units)</p>

38...48^(&F)...255

42...52^(&F)...255 for <ver>=2

<N2>^(num)&W)

Re-transmission attempts N2

1...6^(&F)...255

<ver>^(num)

RLP version number

0...2

7.22 ATP Select pulse dialing

Command is implemented for compatibility reasons only, and has no effect.

Syntax

Exec Command					
ATP					
Response(s)					
OK					
PIN	MDM	APP	→	Last	Reference(s)
+	+	+	+	-	V.250

7.23 ATT Select tone dialing

Command is implemented for compatibility reasons only, and has no effect.

Syntax

Exec Command					
ATT					
Response(s)					
OK					
PIN	MDM	APP	→	Last	Reference(s)
+	+	+	+	-	V.250

7.24 AT+ES Synchronous Data Mode Configuration

This command enables the Synchronous Data Mode

Syntax

<p>Test Command</p> <pre>AT+ES=?</pre> <p>Response(s)</p> <pre>+ES: list of supported <orig_rqst>values, , list of supported <ans_fbk>values OK ERROR +CME ERROR: <err></pre>											
<p>Read Command</p> <pre>AT+ES?</pre> <p>Response(s)</p> <pre>+ES:[<orig_rqst>], [, <ans_fbk>] OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+ES=[<orig_rqst>], [, <ans_fbk>]</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>±</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	±	+	+	-	-	<p>Reference(s)</p> <p>ITU-T V.80ter</p>
PIN	MDM	APP	→	Last							
±	+	+	-	-							

Parameter Description

<orig_rqst>^(num)	
Requested mode	
6 ^(D)	Initiate Synchronous Access mode when connection is completed, and Data Suite is entered
<ans_fbk>^(num)	
Fallback mode answerer	
8 ^(D)	Initiate Synchronous Mode when connection is completed, and Data Suite is entered

7.25 AT+ESA Synchronous Access Mode Configuration

AT+ESA configures the synchronous access mode.

Syntax

<p>Test Command</p> <pre>AT+ESA=?</pre> <p>Response(s)</p> <pre>+ESA: (list of supported <trans_idle>values), , , (list of supported <crc_type>values), (list of supported <nrzi_en>values), (list of supported <syn1>values), OK ERROR +CME ERROR: <err></pre>											
<p>Read Command</p> <pre>AT+ESA?</pre> <p>Response(s)</p> <pre>+ESA: <trans_idle>, , , <crc_type>, <nrzi_en>, <syn1>, OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+ESA=[<trans_idle>][,][,][,][,][<crc_type>][<nrzi_en>][<syn1>]</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	-	-	<p>Reference(s)</p> <p>ITU-T V.80ter</p>
PIN	MDM	APP	→	Last							
+	+	+	-	-							

Parameter Description

<trans_idle>^(num)	
Transmitted bit sequence	
Specifies the bit sequence transmitted by the UE when a transmit data buffer underrun condition occurs, while operating in Transparent sub-Mode.	
0	In transparent sub-mode, UE transmits 8-bit SYN sequence on idle. UE receiver does not hunt for synchronization sequence.
<crc_type>^(num)	
CRC checking	
0	CRC generation and checking disabled.
<nrzi_en>^(num)	
NRZI encoding	
0	NRZI encoding and decoding disabled.

<syn1>^(num)

When <trans_idle>=0, specifies the 8-bit transmit idle sequence to be used by the UE.

0 - 255

7.26 AT+CSTA Select type of address

Set command selects the type of number for further dialing commands [ATD](#) according to 3GPP Technical Specifications. Test command returns values supported a compound value.

Syntax

Test Command											
AT+CSTA=?											
Response(s)											
+CSTA: (list of supported<type>s)											
OK											
Read Command											
AT+CSTA?											
Response(s)											
+CSTA: <type>											
OK											
Write Command											
AT+CSTA=<type>											
Response(s)											
OK											
ERROR											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	Reference(s) 3GPP TS 27.007 [47]
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<type> ^(num)	Description
145	when dialling string includes international access code character "+"
129	otherwise

8. Network Service Commands

The AT Commands described in this chapter are related to various network services. More commands related to this area can be found in Chapter 9., [Supplementary Service Commands](#).

8.1 AT+COPN Read operator names

The [AT+COPN](#) command returns the list of operator names from the UE. Each operator code [<numericn>](#) that has an alphanumeric equivalent [<alphan>](#) in the UE memory is returned.

Syntax

Test Command	
AT+COPN=?	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
Exec Command	
AT+COPN	
Response(s)	
+COPN: <numericn> , <alphan>	
[+COPN: ...]	
OK	
ERROR	
+CME ERROR: <err>	
PIN MDM APP → Last	Reference(s)
+ + + + -	3GPP TS 27.007 [47]

Parameter Description

[<numericn>](#)^(str)

Operator in numeric format; GSM location area identification number.

[<alphan>](#)^(str)

Operator in long alphanumeric format; can contain up to 16 characters.

8.2 AT+COPS Operator Selection

[AT+COPS](#) queries the present status of the PHS8-P's network registration and allows to determine whether automatic or manual network selection shall be used. Additional service is available with [AT^SOPS](#).

Three operator selection modes are available with [AT+COPS](#):

- Automatic
PHS8-P searches for the home operator automatically. If successful the PHS8-P registers to the home network. If the home network is not found, PHS8-P goes on searching. If a permitted operator is found, PHS8-P registers to this operator.
If no operator is found the PHS8-P remains unregistered.
- Manual
Desired operator can be determined using the [AT+COPS](#) write command. If the operator is found, PHS8-P registers to it immediately. If the selected operator is forbidden, the PHS8-P remains unregistered.
- Manual/automatic
The UE first tries to find the operator determined via [AT+COPS](#) write command. If the UE fails to register to this operator, then it starts to select another (permitted) operator automatically.

The [AT+COPS](#) test command lists sets of five parameters, each representing an operator present in the network. A set consists of

- an integer indicating the availability of the operator,
- long alphanumeric format of the operator's name,
- short alphanumeric format of the operator's name,
- numeric format representation of the operator and
- an integer indicating the access technology of the operator.

Any of the parameters may be unavailable and will then be an empty field (,). The list of operators comes in the following order: Home network, networks referenced in SIM and other networks.

The operator list is followed by a list of the supported [<mode>](#)s and [<format>](#)s. These lists are delimited from the operator list by two commas.

The response to the [AT+COPS](#) read command depends on the registration status. If the UE is not registered, the read command returns only the current [<mode>](#). If the UE is registered the response returns the currently selected operator, the currently set format and the currently used [<rat>](#).

The [AT+COPS](#) write command forces an attempt to select and register to a network operator. If the selected operator is not available, no other operator will be selected (except [<mode>=4](#)). The selected operator name [<format>](#) will apply to further read commands and test commands, too.

If the selected operator name [<format>](#) is 0 or 1 the methods of the Enhanced Operator Name String (EONS) specification will be used. Additional [EONS related information](#) is available with [AT^SIND](#).

The [AT+COPS](#) exec command returns OK and has no effect on the current [<mode>](#).

Syntax

Test Command

```
AT+COPS=?
```

Response(s)

```
+COPS: [list of supported (<opStatus>, long alphanumeric <opName>, short alphanumeric <opName>, numeric <opName>, <rat>)s ], , (list of supported <mode>s), (list of supported <format>s)
```

```
OK
```

```
ERROR
```

```
+CME ERROR:<err>
```

<p>Read Command</p> <p>AT+COPS?</p> <p>Response(s)</p> <p>+COPS: <mode>[, <format>[, <opName>][, <rat>]]</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Write Command</p> <p>AT+COPS=<mode>[, <format>[, <opName>][, <rat>]]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	-	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	-	-							

Parameter Description

<opStatus>^(num)	
Operator Status	
0	Unknown
1	Operator available
2	Current operator
3	Operator forbidden
<opName>^{(str)&(V)}	
Operator Name	
If test command: Operator name in long alphanumeric format, short alphanumeric format and numeric format.	
If read command: Operator name as per <format>.	
If write command: Operator name in numeric format.	
<mode>^{(num)&(V)(NV)}	
Only Parameter values 0 and 1 are stored in the non-volatile memory of the PHS8-P.	
0 ^(D)	Automatic mode; <opName> field is ignored.
1	Manual operator selection The AT+COPS write command requires <opName> in numeric format, i.e. <format> shall be 2. <opName> can be omitted when changing only the <rat> parameter and retaining the network already manually selected. The AT+COPS read command returns the current <mode>, the currently selected <opName> and the currently used <rat>. If the UE is not registered the AT+COPS read command returns only the currently set <mode>. A manually selected PLMN is volatile as long as the network registration has not been successful.
2	Manually deregister from network and remain unregistered until <mode>=0 or 1 or 4 is selected.
3	Set only <format> (for AT+COPS read command).
4	Manual / automatic selection; if manual selection fails, automatic mode (<mode>=0) is entered (<opName> field will be present).

`<rat>`^{(num)(&V)(NV)}

Radio Access Technology (RAT)

By delivery default, the `<rat>` parameter is set to an automatic selection mode which enables the UE to select either UTRAN (UMTS) or GSM, depending on the network coverage. This automatic mode for selecting `<rat>` remains enabled until you explicitly set either "0" for GSM or "2" for UTRAN. This means, setting the `<rat>` parameter is a restriction, i.e. it forces the UE to select either UTRAN only or GSM only. The selected `<rat>` value 0 or 2 will be stored in the non-volatile memory. If the selected `<rat>` is not available, the UE cannot register to a network.

The automatic `<rat>` selection mode can be restored any time by executing the `AT+COPS` write command without choosing a specific `<rat>`, i.e. simply by omitting the `<rat>` value. When you do so, it does not matter which value(s) you select for other `AT+COPS` parameters. For example, an easy way is setting `AT+COPS=0`, which means both PLMN and RAT are automatically selected. Another way is giving the `AT+COPS` write command with any `<mode>`, `<format>`, or `<opName>`, but `<rat>` omitted.

Please consider that the `AT+COPS?` read command does not reflect whether `<rat>` was omitted or explicitly set. This is because the response to the `AT+COPS?` read command will always indicate the currently used `<rat>`. Values 3, 4 and 6 occur only in read command responses and are not intended for the `AT+COPS` write command.

If you wish to modify `<rat>` and also the `<rba>` parameter of `AT^SCFG` take care that both values are compatible.

0	GSM
2	UTRAN
3	GSM w/EGPRS
4	UTRAN w/HSDPA
6	UTRAN w/HSDPA and HSUPA

`<format>`^{(num)(&V)(&W)}

0 ^(D)	Long EONS specific alphanumeric format of <code><opName></code> . Can be up to 24 characters long.
1	Short EONS specific alphanumeric format of <code><opName></code> . Can be up to 8 characters long.
2	Numeric format of <code><opName></code> . This is the GSM Location Area Identification (LAI) number, which consists of the 3-digit Mobile Country Code (MCC) plus the 2- or 3-digit Mobile Network Code (MNC).
90	Long alphanumeric format of <code><opName></code> . Can be up to 16 characters long.
91	Short alphanumeric format of <code><opName></code> . Can be up to 8 characters long.

Note

- `AT+COPS=?` shows PLMNs as available (`<opStatus>=1`) as long as a location update was not rejected and the PLMNs are not written to the forbidden PLMN list (SIM EF-FPLMN).

8.3 AT^SOPS Extended Operator Selection

[AT^SOPS](#) queries the present status of the PHS8-P's network registration and uses the methods of the Enhanced Operator Name String (EONS) specification for handling operator name strings.

In addition to the EONS operator names shown by [AT+COPS](#), the [AT^SOPS](#) command delivers further information associated to the EONS operator names, such as [<eonsType>](#), [<servProvider>](#) and [<servProviderType>](#). The same detailed information is also shown by the EONS indicator provided by [AT^SIND](#).

[AT^SOPS](#) test command lists sets of five parameters, each representing an operator present in the network. A set consists of

1. an integer indicating the availability of the operator,
2. specification of the source of the operator name [<eonsOperator>](#),
3. operator name according to EONS Table,
4. Service Provider Name from the SIM Service Table and
5. numeric format representation of the operator.

Any of the parameters may be unavailable and will then be an empty field (,).

The list of operators comes in the following order: Home network, networks referenced in SIM and other networks.

After the operator list the PHS8-P returns lists of supported [<mode>](#)s and [<format>](#)s. These lists are delimited from the operator list by two commas.

If the test command is used while an ongoing GPRS transfer, traffic will be interrupted for up to one minute.

Command settings are effective over all serial interfaces of the PHS8-P.

Syntax

```
Test Command
AT^SOPS=?
Response(s)
^SOPS:[list of present operator( <opStatus>, <eonsType>, <eonsOperator>, <servProvider>,
<servProviderType>, <opName>, <act>)s ], , (list of supported <mode>)s, (list of supported <format>)s
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
+	+	+	-	-

Parameter Description

[<opStatus>](#)^(num)

Status

0	unknown
1	operator available
2	current operator
3	operator forbidden

[<eonsType>](#)^(num)

Specification of the source of the operator name [<eonsOperator>](#). Details of [EONS-supplied operator name types](#) are available at [AT^SIND](#).

<eonsOperator>^(u)

Operator name; format depends on the source of the operator name, specified by <eonsType>.

<servProvider>^(str)

Service Provider Name according to setting of Service No. 17 in the SIM Service Table (EF_{SST}).
Service Provider Name (SPN) will be read from EF_{SPN}. Service Provider Display Information (SPDI) will be read from EF_{SPDI} list.

<servProviderType>^(num)

Service Provider Type according to Registered Public Land Mobile Network (RPLMN) and Home Public Land Mobile Network (HPLMN).

0	No Service Provider Information available.
1	Service Provider Name will be displayed. RPLMN is the HPLMN.
2	Service Provider Display Information will be displayed. One list entry is equal to the RPLMN.

<opName>^(u)

Operator

Operator name in numerical presentation contains the GSM Location Area Identification (LAI) number, which consists of the 3-digit Mobile Country Code (MCC) plus the 2- or 3-digit Mobile Network Code (MNC).

<mode>^(num)

Parameter is not applicable.

<acT>^(num)

Access technology

0	GSM
2	UTRAN

<format>^(num)

Parameter is not applicable.

Notes

- The AT^SOPS Test command is only accepted by the module after a valid pin has been entered.
- AT^SOPS=? shows PLMNs as available (<opStatus>=1) as long as a location update was not rejected and the PLMNs are not written to the forbidden PLMN list (SIM EF-FPLMN).

8.4 AT+CREG Network Registration Status

AT+CREG serves to monitor the PHS8-P's network registration status. For this purpose the read command and the URC presentation mode are available.

Syntax

<p>Test Command</p> <pre>AT+CREG=?</pre> <p>Response(s)</p> <pre>+CREG: (list of supported<urcMode>s) OK</pre>											
<p>Read Command</p> <pre>AT+CREG?</pre> <p>Response(s)</p> <pre>+CREG: <urcMode>, <regStatus>[, <netLac>, <netCellId>] OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CREG=[<urcMode>]</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	-	+	+	-	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
-	+	+	-	-							

Unsolicited Result Codes

URC 1

If **<urcMode>=1** and there is a change in the UE's network registration status:

```
+CREG: <regStatus>
```

URC 2

If **<urcMode>=2** and there is a change of the UE's network registration status or the currently used network cell:

```
+CREG: <regStatus>[, <netLac>, <netCellId>]
```

Parameter Description

<urcMode> ^{(num)(&V)(&W)}	
[0] ^(&F)	Disable +CREG URC.
1	Enable URC +CREG:<regStatus> to report status of network registration.
2	Enable URC +CREG:<regStatus>[,<netLac>,<netCellId>] to report status of network registration including location information. Optional parameters <netLac> and <netCellId> will not be displayed during calls or if these values have not changed since last AT+CREG read command or since last indication by +CREG URC.

`<regStatus>^(num)&V`

0	<p>Not registered, UE is currently not searching for new operator. There is a technical problem. User intervention is required. Yet, emergency calls can be made if any network is available. Probable causes:</p> <ul style="list-style-type: none"> • no SIM card available • no PIN entered • no valid Home PLMN entry found on the SIM
1	Registered to home network.
2	<p>Not registered, but UE is currently searching for a new operator. UE searches for an available network. Failure to log in until after more than a minute may be due to one of the following reasons:</p> <ul style="list-style-type: none"> • No network available or insufficient Rx level. • UE has no access rights to the networks available. • Networks from the SIM list of allowed networks are around, but login fails due to one of the following reasons: <ul style="list-style-type: none"> - #11 ... PLMN not allowed - #12 ... Location area not allowed - #13 ... Roaming not allowed in this location area <p>After this, the search will be resumed (if automatic network search is enabled).</p> <ul style="list-style-type: none"> • The Home PLMN or an allowed PLMN is available, but login is rejected by the cell (reasons: Access Class or LAC). <p>If at least one network is available, emergency calls can be made.</p>
3	<p>Registration denied</p> <ul style="list-style-type: none"> • Authentication or registration fails after Location Update Reject due to one of the following reasons: <ul style="list-style-type: none"> - #2 ... IMSI unknown at HLR - #3 ... Illegal MS - #6 ... Illegal UE <p>Either the SIM or the UE are unable to log into any network. User intervention is required. Emergency calls can be made, if any network is available.</p>
4	Unknown (not used).
5	<p>Registered, roaming. UE is registered at a foreign network (national or international network)</p>

`<netLac>^(str)`

Two byte location area code in hexadecimal format (e.g. "00C1" equals 193 in decimal).

`<netCellId>^(str)`

16 bit (2G) or 28 bit (3G) cell ID in hexadecimal format.

Example

AT+CREG=1	Activate URC mode.
OK	
AT+COPS=0	Force UE to automatically search a network operator.
OK	
+CREG: 2	URC reports that UE is currently searching.
+CREG: 1	URC reports that operator has been found.

8.5 AT+CSQ Signal quality

The `AT+CSQ` execute command indicates the received signal strength `<rssi>` and the channel bit error rate `<ber>`.

Syntax

<p>Test Command</p> <pre>AT+CSQ=?</pre> <p>Response(s)</p> <pre>+CSQ: (list of supported <rssi>s), (list of supported<ber>s) OK</pre>	<p>Exec Command</p> <pre>AT+CSQ</pre> <p>Response(s)</p> <pre>+CSQ: <rssi>,<ber> OK</pre>										
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>+</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	+	+	+	-	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	-	-							

Parameter Description

<code><rssi></code> ^(num)	
0	-113 dBm or less
1	-111 dBm
2..30	-109... -53 dBm
31	-51 dBm or greater
99	not known or not detectable

According to 3GPP TS 27.007 [47], the `<rssi>` value is not applicable to 3G networks. Yet, with a view to employing `AT+CSQ` for all networks the PHS8-P has been designed to show a `<rssi>` value derived from the 3G specific RSCP parameter shown by `AT^SMONI`. Nevertheless, please consider that connection quality in 3G networks is depending on further factors. For example, despite good `<rssi>` or RSCP values for signal quality, data throughput may vary depending on the number of subscribers sharing the same cell. It is therefore recommended to use also `AT^SMONI` which delivers additional information, in particular the values RSCP, EC/n0, SQual and SRxLev RX level.

<code><ber></code> ^(num)	
0..7	as RXQUAL values in the table in 3GPP TS 45.008 [51], section 8.2.4 (for GSM network only).
99	not known or not detectable (for GSM and UMTS networks).

Note

- After using network related commands such as `AT+CCWA`, `AT+CCFC`, users are advised to wait 3s before entering `AT+CSQ`. This is recommended to be sure that any network access required for the preceding command has finished.

8.6 AT+CPLS Select Preferred Operator List

AT+CPLS is used to select a preferred PLMN list defined in Elementary Files of the SIM card or active application of the USIM. The setting takes effect for the **AT+CPOL** command.

Syntax

<p>Test Command</p> <pre>AT+CPLS=?</pre> <p>Response(s)</p> <pre>+CPLS: (list of USIM supported <plmn-selector>s) OK</pre>											
<p>Read Command</p> <pre>AT+CPLS?</pre> <p>Response(s)</p> <pre>+CPLS: <plmn-selector> OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CPLS=<plmn-selector></pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>✈</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	✈	Last	+	+	+	-	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	✈	Last							
+	+	+	-	-							

Parameter Description

<plmn-selector> ^(num)	Description
0	User controlled PLMN with EF _{PLMNwAcT} /EF _{PLMNsel}
1	Operator controlled PLMN selector with EF _{OPLMNwAcT}
2	HPLMN selector with EF _{HPLMNwAcT}

8.7 AT+CPOL Preferred Operator List

AT+CPOL read command queries the list of the preferred operators.
AT+CPOL write command allows to edit the list of the preferred operators.
 The response of **AT+CPOL** read command depends on the setting with **AT+CPLS**.
 If **<index>** is given but **<operator>** is left out, the entry is deleted.

Syntax

<p>Test Command</p> <p>AT+CPOL=?</p> <p>Response(s)</p> <p>+CPOL: (list of supported <index>s), (list of supported <format>s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Read Command</p> <p>AT+CPOL?</p> <p>Response(s)</p> <p>+CPOL: <index>, <format>, <operator>[, <gsm>, <gsm_compact>, <utran>]</p> <p>+CPOL: ...</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Write Command</p> <p>AT+CPOL=<index>[, <format>, <operator>[, <gsm>, <gsm_compact>, <utran>]]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<index> ^(num)	
The order number of the operator in the SIM preferred operator list.	
<format> ^(num)	
2	Numeric format
<operator> ^(str)	
Operator in numeric format (GSM Location Area Identification number which consists of a 3-digit country code plus a 2- or 3-digit network code).	
<gsm> ^(num)	
0	AcT GSM disabled
1	AcT GSM enabled

`<gsm_compact>`^(num)

0	AcT GSM Compact disabled
---	--------------------------

`<utran>`^(num)

0	AcT UTRAN disabled
1	AcT UTRAN enabled

Note

- The Access Technology selection parameters `<gsm>`, `<gsm_compact>` and `<utran>` are required for SIM cards or UICC's containing PLMN selector with Access Technology.

8.8 AT^SMONI Monitoring Serving Cell

The `AT^SMONI` command supplies information of the serving cell.

Syntax

```
Test Command
AT^SMONI=?
Response(s)
OK

Exec Command
AT^SMONI
Response(s)
See: Section 8.8.1, AT^SMONI Responses
OK

Write Command
AT^SMONI=255
Response(s)
See: Section 8.8.2, AT^SMONI Enhanced Responses
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	-	-

Notes

- The parameters LAC and cell are presented as hexadecimal digits, the remaining parameters are composed of decimal digits.
- If the BS supports frequency hopping during a connection, the dedicated channel (ARFCN) is not stable. This mode is indicated by `chann = 'h'`.
- It may happen for a short time that following parameters have no values after a inter-system change from GSM to UMTS: EC/n0, RSCP, SQual and SRxLev. In this case these parameter values are displayed with the "-" character.
- The service state 'SEARCH' (Searching) could mean a PLMN search or a cell search. This can also happen for a short time when UE is leaving connected mode.

8.8.1 AT^SMONI Responses

UE is not connected:

a) UE is camping on a GSM (2G) cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,ARFCN,TS,timAdv,dBm,Q,ChMod
Example:
^SMONI: 2G,71,-61,262,02,0143,83BA,33,33,3,6,G,NOCONN
```

b) UE is camping on a UMTS (3G) cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/
n0,RSCP,ComMod,HSUPA,HSDPA
Example:
^SMONI: 3G,10564,296,-7.5,-79,262,02,0143,00228FF,-92,-78,NOCONN
```

c) UE is searching and could not (yet) find a suitable GSM (2G) cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,ARFCN,TS,timAdv,dBm,Q,ChMod
```

Example:

```
^SMONI: 2G,SEARCH,SEARCH
```

d) UE is searching and could not (yet) find a suitable UMTS (3G) cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/n0,RSCP,ComMod,HSUPA,HSDPA
```

Example:

```
^SMONI: 3G,SEARCH,SEARCH
```

UE is connected (Call in progress):

a:) GSM (2G) cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,ARFCN,TS,timAdv,dBm,Q,ChMod
```

Example:

```
^SMONI: 2G,673,-80,262,07,4EED,A500,35,35,7,4,G,643,4,0,-80,0,S_FR
```

b:) UMTS (3G) cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/n0,RSCP,ComMod,HSUPA,HSDPA
```

Example:

```
^SMONI: 3G,10663,212,-3.0,-75,262,03,9C57,7E7D68B,30,43,DPCH,128,8,-3.0,-75,0
```

Columns for GSM (2) Serving Cell parameters:

Column	Description
ACT	Access Technology
ARFCN	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier
BCCH	Receiving level of the BCCH carrier in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code
cell	Cell ID
C1	Coefficient for base station selection
C2	Coefficient for base station selection
NCC	PLMN colour code
BCC	Base station colour code
GPRS	GPRS state

Columns for UMTS (3G) Serving Cell parameters:

Column	Description
ACT	Access Technology
UARFCN	UARFCN (UTRAN Absolute Radio Frequency Channel Number) of the BCCH carrier
PSC	Primary Scrambling Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm
MCC	Mobile Country Code (first part of the PLMN code)

Column	Description
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code
cell	Cell ID
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)

Columns for GSM (2G) Dedicated Channel parameters):

Column	Description
ARFCN	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier
TS	Timeslot number
timAdv	Timing advance in bits
dBm	Receiving level of the traffic channel carrier in dBm
Q	Receiving quality (0-7)
ChMod	Channel mode (--: Signalling, S_HR: Half rate, S_FR: Full rate, S_EFR: Enhanced Full Rate, A_HR: AMR Half rate, A_FR: AMR Full rate)

Columns for UMTS (3) Dedicated Channel parameters:

Note: Physical channel in downlink are considered.

Column	Description
PhysCh	Physical Channel Type (DPCH, FDPCH)
SF	Spreading Factor (4,8,16,32,64,128,256,512)
Slot	Slot Format for DPCH (0-16) (see 3GPP TS 25.211 V7.10.0 Table 11) Slot Format for FDPCH (0-9) (see 3GPP TS 25.211 V7.10.0 Table 16C)
EC/n0	Carrier to noise ratio in dB
RSCP	Received Signal Code Power in dBm
ComMod	Compressed Mode (0-1) (indicates valid transmission gap pattern)
HSUPA	HSUPA type indicated by xy: x = capability: 0 - no, 1 - yes. Please consider that some providers don't support this flag. y = status: 0 - off, 1 - on, 2 - not available
HSDPA	HSDPA type indicated by xy: x = capability: 0: no, 1: yes, 2: HSDPA+ capable. Please consider that some providers don't support this flag. y = status: 0: off, 1: on, 2: not available

8.8.2 AT^SMONI Enhanced Responses

The `AT^SMONI` write command supplies information of the serving and dedicated cell.

UE is not connected:

a) UE is camping on a GSM (2G) cell and registered to the network:

```
^SMONI :
ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,PWR,RXLev,ARFCN,TS,timAdv,dBm,Q,ChMod
Example:
^SMONI: 2G,990,-75,262,03,0139,02C9,28,28,3,0,G,0,-104,NOCONN
```

b) UE is camping on a UMTS (3G) cell and registered to the network:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/n0,RSCP,ComMod,HSUPA,HSDPA
Example:
^SMONI: 3G,10564,96,-7.5,-79,262,02,0143,00228FF,-92,-78,NOCONN
```

c) UE is camping on a GSM cell but not registered to the network (only emergency call allowed):

```
^SMONI:
ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,PWR,RXLev,ARFCN,TS,timAdv,dBm,Q,ChMod
Example:
^SMONI: 2G,673,-89,262,07,4EED,A500,16,16,7,4,G,5,-107,LIMSRV
```

d) UE is camping on a UMTS cell but not registered to the network (only emergency call allowed):

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/n0,RSCP,ComMod,HSUPA,HSDPA
Example:
^SMONI: 3G,10564,96,-7.5,-79,262,02,0143,00228FF,-92,-78,LIMSRV
```

UE is connected (call in progress):

a:) GSM (2G) cell:

```
^SMONI:
ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,C2,NCC,BCC,GPRS,PWR,RXLev,ARFCN,TS,timAdv,dBm,Q,ChMod
Example:
^SMONI: 2G,852,-80,262,03,4E2D,6C2D,28,32,3,5,E,0,-104,816,1,3,-71,0,A_FR
```

b:) UMTS (3G) cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev,PhysCh,SF,Slot,EC/n0,RSCP,ComMod,HSUPA,HSDPA
Example:
^SMONI: 3G,10663,212,-3.0,-75,262,03,9C57,7E7D68B,30,43,DPCH,128,8,-3.0,-75,0
```

Columns for GSM (2G) Serving Cell parameters):

Column	Description
ACT	Access Technology
ARFCN	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier
BCCH	Receiving level of the BCCH carrier in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code
cell	Cell ID
C1	Coefficient for base station selection
C2	Coefficient for base station selection
NCC	PLMN colour code
BCC	Base station colour code
GPRS	GPRS state
PWR	Maximal power level used on RACH channel in dBm
RxLev	Minimal receiving level (in dBm) to allow registration

Columns for UMTS (3G) Serving Cell parameters):

Column	Description
ACT	Access Technology
UARFCN	UARFCN (UTRAN Absolute Radio Frequency Channel Number) of the BCCH carrier
PSC	Primary Scrambling Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code, see note
cell	Cell ID
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)

Columns for GSM (2G) Dedicated Channel parameters):

Column	Description
ARFCN	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier
TS	Timeslot number
timAdv	Timing advance in bits
dBm	Receiving level of the traffic channel carrier in dBm
Q	Receiving quality (0-7)
ChMod	Channel mode (--: Signalling, S_HR: Half rate, S_FR: Full rate, S_EFR: Enhanced Full Rate, A_HR: AMR Half rate, A_FR: AMR Full rate)

Columns for UMTS (3) Dedicated Channel parameters):

Note: Physical channel in downlink is considered.

Column	Description
PhysCh	Physical Channel Type (DPCH, FDPCH)
SF	Spreading Factor (4,8,16,32,64,128,256,512)
Slot	Slot Format for DPCH (0-16) (see 3GPP TS 25.211 V7.10.0 Table 11) Slot Format for FDPCH (0-9) (see 3GPP TS 25.211 V7.10.0 Table 16C)
EC/n0	Carrier to noise ratio in dB
RSCP	Received Signal Code Power in dBm
ComMod	Compressed Mode (0-1) (indicates valid transmission gap pattern)

8.8.3 Service states

Depending on the service state, an additional textual output is generated (refer also to the response examples):

- 'SEARCH' (Searching) - The MS is searching, but could not (yet) find a suitable cell. This output appears after restart of the MS or after loss of coverage.
- 'NOCONN' (No connection) - The MS is camping on a cell and registered to the network. The service state is 'idle', i.e. there is no connection established or a dedicated channel in use.

-
- 'LIMSRV' (Limited Service) - The MS is camping on a cell but not registered to the network. Only emergency calls are allowed. The MS enters this state, for example, when
 - no SIM card is inserted, or PIN has not been given,
 - neither Home PLMN nor any other allowed PLMN are found,
 - registration request was not answered or denied by the network (use command [AT+CREG](#) to query the registration status),
 - authentication failed.

8.9 AT^SMONP Monitoring Neighbour Cells

The `AT^SMONP` supplies information of 3G active cells and all neighbour cells. The 3G active cells information will be delivered additively because an UE can be situated in Soft Handover or Softer Handover. To retrieve the information use the execute command.

Syntax

```
Test Command
AT^SMONP=?
Response(s)
OK

Exec Command
AT^SMONP
Response(s)
See: Section 8.9.1, AT^SMONP Responses
OK

Write Command
AT^SMONP=255
Response(s)
See: Section 8.9.2, AT^SMONP Enhanced Responses
OK
ERROR
+CME ERROR: <err>

PIN  MDM  APP  →  Last
-    +    +    -    -
```

Notes

- Due to the fact that not all necessary information of the neighbour cells can be decoded during a connection, there are several constraints to be considered:
 - Only neighbour cells that have already been visible in IDLE mode will be further updated, as long as they are still included in the list.
 - Though new neighbour cells can be added to the list (e.g. due to handover), their C1 and C2 parameters cannot be displayed until the connection is released. In this case "-" is presented for C1 and C2.
- The neighbour cells have the same PLMN as the serving cell. In case of searching for a network the serving cell can change and the UE shows different sets of neighbour cells depending on the PLMN of the serving cell.
- In case of a GSM (2G) serving cell the UE shows GSM (2G) and UMTS (3G) neighbour cells. If UE is registered to a UMTS (3G) network then no neighboring GSM (2G) cells are shown or neighboring GSM (2G) cells are shown with incomplete parameter values. Parameters for which no values are available are shown as "-".

8.9.1 AT^SMONP Responses

Responses of `AT^SMONP` execute command (examples):

In case of a GSM (2G) serving cell:

```
2G:
ARFCN1, rs1, dBm1, MCC1, MNC1, NCC1, BCC1, C11, C21, LAC1, cell1
ARFCN2, rs2, dBm2, MCC2, MNC2, NCC2, BCC2, C12, C22, LAC2, cell2
...
```

```
ARFCNn, rsn, dBmn, MCCn, MNCn, NCCn, BCCn, C1n, C2n, LACn, celln
3G:
UARFCN1, PSC1, EC/n01, RSCP1
UARFCN2, PSC2, EC/n02, RSCP2
...
UARFCNn, PSCn, EC/n0n, RSCPn
```

Example:

```
2G:
653,26,-84,262,07,3,0,22,22,0141,3B2F
660,20,-90,262,07,3,3,16,16,0143,83B9
687,19,-91,262,07,3,1,15,15,0141,3B31
678,14,-95,262,07,3,3,10,10,0141,3B2F
671,14,-96,262,07,3,1,10,10,0141,8F67
643,10,-99,262,07,3,7,6,6,0141,83BB
3G:
10564,296,-6.5,-68
10564,96,-10.5,-83
```

In case of a UMTS (3G) serving cell:

```
3G:
UARFCN1, PSC1, EC/n01, RSCP1, SQual1, SRxLev1
UARFCN2, PSC2, EC/n02, RSCP2, SQual2, SRxLev2
...
UARFCNn, PSCn, EC/n0n, RSCPn, SQualn, SRxLevn

2G:
ARFCN1, RSSI1, NCC1, BCC1, SRxLev1
ARFCN2, RSSI2, NCC2, BCC2, SRxLev2
...
ARFCNn, RSSIn, NCCn, BCCn, SRxLevn
```

Example:

```
3G:
10663,212,-8.0,-76,20,39
10663,346,-12.5,-81,11,34
10663,52,-14.0,-83,8,32
10663,208,-19.5,-87,-3,28
10663,214,-22.0,-90,-8,25
10663,263,-24.0,-100,-27,15
2G:
-----,-----,-----,-----
```

Columns for GSM (2G) parameters:

Column	Description
ARFCN	Absolute Radio Frequency Channel Number of the BCCH carrier
rs	RSSI value 0 - 63 (RSSI = Received signal strength indication)
dBm	Receiving level in dBm
MCC	Mobile Country Code (first part of the PLMN code)

Column	Description
MNC	Mobile Network Code (second part of the PLMN code)
NCC	Network colour Code
BCC	Base Station colour code
C1	cell selection criterion
C2	cell reselection criterion
LAC	Location area code
cell	Cell identifier

Columns for UMTS (3G) parameters:

Column	Description
UARFCN	UTRAN Absolute Radio Frequency Channel Number of the BCCH carrier
PSC	Primary Scrambling Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)

8.9.2 AT^SMONP Enhanced Responses

Responses of write command `AT^SMONP=255` (examples):

In case of a GSM (2G) serving cell:

```

2G:
ARFCN1, rS1, dBm1, MCC1, MNC1, NCC1, BCC1, C11, C21, LAC1, cell1, C311, C321
ARFCN2, rS2, dBm2, MCC2, MNC2, NCC2, BCC2, C12, C22, LAC2, cell2, C312, C322
...
ARFCNn, rSn, dBmn, MCCn, MNCn, NCCn, BCCn, C1n, C2n, LACn, celln, C31n, C32n
3G:
UARFCN1, PSC1, EC/n01, RSCP1
UARFCN2, PSC2, EC/n02, RSCP2
...
UARFCNn, PSCn, EC/n0n, RSCPn

```

Example:

```

2G:
653,26,-84,262,07,3,0,22,22,0141,3B2F,0,0
660,20,-90,262,07,3,3,16,16,0143,83B9,0,0
687,19,-91,262,07,3,1,15,15,0141,3B31,0,0
678,14,-95,262,07,3,3,10,10,0141,3B2F,0,0
671,14,-96,262,07,3,1,10,10,0141,8F67,0,0
643,10,-99,262,07,3,7,6,6,0141,83BB,0,0
3G:
10564,296,-6.5,-68
10564,96,-10.5,-83

```

In case of a 3G serving cell:

```

3G:
UARFCN1, PSC1, EC/n01, RSCP1, SQual1, SRxLev1, set1, rank1
UARFCN2, PSC2, EC/n02, RSCP2, SQual2, SRxLev2, set2, rank2
...
UARFCNn, PSCn, EC/n0n, RSCPn, SQualn, SRxLevn, setn, rankn

2G:
ARFCN1, RSSI1, NCC1, BCC1, SRxLev1, rank1
ARFCN2, RSSI2, NCC2, BCC2, SRxLev2, rank2
...
ARFCNn, RSSIn, NCCn, BCCn, SRxLevn, rankn

```

Example:

```

3G:
10663,212,-8.0,-76,20,39,AS,-12
10663,346,-12.5,-81,11,34,SN,-25
10663,52,-14.0,-83,8,32,SN,-28
10663,208,-19.5,-87,-3,28,SN,-32768
10663,214,-22.0,-90,-8,25,SN,-32768
10663,263,-24.0,-100,-27,15,SN,-32768
2G:
-----,-----,-,-,-----,-----

```

Columns for GSM (2G) parameters:

Column	Description
ARFCN	Absolute Radio Frequency Channel Number of the BCCH carrier
rs	RSSI value 0 - 63 (RSSI = Received signal strength indication)
dBm	Receiving level in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
NCC	Network colour Code
BCC	Base Station colour code
C1	cell selection criterion
C2	cell reselection criterion
LAC	Location area code
cell	Cell identifier
C31	cell reselection criterion
C32	cell reselection criterion
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)
rank	Rank of this cell as neighbor for inter-RAT cell reselection

Columns for UMTS (3G) parameters:

Column	Description
UARFCN	UTRAN Absolute Radio Frequency Channel Number of the BCCH carrier
PSC	Primary Scrambling Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)
set	3G neighbour cell set (AS: ASET, SN: Sync Nset, AN: Async Nset)
rank	Rank of this cell as neighbor for inter-RAT cell reselection

9. Supplementary Service Commands

The AT commands described in this chapter are related to Supplementary Services.

9.1 AT+CACM Accumulated call meter (ACM) reset or query

The [AT+CACM](#) read command returns the current ACM value.

The [AT+CACM](#) write command resets the Advice of Charge related to the accumulated call meter (ACM) value in SIM file EF(ACM). ACM contains the total number of home units for both the current and preceding calls.

Syntax

Test Command	
AT+CACM=?	
Response(s)	
OK	
Read Command	
AT+CACM?	
Response(s)	
+CACM: <acm>	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
AT+CACM=[<passwd>]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN MDM APP → Last	Reference(s)
+ + + + -	3GPP TS 27.007 [47]

Parameter Description

<acm>^(str)

Three bytes of the current ACM value in hexadecimal format (e.g. "00001E" indicates decimal value 30) 000000 - FFFFFFFF.

<passwd>^(str)

SIM PIN2

9.2 AT+CAMM Accumulated call meter maximum (ACMmax) set or query

The [AT+CAMM](#) read command returns the current ACMmax value.

The [AT+CAMM](#) write command sets the Advice of Charge related to the accumulated call meter maximum value in SIM file EF (ACMmax). ACMmax contains the maximum number of home units allowed to be consumed by the subscriber.

Syntax

Test Command	
AT+CAMM=?	
Response(s)	
OK	
Read Command	
AT+CAMM?	
Response(s)	
+CAMM: <acmmax>	
OK	
ERROR	
+CME ERROR: <err>	
Write Command	
AT+CAMM=<acmmax>[, <passwd>]	
Response(s)	
OK	
ERROR	
+CME ERROR: <err>	
PIN MDM APP → Last	Reference(s)
+ + + + -	3GPP TS 27.007 [47]

Parameter Description

<acmmax> ^(str)
Three bytes of the max. ACM value in hexadecimal format (e.g. "00001E" indicates decimal value 30) 000000 disable ACMmax feature 000001-FFFFFF.
<passwd> ^(str)
SIM PIN2

9.3 AT+CAOC Advice of Charge Information

AT+CAOC controls the Advice of Charge supplementary service function mode.

Syntax

<p>Test Command</p> <p>AT+CAOC=?</p> <p>Response(s)</p> <p>+CAOC: (list of supported<urcMode>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CAOC?</p> <p>Response(s)</p> <p>+CAOC: <urcMode></p> <p>OK</p>											
<p>Exec Command</p> <p>AT+CAOC</p> <p>Response(s)</p> <p>ERROR</p> <p>+CME ERROR: <err></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CAOC=[<urcMode>]</p> <p>Response(s)</p> <p>ERROR</p> <p>+CME ERROR: <err></p> <p>If <urcMode>=0, UE returns the current <ccmValue> value:</p> <p>+CAOC: <ccmValue></p> <p>OK</p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Unsolicited Result Code

+CCCM: <ccmValue>

If activated a URC is sent everytime the CCM value changes, but not more often than every 10 seconds.

Parameter Description

<urcMode> ^{(num)&(V)}	Description
0	Query current <ccmValue> value.
[1] ^(P)	Deactivate URC reporting of <ccmValue> value.
2	Activate URC reporting of <ccmValue> value.

<ccmValue>^(str)
Current value in hexadecimal format, e.g. "00001E" indicates decimal value 30). The three bytes are coded as ACM_{max} value on the USIM; for details refer to 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21].

9.4 AT+CCUG Closed User Group

The **AT+CCUG** write command serves to activate or deactivate the explicit CUG invocation, to set the desired index, and to specify if Preferential Group or Outgoing Access shall be suppressed.

The **AT+CCUG** read command returns if the Explicit CUG invocation is activated (in parameter **<n>**), which CUG **<index>** is chosen, and if Preferential Group or Outgoing Access is suppressed (in parameter **<info>**).

Syntax

<p>Test Command</p> <pre>AT+CCUG=?</pre> <p>Response(s)</p> <pre>OK</pre>											
<p>Read Command</p> <pre>AT+CCUG?</pre> <p>Response(s)</p> <pre>+CCUG:<n>, <index>, <info></pre> <pre>OK</pre> <pre>ERROR</pre> <pre>+CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CCUG=[[<n>][, <index>][, <info>]]</pre> <p>Response(s)</p> <pre>OK</pre> <pre>ERROR</pre> <pre>+CME ERROR: <err></pre>											
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47], 3GPP TS 22.085 [34], 3GPP TS 24.085</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<n> ^(num)	
Explicit CUG invocation options	
0 ^(P)	Deactivate explicit CUG invocation
1	Activate explicit CUG invocation
<index> ^(num)	
0 ^(P) ...9	Explicit selection of CUG index
10	No index (preferred CUG taken from subscriber data)
<info> ^(num)	
state of the call	
0 ^(P)	No information
1	Suppress outgoing access

-
- | | |
|---|------------------------------------------------|
| 2 | Suppress preferential CUG |
| 3 | Suppress preferential CUG and Outgoing Access. |

Notes

- The active settings for omitted parameters are retained without changes.
- Explicit CUG invocation means that at each call setup, CUG information is added to the called number.
- When starting a call with [ATD](#), Parameter 'G' or 'g' of command [ATD](#) will have no effect if the option selected for this single call is identical to the option already selected with [AT+CCUG](#).
- [ATZ](#) or [AT&F](#) do not influence the current settings.
- Some combinations of parameters may lead to rejection of CUG calls by the network. For more information, please consult 3GPP TS 24.085.

9.5 AT+CCFC Call forwarding number and conditions control

AT+CCFC controls the call forwarding supplementary service. Registration, erasure, activation, deactivation and status query are supported.

Syntax

<p>Test Command</p> <pre>AT+CCFC=?</pre> <p>Response(s)</p> <pre>+CCFC: (list/range of supported <reason>s) OK</pre>	<p>Write Command</p> <pre>AT+CCFC=<reason>, <mode>[, <number>, <type>][, <class>][, <sub-number>, <sub-type>][, <time>]</pre> <p>Response(s)</p> <pre>If <mode> is not equal 2 and command successful: OK If <mode>= 2, <reason> is not equal 2 and command successful: +CCFC: <status>, <class>[, <number>, <type>, <sub-number>, <sub-type>] OK If <mode>= 2, <reason>= 2 and command successful: +CCFC: <status>, <class>[, <number>, <type>, <sub-number>, <sub-type>, <time>] OK If error is related to UE functionality ERROR +CME ERROR: <err></pre>	<p>Reference(s)</p> <p>3GPP TS 27.007 [47], 3GPP TS 22.004 [27], 3GPP TS 22.082 [32], 3GPP TS 24.082</p>
<p>PIN MDM APP → Last</p> <p>+ + + - -</p>		

Parameter Description

<reason> ^(num)	
Reason for call forwarding	
0	Unconditional
1	Mobile busy
2	No reply
3	Not reachable
4	All call forwarding (includes reasons 0, 1, 2 and 3)
5	All conditional call forwarding (includes reasons 1, 2 and 3)
<mode> ^(num)	
Network operation to be performed for Supplementary service "call forwarding"	
0	Disable call forwarding (disable service)
1	Enable call forwarding (enable service)
2	Query status of call forwarding (query service status)

- 3 Register <number> and activate call forwarding (register service)
- 4 Erase <number> and deactivate call forwarding (erase service)

<number>^(str)

String type phone number of forwarding address in format specified by <type>. If you select <mode>= 3, the phone <number> will be registered in the network. This allows you to disable / enable CF to the same destination without the need to enter the phone number once again. Depending on the services offered by the provider the registration may be mandatory before CF can be used. The number remains registered in the network until you register another number or erase it using <mode> = 4.

<type>^(num)

Type of address octet

- 145 Dialing string <number> includes international access code character '+'
- 129 Otherwise

<class>^(num)

Integer or sum of integers each representing a class of information, i.e. a bearer service, telecommunication service or bearer service group as defined in 3GPP TS 22.004 [27].

- 1 Voice
- 2 Data
<class> 2 (data) comprises all those <class> values between 16 and 128, that are supported both by the network and the MS. This means, a setting made for <class> 2 applies to all remaining data classes (if supported). In addition, you can assign a different setting to a specific class. For example, you can activate call forwarding for all data classes, but deactivate it for a specific data class.
- 4 Fax (only for compatibility reasons, not supported by PHS8-P)
- 8 SMS
- 16 Data circuit sync
- 32 Data circuit async
- 64 Dedicated packet access
- 128 Dedicated PAD access
- 1...[7]...255 Combination of some of the above classes. For example, the default setting 7 represents the sum of the integers 1, 2 and 4 for voice, data and fax (fax only for compatibility reasons). If the <class> parameter is omitted, the default value 7 is used.

<sub-number>^(str)

String type phone number of sub address in format specified by <type>.

<sub-type>^(num)

Type of sub-address octet

- 145 International access code character '+'
- 129 Otherwise

<time>^(num)

- 5...[20]...30 Time to wait before call is forwarded, rounded to a multiple of 5 sec. (only for <reason>=no reply)

<status>^(num)

0	Call forwarding not active
1	Call forwarding active

Notes

- For some networks, the interrogation command will return the same result for each requested class.
- You can register, disable, enable and erase <reason> 4 and 5 as described above. However, querying the status of <reason> 4 and 5 with AT+CCFC will result in an error.
- Most networks will not permit registration of new parameters for conditional call forwarding (reasons 1,2,3,5) while unconditional call forwarding is enabled.
- The AT+CCFC command offers a broad range of call forwarding options according to the 3GPP Technical Specifications. However, when you attempt to set a call forwarding option which is not provisioned or not yet subscribed to, the setting will not take effect regardless of the response returned. The responses in these cases vary with the network (for example "OK", "Operation not allowed", "Operation not supported" etc.). To make sure check the call forwarding status with <mode>=2.
- Some networks may choose to have certain call forwarding conditions permanently enabled (e.g. forwarding to a mailbox if the mobile is not reachable). In this case, erasure or deactivation of call forwarding for these conditions will not be successful, even if the CCFC request is answered with response "OK".
- The command has been implemented with the full set of <class> parameters according to 3GPP TS 27.007 [47]. For actual applicability of SS "call forwarding" to a specific service or service group (a specific <class> value) please consult table A.1 of 3GPP TS 22.004 [27].
- There is currently no release of 3GPP TS 22.004 [27], in which the call forwarding supplementary service is defined as applicable to SMS services.
- As stated above <class> 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries call forwarding refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.
- The parameter <class> will not be sent to the network if <mode>=2. Therefore it may happen that the response of the query command contains information about classes which were not requested, or it shows only the inactive status of the class 1 or 255, This means that the status is valid for all classes. The response shows the status in the order of the network response.

Example

Please note that when you configure or query call forwarding without specifying any classes, the settings will refer to classes 1, 2 and 4 only (= default).

- To register the destination number for unconditional call forwarding (CFU):

```
at+ccfc=0,3,"+493012345678",145
OK
```

The destination number will be registered for above default classes.

In most networks, the registration will also cause call forwarding to be activated for these <class> values.

- To query the status of CFU without specifying <class>:

```
at+ccfc=0,2
+CCFC: 1,1,"+493012345678",145
+CCFC: 1,4,"+493012345678",145
OK
```

- To erase the registered CFU destination number:

```
at+ccfc=0,4
OK
```

Now, when you check the status, no destination number will be indicated:

```
at+ccfc=0,2
+CCFC: 0,1
+CCFC: 0,4
OK
```

- To query the status of CFU for all classes:

```
at+ccfc=0,2,,255
+CCFC: 0,255
OK
```

- [<reason>](#) 4 or 5 cannot be used to query the status of all call forwarding reasons (see also notes above):

```
at+ccfc=4,2
error
at+ccfc=5,2
error
```

9.6 AT+CCWA Call Waiting

The [AT+CCWA](#) write command controls the call waiting supplementary service according to 3GPP TS 22.083 [33]. Activation, deactivation and status query are supported. The read command returns the current value of `<n>`.

Syntax

<p>Test Command</p> <p>AT+CCWA=?</p> <p>Response(s)</p> <p>+CCWA: (list of supported <code><n></code>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CCWA?</p> <p>Response(s)</p> <p>+CCWA: <code><n></code></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CCWA=[[<code><n></code>][, <code><mode></code>][, <code><class></code>]]</p> <p>Response(s)</p> <p>If <code><mode></code> is not equal 2 and command successful:</p> <p>OK</p> <p>If <code><mode></code>= 2 and command successful:</p> <p>+CCWA: <code><status></code>, <code><class></code></p> <p>[+CCWA: <code><status></code>, <code><class></code>]</p> <p>[+CCWA: ...]</p> <p>OK</p> <p>If error is related to ME functionality</p> <p>ERROR</p> <p>+CME ERROR: <code><err></code></p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	-	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47], 3GPP TS 22.004 [27], 3GPP TS 22.083 [33], 3GPP TS 24.083</p>
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+	+	+	-	-							

Unsolicited Result Code

Indication of a call that is currently waiting and can be accepted.

+CCWA: `<calling number>`, `<type of number>` [, `<class>`], [, `<CLI validity>`]

If `<n>`=1 and the call waiting supplementary service is enabled in the network, URC "+CCWA" indicates a waiting call to the TE. It appears while the waiting call is still ringing.

Parameter Description

<code><n></code> ^(num)	Description
0	Disable display of URCS "+CCWA"
1	Enable display of URCS "+CCWA"

<mode>^(num)

Network operation to be performed for Supplementary service call waiting

0	Disable call waiting (disable service)
1	Enable call waiting (enable service)
2	Query status of call waiting (query service status)

<class>^(num)

Integer or sum of integers each representing a class of information, i.e. a bearer service, telecommunication service or bearer service group as defined in 3GPP TS 22.083 [33].

In the write command, parameter **<class>** specifies the class of the active call during which an incoming call of any class is to be regarded as a waiting call.

In URC "+CCWA: <calling number>, <type of number>[, <class>], [, <CLI validity>]", parameter **<class>** specifies the class of the waiting call.

1	Voice
2	Data <class> 2 (data) comprises all those <class> values between 16 and 128, that are supported both by the network and the MS. This means, a setting made for <class> 2 applies to all remaining data classes (if supported). In addition, you can assign a different setting to a specific class. For example, you can activate call waiting for all data classes, but deactivate it for a specific data class.
4	Fax (only for compatibility reasons, not supported by PHS8-P)
8	SMS
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access
1...[7]...255	Combination of some of the above classes. For example, the default setting 7 represents the sum of the integers 1, 2 and 4 for voice, data and fax (fax only for compatibility reasons). If the <class> parameter is omitted, the default value 7 is used.

<status>^(num)

0	Call waiting service is not active
1	Call waiting service is active

<calling number>^(str)

Phone number of waiting caller in the format specified by parameter **<type of number>**.

<type of number>^(num)

Type of address octet in integer format (refer to 3GPP TS 24.008 [42], subclause 10.5.4.7)

145	<calling number> includes international access code character '+'
128	Number restricted
129	Otherwise

<CLI validity>^(num)

0	CLI valid
---	-----------

1	CLI has been withheld
2	CLI is not available

Notes

- With [AT+CHLD](#), it is possible to establish a multiparty call or to set the active voice call on hold and then accept a waiting voice call (not possible with data call).
- Users should be aware that if call waiting is activated (`<mode>=1`), the presentation of URCs needs to be enabled, too (`<n>=1`).
Otherwise, on the one hand, a waiting caller would be kept waiting due to lack of BUSY signals, while, on the other hand, the waiting call would not be indicated to the called party.
- [AT+CCWA](#) offers a broad range of options according to 3GPP Technical Specifications. However, when you attempt to enable call waiting for a `<class>` for which the service is not provisioned or not supported, the setting will not take effect regardless of the response returned. The responses in these cases vary with the network (for example "OK", "Operation not allowed", "Operation not supported" etc.). To make sure check the current call waiting settings with `<mode>=2`.
- [AT+CCWA](#) has been implemented with the full set of `<class>` parameters according to 3GPP TS 27.007 [47]. For actual applicability of SS call waiting to a specific service or service group (a specific `<class>` value) please consult table A.1 of 3GPP TS 22.004 [27].
- Despite the specifications stated in 3GPP TS 22.004 [27] call waiting is not handled uniformly among all networks:
3GPP TS 22.004 [27], Annex A, provides the following specification:
"The applicability of call waiting refers to the telecommunication service of the active call and not of the waiting call. The incoming, waiting, call may be of any kind." Nevertheless, networks do differ on the actual implementation of the service. For example, the activation of call waiting for a data `<class>` causes some networks to send a call waiting indication if a call "of any kind" comes in during an active data call, but others may (with the same settings active) indicate a waiting data call during any kind of active call. Thus, the only reliable way to receive or prevent a call waiting indication under any circumstances and in any network, is to activate or deactivate call waiting for all tele- and bearer services (`<class>` 255).
- As stated above `<class>` 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries call waiting refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.
- The parameter `<class>` will not be sent to the network if `<mode>= 2`. Therefore it may happen that the response of the query command contains information about classes which were not requested or it shows only the inactive status of the class 1 or 255. This means, that the status is valid for all classes.

9.7 AT+CHLD Call Hold and Multiparty

The [AT+CHLD](#) command controls the Supplementary Services Call Hold and Multiparty. Calls can be put on hold, recovered, released and added to a conversation.

Like for all Supplementary Services, the availability and detailed functionality of Call Hold and Multiparty services depends on the configuration of the network. The PHS8-P can only request the service, but the network decides whether and how the request will be answered.

Syntax

<p>Test Command</p> <p>AT+CHLD=?</p> <p>Response(s)</p> <p>+CHLD: (list of supported <n>s)</p> <p>OK</p>											
<p>Write Command</p> <p>AT+CHLD=[<n>]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
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PIN	MDM	APP	→	Last							
+	+	+	-	-							

Parameter Description

<n> ^(num)	
0	<p>Release all held calls or set User Determined User Busy (UDUB) for a waiting call:</p> <ul style="list-style-type: none"> If a call is waiting, release the waiting call. The calling party will receive a "BUSY" indication (Supplementary Service User Determined User Busy "UDUB") Otherwise, terminate all held calls (if any).
1	<p>Terminate all active calls (if any) and accept "the other call" as the active call:</p> <ul style="list-style-type: none"> If a call is waiting, the waiting call will be accepted. Otherwise, if a held call is present, the held call becomes active.
1X	<p>Terminate a specific call X. The call may be active, held or waiting. The remote party of the terminated call will receive a "NO CARRIER" indication. Parameter X is the call number <idx> in the list of current calls indicated by AT+CLCC. Instead of AT+CLCC, the AT^SLCC command with parameter <idx> can be used.</p>
2	<p>Place all active calls on hold (if any) and accept "the other call" as the active call:</p> <ul style="list-style-type: none"> If a call is waiting, the waiting call will be accepted. Otherwise, if a held call is present, the held call becomes active.
2X	<p>Place all active calls on hold except call X. Parameter X is the call number <idx> in the list of current calls indicated by AT+CLCC. Instead of AT+CLCC, the AT^SLCC command with parameter <idx> can be used.</p>

- 3 Add a held call to the active calls in order to set up a conference (multiparty) call.
- 4 Connects the two calls of a multiparty call and disconnects the subscriber from both calls (ECT).

Notes

- The [AT+CHLD](#) command offers a broad range of options according to 3GPP Technical Specifications. However, if you attempt to invoke an option which is not provisioned by the network, or not subscribed to, invocation of this option will fail. The responses in these cases may vary with the network (for example "Operation not allowed", "Operation not supported" etc.).
- The handling of the supplementary service Call hold and Multiparty varies with the types of calls. This is because only voice calls can be put on hold, while data calls cannot. The following procedures apply: With [AT+CHLD=2](#) the user can simultaneously place a voice call on hold and accept another waiting voice or data call. If the waiting call is a data call, it is also possible to put the voice call on hold. The user needs to wait for the RING signal and manually answer the data call with [ATA](#). To switch back from the active data call to the held voice call the active call must be terminated with [AT+CHLD=1](#). If all active and held calls are voice calls it is possible to switch back and forth with [AT+CHLD=2](#).
- In conflict situations, e.g. when a waiting call comes while there are already held calls, the above procedures apply to the waiting call only. For example, `<n>=0` rejects the waiting call, but does not affect the held calls.
- See also the [AT+CCWA](#) command for details on how to display waiting calls.

Example

```
at+cpin="9999"
OK
+CREG: 2
+CREG: 1,"0145","0016"
at+ccwa=1,1,1
OK
atd"1234567";
OK
+CCWA: "+491791292364",145,32,,0
at+chld=2
OK
RING
RING
RING
ATA
OK
CONNECT 9600
hello
+++
OK
at+clcc
+CLCC: 1,0,1,0,0,"03038639268",129
+CLCC: 2,1,0,1,0,"+491791292364",145
OK
at+chld=1
OK
at+clcc
+CLCC: 1,0,0,0,0,"03038639268",129
OK
```

The mobile is now registered.
You activate the indication of waiting calls during voice calls.

You make a voice call.

You receive a URC indicating a waiting data call.
You put the voice call on hold.

You now receive the RING of the data call.

You accept the data call.

The data connection is set up.

With "+++" you go in command mode.

You interrogate the status of all established calls.

The active data call is terminated and the held voice call becomes active.

9.8 AT+CLIP Calling Line Identification Presentation

AT+CLIP refers to the supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. The **AT+CLIP** write command enables or disables the presentation of the CLI. It has no effect on the execution of the supplementary service CLIP in the network.

The **AT+CLIP** read command gives the status of `<clipUrcMode>`, and also triggers an interrogation of the provision status of the CLIP service according to 3GPP TS 22.081 [31] (given in `<clipStatus>`).

Syntax

<p>Test Command</p> <p>AT+CLIP=?</p> <p>Response(s)</p> <p>+CLIP: (list of supported<clipUrcMode>s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Read Command</p> <p>AT+CLIP?</p> <p>Response(s)</p> <p>+CLIP: <clipUrcMode>, <clipStatus></p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Write Command</p> <p>AT+CLIP=<clipUrcMode></p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
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PIN	MDM	APP	→	Last							
+	+	+	-	-							

Unsolicited Result Code

+CLIP: <clipNumber>, <clipNumType>, , [, <clipAlpha>] [, <CLI validity>]

If CLIP is enabled (and is permitted by the calling subscriber), this URC is delivered after every "RING" or "+CRING" URC when a mobile terminated voice call occurs. For data calls the URC is delivered only once.

Parameter Description

<code><clipUrcMode></code> ^(num)&V)&W)	
[0] ^{&F)}	Suppress unsolicited result codes
1	Display unsolicited result codes
<code><clipStatus></code> ^(num)&V)	
0	CLIP not provisioned

1	CLIP provisioned
2	Unknown

`<clipNumber>`^(str)

String type phone number of calling address in format specified by `<clipNumType>`.

`<clipNumType>`^(num)

Type of address octet in integer format; 145 when dialing string includes international access code character "+", otherwise 129.

UE returns value 128 for `<clipNumType>` if TON/NPI is unknown in accordance with 3GPP TS 24.008 [42], subclause 10.5.4.7.

`<clipAlpha>`^(str)

String type alphanumeric representation of `<clipNumber>` corresponding to the entry found in phonebook; used character set is the one selected with `AT+CSCS`.

`<CLI validity>`^(num)

0	CLI valid
1	CLI has been withheld by the originator.
2	CLI is not available due to interworking problems or limitations of originating network. <code><clipNumber></code> shall be an empty string ("") and <code><clipNumType></code> value will not be significant.

When CLI is not available (`<CLI validity>=2`), `<clipNumber>` shall be an plus string ("+") and `<clipNumType>` value will be "145". Nevertheless, the UE returns value 128 for `<clipNumType>` if TON/NPI is unknown in accordance with 3GPP TS 24.008 [42], subclause 10.5.4.7.

When CLI has been withheld by the originator, (`<CLI validity>=1`) and the CLIP is provisioned with the "override category" option (refer to 3GPP TS 22.081 [31] and 3GPP TS 23.081), `<clipNumber>` and `<clipNumType>` is provided. Otherwise, the UE returns the same setting for `<clipNumber>` and `<clipNumType>` as if the CLI was not available.

Note

- For alphanumeric representation the number stored in the phonebook must be identical to the number transported via the network - then the associated name will be recognized.

9.9 AT+CLIR Calling Line Identification Restriction

The [AT+CLIR](#) command refers to the supplementary service CLIR (Calling Line Identification Restriction).

Syntax

<p>Test Command</p> <pre>AT+CLIR=?</pre> <p>Response(s)</p> <pre>+CLIR: (list of supported <n>s) OK</pre>											
<p>Read Command</p> <pre>AT+CLIR?</pre> <p>Response(s)</p> <pre>+CLIR<n>, <m> OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CLIR=[<n>]</pre> <p>Response(s)</p> <pre>+CLIR: <n>, <m> OK ERROR +CME ERROR: <err></pre>											
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PIN	MDM	APP	→	Last							
+	+	+	-	-							

Parameter Description

<n>^(num)

Parameter shows the settings for outgoing calls:

[0] ^(P)	Presentation indicator is used according to the subscription of the CLIR service
1	CLIR invocation
2	CLIR suppression

<m>^(num)

Parameter shows the subscriber CLIR service status in the network:

0	CLIR not provisioned
1	CLIR provisioned in permanent mode
2	Unknown (e.g. no network, etc.)
3	CLIR temporary mode presentation restricted
4	CLIR temporary mode presentation allowed

Note

- The settings made with [AT+CLIR=1](#) or [AT+CLIR=2](#) are used for all outgoing calls until the UE is switched off or [AT+CLIR=0](#) is used.

9.10 AT+COLP Connected Line Identification Presentation

This command refers to the supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated voice call. The command enables or disables the presentation of the COL at the TE. It has no effect on the execution of the supplementary service COLR in the network.

Syntax

<p>Test Command</p> <p>AT+COLP=?</p> <p>Response(s)</p> <p>+COLP: (list of supported <n>s)</p> <p>OK</p>	
<p>Read Command</p> <p>AT+COLP?</p> <p>Response(s)</p> <p>+COLP: <n>, <m></p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>	
<p>Write Command</p> <p>AT+COLP=[<n>]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>	
<p>PIN MDM APP → Last</p> <p>+ + + - -</p>	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>

Unsolicited Result Code

Call response format:

+COLP: <number>, <type> [, <sub-number>] [, <sub-type>] [, <alpha>]

Parameter Description

<n>^(num)	
0	Disable - suppress unsolicited result codes
1	Enable - display unsolicited result codes
<m>^(num)	
0	COLP not provisioned (no presentation)
1	COLP provisioned
2	Unknown
<number>^(str)	
String type phone number of connected address in format specified by <type>	

`<type>`^(num)

Type of address octet in integer format; 145 when dialing string includes international access code character "+", 161 for national number (network support for this type is optional), otherwise 129.

`<sub-number>`^(str)

String type phone number of sub address in format specified by `<sub-type>`.

`<sub-type>`^(num)

Type of sub-address octet

145	international access code character '+'
129	otherwise

`<alpha>`^(str)

String type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set is the one selected with `AT+CSCS`.

Note

- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

9.11 AT+CPUC Price per unit and currency table

The [AT+CPUC](#) read command returns the current parameters of PUC.

The [AT+CPUC](#) write command sets the parameters of Advice of Charge related price per unit and currency table. SIM PIN2 is usually required to set the parameters.

Syntax

<p>Test Command</p> <p>AT+CPUC=?</p> <p>Response(s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CPUC?</p> <p>Response(s)</p> <p>+CPUC: <currency>, <ppu></p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<p>Write Command</p> <p>AT+CPUC=<currency>, <ppu>[, <passwd>]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
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PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<currency>^{(str)(+CSCS)}

Three-character currency code (e.g. "GBP", "EUR"). If the currency name is longer than three characters, all characters will be cut off after the third position. Before they are written to the SIM Card, these characters are converted to the standard GSM alphabet.

<ppu>^(str)

Price per unit; dot is used as a decimal separator (e.g. "2.66"). The length is limited to 20 characters. If the string length is exceeded, the command is terminated with an error. This string may only contain digits and a dot. Leading zeros are removed from the string. The minimum and maximum value are determined by the structure of the SIM-PUCT file. The maximum price per unit value is 999 999 999.00. When successfully entered, this value is rounded to maximum accuracy.

Note: Due to storage in mantisse (range 0-4095) and exponent (-7 to 7) it is possible that rounding errors occur.

<passwd>^(str)

SIM PIN2. String parameter which can contain any combination of digits. The maximum string length is limited to 8 digits. If this value is exceeded, the command terminates with an error message. If the PIN2 is incorrect, a CME error (+CME ERROR: incorrect password) is output.

9.12 AT+CSSN Supplementary service notifications

Syntax

<p>Test Command</p> <p>AT+CSSN=?</p> <p>Response(s)</p> <p>+CSSN: (list of supported<n>s), (list of supported<m>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CSSN?</p> <p>Response(s)</p> <p>+CSSN: <n>, <m></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CSSN=<n>[, <m>]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
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PIN	MDM	APP	→	Last							
+	+	+	-	-							

Unsolicited Result Codes

URC 1

+CSSI: <code 1>

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code "+CSSI: <code 1>" is sent to TE before any other MO call setup result codes

URC 2

+CSSU: <code 2>

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, unsolicited result code "+CSSU: <code 2>" is sent to TE.

Command Description

The write command enables or disables the presentation of URCs for supplementary services.

Parameter Description

<n> ^(num)	
0(&F)(P)	Suppress "+CSSI" URCs
1	Activate "+CSSI" URCs
<m> ^(num)	
0(&F)(P)	Suppress "+CSSU" URCs
1	Activate "+CSSU" URCs

<code 1>^(num)

0	Unconditional call forwarding is active
1	Some of the conditional call forwardings are active
2	Call has been forwarded
3	Waiting call is pending
5	Outgoing call is barred

<code 2>^(num)

0	The incoming call is a forwarded call
2	Call has been put on hold (during a voice call)
3	Call has been retrieved (during a voice call)
5	Held call was terminated by other party
10	Additional incoming call forwarded

Note

- URCs will be displayed only if the call concerned is a voice call, but some URCs will be displayed as well as for data calls (like "+CSSU"=0).

9.13 AT+CUSD Unstructured Supplementary Service Data

AT+CUSD allows to control the handling of Unstructured Supplementary Service Data (USSD) according to 3GPP TS 22.090 [36]. Both network and mobile initiated operations are supported. The interaction of this command with other AT commands based on other supplementary services is described in the related technical specifications.

Parameter `<ussdMode>` is used to control the presentation of "+CUSD" URCs to the TE, which will be caused by a USSD response from the network or by different network or **USAT** initiated operations. Therefore, it is recommended to always have "+CUSD" URCs enabled.

If parameter `<ussdReq>` is given, a mobile initiated USSD send request or a USSD response to a network or **USAT** initiated operation is sent to the network. A possible response USSD of the network is again presented by a subsequent "+CUSD" URC.

Syntax

<p>Test Command</p> <p>AT+CUSD=?</p> <p>Response(s)</p> <p>+CUSD: (list of supported<ussdMode>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CUSD?</p> <p>Response(s)</p> <p>+CUSD: <ussdMode></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CUSD=<ussdMode>[, <ussdReq>[, <ussdDCS>]]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
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PIN	MDM	APP	→	Last							
+	+	+	-	-							

Unsolicited Result Code

+CUSD: <ussdStatus> [, <ussdRsp> [, <ussdDCS>]]

"+CUSD" URC indicates a USSD response from the network, respectively caused by a network or **USAT** initiated operation.

Parameter Description

<code><ussdMode></code> ^(num)	
0(&F)	Disable "+CUSD" URC presentation.
1	Enable "+CUSD" URC presentation. If a USSD send request is sent via ATD or handled by Remote-USAT (in ER mode) this setting is activated implicitly.
2	Cancel session (not applicable to read command response).

<ussdReq>^(str)

Unstructured Supplementary Service Data (USSD) to be sent to the network.

If <ussdReq> parameter is not given, network is not interrogated. [AT+CUSSD](#) write command only supports setting <ussdDCS>=15.

<ussdRsp>^{(str)(+CSCS)}

Unstructured Supplementary Service Data (USSD) received from the network.

If <ussdDCS> indicates that 3GPP TS 23.038 [37] GSM 7 bit default alphabet is used, the UE converts GSM alphabet into current TE character set according to rules of 3GPP TS 27.005 [46], Annex A. See also Section 1.8, [Supported character sets](#). However, in case of invalid or omitted <ussdDCS>, conversion of <ussdRsp> is not possible.

<ussdDCS>^(num)

3GPP TS 23.038 [37] Cell Broadcast Data Coding Scheme (default 15).

In case of an incoming USSD with invalid or omitted data coding scheme information <ussdDCS> will not be presented.

<ussdStatus>^(num)

0	No further user action required (network initiated USSD notification, or no further information needed after mobile initiated operation).
1	Further user action is required (network initiated USSD request, or further information is needed after mobile initiated operation). If <ussdStatus>=1 the user input needs to be sent via an additional AT+CUSSD action <ESC>.
2	USSD exchange is terminated by network.
3	A (UE local) client has responded, i.e. the interface was not idle and a busy indication was sent to the network.
4	Operation not supported.
5	Network operation timeout.

Note

- It is recommended to finalize or escape a pending USSD user interaction before further actions are done to prevent blocking situations.

10. Packet Domain Related Commands

The AT commands described in this chapter allow the Customer Application to control packet switched services in GSM/UMTS networks.

10.1 AT+CGATT PS Attach or Detach

The [AT+CGATT](#) write command is used to attach the MT to, or detach the MT from, the Packet Domain service. After the command has completed, the MT remains in V.25ter command state. If the MT 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.

Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

The [AT+CGATT](#) read command returns the current Packet Domain service state.

The [AT+CGATT](#) test command is used for requesting information on the supported Packet Domain service states.

Syntax

Test Command AT+CGATT=? Response(s) +CGATT: (list of supported <state>s) OK	
Read Command AT+CGATT? Response(s) +CGATT: <state> OK	
Write Command AT+CGATT=[<state>] Response(s) OK ERROR +CME ERROR: <err>	
PIN MDM APP → Last + + + - -	Reference(s) 3GPP TS 27.007 [47]

Parameter Description

<state> ^(num)	
Indicates the state of PS attachment.	
0 ^(P)	Detached
[1]	Attached

Note

- If the currently used access technology is GSM and a CS call is in progress, then the write command returns "+CME ERROR: GPRS services not allowed".

10.2 AT+CGACT PDP Context Activate or Deactivate

The [AT+CGACT](#) write command is used to activate or deactivate the specified PDP context(s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the MT is not PS attached when the activation form of the command is executed, the MT first performs a PS attach and then attempts to activate the specified contexts. If no [<cid>](#)s are specified the activation/deactivation form of the command activates/deactivates all defined contexts.

The [AT+CGACT](#) read command returns the current activation states for all the defined PDP contexts.

The [AT+CGACT](#) test command is used for requesting information on the supported PDP context activation states.

Syntax

Test Command

```
AT+CGACT=?  
Response(s)  
+CGACT: (list of supported <state>s)  
OK  
ERROR  
+CME ERROR: <err>
```

Read Command

```
AT+CGACT?  
Response(s)  
+CGACT: [<cid>, <state>]  
[+CGACT: <cid>, <state>]  
...  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

```
AT+CGACT=<state>[, <cid>[, <cid>]]  
Response(s)  
OK  
ERROR  
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
+	+	+	-	-

Reference(s)

3GPP TS 27.007 [47]

Parameter Description

[<state>](#)^(num)

Indicates the state of PDP context activation.

0	Deactivated
1	Activated

[<cid>](#)^(num)

Parameter specifies a particular PDP context definition (see [AT+CGDCONT](#) parameter [<cid>](#)).

Notes

- Only one context can be activated at the same time, no matter on which interface (for interface restrictions see Section 1.5, [AT Command Interpreter](#)). Remember that contexts may be activated implicitly by using other commands, e.g. [AT+CGDATA](#) or [ATD*99#](#).
- Contexts activated by [AT+CGDATA](#) or [ATD*99#](#) can not be handled by the [AT+CGACT](#) write command but their activation state is still visible via [AT+CGACT](#) read command. A write command without specifying any [<cid>](#) will always fail as long as some contexts are still in use by [AT+CGDATA](#) or [ATD*99#](#).
- If activation or deactivation of a context fails, then [AT+CEER](#) may provide further informations about the reason.
- If activation of an Internet service related context fails with "+CME ERROR: service option temporary out of order", then either you already have too many contexts active or deactivation of this context was initiated before, but could not be completed because one or more services are still using this context (see below).
- It is possible to deactivate an Internet service related context even if one or more services are still using this context. In this case any open service using the context will be closed and will indicate this by its [<srvState>](#).

10.3 AT+CGCMOD PDP Context Modify

The [AT+CGCMOD](#) write command can be used to modify the specified PDP context(s) with respect to QoS profiles. If no `<cid>`s are specified then all active contexts will be modified.

The [AT+CGCMOD](#) test command returns a list of `<cid>`s associated with active contexts which could be modified.

Syntax

<p>Test Command</p> <pre>AT+CGCMOD=?</pre> <p>Response(s)</p> <pre>+CGCMOD: (list of <cid>s associated with active contexts) OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CGCMOD=[<cid>[, <cid>]]</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"><tr><td>PIN</td><td>MDM</td><td>APP</td><td>→</td><td>Last</td></tr><tr><td>+</td><td>+</td><td>+</td><td>-</td><td>-</td></tr></table>	PIN	MDM	APP	→	Last	+	+	+	-	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
+	+	+	-	-							

Parameter Description

`<cid>`^(num)

Parameter specifies a particular PDP context definition (see [AT+CGDCONT](#) parameter `<cid>`).

1...16

Note

- If modification of a context fails, then [AT+CEER](#) may provide further informations about the reason.

10.4.1 Automatic deactivation of PDP context during dial-up PPP

When using the AT+CGDATA write command or [ATD*99#](#) the MT issues the intermediate result code CONNECT and enters V.250ter online data state. In V.250 online data state, first some LCP protocol exchange between MT and TE is performed to set up the PPP link. After successfully establishing the PPP link, the MT performs the PDP context activation procedure if the context is not already activated. As a result, the MT is in a "PDP context activated" state within the PLMN, the PPP link is established on the mobile side and the mobile is ready for IP data transfer.

If the TE wants to close the LCP link the MT may perform an LCP termination request procedure on PPP level. After this LCP termination procedure the MT deactivates the PDP context automatically and the MT returns to V.250 command mode and issues the final result code NO CARRIER.

If DTR is configured to disconnect data connections ([AT&D2](#)), then the application should not toggle DTR during the implicit PDP context deactivation and before "NO CARRIER" is received.

10.5 AT+CGDCONT Define PDP Context

[AT+CGDCONT](#) specifies the parameters for a PDP context identified by the context identifier `<cid>`. The number of contexts that may be in a defined state at the same time is given by the range returned by the [AT+CGDCONT](#) test command. A special form of the write command ([AT+CGDCONT=<cid>](#)) causes the values for context `<cid>` to become undefined.

It is not allowed to change the definition of an already activated context.

The [AT+CGDCONT](#) read command returns the current settings for each defined PDP context.

Syntax

<p>Test Command</p> <pre>AT+CGDCONT=?</pre> <p>Response(s)</p> <pre>+CGDCONT: (range of supported <cid>s), "IP", , , (list of supported <d_comp>s), (list of supported <h_comp>s) OK ERROR +CME ERROR: <err></pre>											
<p>Read Command</p> <pre>AT+CGDCONT?</pre> <p>Response(s)</p> <pre>+CGDCONT: [<cid>, <PDP_type>, <APN>, <PDP_addr>, <d_comp>, <h_comp>] [+CGDCONT: <cid>, <PDP_type>, <APN>, <PDP_addr>, <d_comp>, <h_comp>] [+CGDCONT: ...] OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CGDCONT=<cid>[, <PDP_type>[, <APN>[, <PDP_addr>[, <d_comp>[, <h_comp>]]]]]</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP 27.007</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<code><cid></code> ^{(num)(NV)}	
PDP Context Identifier	
Parameter specifies a particular PDP context definition. This parameter is used in other PDP context-related commands.	
1...16	
101...116	Context definitions for the embedded TCP/IP stack (see Chapter 12., Internet Service Commands)

10.6 AT+CGPADDR Show PDP Address

The [AT+CGPADDR](#) exec command returns a list of PDP addresses for all defined contexts.

The [AT+CGPADDR](#) write command returns a list of PDP addresses for the specified context identifiers. If a context is not defined, then no output line is generated for it. If no [<cid>](#) is specified, the addresses for all defined contexts are returned.

The [AT+CGPADDR](#) test command returns a list of defined [<cid>](#)s.

Syntax

<p>Test Command</p> <pre>AT+CGPADDR=?</pre> <p>Response(s)</p> <pre>[+CGPADDR: (list of defined <cid>s)] OK</pre>											
<p>Exec Command</p> <pre>AT+CGPADDR</pre> <p>Response(s)</p> <pre>[+CGPADDR: <cid>, <PDP_address>] [+CGPADDR: ...] OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CGPADDR=[<cid>[,<cid>[, ...]]]</pre> <p>Response(s)</p> <pre>[+CGPADDR: <cid>, <PDP_address>] [+CGPADDR: ...] OK ERROR +CME ERROR: <err></pre>											
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PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

[<cid>](#)^(num)

Parameter specifies a particular PDP context definition (see [AT+CGDCONT](#) parameter [<cid>](#)).

[<PDP_address>](#)^(str)

A string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic.

- 1 High Priority
Service commitments shall be maintained ahead of precedence classes 2 and 3
- 2 Normal priority
Service commitments shall be maintained ahead of precedence class 3
- 3 Low priority
Service commitments shall be maintained

`<delay>^(num)(NV)`

Delay class

The delay parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the Packet Domain network(s).

- [0] Network subscribed value
- 1..4 SDU size: 128 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	

SDU size: 1024 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	

`<reliability>^(num)(NV)`

Reliability class

- [0] Network subscribed value
- 1 Non real-time traffic, error-sensitive application that cannot cope with data loss
- 2 Non real-time traffic, error-sensitive application that can cope with infrequent data loss
- 3 Non real-time traffic, error-sensitive application that can cope with data loss, GMM/SM, and SMS
- 4 Real-time traffic, error-sensitive application that can cope with data loss
- 5 Real-time traffic, error non-sensitive application that can cope with data loss

`<peak>^(num)(NV)`

Peak throughput class (in octets per second).

- [0] Network subscribed value
- 1 Up to 1 000 (8 kbit/s).
- 2 Up to 2 000 (16 kbit/s).
- 3 Up to 4 000 (32 kbit/s).
- 4 Up to 8 000 (64 kbit/s).

Parameter Description

<cid>^{(num)(NV)}

Parameter specifies a particular PDP context definition (see [AT+CGDCONT](#) parameter <cid>).

<Traffic class>^{(num)(NV)}

0	conversational
1	streaming
2	interactive
3	background
[4]	subscribed value

<Maximum bitrate UL>^{(num)(NV)}

This parameter 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,...](#)).

[0]	subscribed value
1...5760	

<Maximum bitrate DL>^{(num)(NV)}

This parameter 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,...](#)).

[0]	subscribed value
1...14000	

<Guaranteed bitrate UL>^{(num)(NV)}

This parameter 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,...](#)).

[0]	subscribed value
1...5760	

<Guaranteed bitrate DL>^{(num)(NV)}

This parameter 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,...](#)).

[0]	subscribed value
1...14000	

<Delivery order>^{(num)(NV)}

This parameter indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0	no
1	yes
[2]	subscribed value

<Maximum SDU size>^{(num)(NV)}

This parameter indicates the maximum allowed SDU size in octets.

[0]	subscribed value
-----	------------------

10...1520 (value needs to be divisible by 10 without remainder)
1502

<SDU error ratio>^{(str)(NV)}

This parameter 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", ...).

["0E0"] subscribed value
"1E2"
"7E3"
"1E3"
"1E4"
"1E5"
"1E6"
"1E1"

<Residual bit error ratio>^{(str)(NV)}

This parameter 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", ...).

["0E0"] subscribed value
"5E2"
"1E2"
"5E3"
"4E3"
"1E3"
"1E4"
"1E5"
"1E6"
"6E8"

<Delivery of erroneous SDUs>^{(num)(NV)}

This parameter indicates whether SDUs detected as erroneous shall be delivered or not.

0 no
1 yes
2 no detect
[3] subscribed value

<Transfer delay>^{(num)(NV)}

This parameter indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds.

[0] subscribed value
100...150 (value needs to be divisible by 10 without remainder)
200...950 (value needs to be divisible by 50 without remainder)
1000...4000 (value needs to be divisible by 100 without remainder)

<Traffic handling priority>^{(num)(NV)}

This parameter specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of the other bearers.

[0]	subscribed
1	
2	
3	

<PDP_type>^{(str)(NV)}

Packet Data Protocol Type

"IP"	Internet Protocol (IETF STD 5)
------	--------------------------------

Notes

- Definitions of parameters can be found in 3GPP 23.107. Please note, that not all parameter combinations are allowed. Details can be found in 3GPP TS 23.107 in section 6.5.1 "Ranges of UMTS Bearer Service Attributes".
- All QOS settings are non-volatile and independent of [AT&F](#) and [ATZ](#).
- If QOS settings are configured with [AT+CGQMIN](#) and [AT+CGEQMIN](#) in parallel the MT will use only the [AT+CGEQMIN](#) settings for connection setup while the [AT+CGQMIN](#) settings are ignored.

10.9 AT+CGREG Packet Domain Network Registration Status

The **AT+CGREG** write command enables the presentation of the URC "+CGREG: <stat>" when <n>=1 and ME's Packet Domain network registration status changes.
AT+CGREG read command queries the current URC presentation status <n> and an integer <stat> which shows whether the network has currently indicated the registration of the ME.

Syntax

<p>Test Command</p> <p>AT+CGREG=?</p> <p>Response(s)</p> <p>+CGREG: (list of supported <n>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CGREG?</p> <p>Response(s)</p> <p>+CGREG: <n>, <stat></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CGREG=[<n>]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP 27.007</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Unsolicited Result Code

+CGREG: <stat>

Indicates a change in the ME's Packet Domain network registration status.

Parameter Description

<n> ^(num)	
0(&F)(P)	Disable Packet Domain network registration URC
1	Enable Packet Domain network registration URC "+CGREG: <stat>"
<stat> ^(num)	
0	Not registered, ME is not currently searching an operator to register to. The ME is in GMM state GMM-NUL or GMM-DEREGISTERED-INITIATED. Packet Domain service is disabled, the ME is allowed to attach to the Packet Domain if requested by the user.
1	Registered, home network. The ME is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED INITIATED on the home PLMN

-
- 2 Not registered, but ME is currently trying to attach or searching an operator to register to. The ME is in GMM state GMM-DEREGISTERED or GMM-REGISTERED-INITIATED. The Packet Domain service is enabled, but an allowable PLMN is currently not available. The ME will start a PS attach as soon as an allowable PLMN is available.
 - 3 Registration denied. The ME is in GMM state GMM-NULL. The Packet Domain service is disabled, the ME is not allowed to attach to the Public Domain if requested by the user.
 - 4 Unknown
 - 5 Registered, roaming. The ME is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED on a visited PLMN.

10.10 AT+CGQREQ Quality of Service Profile (Requested)

[AT+CGQREQ](#) allows the TE to specify a Quality of Service Profile that is used when the MT sends an Activate PDP Context Request message to the network.

The [AT+CGQREQ](#) write command specifies a profile for the context identified by the context identification parameter, [<cid>](#).

A special form of the write command, [AT+CGQREQ=<cid>](#) causes the requested profile for context number [<cid>](#) to become undefined.

The [AT+CGQREQ](#) read command returns the current settings for each context for which a QOS was explicitly specified.

The [AT+CGQREQ](#) test command returns values supported as a compound value.

Syntax

<p>Test Command</p> <p>AT+CGQREQ=?</p> <p>Response(s)</p> <p>+CGQREQ: "IP", (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)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CGQREQ?</p> <p>Response(s)</p> <p>+CGQREQ: [<cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>]</p> <p>[+CGQREQ: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>]</p> <p>[+CGQREQ: ...]</p>											
<p>Write Command</p> <p>AT+CGQREQ=<cid>[, <precedence>[, <delay>[, <reliability>[, <peak>[, <mean>]]]]]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>											
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PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<cid> ^{(num)(NV)}	Parameter specifies a particular PDP context definition (see AT+CGDCONT parameter <cid>).
<precedence> ^{(num)(NV)}	Precedence class
[0]	Network subscribed value
1	High Priority Service commitments shall be maintained ahead of precedence classes 2 and 3

- 2 Normal priority
Service commitments shall be maintained ahead of precedence class 3
- 3 Low priority
Service commitments shall be maintained

<delay>^{(num)(NV)}

Delay class

This parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the network(s).

- [0] Network subscribed value
- 1..4 With SDU size = 128 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	-

with SDU size = 1024 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	-

<reliability>^{(num)(NV)}

Reliability class

- [0] Network subscribed value
- 1 Non real-time traffic, error-sensitive application that cannot cope with data loss
- 2 Non real-time traffic, error-sensitive application that can cope with infrequent data loss
- 3 Non real-time traffic, error-sensitive application that can cope with data loss, GMM/SM, and SMS
- 4 Real-time traffic, error-sensitive application that can cope with data loss
- 5 Real-time traffic, error non-sensitive application that can cope with data loss

<peak>^{(num)(NV)}

Peak throughput class
in octets per second

- [0] Network subscribed value
- 1 Up to 1 000 (8 kbit/s)
- 2 Up to 2 000 (16 kbit/s)
- 3 Up to 4 000 (32 kbit/s)
- 4 Up to 8 000 (64 kbit/s)
- 5 Up to 16 000 (128 kbit/s)

6	Up to 32 000 (256 kbit/s)
7	Up to 64 000 (512 kbit/s)
8	Up to 128 000 (1024 kbit/s)
9	Up to 256 000 (2048 kbit/s)

`<mean>(num)(NV)`

Mean throughput class
in octets per hour

[0]	Network subscribed value
1	100 (~0.22 bit/s)
2	200 (~0.44 bit/s)
3	500 (~1.11 bit/s)
4	1 000 (~2.2 bit/s)
5	2 000 (~4.4 bit/s)
6	5 000 (~11.1 bit/s)
7	10 000 (~22 bit/s)
8	20 000 (~44 bit/s)
9	50 000 (~111 bit/s)
10	100 000 (~0.22 kbit/s)
11	200 000 (~0.44 kbit/s)
12	500 000 (~1.11 kbit/s)
13	1 000 000 (~2.2 kbit/s)
14	2 000 000 (~4.4 kbit/s)
15	5 000 000 (~11.1 kbit/s)
16	10 000 000 (~22 kbit/s)
17	20 000 000 (~44 kbit/s)
18	50 000 000 (~111 kbit/s)
31	Best effort

`<PDP_type>(str)(NV)`

Packet Data Protocol type

“IP” Internet Protocol (IETF STD 5)

Notes

- Definitions of parameters can be found in 3GPP 23.107.
- All QOS settings are non-volatile and independent of [AT&F](#) and [ATZ](#).
- If QOS settings are configured with [AT+CGQREQ](#) and [AT+CGEQREQ](#) in parallel the MT will use only the [AT+CGEQREQ](#) settings for connection setup while the [AT+CGQREQ](#) settings are ignored.

<Traffic class>^{(num)(NV)}

0	conversational
1	streaming
2	interactive
3	background
[4]	subscribed value

<Maximum bitrate UL>^{(num)(NV)}

This parameter 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+CGEQREQ=...,32,...](#)).

[0]	subscribed value
1...5760	

<Maximum bitrate DL>^{(num)(NV)}

This parameter 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+CGEQREQ=...,32,...](#)).

[0]	subscribed value
1...14000	

<Guaranteed bitrate UL>^{(num)(NV)}

This parameter 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,...](#)).

[0]	subscribed value
1...5760	

<Guaranteed bitrate DL>^{(num)(NV)}

This parameter 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,...](#)).

[0]	subscribed value
1...14000	

<Delivery order>^{(num)(NV)}

This parameter indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0	no
1	yes
[2]	subscribed value

<Maximum SDU size>^{(num)(NV)}

This parameter indicates the maximum allowed SDU size in octets.

[0]	subscribed value
10...1520	(value needs to be divisible by 10 without remainder)
1502	

<SDU error ratio>^{(str)(NV)}

This parameter 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"] subscribed value
"1E2"
"7E3"
"1E3"
"1E4"
"1E5"
"1E6"
"1E1"

<Residual bit error ratio>^{(str)(NV)}

This parameter 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"] subscribed value
"5E2"
"1E2"
"5E3"
"4E3"
"1E3"
"1E4"
"1E5"
"1E6"
"6E8"

<Delivery of erroneous SDUs>^{(num)(NV)}

This parameter indicates whether SDUs detected as erroneous shall be delivered or not.

0 no
1 yes
2 no detect
[3] subscribed value

<Transfer delay>^{(num)(NV)}

This parameter indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds.

[0] subscribed value
100...150 (value needs to be divisible by 10 without remainder)
200...950 (value needs to be divisible by 50 without remainder)
1000...4000 (value needs to be divisible by 100 without remainder)

<Traffic handling priority>^{(num)(NV)}

This parameter specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of the other bearers.

[0]	subscribed
1	
2	
3	

<PDP_type>^{(str)(NV)}

Packet Data Protocol Type

"IP"	Internet Protocol (IETF STD 5)
------	--------------------------------

Notes

- Definitions of parameters can be found in 3GPP 23.107. Please note, that not all parameter combinations are allowed. Details can be found in 3GPP TS 23.107 in section 6.5.1 "Ranges of UMTS Bearer Service Attributes".
- All QOS settings are non-volatile and independent of [AT&F](#) and [ATZ](#).
- If QOS settings are configured with [AT+CGQREQ](#) and [AT+CGEQREQ](#) in parallel the MT will use only the [AT+CGEQREQ](#) settings for connection setup while the [AT+CGQREQ](#) settings are ignored.

10.12 AT+CGSMS Select Service for MO Short Messages

AT+CGSMS specifies the service or service preference that the MT will use to send MO (mobile originated) short messages.

Syntax

Test Command					
AT+CGSMS=?					
Response(s)					
+CGSMS: (list of supported <service>s)					
OK					
Read Command					
AT+CGSMS?					
Response(s)					
+CGSMS: <service>					
OK					
Write Command					
AT+CGSMS=<service>					
Response(s)					
OK					
ERROR					
+CME ERROR: <err>					
PIN	MDM	APP	→	Last	Reference(s)
+	+	+	+	-	3GPP 27.007

Parameter Description

<service> ^{(num)(NV)}	
A numeric parameter which indicates the service or service preference to be used.	
0	Packet Domain
1 ^(D)	Circuit switched
2	Packet Domain preferred (use circuit switched SMS transfer if mobile is not PS attached)
3	Circuit switched preferred (use Packet Domain if circuit switched is not available)

10.13 ATD*99# Request Packet Domain service

This command causes the MT to perform whatever actions are necessary to establish a communication between the TE and the external PDN.

The V.250 'D' (Dial) command causes the MT to enter the V.250 online data state and, with the TE, to start the specified layer 2 protocol. No further commands may follow on the AT command line. 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 [AT+CGATT](#) and [AT+CGACT](#) commands.

To confirm acceptance of the command before entering the V.250 online data state command will respond with CONNECT.

The application that initiates the PPP mode must be designed to start all LCP configure requests in accordance with TS 27.060 par 9.1. Otherwise the MT remains, after the CONNECT, infinitely in a waiting state.

When the layer 2 protocol has terminated, either as a result of an orderly shut down of the PDP or an error, the MT enters V.250 command state and returns NO CARRIER (for details refer to Section [10.4.1, Automatic deactivation of PDP context during dial-up PPP](#)).

As long as a GPRS data connection is active, it is not possible to establish a CS data call (incoming and outgoing).

[ATD*99#](#) is blocked when the Fixed Dialing lock is enabled and the number "*99#" is not present in the "FD" phonebook (see [AT+CLCK](#) SIM Fixed Dialing lock). In this case "+CME ERROR: call barred" is returned.

Syntax

Exec Command					
ATD*99[* [<called_address>][* [<L2P>][* [<cid>]]]]#					
Response(s)					
CONNECT					
NO CARRIER					
ERROR					
+CME ERROR: <err>					
PIN	MDM	APP	→	Last	Reference(s)
+	+	-	-	+	3GPP TS 27.007

Parameter Description

<called_address>^(str)

IP V4 address in the form w.x.y.z, which identifies the called party; if it is provided, the MT will automatically set up a virtual call to the specified address after the context has been activated.

<L2P>^(str)

Layer 2 protocol to be used between the TE and MT.

["PPP"] layer 2 protocol PPP

"1" layer 2 protocol PPP

<cid>^(num)

Parameter specifies a particular PDP context definition (see [AT+CGDCONT](#) parameter <cid>). If parameter is not specified, then the first defined primary context is used.

10.14 AT^SGAUTH Set Type of Authentication for PDP-IP Connections

AT^SGAUTH specifies the authentication protocol, password and user name to be given if a Packet Domain network requires authentication and the subscriber uses **AT+CGACT** for PDP context activation.

See also parameter **<gauth>** provided by the configuration command **AT^SCFG**. This parameter specifies the authentication protocol applied by **AT+CGDATA** or **ATD*99#** during the PPP startup phase if no PDP context is activated yet.

Syntax

```

Test Command
AT^SGAUTH=?
Response(s)
^SGAUTH: (range of supported<cid>s), (list of supported <auth_type>s), ,
OK
ERROR
+CME ERROR: <err>

Read Command
AT^SGAUTH?
Response(s)
^SGAUTH:<cid>, <auth_type>[, <user>]
^SGAUTH:<cid>, <auth_type>[, <user>]
...
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SGAUTH=<cid>[, <auth_type>[, <passwd>, <user>]]
Response(s)
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
+	+	+	+	-

Parameter Description

<cid>^{(num)(NV)}
Parameter specifies a particular PDP context definition (see **AT+CGDCONT** parameter **<cid>**).

<auth_type>^{(num)(NV)}
Indicates the types of authentication to be used for the specified context. If CHAP or PAP is selected two additional parameters **<passwd>** and **<user>** need to be specified.

[0]	none
1	PAP
2	CHAP

`<passwd>(str)(NV)`

Parameter specifies the password used for authentication. It is required for the authentication types PAP and CHAP.

Maximum length: 127 characters.

`<user>(str)(NV)`

Parameter specifies the user name used for authentication. It is required for the authentication type PAP and CHAP.

Maximum length: 127 characters.

10.15 AT^SGCONF Configuration of GPRS related Parameters

AT^SGCONF configures the used E/GPRS Multislot Classes. Four Multislot Classes are supported for GPRS respectively EGPRS. Changed settings will be applied with the next restart of UE.

Syntax

```

Test Command
AT^SGCONF=?
Response(s)
^SGCONF: (list of supported <llc_pdu_length_U>s), (list of supported <llc_pdu_length_I>s), (list of supported <GPRS msclass>es), (list of supported <EGPRS msclass>es)
OK

Read Command
AT^SGCONF?
Response(s)
^SGCONF: <llc_pdu_length_U>, <llc_pdu_length_I>, <GPRS msclass>, <EGPRS msclass>
OK

Write Command
AT^SGCONF=[<llc_pdu_length_U>][, [<llc_pdu_length_I>][, [<GPRS msclass>][, [<EGPRS msclass>]]]]
Response(s)
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<llc_pdu_length_U>^(num)
 The maximum number of octets in an information field of Unnumbered (U) frames.
 0^(P) No negotiation with network (A fixed number of octets will be used).

<llc_pdu_length_I>^(num)
 The maximum number of octets in an information field of Combined Information (I) frames.
 0^(P) No negotiation with network (A fixed number of octets will be used).

<GPRS msclass>^{(num)(NV)}
 GPRS Multislot Class. The value can be one of the classes indicated with the Test command. Changed settings will be applied with the next restart of UE.

8	GPRS Multislot Class 8
10 ^(D)	GPRS Multislot Class 10
11	GPRS Multislot Class 11
12	GPRS Multislot Class 12

<EGPRS mclass>^{(num)(NV)}

EGPRS Multislot Class. The value can be one of the classes indicated with the Test command. Changed settings will be applied with the next restart of UE.

- | | |
|-------------------|--------------------------|
| 8 | EGPRS Multislot Class 8 |
| 10 ^(D) | EGPRS Multislot Class 10 |
| 11 | EGPRS Multislot Class 11 |
| 12 | EGPRS Multislot Class 12 |

11. Short Message Service (SMS) Commands

The AT Commands described in this chapter allow an external application to use the Short Message Service with the PHS8-P.

11.1 SMS parameters

Parameter Description

`<ackpdu>(num)`

Format is same for `<pdu>` in case of SMS, but without 3GPP TS 24.011 [41] SC address field and parameter shall be bounded by double quote characters like a normal string type parameter.

`<ct>(num)`

Command Type

3GPP TS 23.040 [38] TP-Command-Type in integer format

[0]...255

`<da>(str)(+CSCS)`

Destination Address

3GPP TS 23.040 [38] TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by `<toda>`

`<data>(num)(+CSCS)`

User Data

In case of SMS: 3GPP TS 23.040 [38] TP-User-Data in text mode responses; format:

- If `<dcs>` indicates that 3GPP TS 23.038 [37] default alphabet is used and `<fo>` indicates that 3GPP TS 23.040 [38] TP-User-Data-Header-Indication is not set: UE converts GSM alphabet into current TE character set according to rules covered in Annex A.
- If `<dcs>` indicates that 8-bit or UCS2 data coding scheme is used, or `<fo>` indicates that 3GPP TS 23.040 [38] TP-User-Data-Header-Indication is set: UE converts each 8-bit octet into hexadecimal numbers containing two IRA characters (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).

In case of CBS: 3GPP TS 23.041 [39] CBM Content of Message in text mode responses; format:

- If `<dcs>` indicates that 3GPP TS 23.038 [37] default alphabet is used: UE converts GSM alphabet into current TE character set according to rules covered in Annex A.
- If `<dcs>` indicates that 8-bit or UCS2 data coding scheme is used: UE converts each 8-bit octet into hexadecimal numbers containing two IRA characters.

`<dt>(num)`

Discharge Time

3GPP TS 23.040 [38] TP-Discharge-Time in time-string format: "yy/MM/dd,hh:mm:ss+zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone. For example, 6th of May 1994, 22:10:00 GMT+2 hours equals "94/05/06,22:10:00+08"

<ieia>^(num)

IEIa (Information Element Identifier octet) of the concatenated SMS.

8	Concatenated short messages, 8-bit reference number
16	Concatenated short messages, 16-bit reference number

<index>^(num)

Integer type; value in the range of location numbers supported by the associated memory. Indexing starts from 0.

<length>^(num)

Message Length

Integer type value indicating in PDU mode ([AT+CMGF=0](#)), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length).

For concatenated SMS messages the maximum length will be reduced by the length of the user data header with respect to <ieia> (6 bytes for <ieia>=8 and 7 bytes for <ieia>=16). In the case of 8-bit data, the maximum length of the short message field is: 140 octets - (6 or 7) = 134 or 133. In the case of GSM 7 bit default alphabet data, the maximum length of the short message is $(140 - (6 \text{ or } 7)) * 8 / 7 = 153 \text{ or } 152$ characters. In the case of 16 bit UC2 data, the maximum length of the short message is: $(140 - (6 \text{ or } 7)) / 2 = 67 \text{ or } 66$ characters.

<max>^(num)

Maximum number of all segments to be concatenated into one SMS, beginning with 1.
<max>=0 means: ignore the value. This will result in a non-concatenated SMS.

0...255

<mem1>^(str)

Memory to be used when listing, reading and deleting messages:

"SM"	SIM message storage
"ME"	GSM/UMTS Engine message storage
"MT"	Same as "ME" storage

<mem2>^(str)

Memory to be used when writing and sending messages:

"SM"	SIM message storage
"ME"	GSM/UMTS Engine message storage
"MT"	Same as "ME" storage

<mem3>^(str)

Received messages will be placed in this memory storage if routing to TE is not set. See command [AT+CNMI](#) with parameter <mt>=2.

"SM"	SIM message storage
"ME"	GSM/UMTS Engine message storage
"MT"	Same as "ME" storage

<mid>^(num)

Message Identifier

3GPP TS 23.041 [\[39\]](#) CBM Message Identifier in integer format

`<scts>`^(num)

Service Centre Time Stamp

3GPP TS 23.040 [38] TP-Service-Centre-Time-Stamp in time-string format (refer `<dt>`)

`<seq>`^(num)

Sequence number of the concatenated SMS beginning with 1. The number must be incremented by one for each segment of the concatenated short message.

`<seq>=0` means: ignore the value. This will result in a non-concatenated SMS.

0...255

`<sn>`^(num)

Serial Number

3GPP TS 23.041 [39] CBM Serial Number in integer format

`<st>`^(num)

Status

3GPP TS 23.040 [38] TP-Status in integer format

0...255

`<stat>`^(str)

Message status

3GPP 27.005 Interface of SMS and CB. Indicates the status of message in memory.

Description	text mode (<code><mode>=1</code>)	PDU mode (<code><mode>=0</code>)	Default
Received unread messages	"REC UNREAD"	0	for SMS reading commands
Received read messages	"REC READ"	1	
Stored unsent messages	"STO UNSENT"	2	for SMS writing commands
Stored sent messages	"STO SENT"	3	
All messages	"ALL"	4	

`<toda>`^(num)

Type of Destination Address

3GPP TS 24.011 [41] TP-Destination-Address Type-of-Address octet in integer format (when first character of `<da>` is + (IRA 43) default is 145, otherwise default is 129)

0...255

`<toa>`^(num)

Type of Originating Address

3GPP TS 24.011 [41] TP-Originating-Address Type-of-Address octet in integer format (default refer `<toda>`)

`<tora>`^(num)

Type of Recipient Address

3GPP TS 24.011 [41] TP-Recipient-Address Type-of-Address octet in integer format (default refer `<toda>`)

`<tosca>`^(num)

Type of Service Center Address

3GPP TS 24.011 [41] RP SC address Type-of-Address octet in integer format (default refer `<toda>`)

11.2 AT+CMGC Send an SMS command

Syntax

Test Command

AT+CMGC=?

Response(s)

OK

Write Command

If text mode (see [AT+CMGF=1](#))

AT+CMGC=<fo>, <ct>[, <pid>[, <mn>[, <da>[, <toda>]]]]<CR> Text can be entered <CTRL-Z>/<ESC>

Response(s)

+CMGC: <mr>[, <scts>]

If sending fails

ERROR

+CMS ERROR: <err>

Write Command

If PDU mode (see [AT+CMGF=0](#))

AT+CMGC=<length><CR> PDU can be entered <CTRL-Z>/<ESC>

Response(s)

+CMGC: <mr>[, <ackpdu>]

OK

ERROR

+CMS ERROR: <err>

PIN MDM APP → Last

+ + + - -

Reference(s)

3GPP TS 27.005 [\[46\]](#)

Note

- After invoking the commands [AT+CMGW](#), [AT+CMGS](#) or [AT+CMGC](#) it is necessary to wait for the prompt ">" before entering text or PDU.

11.3 AT+CMGD Delete short message

The write command deletes a short message from the preferred message storage `<mem1>` location `<index>`.

Syntax

Test Command				
AT+CMGD=?				
Response(s)				
OK				
Write Command				
AT+CMGD=<index>				
Response(s)				
OK				
ERROR				
+CMS ERROR: <err>				
PIN	MDM	APP	→	Last
+	+	+	+	-
Reference(s)				
3GPP TS 27.005 [46]				

Notes

- If there is no short message stored at the selected index, the response is OK too.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

11.4 AT+CMGF Select SMS message format

The [AT+CMGF](#) command specifies the input and output format of the short messages.

Syntax

<p>Test Command</p> <p>AT+CMGF=?</p> <p>Response(s)</p> <p>+CMGF: (list of supported <mode>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CMGF?</p> <p>Response(s)</p> <p>+CMGF: <mode></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CMGF=<mode></p> <p>Response(s)</p> <p>OK</p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.005 [46]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<mode> ^{(num)(&V)(&W)}	
[0] ^(&F)	PDU mode
1	Text mode

11.5 AT+CMGL List SMS messages from preferred store

The write command returns messages with status value `<stat>` from message storage `<mem1>` to the TE. If the status of the message is 'received unread', the status in the storage changes to 'received read'. The execute command is the same as the write command with the given default for `<stat>`.

Syntax

Test Command

AT+CMGL=?

Response(s)

+CMGL: (list of supported `<stat>`s)

OK

Exec Command

AT+CMGL

Response(s)

+CMGL: (see write command for default of `<stat>`)

OK

Write Command

AT+CMGL=`<stat>`

Response(s)

Output if text mode (`AT+CMGF=1`) and command successful:

For SMS- SUBMITs and/or SMS-DELIVERs

+CMGL: `<index>`, `<stat>`, `<oa>/<da>`, , [`<scts>`][, `<toa>/<tda>`, `<length>`]

`<data>`

[...]

OK

[...]

OK

For SMS-Commands

+CMGL: `<index>`, `<stat>`, `<fo>`, `<ct>`

[...]

OK

Output if PDU mode `AT+CMGF=0` and command successful:

For SMS-SUBMITs and/or SMS-DELIVERs

+CMGL: `<index>`, `<stat>`, , `<length>`

`<pdu>`

[...]

OK

If error is related to ME functionality

ERROR

+CMS ERROR: `<err>`

PIN MDM APP → Last

+ + + + -

Reference(s)

3GPP TS 27.005 [46]

Notes

- The selected `<mem1>` can contain different types of SMS (e.g. SMS-DELIVERs, SMS-SUBMITs and SMS-COMMANDs), the response may be a mix of the responses of different SM types. TE application can recognize the response format by examining the third response parameter.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.
- Status reports are not stored by the module and therefore are not displayed by `AT+CMGR` and `AT+CMGL` commands.

11.6 AT+CMGR Read SMS messages

The write command returns SMS message with location value `<index>` from message storage `<mem1>` to the TE. If status of the message is 'received unread', status in the storage changes to 'received read'.

Syntax

Test Command

AT+CMGR=?

Response(s)

OK

Write Command

AT+CMGR=<index>

Response(s)

Output if text mode (`AT+CMGF=1`) and command successful:

For SMS-DELIVER

+CMGR: <stat>, <oa>, , <scts>[, <toa>, <fo>, <pid>, <dcs>, <sca>, <tosca>, <length>]

<data>

[...]

OK

For SMS-SUBMIT

+CMGR: <stat>, <da>, [, <toda>, <fo>, <pid>, <dcs>, [<vp>], <sca>, <tosca>, <length>]

<data>

[...]

OK

<data>

[...]

OK

For SMS-Commands

+CMGR: <stat>, <fo>, <ct>[, <pid>, [<mn>], [<da>], [<toda>], <length>]

<data>

[...]

OK

Output if PDU mode (`AT+CMGF=0`) and command successful:

For SMS-SUBMITs and/or SMS-DELIVERs

+CMGR: <stat>, , <length>

<pdu>

[...]

OK

ERROR

+CMS ERROR: <err>

PIN MDM APP → Last

+ + + + -

Reference(s)

3GPP TS 27.005 [46]

Notes

- If [AT+CMGR](#) is used to read an empty record the response is: OK.
- If [AT+CMGR](#) is used to read a non-existent record index the response is: "+CMS ERROR: 321" (invalid memory index).
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.
- Status reports are not stored by the module and therefore are not displayed by [AT+CMGR](#) and [AT+CMGL](#) commands.

11.7 AT+CMGS Send Short Message

The write command transmits a short message from TE to network (SMS-SUBMIT). After invoking the write command wait for the prompt ">" and then start to write the message. To send the message simply enter <CTRL-Z>. To abort sending use <ESC>. Abortion is acknowledged with "OK", though the message will not be sent. The message reference <mr> is returned to the TE on successful message delivery. The value can be used to identify the message in a delivery status report provided as an unsolicited result code.

Syntax

Test Command	
AT+CMGS=?	
Response(s)	
OK	
Write Command	
If text mode (see AT+CMGF=1)	
AT+CMGS=<da>[, <toda>]<CR> Text can be entered. <CTRL-Z>/<ESC>	
Response(s)	
+CMGS: <mr>[, <scts>]	
OK	
ERROR	
+CMS ERROR: <err>	
Write Command	
If PDU mode (see AT+CMGF=0)	
AT+CMGS=<length><CR> PDU can be entered. <CTRL-Z>/<ESC>	
Response(s)	
+CMGS: <mr>[, <ackpdu>]	
OK	
ERROR	
+CMS ERROR: <err>	
PIN MDM APP → Last	Reference(s)
+ + + - -	3GPP TS 27.005 [46]

Notes

- Note that some providers do not recognize an @ symbol used in a short message. A widely used alternative is typing "*" as defined in 3GPP TS 23.040 [\[38\]](#).
- Message Length in Text Mode:
The maximum length of a short message depends on the used coding scheme: It is 160 characters if the 7 bit GSM coding scheme is used, and 140 characters according to the 8 bit GSM coding scheme.

11.8 AT+CMGW Write Short Messages to Memory

The execute and write commands transmit a short message (either SMS-DELIVER or SMS-SUBMIT) from TE to memory storage `<mem2>`. Memory location `<index>` of the stored message is returned. Message status will be set to 'stored unsent' unless otherwise given in parameter `<stat>`.

After invoking the execute or write command wait for the prompt ">" and then start to write the message. To save the message simply enter `<CTRL-Z>`.

To abort writing use `<ESC>`. Abortion is acknowledged with "OK", though the message will not be saved.

Syntax

<p>Test Command</p> <p>AT+CMGW=?</p> <p>Response(s)</p> <p>OK</p>											
<p>Exec Command</p> <p>If text mode (see AT+CMGF=1):</p> <p>AT+CMGW</p> <p>Response(s)</p> <p><CR> Text can be entered. <CTRL-Z>/<ESC></p> <p>+CMGW: <code><index></code></p> <p>OK</p> <p>ERROR</p> <p>+CMS ERROR: <code><err></code></p>											
<p>Write Command</p> <p>If text mode (see AT+CMGF=1):</p> <p>AT+CMGW=<code><oa>/<da></code>[, [<code><toa>/<toda></code>]], <code><stat></code>][<CR> Text can be entered. <CTRL-Z>/<ESC></p> <p>Response(s)</p> <p>+CMGW: <code><index></code></p> <p>OK</p> <p>ERROR</p> <p>+CMS ERROR: <code><err></code></p>											
<p>Write Command</p> <p>If PDU mode (see AT+CMGF=0):</p> <p>AT+CMGW=<code><length></code>[, <code><stat></code>][<CR> PDU can be entered. <CTRL-Z>/<ESC></p> <p>Response(s)</p> <p>+CMGW: <code><index></code></p> <p>OK</p> <p>If writing fails see notes below.</p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.005 [46]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Notes

- Note that some providers do not recognize an @ symbol used in a short message. A widely used alternative is typing "*" as defined in 3GPP TS 23.040 [\[38\]](#).
- Message Length in Text Mode:
The maximum length of a short message depends on the used coding scheme: It is 160 characters if the 7 bit GSM coding scheme is used, and 140 characters according to the 8 bit GSM coding scheme.

11.9 AT+CMMS More Messages to Send

[AT+CMMS](#) controls the continuity of the SMS relay protocol link. If the feature is enabled (and supported by the currently used network) multiple messages can be sent faster as the link is kept open.

Syntax

<p>Test Command</p> <p>AT+CMMS=?</p> <p>Response(s)</p> <p>+CMMS: (list of supported) <mode>s</p>											
<p>Read Command</p> <p>AT+CMMS?</p> <p>Response(s)</p> <p>+CMMS: <mode></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CMMS=<mode></p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CMS ERROR: <err></p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.005 [46]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<mode> ^(num)	Description
[0]	Feature disabled.
1	Keep link open until the time between the response of the latest message's send command (AT+CMGS , AT+CMSS , etc.) and the next send command exceeds 1-5 seconds. Afterwards UE will close the link and automatically switches <mode> back to 0.
2	Keep link open until the time between the response of the latest message's send command (AT+CMGS , AT+CMSS , etc.) and the next send command exceeds 1-5 seconds. Afterwards UE will close the link, but will not reset <mode> to 0.

Note

- After read command usage a delay of 5-10 seconds is required before issuing the write command, otherwise the "+CMS ERROR: 500" may appear.

11.10 AT+CMSS Send short messages from storage

The write command sends message with location value `<index>` from message storage `<mem2>` to the network (SMS-SUBMIT or SMS-COMMAND). If new recipient address `<da>` is given for SMS-SUBMIT, it shall be used instead of the one stored with the message. Reference value `<mr>` is returned to the TE on successful message delivery. Value can be used to identify message upon unsolicited delivery status report result code. If the optional parameter `<da>` is given, the old status of the short message at `<index>` remains unchanged (see `<stat>`).

Syntax

Test Command	
AT+CMSS=?	
Response(s)	
OK	
Write Command	
If text mode (<code>AT+CMGF=1</code>):	
AT+CMSS= <code><index></code> [, <code><da></code>], <code><toda></code>]]	
Response(s)	
+CMSS: <code><mr></code> [, <code><scts></code>]	
OK	
If sending fails	
ERROR	
+CMS ERROR: <code><err></code>	
Write Command	
If PDU mode (<code>AT+CMGF=0</code>):	
AT+CMSS= <code><index></code> [, <code><da></code>], <code><toda></code>]]	
Response(s)	
+CMSS: <code><mr></code> [, <code><ackpdu></code>]	
OK	
ERROR	
+CMS ERROR: <code><err></code>	
PIN MDM APP → Last	Reference(s)
+ + + - -	3GPP TS 27.005 [46]

11.11 AT+CNMA New Message Acknowledgement to UE/TE

Write and execute command confirm successful receipt of a new message (SMS-DELIVER or SMS-STATUS-REPORT) routed directly to the TE. If the PHS8-P does not receive acknowledgement within required time (network timeout), it sends an "RP-ERROR" message to the network. The UE will automatically disable routing to the TE by setting both `<mt>` and `<ds>` values of `AT+CNMI` to zero.

Syntax

<p>Test Command</p> <pre>AT+CNMA=?</pre> <p>Response(s)</p> <pre>+CNMA: (list of supported <n>s) OK</pre>	
<p>Exec Command</p> <pre>AT+CNMA</pre> <p>Response(s)</p> <pre>OK ERROR +CMS ERROR: <err></pre>	
<p>Write Command</p> <pre>AT+CNMA=<n></pre> <p>Response(s)</p> <pre>OK ERROR +CMS ERROR: <err></pre>	
<p>PIN MDM APP → Last</p> <pre>+ + + - -</pre>	<p>Reference(s)</p> <p>3GPP TS 27.005 [46]</p>

Parameter Description

<code><n></code> ^(num)	Description
0	Parameter required only for PDU mode. Command operates similarly as in text mode.
1	Send positive (RP-ACK) acknowledgement to the network. Accepted only in PDU mode.
2	Send negative (RP-ERROR) acknowledgement to the network. Accepted only in PDU mode.

Note

- Execute and write command shall only be used when `AT+CSMS` parameter `<service>` equals 1 (= phase 2+) and an appropriate URC has been issued by the module, i.e.:
 - `<+CMT>` for `<mt>=2` incoming message classes 0,1,3 and none;
 - `<+CMT>` for `<mt>=3` incoming message classes 0 and 3;
 - `<+CDS>` for `<ds>=1`.

11.12 AT+CNMI SMS Event Reporting Configuration

AT+CNMI controls details of the SMS related URC presentation. It selects the procedure how the receipt of a new SMS from the network is indicated to the TE when TE is active, e.g. DTR signal is ON. If the TE is inactive (e.g. DTR signal is OFF), message receiving should be done as specified in 3GPP TS 23.038 [37]. If the DTR signal is not available or the state of the signal is ignored, reliable message transfer can be assured by using **AT+CNMA** acknowledgment procedure. The rules `<mt>=2` and `<mt>=3` for storing received messages are possible only if phase 2+ compatibility is activated with `AT+CSMS=1`. The parameter `<ds>=1` is also only available in phase 2+.

Syntax

<p>Test Command</p> <pre>AT+CNMI=?</pre> <p>Response(s)</p> <pre>+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)</pre> <pre>OK</pre>											
<p>Read Command</p> <pre>AT+CNMI?</pre> <p>Response(s)</p> <pre>+CNMI: <mode>, <mt>, <bm>, <ds>, <bfr></pre> <pre>OK</pre>											
<p>Write Command</p> <pre>AT+CNMI=[[<mode>][, [, <mt>][, [, <bm>][, [, <ds>][, [, <bfr>]]]]]]</pre> <p>Response(s)</p> <pre>OK</pre> <pre>ERROR</pre> <pre>+CMS ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.005 [46]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Unsolicited Result Codes

URC 1

`<mt>=1,2 or 3` - indication only:

```
+CMTI: <mem3>, <index>
```

 Indicates that new message has been received

URC 2

`<mt>=1,2 or 3` - directly routed message (PDU mode enabled):

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

 Indicates that new message has been received

URC 3

`<mt>=1,2 or 3` - directly routed message (text mode enabled):

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

 Indicates that new message has been received

URC 4

<bm>=2 (PDU mode enabled):

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

Indicates that new cell broadcast message has been received

URC 5

<bm>=2 (text mode enabled):

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

Indicates that new cell broadcast message has been received

URC 6

<ds>=1 (PDU mode enabled):

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

Indicates that new SMS status report has been received

URC 7

<ds>=1 (text mode enabled):

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

Indicates that new SMS status report has been received

Parameter Description

<mode> ^{(num)&(V)&(W)}	
0(&F)(D)	SMS related URCs are always buffered in the UE. If the buffer is full, the oldest indications are discarded and replaced with newly received indications.
1	SMS related URCs are forwarded directly to the TE. However, if this is not possible because UE-TE link is reserved, e.g. during a data call, these URCs are discarded.
2	SMS related URCs are forwarded directly to the TE. However, if this is not possible because UE-TE link is reserved these URCs are buffered and flushed to the TE afterwards. Additionally, while UE-TE link is reserved, buffered URCs are signaled to the TE via sending a BREAK or activating the RING line, according to AT [^] SCFG parameters <urcRinglineCfg>, <urcSigType> and <urcRinglineDuration>.

<mt> ^{(num)&(V)&(W)}	
Rules for storing received short messages depend on the relevant data coding method (refer to 3GPP TS 23.038 [37]), preferred memory storage setting (AT+CPMS) and this value.	
0(&F)(D)	No SMS-DELIVER indications are routed to the TE.
1	Class 0 SMS-DELIVERs are routed directly to the TE via URC. For all other messages the following applies: If SMS-DELIVER is stored in UE, indication of the memory location is routed to the TE via URC.
2	SMS-DELIVERs, except class 2 messages and messages in the message waiting indication group (store message) are routed directly to the TE via URC.
3	Class 0 and 3 SMS-DELIVERs are routed directly to the TE via URCs defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1.

`<bm>`^{(num)(&V)(&W)}

Rules for storing received CBMs depend on the relevant data coding method (refer to 3GPP TS 23.038 [37]), the setting of Select CBM Types ([AT+CSCB](#)) and this value:

0 ^{(&F)(D)}	No CBM indications are routed to the TE.
2	New CBMs are routed directly to the TE via URC.

`<ds>`^{(num)(&V)(&W)}

0 ^{(&F)(D)}	No SMS-STATUS-REPORTs are routed to the TE. Also see notes.
1	SMS-STATUS-REPORTs are routed to the TE via URC.

`<bfr>`^{(num)(&V)(&W)}

1 ^{(&F)(D)}	UE's buffer of SMS related URCs is cleared when <code><mode></code> changes from 0 to 1, 2 or 3.
--------------------------	--------------------------------------------------------------------------------------------------------

`<index>`^(num)

Integer type; value in the range of location numbers supported by the associated memory

Notes

- With `<mt>=2,3` and `<ds>=1` messages routed directly to the TE (either short messages or status reports) have to be acknowledged with [AT+CNMA](#). To do this, GSM Phase 2+ has to be enabled (see [AT+CSMS](#)).
- If Phase 2+ is enabled and either a short message or a status report is not acknowledged within the required time, then `<mt>` and `<ds>` will be set to zero. See [AT+CNMA](#) for further detail.
- Status reports are not stored by the module and therefore are not displayed by [AT+CMGR](#) and [AT+CMGL](#) commands.

11.13 AT+CPMS Preferred SMS message storage

The write command selects memory storages `<mem1>`, `<mem2>`, `<mem3>` to be used for reading, writing, etc.

Syntax

Test Command

AT+CPMS=?

Response(s)

+CPMS: (list of supported `<mem1>`s), (list of supported `<mem2>`s), (list of supported `<mem3>`s)
OK

Read Command

AT+CPMS?

Response(s)

+CPMS: `<mem1>`, `<used1>`, `<total1>`, `<mem2>`, `<used2>`, `<total2>`, `<mem3>`, `<used3>`, `<total3>`
OK
ERROR
+CMS ERROR: `<err>`

Write Command

AT+CPMS=`<mem1>`[, `<mem2>`[, `<mem3>`]]

Response(s)

+CPMS: `<used1>`, `<total1>`, `<used2>`, `<total2>`, `<used3>`, `<total3>`
OK
ERROR
+CMS ERROR: `<err>`

PIN	MDM	APP	→	Last
+	+	+	+	-

+	+	+	+	-
---	---	---	---	---

Reference(s)

3GPP TS 27.005 [46]

Parameter Description

`<used1>`^(num)

Number of messages currently in `<mem1>`

`<used2>`^(num)

Number of messages currently in `<mem2>`

`<used3>`^(num)

Number of messages currently in `<mem3>`

`<total1>`^(num)

Number of messages storable in `<mem1>`

`<total2>`^(num)

Number of messages storable in `<mem2>`

`<total3>`^(num)

Number of messages storable in `<mem3>`

Notes

- The Mobile Equipment storage "ME" offers space for 255 short messages, see [<mem1>](#).
- The [<mem1>](#), [<mem2>](#) and [<mem3>](#) parameter will be stored in non-volatile memory.
- Incoming Class 1 short messages (ME specific) will be preferably stored to "ME" and may be transferred to the "SM" storage if "ME" is used up.
Incoming Class 2 messages (SIM specific) will be stored to the SIM card only, no matter whether or not there is free "ME" space. For more information regarding SIM and ME specific message classes refer to parameter [<dcs>](#) and the following specification: 3GPP TS 23.038 [\[37\]](#).
- While [<mem3>](#) equals "SM" and [<mem1>](#) equals "ME" it is possible that, after deleting short messages from "ME", the freed space on "ME" is reclaimed for new incoming short messages, when there is no space left on the "SM" storage. As it is often the clients concern to have received short messages stored only to the SIM card, inconsistent settings should be generally avoided. This can be achieved simply by using the same parameter for all memory indices.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

11.14 AT+CSCA SMS Service Center Address

Write command updates the SMSC address, through which mobile originated SMs are transmitted. In text mode, setting is used by send and write commands. In PDU mode, setting is used by the same commands, but only when the length of the SMSC address coded into the `<pdu>` parameter equals zero.

Syntax

Test Command	
AT+CSCA=?	
Response(s)	
OK	
Read Command	
AT+CSCA?	
Response(s)	
+CSCA: <code><sca></code> , <code><tosca></code>	
OK	
Write Command	
AT+CSCA= <code><sca></code> [, <code><tosca></code>]	
Response(s)	
OK	
PIN MDM APP → Last	Reference(s)
+ + + + -	3GPP TS 27.005 [46]

Notes

- This command writes the service center address to non-volatile memory.
- The SMS service center address should be entered as specified by the service provider.

11.15 AT+CSCB Select Cell Broadcast Message Indication

The test command returns the supported `<operation>`s as a compound value.
The read command displays the accepted message types.
Depending on the `<operation>` parameter, the write command adds or deletes the message types accepted by the ME.

Syntax

<p>Test Command</p> <p>AT+CSCB=?</p> <p>Response(s)</p> <p>+CSCB: (list of supported <code><operation></code>s)</p> <p>OK</p> <p>ERROR</p> <p>+CMS ERROR: <code><err></code></p>											
<p>Read Command</p> <p>AT+CSCB?</p> <p>Response(s)</p> <p>+CSCB: <code><operation></code>, <code><mids></code>, <code><dcss></code></p> <p>OK</p> <p>ERROR</p> <p>+CMS ERROR: <code><err></code></p>											
<p>Write Command</p> <p>AT+CSCB=[<code><operation></code>[, <code><mids></code>[, <code><dcss></code>]]]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CMS ERROR: <code><err></code></p>											
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PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<code><operation></code> ^(num)	
Add/delete operation	
0(&F)	Add new message types defined in <code><mids></code> to the list of accepted message types by ME and replace types defined in <code><dcss></code> . In case of using this operation code without parameters default (0-65535) range will be added to the list of <code><mids></code> .
1	Delete message types defined in <code><mids></code> from the list of accepted message types by ME and replace types defined in <code><dcss></code> . In case of using this operation code without parameters all <code><mids></code> s will be deleted. (for more see notes)

<code><mids></code> ^{(str)(NV)}
Cell Broadcast Message ID specification
All different possible combinations of CBM message identifiers; e.g. "0,1,5,320-478,922".

<dcss>^(str)

CBM data coding scheme specification

All different possible combinations of CBM data coding schemes (e.g. "0-3,5"). A given <dcss> replaces any former value and is used for consecutive requests.

“(&F) Default is empty string and if it is used all CBMs are received independent of their dcsc.

Note

- The <operation> parameter shown in the AT+CSCB read command response retains the value last used in the write command. This way, the read command response always reflects the last action done: 0 means that the last action was adding new channel(s), 1 means that the last action was deleting channel(s).

11.16 AT+CSDH Show SMS text mode parameters

The write command sets whether or not detailed header information is shown in text mode result codes.

Syntax

<p>Test Command</p> <p>AT+CSDH=?</p> <p>Response(s)</p> <p>+CSDH: ((list of supported <show>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CSDH?</p> <p>Response(s)</p> <p>+CSDH: <show></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CSDH=<show></p> <p>Response(s)</p> <p>OK</p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.005 [46]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<show> ^{(num)(&W)}	
0(&F)(D)	Do not show header values defined in commands AT+CSCA and AT+CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <tooa> in "+CMTI", AT+CMGL , AT+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>
1	Show the values in result codes

11.17 AT+CSMP Set SMS Text Mode Parameters

AT+CSMP controls additional parameters needed when an SMS is sent to the network or placed in a storage if text format message mode is selected.

It is possible to set the validity period starting from the time when the short message is received by the SMSC (**<vp>** is in the range 0... 255) or define an absolute time for validity period termination (**<vp>** is a string). The format of **<vp>** is given by **<fo>**. The enhanced validity period format is given as hexadecimal coded string (e.g. **< pdu>**) with quotes.

Syntax

<p>Test Command</p> <p>AT+CSMP=?</p> <p>Response(s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CSMP?</p> <p>Response(s)</p> <p>+CSMP:<fo>, <vp>/ <scts>, <pid>, <dcs></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CSMP=<fo>[, [<vp>/<scts>][, [<pid>][, [<dcs>]]]]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CMS ERROR: <err></p>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.005 [46]</p>
PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<p><fo>^(num)</p> <p>First Octet</p> <p>Depending on the command or result code: First octet of 3GPP TS 23.040 [38] SMS-DELIVER, SMS-SUBMIT, SMS-STATUS-REPORT, or SMS-COMMAND in integer format. If a valid value has been entered once, parameter can be omitted.</p> <p>0...255</p>
<p><vp>^(num)</p> <p>Validity Period</p> <p>Depending on SMS-SUBMIT <fo> setting: 3GPP TS 23.040 [38] TP-Validity-Period either in integer format or in time-string format (refer <dt>).</p> <p>0...255</p>
<p><pid>^(num)</p> <p>Protocol Identifier</p> <p>3GPP TS 23.040 [38] TP-Protocol-Identifier in integer format.</p> <p>0(&F)...255</p>

<dc>^(num)

Data Coding Scheme

3GPP TS 23.038 [37] SMS Data Coding Scheme, or Cell Broadcast Data Coding Scheme in integer format.

0(&F)...247

Notes

- When storing a SMS DELIVER from the TE to the preferred memory storage in text mode (using the AT+CMGW write command), <vp> field can be used for <scts>.
- AT+CSMP stores parameters <dc> and <pid> in UE's non-volatile memory.

11.18 AT+CSMS Select Message Service

Syntax

<p>Test Command</p> <p>AT+CSMS=?</p> <p>Response(s)</p> <p>+CSMS: (list of supported<service>s)</p> <p>OK</p>											
<p>Read Command</p> <p>AT+CSMS?</p> <p>Response(s)</p> <p>+CSMS: <service>, <mt>, <mo>, <bm></p> <p>OK</p>											
<p>Write Command</p> <p>AT+CSMS=<service></p> <p>Response(s)</p> <p>+CSMS: <mt>, <mo>, <bm></p> <p>OK</p> <p>ERROR</p> <p>+CMS ERROR: <err></p>											
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PIN	MDM	APP	→	Last							
+	+	+	+	-							

Parameter Description

<service> ^{(num)(&V)(&W)}	Description
0(&F)	3GPP TS 23.040 [38] and 3GPP TS 23.041 [39] (the syntax of SMS AT commands is compatible with 3GPP TS 27.005 [46] Phase 2 version 4.7.0; Phase 2+ features which do not require new command syntax may be supported, e.g. correct routing of messages with new Phase 2+ data coding schemes)
1	3GPP TS 23.040 [38] and 3GPP TS 23.041 [39] (the syntax of SMS AT commands is compatible with 3GPP TS 27.005 [46] Phase 2+ version; the requirement of <service> setting 1 is mentioned under corresponding command descriptions).

<mt> ^{(num)(&V)}	Description
0	Type not supported
1	Type supported

<mo> ^{(num)(&V)}	Description
0	Type not supported
1	Type supported

<bm>^{(num)&V}

Broadcast Type Messages:

0	Type not supported
1	Type supported

Note

- Phase 2+ (<service>=1) must be set before acknowledging incoming short messages with [AT+CNMA](#) is possible. Acknowledgements are required for directly routed messages delivered using "+CMT" and "+CDS" URCS. Direct routing is used for certain message classes when <mt>=2, <mt>=3 or <ds>=1.

11.19 AT^SMGL List Short Messages from preferred store without setting status to REC READ

The write command lists messages stored in `<mem1>` without changing their status to "read". The execute command is identical to the write command with default `<stat>` (for defaults see "Section 11.1, SMS parameters").

Syntax

Test Command

```
AT^SMGL=?
```

Response(s)

(list of supported `<stat>`s)

Exec Command

```
AT^SMGL
```

Response(s)

```
^SMGL: (same as write command with default <stat>)
```

```
OK
```

Write Command

```
AT^SMGL=[<stat>]
```

Response(s)

same as [AT+CMGL](#)

PIN	MDM	APP	→	Last
+	+	+	+	-

Notes

- The selected `<mem1>` can contain different types of SMs (e.g. SMS-DELIVERs, SMS-SUBMITs and SMS-COMMANDs), the response may be a mix of the responses of different SM types. TE application can recognize the response format by examining the third response parameter.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

11.20 AT^SCML List Concatenated Short Messages from preferred store

The write command returns messages with status value `<stat>` from message storage `<mem1>` to the TE. If the status of the message is 'received unread', the status in the storage changes to 'received read'. The execute command is the same as the write command with the given default for `<stat>`. See notes of [AT+CMGL](#).

Syntax

Test Command

AT^SCML=?

Response(s)

^SCML: (list of supported `<stat>`s)
OK

Exec Command

AT^SCML

Response(s)

^SCML: (see write command for default of `<stat>`)
OK

Write Command

AT^SCML=`<stat>`

Response(s)

Output if text mode (`AT+CMGF=1`) and command successful:

For SMS-SUBMITs and/or SMS-DELIVERs

^SCML: `<index>`, `<stat>`, `<oa>/<da>`, , [`<scts>`]], `<toa>/<toda>`, `<length>`][, [`<seq>`, `<max>`,
`<ieia>`, `<ref>`]
`<data>`
[...]
OK

For SMS-STATUS-REPORTs

^SCML: `<index>`, `<stat>`, `<fo>`, `<mr>`, [`<ra>`], [`<tora>`], `<scts>`, `<dt>`, `<st>`
[...]
OK

For SMS-Commands

^SCML: `<index>`, `<stat>`, `<fo>`, `<ct>`
[...]
OK

Output if PDU mode (`AT+CMGF=0`) and command successful:

For SMS- SUBMITs and/or SMS-DELIVERs

^SCML: `<index>`, `<stat>`, , `<length>`
`<pdu>`
[...]
OK

If error is related to ME functionality

ERROR

+CMS ERROR: `<err>`

PIN	MDM	APP	→	Last
+	+	+	+	-

11.21 AT^SCMR Read Concatenated Short Messages

The write command returns the message with location value `<index>` from message storage `<mem1>` to the TE. If the status of the message is 'received unread', the status in the storage changes to 'received read'. See notes of [AT+CMGR](#).

Syntax

Test Command

```
AT^SCMR=?
```

Response(s)

```
OK
```

Write Command

```
AT^SCMR=<index>
```

Response(s)

Output if text mode (`AT+CMGF=1`) and command successful:

For SMS-DELIVER

```
^SCMR: <stat>, <oa>, , <scts>[, <toa>, <fo>, <pid>, <dc>, <sca>, <tosca>, <length>][, <seq>, <max>, <ieia>, <ref>]
```

```
<data>
```

```
[...]
```

```
OK
```

For SMS-SUBMIT

```
^SCMR: <stat>, <da>, [, <toda>, <fo>, <pid>, <dc>, [, <vp>], <sca>, <tosca>, <length>][, <seq>, <max>, <ieia>, <ref>]
```

```
<data>
```

```
[...]
```

```
OK
```

For SMS-STATUS-REPORT

```
^SCMR: <stat>, <fo>, <mr>, [, <ra>], [, <tora>], <scts>, <dt>, <st>
```

```
<data>
```

```
[...]
```

```
OK
```

For SMS-Commands

```
^SCMR: <stat>, <fo>, <ct>[, <pid>, [, <mn>], [, <da>], [, <toda>], <length>]
```

```
<data>
```

```
[...]
```

```
OK
```

Output if PDU mode (`AT+CMGF=0`) and command successful:

For SMS-SUBMITs and/or SMS-DELIVERs

```
^SCMR: <stat>, , <length>
```

```
<pdu>
```

```
[...]
```

```
OK
```

ERROR

```
+CMS ERROR: <err>
```

PIN	MDM	APP	→	Last
-----	-----	-----	---	------

+	+	+	+	-
---	---	---	---	---

11.22 AT^SCMS Send Concatenated Short Messages

Sending a concatenated message is similar to sending a "normal" message, except that each segment of the concatenated message must be identified by the additional parameters `<seq>`, `<ieia>` and `<ref>`. To send all segments of the message one by one, the `AT^SCMS` write command must be executed for each segment.

The write command transmits one segment of a concatenated short message from TE to network (SMS-SUBMIT).

After invoking the write command wait for the prompt `>` and then start to write the message. To send the message simply enter `<CTRL-Z>`. After the prompt a timer will be started to observe the input.

To abort sending use `<ESC>`. Abortion is acknowledged with "OK", though the message will not be sent.

The message reference `<mr>` is returned to the TE on successful message delivery. The value can be used to identify the message in a delivery status report provided as an unsolicited result code.

Syntax

Test Command

```
AT^SCMS=?
```

Response(s)

```
OK
```

Write Command

Command syntax for text mode (see `AT+CMGF=1`):

```
AT^SCMS=<da>[, <tda>], <seq>, <max>, <ieia>, <ref><CR> Text can be entered <CTRL-Z>/<ESC>
```

Response(s)

```
^SCMS: <mr>[, <scts>]
```

```
OK
```

If sending fails

```
ERROR
```

```
+CMS ERROR: <err>
```

PIN	MDM	APP	→	Last
+	+	+	-	-

Notes

- See notes provided for `AT+CMGS`.
- Command is only available if `AT+CMGF=1`.

11.23 AT^SCMW Write Concatenated Short Messages to Memory

Writing a concatenated message to the memory is similar to writing a "normal" message, except that each segment of the concatenated message must be identified by the additional parameters `<seq>`, `<ieia>` and `<ref>`. To store all segments of the message one by one, the `AT^SCMW` write command must be executed for each segment.

The write commands transmits one segment of a concatenated SMS (either SMS-DELIVER or SMS-SUBMIT) from TE to memory storage `<mem2>`. Memory location `<index>` of the stored message is returned. Message status will be set to 'stored unsent' unless otherwise given in parameter `<stat>`.

Syntax

```
Test Command
AT^SCMW=?
Response(s)
OK

Write Command
If text mode (see AT+CMGF=1)
AT^SCMW=<oa>/<da>, [<tooa>/<toda>][, <stat>], <seq>, <max>, <ieia>, <ref><CR> Text can be
entered. <CTRL-Z>/<ESC>
Response(s)
^SCMW: <index>
OK
If writing fails
ERROR
+CMS ERROR: <err>
```

PIN	MDM	APP	→	Last
+	+	+	+	-

Notes

- Command is only available if `AT+CMGF=1`.
- To send or delete a concatenated short message please use the known SMS commands, see `AT+CMSS` for sending and `AT+CMGD` for deleting.
- See notes provided for `AT+CMGW`.

12. Internet Service Commands

PHS8-P has an embedded TCP/IP stack that is driven by AT commands and enables the host application to easily access the Internet. The advantage of this solution is that it eliminates the need for the application manufacturer to implement own TCP/IP and PPP stacks, thus minimizing cost and time to integrate Internet connectivity into a new or existing host application. This chapter is a reference guide to all the AT commands and responses defined for use with the TCP/IP stack.

Access is provided to the following Internet Services:

1. UDP Client
2. TCP Client

Step-by-step overview of how to configure and use TCP/IP communications with PHS8-P:

- First of all, create a connection profile with `AT+CGDCONT` which later will be used by the IP service. The connection is also referred to as bearer.
- Secondly, use `AT+CGACT` to activate the connection.
- Thirdly, use `AT^SISS` to create an IP service profile.
- Once the connection profile and the service profile are created, an Internet session can be opened by entering the `AT^SISO` write command with the desired `<srvProfileId>`.
A URC indicates how to proceed. The "`^SISW`" URC means that data can be sent. The "`^SISR`" URC means that received data are available for reading. If an error occurs the "`^SIS`" URC is delivered instead.
- If you are using the UDP or the TCP client you can now either read data packets with `AT^SISR` or write data packets with `AT^SISW`.
- If you are using the TCP client you can now alternatively enter the `AT^SIST` command which opens the transparent access mode. In that mode the service is connected to a dedicated multiplex channel or to the Modem interface in a transparent manner. Exchanging payload data is stream-oriented, i.e. a single data stream can be sent, and another single data stream can be received.
- If an error occurs during a session you can enter the `AT^SISE` command to identify the reason.
- Finally, to end an Internet service session, enter the `AT^SISC` write command.

AT commands designed for controlling and monitoring the connection profiles (bearers):

- The commands `AT+CGDCONT`, `AT+CGQMIN`, `AT+CGEQMIN`, `AT+CGQREQ`, `AT+CGEQREQ` and `AT^SGAUTH` can be used to define the connection profile.
- The `AT+CGACT` command can be used to activate, deactivate or query the activation state of a connection.
- The `AT+CGPADDR` command can be used to query the local IP address for an active connection.
- The `AT^SISX` command is usable to send ICMP (Internet Control Message Protocol) Echo Requests (Ping) to a target IP address or host name to verify the TCP/IP network connection. This command can also be used to resolve DNS addresses.
- With the command `AT^SICS` it is possible to explicitly set the addresses of the DNS servers used to resolve DNS addresses.

Number of Internet service profiles:

PHS8-P allows creating and opening up to two TCP client service profiles and 1 UDP client service profile. Therefore, trying to create a third TCP client service profile or a second UDP service profile with `AT^SISS` will be denied with `+CME ERROR`.

12.1 AT^SICS Internet Connection Settings

AT^SICS serves to specify additional settings for Internet connection specified with the AT+CGDCONT command. Currently only setup and query of DNS server addresses is supported.

Table 12.1: Applicability of AT^SICS <conParmTag> values

<conParmTag>	Mandatory or optional
"dns1"	optional
"dns2"	optional

Syntax

```

Test Command
AT^SICS=?
Response(s)
OK

Read Command
AT^SICS?
Response(s)
^SICS: <conProfileId>, <conParmTag>, <conParmValue>
[ ^SICS: ...]
OK

Write Command
AT^SICS=<conProfileId>[, <conParmTag>, <conParmValue>]
Response(s)
OK
ERROR
+CME ERROR: <err>
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<conProfileId>^{(num)(NV)}

Internet connection profile as specified with AT+CGDCONT parameter <cid>. Invoking command only with this parameter will delete related DNS server address.

<conParmTag>^{(str)(NV)}

Internet connection parameter.

"dns1"

Primary DNS server address (IP address in dotted-four-byte format). This value determines whether to use the DNS server addresses dynamically assigned by the network or a specific DNS server address given by the user. "dns1" = "0.0.0.0" (default) means that the connection profile uses dynamic DNS assignment. Any other address means that the Primary DNS is manually set. The default value applies automatically if no other address is set. Note that the

AT^SICS read command only returns a manually configured IP address, while the value "0.0.0.0" is not indicated at all, no matter whether assumed by default or explicitly specified.
See also note below.

"dns2"

Secondary DNS server address (IP address in dotted-four-byte format).
If "dns1" = "0.0.0.0" this setting will be ignored. Otherwise this value can be used to manually configure an alternate server for the DNS1.
If "dns1" is not equal "0.0.0.0" and no "dns2" address is given, then "dns2"="0.0.0.0" will be assumed automatically. The **AT^SICS** read command only returns a manually configured IP address, while the value "0.0.0.0" is not indicated at all, no matter whether assumed by default or explicitly specified.

`<conParmValue>(str)(NV)`

Parameter value; type and supported content depend on related `<conParmTag>`.

Note

- If a GPRS network does not support or is not correctly configured for automatic DNS address assignment the TCP/IP stack cannot resolve fully qualified domain names. In this case, a warning message will be returned when trying to open an Internet service configured for automatic DNS address assignment.

12.2 AT^SISS Internet Service Setup Profile

AT^SISS serves to set up the necessary parameters in the Internet service profiles. Any service profile can then be used to control a data link in conjunction with AT^SISO, AT^SISC, AT^SISR, AT^SISW, AT^SIST and AT^SISE.

The AT^SISS read command requests the current settings of all Internet service profiles. One line is issued for every possible parameter of a given <srvParmTag> "srvType" value.

The AT^SISS write command specifies the parameters for a service profile identified by <srvProfileId>. At first the type of Internet service needs to be selected via <srvParmTag> value "srvType". This determines the applicability of all other <srvParmTag> values related to this "srvType" and sets their defaults. Changing the <srvParmTag> "srvType" of an existing service profile will reset all <srvParmTag> values.

To change the settings the write command needs to be executed for each single <srvParmTag>. All profile parameters set with AT^SISS are volatile.

The list below shows which <srvParmTag> parameters apply to each Internet service and which of them are mandatory or optional.

Table 12.2: Applicability of AT^SISS <srvParmTag> values

<srvParmTag>	Mandatory or optional
<i>UDP client service</i>	
"srvType"	mandatory
"conId"	mandatory
"address"	mandatory
<i>TCP client service</i>	
"srvType"	mandatory
"conId"	mandatory
"address"	mandatory

Syntax

Test Command

AT^SISS=?

Response(s)

OK

Read Command

AT^SISS?

Response(s)

^SISS: <srvProfileId>, <srvParmTag>, <srvParmValue>

[^SISS: ...]

OK

ERROR

+CME ERROR: <err>

Write Command

AT^SISS=<srvProfileId>, <srvParmTag>, <srvParmValue>

Response(s)

OK

ERROR

+CME ERROR: <err>

PIN MDM APP → Last

- + + + -

Parameter Description

<srvProfileId>^(num)

Internet service profile identifier.

The <srvProfileId> is used to reference all parameters related to the same service profile. Furthermore, when using the AT commands [AT^SISO](#), [AT^SISC](#), [AT^SISR](#), [AT^SISW](#), [AT^SIST](#) and [AT^SISE](#) the <srvProfileId> is needed to select a specific service profile.

0...9

<srvParmTag>^(str)

Internet service profile parameter.

"srvType"	Type of Internet service to be configured with consecutive usage of AT^SISS . For supported values of <srvParmValue> refer to <srvParmValue-srvType>.
"conId"	Internet connection profile to be used as specified with AT+CGDCONT parameter <cid>. Empty string "" will be printed in case the value was not set.
"address"	String value specifying a URL to be used <ol style="list-style-type: none"> 1. <i>UDP client service:</i> "sockudp://:local udpPort" Parameter "local udpPort": 1 ... 2¹⁶-1 for the local port number to be used for the UDP client. 2. <i>TCP client service:</i> "host":remote tcpPort[;timer=100][;etx=<etxChar>]" Parameter "host": IP address in the standard dot format (e.g. "192.168.1.2"). Parameter "remote tcpPort": 1 ... 2¹⁶-1 for the remote port number. Parameter "timer" (optional): Either 0 or 20 ... 500 milliseconds in steps of 20. Default if parameter is not specified is 100ms. Value 0 disables the Nagle algorithm. The parameter configures the Nagle algorithm, which is used in transparent access mode. Parameter "etx" (optional): Specifies the character used to change from transparent access mode to AT command mode. Range of <etxChar>: 1 ... 15, 17 ... 255. The value 16 is not allowed because it is defined as DLE (data link escape character, 0x10). If value is not set, then no escaping is configured, thus requiring either +++ or DTR ON-OFF transition for changing to AT command mode. If value is set, then the transmitted bytes are parsed for the DLE character followed by the specified <etxChar> value. If both characters are found the service returns to AT

command mode without transmitting these two bytes. This behavior differs from +++ handling, where the +++ characters are transmitted over the air. If you wish to send DLE characters as normal text string within your payload data the characters shall be doubled (DLE DLE).

`<srvParmValue>(str)`

Parameter value; type and supported content depend on related `<srvParmTag>` and are described above.

`<srvParmValue-srvType>(str)`

Supported Internet service type values in `<srvParmValue>` for `<srvParmTag>` value "srvType". Before changing the "srvType" of an existing service profile be sure that the profile is closed. To verify the connection state of the service profile enter the read command `AT^SISO?`. Only when `<srvState>=2` is returned for this specific service profile you can change its service type.

"Socket"	PHS8-P acting as UDP client
"TCPclient"	PHS8-P acting as TCP socket client.
"Transparent"	deprecated; is the same as "TCPclient"
"none"	Reset Internet service profile settings. Operation is not allowed if profile is in use, i.e. it was activated via <code>AT^SISO</code> .

12.3 AT^SISO Internet Service Open

The `AT^SISO` write command starts the internet service configured before with `AT^SISS`. Before you can start a service it's necessary to activate, with `AT+CGACT`, the connection used by the service that was specified with the `AT^SISS` parameter "conId").

If the service opens successfully, the URCs "`^SISW`" and "`^SISR`" will trigger the action to follow, either writing data with `AT^SISW`, reading data with `AT^SISR` or starting the transparent mode by using `AT^SIST`.

If an error occurs after opening or while using a service then the URC type "`^SIS`" described below will be delivered. An opened service must be finished by sending the Close command `AT^SISC`. This applies no matter whether the service has been completed successfully (all data transmitted) or ends up with error (e.g. indicated by the "`^SIS`" URC).

The `AT^SISO` read command requests the status of all Internet service profiles. One line is issued for every Internet service profile. Information following the parameter `<srvType>` is issued only, if the `AT^SISS` parameter `<srvParmValue-srvType>` is set to a value other than "None".

Syntax

Test Command

```
AT^SISO=?
```

Response(s)

```
OK
```

Read Command

```
AT^SISO?
```

Response(s)

```
^SISO: <srvProfileId>, <srvType>[, <srvState>, <socketState>, <rxCount>, <txCount>, <locAddr>[, <remAddr>]]
```

```
[^SISO: ...]
```

```
OK
```

Write Command

```
AT^SISO=<srvProfileId>
```

Response(s)

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
±	+	+	-	-

Parameter Description

`<srvProfileId>`^(num)

The profile identifier as specified by the parameter `<srvProfileId>` of `AT^SISS`.

`<srvType>`^(str)

The type of the internet service as specified by the `AT^SISS` parameter `<srvParmValue-srvType>`.

<srvState>^(num)

Internet service state.

2	Allocated Service profile resources are allocated, i.e. at least the service type has been set (parameter <srvParmTag>, value "srvType" of AT^SISS). The service is not opened, but ready for configuration. This state is entered implicitly if the associated internet connection was closed by the network or by the user itself by initiating context deactivation using AT+CGACT=0 or by initiating a GPRS detach by using AT+CGATT=0.
4	Up The service is usable for data transfer.
5	Closing Internet Service is closing the network connection.
6	Down This state is entered if <ul style="list-style-type: none">• the service has successfully finished its session,• the remote peer has reset the connection or• the IP connection has been closed because of an error (see note below on service or network errors). If a service is in this state you need to close it with AT^SISC before you can reopen it.

<socketState>^(num)

Socket state identifier.

1	Socket not assigned, i.e. no TCP/UDP connection active.
2	Socket assigned as CLIENT.

<rxCount>^(num)

Number of bytes received via AT^SISR or AT^SIST since last successful AT^SISO write command.

<txCount>^(num)

Number of bytes sent via AT^SISW or AT^SIST since last successful AT^SISO write command.

<locAddr>^(str)

Recently used local IP address in dotted-four-byte format and port, separated by colon, e.g. "192.60.10.10:80".

<remAddr>^(str)

Remote IP address in dotted-four-byte format and port, separated by colon, e.g. "192.60.10.10:80". This parameter is displayed only for TCP services.

Notes

- In addition to the "^SIS" URC detailed release cause information can be obtained with AT+CEER.
- If the bearer cannot be established and AT^SISO returns an error there might be a general network problem. To identify the reason you can take advantage of the AT+CEER command. Using AT+CEER is especially recommended when the <infoID> parameter of the AT^SISE command equals 0.
- If a service or network error occurs during an IP session and the "^SIS" URC or the AT^SISE command display an error message, the service enters <socketState>=5 and then 6, i.e. the IP connection is closed. In this case, the service still allows reading the data stored in the buffer, but writing data is denied. After reading, close the service and open it again.

12.4 AT^SISC Internet Service Close

The `AT^SISC` write command closes the TCP/IP connection to the remote peer which was opened with `AT^SISO`. All resources are released, all status information parameters, e.g. `<srvState>`, `<rxCount>` and `<txCount>` counters are reset. Only the initial configuration settings are preserved. The service can be restarted any time, using the same configuration or a new one.

Syntax

```
Test Command
AT^SISC=?
Response(s)
OK

Write Command
AT^SISC=<srvProfileId>
Response(s)
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
±	+	+	-	-

Parameter Description

<code><srvProfileId></code> ^(num)	
0...9	<code><srvProfileId></code> specified with <code>AT^SISC</code> .

12.5 AT^SISR Internet Service Read Data

The `AT^SISR` write command can be used to read data for the specified service. It may return the following errors:

- "+CME ERROR: operation failed" if there is a problem on application, socket, PPP or network level. The `AT^SISR` command and the "`^SISR`" URC offer additional error information.
- "+CME ERROR: operation temporary not allowed" e.g. if the service has not network resources allocated.
- "+CME ERROR: operation not allowed" e.g. if the service is not configured.

The `AT^SISR` read command can be used for UDP client services to query the number of dropped data packets.

Syntax

```

Test Command
AT^SISR=?
Response(s)
OK

Read Command
AT^SISR?
Response(s)
[^SISR: <srvProfileId>, <rxDropped>, <txDropped>]
[^SISR: ...]
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SISR=<srvProfileId>[, <reqReadLength>]
Response(s)
^SISR: <srvProfileId>, <cnfReadLength>[, <address>]
Number of data bytes are sent as specified by <cnfReadLength>. If peek operator was used no data bytes are sent.
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
±	+	+	-	+

Unsolicited Result Code

`^SISR: <srvProfileId>, <urcCauseId>`

Data availability status of the used Internet service has changed. See `<urcCauseId>`.

Parameter Description

`<srvProfileId>`^(num)

`<srvProfileId>` 0 ... 9 specified with `AT^SISR`.

`<address>`^(str)

IP address of the remote host incl. remote port separated by colon, e.g. "192.168.1.3:450". Parameter is displayed only if `<cnfReadLength>` is not 0.

<rxDropped>^(num)

Number of received UDP data packets dropped locally by PHS8-P.

0...4294967296

<txDropped>^(num)

Number of transmitted UDP data packets dropped locally by PHS8-P.

0...4294967296

<reqReadLength>^(num)

Parameter is not supported for UDP client services. For TCP client services this parameter is mandatory.

0 Peek Operator: Query number of received bytes within internal buffers.

1...1500 Requested number of data bytes to be read.

<cnfReadLength>^(num)

-2 Indicates end of data. Data transfer has been finished (all data have been read) and the service can be closed with [AT^SISC](#).

0 Indicates that no data can be read

1...1500 Confirmed number of data bytes to be read via the Internet service configured by [AT^SISS](#).

<urcCauseId>^(num)

Indicates whether or not data is available for reading with [AT^SISR](#) or [AT^SIST](#).

1 Indicates that a new event for the specified service is available while the service is in "Up" state. Usually, this is a notification, that the server has sent new data and by this a trigger to read those data via [AT^SISR](#) or [AT^SIST](#). Sometimes this URC also indicates socket specific events (e.g. internal graceful handling). In such cases, no data will be returned, but the event handling on the services continues. Therefore, the read access for the specified service using [AT^SISR](#) or [AT^SIST](#) is always necessary when this URC occurs.

2 End of data. Data transfer has completed (all data read). The service can be closed with [AT^SISC](#).

3 Maximum number of queued elements is exceeded, data is lost. This value is applicable for UDP services only.

Note

- If [AT^SIST](#) is running for a certain [<srvProfileId>](#), then [AT^SISR](#) is not usable for the same [<srvProfileId>](#).

12.6 AT^SISW Internet Service Write Data

The AT^SISW write command is used for the UDP or TCP client to trigger the process of sending data. The URC "^SISW: <srvProfileId>, <urcCauseId>" will be issued if the PHS8-P is ready to accept user data.

The AT^SISW write command may return the following errors:

- "+CME ERROR: operation failed" if there is a problem on application, socket, PPP or network level. The AT^SISE command and the "^SIS" URC offer additional error information.
- "+CME ERROR: operation temporary not allowed" e.g. if the service has not network resources allocated.
- "+CME ERROR: operation not allowed" e.g. if the service is not configured.

Syntax

Test Command

```
AT^SISW=?
```

Response(s)

```
OK
```

Write Command

for UDP client:

```
AT^SISW=<srvProfileId>, <reqWriteLength>, <remAddr>
```

Response(s)

```
^SISW: <srvProfileId>, <cnfWriteLength>
```

```
[Number of data bytes as specified by <cnfWriteLength>.]
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

Write Command

for TCP client:

```
AT^SISW=<srvProfileId>, <reqWriteLength>[, <eodFlag>]
```

Response(s)

```
^SISW: <srvProfileId>, <cnfWriteLength>, <unackData>
```

```
[Number of data bytes as specified by <cnfWriteLength>.]
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
±	+	+	-	+

Unsolicited Result Code

```
^SISW: <srvProfileId>, <urcCauseId>
```

Data availability status of the used Internet service has changed. See <urcCauseId>.

Parameter Description

<srvProfileId>^(num)

<srvProfileId> 0 ... 9 specified with AT^SISW.

<reqWriteLength>^(num)

0...1500

Specifies the number of bytes to be sent with [AT^SISW](#). If the selected service is an UDP client, then the maximum usable value for <reqWriteLength> is 1460.

<remAddr>^(str)

Remote IP address in dotted-four-byte format and remote port, separated by colon, e.g. "192.60.10.10:80".

<eodFlag>^(num)

End of data indication flag.

- | | |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [0] | No end of data. Other data may follow to be transmitted via the Internet service. |
| 1 | End of data is signalled to the Internet Service. Further AT^SISW write commands return an error response. However, reading data may be possible. The <eodFlag> is effective only if the <reqWriteLength> equals <cnfWriteLength>, in particular if the <reqWriteLength> equals 0. |

<cnfWriteLength>^(num)

0...1500

Confirmed number of data bytes which can be transmitted via the service. The application has to deliver exactly the number of bytes indicated by <cnfWriteLength>. Characters above the indicated number are ignored. A 0 value means that no data can be written at this time.

<unackData>^(num)

Parameter is currently not applicable for any service and always set to 0.

0

<urcCauseId>^(num)

- | | |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Socket successfully connected, transfer possible from now. |
| 2 | Only applicable to TCP client.
Data transfer has been finished successfully and Internet service is closed for write access. It may still be possible to read received data by using the AT^SISR write command or by switching to transparent access mode with AT^SIST . |

Notes

- The [AT^SISW](#) write command must be terminated only with the ASCII character set with [ATS3](#). The factory default for S3 is #13 (Carriage Return). Do not send any further characters after the S3 end-of-line identifier, until the response "[^SISW](#)" is received. This is necessary to avoid that any characters related to the AT command can be interpreted as being part of the data stream to be transferred. Also refer to Section [1.6, AT Command Syntax](#).
- If [AT^SIST](#) is running for a certain <srvProfileId>, then [AT^SISW](#) is not usable for the same <srvProfileId>.

12.7 AT^SIST Transparent Access Mode

The `AT^SIST` command applies only to the TCP service defined with `AT^SISS`. The command controls the transparent access mode which enables the ME to transparently send or receive payload data either over dedicated multiplex channels or over the Modem interface.

`AT^SIST` can be used after the TCP service has been opened with `AT^SISO` and is in "Up" state (`<srvState>=4`). If the service is not "Up" trying to open it will be denied with "+CME ERROR: operation temporary not allowed". There are two ways to verify that the service is "Up": Each time after opening the service with `AT^SISO` wait for the "`^SISW: x, 1`" URC. In addition you can request the `<srvState>` with `AT^SISO`.

If data is received while the service is in "Up" state, but not in transparent access mode, the "`^SISR: x, 1`" URC appears once notifying the client that the server has sent new data. In this case, the client shall enter `AT^SIST` to go to transparent access mode and read out the data.

See also Section 1.5, [AT Command Interpreter](#) and Section 1.9, [Unsolicited Result Code Presentation](#)) for information regarding the interfaces used for URC output.

The handling of the service largely depends on whether you are using transparent access mode on the dedicated multiplex channels or on the Modem interface. The major difference is that the second method blocks the AT command interface used for transparent access and the first method does not.

1. Using transparent access mode on dedicated multiplex channels 5 and 6:

In this case, enter the `AT^SIST` write command either on the Application interface or the Modem interface along with the parameters `<muxChannelId>` and `<muxChannelState>` "1". The advantage is that the Application or Modem interface remains accessible for AT commands and URCs, while transparent access mode is assigned to a dedicated multiplex channel. The multiplex channel is only used for transferring payload data. Therefore, result codes such as "CONNECT" or "NO CARRIER" will not appear. The DCD line goes active when transparent access mode starts, and inactive when it stops. If a transparent socket is closed (remotely by the server or locally by the client) the transparent access mode closes automatically.

2. Using transparent access mode without dedicated multiplex channels:

In this case, enter the `AT^SIST` write command on the Modem interface with `<srvProfileId>` only. Please note that this method is not supported on the Application interface (trying to do so will be denied with "+CME ERROR: operation not allowed").

After entering `AT^SIST` the CONNECT response notifies that the ME has entered transparent access mode and is ready to transfer payload data over the Modem interface.

There are several ways to quit transparent access mode and revert to AT command mode on the used interface:

- `+++` escape sequence (also transmitted over the air)
- DTR ON-OFF transition (see [AT&D](#) for configuring DTR handling)
- "etx" parameter set within the server address for transparent access mode (see [AT^SISS](#), `<srvParmTag>` "address").

Switching back and forth between both modes does not affect the underlying socket and has no influence on the service `<srvState>`.

If the TCP service is released, for example by the local client with `AT^SISC` or by the remote server, and the service is in transparent access mode (CONNECT mode) the following applies: The ME returns to AT command mode and issues a specific "NO CARRIER" result code. The "NO CARRIER" result code starts with 0x10 (DLE) and 0x04 (EOT) and ends with the characters defined by [ATS3](#) and [ATS4](#).

The result codes "CONNECT" and "NO CARRIER" are not influenced by `ATV`.

In AT command mode or after releasing TCP service, you can use `AT^SISO` to check the `<srvState>`.

Syntax

```

Test Command
AT^SIST=?
Response(s)
OK

Read Command
AT^SIST?
Response(s)
^SIST: <srvProfileId>, <ChannelId>
[^SIST: ...]
OK

Write Command
AT^SIST=<srvProfileId>[, <muxChannelId>, <muxChannelState>]
Response(s)
CONNECT
(indicates that the Modem interface has entered transparent access mode. Not issued on multiplex channels
5 or 6.)
OK
ERROR
+CME ERROR: <err>

PIN  MDM  APP  →  Last
-    +    +    +    +
    
```

Parameter Description

<srvProfileId>^(num)

<srvProfileId> 0 ... 9 specified with AT^SISS.

<muxChannelId>^(num)

5...6

Identifier of the dedicated multiplex channel to be used for data exchange. If the parameter is not specified, then the Modem interface instead of a dedicated multiplex channel is used to exchange the data. In this case AT^SIST is allowed to be executed on the Modem interface only.

<ChannelId>^(num)

0	Transparent access mode is activated on the Modem interface.
5...6	Transparent mode is activated on a multiplex channel. The value refers to <muxChannelId>.

<muxChannelState>^(num)

Control the transparent access mode on a dedicated multiplex channel.

[0]	Stop transparent access mode
1	Start transparent access mode

Note

- If AT^SIST is running for a certain <srvProfileId>, then the commands AT^SISR and AT^SISW are not usable for the same <srvProfileId>.

12.8 AT^SISX Internet Service Execution

The `AT^SISX` command can be used to send ICMP (Internet Control Message Protocol) Echo Requests to a target IP address or DNS host name (also referred to as Ping command). This command can also be used to resolve DNS host names to IP addresses (HostByName).

The `AT^SISX` command can be used any time while a connection profile (bearer) is active. If issued although no connection is active, then `AT^SISX` returns ERROR.

If the `AT^SISX` write command is executed for Ping, then the command returns one row for every ICMP Echo Request. The last Ping response line is followed by an empty line, then another two lines appear to report a statistic calculated from the Echo Request responses. After starting the ping command the AT channel is blocked until all ICMP requests are executed. To stop the periodic ping early, send any character (user break).

It is also possible to cancel the HostByName service by user break. But this may temporarily block further `AT^SISX` write commands which is indicated by the error response "+CME ERROR: operation temporary not allowed". As soon as the background activity for the last started HostByName service is finished the `AT^SISX` write command can be used again.

Syntax

Test Command

`AT^SISX=?`

Response(s)

`^SISX: "Ping", (list of supported <conProfileId>s), , (range of supported <request>s), (range of supported <timelimit>s)`

`^SISX: "HostByName", (list of supported <conProfileId>s)`

OK

Write Command

`AT^SISX=<service>, <conProfileId>, <address>[, <request>[, <timelimit>]]`

Response(s)

In case of `<pingInfoType>= 1: ICMP Echo Requests (1 - 30 rows)`

`^SISX: "Ping", <pingInfoType>, <conProfileId>, <ip-address>, <roundTripTime>`
[...]

In case of `<pingInfoType>= 2: Packet statistic (1 row)`

`^SISX: "Ping", <pingInfoType>, <conProfileId>, <sent>, <received>, <lost>, <lostPercent>`

In case of `<pingInfoType>= 3: Time statistic (1 row)`

`^SISX: "Ping", <pingInfoType>, <conProfileId>, <minRTT>, <maxRTT>, <meanRTT>`

In case of `<service>= "HostByName"`

`^SISX: "HostByName", <ip-address>`

OK

ERROR

+CME ERROR: <err>

PIN MDM APP → Last

+ + + - -

Parameter Description

`<service>`^(str)

"Ping" Service type.

"HostByName" Service type.

<conProfileId>^(num)

The context identifier <cid> of an activated Internet connection profile to be used (defined with [AT+CGDCONT](#) and activated with [AT+CGACT](#)).

<address>^(str)

In case of "Ping" this is the target host as FQDN or IP address (i.e. "192.168.1.3"), in case of "HostByName" this is the FQDN to be resolved into the IP address.

<ip-address>^(str)

The IP address of the host (i.e. "192.168.1.3").

<request>^(num)

[1]...30 Number of "Ping" ICMP Echo Requests to be sent.
Parameter is not supported for "HostByName".

<timelimit>^(num)

200...[5000]...10000 Amount of time, in milliseconds, to wait for an ICMP Echo Response message related to a previously sent Echo Request message.
Parameter is not supported for "HostByName".

<pingInfoType>^(num)

Indicate the type and format of the information given in the command responses (see syntax of the [AT^SISX](#) write command above).

- 1 Ping status received for the ICMP Echo Request(s). Depending on parameter <request> 1 - 30 rows. Address and Round Trip Time are returned for each request.
- 2 one row packet statistic calculated from the ping response(s) received for <pingInfoType>=1.
- 3 one row time statistics calculated from the ping response(s) received for <pingInfoType>=1 (displayed only if at least one Echo response message was received).

<roundTripTime>^(num)

Round Trip Time in milliseconds. If the Echo Response message is not received within the time specified by <timelimit> the value -1 is returned (e.g. when the bearer shuts down during command execution).

<sent>^(num)

Number of sent packets.

<received>^(num)

Number of received packets.

<lost>^(num)

Number of lost packets.

<lostPercent>^(num)

Lost packets in percent.

`<minRTT>^(num)`

Minimum Round Trip Time in milliseconds.

`<maxRTT>^(num)`

Maximum Round Trip Time in milliseconds.

`<meanRTT>^(num)`

Average Round Trip Time in milliseconds.

12.9 AT^SISE Internet Service Error Report

The [AT^SISE](#) write command returns the current error status of the specified Internet service profile. If the service profile is not defined or the value is invalid "+CME ERROR" response is returned. The error status is identical to the content of the "[^SIS](#)" URC last issued or if a service fails the commands [AT^SISR](#), [AT^SISW](#) or [AT^SIST](#) will return an error response. However, if the [AT^SISE](#) command returns [<infoID>=0](#) it is recommended to use the [AT+CEER](#) command because a general network problem might be the reason.

Syntax

```
Test Command
AT^SISE=?
Response(s)
OK

Write Command
AT^SISE=<srvProfileId>
Response(s)
^SISE: <srvProfileId>, <infoID>[, <info>]
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	-	-

Parameter Description

[<srvProfileId>](#)^(num)

Internet service profile identifier as defined by [AT^SISS <srvProfileId>](#).
0...9

[<infoID>](#)^(num)

Reason for Internet service error. This is a subset of the [<urcInfoId>](#)s which can be found in Section [12.10, Internet Service URC](#).
The value 0 indicates there is no special Internet service error. In this case the application may use [AT+CEER](#) to check for general network problems.

[<info>](#)^(str)

Information text related to [<infoID>](#). This is a subset of the [<urcInfoText>](#)s which can be found in Section [12.10, Internet Service URC](#).

12.10 Internet Service URC

This section first describes the syntax and the parameters of the "**^SIS**" URC. The second part consists of tables listing the information elements delivered within the "**^SIS**" URC and the command response of **AT^SISE**.

Unsolicited Result Code

Indicates an event, an error or an information element. The same information can be obtained via **AT^SISE**.

^SIS: <id>, <urcCause>[, [<urcInfoId>] [, <urcInfoText>]]

The URC may appear if an event or an error related to the Internet service commands occurs, for example after opening an Internet service with **AT^SISO** or any time during operation. The URC also indicates a request for a mobile terminated Internet service client connection, or a failure if a mobile terminated request is rejected. Furthermore, the URC may deliver an information element resulting from a specific command given in **<id>**.

A list of possible causes can be found in the tables below. The tables contain the **<urcInfoId>** and, if applicable, a specific **<urcInfoText>**. If marked with *) the precise text related to a **<urcInfoId>** varies greatly depending on the scenario and the implementation of the remote server. In these cases, only a brief explanation of the scenario can be found in the table column "Description".

Parameter Description

<id>^(num)

Identifier of the relevant Internet service profile as defined with **AT^SISS** parameter **<srvProfileId>** or, if **<urcCause>** is 6002, the relevant Internet service connection identifier as defined with the **AT+CGDCONT** parameter **<cid>** and referenced by the **AT^SISS** Internet service profile parameter "conId" (see **<srvParam-Tag>** for details).

<urcCause>^(num)

URC cause identifier.

0

An event has occurred after opening or while using an Internet service. The event number is presented via **<urcInfoId>** and may be an error, a warning, an information element or a note. Optionally additional information may be supplied via **<urcInfoText>**.

<urcInfoId>^(num)

Information identifier related to **<urcCause>**. See tables below for further detail. The **<urcInfoId>** number ranges indicate the type of information element:

0: Service is working properly.

1 - 2000: Error, service is aborted and enters **<srvState>=6** (Down).

2001 - 4000: Information related to progress of service.

4001 - 6000: Warning, but no service abort.

6001 - 8000: Notes

<urcInfoText>^(str)

Information text related to **<urcCause>**. See tables below for further details. The maximum length of an information text is 255 bytes. Any longer messages will be truncated.

12.10.1 Information Elements Related to the Service Application

The following table lists the information elements which may be returned by all supported services within the "**^SIS**" URC and the command response of **AT^SISE**. It should be noted that TCP/IP socket problems may occur in all Internet service connections.

<urcInfoId>	<urcInfoText>	Description
<i>Information Elements Returned by the TCP/IP socket</i>		
2	Invalid socket descriptor	Socket error
3	Bad address specified	Socket error
4	Invalid operation	Socket error
5	No free socket descriptors	Socket error
6	The operation would block	Socket error
7	A previous attempt at this operation is still ongoing	Socket error
8	Socket is not bound	Socket error
9	The supplied buffer is too small / large	Socket error
10	Flags not supported	Socket error
11	Operation not supported	Socket error
12	The address is already in use	Socket error
13	The network is unavailable	Socket error
14	An established connection was aborted (transmission time-out or protocol error)	Socket error
15	Remote host has reset the connection	Socket error
16	No buffer space available	Socket error
17	The socket is already connected	Socket error
18	For TCP/IP sockets, the socket is not connected	Socket error
19	Socket has been shut down	Socket error
20	Connection timed out	Socket error
21	Remote host has rejected the connection	Socket error
22	Remote host is unreachable	Socket error
23	An unexpected error occurred	Socket error
24	Host not found	DNS error
25	An error occurred that may be transient; a further attempt may succeed.	DNS error
26	An unrecoverable error occurred	DNS error
27	IP address changed, causing TCP reset.	Socket error
<i>General Information Elements</i>		
46	Fatal: The service has detected an unknown error	
47	*)	Indicates that the remote service has closed the connection. The host shall close the service.

<urcInfoId>	<urcInfoText>	Description
48	Remote peer has closed the connection	Remote peer has closed the connection unexpectedly, and no data are available. The host shall close the service. Note that the " ^SIS " URC only indicates the <urcInfoId> , but the AT^SISE command indicates both the <urcInfoId> and the <urcInfoText> .
49	Fatal: No memory is available for service action	
50	Fatal: Service has detected an internal error	
70	Mobile is in a QOS Unaware System.	
80		Connection profile not defined.
84	PPP LCP FAILED	PPP error
85	PAP Authentication failed	PPP error
86	CHAP Authentication failed	PPP error
87	IPCP failed	PPP error
<i>General Information Elements</i>		
6001		General progress information for connection setup.
6002	Unsolicited change of connection state	Implicit state change of connection <id> , e.g. caused by network loss. Query the activation state of the given <id> using AT+CGACT read command. The command AT+CEER can be used to query the cause of the status change.

*) Text varies depending on scenario.

12.11 Examples of how to Configure and Use Internet Service Profiles

Below you can find selective examples of how to configure and use Internet service profiles.

12.11.1 Configuring an Internet Connection Profile

AT+COPS?	Checking network registration.
+COPS: 0,0,"E-Plus",0	ME is registered to German provider E-Plus.
OK	
AT+CGATT=1	Attaching to GPRS network (optional).
OK	
AT+CGDCONT=101,"ip","internet.eplus.de"	Specifying PDP context 101 with APN for E-Plus.
OK	
AT^SICS=101,"dns1","198.023.097.002"	Specifying primary DNS address (optional).
OK	
AT^SICS=101,"dns2","212.023.097.003"	Specifying secondary DNS address (optional).
OK	
AT+CGACT=1,101	Activating PDP context 101.
OK	
AT+CGPADDR=101	Requesting dynamic IP address assigned to local client for context 101.
+CGPADDR: 101,"10.129.137.217"	Response returns currently assigned IP address.
OK	

12.11.2 Configuring a Service Profile for TCP Service

AT^SISS=2,"srvType","TCPclient"	Configuring service profile 2 for TCP Service.
OK	
AT^SISS=2,"address","10.10.228.5:9999"	Setting remote host and port for TCP service.
OK	
AT^SISS=2,"conId",101	Assigning PDP context to service profile 2.
OK	
AT^SISS?	Requesting current service profile settings.
^SISS: 0,"srvType","none"	"none" means that service profile is not created.
^SISS: 1,"srvType","none"	
^SISS: 2,"srvType","TCPclient"	Service profile 2 is configured for TCP service.
^SISS: 2,"conId","101"	Service profile 2 is assigned to PDP context 101.
^SISS: 2,"address","10.10.228.5:9999"	Remote host and port for TCP service are shown.
^SISS: 3,"srvType","none"	
^SISS: 4,"srvType","none"	
^SISS: 5,"srvType","none"	
^SISS: 6,"srvType","none"	
^SISS: 7,"srvType","none"	
^SISS: 8,"srvType","none"	
^SISS: 9,"srvType","none"	
OK	
AT^SISO=2	Opening service profile 2.
OK	
^SISW: 2,1	URC indicates that TCP service is ready.
^SISR: 2,1	URC indicates that new data is available for reading.
AT^SISO?	Requesting status of service profiles.
^SISO: 0,"none"	

```

^SISO: 1, "none"
^SISO: 2, "TCPcli-
ent", 4, 2, 0, 0, "10.129.137.217:53042", "10.10.
228.5:9999"
^SISO: 3, "none"
^SISO: 4, "none"
^SISO: 5, "none"
^SISO: 6, "none"
^SISO: 7, "none"
^SISO: 8, "none"
^SISO: 9, "none"
OK

```

TCP Service is open and in "Up" state (<srvState>=4). Locally assigned IP address, remote host and remote port are shown.

12.11.3 Using TCP Service on Dedicated Multiplex Channel

This example uses the Internet connection profile shown in Section 12.11.1 and the service profile shown in Section 12.11.2. The service can be started from the Modem or Application interface. The example only shows actions taken on the AT command interface, data transfer on the multiplex channel is not visualized. Remember that the DCD line indicates the state of the transparent access mode on the multiplex channel.

```

AT^SIST=2, 5, 1
OK
AT^SIST?
^SIST: 2, 5
OK
AT^SISO?
^SISO: 0, "none"
^SISO: 1, "none"
^SISO: 2, "TCPcli-
ent", 4, 2, 550, 2, "10.129.137.217:53042", "10.1
0.228.5:9999"
^SISO: 3, "none"
^SISO: 4, "none"
^SISO: 5, "none"
^SISO: 6, "none"
^SISO: 7, "none"
^SISO: 8, "none"
^SISO: 9, "none"
OK
AT^SIST?
OK
AT^SISO?
^SISO: 0, "none"
^SISO: 1, "none"
^SISO: 2, "TCPcli-
ent", 6, 1, 550, 2, "0.0.0.0:0", "10.10.228.5:999
9"
^SISO: 3, "none"
^SISO: 4, "none"
^SISO: 5, "none"

```

Starting transparent access mode on multiplex channel 5.

Requesting status of transparent access mode. Transparent access mode has been started on multiplex channel 5.

Sending or receiving data on multiplex channel 5 is now possible (not visualized in this example). Requesting status of service profiles.

TCP Service is open and in "Up" state (<srvState>=4). Socket is assigned. On the multiplex channel 550 bytes were received and 2 bytes sent. Locally assigned IP address, remote host and remote port are shown.

Requesting status of transparent access mode. Connection hung up by server. Requesting status of service profiles.

TCP Service is in "Down" state (<srvState>=6). Socket is assigned. On the multiplex channel 550 bytes were received and 2 bytes sent. No IP address assigned to local client. Remote host address and port are shown.

```

^SISO: 6, "none"
^SISO: 7, "none"
^SISO: 8, "none"
^SISO: 9, "none"
OK
AT^SISC=2                                Closing TCP service.
OK
AT^SISO?                                  Requesting status of service profiles.
^SISO: 0, "none"
^SISO: 1, "none"
^SISO: 2, "TCPcli-                        Service profile resources are allocated.
ent", 2, 1, 0, 0, "0.0.0.0:0", "10.10.228.5:9999"
^SISO: 3, "none"
^SISO: 4, "none"
^SISO: 5, "none"
^SISO: 6, "none"
^SISO: 7, "none"
^SISO: 8, "none"
^SISO: 9, "none"
OK

```

12.11.4 Using TCP Service on Modem Interface

This example uses the Internet connection profile shown in Section 12.11.1 and the service profile shown in Section 12.11.2. Without employing multiplex channels the service can only be started on the Modem interface. The example assumes that the Modem interface is mapped to the module's ASC0 interface, i.e. `AT^SDPORT=2` is set. In this case all URCs are output on the same interface.

```

AT^SQPORT                                  Requesting currently used interface.
^SQPORT: MODEM                             Modem interface is used.
AT+CGPADDR=101                             Requesting dynamic IP address assigned to local cli-
ent for context 101.
+CGPADDR: 101, "10.129.69.29"              Response returns currently assigned IP address.
OK
AT^SISO=2                                  Opening service profile 2.
OK
^SISW: 2, 1                                URC indicates that TCP service is ready.
^SISR: 2, 1                                URC indicates that new data is available for reading.
AT^SISO?                                  Requesting status of service profiles.
^SISO: 0, "none"
^SISO: 1, "none"
^SISO: 2, "TCPcli-                          TCP Service is open and in "Up" state
ent", 4, 2, 0, 0, "10.129.69.29:9824", "10.10.228 (<srvState>=4). Locally assigned IP address,
.5:9999"                                    remote host and remote port are shown.
^SISO: 3, "none"
^SISO: 4, "none"
^SISO: 5, "none"
^SISO: 6, "none"
^SISO: 7, "none"
^SISO: 8, "none"
^SISO: 9, "none"
OK
AT^SIST=2                                  Starting transparent access mode on Modem inter-
face.
CONNECT                                    Service is ready to send or receive data.
                                           Client is sending data (not visible in example).

```

OK	Client types +++ to return to AT command mode (not visible in example).
AT^SIST=2	Returning to transparent access mode on Modem interface.
CONNECT	CONNECT response indicates that data can be transmitted.
Hello...NO CARRIER	Client is reading data. Finally, the NO CARRIER result code indicates that the server has hung up
AT^SIST?	Requesting status of transparent access mode.
OK	Transparent access mode has been stopped.
AT^SISO?	Requesting status of service profiles.
^SISO: 0, "none"	
^SISO: 1, "none"	
^SISO: 2, "TCPcli-ent", 6, 1, 50, 100, "0.0.0.0:0", "10.10.228.5:9999"	TCP service is in "Down" state (<srvState>=6). 50 bytes received, 100 bytes sent. No IP address assigned to local client. Remote host and port are shown.
^SISO: 3, "none"	
^SISO: 4, "none"	
^SISO: 5, "none"	
^SISO: 6, "none"	
^SISO: 7, "none"	
^SISO: 8, "none"	
^SISO: 9, "none"	
OK	
AT^SISC=2	Closing TCP service.
OK	
AT^SISO?	Requesting status of service profiles.
^SISO: 0, "none"	
^SISO: 1, "none"	
^SISO: 2, "TCPcli-ent", 2, 1, 0, 0, "0.0.0.0:0", "10.10.228.5:9999"	Service profile resources are allocated.
^SISO: 3, "none"	
^SISO: 4, "none"	
^SISO: 5, "none"	
^SISO: 6, "none"	
^SISO: 7, "none"	
^SISO: 8, "none"	
^SISO: 9, "none"	
OK	

12.11.5 Configuring and Using UDP Client

AT^SISS=3, srvType, socket	Configuring service profile 3 for a UDP client.
OK	
AT^SISS=3, conId, 101	Assigning PDP context to service profile 3.
OK	
AT^SISS=3, address, "sockudp://:6666"	Specifying local UDP port.
OK	
AT^SISS?	Requesting current service profile settings.
^SISS: 0, "srvType", "none"	
^SISS: 1, "srvType", "none"	
^SISS: 2, "srvType", "none"	
^SISS: 3, "srvType", "Socket"	
^SISS: 3, "conId", "101"	

```

^SISS: 3, "address", "sockudp://:6666"
^SISS: 4, "srvType", "none"
^SISS: 5, "srvType", "none"
^SISS: 6, "srvType", "none"
^SISS: 7, "srvType", "none"
^SISS: 8, "srvType", "none"
^SISS: 9, "srvType", "none"
OK
AT^SISO=3
OK
^SISW: 3,1
AT^SISW=3,10,"10.10.228.5:9998"
^SISW: 3,10
test test
OK
AT^SISO?
^SISO: 0, "none"
^SISO: 1, "none"
^SISO: 2, "none"
^SISO:
3, "Socket", 4, 2, 10, 10, "10.129.69.109:6666"
^SISO: 4, "none"
^SISO: 5, "none"
^SISO: 6, "none"
^SISO: 7, "none"
^SISO: 8, "none"
^SISO: 9, "none"
OK
AT^SISC=3
OK
AT^SISO?
^SISO: 0, "none"
^SISO: 1, "none"
^SISO: 2, "none"
^SISO: 3, "Socket", 2, 1, 0, 0, "0.0.0.0:0"
^SISO: 4, "none"
^SISO: 5, "none"
^SISO: 6, "none"
^SISO: 7, "none"
^SISO: 8, "none"
^SISO: 9, "none"
OK

```

Opening service profile 3.

The URC confirms that the UDP client is ready to send data.
The UDP client requests to send 10 bytes to the given address.
The write command response confirms that 10 bytes can be sent.
Data sent.

Requesting status of service profiles.

Service profile resources are allocated.
UDP service is in state "Up" (4). Socket is assigned.
10 bytes received, 10 bytes sent. Locally assigned IP address is indicated.

Closing the UDP client.

Requesting status of service profiles.

Service profile resources are allocated.
UDP service is state "Allocated" (2). Socket is not assigned (1). No IP address assigned to local client.

12.11.6 Ping

This example shows a Ping output. The example uses the Internet connection profile shown in Section [12.11.1](#).

```

AT^SISX=Ping,101,"74.125.39.99",5,5000
^SISX: "Ping",1,101,"74.125.39.99",1696
^SISX: "Ping",1,101,"74.125.39.99",175
^SISX: "Ping",1,101,"74.125.39.99",174

```




```
^SISX: "Ping",1,101,"74.125.39.99",174
^SISX: "Ping",1,101,"74.125.39.99",2111
^SISX: "Ping",2,101,5,5,0,0
^SISX: "Ping",3,101,174,2111,865
OK
```

12.11.7 Resolving DNS Host Name to IP Address

This example uses the Internet connection profile shown in Section [12.11.1](#).

```
AT^SISX=HostByName,101,"www.google.de"
^SISX: "HostByName", "74.125.39.99"
OK
```

13. USIM related Commands

AT commands described in this chapter are related to the Universal Subscriber Identity Module (USIM) connected to the PHS8-P.

Note:

If using data from the USIM please bear in mind that the content of all Elementary Files is *subject to change* at any moment!

This is because the network can change the USIM's data in the background via [USIM Application Toolkit \(USAT\)](#) procedure "Data download to USIM". For a detailed description please refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

To get informed that changing Elementary Files has taken place the Customer Application (TE) needs to hook up [USAT](#) Proactive Command "REFRESH". For more information please refer to Chapter 14., [USIM Application Toolkit \(USAT\) Commands](#) and Section 14.7, [SAT Get Information - Refresh \(1\)](#) in particular.

13.1 AT+CRSM Restricted USIM Access

[AT+CRSM](#) offers easy access of the Elementary Files on the USIM. Access to the USIM database is restricted to the commands listed with parameter `<command>`.

All parameters of [AT+CRSM](#) are used as defined by the specifications listed below. PHS8-P handles internally all required USIM interface locking and file selection routines.

As response to the command, the PHS8-P sends the actual USIM information parameters and response data. "+CME ERROR" may be returned if the command cannot be passed to the USIM, e.g. if the USIM is not inserted. Failures to execute the command on the USIM will be reported by the `<sw1>` and `<sw2>` parameters.

Please beware of *possible changes to Elementary Files* by the network at any time, refer Chapter 13., [USIM related Commands](#).

Syntax

Test Command				
AT+CRSM=?				
Response(s)				
OK				
Write Command				
AT+CRSM=<command>[, <fileID>[, <P1>, <P2>, <P3>[, <data>][, <pathId>]]]				
Response(s)				
+CRSM: <sw1>,<sw2>[,<response>]				
OK				
ERROR				
+CME ERROR: <err>				
PIN	MDM	APP	→	Last
-	+	+	+	-
Reference(s)				
3GPP TS 27.007 [47], 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21] ETSI TS 102 221 [22]				

Parameter Description

`<command>`^(num)

USIM command number.

176	READ BINARY
178	READ RECORD
192	GET RESPONSE
214	UPDATE BINARY
220	UPDATE RECORD
242	STATUS

`<fileID>`^(num)

Identifier for an elementary data file on USIM, if used by `<command>`.

`<P1>`^(num)

Parameter to be passed on by the PHS8-P to the USIM.

0...255

`<P2>`^(num)

Parameter to be passed on by the PHS8-P to the USIM.

0...255

`<P3>`^(num)

Parameter to be passed on by the PHS8-P to the USIM.

0...255

`<data>`^(str)

Information which shall be written to the USIM (hexadecimal character format).

`<pathId>`^(str)

Contains the directory path of an elementary file on a UICC in hexadecimal format (e.g. "7F105F50").
Up to 3 Dedicated Files (DFs) can be listed.

The `<pathId>` parameter is applicable only to UICCs.

Some types of UICCs may have Dedicated Files which are not unique, because the same file ID is allocated to several applications on the UICC and this way used twice or even more times. Therefore, to access UICC files of USIM applications please use the optional parameter `<pathId>`. UICC files of USIM applications are accessible without any need for the `<pathId>` parameter.

`<sw1>`^(num)

Status information from the USIM about the execution of the actual command. It is returned in both cases, on successful or failed execution of the command.

0...255

`<sw2>`^(num)

Status information from the USIM about the execution of the actual command. It is returned in both cases, on successful or failed execution of the command.

0...255

`<response>`^(str)

Response data in case of a successful completion of the previously issued command. "STATUS" and "GET RESPONSE" commands return data, which gives information about the currently selected elementary data field. This information includes the type of file and its size. After "READ BINARY" or "READ RECORD" commands the requested data will be returned. `<response>` is empty after "UPDATE BINARY" or "UPDATE RECORD" commands.

13.2 AT+CSIM Generic USIM Access

[AT+CSIM](#) allows direct control of the USIM.

Compared to the restricted USIM access command [AT+CRSM](#), the definition of [AT+CSIM](#) allows to take more control over the USIM interface.

However, the [USIM Application Toolkit](#) functionality is not supported by [AT+CSIM](#). Therefore the following USIM commands cannot be used: TERMINAL PROFILE, ENVELOPE, FETCH and TEMINAL RESPONSE.

Syntax

Test Command

```
AT+CSIM=?
```

Response(s)

```
OK
```

Write Command

```
AT+CSIM=<length>, <command>
```

Response(s)

```
+CSIM: <length>,<response>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

PIN MDM APP  Last

- + + + -

Reference(s)

3GPP TS 27.007 [47],
3GPP TS 11.11 [19], 3GPP TS
31.101 [20], 3GPP TS 31.102 [21]
ETSI TS 102 221 [22]

Parameter Description

<length>^(num)

Length of <command> or <response> string.

<command>^(str)

Command passed on by the PHS8-P to the USIM.
Parameter length: maximum 260 Bytes.

<response>^(str)

Response data of the command returned by the USIM.
Parameter length: maximum 258 Bytes.

Note

- Access to datafields via SELECT is only allowed to files according to 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21].

Example

The following examples explain how to use [AT+CSIM](#).

```
AT+CSIM=14, "A0A40000027F10"
```

```
+CSIM: 4, "9F19"
```

```
OK
```

Select DF-Telecom

Command successful, length '19' of the response data

```
AT+CSIM=14,"A0A40000026F3A"  
+CSIM: 4,"9F0F"
```

Select EF-ADN (Abbreviated dialling numbers)
Command successful, length '0F' of the response
data

OK

```
AT+CSIM=16,"A0C000000F"
```

Get Response

```
+CSIM: 34,"000002306F3A040011F0220102011C9000"
```

OK

13.3 AT^SCKS Query USIM and Chip Card Holder Status

AT^SCKS write command enables or disables the presentation of URCs to report the connection status of the USIM.

AT^SCKS read command returns the URC presentation mode and the status of the USIM connection. Also refer to **AT^SIND**, which supplies indicator "simstatus" to monitor the USIM status.

Syntax

<p>Test Command</p> <p>AT^SCKS=?</p> <p>Response(s)</p> <p>^SCKS: (list of supported <mode>s)</p> <p>OK</p>										
<p>Read Command</p> <p>AT^SCKS?</p> <p>Response(s)</p> <p>^SCKS: <mode>, <SimStatus></p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>										
<p>Write Command</p> <p>AT^SCKS=<mode></p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>										
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-
PIN	MDM	APP	→	Last						
-	+	+	+	-						

Unsolicited Result Codes

URC 1

^SCKS: <SimStatus>

If the USIM connection status has changed an unsolicited result code (URC) is issued.

URC 2

^SCRD: <MCC>

If the USIM is not supported by PHS8-P and the connection is rejected an unsolicited result code (URC) is issued. The presentation of this URC cannot be suppressed.

Parameter Description

<mode> ^{(num)&(V)&(W)}	
0(&F)	Disable URC " ^SCKS ".
1	Enable URC " ^SCKS ".
<SimStatus> ^{(num)&(V)}	
0	USIM connection error (usually the USIM is not inserted).
1	USIM inserted.

- 2 The USIM interface hardware has been deactivated to prevent possible damage (e.g. if a USIM with invalid or unsupported electrical specifications has been detected).
The USIM interface can be reactivated only by restarting the UE, e.g. with "AT+CFUN= n,1".
In case a 5V USIM is inserted it might be possible that the USIM is not functional at all. As a result, URC "^SCKs: 0" occurs.
- 3 If during power up the USIM returns status words 6F00h (Technical problem, no precise diagnosis) to three consecutive APDUs sent by PHS8-P, the USIM interface hardware has been deactivated.
The USIM interface can be reactivated only by restarting the UE, e.g. via "AT+CFUN= n,1".

<MCC>^(num)

MCC (Mobile Country Code) of a USIM that is not supported by PHS8-P.

13.4 AT^SSET USIM Data Ready Indication

After power-up and personalization (PIN entry if required) PHS8-P starts reading data from the USIM. AT^SSET controls the presentation of "[^SSIM READY](#)" URC which indicates that the UE has finished this initial reading. Afterwards all AT commands that depend on USIM data can be used, e.g. SMS and phonebook related AT commands. Refer to Section [20.1, Restricted access to SIM data after SIM PIN authentication](#) for further details.

Syntax

<p>Test Command</p> <p>AT^SSET=?</p> <p>Response(s)</p> <p>^SSET: (list of supported <n>s)</p> <p>OK</p>										
<p>Read Command</p> <p>AT^SSET?</p> <p>Response(s)</p> <p>^SSET: <n></p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>										
<p>Write Command</p> <p>AT^SSET=[<n>]</p> <p>Response(s)</p> <p>OK</p> <p>ERROR</p> <p>+CME ERROR: <err></p>										
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-
PIN	MDM	APP	→	Last						
-	+	+	+	-						

Unsolicited Result Code

[^SSIM READY](#)

This URC indicates that the UE has finished its initial USIM access. Before that, any attempt to access phonebook, SMS or other USIM data may result in "+CME ERROR" type "SIM busy".

Parameter Description

<n> ^{(num)(&V)(&W)}	
URC presentation mode	
0(&F)	Disable " ^SSIM READY " URC.
1	Enable " ^SSIM READY " URC.

13.5 AT^SCID USIM Identification Number

AT^SCID serves to query the USIM identification number. This information is retrieved from USIM elementary file EF_{ICCID}; for details refer to 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21].

Syntax

Test Command

```
AT^SCID=?
```

Response(s)

```
OK
```

Exec Command

```
AT^SCID
```

Response(s)

```
^SCID: <cid>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cid>^(str)

USIM identification number.

14. USIM Application Toolkit (USAT) Commands

This chapter describes AT commands and responses related to the PHS8-P's [USIM Application Toolkit \(USAT\)](#) implementation.

[USAT](#) is a technology that allows an application running on the USIM to control the GSM/UMTS Engine (UE); it is specified in 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

[Remote USIM Application Toolkit](#), or short [Remote-USAT](#), provides a link between an application running on the USIM and the Customer Application (TE). The purpose of [Remote-USAT](#) is to allow the TE to send AT commands to the [USAT](#) interface and to display dedicated [USAT](#) activity on the user interface of the TE. The overall scenario is illustrated in the context diagram below.

Following types of data are exchanged between the PHS8-P and the application running on the USIM:

- Proactive commands (PACs) are sent from the USIM application to the UE. Some PAC types are executed by the UE itself, comparable with AT commands. Other PAC types are immediately forwarded to the TE, e.g. "DISPLAY TEXT".
- Terminal Response is the UE's answer to the last PAC, sometimes to be provided by the TE.
- Envelope commands are sent from the UE or TE to the USIM Application, such as "MENU SELECTION".

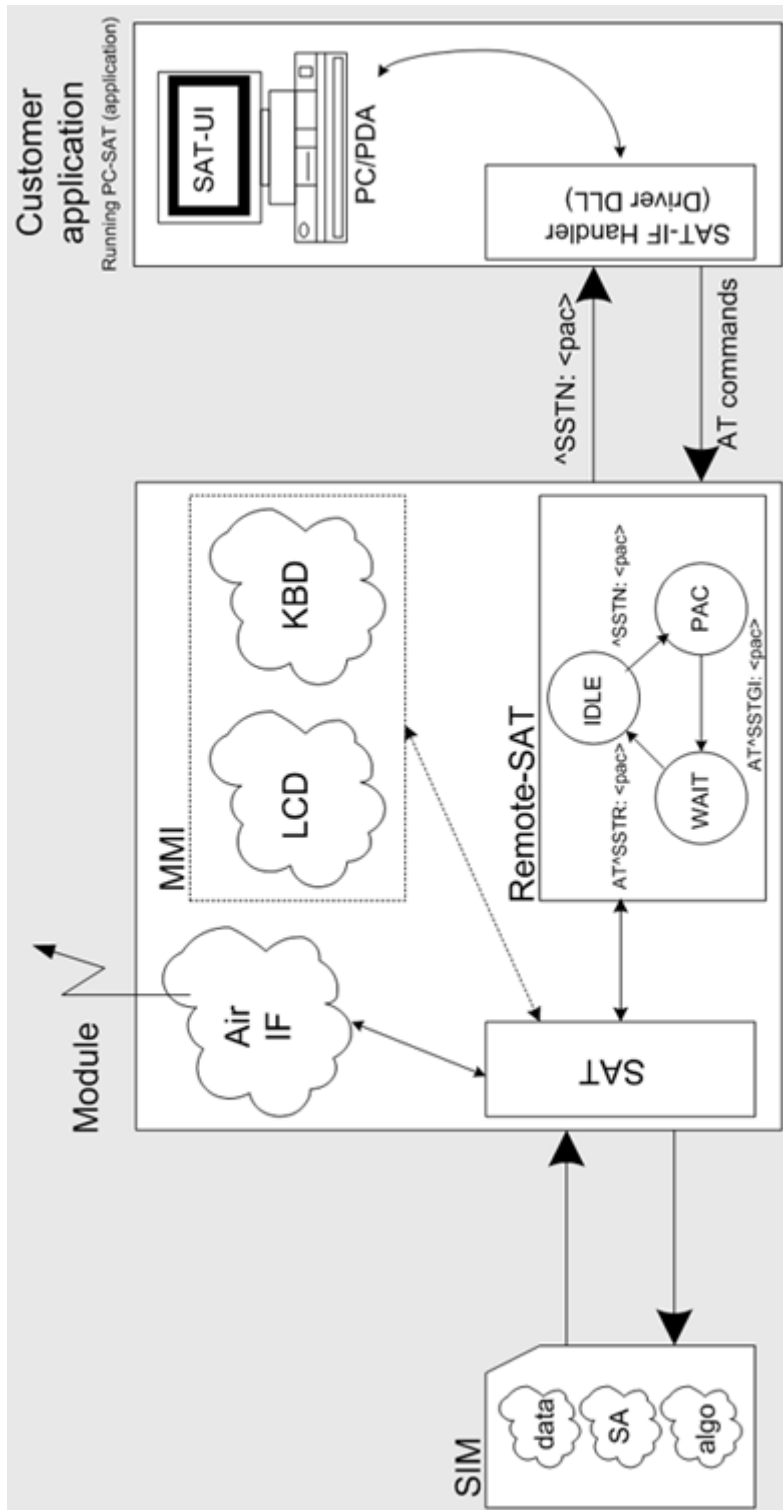


Figure 14.1: Remote-USAT Context Diagram

14.1 Usage of Remote-SAT

If USAT functionality is delivered by the USIM provider, the related USAT commands have to be handled. Otherwise other USIM functionality may not working correctly (e.g. SMS-PP downloads). Therefore two possible modes are available.

14.1.1 Automatic Response Mode (AR Mode)

If the UE operates in this (default) mode, usage of any Remote-USAT AT commands is not necessary. In this case, all commands and responses are exchanged automatically between the UE and the USIM application. The type of Terminal Response (TR) to a USAT Proactive Command issued by the USIM application used in AR mode is listed at Table 14.6, [Command Type Table](#), column "Auto Terminal Response". However, even while using AR Mode it is crucial to react on USAT REFRESH Proactive Commands, indicating that data read from the USIM has been changed!

Therefore, enable handling of `AT^SIND`, using parameter `<indDescr>="simdata"` to get informed about USAT REFRESH events.

Furthermore it is recommended to activate the `AT^SCKS` URC, because for USAT REFRESH Type SIM RESET the same internally functionality as for physical remove and insertion of the USIM is done.

To take full advantage of Remote-USAT the ER mode has to be enabled using `AT^SSTA=1`. This setting is stored in the non-volatile memory and takes effect after next switch-on of the UE.

14.1.2 Explicit Response Mode (ER Mode)

As a Wireless Modem does not have an MMI, Remote-USAT differs from a phone implementation of USAT. It uses a special set of AT commands to pass data, e.g. a list of menu items, to the TE and to receive responses, e.g. a selected menu item.

The TE is required to monitor the status of an ongoing USAT Proactive Command (PAC) and, if required, sends appropriate AT commands, depending upon users input.

14.1.3 Character Sets

Strings are passed as UCS2 characters, but using the GSM alphabet is also possible. Use of GSM alphabet is not recommended since a USIM can contain text which might be not displayable, e.g. Greek characters. Use the `AT^SSTA` command to select the type of alphabet both for input and output. UCS is specified in ISO/IEC 10646. There are 2 and 4 octet versions available, of which only the 2-octet variant is used, known as UCS2. The 65536 positions in the 2-octet form of UCS are divided into 256 rows, each with 256 cells. The first octet of a character representation gives the row number, the second the cell number. The first row, row 0, contains exactly the same characters as ISO/IEC 8859-1. The first 128 characters are thus the ASCII characters. The octet representing an ISO/IEC 8859-1 character is easily transformed to the representation in UCS by putting a 0 octet in front of it. UCS includes the same control characters as ISO/IEC 8859 which are located in row 0.

14.1.4 USIM Update Initiated by the Network

If a Customer Application (TE) uses data of the USIM card please consider that the contents of all elementary files are subject to change at any time. This happens because the network can change the USIM data in the background via the [USIM Application Toolkit \(USAT\)](#) procedure "Data download to USIM". For a detailed description refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25]. In order to receive the information that an elementary file has been changed the TE has to activate Remote-USAT and needs to look for the USAT Proactive Command "REFRESH", Section 14.7, [SAT Get Information - Refresh \(1\)](#).

14.1.5 Icon Handling

Several USAT Proactive commands may provide an icon identifier. Icons are intended to enhance the MMI by providing graphical information to the user. The display of icons is optional for the UE. The USIM indicates to the UE whether the icon replaces an alpha identifier or text string, or whether it accompanies it (icon qualifier).

If both an alpha identifier or text string, and an icon are provided with a proactive command, and both are requested to be displayed, but the UE is not able to display both together on the screen, then the alpha identifier or text string takes precedence over the icon.

If the USIM provides an icon identifier with a proactive command, then the UE shall inform the USIM if the icon could not be displayed by sending the response "Command performed successfully, but requested icon could not be displayed" (via AT^SSTR).

Icon data can be fetched directly from the USIM using the [AT+CRSM](#) command, for details please refer to 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21]. Icon data can be read from the USIM on system start then cached.

14.1.6 Using SMS Related AT Commands

UE activities triggered by USAT often end in sending or receiving short messages. Usually, a short message containing a service request is sent to the network, for example a request to send the latest news. Subsequently, the network returns a short message containing the requested information. This short message needs to be read by the Customer Application.

Set SMS text mode

[AT+CMGF=1](#)

Activate the display of a URC on every received SMS

[AT+CNMI=1,1](#)

If needed activate extended SMS text mode parameter output

[AT+CSDH=1](#)

This is useful in order to obtain more detailed header information along with the incoming SMS (e.g. SMS class). Please refer to 3GPP TS 23.038 [37] for details.

As a result, a URC will be output each time a short message is received

["+CMTI"](#): "MT", 1 where

- the first parameter "MT" specifies the storage type of the SMS
- the second parameter contains a unique location number.

In the given example, the short message was stored to the memory type "MT" at location number 1.

The short message storage "MT" is a logical storage. For more detailed information please refer to [AT+CPMS](#).

To read the SMS data use

[AT+CMGR=<location>](#)

where <location> is the location number of the received SMS, e.g. 1 in the example above.

To list all stored short messages use

[AT+CMGL="ALL"](#)

To delete a certain SMS after reading use

[AT+CMGD=<location>](#)

14.2 Remote-SAT States

In order to communicate with the SIM Application Toolkit it is necessary to use AT commands which are explained in detail in the following chapters. In general, the type of AT command which should be issued depends on the current state of the Remote-SAT interface.

The current state of Remote-SAT is determined by

1. the Remote-SAT operating mode (AR or ER mode),
2. the application running on the SIM,
3. the Customer Application (in case of ER mode only), and
4. internal actions of the UE (especially SAT and Call Control).

14.2.1 Remote-SAT State Transition Diagram

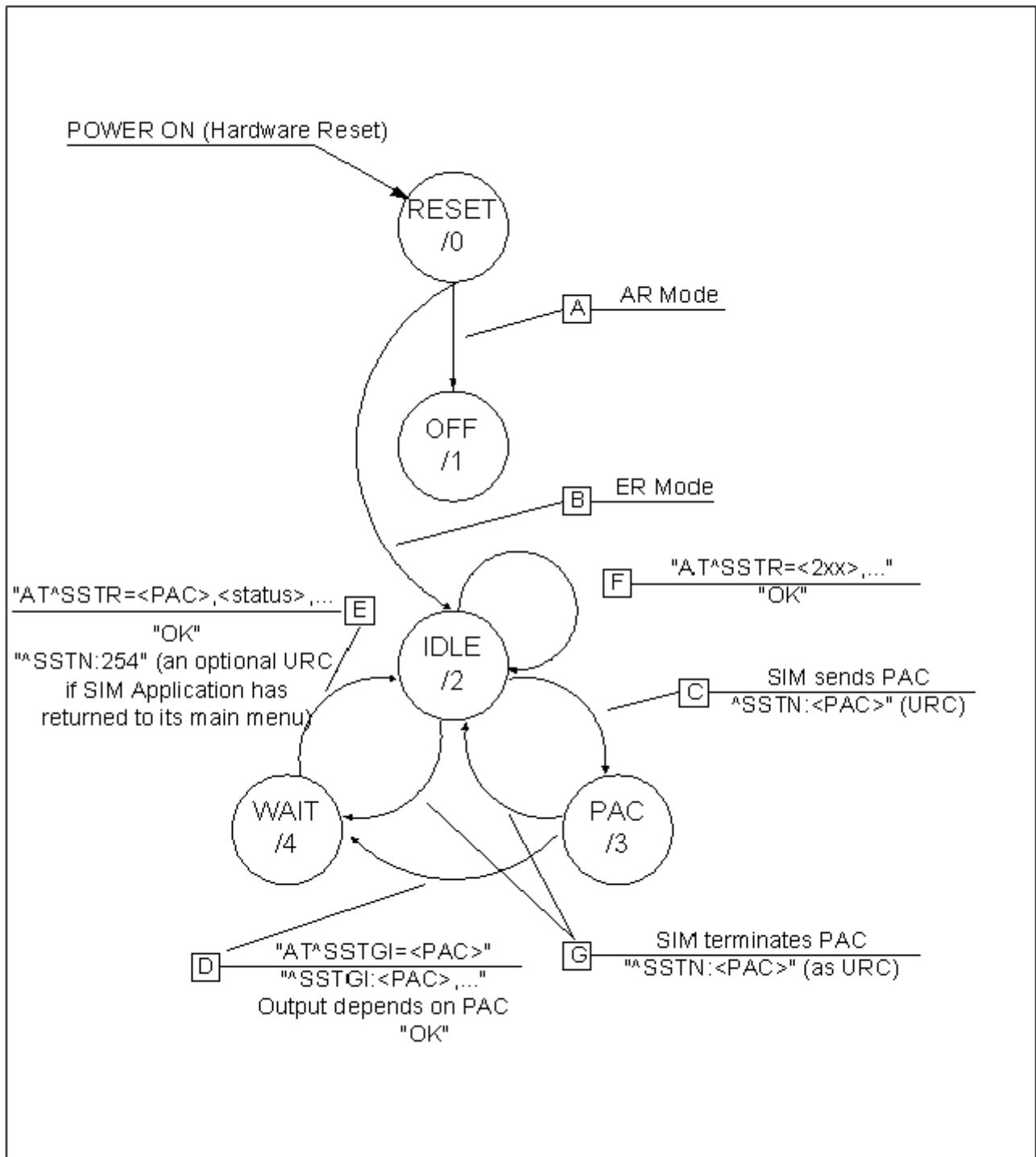


Figure 14.2: Remote-SAT State Transition Diagram

14.2.2 Remote-SAT State Transition Table

The following table outlines which AT commands can be issued during certain states. However, the test and read AT commands are available at any time. This way it is possible to determine the current state of the interface via [AT^SSTA?](#).

Meaning of options usable in column "M/O/X" of the following tables:
M: The TE has to issue the AT command to get Remote-SAT service (mandatory).
O: Usage of AT command is optional.
X: Usage of AT command is not allowed or not useful at this time and may cause an error message.

Table 14.1: State: RESET description

RESET: State after power on the UE.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	X	
^SSTR=<pac>	X	
^SSTR=<event>	X	

Table 14.2: State: OFF description

OFF: UE is in Auto Response Mode.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	X	
^SSTR=<pac>	X	
^SSTR=<event>	X	

Table 14.3: State: IDLE description

IDLE: UE is in Explicit Response Mode.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	O	Show PAC information
^SSTR=<pac>	X	
^SSTR=<event>	O	

Table 14.4: State: PAC description

PAC ¹ : SIM application has issued a proactive command. This event is signalled to the TE via ^SSTN: <cmdType>.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	M	Show PAC information
^SSTR=<pac>	X	
^SSTR=<event>	X	

Table 14.5: State: WAIT description

WAIT ¹ : SIM application is waiting for the response to the ongoing proactive command.		
AT command	M/O/X	Description
^SSTA=0,n	O	Enable AR Mode (with alphabet type <n>)
^SSTA=1,n	O	Enable ER Mode (with alphabet type <n>)
^SSTGI=<pac>	O	Show PAC information
^SSTR=<pac>	M	
^SSTR=<event>	X	

1) To limit the time Remote-SAT is kept in states PAC or WAIT, any ongoing (but unanswered) PAC will be aborted after 5 minutes automatically. For details refer to [AT^SSTA](#), parameter [<userTOut>](#).

14.3 Remote-SAT Command Types

The Command Type value (cmdType) identifies the type of command or associated response passed between the TE and the UE.

cmdType is the parameter that comes first in AT commands, in responses to `AT^SSTGI` and `AT^SSTR` commands, and in the "`^SSTN`" URC. Also, the cmdType values may be used as Next Action Indicator for the SETUP MENU and for SELECT ITEM.

USAT implementation supports SAT class 3 (as specified by 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25] Release 99, letter class "c").

Table 14.6: Command Type Table

Proactive Toolkit commands vs. Terminal Responses			
Proactive Toolkit command (<code>AT^SSTR=<cmd-Type></code>)	Terminal Response in Automatic Response Mode (see <code>AT^SSTA=0</code>)	Terminal Response user choices in Explicit Response Mode (see <code>AT^SSTR=<cmd-Type>,<status></code>)	Terminal Response after user timeout in Explicit Response Mode (see URC <code>^SSTN: <cmdTerminateValue></code>)
REFRESH (1)	0	0	0
SET UP EVENT LIST (5)	0	0, 32, 48, 132	132
SET UP CALL (16)	48	0, 4, 16, 20, 32, 34, 35, 48, 132	132
SEND SS (17)	48	0, 4, 20, 32, 48, 132	132
SEND USSD (18)	48	0, 4, 20, 32, 48, 132	132
SEND SHORT MESSAGE (19)	48	0, 4, 32, 48, 132	132
SEND DTMF (20)	48	0, 4, 16, 32, 48, 132	132
LAUNCH BROWSER (21)	48	0, 4, 32, 34, 38, 48, 132, 138, 238, 239	132
PLAY TONE (32)	48	0, 4, 16, 32, 48, 132	132
DISPLAY TEXT (33)	0	0, 4, 16, 17, 18, 32, 48, 132	132
GET INKEY (34)	48	0, 4, 16, 17, 18, 19, 32, 48, 132	18
GET INPUT (35)	48	0, 4, 16, 17, 18, 19, 32, 48, 132	18
SELECT ITEM (36)	48	0, 4, 16, 17, 18, 19, 32, 48, 132	18
SET UP MENU (37)	0	0, 4, 32, 48, 132	132
SET UP IDLE MODE TEXT (40)	0	0, 4, 32, 48, 132	132
LANGUAGE NOTIFICATION (53)	0	0	0

14.4 AT^SSTA Remote-SAT Interface Activation

AT^SSTA write command can be used to determine the Remote-SAT activation mode <mode> and, if Explicit Response mode is enabled, to activate the Remote-SAT interface. Removing and inserting the SIM does not affect the activation status.

SAT commands which are not using the AT interface (non-MMI related SAT commands, e.g. PROVIDE LOCAL INFORMATION) are executed without activating Remote-SAT.

The read command can be used to request the current operating status and the used alphabet of the Remote-SAT interface.

Syntax

```

Test Command
AT^SSTA=?
Response(s)
^SSTA: (list of supported <state>s), (list of supported <Alphabet>s)
OK

Read Command
AT^SSTA?
Response(s)
^SSTA: <state>, <Alphabet>, <allowedInstance>, <SatProfile>, <userTOut>, <AppType>
OK

Write Command
AT^SSTA=<mode>[, <Alphabet>]
Response(s)
OK
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<state>^(num)

UE Remote-SAT interface states

0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT

<Alphabet>^{(num)(NV)}

Setting becomes effective after restarting the UE.

0 ^(D)	GSM character set Input of a character requests one byte, e.g. "Y".
1	UCS2 To display the 16 bit value of characters represented in UCS2 alphabet a 4 byte string is required, e.g. "0059" is coding the character "Y". For details please refer to ISO/IEC 10646.

`<allowedInstance>`^(num)

Remote-SAT handling (i.e. "`^SSTN`" URC, `AT^SSTGI` and `AT^SSTR` sequence) is only usable via the serial channel on which the Explicit Response (ER) mode was activated.

To change the serial channel execute `AT^SSTA=1` on the desired channel and perform a restart.

- | | |
|---|----------------------------------------------------------------------------|
| 0 | Not applicable |
| 1 | SAT may be started on this instance via the write version of this command. |

`<SatProfile>`^(str)

SAT or USAT Terminal Profile according to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25]. UE supports different profiles for 2G SIM and 3G USIM applications. The type of profile issued by `AT^SSTA` read command depends on the inserted SIM or USIM.

In case of no SIM is inserted the SAT Terminal Profile will be issued.

The profile tells the SIM Application which features (e.g. Proactive Commands) are supported by the SIM Application Toolkit implementation of the UE.

`<userTOut>`^(num)

PAC user timeout in seconds.

To limit the time Remote-SAT is kept in states PAC or WAIT, any ongoing (but unanswered) proactive command will be aborted automatically after 5 minutes. In this case, the terminal response is either "ME currently unable to process command", or if applicable, "No response from user". In addition a URC "Terminate Proactive Command" will be sent to the external application.

`<AppType>`^(num)

SIM Application type.

This parameter shows the type of SIM application currently running.

- | | |
|---|-----------------------|
| 1 | 2G Application (SAT) |
| 2 | 3G Application (USAT) |

`<mode>`^{(num)(NV)}

Select Remote-SAT activation mode.

Setting becomes effective after restarting the UE. Removing and inserting the SIM does not affect the activation status.

- | | |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 ^(D) | Automatic Response (AR) mode.
All commands and responses are exchanged automatically between the UE and the SIM application. This eliminates the need to enter any Remote-SAT commands including the <code>AT^SSTA</code> command.
If AR mode is enabled the UE enters the OFF state (<code><state>=1</code>) after restart. |
| 1 | Explicit Response (ER) mode.
This mode is intended for use with an MMI. If ER mode is enabled the MMI is required to handle, via UE's Remote-SAT interface, all commands and responses transmitted to or from the SIM or USIM.
If ER mode is enabled the UE enters the IDLE state (<code><state>=2</code>) after reboot. |

14.5 ^SSTN SAT Notification

Unsolicited Result Codes

URC 1

Proactive command notification

`^SSTN: <cmdType>`

Every time the SIM Application issues an MMI relevant proactive command, via the UE, the TE will receive a notification. This indicates the type of proactive command issued.

`AT^SSTGI` must then be used by the TE to request the parameters of the proactive command from the UE. Upon receiving the `^SSTGI` response from the UE, the TE must send `AT^SSTR` to confirm the execution of the proactive command and provide any required user response, e.g. a selected menu item.

URC 2

Terminate proactive command notification

`^SSTN: <cmdTerminateValue>`

When the SIM Application has issued a proactive command to the UE, it is possible that this command will be terminated later. URC "`^SSTN`" is sent with a different proactive command type number (added terminate offset 100) to indicate the termination of the specified command.

The state changes to idle. Therefore the TE should avoid sending any further commands related to the terminated proactive command, e.g. `AT^SSTGI` or `AT^SSTR`.

URC 3

Notification to the TE when the SIM Application has finished a command cycle and does not issue a subsequent proactive command.

`^SSTN: 254`

The TE does not need to respond directly, i.e. `AT^SSTR` is not required. The next action is left as an implementation decision to the manufacturer of the Customer Application (TE). Examples:

- If a Toolkit menu "`^SSTN: 37`" (SET UP MENU) proactive command was received at startup, the customer application can return to this Toolkit menu again after receiving the "`^SSTN: 254`" URC.
- In a Windows Mobile environment, the ToolkitUI application can be closed after receiving this URC.

Important notes:

- The Idle Mode text transferred with the SET UP IDLE MODE TEXT proactive command should not be removed as a result of this URC.
- If the text transferred with the DISPLAY TEXT proactive command is coded with an immediate response object set to "1" (see parameter `<immediateResponse>` of the `AT^SSTGI=33` command), the text should not be removed as a result of this URC.

URC 4

SIM reset notification

`^SSTN: 255`

Notification to the TE indicating that the SIM is lost, e.g. if a proactive command "REFRESH - SIM Reset" has been issued by the SIM Application, please refer to `AT^SSTGI=1`.

This URC should be used to set the Customer Application to its initial state since the SIM Application will start from the beginning, too.

The TE does not need to respond directly, i.e. related `AT^SSTGI` and `AT^SSTR` are neither required nor allowed.

After reset SIM PIN authentication is required.

Parameter Description

`<cmdType>`^(num)

Proactive Command number

`<cmdTerminateValue>`^(num)

Defined as `<cmdType>` + terminate offset. The terminate offset equals 100.

14.6 AT^SSTGI SAT Get Information

Regularly this command is used upon receipt of an URC "**^SSTN**" to request the parameters of the Proactive Command.

Then the TE is expected to acknowledge the **AT^SSTGI** response with **AT^SSTR** to confirm that the Proactive Command has been executed. **AT^SSTR** will also provide any user information, e.g. a selected menu item. The Proactive Command type value specifies to which "**^SSTN**" the command is related.

Syntax

Test Command

AT^SSTGI=?

Response(s)

^SSTGI : (list of supported <state>s), (list of supported <cmdType>s)

OK

Read Command

AT^SSTGI?

Response(s)

^SSTGI : <state>, <cmdType>

OK

Write Command

AT^SSTGI=<cmdType>

Response(s)

OK

ERROR

+CME ERROR: <err>

PIN MDM APP → Last

- + + + -

Parameter Description

<state>^(num)

PHS8-P Remote-SAT interface states

0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT

<cmdType>^(num)

Related Proactive Command

14.7 AT^SSTGI SAT Get Information - Refresh (1)

The `AT^SSTGI=1` command shall be used after receiving the URC "`^SSTN: 1`". This URC notifies the TE that one or more Elementary Files on the USIM have been changed as a result of a USIM application activity, usually caused by the network provider. The response to the `AT^SSTGI=1` command indicates what type of USIM refresh has occurred. The change requires that the Elementary Files of the USIM be synchronized with the equivalent information (if any) stored inside the TE. Depending on the type of USIM refresh the TE may need to use the `AT+CRSM` command to read out the Elementary Files and store the refreshed information.

The response parameters `<pathLen>`, `<fileNum>` and `<fileList>` are mandatory if `<commandDetails>` equals 1 or 2. In all other cases they are optional and can be ignored.

Syntax

```
Write Command
AT^SSTGI=1

Response(s)
^SSTGI: <cmdType>, <commandDetails>[, <pathLen>, <fileNum>, <fileList>]
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<code><cmdType></code> ^(num)	
1	Proactive command ID, see Section 14.3, Remote-SAT Command Types and Table 14.6.
<code><commandDetails></code> ^(num)	
For every return value of <code><commandDetails></code> other than 4 (USIM Reset) the TE shall complete the proactive command cycle using <code>AT^SSTGI=1</code> .	
0	USIM Initialization and Full File Change Notification
1	File Change Notification
2	USIM Initialization and File Change Notification
3	USIM Initialization
4	Value "4" means USIM Reset, but the value itself never appears. This is because value "4" is mapped to the URC " <code>^SSTN: 255</code> " which will be sent when a USIM reset occurs. In this case, the TE does not need to respond, i.e. the USIM Refresh commands <code>AT^SSTGI</code> and <code>AT^SSTR</code> are neither required nor allowed. Instead, as the USIM application restarts, the Toolkit application inside the TE should also return to initial state after receiving the URC " <code>^SSTN: 255</code> ". For more information on USIM reset and the URC " <code>^SSTN: 255</code> " refer to Section 14.5, ^SSTN SAT Notification .
5...255	Reserved values

<code><pathLen></code> ^(num)	
Number of bytes coded in <code><fileList></code>	

<fileNum>^(num)

Number of updated Elementary Files (EF) with path given in <fileList>

<fileList>^(num)

String containing Elementary File paths. Each path contains at least two file entries; each file entry (MF, EF or DF) consists of two bytes, e.g. '3F002FE2' or '3F007F206FAD'. Every path in the file description begins with the Master File (MF). There can be any number of Dedicated File (DF) entries between Master File and Elementary File.

Example

In general, the TE only needs to take care of USIM content synchronization if it is permanently interested in the latest contents of one or more specific USIM files, e.g. because the TE has its own cache for specific USIM information. In this case, the TE needs to know exactly the paths and file IDs of these specific USIM files. Paths and file IDs can be found in 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21] and ETSI TS 102 221 [22].

When <commandDetails> equals 0, 2 or 3 or the "^SSTN: 255" notification is received (refer to Section 14.5, ^SSTN SAT Notification), the TE shall synchronize its own cache for USIM information in any case.

When <commandDetails> equals 1, reloading the USIM information is only necessary if the TE finds that an important file is included in the Refresh <fileList>. For example, assuming that the TE is always interested in the latest contents of the "FD" (Fixed Dialing) phonebook, it has to know that EF_FDN is located at path "3F00\7F10\6F3B". Then, during normal operation, the TE should always check the Refresh <fileList>, if it includes the path and file ID of EF_FDN. An example is given below:

^SYSSTART	UE has been started.
AT+CLCK="FD", 2	Request "FD" lock state.
+CLCK: 1	"FD" lock is enabled.
OK	
AT+CPBS="FD"	Select the "FD" phonebook.
OK	
AT+CPBR=1	Read first "FD" phonebook entry.
+CPBR: 1, "123", 129, "ABC"	This is the "FD" phonebook content before Refresh.
OK	
^SSTN: 1	Indicates that a SIM Refresh has occurred.
AT^SSTGI=1	Request type of SIM Refresh.
^SSTGI: 1, 1, 6, 1, "3F007F106F3B"	The Refresh <fileList> includes path and file ID 3F00\7F10\6F3B which corresponds to EF_FDN, indicating that its contents may have changed.
OK	
AT^SSTR=1, 0	Terminate the proactive command.
OK	
^SSTN: 254	Session finished.
AT+CPBR=1	Read first "FD" phonebook entry.
+CPBR: 1, "0123456789", 129, "ABC"	This is the "FD" phonebook content after the Refresh.
OK	

Please keep in mind that this process is only necessary if the TE has its own cache for SIM/USIM information (e.g. SIM/USIM phonebook is cached inside the TE). If the TE does not have a cache for USIM information (e.g. USIM phonebook is read by the TE only at the user's request, directly from the USIM), it is not necessary to synchronize the content. The TE USIM content synchronization is not required for a proper operation of the UE. As long as the TE answers the "^SSTN: 1" notification with the commands AT^SSTGI=1 and AT^SSTR=1,0, the UE will use the latest USIM contents and will continue to work flawlessly, regardless of a possible TE USIM content synchronization.

14.8 AT^SSTGI SAT Get Information - Set Up Event List (5)

This command shall be used after receiving the URC ^SSTN: 5. However, please refer to the note below.

The response informs the TE of the events that it must monitor within itself. If any of these events occur the TE must report them to the UE.

Syntax

```
Write Command
AT^SSTGI=5
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <eventList>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)
5 Proactive command ID, see Table 14.6, Command Type Table.

<commandDetails>^(num)
This byte is RFU.

<eventList>^(num)
The event list tells the TE which events have to be reported to the UE via the related commands AT^SSTR=(232, 233, 235, 236)

0...65535	Used as bit field
bit 1-4	RFU
bit 5	0: User Activity not in Event List 1: Any user activity (keyboard press) has to be signaled to the UE
bit 6	0: Idle Screen Available not in Event List 1: Any idle screen available event has to be signaled to the UE.
bit 7	RFU
bit 8	0: Language Selection not in Event List 1: Language Selection events have to be signaled to the UE.
bit 9	0: Browser Termination not in Event List 1: Browser Termination events have to be signaled to the UE
bit 10-16	RFU

Note

- It is possible to issue AT^SSTGI during states IDLE, PAC and WAIT for this proactive command without previously receiving a URC ^SSTN:<cmdType>, see AT^SSTGI.

14.9 AT^SSTGI SAT Get Information - Set Up Call (16)

This command shall be used after receiving the URC ^SSTN: 16. If the SIM Application attempts to set up a call it uses this response to inform the TE of the call parameters.

The sequence of events is as follows:

1. After the Remote-SAT notification 16 was issued the TE has to request the command parameter using AT^SSTGI=16.
2. If the SIM Application does not supply a confirmation text or icon parameter, the TE gives other information to the user, e.g. the telephone number. In this case refer to step 4.
3. If the SIM Application supplies a non empty confirmation text or icon parameter, the TE uses only these to ask the user whether or not he wishes to set up the call.
4. If the user confirms to set up the call, AT^SSTR=16,0 shall be responded.
5. If the user denies to set up the call, AT^SSTR=16,34 shall be responded.
6. After confirmation phase the TE may present a dialing animation on the screen until a mandatory parameter line ^SSTR: 16, <TermQualifier>, <TerminationCauseText> is issued.
7. If <TermQualifier> is not equal to 0 the call setup process has not been successfully. If <TerminationCauseText> is not an empty string, this text shall be shown to the user for an appropriate time, e.g. 2 seconds. The text contains information regarding the dial termination cause, e.g. call barring through Call Control by SIM mechanism. If <TerminationCauseText> is an empty string, the TE shall give an own indication to the user.
8. If <TermQualifier> is equal to 0, the call setup process has been started: If <TerminationCauseText> is not an empty string, this text shall be used to inform the user during the call setup. If <TerminationCauseText> is an empty string, <callSetupText> and/or <confirmationIconId> shall be used to inform the user during call setup. However, if <callSetupText> contains no data, too, no indication shall be shown.
9. The TE shall give the user an opportunity to end an ongoing call, set up by the Proactive Command. In this case the TE shall issue an ATH command to the UE.

Syntax

```
Write Command
AT^SSTGI=16
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <confirmationText>, <calledNumber>,
<callSetupText>, <confirmationIconQualifier>, <confirmationIconId>,
<callSetupIconQualifier>, <callSetupIconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType> ^(num)	
16	Proactive command ID, see Table 14.6, Command Type Table .
<commandDetails> ^(num)	
0	Set up call, but only if not currently busy on another call
1	Set up call, but only if not currently busy on another call, with redial
2	Set up call, putting all other calls (if any) on hold
3	Set up call, putting all other calls (if any) on hold, with redial
4	Set up call, disconnecting all other calls (if any)

5 Set up call, disconnecting all other calls (if any), with redial
6...255 Reserved Values

`<confirmationText>`^(str)

String for user confirmation stage

`<calledNumber>`^(num)

String containing called number

`<callSetupText>`^(str)

String for call set up stage

`<confirmationIconQualifier>`^(num)

0...255 Used as bit field

bit 1 0: Icon is self explanatory and replaces text

1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).

bit 2-8 RFU

`<confirmationIconId>`^(num)

0...255

0 No Icon

`<callSetupIconQualifier>`^(num)

0...255 Used as bit field

bit 1 0: Icon is self explanatory and replaces text

1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).

bit 2-8 RFU

`<callSetupIconId>`^(num)

0...255

0 No Icon

Note

- If the Fixed Dialling Number service is enabled, the number included in the SET UP CALL proactive command shall not be checked against those of the FDN list.

14.10 AT^SSTGI SAT Get Information - Send SS (17)

This command shall be used after receiving the URC ^SSTN: 17
The module is sending a supplementary service request to the network, and is alerting the user of this. Text and an icon identifier shall be passed to the TE to display to the user.

Syntax

```
Write Command
AT^SSTGI=17
Response(s)
^SSTGI: <cmdType>[, <commandDetails>][, <text>], <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType> ^(num)	
17	Proactive command ID, see Table 14.6, Command Type Table .
<commandDetails> ^(num)	
This byte is RFU.	
<text> ^(str)	
String to provide the user with information. If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is sending an SS request. If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.	
<iconQualifier> ^(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU
<iconId> ^(num)	
0...255	
0	No Icon

14.11 AT^SSTGI SAT Get Information - Send USSD (18)

This command shall be used after receiving the URC ^SSTN: 18
The module is sending an unstructured supplementary service request to the network, and is alerting the user of this.

Text and an icon identifier shall be passed to the TE to display to the user.

Syntax

```
Write Command
AT^SSTGI=18
Response(s)
^SSTGI: <cmdType>[, <commandDetails>][, <text>], <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)
18 Proactive command ID, see Table 14.6, Command Type Table.

<commandDetails>^(num)
This byte is RFU.

<text>^(str)
String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is sending a USSD request.
If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

<iconQualifier>^(num)
0...255 Used as bit field
bit 1 0: Icon is self explanatory and replaces text
1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8 RFU

<iconId>^(num)
0...255
0 No Icon

14.12 AT^SSTGI SAT Get Information - Send Short Message (19)

This command shall be used after receiving the URC ^SSTN: 19
The SIM Application is sending a Short Message and the TE is informed of this. The user can be passed a string containing information to display.

Syntax

```
Write Command
AT^SSTGI=19
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <textInfo>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)	
19	Proactive command ID, see Table 14.6, Command Type Table .
<commandDetails>^(num)	
This byte is RFU.	
<textInfo>^(str)	
String to provide the user with information. If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is sending a short message. If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.	
<iconQualifier>^(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU
<iconId>^(num)	
0...255	
0	No Icon
1	An icon is provided by the SIM, the icon indicated in the command may be used by the UE to inform the user, in addition to, or instead of the alpha identifier, as indicated with the icon qualifier.

14.13 AT^SSTGI SAT Get Information - Send DTMF (20)

This command shall be used after receiving the URC ^SSTN: 20

The SIM Application is sending DTMF tones to the network, and can provide the TE with some information about this.

Text and an icon identifier can be passed to the TE to display to the user.

Syntax

```
Write Command
AT^SSTGI=20
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)
20 Proactive command ID, see Table 14.6, [Command Type Table](#).

<commandDetails>^(num)
This byte is RFU.

<text>^(str)
String to provide the user with information.
If the string is provided by the SIM, the TE shall use it to inform the user. This is also an indication that the TE should not give any other information to the user on the fact that the UE is performing a SEND DTMF command. If the alpha identifier is not provided by the SIM, the UE may give information to the user concerning what is happening.

<iconQualifier>^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>^(num)

0...255	
0	No Icon

14.14 AT^SSTGI SAT Get Information - Launch Browser (21)

This command shall be used after receiving the URC ^SSTN: 21.
If the SIM Application attempts to start an Internet Browser, it uses this response to inform the TE of the launch parameters.

The sequence of events is as follows:

1. After the Remote-SAT notification 21 was issued the TE shall ask for the command parameters via AT^SSTGI=21.
2. The UE shall ask the user for confirmation using the Alpha Identifier/Icon Identifier (user confirmation phase) if present, when it receives a LAUNCH BROWSER command which requests to connect the existing browser session to a new URL or to terminate a browser session.
3. If the user confirms to start the browser, AT^SSTR=21,0 shall be responded.
4. If the user denies to start the browser, AT^SSTR=21,34 shall be responded.
5. The SIM Application will end the proactive session.
6. The UE shall request content using the given URL. However, if no URL string is supplied a default URL shall be used.
7. On response AT^SSTR=21,0 the browser session may still be active while a next proactive command is issued. Therefore the end of the browser session shall be reported to the UE via browser termination event command asynchronously if determined by the event list.

For details please refer to [AT^SSTR](#).

Syntax

```
Write Command
AT^SSTGI=21
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <confirmationText>,
<confirmationIconQualifier>, <iconId>, <browserIdentity>, <url>, <bearerList>,
<fileRefList>, <gatewayIdentity>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)	
21	Proactive command ID, see Remote-SAT Command Types
<commandDetails>^(num)	
This byte is RFU.	
<confirmationText>^(str)	
String for user confirmation stage	
<confirmationIconQualifier>^(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text

1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).

bit 2-8 RFU

`<iconId>`^(num)

0...255

0 No Icon

`<browserIdentity>`^(num)

0...255

Browser to be used

0 Default Browser shall be used.

1...255 RFU

`<url>`^(str)

String containing URL to be used by the TE to request content. The way the UE requests content using the URL is out of the scope of the present document. This is specified in RFC 1738 Annex K for example.

`<bearerList>`^(str)

"00" SMS

"01" CSD

"02" USSD

"03" GPRS

04...FF RFU

`<fileRefList>`^(str)

String containing full path to the provisioning file. The first byte contains the number of files. Every comma separated path is the concatenation of file identifiers starting from the Master File (e.g. 3F007F206FX). The file contains a single unambiguous set of parameters required to make the connection. The content of the file is expected to be consistent with the format defined for provisioning information for the requested type of browser.

`<gatewayIdentity>`^(str)

String containing the Gateway/Proxy Identity which gives to the mobile the name/identity of the Gateway/Proxy to be used for connecting to the URL. This Gateway/Proxy identity is required when the bearer data object is present.

14.15 AT^SSTGI SAT Get Information - Play Tone (32)

This command shall be used after receiving the URC ^SSTN: 32. The UE has been instructed to generate an audible tone, and may pass to the TE some information to support this.

Syntax

```
Write Command
AT^SSTGI=32
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <infoText>, <tone>, <durationUnit>, <duration>,
<iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType> ^(num)	
32	Proactive command ID, see Remote-SAT Command Types
<commandDetails> ^(num)	
This byte is RFU.	
<infoText> ^(str)	
String to accompany tone	
<tone> ^(str)	
Tone generated by the UE	
01...08	Standard supervisory tones:
“01”	Dial tone
“02”	Called subscriber busy
“03”	Congestion
“04”	Radio path acknowledge
“05”	Radio path not available / Call dropped
“06”	Error / Special information
“07”	Call waiting tone
“08”	Ringing tone
16...18	UE proprietary tones:
“16”	General beep
“17”	Positive acknowledgement tone
“18”	Negative acknowledgement or error tone

<durationUnit>^(num)

0	Minutes
1	Seconds
2	Tenth of Seconds

<duration>^(num)

1...255	Duration of tone, expressed in units
---------	--------------------------------------

<iconQualifier>^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>^(num)

0...255	
0	No Icon

14.16 AT^SSTGI SAT Get Information - Display Text (33)

This command shall be used after receiving the URC ^SSTN: 33. The TE gets a message to be displayed to the user. The message can have different display characteristics.

Syntax

```

Write Command
AT^SSTGI=33
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <text>, <immediateResponse>, <iconQualifier>,
<iconId>
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)	
33	Proactive command ID, see Section 14.3, Remote-SAT Command Types and Table 14.6.
<commandDetails>^(num)	
0...255	Used as bit field
bit 1	0: Normal priority (see note). 1: High priority (see note).
bit 2-7	RFU
bit 8	0: Clear message after a delay. 1: Wait for user to clear message.
<text>^(str)	
String to be displayed	
<immediateResponse>^(num)	
This parameter indicates whether the UE should sustain the display beyond sending the TERMINAL RESPONSE.	
0	Send TERMINAL RESPONSE when text is cleared from screen.
1	Send TERMINAL RESPONSE immediately and continue to display the text until one of the following events occurs: <ul style="list-style-type: none"> • A subsequent proactive command is received, containing display data. • A short delay notified with <commandDetails> has expired. • User intervention.

- A higher priority event occurs, e.g. a mobile terminated call.

No further TERMINAL RESPONSE shall be sent when the UE removes the text from the display, regardless of the cause.

If the `<immediateResponse>` parameter equals "1" the subsequent "`^SSTN: 254`" URC should not be used to clear the text from the screen - in this case the text should remain on the screen until one of the above events occurs.

`<iconQualifier>`^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text. 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

`<iconId>`^(num)

0...255	
0	No Icon

Notes

- The MMI shall reject normal priority text commands if the screen is currently used for more than its normal standby display, e.g. if the MMI is in sub-menu. If the command is rejected, the MMI sends the TERMINAL RESPONSE message to the SIM (UE currently unable to process command - screen busy).
- High priority text shall be displayed on the screen immediately, except if a priority conflict of the alerting events occurs, e.g. incoming call, see 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

14.17 AT^SSTGI SAT Get Information - Get Inkey (34)

This command shall be used after receiving the URC ^SSTN: 34.
The TE is asked to prompt the user for an input, which is a single character. Help can be requested by the user, if available.

Syntax

```
Write Command
AT^SSTGI=34

Response(s)
^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)
34 Proactive command ID, see [Remote-SAT Command Types](#)

<commandDetails>^(num)

0...255	Used as bit field
bit 1	0: Digits only (0 9, *, # and +) 1: Alphabet set
bit 2	0: SMS default alphabet (GSM character set) 1: UCS2 alphabet
bit 3	0: Character sets defined by bit 1 and bit 2 are enabled 1: Character sets defined by bit 1 and bit 2 are disabled and the "Yes/No" response is requested
bit 4-7	RFU
bit 8	0: No help information available 1: Help information available

<text>^(str)
String as prompt for text.

<iconQualifier>^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>^(num)

0...255

0

No Icon

14.18 AT^SSTGI SAT Get Information - Get Input (35)

This command shall be used after receiving the URC ^SSTN: 35.
The TE is asked to prompt the user for an input, of a specified length and type, e.g. digits only. Help can be requested by the user, if available.

Syntax

```
Write Command
AT^SSTGI=35
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <text>, <responseMin>, <responseMax>[,
<defaultText>], <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	✈	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)
35 Proactive command ID, see [Remote-SAT Command Types](#)

<commandDetails>^(num)

0...255	Used as bit field
bit 1	0: Digits only (0 9, *, # and +) 1: Alphabet set
bit 2	0: SMS default alphabet (GSM character set) 1: UCS2 alphabet
bit 3	0: UE may echo user input on the display 1: User input shall not be revealed in any way (see note)
bit 4	0: User input to be in unpacked format 1: User input to be in SMS packed format
bit 5-7	RFU
bit 8	0: No help information available 1: Help information available

<text>^(str)
String as prompt for text

<responseMin>^(num)
0...255 Minimum length of user input.

<responseMax>^(num)
0...255 Maximum length of user input.

<defaultText>^(str)

String supplied as default response text

<iconQualifier>^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<iconId>^(num)

0...255	
0	No Icon

Note

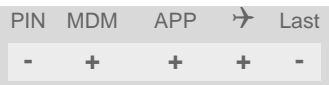
- Hidden entry mode (see 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25]) is only available when using digit input. In hidden entry mode only characters ('0', '9', '*' and '#') are allowed.

14.19 AT^SSTGI SAT Get Information - Select Item (36)

This command shall be used after receiving the URC ^SSTN: 36. The TE is supplied with a list of items allowing the user to select one. Help can be requested by the user, if available and the presentation style is specified. In addition to text strings and icon identifiers, a next action indicator informs the user of the likely result of selecting a chosen item.

Syntax

```
Write Command
AT^SSTGI=36
Response(s)
The first line of output from the ME is:
^SSTGI: <cmdType>, <commandDetails>, <numOfItems>, <titleText>, <defaultItemId>,
<itemIconsPresent>, <itemIconsQualifier>, <titleIconQualifier>, <titleIconId>
One line follows for every item, repeated for <numOfItems>:
^SSTGI: <cmdType>, <itemId>, <itemText>, <nextActionId>, <iconId>
OK
ERROR
+CME ERROR: <err>
```



Parameter Description

<cmdType>^(num)	
36	Proactive command ID, see Remote-SAT Command Types
<commandDetails>^(num)	
0...255	Used as bit field
bit 1	0: Presentation type is not specified 1: Presentation type is specified in bit 2
bit 2	0: Presentation as a choice of data values, if bit 1 = '1' 1: Presentation as a choice of navigation options if bit 1 is '1'
bit 3	0: No selection preference 1: Selection using soft key preferred
bit 4-7	RFU
bit 8	0: No help information available 1: Help information available
<numOfItems>^(num)	
Number of items in the list	
<titleText>^(str)	
String giving menu title	

<defaultItemId>^(num)

ID of default item

The SIM may supply with the list an indication of the default item, e.g. the previously selected item

0	No default item issued by the SIM application
1...255	Id of the default Item

<itemIconsPresent>^(num)

0	No icons
1	Icons present

<itemIconsQualifier>^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<titleIconQualifier>^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<titleIconId>^(num)

0...255	
0	No Icon

<itemId>^(num)

Item identifier (1 - [<numOfItems>](#))

<itemText>^(str)

String giving menu title

<nextActionId>^(num)

The next proactive command type to be issued upon execution of the menu item. See [Remote-SAT Command Types](#)

0	Next Action information available
---	-----------------------------------

<iconId>^(num)

0...255	
0	No Icon

14.20 AT^SSTGI SAT Get Information - Set up Menu (37)

This command shall be used after receiving the URC ^SSTN: 37. The response provides the main menu of the SIM Application to the TE. It needs to be stored by the TE so that it can be displayed without invoking a proactive session.

As with every proactive command the TE is expected to acknowledge the ^SSTGI response with AT^SSTR to confirm that the proactive command has been executed.

Terminal Response via AT^SSTR will not provide any user information in case of this proactive command. Refer to [AT^SSTR](#).

AT^SSTGI can be issued during states IDLE, PAC and WAIT for this proactive command without previously receiving a URC ^SSTN:<cmdType>, see [AT^SSTGI](#).

Syntax

```

Write Command
AT^SSTGI=37
Response(s)
The first line of output from the ME is:
^SSTGI: <cmdType>, <commandDetails>, <numOfItems>, <titleText>,
<menuItemIconsPresent>, <menuItemIconsQualifier>, <titleIconQualifier>,
<titleIconId>
One line follows for every item, repeated for <numOfItems>:
^SSTGI: <cmdType>, <itemId>, <itemText>, <nextActionId>, <iconId>
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)	
37	Proactive command ID, see Remote-SAT Command Types
<commandDetails>^(num)	
0...255	Used as bit field
bit 1	0: No selection preference 1: Selection using soft key preferred
bit 2-7	RFU
bit 8	0: No help information available 1: Help information available
<numOfItems>^(num)	
Number of menu items in the list	
<titleText>^(str)	
String displaying menu title	

<menuItemIconsPresent>^(num)

0	No icons
1	Icons present

<menuItemIconsQualifier>^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<titleIconQualifier>^(num)

0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU

<titleIconId>^(num)

0...255	
0	No Icon

<itemId>^(num)

Menu item identifier (1 - <numOfItems>)

<itemText>^(str)

Title of menu item

<nextActionId>^(num)

The next proactive command type to be issued upon execution of the menu item. See [Remote-SAT Command Types](#)

0	No next Action information available
---	--------------------------------------

<iconId>^(num)

0...255	
0	No Icon

14.21 AT^SSTGI SAT Get Information - Set up Idle Mode Text (40)

This command shall be used after receiving the URC ^SSTN: 40. It provides text and optionally an icon to be displayed by the TE when the display is Idle.

Syntax

```

Write Command
AT^SSTGI=40
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <text>, <iconQualifier>, <iconId>
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cmdType>^(num)	
40	Proactive command ID, see Remote-SAT Command Types
<commandDetails>^(num)	
This byte is RFU.	
<text>^(str)	
Text to be displayed when TE in IDLE mode	
<iconQualifier>^(num)	
0...255	Used as bit field
bit 1	0: Icon is self explanatory and replaces text 1: Icon is not self-explanatory and shall be displayed with the text Determined value only if associated icon ID is not 0 (an icon exists).
bit 2-8	RFU
<iconId>^(num)	
0...255	
0	No Icon

Note

- AT^SSTGI can be issued during states IDLE, PAC and WAIT for this proactive command without previously receiving a URC ^SSTN:<cmdType>, see AT^SSTGI.

14.22 AT^SSTGI SAT Get Information - Language Notification (53)

This command shall be used after receiving the URC ^SSTN: 53.

It provides text to inform the TE about the language currently used for any text string within proactive commands or envelope command responses.

The notified language remains valid until the end of the card session or upon executing another LANGUAGE NOTIFICATION command.

If the Toolkit application is not aware of the currently selected language, no specific language or several languages will be used. The SIM may notify non-specific language. All LANGUAGE NOTIFICATION previously made will be cancelled.

Two types of language notification are defined:

- specific, where a two-character language notification is issued in `<langText>`,
- non-specific, where no language notification is issued, i.e. `<langText>` is an empty string.

The TE may use the language included in LANGUAGE NOTIFICATION as appropriate. For instance, this could be done to avoid a mix of languages in screen displays combining UE MMI and SIM Toolkit originating text strings.

Syntax

```
Write Command
AT^SSTGI=53
Response(s)
^SSTGI: <cmdType>, <commandDetails>, <langText>
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<code><cmdType></code> ^(num)	
53	Proactive command ID, see Remote-SAT Command Types
<code><commandDetails></code> ^(num)	
0...255	Used as bit field
bit 1	0: non-specific language notification 1: specific language notification
bit 2-8	RFU
<code><langText></code> ^(str)	
Language code string provided as a pair of alpha-numeric characters, defined in ISO 639. Each alphanumeric character is coded on one byte using the SMS default 7-bit coded alphabet as defined in 3GPP TS 23.038[37].	

Note

- AT^SSTGI can be issued during states IDLE, PAC and WAIT for this proactive command without previously receiving a URC ^SSTN:<cmdType>, see AT^SSTGI.

14.23 AT^SSTR SAT Response

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed. `AT^SSTR` will also provide any user information, e.g. a selected menu item.

Syntax

<p>Test Command</p> <pre>AT^SSTR=?</pre> <p>Response(s)</p> <pre>^SSTR: (list of supported <state>s), (list of supported <cmdType>s) OK</pre>										
<p>Read Command</p> <pre>AT^SSTR?</pre> <p>Response(s)</p> <pre>^SSTR: <state>, <cmdType> OK</pre>										
<p>Write Command</p> <pre>AT^SSTR=<cmdType>, <status>[, <inputNumber>][, <inputString>][, <statAddInfo>]</pre> <p>Response(s)</p> <pre>^SSTR: <cmdType>[, <TerminationQualifier>, <TerminationCauseText>] OK</pre>										
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-
PIN	MDM	APP	→	Last						
-	+	+	+	-						

Parameter Description

<code><state></code> ^(num)	
PHS8-P Remote-SAT interface states	
0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT
<code><cmdType></code> ^(num)	
Number related to Proactive Command or event type according to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
<code><TerminationQualifier></code> ^(num)	
0	The proactive command has been successfully finished.
1...255	The proactive command did not perform successfully.

`<TerminationCauseText>`^(str)

This text has to be shown to the user for an appropriate time, e.g. 2 seconds. The text contains information regarding the termination cause, e.g. in case of a failed dialing process call barring through Call Control by SIM mechanism may be indicated.

If `<TerminationCauseText>` is an empty string and `<TerminationQualifier>` is not equal to 0, the TE may give an own indication to the user.

`<status>`^(num)

Command status return regarding the type of action that has taken place, e.g. action performed by the user. Values are in accordance with 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

`<inputNumber>`^(num)

Response number entered by user

`<inputString>`^(str)

Response string entered by user

`<statAddInfo>`^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

14.24 AT^SSTR SAT Response - Refresh (1)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=1, <status>, [, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<code><status></code> ^(num)	
0...255	
0	Command performed successfully
<code><statAddInfo></code> ^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
0...255	

Note

- The refresh action (SIM data cache update) will be performed in any case, i.e. `<status>` values other than 0 will be ignored.

14.25 AT^SSTR SAT Response - Set Up Event List (5)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed. The TE acknowledges that the event list has been set up correctly.

Syntax

Write Command

```
AT^SSTR=5, <status>, [, <statAddInfo>]
```

Response(s)

```
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

`<status>`^(num)

0...255

0	Command performed successfully
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

`<statAddInfo>`^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

0...255

14.26 AT^SSTR SAT Response - Set Up Call (16)

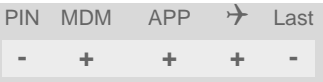
The TE is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

```

Write Command
AT^SSTR=16, <status>, [, <statAddInfo>]
Response(s)
^SSTR: 16, <TerminationQualifier>, <TerminationCauseText>
OK

```



Parameter Description

<status>^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
20	USSD/SS Transact terminated by user
32	UE currently unable to process command
34	User did not accept the proactive command. Indicate that the user has denied the call request
35	User cleared down call before connection or network release
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<statAddInfo>^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
0...255	

Note

- After confirmation phase the TE may show a dialling animation on the screen until a mandatory response parameter is issued.
^SSTR: <cmdType>, <TerminationQualifier>, <TerminationCauseText>

14.27 AT^SSTR SAT Response - Send SS (17)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed.

Syntax

Write Command

```
AT^SSTR=17, <status>, [, <statAddInfo>]
```

Response(s)

```
^SSTR: 17, <TerminationQualifier>, <TerminationCauseText>
```

```
OK
```

PIN MDM APP → Last

- + + + -

Parameter Description

<status>^(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the SS request.
4	Command performed successfully, but requested icon could not be displayed.
20	USSD/SS Transact terminated by user
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<statAddInfo>^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

0...255

14.28 AT^SSTR SAT Response - Send USSD (18)

The TE is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=18, <status>, [, <statAddInfo>]
Response(s)
^SSTR: 18, <TerminationQualifier>, <TerminationCauseText>
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<status> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the USSD request.
4	Command performed successfully, but requested icon could not be displayed.
20	USSD/SS Transact terminated by user
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<statAddInfo> ^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
0...255	

14.29 AT^SSTR SAT Response - Send Short Message (19)

The TE is expected to acknowledge the [AT^SSTGI](#) response with [AT^SSTR](#) to confirm that the Proactive Command has been executed.

Syntax

Write Command

```
AT^SSTR=19, <status>[, , , <statAddInfo>]
```

Response(s)

```
^SSTR: 19, <TerminationQualifier>, <TerminationCauseText>
```

```
OK
```

PIN MDM APP → Last

- + + + -

Parameter Description

<status>^(num)

0...255

0	Command performed successfully. Indicate that the user has accepted the Send SMS request.
4	Command performed successfully, but requested icon could not be displayed.
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<statAddInfo>^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

0...255

14.30 AT^SSTR SAT Response - Send DTMF (20)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=20, <status>, [, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<code><status></code> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the Send DTMF request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<code><statAddInfo></code> ^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
0...255	

14.31 AT^SSTR SAT Response - Launch Browser (21)

The TE is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=21, <status>, [, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<status> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the Launch Browser request.
4	Command performed successfully, but requested icon could not be displayed.
32	UE currently unable to process command
34	User did not accept the proactive command. Indicate that the user has denied the Launch Browser request
38	Launch Browser generic error with additional information "No specific cause can be given".
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy
138	Launch Browser generic error with additional information "Bearer unavailable".
238	Launch Browser generic error with additional information "Browser unavailable".
239	Launch Browser generic error with additional information "UE unable to read the provisioning data".

<statAddInfo> ^(num)	
For the general result "Launch Browser generic error code", it is mandatory for the UE to provide additional information.	
0...255	
0	"No specific cause can be given"
1	"Bearer unavailable"
2	"Browser unavailable"
3	"UE unable to read the provisioning data"

14.32 AT^SSTR SAT Response - Play Tone (32)

The TE is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=32, <status>, [, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<status> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session was terminated by user.
32	UE or TE currently unable to process command.
48	Command beyond UE's (respectively TE's) capabilities.
132	TE currently unable to process command because screen is busy.

<statAddInfo> ^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
0...255	

Note

- This command starts playing the tone by the UE. It is possible for the TE to stop playing the tone via user break, i.e. issue any character whilst the command is running.

14.33 AT^SSTR SAT Response - Display Text (33)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=33, <status>, [, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<code><status></code> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<code><statAddInfo></code> ^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
0...255	

14.34 AT^SSTR SAT Response - Get Inkey (34)

The TE is expected to acknowledge the [AT^SSTGI](#) response with [AT^SSTR](#) to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=34, <status>, , <inputString>[, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<status> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
19	Help information required by the user
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<inputString>^(str)
User response entered as a string parameter

<statAddInfo>^(num)
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].
0...255

Notes

- Coding of any input character is related to the selected alphabet:
 - Input of a character in case of GSM character set requests one byte, e.g. "Y".
 - Input of any characters in UCS2 alphabet requests a 4 byte set, e.g. "0059" is coding the same character "Y".
 - If, as a user response, a binary choice (Yes/No) is requested by the SIM application using bit 3 of the [<commandDetails>](#) parameter the valid content of the [<inputString>](#) is:
 - a) GSM alphabet: "Y" or "y" (positive answer) and "N" or "n" (negative answer).
 - b) UCS2 alphabet "0079" or "0059" (positive answer) and "006E" or "004E" (negative answer). For more detailed information refer to [AT^SSTGI](#).
 - Coding of an empty string is done as a "\1b" string with every alphabet.

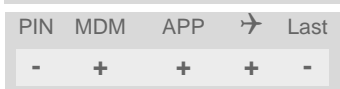
- The `<Alphabet>` parameter of `AT^SSTA` determines the alphabet used on the AT command interface, while the value reported by the `<commandDetails>` bit 2 of the `AT^SSTGI=34` command determines the set of characters allowed. If these alphabet settings are different, the following applies:
Example: If UCS2 alphabet is selected with `AT^SSTA` and the `<commandDetails>` bit 2 of the `AT^SSTGI=34` command is reported as "SMS default alphabet (GSM character set)" any input has to be done in UCS2 alphabet. However, take care to enter only UCS2 characters for which equivalent characters are defined in the SMS (GSM) default alphabet. In this case, the ME will correctly translate the given UCS2 data into a TERMINAL RESPONSE coded in SMS (GSM) default alphabet. See also Section 1.8.2, [UCS2 and GSM character coding and conversion](#).

14.35 AT^SSTR SAT Response - Get Input (35)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=35, <status>, , <inputString>[, <statAddInfo>]
Response(s)
OK
```



Parameter Description

`<status>`^(num)

0...255	
0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
19	Help information required by the user
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

`<inputString>`^(str)

User response entered as a string, length depends on the `<responseMin>` and `<responseMax>` values returned by the related `AT^SSTGI=35` command.

`<statAddInfo>`^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

0...255

Notes

- Coding of any input character is related to the selected alphabet:
 - Input of a character in case of GSM character set requests one byte, e.g. "Y".
 - Input of any characters in UCS2 alphabet requests a 4 byte set, e.g. "0059" is coding the same character "Y".
 - Coding of an empty string is done as a "\1b" string with every alphabet.

- The `<Alphabet>` parameter of `AT^SSTA` determines the alphabet used on the AT command interface, while the value reported by the `<commandDetails>` bit 2 of the `AT^SSTGI=35` command determines the set of characters allowed. If these alphabet settings are different, the following applies:
Example: If UCS2 alphabet is selected with `AT^SSTA` and the `<commandDetails>` bit 2 of the `AT^SSTGI=35` command is reported as "SMS default alphabet (GSM character set)" any input has to be done in UCS2 alphabet. However, take care to enter only UCS2 characters for which equivalent characters are defined in the SMS (GSM) default alphabet. In this case, the UE will correctly translate the given UCS2 data into a TERMINAL RESPONSE coded in SMS (GSM) default alphabet. See also Section 1.8.2, [UCS2 and GSM character coding and conversion](#).

14.36 AT^SSTR SAT Response - Select Item (36)

The TE is expected to acknowledge the AT^SSTGI response with AT^SSTR to confirm that the Proactive Command has been executed. The TE sends a response that can indicate the user's intentions, e.g. when the user is requesting help or selecting a menu item.

For compatibility reasons <itemId> is optional in case of <status>=19 ("Help information required by the user"). In this case <itemId>=0 is sent to the USIM.

Syntax

```
Write Command
AT^SSTR=36, <status>, <itemId>[, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<status> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
16	Proactive SIM session terminated by user
17	Backward move in the proactive SIM session requested by the user
18	No response from user
19	Help information required by the user
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<itemId> ^(num)	
Item IDs are supplied by the SIM Application	
1...255	ID of selected item can be issued if a <status> value of 0 is returned

<statAddInfo> ^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
0...255	

14.37 AT^SSTR SAT Response - Setup Menu (37)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=37, <status>, [, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<code><status></code> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

<code><statAddInfo></code> ^(num)	
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].	
0...255	

Note

- The response simply conveys, to the SAT, the information that the main menu was received and set up on the user interface. It does not transmit any information about a selected item, like in the case of `AT^SSTR`.

Once this command was executed the user can proceed as described in the `AT^SSTR` SAT Response - Setup Menu (37).

14.38 AT^SSTR SAT Response - Set Up Idle Mode Text (40)

The TE is expected to acknowledge the `AT^SSTGI` response with `AT^SSTR` to confirm that the Proactive Command has been executed.

Syntax

```
Write Command
AT^SSTR=40, <status>, [, <statAddInfo>]
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<code><status></code> ^(num)	
0...255	
0	Command performed successfully. Indicate that the user has accepted the call request.
4	Command performed successfully, but requested icon could not be displayed.
32	UE currently unable to process command
48	Command beyond UE's capabilities
132	UE currently unable to process command because screen is busy

`<statAddInfo>`^(num)
Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].
0...255

14.39 AT^SSTR SAT Response - Language Notification (53)

The TE is expected to acknowledge the [AT^SSTGI](#) response with [AT^SSTR](#) to confirm that the Proactive Command has been executed. The TE indicates whether the Language Notification command was correctly executed.

Syntax

Write Command

```
AT^SSTR=53, <status>, [, <statAddInfo>]
```

Response(s)

```
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<status>^(num)

0...255

0

Command performed successfully. Indicate that the user has accepted the call request.

<statAddInfo>^(num)

Optional additional command status; for possible values refer to 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25].

0...255

14.40 AT^SSTR SAT Event - Menu Selection (211)

The TE specifies the user's selection of an item from the main menu, which was set up using SETUP MENU command. Alternatively help can be requested.

Syntax

Write Command

```
AT^SSTR=211, <status>, <itemId>
```

Response(s)

```
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<status>^(num)

0...255

0 Command performed successfully.

19 Help information required by the user, no other value can be returned.

<itemId>^(num)

ID of selected item

0...255

14.41 AT^SSTR SAT Event - User Activity (232)

Sent by the customer application to indicate that a key has been pressed.

Syntax

Write Command

```
AT^SSTR=232
```

Response(s)

```
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

14.42 AT^SSTR SAT Event - Idle Screen Available (233)

Sent by the customer application to indicate that the screen has become idle.

Syntax

Write Command

```
AT^SSTR=233
```

Response(s)

```
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

14.43 AT^SSTR SAT Event - Language Selection (235)

Sent by the customer application to indicate that the customer application has changed the language. The last value given via this command is also provided to the SIM as response to the proactive command "Provide Local Information (Language Setting)".

Syntax

Write Command

```
AT^SSTR=235,, , <inputString>
```

Response(s)

```
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<inputString>^(str)

Two character language tag, e.g. "en" for English or "de" for German. Default value is "en".

14.44 AT^SSTR SAT Event - Browser Termination (236)

Sent by the customer application to indicate that the internet browser application has been terminated.

Syntax

```
Write Command
AT^SSTR=236, , , <TermCause>
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<TermCause> ^(num)	
Browser Termination Cause	
0...255	
0	User termination
1	Error termination

14.45 AT^SSTR SAT Event - Terminate Command (254)

This command allows the TE to finish an ongoing proactive command session. As a result, the UE will attempt to return to IDLE mode. This is done by sending repeatedly a Terminal Response ("ME currently unable to process command") to the SIM (see 3GPP TS 11.14 [23], 3GPP TS 31.111 [24], ETSI TS 102 223 [25]), if issued in states PAC or WAIT. No action is performed if the interface is already in IDLE state, however, the command returns "OK".

The reaction to the Terminal Response depends on the SIM application: The UE may either be kept in IDLE state or requested to perform another action.

Syntax

```
Write Command
AT^SSTR=254
Response(s)
OK
```

PIN	MDM	APP	→	Last
-	+	+	+	-

14.46 Examples for Using Remote-SAT

To give you an idea of how to start and use Remote-SAT, you may follow the steps described below:

```
// Start after switch on the module
at
OK

// Switch on verbose error messages
at+cmee=2
OK

// Enter the PIN code (if necessary due to SIM configuration)
at+cpin=1234
OK

// Query the Remote-SAT activation status
at^ssta?
^SSTA: 1,0,1,"7FFFFFFF7F0300DFFF",300,1
OK
// First '1' indicates that the interface is in OFF state, i.e. the Automatic Response (AR) mode is enabled. During
this mode all SAT Proactive Commands are handled internally by the UE.

// Tell the module that the TE is interested in handling SAT, i.e. switch to Explicit Response (ER) mode.
at^ssta=1,0
OK

// This setting takes effect after next start of the UE only, so switch off first
AT^SMSO
OK

// Switch on UE again

// Switch on verbose error messages
at+cmee=2
OK

// Enter the PIN code (if necessary due to SIM configuration)
at+cpin=1234
OK

// Receiving the first proactive command (if the mounted SIM carries a SIM Application)
^SSTN:37

// Requesting parameter details
at^sstgi=37

// These are the details:
^SSTGI: 37,0,3,"SAT Special Menu",0,1,1,0
^SSTGI: 37,1,"News",0,0
^SSTGI: 37,2,"EMail",0,0
^SSTGI: 37,3,"Banking",0,0

OK

// To query the status of the proactive command
at^sstr=37,0

OK

// SAT indicates that the proactive session has ended and enters its main menu (which should then be opened
```

```
on the screen by an MMI): ^SSTN:254

// Selecting item number 1 of the menu sent before:
at^sstr=211,0,1

OK

// Receiving the next proactive command:
^SSTN:36

// Requesting more information...
at^sstgi=36

// ... and get it:
^SSTGI: 36,0,12,"Rubriken >",0,0,1,1,0
^SSTGI: 36,1,"News >",0,0
^SSTGI: 36,2,"Stock Infos>",0,0
^SSTGI: 36,3,"Aktien D >",0,0
^SSTGI: 36,4,"Aktien INT >",0,0
^SSTGI: 36,5,"Sports >",0,0
^SSTGI: 36,6,"1.BL-Clubs >",0,0
^SSTGI: 36,7,"Unterhaltung>",0,0
^SSTGI: 36,8,"Horoskop >",0,0
^SSTGI: 36,9,"Wetter D >",0,0
^SSTGI: 36,10,"Wetter INT >",0,0
^SSTGI: 36,11,"Wetter spez>",0,0
^SSTGI: 36,63,"Extras >",0,0

OK

// Remember to acknowledge:
at^sstr=36,0,63

OK

// And again: Receiving the next proactive command:
^SSTN:36
// ...
```

Examples

EXAMPLE 1

```
// Switch on verbose error messages
at+cmee=2
OK
```

EXAMPLE 2

```
// Enter the PIN code
at+cpin=1234
OK
```

EXAMPLE 3

```
// Start Remote-SAT
at^ssta=1,0
OK
```

EXAMPLE 4

```
// Proactive command "GET INKEY" is issued by the SIM
^SSTN: 34
```

EXAMPLE 5

```
// Get complete data
```

```
at^sstgi=34
^SSTGI: 34,0,"<COLOUR-ICON>",1,2
OK
```

EXAMPLE 6

```
// Use GET RESPONSE command (192) to analyze SIM file EF-IMG (hex. 4F20)
at+crsm=192,20256,0,0,15
+CRSM: 144,0,000000644F20040014F04401020114
OK
```

EXAMPLE 7

```
// Use READ RECORD command (178) to get its content
at+crsm=178,20256,2,4,20
+CRSM: 144,0,010808214F0200000016FFFFFFFFFFFFFFFFFFFFFFF
OK
```

EXAMPLE 8

```
// Use READ BINARY command (176) to get content of image instance data file (e.g. hex 4F02)
at+crsm=176,20226,0,0,22
+CRSM: 144,0,080802030016AAAA800285428142814281528002AAAA
OK
```

```
at+crsm=176,20226,0,22,9
+CRSM: 144,0,FF000000FF000000FF
OK
```

EXAMPLE 9

```
// Finalize Proactive Command session
at^sstr=34,0,,"+"
OK
```

EXAMPLE 10

```
// Session end indication, i.e. display SAT main menu
^SSTN: 254
```

15. Phonebook Commands

The AT commands described in this chapter allow the external application to access the phonebooks located in the PHS8-P's memory or on the attached Subscriber Identity Module (SIM).

15.1 AT+CNUM Read own numbers

[AT+CNUM](#) returns the subscribers own number(s) from the SIM.

Syntax

Test Command	
AT+CNUM=?	
Response(s)	
OK	
Exec Command	
AT+CNUM	
Response(s)	
[+CNUM: [<alpha>], <number> , <type>]	
[+CNUM: ...]	
OK	
ERROR	
+CME ERROR: <err>	
PIN MDM APP → Last	Reference(s)
+ + + + -	3GPP TS 27.007 [47]

Parameter Description

[<alpha>](#)^(str)

Optional alphanumeric string associated with [<number>](#).

[<number>](#)^(str)

Phone number in format specified by [<type>](#).

[<type>](#)^(str)

Type of address octet, see also: [AT+CPBR <type>](#).

Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section [20.1, Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

15.2 AT+CPBF Find phonebook entries

The `AT+CPBF` write command searches the current phonebook for alphanumeric field entries starting with the given `<findtext>` string. The write command response returns all found entries sorted in alphanumeric order. Entry fields returned are `<location>` number, phone `<number>` stored there (of format `<type>`) and `<text>` associated with the number.

The `AT+CPBF` test command returns the maximum lengths of `<nlength>` and `<tlength>` fields.

Syntax

```

Test Command
AT+CPBF=?
Response(s)
+CPBF: <nlength>, <tlength>
OK
ERROR
+CME ERROR: <err>

Write Command
AT+CPBF=<findtext>
Response(s)
+CPBF: <location>, <number>, <type>, <text>
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
+	+	+	+	-

Parameter Description

`<location>`^(num)

The location number in the range of location numbers of phonebook memory.

`<number>`^(str)

Phone number in format specified by `<type>`, it may be an empty string.

`<type>`^(num)

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with `ATD><mem><index>` is, depending on the network, not always possible (refer to 3GPP TS 24.008 [42], subclause 10.5.4.7 for details). See also `<type>` of `AT+CPBW`.

Possible values are:

- 128 Restricted `<number>` includes unknown type and format.
- 145 Dialing string `<number>` includes international access code character '+'.
161 National number `<number>`. Network support of this type is optional.
- 209 Dialing string `<number>` has been saved as ASCII string and includes non-digit characters other than "*", "#", "+" or "p". Note that phonebook entries saved with this type cannot be dialed.

- 255 Dialing string `<number>` is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
- 129 Otherwise.

`<text>`^{(str)(+CSCS)}

Text assigned to a phone number. The maximum length for this parameter is given with test command response parameter `<tlength>`.
If using an ASCII terminal characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.8, [Supported character sets](#).

`<findtext>`^{(str)(+CSCS)}

String for finding the `<text>` in the active phonebook.

`<nlength>`^(num)

Maximum length of phone number for "normal" locations. Depending on the storage a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is $2 * \text{<nlength>}$ digits for normal numbers, but only `<nlength>` digits for numbers saved with `<type>=209`.

`<tlength>`^(num)

Maximum length of `<text>` assigned to the telephone number. The value indicated by the test command is given in octets. If `<text>` is given as GSM characters each character corresponds to one octet. If the `<text>` string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM according to 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21], Annex B. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.

Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- The search in the dialed calls (DC) phonebook is not supported.

Example

```
AT+CPBF=?
+CPBF: 40,16
AT+CPBF="cha"
+CPBF:1,"+999999",145,"Charlie"
```

First run the `AT+CPBF` test command to find out the lengths of `<nlength>` and `<tlength>` in the active phonebook.
PHS8-P returns the supported values, where 40 is the maximum length of the phone number and 16 is the maximum length of the associated text.
Then use the `AT+CPBF` write command to find any `<text>` string in the phonebook.

15.3 AT+CPBR Read from phonebook

AT+CPBR serves to read one or more entries from the phonebook selected with AT command AT+CPBS.

The AT+CPBR test command returns the location range supported by the current phonebook storage, the maximum length of <number> field and the maximum length of <text> field.

Note: Length information may not be available while SIM storage is selected. If storage does not offer format information, the format list contains empty parentheses.

The AT+CPBR write command determines the phonebook entry to be displayed with <location1> or a location range from <location1> to <location2>. Hence, if no <location2> is given only the entry at <location1> will be displayed.

If no entries are found at the selected location "+CME ERROR: not found" will be returned.

Syntax

```
Test Command
AT+CPBR=?
Response(s)
+CSPBR: (1-<maxloc>), <nlength>, <tlength>
OK
ERROR
+CME ERROR: <err>
```

```
Write Command
AT+CPBR=<location1>[, <location2>]
Response(s)
[+CPBR: <location1>, <number>, <type>, <text>]
[+CPBR: <location2>, <number>, <type>, <text>]
OK
ERROR
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
+	+	+	+	-

Reference(s)
3GPP TS 27.007 [47],
3GPP TS 24.008 [42],
3GPP TS 11.11 [19], 3GPP TS
31.101 [20], 3GPP TS 31.102 [21]

Parameter Description

<location1>^(num)

The first (lowest) location number within phonebook memory where to start reading. The maximum range supported by the current phonebook is given in the test command response.

If <location1> exceeds the upper bound <maxloc> (as indicated by the test command), command will respond with "+CME ERROR: invalid index".

<location2>^(num)

The last (highest) location number within phonebook memory where to stop reading. The maximum range supported by the current phonebook is given in the test command response.

If both <location1> and <location2> are in the range indicated by the test command parameter <maxloc>, the list of entries will be output and terminated with "OK".

If <location2> exceeds the range indicated by the test command parameter <maxloc>, no list of entries will be shown and the output is terminated with "+CME ERROR: invalid index".

`<number>`^(str)

Phone number in format specified by `<type>`, it may be an empty string.

`<type>`^(num)

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with `ATD<mem><index>` is, depending on the network, not always possible (refer to 3GPP TS 24.008 [42], subclause 10.5.4.7 for details). See also `<type>` of `AT+CPBW`.

Possible values are:

128	Restricted <code><number></code> includes unknown type and format.
145	Dialing string <code><number></code> includes international access code character '+'. National number <code><number></code> . Network support of this type is optional.
161	Dialing string <code><number></code> has been saved as ASCII string and includes non-digit characters other than "*", "#", "+" or "p". Note that phonebook entries saved with this type cannot be dialed.
209	Dialing string <code><number></code> is a command to control a Supplementary Service, i.e. "*" and "#" codes are contained. Network support of this type is optional.
255	Otherwise.
129	

`<text>`^{(str)(+CSCS)}

Text assigned to a phone number. The maximum length for this parameter is given with test command response parameter `<tlength>`.

If using an ASCII terminal characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.8, [Supported character sets](#).

`<maxloc>`^(num)

Maximum location number for the currently selected storage. For phonebooks located on SIM, this value varies depending on the SIM card. See `AT+CPBS` for typical values.

`<nlength>`^(num)

Maximum length of phone number for "normal" locations. Depending on the storage a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is $2 * \text{<nlength>}$ digits for normal numbers, but only `<nlength>` digits for numbers saved with `<type>=209`.

`<tlength>`^(num)

Maximum length of `<text>` assigned to the telephone number. The value indicated by the test command is given in octets. If `<text>` is given as GSM characters each character corresponds to one octet. If the `<text>` string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM according to 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21], Annex B. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.

Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- When storing a supplementary service command to the phonebook along with a "+" within the phone number please note that the ME will not display the "+" after restart, but correctly handles the phone number as international type.

- When emergency number ("EN") phonebook is selected by [AT+CPBS](#) write command the numbers 911 and 112 must always be output by using [AT+CPBR](#) write command. For more details about emergency numbers see notes in [ATD](#) dial command.
- Emergency number ("EN") phonebook can be accessed (using [AT+CPBS="EN"](#)) without entering PIN usually used by [AT+CPIN="PIN1"](#). Then [AT+CPBS](#) read command and [AT+CPBR](#) write command are also possible without entering PIN.
- There is no restriction reading unsupported values for [<type>](#).

Example

```
AT+CPBR=?
```

```
+CPBR: (1-100),20,17
```

```
AT+CPBR=1,3
```

```
+CPBR: 1,"+999999",145,"Charlie"
```

```
+CPBR: 2,"+777777",145,"Bill"
```

```
+CPBR: 3,"+888888",145,"Arthur"
```

First run the [AT+CPBR](#) test command to find out the maximum range of entries stored in the active phonebook.

PHS8-P returns the supported values, where 100 is the supported range of location numbers, 20 is the length of the phone number and 17 is the maximum length of the associated text.

Then use the [AT+CPBR](#) write command to display the phonebook entries sorted by location numbers.

15.4 AT+CPBS Select phonebook memory storage

AT+CPBS selects the active phonebook storage, i.e. the phonebook storage that all subsequent phonebook commands will be operating on.

The read command returns the currently selected **<storage>**, the number of **<used>** entries and the **<total>** number of entries available for this storage. The test command returns all supported **<storage>**s as compound value.

Syntax

Test Command

AT+CPBS=?

Response(s)

+CPBS: (list of supported **<storage>**s)

OK

ERROR

+CME ERROR: **<err>**

Read Command

AT+CPBS?

Response(s)

+CPBS: **<storage>**, **<used>**, **<total>**

OK

ERROR

+CME ERROR: **<err>**

Exec Command

All records of the "MC", "RC", "DC" and "LD" phonebooks will be deleted.

AT+CPBS

Response(s)

OK

ERROR

+CME ERROR: **<err>**

Write Command

AT+CPBS=**<storage>**

Response(s)

OK

ERROR

+CME ERROR: **<err>**

Write Command

For write access to FD phonebook

AT+CPBS=**<storage>**, **<pin>**

Response(s)

OK

ERROR

+CME ERROR: **<err>**

PIN	MDM	APP	→	Last
+	+	+	+	-

Reference(s)

3GPP TS 27.007 [47]

Parameter Description

<storage>^(str)

"SM" ^{(&F)(P)}	USIM phonebook Capacity: depending on USIM Location: USIM
"DC"	Dialed calls list Capacity: max. 10 entries Location: ME AT+CPBW command is not applicable to this storage.
"FD"	Fixed dialing phonebook Capacity: depending on USIM Location: USIM
"LD"	Last number dialed phonebook. Stores all call numbers dialed with ATD. Capacity: max. 10 entries, depending on USIM Location: USIM AT+CPBW command is not applicable to this storage.
"MC"	Missed (unanswered received) voice calls list Capacity: max. 10 entries Location: ME AT+CPBW command is not applicable to this storage.
"ME"	Mobile equipment phonebook Capacity: max. 250 entries Location: ME
"RC"	Received voice calls list Capacity: max. 10 entries Location: ME AT+CPBW command is not applicable to this storage.
"EN"	Emergency number Capacity: depending on USIM or ME Location: USIM or ME Can be accessed without entering PIN. AT+CPBW command is not applicable to this storage.
"ON"	MSISDN list Capacity: depending on USIM Location: USIM
"VM"	CPHS voice mailbox phonebook Capacity: depending on USIM Location: USIM

<used>^(num)

Value indicating the number of used locations in selected memory storage.

<total>^(num)

Value indicating the maximum number of locations allowed in the selected memory storage.

Notes

- Users should be aware that when using this AT command quickly after USIM PIN authentication the USIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.

- The following call history rule applies to the phonebook types "DC", "LD", "MC" and "RC":
When the same number is dialed several times in direct succession the "DC" and "LD" phonebook will store each entry, resulting in double or multiple "DC" and "LD" phonebook entries related to this number. Likewise, the "MC" or "RC" phonebook will store each entry when calls from the same number are received several times.
- To get write access to the "FD" phonebook the following input is required: `AT+CPBS="FD",PIN2`
- When using "EN" phonebook the numbers 911 and 112 must always be output by using `AT+CPBR` write command. For more details about emergency numbers see notes in `ATD` dial command.
- Emergency number ("EN") phonebook can be accessed (using `AT+CPBS="EN"`) without entering PIN usually used by `AT+CPIN="PIN1"`. Then `AT+CPBS` read command and `AT+CPBR` write command are also possible without entering PIN.
- Missed and received calls which are not presented to the called party are not stored in MC and RC phonebook.
- "LD" phonebook is only supported when corresponding Elementary File is available on USIM. Elementary Files belonging to "LD" phonebook are optional on USIM.
- If `<tlength>` of the number dialed and stored in the ME phonebook is higher than allowed for the "LD" phonebook then the "LD" phonebook doesn't store this number. In this case, use the "DC" phonebook.
- The `<text>` assigned to a phone `<number>` is stored to the "DC", "LD", "MC" and "RC" phonebooks only if the complete comparison with the number delivered by the network provider is successful.
- When a dial string includes DTMF digits, the DTMF digits are not saved at the "LD" or "DC" phonebook. ABCD can be used as DTMF digits within a `ATD` dial string, but cannot be saved due to BCD limitations.
- After having locked or unlocked the "FD" phonebook using the command `AT+CLCK="FD",1 or 0,PIN2` the refresh mechanism takes some seconds, therefore it is not possible to see the "SM" phonebook shortly after entering the lock or unlock command.

15.5 AT+CPBW Write into phonebook

The [AT+CPBW](#) write command can be used to create, edit and delete a phonebook entry at a [<location>](#) of the active storage selected with [AT+CPBS](#).

If [<storage>](#)="FD" (SIM fixed dialing numbers) is selected, PIN2 authentication has to be performed prior to any write access.

The [AT+CPBW](#) test command returns the location range supported by the current storage, the maximum length of the [<number>](#) field, the range of supported [<type>](#) values and the maximum length of the [<text>](#) field. Note: The length may not be available while SIM storage is selected. If storage does not offer format information, the format list contains empty parentheses.

Syntax

<p>Test Command</p> <pre>AT+CPBW=?</pre> <p>Response(s)</p> <pre>+CPBW: (1-<maxloc>), <nlength>, (list of supported <type>s), <tlength></pre> <p>OK ERROR +CME ERROR: <err></p>												
<p>Write Command</p> <pre>AT+CPBW=[<location>][, <number>][, <type>][, <text>]]</pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>												
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	+	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47], 3GPP TS 24.008 [42], 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21]</p>	
PIN	MDM	APP	→	Last								
+	+	+	+	-								

Parameter Description

[<location>](#)^(num)

Location number within phonebook memory. The maximum range supported by each storage type is indicated in the test command response. If [<location>](#) is not given, the first free entry will be used. If [<location>](#) is given as the only parameter, the phonebook entry specified by [<location>](#) is deleted.

[<number>](#)^(str)

Phone number in format specified by [<type>](#). Parameter must be present, although it may be an empty string. Alphabetic characters are not permitted. The [<number>](#) may contain dialstring modifiers "*", "#", "+" or "p". If other printable non-alphabetic characters are used the entry needs to be saved with [<type>](#)=209. Otherwise, if [<type>](#)=209 is not used any non-digit characters other than "*", "#", "+" or "p" will be removed from the string and only accepted modifiers from the GSM alphabet will be saved. A [<number>](#) saved with [<type>](#)=209 requires double memory. In order to fit into a standard location, the number needs to be reduced to a maximum length of [<nlength>](#)/2, including all digits and dial string modifiers. Extended locations may be used as stated below for [<nlength>](#).

`<type>`^(num)

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with `ATD<mem><index>` is, depending on the network, not always possible (refer 3GPP TS 24.008 [42], subclause 10.5.4.7 for details). If `<type>` is not specified the unknown `<type>=129` is used. If `<number>` contains a leading "+" `<type>=145` (international) is used.

Supported values are:

128	Restricted <code><number></code> includes unknown type and format.
145	Dialing string <code><number></code> includes international access code character "+".
161	National number <code><number></code> . The network support for this type is optional.
209	Dialing string <code><number></code> will be saved as ASCII string. This is the default value, if <code><type></code> is not specified explicitly and characters other than "*", "#", "+" or "p" are included in <code><number></code> . Note that phonebook entries saved with this type cannot be dialed.
255	Dialing string <code><number></code> is a command to control a Supplementary Service, i.e. "*" and "#" codes are contained. Network support of this type is optional.
129	Unknown number. If <code><type></code> is unknown and the <code><number></code> contains a leading "+", then this sign is removed.

`<text>`^{(str)(+CSCS)}

Text assigned to the phone number. The maximum length of this parameter is given in the test command response `<tlength>`. When using an ASCII terminal, characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.8, [Supported character sets](#).

`<maxloc>`^(num)

Maximum number of locations supported by the currently selected storage. For phonebooks located on SIM, this value varies depending on the SIM card. See [AT+CPBS](#) for typical values.

`<nlength>`^(num)

Maximum length of phone number for "normal" locations. Depending on the storage, a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is $2 \times \text{<nlength>}$ digits for normal numbers, but only `<nlength>` digits for numbers saved with parameter `<type>= 209`. If all extended locations of the selected phonebook are used up, then any attempt to write a number which requires extended memory will be denied with "+CME ERROR: memory full".

`<tlength>`^(num)

Maximum length of `<text>` assigned to the telephone number. The value indicated by the test command is given in octets. If the `<text>` string is given in GSM characters, each character corresponds to one octet. If the `<text>` string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.

For a detailed description please refer to 3GPP TS 11.11 [19], 3GPP TS 31.101 [20], 3GPP TS 31.102 [21], Annex B.

Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- See for more details [AT+CPBS](#) select command which phonebook <storage> is possible to write by the user.
- DTMF transmission:
If a dial string contains the call modifier "p" the digits after this call modifier will be saved as DTMF tones. The DTMF tones 'A','B','C' and 'D' can not be saved due to BCD limitations.

Examples

EXAMPLE 1

Make a new phonebook entry at the first free location

```
AT+CPBW=,"+431234567",145,"international"
```

EXAMPLE 2

Delete entry at location 1

```
AT+CPBW=1
```

EXAMPLE 3

The following examples are provided to illustrate the effect of writing phonebook entries with different types of dial string modifiers in <number>

```
AT+CPBW=5,"12345678",,"Arthur"  
AT+CPBW=6,"432!p-765()&54*654#",,"John"  
AT+CPBW=7,"432!p-765()&54*654#",129,"Eve"  
AT+CPBW=8,"432!p-765()&54*654#",145,"Tom"  
AT+CPBW=9,"432!p-765()&54*654#",209,"Richard"
```

EXAMPLE 4

Read phonebook entries from locations 5 - 9 via [AT+CPBR](#)

```
+CPBR:5,"12345678",129,"Arthur"  
+CPBR:6,"432!p-765()&54*654#",209,"John"  
+CPBR:7,"432p76554*654#",129,"Eve"  
+CPBR:8,"+432p76554*654#",145,"Tom"  
+CPBR:9,"432!p-765()&54*654#",209,"Richard"
```

16. GPS Commands

PHS8-P integrates a GPS engine which supports the NMEA 0183 V2.3 protocol.

To configure, activate or deactivate the GPS engine, to choose Standalone GPS or A-GPS operation, to start and stop NMEA output, please use the `AT^SGPSC` command. The `AT^SGPSS` command may also be used, but is deprecated and supported only for compatibility with other Cinterion wireless modules.

A-GPS will improve the startup performance, i.e. the Time to First Fix (TTFF), if the GPS engine has not yet precise location and time information. In most cases, however, it will be sufficient to activate the GPS driver since the GPS engine dynamically determines the best startup scenario depending on the available position, time, Almanac and/or Ephemeris data.

If Multiplex mode is started NMEA data will be output on the third Multiplex channel. Otherwise NMEA data will be printed to the dedicated NMEA interface (depending on the settings made with `AT^SDPORT`). The dedicated NMEA interfaces and the third Multiplex channel do not accept any AT commands. If the serial port ASC0 is selected for NMEA output (`AT^SDPORT=5`) please consider that NMEA data is transmitted at a fixed bit rate of 115200 bps regardless of the `AT+IPR` value set on ASC0.

After getting the first position fix the GPS engine will start to output NMEA data at the rate specified with the parameter `<FreqVal>` of the `AT^SGPSC` command. Before that, without a position fix, NMEA data will be output every second.

All of the standard NMEA sentences have a two letter prefix defining the device (for GPS engines the prefix is GP). The prefix is followed by a three letter sequence which indicates the sentence contents. PHS8-P supports the following GPS related NMEA sequences:

- GPGGA - Fix information
- GPRMC - Recommended minimum data for GPS
- GPGSV - Detailed satellite data
- GPGSA - Overall satellite data
- GPVTG - Vector track and speed over the Ground

The UE may connect to an active or passive GPS antenna. Active GPS antennas need an extra power supply which can be switched on or off with `AT^SGPSC` or the deprecated command `AT^SGPSS`. Details on how to connect and handle active or passive antennas can be found in [2].

The GPS engine also features E911 emergency call service. Supported via Control Plane there is no need to control E911 service by AT commands or user intervention. Nevertheless, A-GPS operation and On-Demand Power Mode (ODP) will also improve the availability of location and time information for E911 emergency calls.

16.1 ^SGPSE GPS Event Notification

This URC provides GPS related status information.

Unsolicited Result Code

NMEA buffer notification

^SGPSE: <UrcType>, <BufferStatus>, <BufferCount>

Parameter Description

<UrcType>^(num)

NMEA buffer notification

0

This URC type is enabled by setting the `AT^SGPSC` parameter `<OutVal>="buffered"`. Deactivating the buffer mechanism `<OutVal>="on"` or `"off"` will disable the URC.

If the NMEA buffering mechanism is active (see `<OutVal>`), two URCs will be generated. The first URC will show up when approximately 80% of the buffer is filled. This way, the application has enough time to wake up and select `<OutVal>="on"` in order to read and empty the buffer and get new NMEA sentences.

The second URC will show up when the buffer is full.

<BufferStatus>^(num)

Status of NMEA buffer

0

Buffer fill status is 80%.

1

Buffer is full.

If the buffer is not emptied buffering stops to retain the data buffered data. This allows the TE to store the buffered data, e.g. for position tracking.

<BufferCount>^(num)

GPS NMEA buffer count

Number of bytes located in NMEA buffer

16.2 AT^SGPSC GPS Configuration

AT^SGPSC is a configuration command that can be used to set GPS parameters and to switch the GPS engine on and off.

Syntax

Test Command

AT^SGPSC=?

Response(s)

^SGPSC: "Engine", (list of supported <EngineVal>s)
^SGPSC: "Nmea/Freq", (list of supported <FreqVal>s)
^SGPSC: "Nmea/Output", (list of supported <OutVal>s)
^SGPSC: "Power/Antenna", (list of supported <AntVal>s)
^SGPSC: "Power/Odm", (list of supported <OdmVal>s)
^SGPSC: "Power/Psm", (list of supported <PsmVal>s)
^SGPSC: "StartMode", (list of supported <StartMode>s)
^SGPSC: OK

Read Command

AT^SGPSC?

Response(s)

^SGPSC: "Engine", <EngineState>
^SGPSC: "Nmea/Freq", <FreqVal>
^SGPSC: "Nmea/Output", <OutVal>
^SGPSC: "Power/Antenna", <AntVal>
^SGPSC: "Power/Odm", <OdmVal>
^SGPSC: "Power/Psm", <PsmVal>
^SGPSC: "StartMode", <StartMode>

Write Command

Activating or deactivating GPS engine.

AT^SGPSC="Engine"[, <EngineVal>]

Response(s)

^SGPSC: "Engine", <EngineState>[, <AssistDataError>]
OK
ERROR
+CME ERROR: <err>

Write Command

Get GPS related Infos.

AT^SGPSC="Info"[, <InfoType>]

Response(s)

^SGPSC: ["Info", "Xtra", <InfoXtraWeek>, <InfoXtraMinute>, <InfoXtraDurationMinutes>]
OK
ERROR
+CME ERROR: <err>

Write Command

Setting frequency of position requests.

AT^SGPSC="Nmea/Freq"[, <FreqVal>]

Response(s)

^SGPSC: "Nmea/Freq", <FreqVal>
OK

Write Command (Continued)

Setting frequency of position requests.

```
AT^SGPSC="Nmea/Freq"[, <FreqVal>]
```

Response(s)

```
ERROR  
+CME ERROR: <err>
```

Write Command

Configuring output of NMEA sentences.

```
AT^SGPSC="Nmea/Output"[, <OutVal>]
```

Response(s)

```
^SGPSC: "Nmea/Output", <OutVal>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

Configuring antenna supply.

```
AT^SGPSC="Power/Antenna"[, <AntVal>]
```

Response(s)

```
^SGPSC: "Power/Antenna", <AntVal>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

Activating intelligent polling mechanism to get a fast Fix (On demand mode).

```
AT^SGPSC="Power/Odm"[, <OdmVal>]
```

Response(s)

```
^SGPSC: "Power/Odm", <OdmVal>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

Activating sleep mode for GPS engine (Power Save Mode).

```
AT^SGPSC="Power/Psm"[, <PsmVal>]
```

Response(s)

```
^SGPSC: "Power/Psm", <PsmVal>  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

Setting which satellite data should be used for next start of GPS engine.

```
AT^SGPSC="StartMode", <StartMode>
```

Response(s)

```
OK  
ERROR  
+CME ERROR: <err>
```

PIN	MDM	APP	✈	Last
-	+	+	+	-

Parameter Description

<EngineVal>^(str)

This parameter switches the GPS engine on or off.

- | | |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| "0" ^(P) | GPS engine off. |
| "1" | Start GPS engine without employing GpsOneXTRA assistance data. The GPS engine dynamically determines the best startup scenario depending on the available position, time, Almanac and/or Ephemeris data. |
| "2" | Start GPS engine in A-GPS mode by employing the GpsOneXTRA assistance data previously stored to the FFS with AT^SBNW . GpsOneXTRA assistance data is injected into the GPS engine.
Make sure that the RTC is correctly set (AT+CCLK) to Greenwich Mean Time (GMT):0. This is important for storing XTRA.bin data to the FFS and to successfully activate A-GPS. |

<EngineState>^(str)

This parameter shows the GPS engine state.

- | | |
|-----|----------------|
| "0" | GPS engine off |
| "1" | GPS engine on |

<AssistDataError>^(str)

This parameter may appear in the write command response only if an error occurs while GpsOneXTRA assistance data are injected into the GPS engine. Possible error codes:

- | | |
|-----|---------------------------------------------------------------------------------------------|
| "1" | Bad CRC |
| "2" | Validity time is out of range |
| "3" | Internal resource error |
| "4" | GPS subsystem currently busy |
| "5" | Time info error (AT+CCLK not correctly set to Greenwich Mean Time (GMT):0) |
| "6" | GPS subsystem is locked |
| "7" | GPS state error |
| "8" | Other error |

<InfoType>^(str)

This parameter specifies the type of information which will be requested

- | | |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| "Xtra" | Validity of saved XTRA file.
The write command AT^SGPSC="Info","Xtra" requests the validity of the XTRA.bin file and returns the parameters <InfoXtraWeek> , <InfoXtraMinute> and <InfoXtraDurationMinutes> . |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

<InfoXtraWeek>^(str)

This parameter shows the GPS week(time stamp since 1st epoch 1.1.1980 Sunday 24:00) of the injected XTRA.bin file to calculate manually the time difference to GMT0 time.

<InfoXtraMinute>^(str)

This parameter shows the GPS minute(time stamp since 1st epoch 1.1.1980 Sunday 24:00) of the injected XTRA.bin file to calculate manually the time difference to GMT0 time.

<InfoXtraDurationMinutes>^(str)

This parameter shows the validity duration of the currently saved XTRA file in minutes. The calculation uses [AT+CCLK](#) time. This must be GMT0.

“0“ No saved XTRA file or the saved XTRA file is no longer valid.
1...10080 Validity of current XTRA file in minutes

<FreqVal>^(str)

This parameter specifies the frequency of position requests (in seconds). If the GPS engine is started (see [<EngineVal>](#)) and the output of data is activated (see [<OutVal>](#)) and there is no position fix yet, then empty NMEA data will be output every second. After getting a position fix the GPS engine will start to output NMEA messages at the given [<FreqVal>](#).

“1“(P) Every second an NMEA message will be output.
1(P)...65535 Every n seconds an NMEA message will be output.

<OutVal>^(str)

This parameter configures the output of NMEA sentences.

“off“ No output, no buffering of NMEA sentences. Previously buffered NMEA sentences will be discarded. The "[^SGPSE](#)" URC for buffer notification is deactivated. If the GPS engine is set to sleep mode via [<PsmVal>=1](#) (delivery default) then please note that after switching [<OutVal>](#) from "off" to "on" the GPS engine may take a couple of seconds to transmit a position fix.

“on“(P) NMEA sentences will be output on the dedicated NMEA port at the frequency set with [<FreqVal>](#). (For NMEA port settings see [AT^SDPORT](#)). Buffering is deactivated. Previously buffered NMEA sentences will be output (thereby freeing the buffer) before printing new NMEA sentences. If there is no previously buffered data, printing new NMEA sentences starts instantly. The "[^SGPSE](#)" URC for buffer notification is deactivated.

“buffered“ No NMEA output on dedicated NMEA port. NMEA sentences will be buffered. The "[^SGPSE](#)" URC for buffer notification is activated to notify the TE when the buffer becomes full. If buffering is activated then the TE has to enable NMEA output again in order to get the buffered data and to empty the buffer. This shall be done by selecting [<OutVal>= "on"](#). The "[^SGPSE](#)" URC for buffer notification may be used to trigger the TE to start reading the buffer. The first URC "[^SGPSE: 0,0, x](#)" will be generated when the buffer reaches 80% capacity. When full, the second URC "[^SGPSE: 0,1, x](#)" will be generated.

Buffer size: The buffer will hold NMEA data for at least one minute (assuming a max. NMEA sentence length of 640 byte, max. 8 sentences per update and an update interval of one second). The TE may extend the buffering time by increasing the frequency with [<FreqVal>](#). When the buffer is full and not emptied the most recent NMEA sentences will be discarded.

Benefit of buffering: The mechanism of switching back and forth between NMEA output and NMEA buffering can be used, for example, to save power for NMEA output or to store the buffered NMEA data to a log file for position tracking.

<AntVal>^(str)

This parameter configures the GPS antenna power supply.
The setting can only be changed when the GPS engine is off (see parameter <EngineVal> and also parameter <OdmVal>).

"off" ^(P)	Antenna power off.
"on"	Antenna power on.
"auto"	Antenna power will be automatically switched on or off depending on GPS engine activity. This mechanism takes effect either if the GPS engine is activated with <EngineVal> or if an E-911 emergency call is established by Control Plane.

<OdmVal>^(str)

This parameter activates the intelligent polling mechanism to get a fast Fix. After selecting values "1" or "2", the value "1" will be set after next UE restart. <OdmVal> value "2" is volatile and, if desired, needs to be set again after UE restart.

Please consider that modes "1" and "2" are automatic modes, with the GPS engine running unsteadily in background.

"0" ^(D)	Off
"1"	On Demand Low Power Mode
"2"	On Demand Ready Mode

<PsmVal>^{(str)(NV)}

This parameter activates sleep mode for the GPS engine. The setting can only be changed when the GPS engine is off (see parameter <EngineVal>).

"0"	Off
"1" ^(D)	On

<StartMode>^(str)

This parameter is deprecated and eliminated by <EngineVal>"2". Nevertheless, it is still supported for compatibility with earlier PHS8-Ps.

"0"	A-GPS start mode (uses the GpsOneXTRA assistance data of the XTRA.bin file previously stored to the PHS8-P Flash File System with AT^SBNW.) Keep in mind that the RTC of PHS8-P is correctly set to Greenwich Mean Time (GMT):0 with AT+CCLK and is up to date. This is significant when storing XTRA.bin data to the FFS and when activating A-GPS start mode.
"1" ^(P)	Last Session (with last available data).

16.2.1 Power Saving Considerations

The purpose of this section is to explain the modes provided by PHS8-P to save power while maintaining or getting a position fix. The settings can be made by using the command `AT^SGPSC="Power/PSM",<PsmVal>`.

16.2.1.1 Dynamic Power Optimization (DPO)

DPO is a power saving feature which attempts to turn off GPS RF and other components when the components are not needed. DPO takes effect when enabled with `<PsmVal>`, when there is good GNSS signal visibility, and when the receiver has sufficient navigational data to perform a fix (either has GpsOneXTRA assistance data or has decoded it off-the-air). By delivery default of PHS8-P, DPO is enabled and ODP/ODR disabled.

Preconditions for DPO to turn on:

- Have ephemeris for all SVs -> 26 dB-Hz or recent (<3.5 days) almanac corrections for those SVs provided by GpsOneXTRA assistance data.
- Health or UTC information is not transmitted over-the-air (i.e., not in subframe 4 of page 18, or subframes 4 and 5 of page 25).
- Valid position and HEPE is less than 50 m and also less than QoS timeout of 60 secs
- 6 SVs > 37 dB-Hz or 4 SVs > 26 dB-Hz and have almanac and health for all SVs.

Benefits and impact:

- The GPS engine is not on continuously and the SV or navigational data cannot be decoded at that time.
- TTFF and yield should not be impacted.

16.2.1.2 On-Demand Power Mode (ODP)

The command `AT^SGPSC="Power/Odm",<OdmVal>` enables the GPS engine to perform background positioning. ODP offers the choice of two basic operating modes:

- ODP Low Power Mode:
 - Enables the GPS engine to maintain position uncertainty and time uncertainty within reasonable values so that the GPS standalone Time To First Fix (TTFF) is comparable to Assisted mode values.
 - ODP Low Power Mode will reduce the current consumption, though not to the same extent as DPO.
- ODP Ready Mode referred to as ODR:
 - Enables the GPS engine to obtain a position quickly when requested by the application. Precondition for ODR is that ODP Low Power Mode is switched on. This way, if the application puts the UE into Ready mode, the UE is able to quickly obtain a GPS fix by starting 1 Hz background positioning.
 - After ODR Mode has been turned off, positioning continues for 60 seconds before the UE resumes ODP Low Power Mode.
 - ODR Mode has a significant impact on current consumption.

ODP Low Power Mode and ODR also improve the performance of E911 emergency calls.

ODP system requirements:

- ODP requires valid GpsOneXTRA assistance data.
- ODP requires that PHS8-P is in service.

If these two requirements are not fulfilled ODP will be turned off automatically. ODP will be suspended if a regular GPS fix is running.

ODP Low Power Mode has three sub-modes depending on GPS signal conditions:

- ODP Low Power Mode 1:

-
- Precondition: position uncertainty is >20 km and time uncertainty is between 80-160 microsec.
 - Algorithm wakes up every 5 min.
 - GPS session is started with QoS timeout of 3 secs (later 2 secs) and accuracy threshold of 250 m.
 - + Successful GPS fix: continue in this mode.
 - + No successful GPS fix for approximately 30 minutes: ODP goes into mode 2.
 - ODP Low Power Mode 2:
 - Precondition: time uncertainty is between >250 microsec, phone is in service.
 - Algorithm wakes up every 30 min.
 - GPS session is started with QoS timeout of 30 secs and accuracy threshold of 250 m.
 - + Successful GPS fix: fall back to mode 1.
 - + No successful GPS fix for approximately 2 hours: continue in this mode.
 - + No successful GPS fix for more than 2 hours: ODP changes to mode 3.
 - ODP Low Power Mode 3:
 - Algorithm wakes up every 2 hours.
 - GPS session is started with QoS timeout of 30 secs and accuracy threshold of 250 m.
 - + Successful GPS fix: fall back to mode 1.
 - + No successful GPS fix: continue in this mode.

16.3 AT^SGPSS GPS Switch

PHS8-P supports the [AT^SGPSS](#) command for compatibility with other Cinterion modules. Yet it is recommended to use only the [AT^SGPSC](#) command for configuring, activating and deactivating the GPS engine. If settings of [AT^SGPSC](#) cannot be reflected via the [AT^SGPSS](#) command the read command will return -1.

The [AT^SGPSS](#) command can be used to turn on/off the GPS receiver, control the supply voltage of the GPS antenna and enable/disable NMEA output on one of the dedicated NMEA interfaces.

Syntax

```

Test Command
AT^SGPSS=?
Response(s)
^SGPSS: (list of supported <state>s)

Read Command
AT^SGPSS?
Response(s)
^SGPSS: <state>

Write Command
AT^SGPSS=<state>
Response(s)
[^SGPSS: <state>, <StartMode>, <result>]
OK
ERROR
+CME ERROR: <err>
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<state> ^(num)	
Turning on/off GPS receiver, antenna voltage supply, NMEA output	
-1	There are settings outside the scope of this command done (see AT^SGPSC parameters)
0	GPS receiver off, antenna voltage supply off.
1	For passive GPS antennas only: GPS receiver on, NMEA output off, antenna voltage supply off (GPS IDLE mode).
2	For passive GPS antennas only: GPS receiver on, NMEA output on, antenna voltage supply off.
3	For active GPS antennas only: GPS receiver on, NMEA output off, antenna voltage supply on (GPS IDLE mode).
4	For active GPS antennas only: GPS receiver on, NMEA output on, antenna voltage supply on.

<result> ^(num)	
GPS switch result	
0	No error

-
- 1 Bad CRC (xtra.bin data file stored on FFS is corrupted)
 - 2 Time of validity out of range
 - 4 GPS subsystem busy
 - 5 Time info error (xtra.bin data file stored on FFS is obsolete)
 - 6 Other error

16.4 Examples of How to Configure and Use GPS

Below you can find selective examples of how to configure and use the PHS8-P's integrated GPS engine.

16.4.1 Loading Xtra.Bin File and Activating A-GPS Start Mode

To take advantage of A-GPS ensure that valid GpsOneXTRA assistance data is available. To do so, first download a new GpsOneXTRA binary file (named xtra.bin) via HTTP from one of the gpsOneXtra assistance web-servers. Save the received xtra.bin file to your local memory and check the exact file size (approximately 40kB).
 - <http://xtra1.gpsonextra.net/xtra.bin>
 - <http://xtra2.gpsonextra.net/xtra.bin>
 - <http://xtra3.gpsonextra.net/xtra.bin>.

Next, use [AT+CCLK](#) to set the RTC. Then, use [AT^SBNW](#) to store the GpsOneXTRA assistance data on the FFS. Finally, use [AT^SGPSC](#) to inject the GpsOneXTRA assistance data and switch on the GPS engine.

AT+CCLK="11/01/20,13:15:57"	Set PHS8-P RTC to Greenwich Mean Time (instead of local time).
OK	
AT^SGPSC="Engine", "0"	Deactivate the GPS engine.
^SGPSC: "Engine", "0"	
OK	
AT^SBNW=agps, -1	Optional: Remove existing xtra.bin file from FFS.
CONNECT	
AGPS READY: RESET GPS ENGINE AND DELETE XTRA FILE ...	
AGPS END OK	
OK	
AT^SBNW="agps", 38521	Write new xtra.bin file to FFS. File size is 38521 bytes.
CONNECT	
AGPS READY: SEND FILE ...	
AGPS END OK	New xtra.bin file successfully stored to FFS.
OK	
AT^SGPSC="Power/Antenna", "on"	For active antenna only: Switch on antenna power supply.
^SGPSC: "Power/Antenna", "on"	
OK	
AT^SGPSC="Engine", "2"	Inject GpsOneXTRA assistance data from FFS to GPS engine and switch on GPS engine. The response confirms that the GPS engine is active.
^SGPSC: "Engine", "1"	
OK	
AT^SGPSC="NMEA/Output", "on"	NMEA output is enabled by power-up default, therefore setting this command is necessary only if NMEA output was deactivated before.
^SGPSC: "Nmea/Output", "on"	
OK	

NMEA output will instantly start on the dedicated NMEA port. The example shows a position fix.

```

.....
$GPGGA,123521.0,5232.017893,N,01316.443884,E,1,05,3.7,198.0,M,43.0,M,,*5C
$GPVTG,,T,0.0,M,0.0,N,0.0,K,A*0D
$GPRMC,123521.0,A,5232.017893,N,01316.443884,E,0.0,,270711,,A*44
$GPGSA,A,3,09,14,25,27,29,,,,,,,,,6.4,3.7,5.2*36
$GPGSV,3,1,12,01,,,29,02,19,122,19,09,50,142,26,14,38,288,26*46
$GPGSV,3,2,12,25,43,265,38,27,38,140,36,29,09,205,31,04,24,075,*78
$GPGSV,3,3,12,12,82,293,,17,11,043,,32,03,347,,30,,,*4B
$GPGGA,123522.0,5232.017872,N,01316.443885,E,1,06,1.9,198.0,M,43.0,M,,*5E
.....
    
```

16.4.2 Trying to Load Invalid Xtra.Bin File

<pre>AT^SBNW=agps, -1 CONNECT AGPS READY: RESET GPS ENGINE AND DELETE FILE ... AGPS END OK OK AT^SBNW="agps", 47616 CONNECT AGPS READY: SEND FILE ... BAD CRC OK</pre>	<p>Optional: Remove existing xtra.bin file from FFS.</p> <p>Write new xtra.bin file to FFS. Specified number of bytes is greater than actual xtra.bin file size.</p> <p>Wrong check sum. New xtra.bin file cannot be stored, though the old one has already been deleted. FFS remains empty.</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

16.4.3 Starting GPS without Aiding

<pre>AT^SGPSC="Power/Antenna", "on" ^SGPSC: "Power/Antenna", "on" OK AT^SGPSC="Engine", "1" ^SGPSC: "Engine", "1" OK AT^SGPSC="NMEA/Output", "on" ^SGPSC: "Nmea/Output", "on" OK</pre>	<p>For active antenna only: Switch on antenna power supply.</p> <p>Switch on GPS engine.</p> <p>NMEA output is active by power-up default, therefore setting this command is necessary only if NMEA output was deactivated before.</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

NMEA output will instantly start on the dedicated NMEA port. The example shows a position fix.

```
....
$GPGGA,123521.0,5232.017893,N,01316.443884,E,1,05,3.7,198.0,M,43.0,M,,*5C
$GPVTG,,T,0.0,M,0.0,N,0.0,K,A*0D
$GPRMC,123521.0,A,5232.017893,N,01316.443884,E,0.0,,270711,,,A*44
$GPGSA,A,3,09,14,25,27,29,,,,,,,,,6.4,3.7,5.2*36
$GPGSV,3,1,12,01,,,29,02,19,122,19,09,50,142,26,14,38,288,26*46
$GPGSV,3,2,12,25,43,265,38,27,38,140,36,29,09,205,31,04,24,075,*78
$GPGSV,3,3,12,12,82,293,,17,11,043,,32,03,347,,30,,,*4B
$GPGGA,123522.0,5232.017872,N,01316.443885,E,1,06,1.9,198.0,M,43.0,M,,*5E
....
```

16.4.4 Using the GPS Buffering Mechanism

<pre>AT^SGPSC="Power/Antenna", "on" ^SGPSC: "Power/Antenna", "on" OK AT^SGPSC="Engine", "1" ^SGPSC: "Engine", "1" OK AT^SGPSC="NMEA/Output", "buffered" ^SGPSC: "Nmea/Output", "buffered" OK ^SGPSE: 0,0,308736</pre>	<p>For active antenna only: Switch on antenna power supply.</p> <p>Switch on GPS engine and start buffering.</p> <p>This setting activates NMEA buffering and enables the presentation of the "^SGPSE" URC. NMEA sentences will be buffered without additional power consumption for data output.</p> <p>The first URC shows up indicating that the buffer is filled to 80%.</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

```
^SGPSE: 0,1,523740
```

The second URC shows up indicating that the buffer is full.

```
AT^SGPSC="NMEA/Output","on"
```

TE disables buffering and activates NMEA output on the dedicated NMEA port.

```
^SGPSC: "Nmea/Output","on"  
OK
```

Buffered NMEA sentences will be instantly flushed to the dedicated NMEA port, followed by new NMEA sentences:

```
....  
$GPGGA,155041.0,5232.043142,N,01316.468218,E,1,04,3.0,87.6,M,43.0,M,,*63  
$GPVTG,9.6,T,9.6,M,0.0,N,0.0,K,A*23  
$GPRMC,155041.0,A,5232.043142,N,01316.468218,E,0.0,9.6,020312,,A*65  
$GPGSA,A,3,05,08,10,28,,,,,,,,,4.1,3.0,2.8*38  
$GPGSV,4,1,14,03,06,028,18,05,57,239,29,08,79,077,20,10,23,168,31*72  
$GPGSV,4,2,14,26,47,288,22,27,,34,28,32,157,34,06,03,015,*43  
$GPGSV,4,3,14,07,40,061,,13,08,104,,15,07,288,,19,06,060,*79  
$GPGSV,4,4,14,21,07,333,,24,,,*4D  
$GPGGA,155042.0,5232.043142,N,01316.468216,E,1,04,3.0,87.6,M,43.0,M,,*6E  
$GPVTG,9.6,T,9.6,M,0.0,N,0.0,K,A*23  
$GPRMC,155042.0,A,5232.043142,N,01316.468216,E,0.0,9.6,020312,,A*68  
$GPGSA,A,3,05,08,10,28,,,,,,,,,4.1,3.0,2.8*38  
$GPGSV,4,1,14,03,06,028,18,05,57,239,29,08,79,077,20,10,23,168,31*72  
$GPGSV,4,2,14,26,47,288,21,27,,35,28,32,157,35,06,03,015,*40  
$GPGSV,4,3,14,07,40,061,,13,08,104,,15,07,288,,19,06,060,*79  
$GPGSV,4,4,14,21,07,333,,24,,,*4D  
$GPGGA,155043.0,5232.043141,N,01316.468213,E,1,04,3.0,87.6,M,43.0,M,,*69  
....
```

Now the buffer mechanism can be activated again:

```
AT^SGPSC="NMEA/Output","buffered"
```

This setting activates NMEA buffering and enables the presentation of the "[^SGPSE](#)" URC. NMEA sentences will be buffered without additional power consumption for data output.

```
^SGPSC: "Nmea/Output","buffered"  
OK
```


17. Audio Commands

The AT Commands described in this chapter are related to the PHS8-P's audio interface.

17.1 ATL Set monitor speaker loudness

[ATL](#) is implemented for V.250ter compatibility reasons only, and has no effect.

Syntax

Exec Command				
ATL[<val>]				
Response(s)				
OK				
PIN	MDM	APP	→	Last
+	+	+	+	-
Reference(s)				
V.250				

Parameter Description

<val>^(num)

17.2 ATM Set monitor speaker mode

[ATM](#) is implemented for V.250ter compatibility reasons only, and has no effect.

Syntax

Exec Command				
ATM[<val>]				
Response(s)				
OK				
PIN	MDM	APP	→	Last
+	+	+	+	-
Reference(s)				
V.250				

Parameter Description

<val>^(num)

17.3 AT+CMUT Mute control

The [AT+CMUT](#) command mutes the microphone input. The command can be used in all audio modes (1 to 6) and during a voice call only. See [AT^SNFS](#) for more details on the various audio modes. During an active call, users should be aware that when they switch back and forth between different audio modes the value of `<mute>` does change.

Syntax

<p>Test Command</p> <pre>AT+CMUT=?</pre> <p>Response(s)</p> <pre>+CMUT: (list of supported<mute>s) OK</pre>											
<p>Read Command</p> <pre>AT+CMUT?</pre> <p>Response(s)</p> <pre>+CMUT: <mute> OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT+CMUT=<mute></pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"> <tr> <td>PIN</td> <td>MDM</td> <td>APP</td> <td>→</td> <td>Last</td> </tr> <tr> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> </tr> </table>	PIN	MDM	APP	→	Last	-	+	+	+	-	<p>Reference(s)</p> <p>3GPP TS 27.007 [47]</p>
PIN	MDM	APP	→	Last							
-	+	+	+	-							

Parameter Description

<code><mute></code> ^(num)	Description
0	Mute off
1	Mute on

Note

- When a voice connection will be established or an other audio mode will be started by [AT^SNFS](#) command during an active voice call then mute will be switched off.

17.4 AT+VTS DTMF and tone generation

AT+VTS is intended to send ASCII characters which cause the Mobile Switching Center (MSC) to transmit DTMF tones to a remote subscriber. The command can be used in alert state and during active voice calls and offers the following variants:

- **AT+VTS=<dtmf>[,<duration>]** allows to send a single DTMF tone. The duration can be individually determined during the call.

Syntax

Test Command AT+VTS=? Response(s) +VTS: (list of supported<dtmf>s), (list of supported<duration>s) OK	Write Command AT+VTS=<dtmf>[, <duration>] Response(s) OK ERROR +CME ERROR: <err>	Reference(s) 3GPP TS 27.007 [47]
PIN MDM APP → Last - + + - -		

Parameter Description

<dtmf>^(str)
ASCII character in the set 0...9,#,*, A, B, C, D. The string must be enclosed in quotation marks ("...").

<duration>^(num)
Tone duration in 1/10 seconds with tolerance. If not specified the default value (300 ms) is used. The minimum duration of DTMF signals is 300ms. DTMF tones below 300ms cannot be generated.
1...[3]...255

17.5 AT^SAIC Audio Interface Configuration

AT^SAIC configures the interface connections of the active audio mode. The write command is usable in audio modes 2 to 8 only.

If AT^SNFS=1, any attempt to use AT^SAIC write command is rejected with error response. This is because all default parameters in audio mode 1 are determined for type approval and are not adjustable.

To allocate a specific audio mode to one of the audio interfaces, first select the audio mode with AT^SNFS and then choose the interface using AT^SAIC.

It is recommended to configure the interface settings for all employed audio modes 2 to 6 during initialization after module startup.

An impermissible configuration will be answered by an error. Further information regarding the digital settings is available in the "PHS8-P Hardware Interface Description" [2].

Syntax

```

Test Command
AT^SAIC=?
Response(s)
^SAIC: (list of supported <io>s), (list of supported<mic>s), (list of supported<ep>s), (list of
supported<clock>s), (list of supported<mode>s), (list of supported<frame_mode>s), (list of
supported<ext_clk_mode>s)
OK

Read Command
AT^SAIC?
Response(s)
^SAIC: <io>, <mic>, <ep>, <clock>, <mode>, <frame_mode>, <ext_clk_mode>
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SAIC=<io>[, <mic>[, <ep>][, <clock>, <mode>, <frame_mode>, <ext_clk_mode>]]
Response(s)
OK
ERROR
+CME ERROR: <err>
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<io> ^(num)	
Input and output selection	
1	Digital input and output (PCM)
2	Analog input and output
3	Digital input and output (I ² S)

<mic> ^(num)	
Microphone selection	
1	Microphone 1

<ep>^(num)

Select differential earpiece amplifier

1 Selects the earpiece amplifier 1

<clock>^(num)

Parameter is mandatory if <io>=1 (digital PCM).

0 128 kHz clock
1 256 kHz clock
2 512 kHz clock
3 2048 kHz clock

<mode>^(num)

Parameter is mandatory if <io>=1 (digital PCM).

0 Master mode
1 Slave mode

<frame_mode>^(num)

Parameter is mandatory if <io>=1 (digital PCM).

0 Short frame
1 Long frame

<ext_clk_mode>^(num)

Parameter is mandatory if <io>=1 (digital PCM).

0 External clock will be provided permanently when digital audio path is configured. Please note that if the external clock is permanently provided the UE will no longer enter its power save (SLEEP) state.
1 External clock will be provided only during digital audio activity (non permanent).

Notes

- The default values of AT^SAIC after restart of ME are AT^SAIC=2,1,1,3,0,0,1 for every audio mode.
- The parameters <clock>, <mode>, <frame_mode> and <ext_clk_mode> are mandatory, if parameter <io> is set to 1 (digital PCM). These parameters can be used to configure the PCM functionality over the digital audio interface (DAI). The PCM interface supports 128 kHz, 256 kHz, 512 kHz or 2048 kHz bit clock frequency and short frame or long frame synchronization.
- If command AT^SAIC=2 (analog) is used the optional parameters go to default value and are ignored as long as the values are in ranges.
- If command AT^SAIC=3 (digital I²S) is used the optional parameters go to default values (^SAIC: 3,1,1,3,0,0,1) and are ignored as long as the values are in ranges.
- If a reconfiguration of the digital audio path with permanent clock is necessary, this should be reached about the setting of the analog path before or by setting the new digital configuration with non permanent clock. Then the digital audio path with the new parameters can be configured.
- Changes to digital PCM parameters will not become effective during any of following audio activities:
 - MO or MT voice call is being setup or present (e.g., active, waiting, hold-on)
 - Ring tone configuration is being tested (AT^SRTC execution command)During any of the above mentioned activities the PCM interface configuration can therefore not be modified, neither by AT^SAIC command nor by using the AT^SNFS command to switch to another audio mode that also configures the PCM interface but with different parameter settings.

17.6 AT^SNFI Set microphone path parameters

AT^SNFI controls the microphone settings. Read and write parameters of this command are related to the current audio mode. The write command works only in audio modes 2 to 6 to configure with AT^SNFS. Audio mode 1 is write protected for AT^SNFI.

Syntax

```

Test Command
AT^SNFI=?
Response(s)
^SNFI: (list of supported <micAmp1>s), (list of supported <micAmp2>s), (list of supported <micTxVol>s)
OK

Read Command
AT^SNFI?
Response(s)
^SNFI: <micAmp1>, <micAmp2>, <micTxVol>
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SNFI=<micAmp1>, <micAmp2>, <micTxVol>
Response(s)
OK
ERROR
+CME ERROR: <err>
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<micAmp1>^(num)

First analogue amplifier, 0 dB or +20 dB.

0 ^(D)	0 dB
1	20 dB

<micAmp2>^(num)

Second analogue amplifier, adjustable in 64 steps of 0.75 dB from -12 dB to +35.25 dB. (0 = -12 dB, 63 = +35.25 dB, 64 steps of 0.75 dB).

0...63

<micTxVol>^(num)

Multiplication factor for digital gain of uplink speech.

The digital gain has a valid range from -84 dB to +12 dB and can be calculated according to following formula:

Gain = 20 * LOG(<micTxVol> / 16384)

The value 16384 for <micTxVol> corresponds to unity gain and the value 0 to mute state.

0...65535

Notes

- CAUTION! When you adjust audio parameters avoid exceeding the maximum allowed level. Bear in mind that exposure to excessive levels of noise can cause physical damage to users!
- All audio parameters handled by [AT^SNFI](#) and [AT^SNFO](#) are volatile for the current audio mode.
- Parameters [<micAmp1>](#) and [<micAmp2>](#) are used only when analog interface (see [AT^SAIC](#)) is chosen.

17.7 AT^SNFO Set audio output parameter (loudspeaker path)

AT^SNFO controls the audio output path amplification. The read and write parameters of this commands are related to the current audio mode configured by **AT^SNFS**. The write command works only in audio modes 2 to 6. Audio mode 1 is write protected for **AT^SNFO**.

Syntax

```

Test Command
AT^SNFO=?
Response(s)
^SNFO: (list of supported <cdcRxGain>s) , (list of supported <rxVol>s) , (list of supported <stGain>s)
OK

Read Command
AT^SNFO?
Response(s)
^SNFO: <cdcRxGain>, <rxVol>, <stGain>
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SNFO=<cdcRxGain>, <rxVol>, <stGain>
Response(s)
OK
ERROR
+CME ERROR: <err>

```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<cdcRxGain>^(num)

<cdcRxGain> is the analogue gain of output signal after summation of sidetone. The analogue gain has a valid range from -57 dB to +6 dB, adjustable in 64 steps of 1 dB. (0 = -57 dB, 63 = +6 dB, 64 steps of 1 dB).

0...63

<rxVol>^(num)

<rxVol> is the speaker volume gain control (digital gain). There are 42 volume gain levels covering the range from -50 dB to +12 dB which are adjustable in steps of 1.5 dB (-50 dB means mute). (0 = mute, 1 = -48 dB, 41 = +12 dB, 42 steps of 1.5 dB).

0...41

<stGain>^(num)

Multiplication factor for digital gain of the loop-back from speech TX to speech RX path (side tone gain). The digital gain has a valid range from -96 dB to 0 dB and can be calculated according to following formula:
Gain = 20 * LOG(**<stGain>** / 16384) - 12 dB

<stGain> value 16384 results in -12 dB of gain and the value 0 in side tone muting.

0...65535

Notes

- CAUTION! When you adjust audio parameters avoid exceeding the maximum allowed level. Bear in mind that exposure to excessive levels of noise can cause physical damage to users!
- All audio parameters handled by AT^SNFI and AT^SNFO are volatile for the current audio mode.
- Parameter <cdcRxGain> is used only when analog interface (see AT^SAIC) is chosen.

17.8 AT^SNFS Select audio hardware set

The `AT^SNFS` write command serves to set the audio mode required for the connected equipment. Each audio mode can be assigned to a specific interface.
The `AT^SNFS` read command delivers the last configured audio mode.

Syntax

```

Test Command
AT^SNFS=?
Response(s)
^SNFS: (list of supported <audMode>s)
OK

Read Command
AT^SNFS?
Response(s)
^SNFS: <audMode>
OK
ERROR
+CME ERROR: <err>

Write Command
AT^SNFS=<audMode>
Response(s)
OK
ERROR
+CME ERROR: <err>
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<audMode> ^(num)	
1 ^(P)	Audio mode 1: Standard mode. Optimized for the reference handset, that can be connected to the analog interface (see "PHS8-P Hardware Interface Description" for information on this handset). Note: The default parameters are determined for type approval and are not adjustable with AT commands.
2	Audio mode 2: Echo canceller and noise suppressor are preset for router applications.
3	Audio mode 3: Echo canceller and noise suppressor are preset for user handset usage.
4	Audio mode 4: Echo canceller and noise suppressor are preset for mono-headset usage.
5	Audio mode 5: Echo canceller and noise suppressor are preset for speakerphone usage.
6	Audio mode 6: Echo canceller and noise suppressor are preset for transparent applications.

-
- | | |
|---|-----------------------------------------------------------------------------------------------------------------|
| 7 | Audio mode 7: Echo canceller and noise suppressor are preset for dual microphone user handset. |
| 8 | Audio mode 8: Echo canceller and noise suppressor are preset for dual microphone handheld hands-free operation. |

Notes

- Audio mode 1 will be active each time after module is powered up.
- The write command can be used during a voice call to switch back and forth between different modes. This allows the user, for example, to switch handsfree operation (speakerphone) on and off.

17.9 AT^SNFTTY Signal TTY/CTM audio mode capability

PHS8-P offers an integrated implementation of CTM modem (Cellular Text Telephone Modems). The benefit of CTM is that text characters typed on a TTY device (Text Telephone Type-writer) can be transformed into special audio burst signals for reliable transmission via the existing speech channels of a cellular phone system. The internal CTM modem supports a baud rate of 45.45bps. An automatic recognition of TTY devices isn't supported. If CTM mode is activated, the ME will set the necessary bearer capability bit on outgoing (mobile originated) calls, and incoming calls with this bearer capability bit set are accepted. The TE needs to decode the special audio burst signals.

If CTM mode is disabled, the ME will clear the bearer capability bit on mobile originated calls, and incoming calls with the bearer capability bit set are rejected because the PHS8-P expects that CTM coded speech data cannot be decoded by the TE.

Designed to set the module's speech system into CTM mode, the `AT^SNFTTY` command allows a TTY device to be connected to the audio interfaces of PHS8-P.

Related documents: Refer to the relevant standards, such as 3GPP TS 26.226 (ETSI TS 126 226) and 3GPP TS 26.231 (ETSI TS 126 231). 3GPP documentation can be retrieved, for example, from <http://www.3gpp.org/specs/specs.htm>. Application Note 22 "Using TTY/CTM equipment" supplies information needed to connect TTY/CTM equipment to the PHS8-P.

Requirements for using TTY/CTM features:

- TTY/CTM functionality requires an own audio mode with all audio parameters set to their factory default. This will be reached by a specific internal audio mode for TTY/CTM activated with `AT^SNFTTY`. When TTY/CTM mode is activated the audio mode indicated by the `AT^SNFS` read command is invalid.

Syntax

<p>Test Command</p> <pre>AT^SNFTTY=?</pre> <p>Response(s)</p> <pre>^SNFTTY: (list of supported <audioState>s) OK</pre>											
<p>Read Command</p> <pre>AT^SNFTTY?</pre> <p>Response(s)</p> <pre>^SNFTTY: <audioState> OK ERROR +CME ERROR: <err></pre>											
<p>Write Command</p> <pre>AT^SNFTTY=<audioState></pre> <p>Response(s)</p> <pre>OK ERROR +CME ERROR: <err></pre>											
<table border="1"> <thead> <tr> <th>PIN</th> <th>MDM</th> <th>APP</th> <th>→</th> <th>Last</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	PIN	MDM	APP	→	Last	-	+	+	-	-	<p>Reference(s)</p> <p>Cinterion</p>
PIN	MDM	APP	→	Last							
-	+	+	-	-							

Parameter Description

<audioState> ^(num)	Description
0 ^(P)	Audio path is in normal speech mode.
1	Audio path is in TTY/CTM mode. The <code>AT^SNFTTY=1</code> write command has to be set before dialing with <code>ATD</code> .

Notes

- Functionality of TTY mode will be not guaranteed if `AT^SNFTTY=1` is set and audio mode will be changed by `AT^SNFS` write command.
- Functionality of voice call will be not guaranteed if TTY mode will be changed during activated voice call.

17.10 AT^SRTC Ring tone configuration

The `AT^SRTC` test command returns a list of ranges for parameter `<event>`, `<number>` and `<volume>`.

The `AT^SRTC` read command returns the currently set ring tone melody `<number>` and ring tone volume `<volume>` for the incoming `<event>`s voice call, CSD call and SMS.

The `AT^SRTC` write command allows to configure the parameters ring tone melody `<number>` and ring tone volume `<volume>` for the ring tone events `<event>`s voice call, CSD call and SMS.

The `AT^SRTC` execution command is intended for testing. It starts to test the settings currently selected for `<event>=1` (incoming CSD calls). To stop test playback use `AT^SRTC` again. To try different settings use the `AT^SRTC` write command, select another configuration for incoming CSD calls and start the `AT^SRTC` execution command once again. An incoming or outgoing call stops the test started by using the `AT^SRTC` execution command.

Syntax

Test Command

```
AT^SRTC=?
```

Response(s)

```
^SRTC: (list of supported <event>s) , (list of supported <number>s) , (list of supported <volume>s)  
OK
```

Read Command

```
AT^SRTC?
```

Response(s)

```
^SRTC: 0, <number>, <volume>  
^SRTC: 1, <number>, <volume>  
^SRTC: 2, <number>, <volume>  
OK  
ERROR  
+CME ERROR: <err>
```

Exec Command

```
AT^SRTC
```

Response(s)

```
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

```
AT^SRTC=<event>, <number>, <volume>
```

Response(s)

```
OK  
ERROR  
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

`<event>`^(num)

Ring tone melodies for the following events. Melody will be played from the audio output.

0	Ringing alert for incoming voice calls.
1	Ringing alert for incoming CSD calls.
2	Ringing alert for incoming SMS messages. In case of concatenated SMS ringing will start when last SMS segment is received.

`<number>`^(num)

Type or number of ring tone melody. You have a choice of ring tone melody or mute. Ring tone melody will be played from the audio output. `<number>=0` is only intended for muting.

0 ^{(D)(P)}	No ringing alert melody.
1	Melody #1 active.
2	Melody #2 active.
3	Melody #3 active.
4	Melody #4 active.
5	Melody #5 active.
6	Melody #6 active.
7	Melody #7 active.
8	Melody #8 active.
9	Melody #9 active.

`<volume>`^(num)

The volume of ring tone melodies varies from 0 dB to mute.

0 ^{(D)(P)}	Mute.
1	Volume level 1, set to -12dB.
2	Volume level 2, set to -8dB.
3	Volume level 3, set to -4dB.
4	Volume level 4, set to 0dB.

18. Hardware related Commands

All AT commands described in this chapter are related to the hardware interface of the PHS8-P. Further information regarding this interface is available in the "PHS8-P Hardware Interface Description" [2].

18.1 AT+CCLK Real Time Clock

[AT+CCLK](#) controls the real time clock (RTC) of PHS8-P.

The current setting of the clock is retained if the UE enters Power Down mode via [AT^SMSO](#) or restarts using [AT+CFUN](#). However, it will be reset to its factory default value if the UE is totally disconnected from power.

Each time the UE is restarted it may take up to two seconds to reinitialize the RTC and to update the current time. Therefore, it is recommended to delay the usage of [AT+CCLK](#) after restart.

If the clock is set into the past, then it is recommended to reset the UE using [AT+CFUN](#) to avoid blocked calls because of the autocal restriction.

Syntax

Test Command					
AT+CCLK=?					
Response(s)					
OK					
Read Command					
AT+CCLK?					
Response(s)					
+CCLK: <time>					
OK					
Write Command					
AT+CCLK=<time>					
Response(s)					
OK					
ERROR					
+CME ERROR: <err>					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	3GPP TS 27.007 [47]

Parameter Description

<time>^{(str)(NV)}

Real time clock setting

Format is "yy/mm/dd,hh:mm:ss", where the characters yy indicate the two last digits of the year, followed by month (mm), day (dd), hour (hh, 24 hour format), minutes (mm) and seconds (ss).

For the write command the base of the year part is 2000. For example the 6th of July 2011 at ten past ten in the evening equates to "11/07/06,22:10:00".

The factory delivery value, which is also used if the UE was totally disconnected from power, is "80/01/06,00:00:00", where "80" here stands for "1980"! So <time> values as reponse of the read command are ambiguous if the year part is > "79"! To be sure that in such cases the correct time is used, it should be set explicitly using the [AT+CCLK](#) write command.

18.2 AT^SAD Antenna Configuration

AT^SAD controls UMTS receiver (RX) antenna diversity support to achieve

- verification of receive paths,
- support of CTIA 3.0 diversity tests (relevant for application approval).

RX antenna diversity means usage of two antennas and two receiver paths to provide significant gains in performance. The gains depend on how 'decoupled' the antennas are from each other. Transmitter (TX) signal is always transferred via primary antenna.

Syntax

```

Test Command
AT^SAD=?
Response(s)
^SAD: (list of supported <sadMode>s)
OK

Write Command
AT^SAD=<sadMode>
Response(s)
^SAD: <sadValue>
OK
ERROR
+CME ERROR: <err>
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<sadMode> ^(num)	
10	Disable RX diversity functionality. Activate only the first antenna for RX operation, i.e. use the primary antenna for reception. The secondary (diversity) receiver path is switched off. Configuration is stored in non-volatile memory and becomes effective after next restart of UE.
11 ^(D)	Enable RX diversity functionality by activating both antennas for RX operation. This setting is active as factory delivery configuration. It is stored in non-volatile memory and becomes effective after next restart of the UE.
12	Query RX diversity functionality setting. <sadValue> returns the currently stored configuration.
13	Configure UMTS antenna test mode for production tests. The primary (main) antenna port is used as TX chain. However, the related receiver path is switched off. Only the secondary (diversity) antenna is activated for RX operation. Configuration is stored in non-volatile memory and becomes effective after next restart of the UE.

<sadValue>^(num)

The meaning of this parameter depends on given <sadMode>.

For <sadMode>=10 .. 13 <sadValue> returns the currently stored configuration of the RX diversity functionality, which will be used after next restart of the UE.

18.3 AT^SBV Battery/Supply Voltage

[AT^SBV](#) allows to monitor the supply (or battery) voltage of the module. The voltage is continuously measured at intervals depending on the operating mode of the RF interface. The duration of a measurement period ranges from 0.5s in TALK / DATA mode up to 50s when PHS8-P is in IDLE mode or Limited Service (deregistered). The displayed value is averaged over the last measuring period before the [AT^SBV](#) command was executed.

The measurement is related to the reference points of BATT+ and GND. For details on the reference points please refer to the Hardware Interface Description [\[2\]](#).

Syntax

Test Command

```
AT^SBV=?
```

Response(s)

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

Exec Command

```
AT^SBV
```

Response(s)

```
^SBV: <value>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<value>^(num)

Supply (or battery) voltage in mV

18.4 AT^SCTM Critical Operating Temperature Monitoring

AT^SCTM allows to monitor the operating temperature range of the PHS8-P device. Refer to "PHS8-P Hardware Interface Description" [2] for specifications on critical temperature ranges.

AT^SCTM write command controls the presentation of URCs to report critical operating temperature limits.

Use parameter <UrcMode> to enable (1) and disable (0) URC presentation.

Important: Even if setting is <UrcMode>=0 URC presentation is enabled for a period of 15 seconds after PHS8-P was switched on. After expiry URC presentation will be disabled, i.e. no URCs will be generated.

URCs indicating levels "2" or "-2" are always enabled, i.e. they will be issued even though the factory setting AT^SCTM=0 was never changed. If level "2" or "-2" URCs occur PHS8-P will switch off within 5 seconds, unless the temperature returns to a valid operating level ("1", "0", "-1").

URCs indicating alert levels "1" or "-1" are intended to enable the user to take appropriate precautions, such as protect PHS8-P from exposure to extreme conditions, or save or back up data etc.

AT^SCTM read command returns:

- The URC presentation mode.
- Information about the current temperature range of the PHS8-P device.
- The board temperature (in degree Celsius) if parameter <tempCtrl>=1.

Syntax

Test Command

```
AT^SCTM=?
```

Response(s)

```
^SCTM: (list of supported <UrcMode>s)[, (range of <temp>in Celsius)]  
OK
```

Read Command

```
AT^SCTM?
```

Response(s)

```
^SCTM: <UrcMode>, <UrcCause>[, <temp>]  
OK  
ERROR  
+CME ERROR: <err>
```

Write Command

```
AT^SCTM=<UrcMode>[, <tempCtrl>]
```

Response(s)

```
OK  
ERROR  
+CME ERROR: <err>
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Unsolicited Result Code

URCs will be automatically sent to the TE when the temperature reaches or exceeds the critical level, or when it is back to normal.

```
^SCTM_B: <UrcCause>
```

URC for PHS8-P device temperature warning.

Parameter Description

<UrcMode>^(num)

URC presentation mode. Setting will not be stored during power-down, i.e. after next restart default setting will be restored.

- 0^(P) Disable URC presentation (except for <UrcCause> equal to -2 or +2).
- 1 Enable URC presentation.

<UrcCause>^(num)

- 2 Below lowest temperature limit (causes switch-off after 5 s time)
- 1 Below low temperature alert limit
- 0 Normal operating temperature
- 1 Above upper temperature alert limit
- 2 Above uppermost temperature limit (causes switch-off after 5 s time)

<tempCtrl>^(num)

- 0(&F)(P) Suppress output of <temp> in read command.
- 1 Output <temp> in test and read command.

<temp>^(num)

Board temperature in Celsius. Is comprised between the lowest temperature warning level and the uppermost temperature warning level.

Examples

EXAMPLE 1

URCs issued when the operating temperature is out of range:

- ^SCTM_B: 1 Caution: Module close to overtemperature limit.
- ^SCTM_B: 2 Alert: Module is above overtemperature limit and switches off.
- ^SCTM_B: -1 Caution: Module close to undertemperature limit.
- ^SCTM_B: -2 Alert: Module is below undertemperature limit and switches off.

EXAMPLE 2

URCs issued when the temperature is back to normal (URC is output once):

- ^SCTM_B: 0 Module back to normal temperature.

18.5 AT^SLED LED Feature

AT^SLED controls the LED function provided by the PHS8-P's STATUS pin, which acts as an output and can be used to control a connected LED. The electrical specifications of the status pin and advice on how to connect the LED circuit can be found in [2]. The LED indicates the operating states listed below:

Table 18.1: PHS8-P Status and Mode Indication via LED

PHS8-P Status	<mode>=1	<mode>=2 <flash>= default	<mode>=2 <flash>= user defined
- GSM CS data call in progress or established - GSM voice call in progress or established - UMTS voice call in progress or established - UMTS CS data call in progress	Permanently on	10 ms on / 990 ms off	<flash> ms on / 990 ms off
- GSM PS data transfer - UMTS data transfer	Permanently on	10 ms on / 1990 ms off	<flash> ms on / 1990 ms off
UE registered to a network. No call, no data transfer	Permanently on	10 ms on / 3990 ms off	<flash> ms on / 3990 ms off
Limited Network Service (e.g. because no SIM/ USIM, no PIN or during network search)	500ms on / 500 ms off	500ms on / 500 ms off	500ms on / 500 ms off

Syntax

```

Test Command
AT^SLED=?
Response(s)
^SLED: (list of supported <mode>s), (range of supported <flash>s)
OK

Read Command
AT^SLED?
Response(s)
^SLED: <mode>[, <flash>]
OK

Write Command
AT^SLED=<mode>[, <flash>]
Response(s)
OK
ERROR
+CME ERROR: <err>
    
```

PIN	MDM	APP	→	Last
-	+	+	+	-

Parameter Description

<mode> ^(num)	
LED operating mode	
0 ^(P)	LED feature is disabled.

-
- | | |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | LED lights steadily when the UE is registered to the network and either awake or in power saving state. |
| 2 | LED is flashing when the UE is in Limited Service or registered with a network and either awake or in power saving state. The duration of flashing can be configured using the parameter <code><flash></code> . |

`<flash>`^(num)

LED flash period

1...10^(P)...50

LED flash period (in milliseconds) if `<mode>=2`.
LED off-time between flashing is approximately 4 seconds and is not configurable.

19. Miscellaneous Commands

The AT Commands described in this chapter are related to various areas.

19.1 A/ Repeat Previous Command Line

Repeat previous AT command line.

In general, after beginning a command line with character "a" or "A" a second character "t", "T" or "/" has to follow. "/" acts as line terminating character. In case of using a wrong second character, it is necessary to start again with character "a" or "A".

Syntax

Exec Command					
A/					
Response(s)					
PIN	MDM	APP	→	Last	Reference(s)
-	+	+	+	-	V.250

19.2 ATS3 Command Line Termination

[ATS3](#) determines the character recognized by the PHS8-P to terminate an incoming command line. It is also generated for result codes and information text, along with character value set via [ATS4](#).

Syntax

Read Command	
ATS3?	
Response(s)	
<n>	
OK	
Write Command	
ATS3=<n>	
Response(s)	
OK	
ERROR	
PIN MDM APP → Last	Reference(s)
- + + + -	ITU-T V.250 [18]

Parameter Description

<n> ^{(num)(&V)(&W)}
Command line termination character. It is not recommended to change this value. 000...013 ^(&F) ...127

19.3 ATS4 Response Formatting

[ATS4](#) determines the character generated by the PHS8-P for result code and information text, along with the command line termination character set via [ATS3](#).

Syntax

Read Command	
ATS4?	
Response(s)	
<n> OK	
Write Command	
ATS4= <n>	
Response(s)	
OK ERROR	
PIN MDM APP → Last	Reference(s)
- + + + -	ITU-T V.250 [18]

Parameter Description

<n> ^{(num)(&V)(&W)}
Response formatting character. It is not recommended to change this value. 000...010 ^(&F) ...127

19.4 ATS5 Command Line Editing

ATS5 determines the character value used by the PHS8-P to delete the immediately preceding character from the AT command line (i.e. equates backspace key).

Syntax

Read Command	
ATS5?	
Response(s)	
<code><n></code> OK	
Write Command	
ATS5= <code><n></code>	
Response(s)	
OK ERROR	
PIN MDM APP → Last	Reference(s)
- + + + -	ITU-T V.250 [18]

Parameter Description

<code><n></code> ^{(num)(&V)(&W)}
Command line editing character. It is not recommended to change this value. 000...008 ^(&F) ...127

19.5 AT^SBNW Binary Write

The `AT^SBNW` write command can be used to load binary data for A-GPS from a local memory to the PHS8-P Flash File System (FFS). The GPS receiver integrated in PHS8-P supports `gpsOneXTRA™` assistance data.

Before transferring A-GPS data ensure that the following conditions are met:

- Take care that the RTC of PHS8-P is correctly set to Greenwich Mean Time (GMT):0 with `AT+CCLK` and is up to date.
- Deactivate the GPS receiver with `AT^SGPSC=<EngineVal>,0`.
- Download a new GpsOneXTRA binary file (named `xtra.bin`) via HTTP from one of the following `gpsOneXtra` assistance webservers:
 - `http://xtra1.gpsonextra.net/xtra.bin`
 - `http://xtra2.gpsonextra.net/xtra.bin`
 - `http://xtra3.gpsonextra.net/xtra.bin`
- Save the received `xtra.bin` file to your local memory and check the exact file size (approximately 40kB). This is because the precise data length shall be given when storing the `xtra.bin` file to the PHS8-P FFS. The data length shall be the second parameter `<agps_length>`.

When `xtra.bin` file transfer starts, any old data stored in the FFS will be cleared. After successfully storing the new GpsOneXTRA assistance data to the FFS the UE will send the responses "AGPS END OK" and "OK" and return to command mode. The data can be used to achieve faster TTFF (Time to First Fix). For this purpose, set `AT^SGPSC=<EngineVal>,2` to inject the GpsOneXTRA assistance data and activate the GPS receiver. GpsOneXTRA assistance data is valid for up to 7 days.

Please note that if data transfer with `AT^SBNW` was not successful the FFS remains empty.

Syntax

Test Command

`AT^SBNW=?`

Response(s)

`^SBNW : (list of supported <type>s), (list of supported <subtype>s)`

OK

Write Command

Save the `xtra.bin` file to local memory (if `<agps_length>` is used to specify file size):

`AT^SBNW="agps", <agps_length>`

Response(s)

CONNECT

AGPS READY: SEND FILE ...

(Indicates that UE has entered binary data mode. Data can be transferred.)

After data transfer the UE returns one of the following result codes:

AGPS END OK

TIME INFO ERROR

BAD CRC

OK

Write Command

Delete existing `xtra.bin` file (if `<agps_length>= -1`):

`AT^SBNW="agps", <agps_length>`

Response(s)

CONNECT

AGPS READY: RESET GPS ENGINE AND DELETE XTRA FILE...

(Indicates that UE tries to reset all current GPS data and to delete a saved `xtra.bin` file)

Write Command

(Continued)

Delete existing xtra.bin file (if <agps_length>= -1):

AT^SBNW="agps", <agps_length>

Response(s)

After that the UE returns one of the following result codes:

AGPS END OK

AGPS TEMPORARY NOT ALLOWED ERROR

OK

PIN MDM APP → Last

- + + + -

Parameter Description

<type>^(str)

"agps" Activates A-GPS binary data mode.

<subtype>^(num)

0 Not relevant. Always 0.

<agps_length>^(num)

4097...61440 Size of xtra.bin file (number of bytes).

-1 Delete stored xtra.bin file. Also all currently used GPS data are deleted.

19.6 AT^SFDL Enter Firmware Download Mode

[AT^SFDL](#) allows the application manufacturer to download PHS8-P firmware into the module by starting the download process from the host application or a customer-designed download program. The download can be performed via the following serial interfaces: USB, ASC0. The firmware download is processed on the same serial interface as [AT^SFDL](#) was issued, using the currently selected baud rate (refer [AT+IPR](#)).

The PHS8-P firmware update file must be available in the *.USF format. It consists of records to be transferred one by one from the host application to the module.

This manual only describes the handling of the [AT^SFDL](#) command. All technical requirements and steps to prepare the host application for this download solution can be found in the Application Note "Updating Firmware". An example for developing an appropriate download program is included.

The [AT^SFDL](#) execute command causes the module to enter the firmware download mode (this may take some milliseconds). After entering the download mode the module sends the start pattern HEX 0x01 ("ANSWER_OK") to the application to indicate its ready state. Next, the application shall start to send the records of the firmware file. Each record received on the module is acknowledged to the host application. Once all records are successfully received, the module shuts down automatically.

If a valid firmware is still installed, but the [AT^SFDL](#) command is issued without sending any firmware afterwards the module will stay in ready state. In this case it must be switched off.

Syntax

Test Command				
AT^SFDL=?				
Response(s)				
OK				
Exec Command				
AT^SFDL				
Response(s)				
OK				
PIN	MDM	APP	→	Last
-	+	+	+	+

20. Appendix

20.1 Restricted access to SIM data after SIM PIN authentication

The following commands can be used only after data from the SIM have been read successfully for the first time. Reading starts after successful SIM authentication has been performed, and may take up to 30 seconds depending on the SIM used. While the read process is in progress, an attempt to use any of the following commands will result in "+CME Error: 14" (SIM busy).

The "^SIND: simstatus" URC enabled with `AT^SIND` can be used to notify the user when the ME has finished reading the SIM card and SIM data are accessible after SIM PIN authentication.

∅ ... AT Command not available

- ... AT command accessible immediately after PIN entry has returned OK

+ ... AT command fully accessible after SIM PIN authentication has been completed

AT Command	Exec	Test	Read	Write
<code>AT+CMGL</code>	+	-	∅	+
<code>AT+CMGR</code>	∅	-	∅	+
<code>AT+CSCA</code>	∅	-	+	+
<code>AT+CNUM</code>	+	+	∅	∅
<code>AT+CPBF</code>	∅	+	∅	+
<code>AT+CPBR</code>	∅	+	∅	+
<code>AT+CPBS</code>	∅	+	+	+
<code>AT+CPBW</code>	∅	+	∅	+

20.2 Star-Hash (*#) Network Commands

The following command strings can be sent to the network via [ATD](#) and have to be terminated with a semicolon. The command strings are defined with 3GPP TS 22.030 [\[28\]](#).

Table 20.1: Star-Hash (*#) Command Overview

Star-Hash Code	Functionality	Response, also refer to Table 20.3
Phone Security		
*#06#	Query IMEI	<IMEI> OK
**04[2]*oldPin[2]*newPin[2]*new-Pin[2]#	Change SIM pwd	+CME ERROR: <err> / OK
**05[2]*unblKey[2]*newPin[2]*new-Pin[2]#	Change/Unblocking SIM pwd	+CME ERROR: <err> / OK
[]03*[ZZ]*oldPw*newPw*newPw#	Registration of net password	+CME ERROR: <err> / OK
Phone number presentation		
*#30#	Check status of CLIP (Calling Line Identification Presentation)	+CLIP : <n>,<m> OK (see AT+CLIP)
*#31#	Check status of CLIR (Calling Line Identification Restriction)	+CLIR : <n>,<m> OK (see AT+CLIR)
*31#<Phonenumber>[:]	Suppress CLIR	(see AT+CLIR)
#31#<Phonenumber>[:]	Activate CLIR	(see AT+CLIR)
*#76#	Check status of COLP (Connected Line Identification Presentation)	+COLP : 0,<m> OK (where <m> = active or not active)
(choice of *,#,*)77#	Act/deact/int COLR (Connected Line Identification Restriction)	+COLR : 0,<m> OK (where <m> = active or not active)
Call forwarding		
(choice of *,#,*,**,##)21*DN*BS#	Act/deact/int/reg/eras CFU	+CCFC : <status>, <class> [...] (see: AT+CCFC)
(choice of *,#,*,**,##)67*DN*BS#	Act/deact/int/reg/eras CF busy	see above
(choice of *,#,*,**,##)61*DN*BS*T#	Act/deact/int/reg/eras CF no reply	see above
(choice of *,#,*,**,##)62*DN*BS#	Act/deact/int/reg/eras CF no reach	see above
(choice of *,#,*,**,##)002*DN*BS*T#	Act/deact/int/reg/eras CF all	see above
(choice of *,#,*,**,##)004*DN*BS*T#	Act/deact/int/reg/eras CF all cond.	see above
Call waiting		
(choice of *,#,*)43*BS#	Activation/deactivation/int WAIT	+CCWA : <status>, <class> [...]. (Refer to AT+CCWA)
Call barring		
(choice of *,#,*)33*Pw*BS#	Act/deact/int BAOC	+CLCK : <status>, <class> [...].(Refer to AT+CLCK)
(choice of *,#,*)331*Pw*BS#	Act/deact/int BAOIC	see above
(choice of *,#,*)332*Pw*BS#	Act/deact/int BAOIC exc.home	see above

Star-Hash Code	Functionality	Response, also refer to Table 20.3
(choice of *,#,*)35*Pw*BS#	Act/deact/int. BAIC	see above
(choice of *,#,*)351*Pw*BS#	Act/deact/int BAIC roaming	see above
#330*Pw*BS#	Deact. All Barring Services	see above
#333*Pw*BS#	Deact. All Outg.Barring Services	see above
#353*Pw*BS#	Deact. All Inc.Barring Services	see above
Call Hold / Multiparty		
C[C] in call	Call hold and multiparty	+CME ERROR: <err> / OK
USSD messages		
[C]...[C]#	Send USSD message	+CME ERROR: <err> / OK
C[C] (excluded 1[C])	Send USSD message	+CME ERROR: <err> / OK

Table 20.2: Abbreviations of Codes and Parameters used in Table 20.1

Abbreviation	Meaning	Value
ZZ	Type of supplementary services: Barring services All services	330 Not specified
DN	Dialing number	String of digits 0-9
BS	Basic service equivalent to parameter class: Voice Fax (only for compatibility reasons) SMS SMS+Fax (only for compatibility reasons) Data circuit asynchron Data circuit synchron Dedicated PAD access Dedicated Packet access Data circuit asynchron+PAD Data circuit synchron+Packet Data circuit asynchron+synchron+Packet+PAD All Services	11 13 16 12 25 24 27 26 21 22 20 --
T	Time in seconds	In contrast to AT+CCFC , parameter T has no default value. If T is not specified, an operator defined default or the last known value may be used, depending on the network operator.
PW	Password	--
C	Character of TE character set (e.g. asterisk, hash or digit in case of USSD, or digits in case of held calls or multiparty calls)	--

Table 20.3: Star-Hash Command Response Parameters

Parameter	Meaning
<m>	Mode: 0 = not active, 1 = active
<n>	Unsolicited result code: 0 = presentation disabled, 1 = presentation enabled
<status>	Status: 0 = not active, 1 = active
<class>	Represents BS = basic service, refer to AT+CCFC , AT+CLCK

Parameter	Meaning
<fac>	Facility lock, refer to AT+CLCK
<reason>	Call forwarding reason

For exact specification of format and parameters for Star-Hash commands refer to Table 3.2 of 3GPP TS 22.004 [\[27\]](#), and Annex C of of 3GPP TS 22.030 [\[28\]](#).

Table 20.4: Star-Hash Commands for Supplementary Services

Star-Hash Code	Abbreviations in Table 20.1	Functionality
*	act	Activate (except for CLIR, see list above)
**	reg	Register and activate
*#	int	Check status (interrogate)
#	deact	Deactivate (except for CLIR, see list above)
##	eras	Unregister and deactivate

20.3 Available AT Commands and Dependency on SIM PIN

- ∅ ... Command not available
- ... Command does not require PIN1
- + ... Command requires PIN1
- ± ... Command sometimes requires PIN1

Table 20.5: Available AT Commands and Dependency on SIM PIN

AT Command	Exec	Test	Read	Write
Configuration Commands				
AT&F	+	∅	∅	∅
AT&V	-	∅	∅	∅
AT&W	-	∅	∅	∅
ATQ	+	∅	∅	∅
ATV	-	∅	∅	∅
ATX	+	∅	∅	∅
ATZ	+	∅	∅	∅
AT+CFUN	∅	-	-	-
AT^SMSO	-	-	∅	∅
AT+GCAP	+	+	∅	∅
AT+CMEE	-	-	-	-
AT+CSCS	∅	-	-	-
AT^SCFG	∅	-	-	-
AT^SDPORT	∅	-	-	-
Status Control Commands				
AT^SIND	∅	-	-	-
AT+CEER	+	+	∅	+
AT+CPAS	-	-	∅	∅
AT+WS46	∅	-	-	-
Serial Interface Control Commands				
AT\Q	-	∅	∅	∅
AT&C	+	∅	∅	∅
AT&D	+	∅	∅	∅
AT&S	-	∅	∅	∅
ATE	-	∅	∅	∅
AT+IPR	∅	-	-	-
AT+CMUX	∅	-	-	-
AT^SQPORT	-	-	-	∅
Security Commands				
AT+CLCK	∅	+	∅	+
AT+CPIN	∅	-	-	-

AT Command	Exec	Test	Read	Write
AT+CPWD	∅	+	∅	+
AT^SCSL	∅	±	∅	±
AT^SPIC	-	-	-	-
Identification Commands				
ATI	±	∅	∅	∅
AT+CGMI	-	-	∅	∅
AT+GMI	-	-	∅	∅
AT+CGMM	-	-	∅	∅
AT+GMM	-	-	∅	∅
AT+CGMR	-	-	∅	∅
AT+GMR	-	-	∅	∅
AT+CGSN	-	-	∅	∅
AT+GSN	-	-	∅	∅
AT+CIMI	+	+	∅	∅
Call related Commands				
ATA	+	∅	∅	∅
ATD	±	∅	∅	∅
ATD<<mem><index>	+	∅	∅	∅
ATD<<index>	+	∅	∅	∅
ATD<<str>	+	∅	∅	∅
ATH	+	∅	∅	∅
AT+CHUP	-	-	∅	∅
AT^SHUP	∅	+	∅	+
ATS0	∅	∅	+	+
ATS6	∅	∅	+	+
ATS7	∅	∅	+	+
ATS8	∅	∅	+	+
ATS10	∅	∅	+	+
ATO	+	∅	∅	∅
+++	-	∅	∅	∅
AT+CLCC	+	+	∅	∅
AT^SLCC	+	+	+	+
AT+CR	∅	+	+	+
AT+CRC	+	+	+	+
AT+CBST	∅	+	+	+
AT+CRLP	∅	+	+	+
ATP	+	∅	∅	∅
ATT	+	∅	∅	∅
AT+ES	∅	-	±	±
AT+ESA	∅	-	+	+



AT Command	Exec	Test	Read	Write
AT+CSTA	∅	+	+	+
Network Service Commands				
AT+COPN	+	+	∅	∅
AT+COPS	∅	+	+	+
AT^SOPS	∅	+	∅	∅
AT+CREG	∅	-	-	-
AT+CSQ	+	+	∅	∅
AT+CPLS	∅	+	+	+
AT+CPOL	∅	+	+	+
AT^SMONI	-	-	∅	-
AT^SMONP	-	-	∅	-
Supplementary Service Commands				
AT+CACM	∅	+	+	+
AT+CAMM	∅	+	+	+
AT+CAOC	+	+	+	+
AT+CCUG	∅	+	+	+
AT+CCFC	∅	+	∅	+
AT+CCWA	∅	+	+	+
AT+CHLD	∅	+	∅	+
AT+CLIP	∅	+	+	+
AT+CLIR	∅	+	+	+
AT+COLP	∅	+	+	+
AT+CPUC	∅	+	+	+
AT+CSSN	∅	+	+	+
AT+CUSD	∅	+	+	+
Packet Domain Related Commands				
AT+CGATT	∅	+	+	+
AT+CGACT	∅	+	+	+
AT+CGCMOD	∅	+	∅	+
AT+CGDATA	∅	+	∅	+
AT+CGDCONT	∅	+	+	+
AT+CGPADDR	+	+	∅	+
AT+CGQMIN	∅	+	+	+
AT+CGEQMIN	∅	+	+	+
AT+CGREG	∅	+	+	+
AT+CGQREQ	∅	+	+	+
AT+CGEQREQ	∅	+	+	+
AT+CGSMS	∅	+	+	+
ATD*99#	+	∅	∅	∅
AT^SGAUTH	∅	+	+	+

AT Command	Exec	Test	Read	Write
AT^SGCONF	∅	-	-	-
Short Message Service (SMS) Commands				
AT+CMGC	∅	+	∅	+
AT+CMGD	∅	+	∅	+
AT+CMGF	∅	+	+	+
AT+CMGL	+	+	∅	+
AT+CMGR	∅	+	∅	+
AT+CMGS	∅	+	∅	+
AT+CMGW	+	+	∅	+
AT+CMMS	∅	+	+	+
AT+CMSS	∅	+	∅	+
AT+CNMA	+	+	∅	+
AT+CNMI	∅	+	+	+
AT+CPMS	∅	+	+	+
AT+CSCA	∅	+	+	+
AT+CSCB	∅	+	+	+
AT+CSDH	∅	+	+	+
AT+CSMP	∅	+	+	+
AT+CSMS	∅	+	+	+
AT^SMGL	+	+	∅	+
AT^SCML	+	+	∅	+
AT^SCMR	∅	+	∅	+
AT^SCMS	∅	+	∅	+
AT^SCMW	∅	+	∅	+
Internet Service Commands				
AT^SICS	∅	-	-	-
AT^SISS	∅	-	-	-
AT^SISO	∅	-	-	+
AT^SISC	∅	-	∅	+
AT^SISR	∅	-	±	+
AT^SISW	∅	-	∅	+
AT^SIST	∅	-	-	-
AT^SISX	∅	+	∅	+
AT^SISE	∅	-	∅	-
USIM related Commands				
AT+CRSM	∅	-	∅	-
AT+CSIM	∅	-	∅	-
AT^SCKS	∅	-	-	-
AT^SSET	∅	-	-	-
AT^SCID	-	-	∅	∅

AT Command	Exec	Test	Read	Write
AT^SSTR	∅	∅	∅	-
Phonebook Commands				
AT+CNUM	+	+	∅	∅
AT+CPBF	∅	+	∅	+
AT+CPBR	∅	+	∅	+
AT+CPBS	+	+	+	+
AT+CPBW	∅	+	∅	+
GPS Commands				
AT^SGPSC	∅	-	-	-
AT^SGPSS	∅	-	-	-
Audio Commands				
ATL	+	∅	∅	∅
ATM	+	∅	∅	∅
AT+CMUT	∅	-	-	-
AT+VTS	∅	-	∅	-
AT^SAIC	∅	-	-	-
AT^SNFI	∅	-	-	-
AT^SNFO	∅	-	-	-
AT^SNFS	∅	-	-	-
AT^SNFTTY	∅	-	-	-
AT^SRTC	-	-	-	-
Hardware related Commands				
AT+CCLK	∅	-	-	-
AT^SAD	∅	-	∅	-
AT^SBV	-	-	∅	∅
AT^SCTM	∅	-	-	-
AT^SLED	∅	-	-	-
Miscellaneous Commands				
A/	-	∅	∅	∅
ATS3	∅	∅	-	-
ATS4	∅	∅	-	-
ATS5	∅	∅	-	-
AT^SBNW	∅	-	∅	-
AT^SFDL	-	-	∅	∅

20.4 Availability of AT Commands Depending on Operating Mode of ME

- ... AT command not supported
 - + ... AT command supported
 - ± ... AT command partially supported
- See description of AT command for details.

Table 20.6: Availability of AT Commands Depending on Operating Mode of ME

AT Command	Normal Mode	→
Configuration Commands		
AT&F	+	+
AT&V	+	+
AT&W	+	+
ATQ	+	+
ATV	+	+
ATX	+	+
ATZ	+	+
AT+CFUN	+	+
AT^SMSO	+	+
AT+GCAP	+	+
AT+CMEE	+	+
AT+CSCS	+	+
AT^SCFG	+	+
AT^SDPORT	+	+
Status Control Commands		
AT^SIND	+	+
AT+CEER	+	+
AT+CPAS	+	+
AT+WS46	+	+
Serial Interface Control Commands		
AT\Q	+	+
AT&C	+	+
AT&D	+	+
AT&S	+	+
ATE	+	+
AT+IPR	+	+
AT+CMUX	+	+
AT^SQPORT	+	+
Security Commands		
AT+CLCK	+	±
AT+CPIN	+	+



AT Command	Normal Mode	→
AT+CPWD	+	±
AT^SCSL	+	+
AT^SPIC	+	+
Identification Commands		
ATI	+	+
AT+CGMI	+	+
AT+GMI	+	+
AT+CGMM	+	+
AT+GMM	+	+
AT+CGMR	+	+
AT+GMR	+	+
AT+CGSN	+	+
AT+GSN	+	+
AT+CIMI	+	+
Call related Commands		
ATA	+	-
ATD	+	-
ATD><mem><index>	+	-
ATD><index>	+	-
ATD><str>	+	-
ATH	+	-
AT+CHUP	+	-
AT^SHUP	+	-
ATS0	+	-
ATS6	+	+
ATS7	+	+
ATS8	+	+
ATS10	+	+
ATO	+	-
+++	+	-
AT+CLCC	+	-
AT^SLCC	+	-
AT+CR	+	+
AT+CRC	+	+
AT+CBST	+	+
AT+CRLP	+	+
ATP	+	+
ATT	+	+
AT+ES	+	-



AT Command	Normal Mode	→
AT+ESA	+	-
AT+CSTA	+	+
Network Service Commands		
AT+COPN	+	+
AT+COPS	+	-
AT^SOPS	+	-
AT+CREG	+	-
AT+CSQ	+	-
AT+CPLS	+	-
AT+CPOL	+	+
AT^SMONI	+	-
AT^SMONP	+	-
Supplementary Service Commands		
AT+CACM	+	+
AT+CAMM	+	+
AT+CAOC	+	+
AT+CCUG	+	+
AT+CCFC	+	-
AT+CCWA	+	-
AT+CHLD	+	-
AT+CLIP	+	-
AT+CLIR	+	-
AT+COLP	+	-
AT+CPUC	+	+
AT+CSSN	+	-
AT+CUSD	+	-
Packet Domain Related Commands		
AT+CGATT	+	-
AT+CGACT	+	-
AT+CGCMOD	+	-
AT+CGDATA	+	-
AT+CGDCONT	+	+
AT+CGPADDR	+	+
AT+CGQMIN	+	+
AT+CGEQMIN	+	+
AT+CGREG	+	+
AT+CGQREQ	+	+
AT+CGEQREQ	+	+
AT+CGSMS	+	+



AT Command	Normal Mode	→
ATD*99#	+	-
AT^SGAUTH	+	+
AT^SGCONF	+	+
Short Message Service (SMS) Commands		
AT+CMGC	+	-
AT+CMGD	+	+
AT+CMGF	+	+
AT+CMGL	+	+
AT+CMGR	+	+
AT+CMGS	+	-
AT+CMGW	+	+
AT+CMMS	+	+
AT+CMSS	+	-
AT+CNMA	+	-
AT+CNMI	+	+
AT+CPMS	+	+
AT+CSCA	+	+
AT+CSCB	+	+
AT+CSDH	+	+
AT+CSMP	+	+
AT+CSMS	+	+
AT^SMGL	+	+
AT^SCML	+	+
AT^SCMR	+	+
AT^SCMS	+	-
AT^SCMW	+	+
Internet Service Commands		
AT^SICS	+	+
AT^SISS	+	+
AT^SISO	+	-
AT^SISC	+	-
AT^SISR	+	-
AT^SISW	+	-
AT^SIST	+	+
AT^SISX	+	-
AT^SISE	+	-
USIM related Commands		
AT+CRSM	+	+
AT+CSIM	+	+



AT Command	Normal Mode	→
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
AT^SSTR	+	+
Phonebook Commands		
AT+CNUM	+	+
AT+CPBF	+	+
AT+CPBR	+	+
AT+CPBS	+	+
AT+CPBW	+	+
GPS Commands		
AT^SGPSC	+	+
AT^SGPSS	+	+
Audio Commands		
ATL	+	+
ATM	+	+
AT+CMUT	+	+
AT+VTS	+	-
AT^SAIC	+	+
AT^SNFI	+	+
AT^SNFO	+	+
AT^SNFS	+	+
AT^SNFTTY	+	-
AT^SRTC	+	+
Hardware related Commands		
AT+CCLK	+	+
AT^SAD	+	+
AT^SBV	+	+
AT^SCTM	+	+
AT^SLED	+	+
Miscellaneous Commands		
A/	+	+
ATS3	+	+
ATS4	+	+
ATS5	+	+
AT^SBNW	+	+
AT^SFDL	+	+

20.5 AT Command Settings storable with AT&W

Table 20.7: Settings Stored to User Profile

AT Command	Stored Parameters
Configuration Commands	
ATQ	<n>
ATV	<value>
ATX	<value>
AT+CMEE	<errMode>
Serial Interface Control Commands	
AT\Q	<n>
AT&C	<value>
AT&D	<value>
AT&S	<value>
ATE	<value>
Call related Commands	
ATS0	<n>
ATS6	<n>
ATS7	<n>
ATS8	<n>
ATS10	<n>
AT^SLCC	<n>
AT+CR	<mode>
AT+CRC	<mode>
AT+CBST	<speed>, <name>, <ce>
AT+CRLP	<iws>, <mws>, <T1>, <N2>
Network Service Commands	
AT+COPS	<format>
AT+CREG	<urcMode>
Supplementary Service Commands	
AT+CLIP	<clipUrcMode>
Short Message Service (SMS) Commands	
AT+CMGF	<mode>
AT+CNMI	<mode>, <mt>, <bm>, <ds>, <bfr>
AT+CSDH	<show>
AT+CSMS	<service>
USIM related Commands	
AT^SCKS	<mode>

AT Command	Stored Parameters
AT^SSET	<n>
Miscellaneous Commands	
ATS3	<n>
ATS4	<n>
ATS5	<n>

20.6 Factory Default Settings Restorable with AT&F

Table 20.8: Factory Default Settings Restorable with AT&F

AT Command	Factory Defaults
Configuration Commands	
ATQ	<n>=0
ATV	<value>=1
ATX	<value>=0
AT+CMEE	<errMode>=0
AT+CSCS	<charSet>="GSM"
Serial Interface Control Commands	
AT\Q	<n>=3
AT&C	<value>=1
AT&D	<value>=2
AT&S	<value>=0
ATE	<value>=1
Call related Commands	
ATS0	<n>=000
ATS7	<n>=000
ATS10	<n>=014
AT^SLCC	<n>=0
AT+CR	<mode>=0
AT+CRC	<mode>=0
AT+CBST	<speed>=0, <name>=0, <ce>=1
AT+CRLP	<iws>=61, <mws>=61, <T1>=48, <N2>=6
Network Service Commands	
AT+CREG	<urcMode>=0
Supplementary Service Commands	
AT+CLIP	<clipUrcMode>=0
AT+CSSN	<n>=0, <m>=0
AT+CUSD	<ussdMode>=0
Packet Domain Related Commands	
AT+CGREG	<n>=0
Short Message Service (SMS) Commands	
AT+CMGF	<mode>=0
AT+CNMI	<mode>=0, <mt>=0, <bm>=0, <ds>=0, <bfr>=1
AT+CSCB	<operation>=0, <dcss>=" "
AT+CSDH	<show>=0

AT Command	Factory Defaults
AT+CSMP	<code><pid>=0, <dc>=0</code>
AT+CSMS	<code><service>=0</code>
USIM related Commands	
AT^SCKS	<code><mode>=0</code>
AT^SSET	<code><n>=0</code>
Phonebook Commands	
AT+CPBS	<code><storage>="SM"</code>
Hardware related Commands	
AT^SCTM	<code><tempCtrl>=0</code>
Miscellaneous Commands	
ATS3	<code><n>=013</code>
ATS4	<code><n>=010</code>
ATS5	<code><n>=008</code>

20.7 Summary of Unsolicited Result Codes (URC)

Table 20.9: Summary of Unsolicited Result Codes (URC)

AT Command	URC
Unsolicited Result Code Presentation	
	^SBC: Undervoltage
	^SBC: Overvoltage Warning
	^SBC: Overvoltage Shutdown
Configuration Commands	
AT+CFUN	^SYSSTART
AT+CFUN	^SYSSTART AIRPLANE MODE
Status Control Commands	
AT^SIND	+CIEV: <indDescr>, <indValue>
AT^SIND	+CIEV: <indDescr>, <cmdType>, <commandDetails>[, <pathLen>, <fileNum>, <fileList>]
AT^SIND	+CIEV: <indDescr>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>
AT^SIND	+CIEV: <indDescr>, <nitzUT>, <nitzTZ>, <nitzDST>
Call related Commands	
AT^SLCC	if the list of current calls is empty: ^SLCC: if one or more calls are currently in the list: ^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]] [^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]] [...] ^SLCC:
AT+CRC	RING
AT+CRC	+CRING: <type>
Network Service Commands	
AT+CREG	+CREG: <regStatus>
AT+CREG	+CREG: <regStatus>[, <netLac>, <netCellId>]
Supplementary Service Commands	
AT+CAOC	+CCCM: <ccmValue>
AT+CCWA	+CCWA: <calling number>, <type of number>[, <class>], [, <CLI validity>]
AT+CLIP	+CLIP: <clipNumber>, <clipNumType>, , [, <clipAlpha>][, <CLI validity>]
AT+COLP	+COLP: <number>, <type>[, <sub-number>][, <sub-type>][, <alpha>]
AT+CSSN	+CSSI: <code 1>
AT+CSSN	+CSSU: <code 2>
AT+CUSD	+CUSD: <ussdStatus>[, <ussdRsp>[, <ussdDCS>]]

AT Command	URC
Packet Domain Related Commands	
AT+CGREG	+CGREG: <stat>
Short Message Service (SMS) Commands	
AT+CNMI	+CMTI: <mem3>, <index>
AT+CNMI	+CMT: <length><CR><LF><pdu>
AT+CNMI	+CMT: <oa>, , <scts>[, <tooa>, <fo>, <pid>, <dc>, <sca>, <tosca>, <length>]<CR><LF><data>
AT+CNMI	+CBM: <length><CR><LF><pdu>
AT+CNMI	+CBM: <sn>, <mid>, <dc>, <page>, <pages><CR><LF><data>
AT+CNMI	+CDS: <length><CR><LF><pdu>
AT+CNMI	+CDS: <fo>, <mr>[, <ra>][, <tora>], <scts>, <dt>, <st>
Internet Service Commands	
AT^SISR	^SISR: <srvProfileId>, <urcCauseId>
AT^SISW	^SISW: <srvProfileId>, <urcCauseId>
Internet Service URC	^SIS: <id>, <urcCause>[, [<urcInfoId>][, <urcInfoText>]]
USIM related Commands	
AT^SCK	^SCK: <SimStatus>
AT^SCK	^SCRD: <MCC>
AT^SSET	^SSIM READY
USIM Application Toolkit (USAT) Commands	
^SSTN SAT Notification	^SSTN: <cmdType>
^SSTN SAT Notification	^SSTN: <cmdTerminateValue>
^SSTN SAT Notification	^SSTN: 254
^SSTN SAT Notification	^SSTN: 255
GPS Commands	
^SGPSE GPS Event Notification	^SGPSE: <UrcType>, <BufferStatus>, <BufferCount>
Hardware related Commands	
AT^SCTM	^SCTM_B: <UrcCause>

20.8 AT Commands Supported Only on the Modem Interface

Table 20.10: AT Commands Supported Only on the Modem Interface

AT Command
Serial Interface Control Commands
AT&C
AT&D
AT&S
AT+CMUX
Call related Commands
ATH
ATO
+++
Packet Domain Related Commands
AT+CGDATA
ATD*99#

20.9 Alphabetical List of AT Commands

Table 20.11: Alphabetical List of AT Commands

AT Command	Description	Section and Page
+++	Escape from Data Mode to AT Command Mode	Section 7.15, page 131
A/	Repeat Previous Command Line	Section 19.1, page 415
AT&C	Set Data Carrier Detect (DCD) line mode	Section 4.2, page 79
AT&D	Set Data Terminal Ready (DTR) line mode	Section 4.3, page 80
AT&F	Reset AT Command Settings to Factory Default Values	Section 2.1, page 31
AT&S	Set Data Set Ready (DSR) line mode	Section 4.4, page 81
AT&V	Display current Configuration	Section 2.2, page 32
AT&W	Store AT Command Settings to User Defined Profile	Section 2.3, page 33
AT+CACM	Accumulated call meter (ACM) reset or query	Section 9.1, page 172
AT+CAMM	Accumulated call meter maximum (ACMmax) set or query	Section 9.2, page 173
AT+CAOC	Advice of Charge Information	Section 9.3, page 174
AT+CBST	Select Bearer Service Type	Section 7.20, page 140
AT+CCFC	Call forwarding number and conditions control	Section 9.5, page 177
AT+CCLK	Real Time Clock	Section 18.1, page 408
AT+CCUG	Closed User Group	Section 9.4, page 175
AT+CCWA	Call Waiting	Section 9.6, page 181
AT+CEER	Extended Error Report	Section 3.2, page 70
AT+CFUN	PHS8-P Functionality Level	Section 2.8, page 38
AT+CGACT	PDP Context Activate or Deactivate	Section 10.2, page 197
AT+CGATT	PS Attach or Detach	Section 10.1, page 196
AT+CGCMOD	PDP Context Modify	Section 10.3, page 199
AT+CGDATA	Enter Data State	Section 10.4, page 200
AT+CGDCONT	Define PDP Context	Section 10.5, page 202
AT+CGEQMIN	3G Quality of Service Profile (Minimum acceptable)	Section 10.8, page 208
AT+CGEQREQ	3G Quality of Service Profile (Requested)	Section 10.11, page 217
AT+CGMI	Request manufacturer identification	Section 6.2, page 110
AT+CGMM	Request model identification	Section 6.4, page 111
AT+CGMR	Request revision identification of software status	Section 6.6, page 112
AT+CGPADDR	Show PDP Address	Section 10.6, page 204
AT+CGQMIN	Quality of Service Profile (Minimum acceptable)	Section 10.7, page 205
AT+CGQREQ	Quality of Service Profile (Requested)	Section 10.10, page 214
AT+CGREG	Packet Domain Network Registration Status	Section 10.9, page 212
AT+CGSMS	Select Service for MO Short Messages	Section 10.12, page 221
AT+CGSN	Request International Mobile Equipment Identity (IMEI)	Section 6.8, page 113
AT+CHLD	Call Hold and Multiparty	Section 9.7, page 184
AT+CHUP	Hang up call	Section 7.7, page 123
AT+CIMI	Request International Mobile Subscriber Identity (IMSI)	Section 6.10, page 114
AT+CLCC	List of current calls	Section 7.16, page 132
AT+CLCK	Facility Lock	Section 5.1, page 88

AT Command	Description	Section and Page
AT+CLIP	Calling Line Identification Presentation	Section 9.8 , page 186
AT+CLIR	Calling Line Identification Restriction	Section 9.9 , page 188
AT+CMEE	Error Message Format	Section 2.11 , page 42
AT+CMGC	Send an SMS command	Section 11.2 , page 232
AT+CMGD	Delete short message	Section 11.3 , page 233
AT+CMGF	Select SMS message format	Section 11.4 , page 234
AT+CMGL	List SMS messages from preferred store	Section 11.5 , page 235
AT+CMGR	Read SMS messages	Section 11.6 , page 237
AT+CMGS	Send Short Message	Section 11.7 , page 239
AT+CMGW	Write Short Messages to Memory	Section 11.8 , page 240
AT+CMMS	More Messages to Send	Section 11.9 , page 241
AT+CMSS	Send short messages from storage	Section 11.10 , page 242
AT+CMUT	Mute control	Section 17.3 , page 394
AT+CMUX	Multiplex mode	Section 4.7 , page 85
AT+CNMA	New Message Acknowledgement to UE/TE	Section 11.11 , page 243
AT+CNMI	SMS Event Reporting Configuration	Section 11.12 , page 244
AT+CNUM	Read own numbers	Section 15.1 , page 367
AT+COLP	Connected Line Identification Presentation	Section 9.10 , page 189
AT+COPN	Read operator names	Section 8.1 , page 149
AT+COPS	Operator Selection	Section 8.2 , page 150
AT+CPAS	Activity Status	Section 3.3 , page 76
AT+CPBF	Find phonebook entries	Section 15.2 , page 368
AT+CPBR	Read from phonebook	Section 15.3 , page 370
AT+CPBS	Select phonebook memory storage	Section 15.4 , page 373
AT+CPBW	Write into phonebook	Section 15.5 , page 376
AT+CPIN	PIN Authentication	Section 5.2 , page 94
AT+CPLS	Select Preferred Operator List	Section 8.6 , page 158
AT+CPMS	Preferred SMS message storage	Section 11.13 , page 247
AT+CPOL	Preferred Operator List	Section 8.7 , page 159
AT+CPUC	Price per unit and currency table	Section 9.11 , page 191
AT+CPWD	Change Password	Section 5.3 , page 97
AT+CR	Service reporting control	Section 7.18 , page 137
AT+CRC	Set Cellular Result Codes for incoming call indication	Section 7.19 , page 138
AT+CREG	Network Registration Status	Section 8.4 , page 155
AT+CRLP	Configure RLP Parameters for Outgoing Non-Transparent Data Calls	Section 7.21 , page 142
AT+CRSM	Restricted USIM Access	Section 13.1 , page 290
AT+CSCA	SMS Service Center Address	Section 11.14 , page 249
AT+CSCB	Select Cell Broadcast Message Indication	Section 11.15 , page 250
AT+CSCS	Character Set	Section 2.12 , page 46
AT+CSDH	Show SMS text mode parameters	Section 11.16 , page 252
AT+CSIM	Generic USIM Access	Section 13.2 , page 293

AT Command	Description	Section and Page
AT+CSMP	Set SMS Text Mode Parameters	Section 11.17 , page 253
AT+CSMS	Select Message Service	Section 11.18 , page 255
AT+CSQ	Signal quality	Section 8.5 , page 157
AT+CSSN	Supplementary service notifications	Section 9.12 , page 192
AT+CSTA	Select type of address	Section 7.26 , page 148
AT+CUSD	Unstructured Supplementary Service Data	Section 9.13 , page 194
AT+ES	Synchronous Data Mode Configuration	Section 7.24 , page 145
AT+ESA	Synchronous Access Mode Configuration	Section 7.25 , page 146
AT+GCAP	Capabilities List	Section 2.10 , page 41
AT+GMI	Request manufacturer identification	Section 6.3 , page 110
AT+GMM	Request model identification	Section 6.5 , page 111
AT+GMR	Request revision identification of software status	Section 6.7 , page 112
AT+GSN	Request International Mobile Equipment Identity (IMEI)	Section 6.9 , page 113
AT+IPR	Bit Rate	Section 4.6 , page 83
AT+VTS	DTMF and tone generation	Section 17.4 , page 395
AT+WS46	Select wireless network	Section 3.4 , page 77
AT\Q	Flow Control	Section 4.1 , page 78
AT^SAD	Antenna Configuration	Section 18.2 , page 409
AT^SAIC	Audio Interface Configuration	Section 17.5 , page 396
AT^SBNW	Binary Write	Section 19.5 , page 419
AT^SBV	Battery/Supply Voltage	Section 18.3 , page 410
AT^SCFG	Extended Configuration Settings	Section 2.13 , page 47
AT^SCID	USIM Identification Number	Section 13.5 , page 298
AT^SCKS	Query USIM and Chip Card Holder Status	Section 13.3 , page 295
AT^SCML	List Concatenated Short Messages from preferred store	Section 11.20 , page 258
AT^SCMR	Read Concatenated Short Messages	Section 11.21 , page 259
AT^SCMS	Send Concatenated Short Messages	Section 11.22 , page 260
AT^SCMW	Write Concatenated Short Messages to Memory	Section 11.23 , page 261
AT^SCSL	Customer SIM Lock	Section 5.4 , page 100
AT^SCTM	Critical Operating Temperature Monitoring	Section 18.4 , page 411
AT^SDPORT	Configure Interface Allocation	Section 2.14 , page 61
AT^SFDL	Enter Firmware Download Mode	Section 19.6 , page 421
AT^SGAUTH	Set Type of Authentication for PDP-IP Connections	Section 10.14 , page 223
AT^SGCONF	Configuration of GPRS related Parameters	Section 10.15 , page 225
AT^SGPSC	GPS Configuration	Section 16.2 , page 381
AT^SGPSS	GPS Switch	Section 16.3 , page 388
AT^SHUP	Hang up call(s) indicating a specific 3GPP TS 24.008 release cause	Section 7.8 , page 124
AT^SICS	Internet Connection Settings	Section 12.1 , page 263
AT^SIND	Extended Indicator Control	Section 3.1 , page 63
AT^SISC	Internet Service Close	Section 12.4 , page 270
AT^SISE	Internet Service Error Report	Section 12.9 , page 280

AT Command	Description	Section and Page
AT^SISO	Internet Service Open	Section 12.3 , page 268
AT^SISR	Internet Service Read Data	Section 12.5 , page 271
AT^SISS	Internet Service Setup Profile	Section 12.2 , page 265
AT^SIST	Transparent Access Mode	Section 12.7 , page 275
AT^SISW	Internet Service Write Data	Section 12.6 , page 273
AT^SISX	Internet Service Execution	Section 12.8 , page 277
AT^SLCC	Extended list of current calls	Section 7.17 , page 134
AT^SLED	LED Feature	Section 18.5 , page 413
AT^SMGL	List Short Messages from preferred store without setting status to REC READ	Section 11.19 , page 257
AT^SMONI	Monitoring Serving Cell	Section 8.8 , page 161
AT^SMONP	Monitoring Neighbour Cells	Section 8.9 , page 167
AT^SMSO	Switch Off PHS8-P	Section 2.9 , page 40
AT^SNFI	Set microphone path parameters	Section 17.6 , page 398
AT^SNFO	Set audio output parameter (loudspeaker path)	Section 17.7 , page 400
AT^SNFS	Select audio hardware set	Section 17.8 , page 402
AT^SNFTTY	Signal TTY/CTM audio mode capability	Section 17.9 , page 404
AT^SOPS	Extended Operator Selection	Section 8.3 , page 153
AT^SPIC	Display PIN Counter	Section 5.5 , page 103
AT^SQPORT	Query Port Type	Section 4.8 , page 87
AT^SRTC	Ring tone configuration	Section 17.10 , page 406
AT^SSET	USIM Data Ready Indication	Section 13.4 , page 297
AT^SSTA	Remote-SAT Interface Activation	Section 14.4 , page 308
AT^SSTGI	SAT Get Information	Section 14.6 , page 312
AT^SSTGI	SAT Get Information - Refresh (1)	Section 14.7 , page 313
AT^SSTGI	SAT Get Information - Set Up Event List (5)	Section 14.8 , page 315
AT^SSTGI	SAT Get Information - Set Up Call (16)	Section 14.9 , page 316
AT^SSTGI	SAT Get Information - Send SS (17)	Section 14.10 , page 318
AT^SSTGI	SAT Get Information - Send USSD (18)	Section 14.11 , page 319
AT^SSTGI	SAT Get Information - Send Short Message (19)	Section 14.12 , page 320
AT^SSTGI	SAT Get Information - Send DTMF (20)	Section 14.13 , page 321
AT^SSTGI	SAT Get Information - Launch Browser (21)	Section 14.14 , page 322
AT^SSTGI	SAT Get Information - Play Tone (32)	Section 14.15 , page 324
AT^SSTGI	SAT Get Information - Display Text (33)	Section 14.16 , page 326
AT^SSTGI	SAT Get Information - Get Inkey (34)	Section 14.17 , page 328
AT^SSTGI	SAT Get Information - Get Input (35)	Section 14.18 , page 330
AT^SSTGI	SAT Get Information - Select Item (36)	Section 14.19 , page 332
AT^SSTGI	SAT Get Information - Set up Menu (37)	Section 14.20 , page 334
AT^SSTGI	SAT Get Information - Set up Idle Mode Text (40)	Section 14.21 , page 336
AT^SSTGI	SAT Get Information - Language Notification (53)	Section 14.22 , page 337
AT^SSTR	SAT Response	Section 14.23 , page 338
AT^SSTR	SAT Response - Refresh (1)	Section 14.24 , page 340

AT Command	Description	Section and Page
AT^SSTR	SAT Response - Set Up Event List (5)	Section 14.25 , page 341
AT^SSTR	SAT Response - Set Up Call (16)	Section 14.26 , page 342
AT^SSTR	SAT Response - Send SS (17)	Section 14.27 , page 343
AT^SSTR	SAT Response - Send USSD (18)	Section 14.28 , page 344
AT^SSTR	SAT Response - Send Short Message (19)	Section 14.29 , page 345
AT^SSTR	SAT Response - Send DTMF (20)	Section 14.30 , page 346
AT^SSTR	SAT Response - Launch Browser (21)	Section 14.31 , page 347
AT^SSTR	SAT Response - Play Tone (32)	Section 14.32 , page 348
AT^SSTR	SAT Response - Display Text (33)	Section 14.33 , page 349
AT^SSTR	SAT Response - Get Inkey (34)	Section 14.34 , page 350
AT^SSTR	SAT Response - Get Input (35)	Section 14.35 , page 352
AT^SSTR	SAT Response - Select Item (36)	Section 14.36 , page 354
AT^SSTR	SAT Response - Setup Menu (37)	Section 14.37 , page 355
AT^SSTR	SAT Response - Set Up Idle Mode Text (40)	Section 14.38 , page 356
AT^SSTR	SAT Response - Language Notification (53)	Section 14.39 , page 357
AT^SSTR	SAT Event - Menu Selection (211)	Section 14.40 , page 358
AT^SSTR	SAT Event - User Activity (232)	Section 14.41 , page 359
AT^SSTR	SAT Event - Idle Screen Available (233)	Section 14.42 , page 360
AT^SSTR	SAT Event - Language Selection (235)	Section 14.43 , page 361
AT^SSTR	SAT Event - Browser Termination (236)	Section 14.44 , page 362
AT^SSTR	SAT Event - Terminate Command (254)	Section 14.45 , page 363
ATA	Connect to Incoming Call	Section 7.1 , page 115
ATD	Mobile originated call to specified number	Section 7.2 , page 116
ATD*99#	Request Packet Domain service	Section 10.13 , page 222
ATD<>index>	Mobile originated call from active memory using index number	Section 7.4 , page 120
ATD<>mem<>index>	Mobile originated call using specific memory and index number	Section 7.3 , page 118
ATD<>str>	Mobile originated call from memory using corresponding string	Section 7.5 , page 121
ATE	AT Command Echo	Section 4.5 , page 82
ATH	Disconnect existing data connection	Section 7.6 , page 122
ATI	Display product identification information	Section 6.1 , page 108
ATL	Set monitor speaker loudness	Section 17.1 , page 393
ATM	Set monitor speaker mode	Section 17.2 , page 393
ATO	Switch from command mode to data mode	Section 7.14 , page 130
ATP	Select pulse dialing	Section 7.22 , page 144
ATQ	Result Code Presentation Mode	Section 2.4 , page 34
ATS0	Automatic Answer	Section 7.9 , page 125
ATS10	Set disconnect delay after indicating the absence of data carrier	Section 7.13 , page 129
ATS3	Command Line Termination	Section 19.2 , page 416
ATS4	Response Formatting	Section 19.3 , page 417

AT Command	Description	Section and Page
ATS5	Command Line Editing	Section 19.4 , page 418
ATS6	Set pause before blind dialing	Section 7.10 , page 126
ATS7	Set number of seconds to wait for connection completion	Section 7.11 , page 127
ATS8	Comma Dial Pause Time	Section 7.12 , page 128
ATT	Select tone dialing	Section 7.23 , page 144
ATV	Result code format mode	Section 2.5 , page 35
ATX	CONNECT Result Code Format	Section 2.6 , page 36
ATZ	Restore AT Command Settings from User Defined Profile	Section 2.7 , page 37