ETSI TS 103 368 V1.2.1 (2021-06)

Rail Telecommunications;
Commands necessary for mobile
radio equipment operation on railways

Reference
RTS/RT-0072

Keywords
GSM-R, radio, railways

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Contents

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM**® and the GSM logo are trademarks registered and owned by the GSM Association.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Railway Telecommunications (RT).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document defines the minimum set of commands necessary for mobile radio systems operation on Railways. The following operational cases are addressed within the present document:

- GSM-R Circuit Switched Voice (including ASCI calls, Enhanced Railway Emergency Call, etc.).
- GSM-R Circuit Switched Data (CS) bearer service.
- GSM-R Packet Switched (PS) bearer service.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 127 007 (V4.7.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; AT command set for User Equipment (UE) (3GPP TS 27.007 version 4.7.0 Release 4)".

[2] Recommendation ITU-T V.250 (07/2003): "Serial asynchronous automatic dialling and control".

[3] Void.

[4] ETSI TS 122 011 (V4.8.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Service accessibility (3GPP TS 22.011 version 4.8.0 Release 4)".

[5] ETSI TS 127 010 (V4.2.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Terminal Equipment to Mobile Station (TE-MS) multiplexer protocol (3GPP TS 27.010 version 4.2.0 Release 4)".

[6] ETSI TS 127 005 (V4.2.1): " Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS) (3GPP TS 27.005 version 4.2.1 Release 4)".

[7] ETSI TS 122 030 (V4.1.0): " Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Man-Machine Interface (MMI) of the User Equipment (UE) (3GPP TS 22.030 version 4.1.0 Release 4)".

[8] ETSI TS 127 007 (V13.4.0): " Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; AT command set for User Equipment (UE) (3GPP TS 27.007 version 13.4.0 Release 13)".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI TS 127 060 (V4.3.1): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Packet domain; Mobile Station (MS) supporting Packet Switched services (3GPP TS 27.060 version 4.3.1 Release 4)".

[i.2] EIRENE SRS: "System Requirements Specification", version 16.0.0".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

ETCS application(s): application(s) comprising the EuroRadio protocol suite

non-ETCS application(s): application(s) comprising any other protocol suites than EuroRadio

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

APN	Access Point Name
ASCI	Advanced Speech Call Items
AT	ATtention
CS	Circuit Switch
CTS	Clear To Send
DCD	Data Carrier Detect
DCE	Data Circuit Equipment
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
EDOR	ETCS Data Only Radio
EGPRS	Enhanced GPRS
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
ETSI	European Telecommunication Standardisation Institute
GMM	GPRS Mobility Management
GPRS	General Packet Radio Service
GSM	Global System Mobile
GSM-R	lobal System for Mobile - Railways
HLR	Home Location Register
IMEI	International Mobile Equipment Identifier
IP	Internet Protocol
ITU-T	International Telecommunication Union - Telecommunications Standardization Sector

ME	Mobile Equipment
MOC	Mobile Originated Call
MSISDN	Mobile Station International Subscriber Directory Number
MT	Mobile Termination
NCH	Notification CHannel
PDP	Packet Data Protocol
PLMN	Public Land Mobile Network
PPP	Point to Point Protocol
PS	Packet Switched
QoS	Quality of Service
RTS	Ready To Send
SGSN	Serving GPRS Support Node
SIM	Subscriber Identity Module
TA	Terminal Adaptor
TA/TE	Terminal Adapter / Terminal Equipment
TE	Terminal Equipment
UE	User Equipment
VBS	Voice Broadcast Service
VGCS	Voice Group Call Service

4 General requirements for AT commands

4.1 AT command syntax

4.1.1 Alphabet

Clause 5.1 of Recommendation ITU-T V.250 [2] shall apply.

4.1.2 Command Lines

Clause 5.2 of Recommendation ITU-T V.250 [2] shall apply.

4.1.3 Basic Syntax Commands

Clause 5.3 of Recommendation ITU-T V.250 [2] shall apply.

4.1.4 Extended Syntax Commands

Clause 5.4 of Recommendation ITU-T V.250 [2] shall apply.

4.1.5 Issuing Commands

Clause 5.5 of Recommendation ITU-T V.250 [2] shall apply.

4.1.6 Executing Commands

Clause 5.6 of Recommendation ITU-T V.250 [2] shall apply.

4.1.7 MT Responses

MT Responses shall be as defined in clause 5.7 of Recommendation ITU-T V.250 [2] with the exception of DIALTONE and NO ANSWER result codes which are not applicable.

4.2 TE-TA interface commands

4.2.1 Escape code character used to switch from Online Data state to Online Command state: S2

Description and Operation

S2 register defines the character used to build the escape sequence to exit from online data state and return to command state or online command state. The escape sequence is built by repeating three time the escape character defines by the S2 register (e.g. if the escape character is '+ ', the escape sequence will be "+++").

The escape character code shall be comprised between 0 and 127. Values from 128 to 255 are reserved to disable the escape sequence mechanism.

Define value:

S2=0..127	Define the escape character code
S2=128..255	Disable the escape sequence mechanism

The default value for operation on Railways shall be set to S2=128. (Escape sequence mechanism is disabled).

Implementation

Mandatory.

4.2.2 Command line termination character: S3

Description and Operation

Clause 6.2.1 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to S3=13 (Carriage return).

Implementation

Mandatory.

4.2.3 Response formatting character: S4

Description and Operation

Clause 6.2.2 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to S4=10 (Line feed).

Implementation

Mandatory.

4.2.4 Command echo: E

Description and Operation

Clause 6.2.4 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to E1 (Echo enabled).

Implementation

Mandatory.

4.2.5 Result code suppression: Q

Description and Operation

Clause 6.2.5 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to Q0 (TA transmit result codes).

Implementation

Mandatory.

4.2.6 TA response format: V

Description and Operation

Clause 6.2.6 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to V1 (DCE transmits full headers and trailers and verbose response text).

Implementation

Mandatory.

4.2.7 Defines CONNECT result code format and dial tone and busy detection: X

Description and Operation

Clause 6.2.7 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to X3 (CONNECT is shown with speed; recognition of dialling tone is disabled and busy detection is enabled).

Implementation

Mandatory.

4.2.8 Behaviour of circuit 109 DCD: &C

Description and Operation

Clause 6.2.8 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to &C1 (Circuit 109 changes physical layer functions in accordance with the underlying DCE).

Implementation

Mandatory.

4.2.9 Behaviour of circuit 108/2 DTR: &D

Description and Operation

Clause 6.2.9 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to &D2 (Upon an on-to-off transition of circuit 108/2, the DTE instructs the underlying DCE to perform an orderly clear down of the call).

Implementation

Mandatory.

4.2.10 Data rate command at which the DCE will accept commands: +IPR

Description and Operation

Clause 6.2.10 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to +IPR=9 600.

NOTE: The Railway application may have to increase it to a value equal or higher to 19 200 in case of PS-mode operation.

4.2.11 DTE-DCE character framing: +ICF

Description and Operation

Clause 6.2.11 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to +ICF=3 (Sets 8 data bit, no parity, 1 stop bit).

Implementation

Mandatory.

4.2.12 Select DTE-DCE flow control mechanism: +IFC

Description and Operation

Clause 6.2.12 of Recommendation ITU-T V.250 [2] shall apply.

The default value for operation on Railways shall be set to +IFC=2,2 (Hardware (based on RTS and CTS) flow control mechanism enabled).

NOTE: The default value for the operation on Railways is similar of the use of the former command &K3. However, +IFC command offers more configuration options.

Implementation

Mandatory.

4.3 Result Codes

Table 1 shows the most important result codes, in the call control procedures and during the ME status change: (Information).

Result Codes are described in table 1. More details can be found in clause 5.7 of Recommendation ITU-T V.250 [2] and in ETSI TS 127 007 [1] and annex B of ETSI TS 127 007 [1].

Table 1: Result Codes

Type of Result Code	Result Code [Response]	Defined Values	Applicable to CS-Mode/ PS-Mode	Description
final	OK	---	CS/PS	acknowledges the execution of a command
unsolicited	RING	---	CS	(if AT+CRC=0) the MT has detected an incoming call signal from the network

Type of Result Code	Result Code [Response]	Defined Values	Applicable to CS-Mode/ PS-Mode	Description
unsolicited	+CRING: ASYNC [,<priority>[,<subaddr>,<satype>]]	Values are defined in ETSI TS 127 007 [1], clause 6.11	CS	(if AT+CRC=1) the MT has detected an incoming call from the network → asynchronous transparent
unsolicited	+CCWA: <number>,<type>,<class> [,<alpha>[,<CLI validity>[,<subaddr>,<satype>[,<priority>]]]]	Values are defined in ETSI TS 127 007 [1], clause 7.12	CS	(if AT+CCWA=1) Call waiting information to the TE
intermediate	CONNECT <data rate>	<data rate>: 1 200 2 400 4 800 9 600	CS/PS	the connection has been established; the MT is moving from command state to online data state
final	NO CARRIER	---	CS/PS	The connection has been terminated The call setup failed before the alerting phase
final	NO ANSWER	---	CS	The called party did not answer the call: the connection completion has time-out
final	BUSY	---	CS	
unsolicited	+CLIP: <number>,<type> [,<subaddr>,<satype>]	Values are defined in ETSI TS 127 007 [1], clause 7.6	CS	(if AT+CLIP=1) calling line identification presentation
intermediate/ unsolicited	+COLP: <number>,<type> [,<subaddr>,<satype>]	Values are defined in ETSI TS 127 007 [1], clause 7.8	CS	(if AT+COLP=1) connected line identification presentation
final	ERROR +CME ERROR: <err>	---	CS/PS	The AT command was not accepted
unsolicited	+CREG: <stat>	Values are defined in ETSI TS 127 007 [1], clause 7.2	CS	(if AT+CREG=1) Change in the MT's network registration status
unsolicited	+CREG: <stat>[,<lac>,<ci>]	Values are defined in ETSI TS 127 007 [1], clause 7.2	CS	(if AT+CREG=2) Change in the MT's network registration status
unsolicited	+CGREG: <stat>	Values are defined in ETSI TS 127 007 [1], clause 10.1.19	PS	(if AT+CGREG=1) Change in the MT's GPRS network registration status. If the GPRS MT also supports circuit mode services, the +CREG command and +CREG: result codes apply to the registration status and location information for those services.
unsolicited	+CGREG: <stat>[,<lac>,<ci>]	Values are defined in ETSI TS 127 007 [1], clause 10.1.19	PS	(if AT+CGREG=2) Change in the MT's GPRS network registration status. If the GPRS MT also supports circuit mode services, the +CREG command and +CREG: result codes apply to the registration status and location information for those services.

Type of Result Code	Result Code [Response]	Defined Values	Applicable to CS-Mode/ PS-Mode	Description
unsolicited	+CGEV: REJECT <PDP_type>, <PDP_addr> +CGEV: NW REACT <PDP_type>, <PDP_addr>, [<ci>] +CGEV: NW DEACT <PDP_type>, <PDP_addr>, [<ci>] +CGEV: ME DEACT <PDP_type>, <PDP_addr>, [<ci>] +CGEV: NW DETACH +CGEV: ME DETACH +CGEV: NW CLASS <class> +CGEV: ME CLASS <class>	Values are defined in ETSI TS 127 007 [1], clause 10.1.18	PS	(if AT+CGEREP=1 or AT+CGEREP=2) MT sends result codes to the DTE in case of certain events occurring in the GPRS MT or the network.
final	CONNECT ERROR	---	PS	The execution command AT+CGDATA=[<LP2>…..] causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more Packet Domain PDP types.

4.4 General commands

4.4.1 Request manufacturer identification: +CGMI

Description and Operation

This command allows to get a text string to identify the manufacturer of the MT. This text string and its content is set up at the sole discretion of the manufacturer. Clause 5.1 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory.

4.4.2 Request model identification: +CGMM

Description and Operation

This command allows to get a text string to identify the model of the MT. This text string and its content is set up at the sole discretion of the manufacturer. Clause 5.2 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory.

4.4.3 Request revision identification: +CGMR

Description and Operation

This command allows to get a text string to identify the version, revision level or date of the MT. This text string and its content is set up at the sole discretion of the manufacturer. Clause 5.3 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory.

4.4.4 Request product serial number identification: +CGSN

Description and Operation

This command allows to get a text string to identify the serial number of the MT. This text string and its content is set up at the sole discretion of the manufacturer but shall at least include the IMEI of the MT. Clause 5.4 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory.

5 AT Commands for voice and CS

5.1 Call control commands and methods

5.1.1 Automatic answer: S0

Description and Operation

Clause 6.3.8 of Recommendation ITU-T V.250 [2] shall apply.

If the implementation is mandatory, the default value for operation on Railways shall be set to S0=1 (ME answers after the first ring).

Implementation

Mandatory for all except EDOR.

5.1.2 Dial command: D

Description and Operation

Clause 6.2 of ETSI TS 127 007 [1] and clause 6.3.1 of Recommendation ITU-T V.250 [2] shall apply.

The Dial command (ATD) instructs the MT to originate a call (see table 2).

Table 2: ATD Responses

Command	Possible Responses
D [<dial_string>]	CONNECT <data rate> NO CARRIER ERROR BUSY OK

The result code OK will be issued, when the TE aborts a command. The <data rate> specifies the speed of the data connection. The permitted values for <data rate> that shall be used for ETCS operation are specified in table 3.

Table 3: Data rate permitted values

Data rate
2 400
4 800
9 600

The priority of a MOC is selected using a Service Code to be put in front of the number to be called, in conformity to annex B of ETSI TS 122 030 [7].

ATD*<SC>#<Number>

Using this command, the priority required for this call is transferred to the GSM-R network by the MT.

The extension *<SC># shall be used.

When the priority selection is not used, the default priority setting for this subscriber in the network HLR is applied.

The possible responses correspond to the responses of the dial command; the extended error codes +CME ERROR: <err> are also supported if the MT is configured accordingly (see ETSI TS 127 007 [1], clause 9).

Defined values:

<SC>	Priority level
75	No priority
750	Priority 0
751	Priority 1
752	Priority 2
753	Priority 3
754	Priority 4

NOTE: The priority to be used for ETCS operation is specified in EIRENE SRS [i.2]

Implementation

Mandatory.

5.1.3 Call clearing: H

Description and Operation

Clause 6.3.6 of Recommendation ITU-T V.250 [2] shall apply.

The Hook Control (ATH) command instructs the MT to clear the call.

Implementation

Mandatory.

5.1.4 Select bearer service type: +CBST

Description and Operation

The MT shall be capable of selecting the GSM-R bearer services used by ETCS application in conformity to clause 6.7 of ETSI TS 127 007 [1].

Set command selects the bearer service <name> with data rate <speed> and the connection element for mobile originated calls (see table 4).

Table 4 :+CBST parameter command syntax

Command	Possible Responses
+CBST=[<speed>[,<name>[,<ce>]]]	OK or ERROR
+CBST?	+CBST: [<speed>[,<name>[,<ce>]]]
+CBST=?	+CBST: (list of supported values)

The permitted values that shall be used for ETCS operation are:

<speed>:	
68	2 400 bps (V.110)
70	4 800 bps (V.110)
71	9 600 bps (V.110)

<name>:	
0	asynchronous modem

<ce>:	
0	Transparent

Implementation

Mandatory.

5.1.5 Radio link protocol: +CRLP

Description and Operation

If the command is implemented, clause 6.8 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.1.6 Extended error report: +CEER

Description and Operation

If the command is implemented, clause 6.10 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.1.7 Cellular result codes: +CRC

Description and Operation

If the implementation is mandatory, clause 6.11 of ETSI TS 127 007 [1] shall apply.

The default value for operation on Railways shall be set to +CRC=0 (Disabled extended format cellular result codes).

Implementation

Mandatory for all except EDOR.

5.2 Network service related commands

5.2.1 Subscriber number: +CNUM

Description and Operation

Clause 7.1 of ETSI TS 127 007 [1] shall apply.

Action command returns the subscriber MSISDN stored in the EFMSISDN in the SIM Card.

Implementation

Mandatory.

5.2.2 Network registration: +CREG

Description and Operation

This command enables the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the ME network registration status. Clause 7.2 of ETSI TS 127 007 [1] shall apply. In the case that the ME deregisters from the GSM-R network, an unsolicited +CREG : <stat> response is sent to the TE.

The default value for operation on Railways shall be set to +CREG=1 (Enables the network registration status).

Implementation

Mandatory.

5.2.3 PLMN selection: +COPS

Description and Operation

Clause 7.3 of ETSI TS 127 007 [1] shall apply with the restrictions concerning the modes which shall be as specified in the present document.

The MT shall select the last mode used, as the default mode, at every switch-on, as specified in ETSI TS 122 011 [4], clause 3.2.1.

Manual (1) and Automatic modes have to be supported by MT.

Default values for operation on Railways:

- <mode>: 1 *manual*
- <format>: 2 *numeric*

Implementation

Mandatory.

5.2.4 Facility lock: +CLCK

Description and Operation

If the command is implemented, clause 7.4 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.5 Change password: +CPWD

Description and Operation

If the command is implemented, clause 7.5 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.6 Calling line identification presentation: +CLIP

Description and Operation

If the command is implemented, clause 7.6 of ETSI TS 127 007 [1] shall apply.

The default value for operation on Railways shall be set to +CLIP=0 (CLIP disabled).

Implementation

Mandatory for all except EDOR.

5.2.7 Calling line identification restriction: +CLIR

Description and Operation

If the command is implemented, clause 7.7 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.8 Connected line identification presentation: +COLP

Description and Operation

If the command is implemented, clause 7.8 of ETSI TS 127 007 [1] shall apply.

The default value for operation on Railways shall be +COLP=0 (COLP disabled).

Implementation

Mandatory for all except EDOR.

5.2.9 Call forwarding number and conditions: +CCFC

Description and Operation

If the command is implemented, clause 7.11 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.10 Call waiting: +CCWA

Description and Operation

If the command is implemented, clause 7.12 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.11 Call related supplementary services: +CHLD

Description and Operation

If the command is implemented, clause 7.13 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.12 Unstructured supplementary service data: +CUSD

Description and Operation

If the command is implemented, clause 7.15 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.13 List current calls: +CLCC

Description and Operation

If the command is implemented, clause 7.18 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.14 User to user signalling service 1: +CUUS1

Description and Operation

If the command is implemented, clause 7.26 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.2.15 Answer: A

Description and Operation

Clause 6.3.5 of Recommendation ITU-T V.250 [2] shall apply.

The Answer a Call (ATA) command instructs the MT to immediately connect to the line and start the answer sequence.

Implementation

Mandatory.

5.3 Mobile termination control and status commands

5.3.1 Enter PIN: +CPIN

Description and Operation

If the command is implemented, clause 8.3 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.3.2 Signal quality: +CSQ

Description and Operation

Clause 8.5 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory.

5.3.3 Restricted SIM access: +CRSM

Description and Operation

Action command and response allows to create an ordered list comprising MCC/MNC and alphanumeric network names for all networks read from the $EF_{GsmrPLMN}$ in the SIM Card. Clause 8.18 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory.

5.3.4 Automatic time zone update: +CTZU

Description and Operation

If the command is implemented, clause 8.39 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.3.5 Time zone reporting: +CTZR

Description and Operation

If the command is implemented, clause 8.40 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

5.3.6 Phone activity status: +CPAS

Description and Operation

Clause 8.1 of ETSI TS 127 007 [1] together with the restrictions defined is the present document shall apply.

Execution command returns the activity status <pas> of the ME. It can be used to interrogate the ME before requesting action from the phone. Possible <err> values are described in clause 9.2 of ETSI TS 127 007 [1].

CPAS command syntax is shown in table 5.

Table 5: +CPAS parameter command syntax

Command	Possible Responses
+CPAS	+CPAS : <pas> +CME ERROR : <err>
+CPAS=?	+CPAS: [list of supported <pas>s] +CME ERROR: <err>

Defined values:

<pas>:

1) ready (ME allows commands from TA/TE)
2) unavailable (ME does not allow commands from TA/TE)
3) unknown (ME is not guaranteed to respond to instructions)
4) ringing (ME is ready for commands from TA/TE, but the ringer is active)
5) call in progress (ME is ready for commands from TA/TE, but a call is in progress)

6) asleep (ME is unable to process commands from TA/TE because it is in a low functionality state)

Only the support of <pas>=0 is mandatory for operation on Railways.

Implementation

Mandatory.

5.4 Mobile termination errors

5.4.1 Report mobile termination error: +CMEE

Description and Operation

Clause 9.1 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory.

5.4.2 Mobile termination error result code: +CME ERROR

Description and Operation

Clause 9.2 of ETSI TS 127 007 [1] shall apply. The default value for operation on Railways shall be set to +CMEE=1 (Presentation of result code enabled).

Implementation

Mandatory.

6 AT commands for Packet Switched services

6.1 General

This clause lists commands that a TE can use to control a MT supporting packet switched services. Functional aspects to support packet switched data services by a MT are described in ETSI TS 127 060 [i.1].

6.2 Commands specific to MTs supporting the packet Switched services

6.2.1 Define PDP context: +CGDCONT

Description and Operation

If the command is implemented, the command "+CGDCONT" according to ETSI TS 127 007 [1], clause 10.1.1 shall be used to define the packet data protocol (PDP) parameters.

Implementation

Mandatory for EDOR and PS operation.

6.2.2 3G Quality of service profile (requested): +CGEQREQ

Description and Operation

If the command is implemented, applicable bearer service QoS parameter(s) shall be requested by using the command "+CGEQREQ" as defined in clause 10.1.6 of ETSI TS 127 007 [1].

Implementation

Mandatory for EDOR and PS operation.

6.2.3 3G quality of service profile (negotiated): +CGEQNEG

Description and Operation

If the command is implemented, in order to verify the negotiated bearer service QoS parameter per PDP context, the command "+CGEQNEG" shall be used as defined in clause 10.1.8 of ETSI TS 127 007 [1].

Implementation

Mandatory for EDOR and PS operation.

6.2.4 PS attach or detach: +CGATT

Description and Operation

If the command is implemented, it is used to enable the access towards GSM PS-mode mobility management node (SGSN), the command "+CGATT" as defined in clause 10.1.9 of ETSI TS 127 007 [1] shall be used. +CGATT parameter command syntax is shown in table 6.

Table 6: +CGATT parameter command syntax

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

To enable/disable GSM PS-domain mobility management, the states="0" and "1" shall be used to attach (state =1) and to detach (state=0) from the applicable network node.

Implementation

Mandatory for EDOR and PS operation.

6.2.5 Automatic attachment to the PS network: +RCGATT

Description and Operation

This command enables the automatic PS-mode to attach in a home or visiting network when the MT detects the support of PS-mode bearer service i.e. GPRS/EGPRS.

The read command returns the current automatic Packet Domain service state.

The test command is used for requesting information on the supported automatic Packet Domain service states.

+RCGATT parameter command syntax is shown in table 7.

Table 7: +RCGATT parameter command syntax

Command	Possible Response(s)
+RCGATT= [<mode>]	OK ERROR
+RCGATT?	+RCGATT: <mode>
+RCGATT=?	+RCGATT: (list of supported <modes>)

<mode>:

0: auto attach to PS domain is disabled

1: auto attach to PS domain is enabled for all PLMNs

2: auto attach to PS domain is enabled only for Home PLMN

If mode 1 or 2 was applied, MT shall recover to mode 1 or 2 after restart or any kind of MT powerless situation.

If the network detaches the MT due to any reason and mode 1 or 2 is applicable, the MT shall re-attach automatically.

The status of command is stored in permanent memory and remains after a module reboot.

The default value for operation on Railways shall be +RCGATT=1 (auto attached for all PLMNs).

Implementation

Mandatory for EDOR and PS operation.

6.2.6 PDP context activate or deactivate: +CGACT

Description and Operation

If the command is implemented, to enable the data exchange between the Mobile and the applicable packet data network, the packet data protocol session (PDP context) shall be established by using the command "+CGACT" as defined in clause 10.1.10 of ETSI TS 127 007 [8].

Implementation

Mandatory for EDOR and PS operation.

6.2.7 PDP context modify: +CGCMOD

Description and Operation

The command "+CGCMOD" can be used to modify the specified PDP context (s) with respect to a changed QoS profile related to context ID (cid). It requires a change of the QoS parameters using the "+CGEQREQ". In this case, "+CGEQREQ" command has to be executed before the "+CGCMOD" command. The QoS profile cannot be changed during ongoing data communication.

A change of bearer service QoS parameter(s) shall be requested from the network by the command "+CGCMOD" during an active PDP context as defined in clause 10.1.11 of ETSI TS 127 007 [1] . +CGCMOD parameter command syntax is shown in table 8.

Table 8: +CGCMOD parameter command syntax

Command	Possible Response(s)
+CGCMOD[=<cid>[,<cid>[,...]]]	*+CME ERROR: <err>*
+CGCMOD=?	+CGCMOD: (list of <cid>s associated with active contexts)

The default value for operation on Railways shall be: <cid> 1.

Implementation

Mandatory for EDOR and PS operation.

6.2.8 Enter data state: +CGDATA

Description and Operation

If the command is implemented, to establish the communication between the TE and the MT, the command "+CGDATA" as defined in clause 10.1.12 of ETSI TS 127 007 [1] shall be used.

The default values for operation on Railways for:

- <L2P> shall be "PPP", Point-to-point protocol for a PDP such as IP.
- <cid> parameter value shall be "1", ETCS APN configuration.

Implementation

Mandatory for EDOR and PS operation.

6.2.9 Show PDP address(es): +CGPADDR

Description and Operation

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

If the command is implemented, clause 10.1.14 of ETSI TS 127 007 [1] shall apply.

Implementation

Optional.

6.2.10 GPRS mobile station class: +CGCLASS

Description and Operation

If the command is implemented, to select the appropriate mobile class the command "+CGCLASS" according to ETSI TS 127 007 [1], clause 10.1.17 shall be used.

The default value for operation on Railways for <class> (a string parameter which indicates the mode of operation) shall be B.

NOTE: <class> B means that the MT would operate PS and CS services but not simultaneously.

Implementation

Mandatory for EDOR and PS operation.

6.2.11 Packet domain event reporting: +CGEREP

Description and Operation

This command enables or disables sending of unsolicited result codes, +CGEV: XXX.

If the command is implemented, ETSI TS 127 007 [1], clause 10.1.18 shall apply.

Implementation

Optional.

6.2.12 GPRS network registration status: +CGREG

Description and Operation

If the command is implemented, to enable the GPRS registration unsolicited result code monitoring, the command "+CGREG" according to ETSI TS 127 007 [1], clause 10.1.19 shall be used. +CGREG parameter command syntax is shown in table 9.

Table 9: +CGREG parameter command syntax

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

Defined/applicable values <n> are:

0 disable network registration unsolicited result code (mandatory)

1 enable network registration unsolicited result code +CGREG: <stat> (mandatory)

2 enable network registration and location information unsolicited result code +CGREG: <stat>[,<lac>,<ci>] (mandatory)
OR
enable network registration and location information unsolicited result code +CGREG: <stat>[,<[lac>,]<[ci>],[<AcT>],[<rac>]] (optional)

3 enable network registration, location information and GMM cause value information unsolicited result code +CGREG: <stat>[,[<lac>],[<ci>],[<AcT>],[<rac>][,<cause_type>,<reject_cause>]] (optional)

Implementation

Mandatory for EDOR and PS operation.

6.2.13 Multiplexing mode: +CMUX

Description and Operation

The operation of multiple PDP context simultaneously active requires the support of multiple sessions over the R-interface of one MT.

The multiplexer mode/protocol as specified in ETSI TS 127 010 [5] shall be used to enable simultaneous operation of multiple sessions on the R-interface.

For the operation of ETCS in PS-mode the following conditions applies for the allocation of multiple communication ports over one physical R-interface:

- at least 2 dedicated ports to be used for ERTMS PS-mode based communication;
- 1 shared port to be used ERTMS CS-mode based communication and the control of the Mobile Termination;
- 1 dedicated port to be used for control purposes of the Mobile Termination.

If the command is implemented, to enable the multiplexer mode, the command "+CMUX" according to ETSI TS 127 007 [1], clause 5.7 shall be used. +CMUX parameter command syntax is shown in table 10.

Table 10: +CMUX parameter command syntax

Command	Possible response(s)
+CMUX=<transparency>[,<subset>[,<port_speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]	+CME ERROR: <err>
+CMUX?	+C MUX: <transparency>,[<subset>],<port_speed>,<N1>,<T1>,<N2>,<T2>,<T3>[,<k>] +CME ERROR: <err>
+CMUX=?	+CMUX: (list of supported <transparency>s),(list of supported <subset>s),(list of supported <port_speed>s),(list of supported <N1>s),(list of supported <T1>s),(list of supported <N2>s),(list of supported <T2>s),(list of supported <T3>s),(list of supported <k>s)

For the operation of ETCS as well as other ERTMS application the specific parameter values for the use of multiplexer mode specified in table 11 shall be applied.

Table 11: +CMUX parameter values

Parameter according to ETSI TS 127 010 [5]	Setting	Requirement
Start-up Mode	Advanced	(M)
Advanced Mode Maximum Frame Size	≥ 64	(M)
Data Link Connection (DLC) Type of frame during channel operation	UIH	(M)
Convergence layer [1 - 4], default: 1	1 & 2	(M)
Priority [0 - 63]	ETCS shall always be operated having the highest priority	(M)

For those parameters not appearing in table 11, the defaults settings defined in ETSI TS 127 010 [5] shall apply.

Implementation

Mandatory for EDOR.

7 AT Commands for eREC, VGCS and VBS Services

7.1 AT+CGIPC - Group Id prefixes capability

Description and Operation

ETSI TS 127 007 [8], clause 11.1.11 shall apply.

For operation on Railways the MT shall be able to manage to Group Id prefixes.

Implementation

Mandatory for all except EDOR.

7.2 Request and termination of VGCS or VBS service: 'D' and 'H '

Description and Operation

ETSI TS 127 007 [1], clauses 11.2.1 and 11.2.2 shall apply.

NOTE: For the MT an eREC is considered as a group call with a priority level equal to 0. For the definition of the priority refer to EIRENE SRS chapter 10.2 [i.2].

Implementation

Mandatory for all except EDOR.

7.3 AT+CSCB - Select Cell Broadcast Message Indication

Description and Operation

If the command is implemented, ETSI TS 127 005 [6], clause 3.3.4 shall apply.

Implementation

Optional.

7.4 AT+CNMI - New short Message Indication

Description and Operation

If the command is implemented, ETSI TS 127 005 [6], clause 3.4.1 shall apply.

Implementation

Optional.

7.5 eMLPP subscriptions: +CPPS

Description and Operation

If the implementation is mandatory, clause 7.23 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory if eMLPP is implemented.

7.6 Fast call setup conditions: +CFCS

Description and Operation

If the implementation is mandatory, clause 7.24 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory if eMLPP is implemented.

7.7 Automatic answer for eMLPP Service: +CAAP

Description and Operation

If the implementation is mandatory, clause 7.25 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory if eMLPP is implemented.

7.8 AT+CGCS - VGCS subscriptions and GId status

Description and Operation

If the implementation is mandatory, clause 11.3.1 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.9 AT+CBCS - VBS subscriptions and GId status

Description and Operation

If the implementation is mandatory, clause 11.3.2 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.10 AT+CAJOIN - Accept an incoming VGCS or VBS Call

Description and Operation

If the implementation is mandatory, clause 11.1.1 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.11 AT+ CAREJ - Reject an incoming VGCS or VBS Call

Description and Operation

If the implementation is mandatory, clause 11.1.2 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.12 AT+ CAHLD - Leave an ongoing VGCS or VBS Call

Description and Operation

If the implementation is mandatory, clause 11.1.3 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.13 AT+ CAPTT - Talker Access for VGCS

Description and Operation

If the implementation is mandatory, clause 11.1.4 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.14 AT+ CAULEV - VGCS Uplink Status Presentation

Description and Operation

If the implementation is mandatory, clause 11.1.5 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.15 AT+ CALCC - List current VGCS and VBS Calls

Description and Operation

If the implementation is mandatory, clause 11.1.6 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.16 AT+ CACSP - VGCS or VBS Call State Attribute Presentation

Description and Operation

If the implementation is mandatory, clause 11.1.7 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.17 AT+ CANCHEV - NCH Support Indication

Description and Operation

If the implementation is mandatory, clause 11.1.8 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

7.18 AT+ COTDI - Originator to Dispatcher Information

Description and Operation

If the implementation is mandatory, clause 11.1.9 of ETSI TS 127 007 [1] shall apply.

Implementation

Mandatory for voice operation.

History

Document history		
V1.1.1	November 2016	Publication
V1.2.1	June 2021	Publication