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


[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)".


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:

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

4.1 AT command syntax

4.1.1 Alphabet


4.1.2 Command Lines


4.1.3 Basic Syntax Commands


4.1.4 Extended Syntax Commands


4.1.5 Issuing Commands


4.1.6 Executing Commands


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 times the escape character defined 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


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


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


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


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


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


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


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


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

**Description and Operation**
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**
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**
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>
<thead>
<tr>
<th>Type of Result Code</th>
<th>Result Code [Response]</th>
<th>Defined Values</th>
<th>Applicable to CS-Mode/PS-Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>final</td>
<td>OK</td>
<td>---</td>
<td>CS/PS</td>
<td>acknowledges the execution of a command</td>
</tr>
<tr>
<td>unsolicited</td>
<td>RING</td>
<td>---</td>
<td>CS</td>
<td>(if AT+CRC=0) the MT has detected an incoming call signal from the network</td>
</tr>
<tr>
<td>Type of Result Code</td>
<td>Result Code [Response]</td>
<td>Defined Values</td>
<td>Applicable to CS-Mode/PS-Mode</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------</td>
<td>----------------</td>
<td>-----------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CRING: ASYNC</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 6.11</td>
<td>CS</td>
<td>(if AT+CRC=1) the MT has detected an incoming call from the network → asynchronous transparent</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CCWA: &lt;number&gt;,&lt;type&gt;,&lt;class&gt; [,&lt;alpha&gt;,&lt;CLI validity]=[,&lt;subaddr&gt;,&lt;satype&gt;],[,&lt;priority&gt;]]</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 7.12</td>
<td>CS</td>
<td>(if AT+CCWA=1) Call waiting information to the TE</td>
</tr>
<tr>
<td>intermediate</td>
<td>CONNECT &lt;data rate&gt;</td>
<td>&lt;data rate&gt;: 1 200 2 400 4 800 9 600</td>
<td>CS/PS</td>
<td>the connection has been established; the MT is moving from command state to online data state</td>
</tr>
<tr>
<td>final</td>
<td>NO CARRIER</td>
<td>---</td>
<td>CS/PS</td>
<td>The connection has been terminated The call setup failed before the alerting phase</td>
</tr>
<tr>
<td>final</td>
<td>NO ANSWER</td>
<td>---</td>
<td>CS</td>
<td>The called party did not answer the call: the connection completion has time-out</td>
</tr>
<tr>
<td>final</td>
<td>BUSY</td>
<td>---</td>
<td>CS</td>
<td>---</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CLIP: &lt;number&gt;,&lt;type&gt;,[&lt;subaddr&gt;,&lt;satype&gt;]</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 7.6</td>
<td>CS</td>
<td>(if AT+CLIP=1) calling line identification presentation</td>
</tr>
<tr>
<td>intermediate/unsolicited</td>
<td>+COLP: &lt;number&gt;,&lt;type&gt;,[&lt;subaddr&gt;,&lt;satype&gt;]</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 7.8</td>
<td>CS</td>
<td>(if AT+COLP=1) connected line identification presentation</td>
</tr>
<tr>
<td>final</td>
<td>ERROR</td>
<td>---</td>
<td>CS/PS</td>
<td>The AT command was not accepted</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CME ERROR: &lt;err&gt;</td>
<td>---</td>
<td>CS/PS</td>
<td>---</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CREG: &lt;stat&gt;</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 7.2</td>
<td>CS</td>
<td>(if AT+CREG=1) Change in the MT’s network registration status</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CREG: &lt;stat&gt;[,&lt;lac&gt;,&lt;ci&gt;]</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 7.2</td>
<td>CS</td>
<td>(if AT+CREG=2) Change in the MT’s network registration status</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CGREG: &lt;stat&gt;</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 10.1.19</td>
<td>PS</td>
<td>(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.</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CGREG: &lt;stat&gt;[,&lt;lac&gt;,&lt;ci&gt;]</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 10.1.19</td>
<td>PS</td>
<td>(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.</td>
</tr>
<tr>
<td>Type of Result Code</td>
<td>Result Code [Response]</td>
<td>Defined Values</td>
<td>Applicable to CS-Mode/ PS-Mode</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>unsolicited</td>
<td>+CGEV: REJECT &lt;PDP_type&gt;, &lt;PDP_addr&gt;, [ci]</td>
<td>Values are defined in ETSI TS 127 007 [1], clause 10.1.18</td>
<td>PS</td>
<td>(if AT+CGREP=1 or AT+CGREP=2) MT sends result codes to the DTE in case of certain events occurring in the GPRS MT or the network.</td>
</tr>
<tr>
<td></td>
<td>+CGEV: NW REACT &lt;PDP_type&gt;, &lt;PDP_addr&gt;, [ci]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+CGEV: NW DEACT &lt;PDP_type&gt;, &lt;PDP_addr&gt;, [ci]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+CGEV: ME DEACT &lt;PDP_type&gt;, &lt;PDP_addr&gt;, [ci]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+CGEV: NW DETACH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+CGEV: ME DETACH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+CGEV: NW CLASS &lt;class&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+CGEV: ME CLASS &lt;class&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>final</td>
<td>CONNECT ERROR</td>
<td>--</td>
<td>PS</td>
<td>The execution command AT+CGDATA=[&lt;LP2&gt;.....] 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.</td>
</tr>
</tbody>
</table>

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


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


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

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>D [&lt;dial_string&gt;]</td>
<td>CONNECT &lt;data rate&gt;</td>
</tr>
<tr>
<td></td>
<td>NO CARRIER</td>
</tr>
<tr>
<td></td>
<td>ERROR</td>
</tr>
<tr>
<td></td>
<td>BUSY</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Data rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 400</td>
</tr>
<tr>
<td>4 800</td>
</tr>
<tr>
<td>9 600</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>&lt;SC&gt;</th>
<th>Priority level</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>No priority</td>
</tr>
<tr>
<td>750</td>
<td>Priority 0</td>
</tr>
<tr>
<td>751</td>
<td>Priority 1</td>
</tr>
<tr>
<td>752</td>
<td>Priority 2</td>
</tr>
<tr>
<td>753</td>
<td>Priority 3</td>
</tr>
<tr>
<td>754</td>
<td>Priority 4</td>
</tr>
</tbody>
</table>

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


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>
<thead>
<tr>
<th>Command</th>
<th>Possible Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>+CBST=+[&lt;speed&gt;],[&lt;name&gt;],[&lt;ce&gt;]]</td>
<td>OK or ERROR</td>
</tr>
<tr>
<td>+CBST?</td>
<td>+CBST: +&lt;speed&gt;,+[&lt;name&gt;],[&lt;ce&gt;]</td>
</tr>
<tr>
<td>+CBST=?</td>
<td>+CBST: (list of supported values)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>&lt;speed&gt;</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td>2400 bps (V.110)</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>4800 bps (V.110)</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>9600 bps (V.110)</td>
<td></td>
</tr>
</tbody>
</table>
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.
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

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 EFGsmrPLMN 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>
<thead>
<tr>
<th>Command</th>
<th>Possible Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>+CPAS</td>
<td>+CPAS: &lt;pas&gt;</td>
</tr>
<tr>
<td></td>
<td>+CME ERROR: &lt;err&gt;</td>
</tr>
<tr>
<td>+CPAS=?</td>
<td>+CPAS: [list of supported &lt;pas&gt;s]</td>
</tr>
<tr>
<td></td>
<td>+CME ERROR: &lt;err&gt;</td>
</tr>
</tbody>
</table>

**Table 5: +CPAS parameter command syntax**

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

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 [1.1].

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

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible Response(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+CGATT= [&lt;state&gt;]</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>ERROR</td>
</tr>
<tr>
<td>+CGATT?</td>
<td>+CGATT: &lt;state&gt;</td>
</tr>
<tr>
<td>+CGATT=?</td>
<td>+CGATT: (list of supported &lt;state&gt;)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible Response(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+RCGATT= [&lt;mode&gt;]</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>ERROR</td>
</tr>
<tr>
<td>+RCGATT?</td>
<td>+RCGATT: &lt;mode&gt;</td>
</tr>
<tr>
<td>+RCGATT=?</td>
<td>+RCGATT: (list of supported &lt;modes&gt;)</td>
</tr>
</tbody>
</table>

<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

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible Response(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+CGCMOD=[&lt;cid&gt;[,&lt;cid&gt;[,...]]]</td>
<td>+CME ERROR: &lt;err&gt;</td>
</tr>
<tr>
<td>+CGCMOD=?</td>
<td>+CGCMOD: (list of &lt;cid&gt;s associated with active contexts)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible response(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+CGREG=[&lt;n&gt;]</td>
<td></td>
</tr>
<tr>
<td>+CGREG?</td>
<td>+CG REG: &lt;n&gt;,&lt;stat&gt;,[&lt;lac&gt;,&lt;ci&gt;]</td>
</tr>
<tr>
<td></td>
<td>+CME ERROR: &lt;err&gt;</td>
</tr>
<tr>
<td>+CGREG=?</td>
<td>+CGREG: (list of supported &lt;n&gt;s)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible response(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+CMUX=&lt;transparency&gt;[,&lt;subset&gt;[,[&lt;port_speed&gt;[,[&lt;N1&gt;[,[&lt;T1&gt;[,[&lt;N2&gt;[,[&lt;T2&gt;[,[&lt;T3&gt;[,[&lt;k&gt;]]]]]]]]]]]]]]]&gt;</td>
<td>+CME ERROR: &lt;err&gt;</td>
</tr>
<tr>
<td>+CMUX?</td>
<td>+CMUX: &lt;transparency&gt;,&lt;subset&gt;,&lt;port_speed&gt;,&lt;N1&gt;,&lt;T1&gt;,&lt;N2&gt;,&lt;T2&gt;,&lt;T3&gt;,&lt;k&gt; +CME ERROR: &lt;err&gt;</td>
</tr>
<tr>
<td>+CMUX=?</td>
<td>+CMUX: (list of supported &lt;transparency&gt;s),(list of supported &lt;subset&gt;s),(list of supported &lt;port_speed&gt;s),(list of supported &lt;N1&gt;s),(list of supported &lt;T1&gt;s),(list of supported &lt;N2&gt;s),(list of supported &lt;T2&gt;s),(list of supported &lt;T3&gt;s),(list of supported &lt;k&gt;s)</td>
</tr>
</tbody>
</table>

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

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

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

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