CHANGE REQUEST No :	**A087**	*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

Technical Specification GSM	03.40	Version:	7.1.0

Submitted to SMG #29	for approval	**X**	without presentation ("non-strategic")	**X**
list SMG plenary meeting no. here ↑	for information		with presentation ("strategic")	

PT SMG CR cover form is available from: http://docbox.etsi.org/tech-org/smg/Document/smg/tools/CR_form/crf28_1.zip

Proposed change affects: SIM ☐ ME **X** Network ☐
(at least one should be marked with an X)

Work item: General improvements and enhancements

Source: SMG4   **Date:** March 1999

Subject: Guidance regarding the SMSC address in a Status Report

Category:			**Release:**		
	F	Correction		Phase 2	
	A	Corresponds to a correction in an earlier release		Release 96	
(one category	B	Addition of feature		Release 97	
and one release	C	Functional modification of feature		Release 98	**X**
only shall be	D	Editorial modification	**X**	Release 99	
marked with an X)					

Reason for change: The need for an MS not to rely on the content of the SMSC address contained in a Status Report requires clarification..

Clauses affected: 3.2.9. Additional paragraph

Other specs affected:				
	Other releases of same spec		→ List of CRs:	
	Other core specifications		→ List of CRs:	
	MS test specifications / TBRs		→ List of CRs:	
	BSS test specifications		→ List of CRs:	
	O&M specifications		→ List of CRs:	

Other comments: 3G CR number: TS 23.040 CR 02

3.2.9 Status report capabilities

The SMS also offers to the SC the capabilities of informing the MS of the status of a previously sent mobile originated short message. The status of the message can be:

- Successfully delivered to the SME;

- The SC was not able to forward the message to the SME. The reason can be an error of permanent or temporary nature. Permanent errors can be e.g. validity period expired, invalid SME address. Errors of temporary nature can be e.g. SC-SME connection being down, SME temporarily unavailable.

This is achieved by the SC returning a status report TPDU (SMS-STATUS-REPORT) to the originating MS when the SC has concluded the status of the short message. The status report may be initiated by a status report request within the mobile originated short message. The status report TPDU is treated as an SMS-DELIVER TPDU by the SC when it comes to delivery procedures e.g. the alerting mechanism. The SC may also return to a non-MS SME the status of a mobile terminated short message. This is however outside the scope of this specification.

The status report capabilities of the SMS are optional, i.e. the choice of whether to offer status report or not is left to the SC operator.

For reasons of resiliance and/or load sharing architecture of SMSC's by network operators, the SMSC address (the RP-OA) used by the SMSC to send the Status Report to the MS cannot be guaranteed to be the same SMSC address (RP-DA) used by the MS to Submit the SM to which the Status Report refers. Where an MS wishes to implement a check that these addresses correlate, a means of disabling the correlation check shall be provided at the MS through MMI.

3.2.10 Reply Path

Reply Path specified in this specification provides a way of both requesting and indicating a service centre's commitment to deliver a reply from the replying MS to the originating SME.

Annex D deals with MS procedures, which in general are outside the scope of GSM specifications. However, for advanced use of the SMS, including both application level protocols and human responses, it is of vital importance to guarantee that a reply-supporting MS is able to reply on every SM, to every SME capable of receiving such reply short messages.

3.3 Unsuccessful short message TPDU transfer SC -> MS

Unsuccessful message transfer SC -> MS may be caused by a variety of different errors. The description of the occurrence of the different errors and how to handle and transfer the error indications is given in GSM 04.08, GSM 04.11 and GSM 09.02.

The different error indications which the SMS-GMSC shall be capable of returning to the SC following an unsuccessful short message TPDU transfer SC -> MS, are given in table 03.40/1. In some cases, additional diagnostic information may be provided.

3.3.1 Errors occurring during transfer of TPDU to MS

These errors are generally due to barring or unsupported service in the PLMN or MS. An error indication is returned to the SC from the SMS-GMSC, but further diagnostic information from the MS will not be available.

3.3.2 Errors occurring after TPDU arrives at MS

These errors may occur due to the MS not supporting optional short message service features, or in connection with a short message application. An error indication shall be returned to the SC from the SMS-GMSC. Additionally, a TPDU (SMS-DELIVER-REPORT) containing diagnostic information may be conveyed from the MS to the originating SC, transparently through the PLMN, by means defined in GSM 04.11 and GSM 09.02. The sending of the diagnostic information is optional at the MS, but when it is sent, the PLMN shall convey the information to the SC, and the SC shall support reception of the information.

CHANGE REQUEST No :	**A076**	*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

Technical Specification GSM / UMTS: 07.07   Version   7.2.0

Submitted to SMG **#29** *list plenary meeting or STC here ↑*	for approval	**X**	without presentation ("non-strategic")	**X**
	for information		with presentation ("strategic")	

PT SMG CR cover form. Filename: crf26_3.doc

Proposed change affects: SIM ☐ ME **X** Network ☐
(at least one should be marked with an X)

Work item: HSCSD

Source: SMG4   **Date:** 1999-03-02

Subject: Syntax error in +CHSN command

Category:

				Release:		
F	Correction		☐		Phase 2	☐
A	Corresponds to a correction in an earlier release		**X**		Release 96	☐
B	Addition of feature		☐		Release 97	☐
C	Functional modification of feature		☐		Release 98	**X**
D	Editorial modification		☐		Release 99	☐
					UMTS	☐

(one category and one release only shall be marked with an X)

Reason for change:

Section 4.1 of 07.07 clearly states:
"Every extended command has a *test command* (trailing =?) to test the existence of the command and to give information about the type of its subparameters".

The +CHSN command violates this syntax (without any obvious reason or benefit). As a result, an application (or user) will have to use a "trial and error" approach when setting this command. This CR introduces the normal syntax.

Clauses affected: 6.14

Other specs affected:

Other releases of same spec	**X**	→ List of CRs:	T2-99053, T2-99054
Other core specifications	☐	→ List of CRs:	
MS test specifications / TBRs	☐	→ List of CRs:	
BSS test specifications	☐	→ List of CRs:	
O&M specifications	☐	→ List of CRs:	

Other comments:

This CR is identical to Tdoc SMG4 98p719 introduced in Salibury. It was then approved in the MSTE subgroup but never reached the plenary due to some "mishap"

3G CR number: TS 27.007 CR 04

help.doc

<--------- double-click here for help and instructions on how to create a CR.

6.14 HSCSD non-transparent call configuration +CHSN

Table 1: +CHSN parameter command syntax

Command	Possible response(s)
+CHSN=[<wAiur>[,<wRx>[,<topRx> [,<codings>]]]]	
+CHSN?	+CHSN: <wAiur>,<wRx>,<topRx>,<codings>
+CHSN=?	+CHSN: ~~<maxAiur>,<modify>~~(list of supported <wAiur>s), (list of supported <wRx>s), (list of supported <topRx>,(list of supported <codings>s)

Description

Set command controls parameters for non-transparent HSCSD calls. Changing <topRx> or <codings> value during a call does not affect the current call. Changing of <wAiur> or <wRx> affects the current call only if <topRx> was non-zero when call was established.

Defined values

<wAiur>: integer type; wanted air interface user rate. Default value 0 indicates that TA shall calculate a proper value from currently selected fixed network user rate (<speed> subparameter from +CBST command), <codings>, and <wRx> (or <maxRx> from +CHSD command if <wRx>=0). Other values:

1   9600 bps
2   14400 bps
3   19200 bps
4   28800 bps
5   38400 bps
6   43200 bps
7   57600 bps

<wRx>: integer type; wanted amount of receive timeslots. Default value 0 indicates that TA shall calculate a proper value from currently selected <wAiur> and <codings>

<topRx>: integer type; top value for <wRx> that user is going to request during the next established non-transparent HSCSD call. Default value 0 indicates that user is not going to change <wAiur>/<wRx> during the next call

<codings>: a sum of integers each representing a channel coding that is accepted for non-transparent HSCSD calls. Default value 0 indicates that all supported codings are accepted (refer +CHSD command for other values)

~~<maxAiur>: integer type; maximum value for <wAiur> (assuming that all supported channel codings are accepted and maximum number of timeslots are used)~~

~~<modify>:~~

~~0   <wAiur>/<wRx> modification during call is not supported by ME/TA (<topRx> accepts only 0)~~

~~1   <wAiur>/<wRx> modification during call is supported by ME/TA~~

Implementation

Mandatory when non-transparent HSCSD implemented.

CHANGE REQUEST No :	**A078**	*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

Technical Specification GSM / UMTS: 07.07   Version   7.2.0

Submitted to SMG 29	for approval	**X**	without presentation ("non-strategic")	**X**
list plenary meeting or STC here ↑	for information		with presentation ("strategic")	

PT SMG CR cover form. Filename: crf26_3.doc

Proposed change affects: SIM ☐   ME ☐   Network ☐
(at least one should be marked with an X)

Work item: GPRS

Source: SMG4   **Date:**   15/3/99

Subject: Moving AT commands to 07.07 for 07.60 handover to SMG3 / 3GPP TSG CN WG3

Category:
F   Correction
A   Corresponds to a correction in an earlier release
B   Addition of feature
C   Functional modification of feature
D   Editorial modification   **X**

(one category and one release only shall be marked with an X)

Release:
Phase 2	
Release 96	
Release 97	
Release 98	**X**
Release 99	
UMTS	

Reason for change: Moving AT commands to 07.07 from 07.60, so 07.60 can be handed over to SMG3 / 3GPP TSG CN WG3 for GPRS release '99 onwards.

Clauses affected: Sections 1, 2, 6.9, 6.10, 6.11, 9.2 + new section 10. Table numbers in clause 10 need adjusting.

Other specs affected:
Other releases of same spec		→ List of CRs:	
Other core specifications		→ List of CRs:	
MS test specifications / TBRs		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments: 3G CR number: TS 27.007 CR 05

1   Scope

This Specification specifies a profile of AT commands and recommends that this profile be used for controlling Mobile Equipment (ME) functions and GSM network services from a Terminal Equipment (TE) through Terminal Adaptor (TA). The command prefix +C is reserved for Digital Cellular in ITU-T Recommendation V.25ter [14]. This TS has also the syntax details used to construct these extended GSM commands. Commands from ITU-T Recommendation V.25ter [14] and existing digital cellular standards (TIA IS-99 [15] and TIA IS-135 [16]) are used whenever applicable. Some of the new commands are defined such way that they can be easily applied to ME of networks other than GSM. ITU-T T.31 [11] and T.32 [12] fax AT commands may be used for GSM fax transmission from TE. GSM Short Message Service AT commands are defined in GSM 07.05 [24]. GPRS AT commands are defined in ~~GSM 07.60 [34]~~clause 10 of this specification.This ETS assumes an abstract architecture comprising a TE (e.g. a computer) and a ME interfaced by a TA (see figure 1). The span of control of the defined commands should allow to handle any physical implementation that this abstract architecture may lead to:

-    TA, ME and TE as three separate entities;

-    TA integrated under the ME cover, and the TE implemented as a separate entity;

-    TA integrated under the TE cover, and the ME implemented as a separate entity;

-    TA and ME integrated under the TE cover as a single entity.

The commands described in this ETS may be observed on the link between the TE and the TA. However, most of the commands retrieve information about the ME, not about the TA.
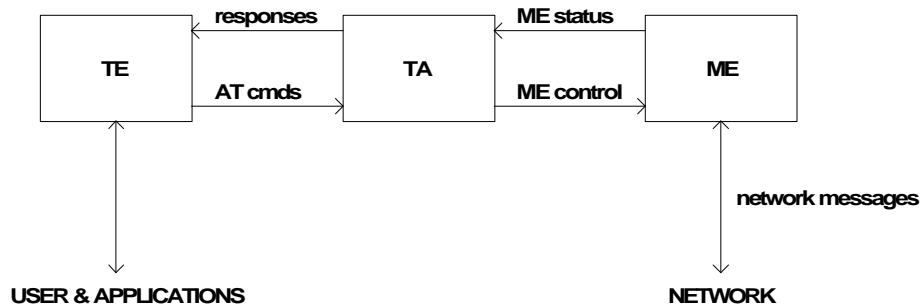

Figure 1: Setup

Interface between TE and TA is intended to operate over existing serial (ITU-T Recommendation V.24) cables, infrared link, and all link types with similar behaviour. For correct operation many of the defined commands require eight bit data and therefore it is recommended that TE-TA link is set to eight bits/ byte mode. (For infrared operation implementation refer informative references IrDA. For embedding AT commands and data during on-line data state refer TIA-617/ITU-T V.80.) Interface between TA and ME is dependent on the interface in the ME.

2   References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

-    References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

-    For a specific reference, subsequent revisions do not apply.

-    For a non-specific reference, the latest version applies.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] GSM 02.02: "Digital cellular telecommunication system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[2] GSM 02.03: "Digital cellular telecommunication system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[3] GSM 02.81: "Digital cellular telecommunication system (Phase 2+); Line identification supplementary services - Stage 1".

[4] GSM 02.82: "Digital cellular telecommunication system (Phase 2+); Call Forwarding (CF) supplementary services - Stage 1".

[5] GSM 02.83: "Digital cellular telecommunication system (Phase 2+); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[6] GSM 02.88: "Digital cellular telecommunication system (Phase 2+); Call Barring (CB) supplementary services - Stage 1".

[7] GSM 03.03: "Digital cellular telecommunication system (Phase 2+); Numbering, addressing and identification".

[8] GSM 04.08: "Digital cellular telecommunication system (Phase 2+); Mobile radio interface layer 3 specification".

[9] GSM MoU SE.13, GSM MoU Permanent Reference Document SE.13: "GSM Mobile Network Codes and Names".

[10] ITU-T Recommendation E.212: "Identification plan for land mobile stations".

[11] ITU-T Recommendation T.31: "Asynchronous facsimile DCE control, service class 1".

[12] ITU-T Recommendation T.32: "Asynchronous facsimile DCE control, service class 2".

[13] ITU-T Recommendation T.50: "International Reference Alphabet (IRA) (Formerly International Alphabet No. 5 or IA5) - Information technology - 7-bit coded character set for information exchange".

[14] ITU-T Draft new Recommendation V.25ter: "Serial asynchronous automatic dialling and control".

[15] Telecommunications Industry Association TIA IS-99: "Data Services Option Standard for Wideband Spread Spectrum Digital Cellular System".

[16] Telecommunications Industry Association TIA IS-135: "800 MHz Cellular Systems, TDMA Services, Async Data and Fax".

[17] Portable Computer and Communications Association PCCA STD-101 Data Transmission Systems and Equipment: "Serial Asynchronous Automatic Dialling and Control for Character Mode DCE on Wireless Data Services".

[18] GSM 04.22: "Digital cellular telecommunication system (Phase 2+); Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[19] GSM 02.30: "Digital cellular telecommunication system (Phase 2+); Man Machine Interface (MMI) of the Mobile Station (MS)".

[20] GSM 05.08: "Digital cellular telecommunication system (Phase 2+); Radio subsystem link control".

[21] GSM 02.85: "Digital cellular telecommunication system (Phase 2+); Closed User Group (CUG) supplementary services - Stage 1".

[22] GSM 02.84: "Digital cellular telecommunication system (Phase 2+); MultiParty (MPTY) supplementary services - Stage 1".

[23] GSM 02.90: "Digital cellular telecommunication system (Phase 2+); Stage 1 description of Unstructured Supplementary Service Data (USSD)".

[24] GSM 07.05: "Digital cellular telecommunication system (Phase 2+); Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[25] GSM 03.38: "Digital cellular telecommunication system (Phase 2+); Alphabet and language specific information".

[26] GSM 02.24: "Digital cellular telecommunication system (Phase 2+); Description of Charge Advice Information (CAI)".

[27] GSM 02.86: "Digital cellular telecommunication system (Phase 2+); Advice of Charge (AoC) supplementary services - Stage 1".

[28] GSM 11.11: "Digital cellular telecommunication system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".

[29] GSM 02.34: "Digital cellular telecommunication system (Phase 2+); High Speed Circuit Switched Data (HSCSD) - Stage 1".

[30] GSM 02.91: "Digital cellular telecommunication system (Phase 2+); Explicit Call Transfer (ECT) supplementary service - Stage 1".

[31] GSM 02.72: "Digital cellular telecommunication system (Phase 2+); Call Deflection (CD) supplementary service - Stage 1".

[32] ISO/IEC10646: "Universal Multiple-Octet Coded Character Set (UCS)"; UCS2, 16 bit coding.

[33] GSM 02.22: "Digital cellular telecommunication system (Phase 2+); Personalisation of GSM Mobile Equipment (ME) Mobile functionality specification".

[34] GSM 07.60: "Digital cellular telecommunication system (Phase 2+); General requirements on Mobile Stations (MS) supporting General Packet Radio Bearer Service (GPRS)".

[35] CCITT Recommendation V.110: "Support of data terminal equipments (DTEs) with V-Series interfaces by an integrated services digital network".

[36] CCITT Recommendation V.120: "Support by an ISDN of data terminal equipment with V-Series type interfaces with provision for statistical multiplexing".

[37] ITU-T Recommendation X.31: "Support of packet mode terminal equipment by an ISDN".

[38] GSM 05.05: "Digital cellular telecommunication system (Phase 2+); Radio transmission and reception".

[39] GSM 09.61: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS); Interworking between the Public Land Mobile Network (PLMN) supporting GPRS and Packet Data Networks (PDN)".

6.9 Service reporting control +CR

Table 1: +CR parameter command syntax

Command	Possible response(s)
+CR=[<mode>]	
+CR?	+CR: <mode>
+CR=?	+CR: (list of supported <mode>s)

Description

Set command controls whether or not intermediate result code +CR: <serv> is returned from the TA to the TE. If enabled, the intermediate result code is transmitted at the point during connect negotiation at which the TA has determined which speed and quality of service will be used, before any error control or data compression reports are transmitted, and before the intermediate result code CONNECT is transmitted.

> NOTE: This command replaces V.25ter [14] command Modulation Reporting Control +MR, which is not appropriate for use in the GSM network. Possible error control (other than radio link protocol) and data compression reporting can be enabled with V.25ter commands Error Control Reporting +ER and Data Compression Reporting +DR.

Test command returns values supported by the TA as a compound value.

Defined values

<mode>:

0 disables reporting

1 enables reporting

<serv>:

ASYNC   asynchronous transparent

SYNC   synchronous transparent

REL ASYNC   asynchronous non-transparent

REL SYNC   synchronous non-transparent

GPRS ~~XXX~~[<L2P>]   GPRS ~~(XXX is a text string, the variable contents of which are specified in 07.60)~~

The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command.

Implementation

Mandatory when data calls implemented.

6.10 Extended error report +CEER

Table 2: +CEER action command syntax

Command	Possible response(s)
+CEER	+CEER: <report>
+CEER=?	

Description

Execution command causes the TA to return one or more lines of information text <report>, determined by the ME manufacturer, which should offer the user of the TA an extended report of the reason ~~of~~ for

- ~~-~~ the failure in the last unsuccessful call setup (originating or answering) or in-call modification, ~~or~~

- ~~-~~ the ~~reason for~~ last call release~~.~~.

- the last unsuccessful GPRS attach or unsuccessful PDP context activation,

- the last GPRS detach or PDP context deactivation.

-Typically, the text will consist of a single line containing the ~~failure~~ cause information given by GSM network in textual format.

Defined values

<report>: the total number of characters, including line terminators, in the information text shall not exceed 2041 characters.

Text shall not contain the sequence 0<CR> or OK<CR>

Implementation

Optional.

# 6.11	Cellular result codes +CRC

Table 3: +CRC parameter command syntax

Command	Possible response(s)
+CRC=[<mode>]	
+CRC?	+CRC: <mode>
+CRC=?	+CRC: (list of supported <mode>s)

Description

Set command controls whether or not the extended format of incoming call indication or GPRS network request for PDP context activation is used. When enabled, an incoming call is indicated to the TE with unsolicited result code +CRING: <type> instead of the normal RING.

Test command returns values supported by the TA as a compound value.

NOTE:	Similar command may be found in TIA IS-99 [15] and TIA IS-135 [16].

Defined values

<mode>:

0	disables extended format

1	enables extended format

<type>:

ASYNC				asynchronous transparent

SYNC				synchronous transparent

REL ASYNC			asynchronous non-transparent

REL SYNC			synchronous non-transparent

FAX				facsimile (TS 62)

VOICE normal voice (TS 11)

VOICE/*XXX* voice followed by data (BS 81) (*XXX* is ASYNC, SYNC, REL ASYNC or REL SYNC)

ALT VOICE/*XXX* alternating voice/data, voice first (BS 61)

ALT *XXX*/VOICE alternating voice/data, data first (BS 61)

ALT VOICE/FAX alternating voice/fax, voice first (TS 61)

ALT FAX/VOICE alternating voice/fax, fax first (TS 61)

~~GPRS *XXX* GPRS (*XXX* is a text string, the variable contents of which are specified in 07.60)~~

GPRS <PDP_type>, <PDP_addr>[, <L2P>] GPRS network request for PDP context activation

<PDP_type> and <PDP_addr> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.25ter online data state) the MT shall reject the request. No corresponding unsolicited result code shall be issued when the MT returns to a command state.

Implementation

Mandatory when data or fax circuit mode calls implemented.

9.2 Mobile Equipment error result code +CME ERROR

The operation of +CME ERROR: <err> result code is similar to the regular ERROR result code: if +CME ERROR: <err> is the result code for any of the commands in a command line, none of the following commands in the same command line is executed (neither ERROR nor OK result code shall be returned as a result of a completed command line execution). The format of <err> can be either numeric or verbose. This is set with command +CMEE (refer previous subclause).

NOTE: ITU-T V.25ter [14] command V does not affect the format of this result code.

<err> values (numeric format followed by verbose format):

9.2.1 General errors

0 phone failure

1 no connection to phone

2 phone-adaptor link reserved

3 operation not allowed

4 operation not supported

5 PH-SIM PIN required

6 PH-FSIM PIN required

7 PH-FSIM PUK required

10 SIM not inserted

11 SIM PIN required

12 SIM PUK required

13 SIM failure

14 SIM busy

15 SIM wrong

16 incorrect password

17 SIM PIN2 required

18 SIM PUK2 required

20 memory full

21 invalid index

22 not found

23 memory failure

24 text string too long

25 invalid characters in text string

26 dial string too long

27 invalid characters in dial string

30 no network service

31 network timeout

32 network not allowed - emergency calls only

40 network personalisation PIN required

41 network personalisation PUK required

42 network subset personalisation PIN required

43 network subset personalisation PUK required

44 service provider personalisation PIN required

45 service provider personalisation PUK required

46 corporate personalisation PIN required

47 corporate personalisation PUK required

100　　　unknown

9.2.2　　GPRS-related errors

9.2.2.1　Errors related to a failure to perform an Attach

Numeric	Text
103	Illegal MS (#3)
106	Illegal ME (#6)
107	GPRS services not allowed (#7)
111	PLMN not allowed (#11)
112	Location area not allowed (#12)
113	Roaming not allowed in this location area (#13)

(Values in parentheses are GSM 04.08 cause codes.)

9.2.2.2 Errors related to a failure to Activate a Context

Numeric   Text

132   service option not supported (#32)
133   requested service option not subscribed (#33)
134   service option temporarily out of order (#34)
149   PDP authentication failure

(Values in parentheses are GSM 04.08 cause codes.)

9.2.2.3 Other GPRS errors

Numeric   Text

150   invalid mobile class

148   unspecified GPRS error

Other values in the range 101 - 150 ~~—~~ are reserved for use by GPRS. ~~(values are specified in 07.60)~~

Aalso all other values below 256 are reserved ~~by this ETS~~.

Implementation
Mandatory for numeric format codes applicable to implemented command set.

10   Commands for GPRS

This clause defines commands that a TE may use to control a GPRS MT. Other aspects of a GPRS MT are described in GSM 07.60 [34].

It is anticipated that GPRS MTs will vary widely in functionality. At one extreme, a class A MT might support multiple PDP types as well as circuit switched data, and use multiple external networks and QoS profiles. At the other extreme a class C MT might support only a single PDP type using a single external network, and rely on the HLR to contain the PDP context definition.

A comprehensive set of GPRS-specifc commands is defined in clause 10.1 to provide the flexibility needed by the more complex MT. The commands are designed to be expandable to accommodate new PDP types and interface protocols, merely by defining new values for many of the parameters. Multiple contexts may be activated if the interface link-layer protocol is able to support them. The commands use the extended information and error message capabilities described in this specification.

For MTs of intermediate complexity, most commands have simplified forms where certain parameters may be omitted.

For the simplest MTs, and for backwards compatibility with existing communications software, it is possible to control access to the GPRS using existing modem-compatible commands. A special dial-string syntax is defined for use with the D command. This "modem compatible" mode of operation is described in subclause 10.2.

A discussion on the interaction of the AT commands, GPRS Management and Packet Data Protocols, together with examples of command sequences for a number of applications may be found in GSM 07.60 [34].

10.1   Commands specific to MTs supporting the GPRS

10.1.1   Define PDP Context +CGDCONT

Table 2: +CGDCONT parameter command syntax

Command	Possible response(s)
+CGDCONT=[<cid> [,<PDP_type> [,<APN> [,<PDP_addr> [,<d_comp> [,<h_comp> [,<pd1> [,…[,pdN]]]]]]]]]	OK ERROR
+CGDCONT?	+CGDCONT: <cid>, <PDP_type>, <APN>,<PDP_addr>, <data_comp>, <head_comp>[,<pd1>[,…[,pdN]]] [<CR><LF>+CGDCONT: <cid>, <PDP_type>, <APN>,<PDP_addr>, <data_comp>, <head_comp>[,<pd1>[,…[,pdN]]] [...]]
+CGDCONT=?	+CGDCONT: (range of supported <cid>s), <PDP_type>,,,(list of supported <d_comp>s), (list of supported <h_comp>s)[,(list of supported <pd1>s)[,…[,(list of supported <pdN>s)]]] [<CR><LF>+CGDCONT: (range of supported <cid>s), <PDP_type>,,,(list of supported <d_comp>s), (list of supported <h_comp>s)[,(list of supported <pd1>s)[,…[,(list of supported <pdN>s)]]] [...]]

Description

The set command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command.

A special form of the set command, +CGDCONT= <cid> causes the values for context number <cid> to become undefined.

The read command returns the current settings for each defined context.

The test command returns values supported as a compound value. If the MT supports several PDP types, <PDP_type>, the parameter value ranges for each <PDP_type> are returned on a separate line.

Defined values

<cid>: (PDP Context Identifier) a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. The range of permitted values (minimum value = 1) is returned by the test form of the command.

<PDP_type>: (Packet Data Protocol type) a string parameter which specifies the type of packet data protocol

X25   ITU-T/CCITT X.25 layer 3
IP   Internet Protocol (IETF STD 5)

<APN>: (Access Point Name) a string parameter which is a logical name that is used to select the GGSN or the external packet data network.

If the value is null or omitted, then the subscription value will be requested.

<PDP_address>: a string parameter that identifies the MT in the address space applicable to the PDP.

If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested.

The read form of the command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the +CGPADDR command.

<d_comp>: a numeric parameter that controls PDP data compression
0 - off (default if value is omitted)
1 - on
Other values are reserved.

<h_comp>: a numeric parameter that controls PDP header compression
0 - off (default if value is omitted)
1 - on
Other values are reserved.

NOTE.   At present only one data compression algorithm (V.42bis) is provided in SNDCP. If and when other algorithms become available, a command will be provided to select one or more of these.

<pd1>, … <pdN>: zero to N string parameters whose meanings are specific to the <PDP_type>

At present none is defined.

Implementation

Mandatory unless only a single subscribed context is supported.

10.1.2   Quality of Service Profile (Requested) +CGQREQ

Table 3: +CGQREQ parameter command syntax

Command	Possible Response(s)
+CGQREQ=[<cid> [,<precedence > [,<delay> [,<reliability.> [,<peak> [,<mean>]]]]]]	OK ERROR
+CGQREQ?	+CGQREQ: <cid>, <precedence >, <delay>, <reliability>, <peak>, <mean> [<CR><LF>+CGQREQ: <cid>, <precedence >, <delay>, <reliability.>, <peak>, <mean> […]]
+CGQREQ=?	+CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s) [<CR><LF>+CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s) […]]

Description

This command 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 set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT command, the +CGQREQ command is effectively an extension to the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGQREQ= <cid> causes the requested profile for context number <cid> to become undefined.

The read command returns the current settings for each defined context.

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

Defined values

   <cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).

The following parameters are defined in GSM 03.60 -

   <precedence>: a numeric parameter which specifies the precedence class

   <delay>: a numeric parameter which specifies the delay class

   <reliability>: a numeric parameter which specifies the reliability class

   <peak>: a numeric parameter which specifies the peak throughput class

   <mean>: a numeric parameter which specifies the mean throughput class

If a value is omitted for a particular class then the value is considered to be unspecified.

Implementation

Optional. If the command is not implemented then all the values are considered to be unspecified.

## 10.1.3	Quality of Service Profile (Minimum acceptable) +CGQMIN

Table 4: +CGQMIN parameter command syntax

Command	Possible Response(s)
+CGQMIN=[<cid> [,<precedence > [,<delay> [,<reliability.> [,<peak> [,<mean>]]]]]]	OK ERROR
+CGQMIN?	+CGQMIN: <cid>, <precedence >, <delay>, <reliability>, <peak>, <mean> [<CR><LF>+CGQMIN: <cid>, <precedence >, <delay>, <reliability.>, <peak>, <mean> […]]
+CGQMIN=?	+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s) [<CR><LF>+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s) […]]

Description

This command allows the TE to specify a minimum acceptable profile which is checked by the MT against the negotiated profile returned in the Activate PDP Context Accept message.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT command, the +CGQMIN command is effectively an extension to the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGQMIN= <cid> causes the minimum acceptable profile for context number <cid> to become undefined. In this case no check is made against the negotiated profile.

The read command returns the current settings for each defined context.

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

Defined values

　<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).

The following parameters are defined in GSM 03.60 -

　<precedence>: a numeric parameter which specifies the precedence class

　<delay>: a numeric parameter which specifies the delay class

　<reliability>: a numeric parameter which specifies the reliability class

　<peak>: a numeric parameter which specifies the peak throughput class

<mean>: a numeric parameter which specifies the mean throughput class

If a value is omitted for a particular class then this class is not checked.

Implementation

Optional. If the command is not implemented then no check is made against the negotiated profile.

10.1.4   GPRS attach or detach +CGATT

Table 5: CGATT action command syntax

Command	Possible Response(s)
+CGATT=[<state>]	OK ERROR
+CGATT?	+CGATT: <state>
+CGATT=?	+CGATT: (list of supported <state>s)

Description

The execution command is used to attach the MT to, or detach the MT from, the GPRS 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. Extended error responses are enabled by the +CMEE command.

Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

The read command returns the current GPRS service state.

The test command is used for requesting information on the supported GPRS service states.

  NOTE: This command has the characteristics of both the V.25ter action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

Defined Values

  <state>: indicates the state of GPRS attachment
    0 - detached
    1 - attached
    Other values are reserved and will result in an ERROR response to the execution command.

Implementation

Optional.

10.1.5   PDP context activate or deactivate +CGACT

Table 6: CGACT action command syntax

Command	Possible Response(s)
+CGACT=[<state> [,<cid>[,<cid>[,…]]]]	OK ERROR
+CGACT?	+CGACT: <cid>, <state> [<CR><LF>+CGACT: <cid>, <state> […]]

| +CGACT=? | +CGACT: (list of supported `<state>`s) |

Description

The execution command is used to activate or deactivate the specified PDP context (s). After the command has completed, the MT remains in V.25ter command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the requested state for any specified context cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. If the MT is not GPRS attached when the activation form of the command is executed, the MT first performs a GPRS attach and them attempts to activate the specified contexts. If the attach fails then the MT responds with ERROR or, if extended error responses are enabled, with the appropriate failure-to-attach error message.

If no <cid>s are specified the activation form of the command activates all defined contexts.

If no <cid>s are specified the deactivation form of the command deactivates all active contexts.

The read command returns the current activation states for all the defined PDP contexts.

The test command is used for requesting information on the supported PDP context activation states.

NOTE. This command has the characteristics of both the V.25ter action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

Defined Values

`<state>`: indicates the state of PDP context activation
0 - deactivated
1 - activated
Other values are reserved and will result in an ERROR response to the execution command.

`<cid>`: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).+CGDCONT

Implementation

Optional.

10.1.6   Enter data state +CGDATA

Table 7: +CGDATA action command syntax

Command	Possible Response(s)
+CGDATA=[<L2P> ,[<cid> [,<cid> [,...]]]]	CONNECT ERROR
+CGDATA=?	+CGDATA: (list of supported <L2P>s)

Description

The execution command causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more GPRS PDP types. This may include performing a GPRS attach and one or more PDP context activations. If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.25ter online data state.

 Commands following +CGDATA command in the AT command line shall not be processed by the MT.

The detailed behaviour after the online data state has been entered is dependent on the PDP type. It is described briefly in GSM 07.60 and in more detail in GSM 09.61 and the specifications for the relevant PDPs. GPRS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

If context activation takes place during the PDP startup, one or more <cid>s may be specified in order to provide the information needed for the context activation request(s).

During each PDP startup procedure the MT may have access to some or all of the following information -

    The MT may have a priori knowledge, for example, it may implement only one PDP type.

    The command may have provided an <L2P> parameter value.

    The TE may provide a PDP type and/or PDP address to the MT during in the PDP startup procedure.

If any of this information is in conflict, the command will fail.

Any PDP type and/or PDP address present in the above information shall be compared with the PDP type and/or PDP address in any context definitions specified in the command in the order in which their <cid>s appear. For a context definition to match -

    The PDP type must match exactly.

    The PDP addresses are considered to match if they are identical or if either or both addresses are unspecified. For example, a PPP NCP request specifying PDP type = IP and no PDP address would cause the MT to search through the specified context definitions for one with PDP type = IP and any PDP address.

The context shall be activated using the matched value for PDP type and a static PDP address if available, together with the other information found in the PDP context definition. If a static PDP address is not available then a dynamic address is requested.

If no <cid> is given or if there is no matching context definition, the MT shall attempt to activate the context with whatever information is available to the MT. The other context parameters shall be set to their default values.

If the activation is successful, data transfer may proceed.

After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the V.25ter command state is re-entered and the MT returns the final result code OK.

In the event of an erroneous termination or a failure to start up, the V.25ter command state is re-entered and the MT returns the final result code NO CARRIER or, if enabled, +CME ERROR. Attach, activate and other errors may be reported.

The test command is used for requesting information on the supported layer 2 protocols.

This command may be used in both normal and modem compatibility modes.

Defined Values

<L2P>: a string parameter that indicates the layer 2 protocol to be used between the TE and MT
PPP   Point-to-point protocol for a PDP such as IP
PAD   character stream for X.25 character (triple X PAD) mode
X25   X.25 L2 (LAPB) for X.25 packet mode
M-xxxx   manufacturer-specific protocol (xxxx is an alphanumeric string)

If the value is omitted, the layer 2 protocol is unspecified. Other values are reserved and will result in an ERROR response.

<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).

Implementation

Optional if the D (dial) command can be used to specify GPRS operation.

10.1.7   Show PDP address +CGPADDR

Table 8:+CGPADDR action command syntax

Command	Possible response(s)
+CGPADDR=[<cid> [,<cid> [,…]]]	+CGPADDR: <cid>,<PDP_addr> [<CR><LF>+CGPADDR: <cid>,<PDP_addr> [...]]
+CGPADDR=?	+CGPADDR: (list of defined <cid>s)

Description

The execution command returns a list of PDP addresses for the specified context identifiers.

The test command returns a list of defined <cid>s.

Defined values

<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command). If no <cid> is specified, the addresses for all defined contexts are returned.

<PDP_address>: a string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the +CGDCONT command when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. <PDP_address> is omitted if none is available.

Implementation

Optional.

10.1.8 Automatic response to a network request for PDP context activation +CGAUTO

Table 9: CGAUTO parameter command syntax

Command	Possible response(s)
+CGAUTO=[<n>]	OK
	ERROR
+CGAUTO?	+CGAUTO: <n>
+CGAUTO=?	+CGAUTO: (list of supported <n>s)

Description

The set command disables or enables an automatic positive response (auto-answer) to the receipt of a Request PDP Context Activation message from the network. It also provides control over the use of the V.25ter basic commands 'S0', 'A and 'H' for handling network requests for PDP context activation. The setting does not affect the issuing of the unsolicited result code RING or +CRING.

The test command returns the values of <n> supported by the MT as a compound value.

When the +CGAUTO=1 command is received, the MT shall attempt to perform a GPRS attach if it is not already attached. Failure will result in ERROR or, if enabled, +CME ERROR being returned to the TE. Subsequently, the MT will announce a network request for PDP context activation by issuing the unsolicited result code RING or +CRING to the TE, followed by the intermediate result code CONNECT. The MT then enters V.25ter online data state and follows the same procedure as it would after having received a +CGANS=1 with no <L2P> or <cid> values specified.

NOTE.   The +CGAUTO=0 command does not perform an automatic GPRS detach.

Defined values

<n>:

    0   turn off automatic response (circuit switched as described elsewhere in this specification)
    1   turn on automatic response (circuit switched as described elsewhere in this specification)
    2   modem compatibility mode, GPRS only
    3   modem compatibility mode, GPRS and circuit switched calls (default)

For <n> = 0 or 1 GPRS network requests are manually accepted or rejected by the +CGANS command. The 'S0', 'A' and 'H' commands control only circuit switched calls as described elsewhere in this specification.

For <n> = 2, automatic acceptance of GPRS network requests is controlled by the 'S0' command. Manual control uses the 'A' and 'H' commands, respectively, to accept and reject GPRS requests. (+CGANS may also be used.) Incoming circuit switched calls can be neither manually nor automatically answered.

For <n> = 3, automatic acceptance of both GPRS network requests and incoming circuit switched calls is controlled by the 'S0' command. Manual control uses the 'A' and 'H' commands, respectively, to accept and reject GPRS requests. (+CGANS may also be used.) Circuit switched calls are handled as described elsewhere in this specification.

Implementation

Optional. If not implemented, the MT shall behave according to the case of <n> = 3.

10.1.9 Manual response to a network request for PDP context activation +CGANS

Table 10: CGANS action command syntax

Command	Possible response(s)
+CGANS=[<response>, [<L2P>,[<cid>]]]	OK ERROR
+CGANS=?	+CGANS: (list of supported <response>s), (list of supported <L2P>s)

Description

The execution command requests the MT to respond to a network request for GPRS PDP context activation which has been signalled to the TE by the RING or +CRING: unsolicited result code. The <response> parameter allows the TE to accept or reject the request.

If <response> is 0, the request is rejected and the MT returns OK to the TE.

If <response> is 1, the following procedure is followed by the MT.

Commands following the +CGANS command in the AT command line shall not be processed by the MT.

If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.25ter online data state.

The detailed behaviour after the online data state has been entered is dependent on the PDP type. It is described briefly in GSM 07.60 and in more detail in GSM 09.61 and the specifications for the relevant PDPs. PDP context activation procedures shall take place prior to or during the PDP startup.

One or more <cid>s may be specified in order to provide the values needed for the context activation request.

During the PDP startup procedure the MT has the PDP type and the PDP address provided by the network in the Request PDP Context Activation message. The MT may also have some or all of the following information -

   The MT may have a priori knowledge, for example, it may implement only one PDP type.

   The command may have provided an <L2P> parameter value.

   The TE may provide one or both of PDP type and PDP address to the MT in the PDP startup.

If any of this information is in conflict, the command will fail.

If one or more <cid> is given then an attempt shall be made to identify an appropriate context definition by matching the PDP type and PDP address in the network request with the PDP type and PDP address in each of the specified context definitions (in the order in which their <cid>s appear in the command) as follows -

   The PDP type must match exactly.

   The PDP addresses are considered to match if they are identical or if the address in the context definition is unspecified.

The context shall be activated using the values for PDP type and PDP address provided by the network, together with the other information found in the PDP context definition. An APN may or may not re required, depending on the application.

If no <cid> is given or if there is no matching context definition, the MT will attempt to activate the context using the values for PDP type and PDP address provided by the network, together with any other relevant information known to the MT. The other context parameters will be set to their default values.

If the activation is successful, data transfer may proceed.

After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the V.25ter command state is re-entered and the MT returns the final result code OK

In the event of an erroneous termination or a failure to startup, the V.25ter command state is re-entered and the MT returns the final result code NO CARRIER or, if enabled, +CME ERROR. Attach, activate and other errors may be reported. It is also an error to issue the +CGANS command when there is no outstanding network request.

> NOTE: This is not the same as if the MT issues a +CGDATA (or +CGACT) command after receiving a +CRING unsolicited result code. A +CGDATA (or +CGACT) does not command the MT to acknowledge the network request but rather to make a new request for context activation. The network request would be ignored.

The test command returns the values of <response> and <L2P> supported by the MT as compound values.

This command may be used in both normal and modem compatibility modes.

Defined values

<response>: is a numeric parameter which specifies how the request should be responded to.

0   reject the request
1   accept and request that the PDP context be activated

If <response> is omitted it is assumed to be 0. Other values are reserved and will result in the ERROR response.

<L2P>: a string parameter which indicates the layer 2 protocol to be used (see +CGDATA command).

<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).

Implementation

Optional.

10.1.10   GPRS mobile station class +CGCLASS

Table 11: CGCLASS parameter command syntax

Command	Possible Response(s)
+CGCLASS=[<class>]	OK ERROR
+CGCLASS?	+CGCLASS: <class>
+CGCLASS=?	+CGCLASS: (list of supported <class>s)

Description

The set command is used to set the MT to operate according to the specified GPRS mobile class. If the requested class is not supported, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

The read command returns the current GPRS mobile class.

The test command is used for requesting information on the supported GPRS mobile classes.

Defined Values

<class>: a string parameter which indicates the GPRS mobile class (in descending order of functionality)

A	class A (highest)
B	class B
C	class C in GPRS and circuit switched alternate mode
CG	class C in GPRS only mode
CC	class C in circuit switched only mode (lowest)

Other values are reserved and will result in an ERROR response to the set command.

If the MT is GPRS attached when the set command is issued with a <class> = CC specified, a detach request shall be sent to the network.

Implementation

Optional.

10.1.11   Configure local triple-X PAD parameters +CGCLPAD

Table 12: CGCLPAD parameter command syntax

Command	Possible Response(s)
+CGCLPAD=[<parm>, <value>]	OK ERROR
+CGCLPAD?	+CGCLPAD: <parm>, <value> [<CR><LF>+CGCLPAD: <parm>, <value>> […]]
+CGCLPAD=?	+CGCLPAD: <parm>, (list of supported <value>s) [<CR><LF>+CGCLPAD: <parm>, (list of supported <value>s) […]]

Description

The set command sets the value of a specified X.3 PAD parameter in the local PAD. A minimum set of parameters to be supported is listed in GSM 07.60.

The read command returns, one per line, the value of each of the supported parameters.

The test command returns, one per line, the permitted range of values for each of the supported parameters.

Defined values

<parm>: a numeric parameter which specifies the X.3 parameter to be configured

<value>: a numeric parameter which specifies the value to which the X.3 parameter is to be set

If <value> is omitted for a particular class then <parm> is set to the X.3-defined default, if any.

Implementation

Optional.

10.1.12   GPRS event reporting +CGEREP

Table 13: CGEREP parameter command syntax

Command	Possible response(s)
+CGEREP=[<mode>[,<bfr>]]	OK ERROR
+CGEREP?	+CGEREP: <mode>,<bfr>
+CGEREP=?	+CGEREP: (list of supported <mode>s),(list of supported <bfr>s)

Description

Set command enables or disables sending of unsolicited result codes, +CGEV: XXX from MT to TE in the case of certain events occurring in the GPRS MT or the network. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1 or 2 is entered. If a setting is not supported by the MT, ERROR or +CME ERROR: is returned.

Read command returns the current mode and buffer settings

Test command returns the modes and buffer settings supported by the MT as compound values.

Defined values

<mode>:

0   buffer unsolicited result codes in the MT; if MT result code buffer is full, the oldest ones can be discarded. No codes are forwarded to the TE.

1   discard unsolicited result codes when MT-TE link is reserved (e.g. in on-line data mode); otherwise forward them directly to the TE

2   buffer unsolicited result codes in the MT when MT-TE link is reserved (e.g. in on-line data mode) and flush them to the TE when MT-TE link becomes available; otherwise forward them directly to the TE

<bfr>:

0   MT buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered

1   MT buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1 or 2 is entered (OK response shall be given before flushing the codes)

Defined events

The following unsolicited result codes and the corresponding events are defined -

+CGEV: REJECT <PDP_type>, <PDP_addr>

A network request for PDP context activation occurred when the MT was unable to report it to the TE with a +CRING unsolicited result code and was automatically rejected.

+CGEV: NW REACT <PDP_type>, <PDP_addr>, [<cid>]

The network has requested a context reactivation. The <cid> that was used to reactivate the context is provided if known to the MT.

+CGEV: NW DEACT <PDP_type>, <PDP_addr>, [<cid>]

The network has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT.

```
+CGEV: ME DEACT  <PDP_type>, <PDP_addr>, [<cid>]
```

The mobile equipment has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT.

```
+CGEV: NW DETACH
```

The network has forced a GPRS detach. This implies that all active contexts have been deactivated. These are not reported separately.

```
+CGEV: ME DETACH
```

The mobile equipment has forced a GPRS detach. This implies that all active contexts have been deactivated. These are not reported separately.

```
+CGEV: NW CLASS <class>
```

The network has forced a change of MS class. The highest available class is reported (see +CGCLASS).

```
+CGEV: ME CLASS <class>
```

The mobile equipment has forced a change of MS class. The highest available class is reported (see +CGCLASS).

Implementation

Optional.

10.1.13 GPRS network registration status +CGREG

Table 14: CGREG parameter command syntax

Command	Possible response(s)
+CGREG=[<n>]	
+CGREG?	+CGREG: <n>,<stat>[,<lac>,<ci>]
	+CME ERROR: <err>
+CGREG=?	+CGREG: (list of supported <n>s)

Description

The set command controls the presentation of an unsolicited result code +CGREG: <stat> when <n>=1 and there is a change in the MT's GPRS network registration status, or code +CGREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

NOTE.   If the GPRS MT also supports circuit mode services, the +CREG command and +CREG: result code apply to the registration status and location information for those services.

The read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. Location information elements <lac> and <ci> are returned only when <n>=2 and MT is registered in the network.

Defined values

<u><n>:</u>

0   disable network registration unsolicited result code

1   enable network registration unsolicited result code `+CGREG: <stat>`

2   enable network registration and location information unsolicited result code `+CGREG:`
   `<stat>[,<lac>,<ci>]`

<u><stat>:</u>

0   not registered, ME is not currently searching a new operator to register to

1   registered, home network

2   not registered, but ME is currently searching a new operator to register to

3   registration denied

4   unknown

5   registered, roaming

`<lac>`: string type; two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)

`<ci>`: string type; two byte cell ID in hexadecimal format

Implementation

Optional.

10.1.14   Select service for MO SMS messages +CGSMS

Table 15: CGSMS parameter command syntax

Command	Possible Response(s)
+CGSMS= [`<service>`]	OK ERROR
+CGSMS?	+CGSMS: `<service>`
+CGSMS=?	+CGSMS: (list of currently available `<service>`s)

Description

The set command is used to specify the service or service preference that the MT will use to send MO SMS messages.

The read command returns the currently selected service or service preference.

The test command is used for requesting information on the currently available services and service preferences.

Defined Values

`<service>`: a numeric parameter which indicates the service or service preference to be used
    0   GPRS
    1   circuit switched
    2   GPRS preferred (use circuit switched if GPRS not available)
    3   circuit switched preferred (use GPRS if circuit switched not available)

Other values are reserved and will result in an ERROR response to the set command.

Implementation

Optional.

10.2   Modem compatibility commands

This subclause describes how existing AT commands, designed for use with a modem, may be used to control a GPRS MT. This is to provide backwards compatibility with existing communications software. For new applications it is recommended that the GPRS-specific commands, described in previous subclauses, be used.

10.2.1   MT originated PDP context activation

In this mode of operation, the MT behaves like an originating modem and accepts the normal V.25ter commands associated with placing and clearing a call. If GPRS-specific configuration commands are required, they may be sent to the MT as part of the modem initialisation commands.

10.2.1.1   Request GPRS service 'D'

Table 14: D command syntax

Command	Possible Response(s)
D*<GPRS_SC>[*[<called_address>] [*[<L2P>][*[<cid>]]]]#	CONNECT ERROR

Description

The V.25ter 'D' (Dial) command causes the MT to enter the V.25ter online data state and, with the TE, to start the specified layer 2 protocol. The MT shall return CONNECT to confirm acceptance of the command prior to entering the V.25ter online data state. No further commands may follow on the AT command line.

When the layer 2 protocol has terminated, either as a result of an orderly shut down of the PDP or an error, the MT shall enter V.25ter command state and return the NO CARRIER final result code.

If <L2P> and <cid> are supported, their usage shall be the same as in the +CGDCONT command. The +CGDCONT command may be used in the modem initialisation AT command string to set values for APN, QoS etc..

This command may be used in both normal and modem compatibility modes.

Defined Values

> <GPRS_SC>: (GPRS Service Code) a digit string (value 99) which identifies a request to use the GPRS

> <called_address>: a digit string (see note) that specifies the address of a called party in the address space applicable to the PDP.

> <L2P>: a digit string (see note) which indicates the layer 2 protocol to be used (see +CGDATA command).
> Numeric equivalents to the alphanumeric values used by +CGDATA are:
> 1   PPP
> 2   PAD
> 3   X25
> 9yyyy M-xxxx
> Other values are reserved and will result in an ERROR response to the set command.

> <cid>: a digit string which specifies a particular PDP context definition (see +CGDCONT command).

> NOTE.   The dial string conforms to the syntax specified in GSM 02.30.

Implementation

Optional if the +CGDATA command is supported. If the D command is provided, then support for `<called_address>`, `<L2P>` and `<cid>` are optional. If they are not supported but values are provided by the TE, the values shall be ignored and this shall not constitute an error.

> NOTE. V.25ter (and certain communications software) does not permit arbitrary characters in the dial string. The `<L2P>` and `<called_address>` strings are therefore specified as containing digits (0-9) only.

10.2.2 Network requested PDP context activation

In this mode of operation, the MT behaves like an answering modem and accepts the normal V.25ter commands associated with answering a call. If GPRS-specific configuration commands are required, they may be sent to the MT as part of the modem initialisation commands.

The +CGAUTO command is used to select modem compatibility mode.

10.2.2.1 Automatic response to a network request for PDP context activation 'S0'

The V.25ter 'S0=n' (Automatic answer) command may be used to turn off (n=0) and on (n>0) the automatic response to a network request for a PDP context activation.

When the 'S0=n' (n>0) command is received, the MT shall attempt to perform a GPRS attach if it is not already attached. Failure will result in ERROR being returned to the TE. Subsequently, the MT will announce a network request for PDP context activation by issuing the unsolicited result code RING to the TE, followed by the intermediate result code CONNECT. The MT then enters V.25ter online data state and follows the same procedure as it would after having received a +CGANS=1 with no <L2P> or <cid> values specified.

> NOTE. The 'S0=n' (n=0) command does not perform an automatic GPRS detach.

Implementation

Optional.

10.2.2.2 Manual acceptance of a network request for PDP context activation 'A'

The V.25ter 'A' (Answer) command may be used to accept a network request for a PDP context activation announced by the unsolicited result code RING. The MT responds with CONNECT, enters V.25ter online data state and follows the same procedure as it would after having received a +CGANS=1 with no <L2P> or <cid> values specified. It is an error to issue the 'A' command when there is no outstanding network request.

Implementation

Optional.

10.2.2.3 Manual rejection of a network request for PDP context activation 'H'

The V.25ter 'H' or 'H0' (On-hook) command may be used to reject a network request for PDP context activation announced by the unsolicited result code RING. The MT responds with OK. It is an error to issue the 'H' command when there is no outstanding network request.

> NOTE: This is an extension to the usage of the 'H' command that is described in ITU-T V.25ter.

Implementation

Optional.

CHANGE REQUEST No :		A018	*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

Technical Specification GSM   07.10   Version: 6.3.0

Submitted to SMG 29		for approval	**X**	without presentation ("non-strategic")	**X**
list SMG plenary meeting no. here ↑		for information		with presentation ("strategic")	

PT SMG CR cover form is available from: http://docbox.etsi.org/tech-org/smg/Document/smg/tools/CR_form/crf28_1.zip

Proposed change affects: SIM [ ]   ME [**X**]   Network [ ]
(at least one should be marked with an X)

Work item: MSTE multiplexing

Source: SMG4   **Date:**   990312

Subject: Editorial corrections

Category: F   Correction   **[X]**   **Release:**   Phase 2   [ ]
                 A   Corresponds to a correction in an earlier release   [ ]   Release 96   [ ]
(one category   B   Addition of feature   [ ]   Release 97   [ ]
and one release   C   Functional modification of feature   [ ]   Release 98   **[X]**
only shall be   D   Editorial modification   [ ]   Release 99   [ ]
marked with an X)

Reason for change: There were some editorial errors in the specification

Clauses affected: 5.4.6.3.9   5.4.6.3.11   5.4.8.1

Other specs affected: Other releases of same spec   [ ]   → List of CRs:
                            Other core specifications   [ ]   → List of CRs:
                            MS test specifications / TBRs   [ ]   → List of CRs:
                            BSS test specifications   [ ]   → List of CRs:
                            O&M specifications   [ ]   → List of CRs:

Other comments: 3G CR number: TS 27.010 CR 02

 <--------- double-click here for help and instructions on how to create a CR.

5.4.6.3.9   Remote Port Negotiation Command (RPN)

This command is optional.

This command is used for set the remote port communication settings.

All devices must assure that the communication settings are correctly set, prior sending data. There are default values assigned on all parameters, if no negotiation is performed, the default value is chosen.

During a connection, a device must send the RPN whenever the communication settings are changed. The same applies for the Port Line Status.

Command RPN	Length 1 or 8	Value octet1 optional (DLCI)	Value octet2 optional	Value octet3 optional	Value octet4 optional	Value octet5 optional	Value octet6 optional	Value octet7 optional	Value octet8 optional

The Remote Port Negotiation Command use the following type field octet:

Table 1: Type field octet

Bit	1	2	3	4	5	6	7	8
	EA	C/R	0	0	1	0	0	1

The length byte contains the value 1 or 8 and there are one or eight value octets.

Table 2: DLCI octet

Bit No.	1	2	3	4	5	6	7	8
	EA	1	D	L	C	I		

Bit 2 in the DLCI octet is not used and always set to 1, the EA bit is according to the description in subclause 5.2.1.2. The DLCI field indicated which DLC the command is applied to.

Table 3: Port Value Octets

Value Octet	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
2	B1	B2	B3	B4	B5	B6	B7	B8
3	D1	D2	S	P	PT1	PT2	res	res
4	FLC1	FLC2	FLC3	FLC4	FLC5	FLC6	res	res
5	XON1	XON2	XON3	XON4	XON5	XON6	XON7	XON8
6	XOF1	XOF2	XOF3	XOF4	XOF5	XOF6	XOF7	XOF8
7	PM1	PM2	PM3	PM4	PM5	PM6	PM7	PM8
8	PM9	PM10	PM11	PM12	PM13	PM14	PM15	PM16

A device transmits a remote port negotiation command to the other device with the fields set to the desired values with the parameter mask indicating which parameters are set..

When the remote port negotiation command is received, the responding station replies according to the following rules:

The DLCI value may not be changed.

The receiver may accept the Port Value Octet bits proposed by the sender, and reply with a respons with the parameter mask set to 1 for all the parameters accepted. If the receiver does not support any of the proposed values, it replies with the parameter mask set to zero for the parameters not supported. For those parameters with the parameters mask set to 1, the new value is accepted and used.

If the receiver does not support any of the proposed values indicated by the parameter mask, the receiver replies with the Remote Parameter Negotiation response with the parameter mask set to zero.
If only one value byte is included in the command, it is interpreted as a request, and the receiver shall respond with the current Port Values setting.

If the sender considers the response to be acceptable, that is, the bits match, the sender will start to use the DLC according to the Port Value Octets. If the response is not acceptable the sender may initiate another remote port negotiation command with revised parameters until a final agreement is reached or pass the failure information to a higher layer.

The B1-B8 indicates the baudrate, see table below:

Table 4: Meaning of B-bits

Meaning	B1	B2	B3	B4	B5	B6	B7	B8
2400 bit/s	0	0	0	0	0	0	0	0
4800 bit/s	1	0	0	0	0	0	0	0
7200 bit/s	0	1	0	0	0	0	0	0
9600 bit/s	1	1	0	0	0	0	0	0
19200 bit/s	0	0	1	0	0	0	0	0
38400 bit/s	1	0	1	0	0	0	0	0
57600 bit/s	0	1	1	0	0	0	0	0
115200 bit/s	1	1	1	0	0	0	0	0
230 400 bit/s	0	0	0	1	0	0	0	0

All other values of the B-bits are reserved.

The default value is 1100 0000 (9600).

The D1-D2 indicates the number of data bits:

D1, D2

00   5 bits

01   6 bits

10   7 bits

11   8 bits - default

The S bit indicate number of stop bits: S=0: 1 stop bit, S=1: 1,5 stop bits. Default value = 0 (1 stop bit)

The P bit indicate the parity. P=0: no parity, P=1: parity. Default value = 0 (no parity)

The PT1 - PT2 indicates the parity type:

PT1,PT2

00   odd parity

01   even parity

10   mark parity

11   space parity

FLC1-FLC6: (Default value=0, no flow control)

Bit1   XON/XOFF on input

Bit2   XON/XOFF on output

Bit3   RTR on input

Bit4   RTR on output

Bit5   RTC on input

Bit6   RTC on output

Note. The RTR is mapped to either CTS (circuit 106) or RFR (circuit 133). The RTC is mapped to either DTR (circuit 108/2) or DSR (circuit 107). (Circuit 133, RFR(Ready for Receiving) is commonly assigned to the connector pin that is alternatively used for circuit 105, RTS. It is sometimes referred to by that name)

XON1-XON8: XON character (default DC1)

XOF1-XOF8: XOFF character.(default DC3)

PM1-PM8: Parameter mask

The parameter mask is used to indicate which parameters in the Remote Port Negotiation command are negotiated. For a command, the parameter mask shall be interpreted as follows:

> 0=no change

> 1= change.

For a response the following values applies:

> 0=not accepted proposal

> 1= accepted proposal, and the new values are used.

The bit mask for the value octets 7 and 8 are shown below:

Bit1   bit rate

Bit2   data bits

Bit3   stop bits

Bit4   Parity

Bit5   parity type

Bit6   XON character

Bit7   XOF character

Bit8   reserved

PM9-PM16: Parameter mask continued

Bit1   XON/XOFF on input

Bit2   XON/XOFF on output

Bit3   RTR on input

Bit4   RTR on output

Bit5   RTC on input

Bit6   RTC on output

All reserved values are set to 0 (zero) by the sender and ignored by the receiver.

NOTE.   The RTR is mapped to either CTS (circuit 106) or RFR (circuit 133). The RTC is mapped to either DTR (circuit 108/2) or DSR (circuit 107). (Circuit 133, RFR(Ready for Receiving) is commonly assigned to the connector pin that is alternatively used for circuit 105, RTS. It is sometimes referred to by that name)

5.4.6.3.11   Service Negotiation Command (SNC)

This command is used to query and set a specific service on a specific DLC. It is for instance used to set specific digital voice types.

In some situations it is not very suitable to mix AT commands and raw data on the same DLC. For those situations, special DLCs can be established and converted to carry a specific data type. Examples of situation where this is especially useful is for voice transportation, where the AT commands controlling the connection (for instance for multiparty) are transported on one DLC and voice data carried by another DLC. This mechanism can be seen as an alternative to sending escape sequences with AT commands in the data flow. If this command is not used, the DLC is by default set to normal AT command mode. If this command is used, the DLC indicated in the DLCI octet, is converted to carry the specific data type. The originator of this command may also query the specific service on each DLCI.

5.4.8   Flow Control

5.4.8.1   RTR Flow Control

Figure 12 shows a DTE connection to a DCE. The flow control scheme defined in this section also applies to DTE - DTE connections. Both 07.10 entities are configured to use RTR (RFR/CTS) flow control. The flow control signal to the local application is a combination of the RTR signal from the opposite device together with three other flow control signals. The flow control signals labelled FCS1 - FCS3 are defined below:

FCS1	Bit 2 in the Modem Status Command or in the control signal octet in convergence layer type 2. Flow control per DLCI
FCS2	Aggregate flow control in 07.10 via the control channel commands Fcon and Fcoff (basic option) or XON/XOFF in the advance option.
FCS3	07.10 internal buffer management (implementation specific)

The flow control signals FCS1-3 are combined with the RTR signal from the opposite 07.10 instance to create the local RTR input signal. E.g. the expression for the CTS signal for the emulated DTE serial port is:

DTE.CTS=DCE.RTR AND FCS1 AND FCS2 AND FCS3

The flow control emulator duplicates the outgoing RTR signal in bit 2 (FC) and bit 4 (RTR) in the modem status command (when convergence layer 1,3 and 4 is used) or in bit 2 (FC) and bit 4 (RTR) in the control signal octet (when the convergence layer 2 is used).
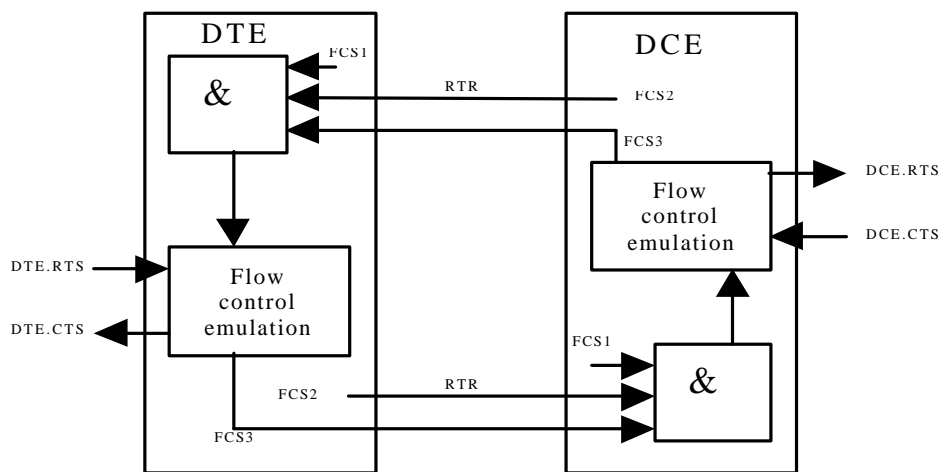

Figure 1: RTR Flow Control